EARNINGS, EDUCATION AND SEGMENTED LABOUR MARKETS IN BRAZIL:

A Comparison Between Recife and São Paulo

TARCISIO PATRICIO DE ARAUJO

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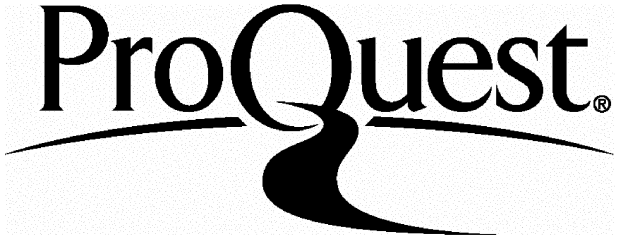
Department of Economics, University College London
University of London



To my parents, my wife and my children

ABSTRACT

EARNINGS, EDUCATION AND SEGMENTED LABOUR MARKETS IN BRAZIL. A Comparison Between Recife and Sao Paulo

Formal-informal earnings differentials in urban labour markets in Brazil tend to persist and the gap does not appear to be narrowing. This thesis, using individual-level primary data from cross-section surveys for 5 years between 1981 and 1989 and assigning contributors to social security to the formal sector (non-contributors to the informal), attempts to explain this phenomenon by examining sectoral differences in returns to education in two typical metropolitan areas.

By resorting to segmented labour market theories and to elements of the human capital model, the thesis establishes an analytical model tailored to the particular characteristics of urban labour markets in Brazil.

The formal-informal segmentation hypothesis is confirmed in both regions whilst no evidence of geographical segmentation is detected. Returns to education differ significantly according to occupational position (wage-employment & self-employment). Education is found to be a major influence on earnings inequality, on entry to the formal market and on the probability of being employed in the formal sector. Evidence of sex discrimination is also found.

Wage equations are first estimated by standard ordinary least squares, the analysis being further expanded to incorporate Heckman's selectivity-bias technique to correct for the unemployment and segmentation biases.

The thesis culminates by discussing policy issues, with focus on three general ideas: a) attempts to "abolish" the informal labour market by enforcing the law more strictly, that is, via a thorough elimination of illegal job contracts; b) efforts to improve the access to primary labour markets; and c) educational policies with redistributive goals. Gini coefficients based on simulated earnings distributions are used to examine this latter issue and the main conclusion is that there is room for making education play a limited, but important, redistributive role in a broader context of better use of public resources in Brazil.

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London, February 6th, 1994

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CHAPTER I. INTRODUCTION

The influence of education on earnings inequality has been at the core of an intense debate on income distribution in Brazil since the sixties. The relevant literature comprises a vast, variegated array of important theoretical and empirical contributions.

This thesis, by utilising segmented labour market theories and elements of the human capital model, sets out to offer a contribution on the specific theme of formal-informal earnings differentials.

In Brazilian urban labour markets, such differentials tend to persist and the gap does not appear to be narrowing. The empirical analysis seeks to document and explain this phenomenon by examining rates of return to education in the formal and informal sectors of two typical Brazilian metropolitan areas - Recife (in the North-East) and Sao Paulo (in the South-East), based on individual-level primary data from cross-section surveys for 5 years between 1981 and 1989. These data are available on magnetic tapes produced by IPEA (National Institute of Economic Applied Research) and FIBGE (Brazilian Foundation of Geography and Statistics).

The general contribution of this study is two-fold. Firstly, by working with primary data on individuals, we are able to analyse in detail otherwise impossible the formal-informal distinction in two important metropolitan labour markets. Our general concern is to investigate the earnings-education relationship, focusing on: i) regional differences;

ii) distinctions by occupational position (wage-employment and self-employment) and iii) gender differences. We thus expect to add to recent contributions by Brazilian economists, especially those at IPEA, who in the last five years have been renewing the debate on education and personal income distribution in Brazil.

Secondly, we hope to make a contribution by utilising quantitative methods in the analysis of informal labour markets in Brazil; the vast bulk of the existing, in-depth informal sector studies tend to be predominantly descriptive, making little use of modern statistical and econometric methods.

The theoretical component of the thesis is, for the most part, developed in the first two of the following Chapters. Chapter II is concerned with a survey of segmented labour market theories and the human capital model, within the natural boundaries defined by our goals. The basic motivation of the discussion is to pick out the essential elements related to our topic of study.

Chapter III lays the foundations of the analytical framework. The main general theoretic assumptions are identified and the analytical model is tailored to the particular characteristics of urban labour markets in Brazil.

The empirical background to the analysis is laid out in Chapter IV, which describes the data sources, comments on previous findings from studies on urban labour markets in Brazil, discusses the formal-informal split criteria and examines selected differing aspects concerning the two

metropolitan areas.

Chapter V is dedicated to: i) the specification of the earnings function - first as a basic Mincerian model, which is later expanded to include other variables; ii) the regression analysis; and iii) the breakdown of the earnings differential by use of Blinder's technique. The whole empirical analysis is based on standard ordinary least squares estimations on a sample of occupied male employees.

Chapter VI goes beyond the limits of the previous chapter. Firstly, it extends standard OLS estimations to the cases of female employees and male self-employed. Secondly, it brings to the stage the discussion of possible selectivity bias, due to unemployment and/or labour market segmentation. Two different procedures, using Heckman's technique, are applied to estimate wage equations corrected for the segmentation and unemployment biases. The selectivity bias investigation is restricted to the case of male employees. The analysis allows for the treatment of education both as a continuous and as a categorical variable.

Finally, Chapter VII sets out the conclusions. It suggests, firstly, a theoretical synthesis which draws on the discussion conducted in Chapters II and III and incorporates the broad findings of the empirical analysis. Secondly, it consolidates the specific results - discussing their theoretic implications. The chapter ends by analysing some selected policy issues and by recommending topics for future research.

CHAPTER II. A DISCUSSION ON SLM STUDIES AND THE HUMAN CAPITAL THEORY

1. Introduction

This chapter sets out to establish the general theoretic background to the analysis conducted in this thesis. This survey will seek to relate the discussion of SLM studies and other theories to empirical issues - in particular those related to our topic of study.

The reason for considering SLM studies as the main theoretical source is the belief that the challenges posed by the Brazilian reality - regional inequalities and deep social differences - demand an approach which : a) recognises the heterogeneity of labour markets in a wider sense than the neoclassical approach does; b) has as basic motif a strong policy concern with inequalities.

2. Purposes and limits of the chapter

To draw up a survey of a topic such as segmentation of labour markets at its present stage is not an easy task. After more than twenty years of intensive debate, important controversial points remain unsolved. Furthermore, as is recognised by several authors we are not dealing with a paradigm in the sense of a complete, singular and rigorously defined theoretical approach. In fact, a distinctive feature of the studies which fall under the label of "segmentation theory" is their **plurality** and heterogeneity. That explains the use made here of the term 'segmented labour markets' (hereafter SLM) **studies** or **theories**. So, it is necessary

initially to establish the limits of this chapter.

The intention is not to conduct a comprehensive review of the whole debate. There is little value in further discussing the extensive debate which followed the emergence of the so-called theories of segmented labour markets in the late sixties. The strong neoclassical criticism of these theories put forward by CAIN (1976) and the sympathetic view held by GORDON (1972), amongst several others, illustrate the debate.

The present survey is then built up on a three-fold frame of reference:

i) although the roots of the classic SLM studies are based on the reality of **developed** capitalist economies, this review will focus mainly on **developing** capitalist economies This does not constitute a major difference since segmentation is now recognised as a more universal phenomenon than before;

ii) the aim of the discussion is to obtain insights into the more specific issue involving education and earnings, although obviously other important questions are also discussed;

iii) elements of the human capital theory will constitute one pillar of this survey, though a comprehensive review of this theory is beyond the scope of the chapter.

Section 3 of this chapter presents an overview, where some key general questions are anticipated. Section 4 examines contributions of SLM studies relating to inequalities in the labour market. Segmentation as it has been primarily understood in studies on less developed economies (informal sector studies) is also examined. Section 5 is concerned with

the issue of human capital and its place in the debate as a whole. Finally, section 6 addresses some concluding remarks - comprising general theoretical points and empirical issues[1].

3. An overview

The studies under the SLM or informal sector labels carried out since the early seventies have had at least two basic stimuli. First, theorists were not satisfied with the way orthodox (neoclassical) theory explains the functioning of the labour market [McNABB and RYAN (1990, p 151)]. Secondly, and in fact a corollary of the former, it was considered that conventional analytical tools cannot provide satisfactory explanations for the persistence of poverty and inequalities both in developed and developing countries. Hypotheses of temporary disequilibrium of a system which **tends** to equilibrium could not theoretically cope with the dimension and continuous character of these problems, particularly in developing economies. Moreover, up to what point could inequalities be understood as reflecting the variegated quality of the workforce (hence, differences in the marginal product of labour)? Could it not be that the labour market itself functions to reinforce or to sanction such inequalities? It should be noted that we are deliberately concentrating on challenges relating to labour market issues and putting aside, for example, macro challenges such as that posed by "stagflation" to the macroeconomic Phillips-curve in

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[1] A tentative theoretical synthesis will be drawn in the chapter of conclusions.

its original version (FINE, 1987, p. 46).

During the eighties, the re-emergence of poverty in countries such as the USA [BLUESTONE and HARRISON (1988)] and the United Kingdom[2] and the eloquent failure of societies which have tried to replace the market with planning have emphasised the continued relevance of these still open questions.

Indeed, even taking the most successful case of capitalism and free market - the USA - it is hard to characterise the labour market in terms of a pure neoclassical model, that is, accepting in full its main assumptions of maximisation of benefits or satisfaction by individuals and minimisation of costs (maximisation of profits) by competitive firms, and perfect mobility of labour. But other competing approaches (GORDON, 1972) have not yet provided a complete alternative to orthodox theory. It seems reality and history have steadily driven us into a world where some eclecticism is unavoidable. However, this should not mean an uncommitted approach. Specific findings by different paradigms can be considered valid but evidently some assumptions have to be made concerning the approach one adopts.

It could be argued that theorists are paying the price of rethinking a world where: i) the theoretical framework of a fully planned economy is now completely fragmented by the collapse of the socialist economies of Eastern Europe; and conversely ii) capitalism has not solved the basic problems of

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[2] For an updated picture of poverty in Britain, see OPPENHEIM (1993).

poverty and inequality, despite all technological advances of the productive system and the high pattern of consumption developed during the last two hundred years. Furthermore, poverty and human misery all over the world (Latin America, Africa) have not been reduced by economic growth.

Although these introductory paragraphs suggest a wide range of subjects - certainly economics alone cannot explain such complex realities - this essay will necessarily be carried out within the limits of labour economics. However, this broader background should necessarily be taken into account as a way of keeping in touch with issues which, in one way or another, have to be referred to in a study which: i) has a clear empirical basis; ii) resorts to an approach - SLM studies - which does not exist as a solid paradigm recognised as such; and iii) aims at policy propositions as an outcome.

4. Segmented Labour Market Theories

4.1 Historical roots

4.1.1 SLM studies

Like several other debates in economics the one about SLM theories has its roots in the far past, particularly in the nineteenth century. Once again it is realised that classical authors anticipated the essence of the problem. In the case under discussion that anticipation could be considered natural, as the relevant issue - poverty and inequality coupled with remarkable progress - emerged from the economic system, capitalism, which would bring about the most outstanding development of economic productive forces ever

seen in history. Today one could say that this system seems to have set in for still many years to come, and inequality remains as the key question although the problem obviously has not the same configuration as that of two hundred years ago.

Authors who belong to different schools of thought [e.g. CAIN (1976), TAUBMAN and WACHTER (1986), FINE (1987), McNABB and RYAN (1990)] usually identify the origins of SLM theories in John Stuart Mill (**Principles of Political Economy**, 1848), the American institutionalists of the 1940's and 1950's and in Karl Marx (**Capital**, 1867), the latter for the "radical" version of segmented labour markets.

CAIN (1976) goes further and also spots, amongst SLM studies, elements of Keynesianism - through the neoinstitutionalists [CAIN (1976, p. 1228)], despite the essential microeconomic nature of SLM literature. Such elements have to do with the **instability** of capitalism and the **trend to a high level of unemployment**, which is partly explained by the rigidity of wages and other prices - contrary to the flexibility and tendency to equilibrium which underlies the neoclassical approach to labour markets. He also sees, residing in the SLM literature, elements of the "structuralism" of the late sixties and seventies fuelled by world economy slumps. Here, the challenge is posed by instability and inequality to "free market" and "conventional macro policies".

The idea of "non-competing groups" in urban labour markets, postulated by John Stuart Mill, meant clusters of labour markets where the supply and demand mechanism for

establishing prices [SMITH (1937)] would not work properly as was the case in the "competitive" nineteen century's agricultural labour markets. The discussion had as central motive the guild and local laws and customs, considered by Adam Smith as "restrictive practices" affecting the free market (CAIN, 1976, p. 1225; TAUBMAN and WACHTER, 1986, p. 1187). "Within these [non-competing] groups, wage levels and the allocation of labor were determined by the institutional rules and customs of the day" (TAUBMAN and WACHTER, 1986, p. 1187). Mill's criticism addressed to Adam Smith's competitive view is now considered the legitimate predecessor of SLM proposition which distinguishes segmented markets with scarce mobility of labour between segments, and markets with their own institutional rules for allocation of labour and determination of wages (internal labour markets).

The Marxist elements which allegedly are in the historical roots of SLM studies are less clear if taken as specific hints for the present understanding of segmentation of labour markets. In fact, phrases and statements are selected from Marx's writings (e. g. "the aristocracy of the working-class", CATEPHORES, 1981, p. 274) in the search to show that Marx would have anticipated the question of heterogeneous labour in the terms understood nowadays. So far as we can see, this is not obvious at all. Of course some parallel can be drawn with regard to the debate on "recreation" of ancient production relations within capitalism. But even here much time was spent in a rather intensive debate during the sixties and seventies, mainly

fuelled by the French Marxist tradition, and the result was not so profitable. It seems that the ample and rich contribution of Marx gives opportunity for many similar deductions, weakened by the ambiguities of a prolific author. Even the reduction of skilled to unskilled labour, the former as a simple multiple of the latter - taken for granted as theoretically satisfactory by CATEPHORES (1981, p.273) and McKENNA (1981), for example - has not been considered free from some imprecision by others (ELSTER, 1987, p. 130, quoting ROWTHORN, 1984, "Skilled Labour in the Marxist System"). It is worth noting, furthermore, that this discussion gives some insights into the issue of human capital as is (incidentally?) shown by ELSTER's reappraisal of Marx's contribution: "Rather he [Marx] argued that skilled labour be conceived as unskilled labour plus an amount of invisible or human capital, that is skill, which is produced in much the same way as any other commodity" (ELSTER, 1987, p. 129 and pp. 129-131). So, at least according to a Marxist reader of Marx, the so much criticised idea of human capital as something measurable as an investment has historical roots in the works of Marx as well as in Adam Smith even though Marx did not use the term or explore its implications as they are understood nowadays.

Although, as has been said, there is no clear specific conceptual heritage from Marx for the purposes of segmented labour markets or heterogeneous labour, Marx's analytical assumptions were adopted by the authors who have built up the "radical view" of segmentation. These assumptions are the same Marx used for his profound criticism and macro diagnosis of

capitalism.

4.1.2 Informal Sector Studies

A result of the discussion on the functioning of labour markets in developing countries is the formulation of the concept of "informal sector", brought about in the early seventies. The historical roots of the concept can be established as follows: in its more remote form the informal sector approach has its origins in the sociological concept of "marginalidad social" developed in the second half of the sixties by Latin-American sociologists[3].

The concept of "marginalidad" describes the bulk of poor people "excluded" from the benefits of economic growth, particularly those who live in the urban slums (**favelas**). That phenomenon would be an intrinsic characteristic of the Third World's **dependent** capitalism. It was an inheritance from the "structuralism" formulated by CEPAL[4] during the fifties, which constituted one of the intellectual contributions of the so-called "pensamento cepalino" (CEPAL thought), mainly circumscribed by the academic limits of Latin America and having the Latin American economy and society as principal object of analysis[5].

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[3] NUN (1969) is one of the main creators of the idea.

[4] CEPAL stands for Comission Economica para America Latina.

[5] That debate is now of mainly historical interest and is briefly mentioned here for purposes of establishing the roots of some concepts. The core of the discussion came out in the works of CARDOSO (1971), KOWARICK (1977), NUN (1969), and Anibal QUIJANO ("Redefinicion de la dependencia y proceso de marginalizacion en America Latina", 1970; "Polo marginal de la

According to NUN (1969), the "marginalidad" would not perform, in the monopoly capitalism, the role of "reserve army of labour" as would have been the case in "competitive" capitalism. That "marginalidad" would be a dead weight in terms of labour reserve for the capital and would represent an amount of "surplus population" beyond the needs of monopoly capitalism. The two main assumptions of NUN's analytical approach were: a) there would be an excess of "surplus population" economically, socially and culturally excluded from the benefits of development; b) the industrial structure was split into a competitive sector (small and medium enterprises) and a monopoly sector. The role of labour reserve was to be performed by the unemployed for the competitive sector. Monopoly firms would try to search for stability of the workforce through better wages, complete fulfilment of legal requirements of legislation and agreements with workers' unions. These assumptions were wrapped in an analysis of industrialization and urbanization during post-1945 capitalist development in "dependent" economies (Latin America, basically).

The dualist approach by NUN was thus quite similar to the one which was then being developed by internal labour market theorists for developed capitalism. But, as far as this study is concerned, no claim of intellectual influence was made and the controversy about NUN's formulation was limited to the Latin America academic environment.

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economia y mano de obra marginalizada", 1971). About the "theory of dependence" a work by F. H. CARDOSO and E. FALLETO is available in English [CARDOSO & FALLETO (1979)].

It can be said that almost as soon as the "marginalidad" debate started losing vitality, the "informal sector" controversy began to emerge from the publishing of **Employment, Incomes and Equality** by ILO (International Labour Office) in 1972 (ILO, 1972). The basic motif continued to be the enormous poverty in the Third World. An ambitious concept of a new pattern of development, based on small business, was about to be launched, with important repercussions. The more systematic formulation of the concept is established in that work, as will be seen in the next section. For the first time, the catch-phrase, "informal sector", was being used for a wide audience all over the developing world.

4.2 Analytical framework

4.2.1 SLM theories

A distinct feature which can be discerned in several essays on SLM literature - some critical, some sympathetic - is its essentially fragmented and plural nature, and the importance given to empirical assumptions and to policy matters. Here we shall try to establish a classification of the various groups of authors/works according to our reading of the principal studies which have built up the SLM approach and of some critical reviews carried out from either a neoclassic or a Marxist point of view.

The main branches of SLM studies - those based on the reality of developed capitalism - can be associated with the classical works of DOERINGER and PIORE (1985) and EDWARDS,

REICH and GORDON (1973)[6]. Three formulations of segmented labour markets can be seen in these works: a) internal labour markets (versus external labour markets), b) dual labour markets (primary and secondary markets) and c) radical theory of segmented labour markets.

The first two groups can be understood as synonymous, and in general they are, although DP (1985) is mainly dedicated to the formulation of "internal labour markets" ("external market" playing a secondary role in the analysis), and only in the final pages is the primary/secondary distinction referred to, based on a contribution made elsewhere by PIORE ["On-the-Job Training in a Dual Labor Market", quoted in DP (1985, p. 165)]. In fact, there is some degree of imprecision in the explanation of these concepts.

The key concept is established as follows, at the beginning of Chapter 1 [DP (1985, pp. 1-2), emphasis given by the authors]:

> The central concept around which this volume is organized is that of **internal labor market**, an administrative unit, such as manufacturing plant, within which the pricing and allocation of labor is governed by a set of administrative rules and procedures.

That concept should be distinguished from the "**external labor market** of conventional economic theory where pricing, allocating, and training decisions are controlled directly by economic variables" [DP (1985, p. 2), emphasis as in the

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[6] As is well known, DOERINGER & PIORE's original classic work is dated 1971. Here we follow the 1985 edition, which contains a "second look" new introduction.

original][7].

DP (1985) also divides the concept into two main types of internal labour markets: "enterprise" and "craft". The former comprises almost everything (workers employed in enterprises established in military services, public sector and private sector - urban activities). The latter is reserved for the workforce of craft unions, supposedly with characteristics of the internal labour market due mainly to skill and customs, "craft traditions". The remainder of the labour market is classified as competitive ("unstructured") markets, comprising casual jobs, farm labourers, self-employed and the like.

Further, in Chapter 3, they estimate that about 80% of the American labour force in 1965 was working in internal labour markets, an ample universe which included military services and public sector.

Two comments on these initial extracts of DP(1985)'s formulation have to be made. First, the concept of the internal labour market is much wider and more ambitious than usually appears in current references[8]. The secondary labour market is understood to be just one-fifth of the whole workforce, although an important analytical position is given to that minor portion since "it is with such competitive

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[7] It is worth noting that DP (1985) recognises the origins of these concepts in John T. Dunlop' "Job Vacancy Measures and Economic Analysis" and Clark Kerr's concept of **balkanization** of labour markets, both authors quoted in a footnote [DP (1985, p. 2)].

[8] Indeed, the concept as understood at present could be applied to just a set of occupations or to a section or department of an industrial plant, for example, and not necessarily involving the establishment as a whole.

unstructured markets that the internal labour market should be contrasted" (p. 5). Secondly, DP (1985) establishes - though with no emphasis - two other synonyms for the same object: **structured** and **unstructured**, overlapping internal and external labour markets. These terms are, not accidentally, also applied elsewhere in the literature about the informal sector.

DP (1985)'s analytical basis for the concept of the internal labour market is not constructed solely upon the existence of administrative rules, but on the fact that these rules tend to be **rigid** and such rigidity is essential for price determination and the allocating process (p. 5). The technical fundamentals of the rigidity of the administrative rules are: investment in enterprise-specific human capital (specific-skill), on-the-job-training and labour as a fixed or quasi-fixed factor of production. In fact, the latter is an analytical result of the first two.

Maintaining that these factors have been historically developed from previous competitive markets, DP (1985) states that employees' interests (wages, security and job stability) and employers' concern (efficiency) tend to fuel the working of internal labour markets.

Lastly, the role of "custom" in DP's analysis should be stressed. Understood as "an unwritten set of rules based largely upon past practice" which "can govern any aspect of the work relationship from discipline to compensation" (p.23), custom can also play a contradictory role. Internal labour markets are, according to DP (1985), able to adapt to technological changes or product-demand alterations, even

though such adaptation could come ahead of efficiency requirements. Thus, custom could preserve the stability of the allocating structure (fuelling internal training and other accommodations) but might prevent adaptation "when economic or technological factors change radically and in unanticipated ways" (p. 63).

The concepts of primary and secondary markets are introduced at the end of the work, as object of "The Dual Labor Market Theory" and apparently with the status of another theoretical formulation. From there is extracted that passage so frequently quoted (p. 165, DP's emphasis):

> This theory argues that the labor market is divided into a **primary** and a **secondary** market. Jobs in the primary market possess several of the following characteristics: high wages, good working conditions, employment stability, chances of advancement, equity, and due process in the administration of work rules. Jobs in the secondary market, in contrast, tend to have low wages and fringe benefits, poor working conditions, high labor turnover, little chance of advancement, and often arbitrary and capricious supervision.

Further, DP (1985) - p. 167 - is somewhat imprecise when associating "primary market" with "internal market", in the context of an accommodation between dual theory and queue theory. "The primary sector consists of a series of internal markets of the kind upon which the analysis focuses. The process of entry into these 'primary' internal markets appears to operate like an employment queue".

On the other hand, even a formulation of a "secondary" internal labour market is established , in a section (p. 167-169) which is anything but clear. In fact, the empirical references used to illustrate this taxonomy fit in with the

currently accepted idea of subcontracting and of secondary jobs offered by big firms where cases of internal labour market may occur.

We shall turn now to the other main group within SLM theories. Keeping the dualist concept of a primary-high wage and a secondary-low wage labour market, radical theorists put stress on the concepts of social class and class conflicts. "Segmented work, divided workers" , the title of the latest more systematic contribution of radical theory (GORDON *et al*, 1982), is in fact a catch-phrase with strong political content which faithfully follows Marx's tradition. Divided workers mean less political solidarity among people from the social class which can jeopardise capitalist purposes to make profits. An (almost?) unstoppable tendency towards accumulation - which characterises capitalism - is translated into a distributive conflict that takes place in the labour market. Workers try to obtain higher wages, capitalists try to obtain higher productivity which can augment the "surplus product" (through the increase of non-paid labour). Dispute over the labour process can also occur. The Marxist labour theory of value plays a central role here, although this and other pillars of Marxian economics (e.g. class struggle) are not given an extreme interpretation by SLM and radical theorists, as already pointed out by CAIN (1976, p. 1226)[9].

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[9] It is not clear but this lack of emphasis on the labour theory of value by radical economics could be partially explained by the fact that this core of Marx's economic analysis has been under strong criticism from several Marxists themselves. Since Joan Robinson's statement about the **metaphysical** nature of Marx's labour theory in 1962 (ROBINSON, 1978, pp. 29-47) - when Marxists had not yet dared to face

It is beyond our purpose to discuss here all the hypotheses of the Marxist approach and their several controversial aspects. We consider that e.g. GORDON (1972, pp. 53-81) has given a comprehensive and now widely-known explanation of this approach which makes repetition unnecessary (furthermore, some aspects of this and the other paradigms will be the object of additional discussion in the final section). For now we are going to extract, from GORDON (1972), GORDON, EDWARDS and REICH (1983) and other works, contributions which we regard as pertinent to this discussion.

As already analysed by WACHTER (1974) and FINE (1987), SLM radical version differs from Doeringer and Piore's formulation in the explicit Marxist elements attached to it. The analytical content is, however, similar. Thus, we would not be oversimplifying by contending that along with the dichotomy primary/secondary, the set of studies under the labels of internal labour markets, dual theory and radical theory bear the following assumptions [DOERINGER and PIORE (1985); WACHTER (1974); GORDON (1972); CAIN (1976); GORDON, EDWARDS and REICH (1983)]:

a) internal labour markets do not work according to the profit-maximising imperative. Instead, administrative rules and customs tend to prevail in the allocating process and wage determination;

b) labour mobility between sectors is rather limited;

c) wage determination and allocating process in the

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openly this challenge - the picture has changed and now many of Marx's contributions are under profound critical reassessment. See, for example, ELSTER (1987).

secondary sector are different from those in the primary sector and, in general, tend to work according to competitive rules;

d) there is a "negative feedback" which tends to confine secondary workers to the secondary sector even if, initially, they are as productive as primary sector workers. This is due to the development of "bad" work habits by secondary workers (lateness, absenteeism, lack of discipline, etc.) which would prevent them from entering a primary market.

It should be said, however, that in summarising the set of assumptions above, we implicitly put aside temporarily internal differences among SLM-affiliated studies. For example, even a "Cambridge school of SLM" is distinguished by FINE (1987), with reference to the works of RUBERY and others [CRAIG *et al* (1982); RUBERY (1978)], because of their criticism of the "neglecting of the supply-side" by earlier SLM theories. Furthermore, some contradiction can be present. Just by way of example, it is hard to reconcile the assumption, at the macro-level, of the capitalist imperative to accumulate **and** the complete rejection of any profit-maximising rule at the microeconomic level.

The more technical SLM hypothesis, which is often brought about for empirical test in several concrete situations, is the one which states that segmentation cannot be explained by skill differentials. In other words, workers from both segments can bear equivalent skills. This assumption corresponds to the theoretical rejection of human capital theory for secondary workers. Since anticipation of turnover

by secondary employers leads them to a "loose" screening in hiring workers, and since on-the-job training is not a strong feature of secondary jobs, individual wages would depend more on structural characteristics than on personal characteristics. Furthermore, the virtual absence of promotion, coupled with the rarity of high wages, would lead to a flat age-earnings profile across groups of secondary workers. Consequently, human capital would be irrelevant to explain individual wages (WACHTER, 1974, p. 653). It is worth mentioning, however, that, if the hypothesis of negative feedback were interpreted in an extreme fashion, secondary workers would end up going into a progressive process of disqualification as potential primary workers - and that would mean no equivalence of skills between primary and secondary workers. Therefore, the ultimate result would be the absolute lack of labour mobility from the secondary towards the primary sector - an extreme hypothesis which did not have place even in earlier formulations of SLM theories.

4.2.2 The informal sector approach

The informal sector and SLM approaches have in common the fact that both constitute a dualist formulation and often resort to a descriptive analysis. Another similarity is their interdisciplinary nearness to sociology, anthropology and other academic subjects. However, the economic contents of informal sector studies is less conspicuous. In fact, when the debate involving informal sector contributions takes place (e.g. the role played by the informal sector in the cost of

reproduction of the urban labour force, or as "reserve army of labour", and relations of exploration or subordination to the formal sector) the tendency is for a mix of older debates relating to development theories and Marxist contributions.

The basic concept of "informal sector", established for a worldwide audience, is due to the already mentioned ILO's study on Kenya (ILO, 1972). However, as a catch-phrase the label is said to have been first utilised by Keith Hart, in 1971[10].

It is worth referring to the motives for the making of the ILO's report and the beliefs professed in it, by way of establishing its proper context.

ILO (1972) is the resultant work of a special mission sent to Kenya to study urban employment issues and to propose a set of policies towards the relief of unemployment problems in that country and elsewhere in the Third World. The dualist view then presented is extremely optimistic with regard to the informal sector potential to develop and has inspired, since then, many programmes and studies on informal sector and urban employment all over urban centres of Africa, Asia and Latin America. One could even argue that, despite the strong criticism that has been directed at the concept since then, several informal sector supporting programmes seem to be more alive than ever and now support informal activities even in a

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[10] In the essay "Informal Income Opportunities and Urban Employment in Ghana", later published in **Journal of Modern African Studies** (March 1973).

metropolis such as New York, USA[11].

With the basic concern of developing an operational concept which could be useful for drawing adequate policies, ILO (1972, p.6) established a concept centred on the characteristics of the firm. The informal sector was then defined as constituted of very small firms and bearing the following features: a) ease of entry; b) reliance on indigenous resources; c) family ownership of enterprises; d) small-scale operation; e) labour intensive and adapted technology; f) skills acquired outside the formal school system; g) unregulated and competitive markets. The formal sector was defined by exactly opposite traits.

The informal sector, far from being a marginal sector, is economically efficient and profit-making, despite its small-scale nature, simple technology and absence of linkages with the formal sector (ILO, 1972, p. 5). From this departure point ILO (1972) postulated that the removal of some constraints (particularly the hostile attitude of government) and the promotion of linkages with the formal sector would allow the informal sector to present an evolutionary growth[12].

This concept has been widely diffused for more than two decades and has influenced many studies, despite being

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[11] See, for example, "Banker to the Poor", TIME (May 27, 1991, p. 52), about the role of ACCION International in offering loans to informal business covering a geographical range which goes from Santo Domingo (Dominican Republic) to New York.

[12] See, especially, Chapter 13 of the Report ("The development of the informal sector") and Chapter 22 of the **Technical Papers** ("The relation between the formal and informal sectors").

frequently subject to a highly critical reappraisal.

Nowadays the consensus on the **heterogeneity** of the informal sector and the analytical stress put on the interrelationship between the two sectors lead to the reassessment of at least the following postulates[13]:

a) Ease of entry. Although not completely discarded, this assumption has been revised. Thus, there are certain segments or occupations in the informal sector in which certain skills are required from newcomers, for example, pottery, carpentry, metalwork; therefore, ease of entry might be limited in some cases. Attempts to attach to it some theoretical sophistication have been made by some by formulating the idea of the average income as an adjustment variable in the determination of the employment (and income) level in part of the informal sector (own-account occupations and activities with lower capital allotment); given the market limits and ease of entry, the workforce surplus would lead to the increase in employment up to the point in which the average income approximates the opportunity cost of labour (given by the subsistence level)[14];

b) Competitive markets. Nowadays it is recognised that the informal sector comprises different organizational forms of production which prevent one from treating the whole set of

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[13] For an up-dated survey of informal sector studies and the main conceptual questions involved see MATHUR and MOSER (1984), MOSER (1984), PORTES, CASTELLS and BENTON (1989), and TOKMAN (1987).

[14] This idea has been developed by PREALC studies (Programa del Empleo para America Latina y el Caribe). See e.g. TOKMAN (1981) and TOKMAN (1987).

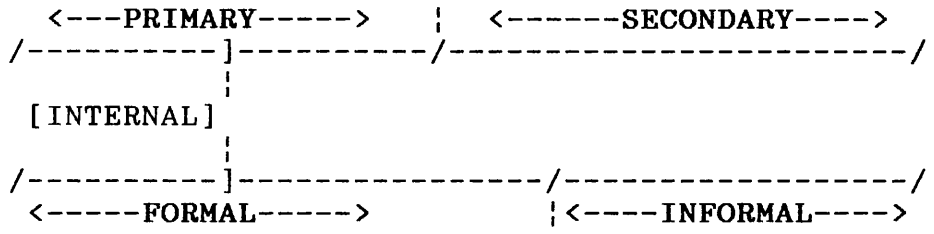
activities as homogeneous and competitive;

c) Skills acquired outside the formal school system. The supposed absence of linkages with the formal sector (ILO, 1972) is not sustainable and subcontract relations between the sectors are not rare. Furthermore, formal education reaches part of the poor population despite the usual inefficiencies of educational and training programmes in the Third World.

It should be noted that ILO (1972) realistically did not established a ceiling limit regarding the number of people *per* informal firm, although some limit is sought in other studies, perhaps 5 or even 10 people. The reality faced by empirical research is, however, one of an ever-changing situation, specially in certain branches of informal manufacturing, according to alterations in product demand. Occasionally, any rigid limit has to be relaxed.

A final word is addressed to the taxonomy brought out by the studies on segmentation. As already referred to, the original conception of internal labour market by DP (1985) is rather ambiguous. If such a concept were taken in its wide sense, the greater part of the modern capitalist economy would be comprised of internal labour markets. However, the specificity of the concept (administrative unit with strict internal institutional rules for pricing and allocating labour) means that it is not to be achieved by every formal firm. In reality, the internal labour market can occur inside a unit for some occupational groups only. The petrochemical

activity is an example of that[15]. It is in that sense that the concept has been predominantly considered (at least in the Brazilian case) and we present here a taxonomy which could be an appropriate synthesis :



5. Human capital: its place in the debate on segmented labour markets

5.1 Introduction

The immediate motive which gave rise to segmented labour market formulations was the picture of urban poverty and consequent riots and urban conflicts during the sixties. The black urban ghettos of USA inner cities were at the centre of those events [GORDON (1972, Preface)]. On the theoretical side, the need to challenge the human capital theory was the other immediate factor which stimulated the development of SLM theories[16]. This section thus conducts a critical review of the paradigm which stimulated the competing SLM approach. Empirical issues will be at the heart of the discussion.

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[15] ARAUJO (1983) makes an indirect investigation into this possibility in the case of the Northeastern Petrochemical Complex in Bahia, Brazil. For more precise evidence of internal labour markets in Brazil see MORLEY, BARBOSA and SOUZA (1979).

[16] FINE (1987, p. 11), who refers to Bennett Harrison's "Human Capital, Black Poverty and 'Radical' Economics" (**Industrial Relations**, vol. 10, no. 3, pp. 277-86) with regard to the links between the emergence of dual labour market theory and "the problems posed by black poverty and human capital theory".

5.2 The human capital approach

Education - the conspicuous example of human capital - is positively related to earnings via enhancement of the worker's productivity. That would augment the individual's potential gains to an extent that justifies the investment made today.

That is essentially the central idea brought about by the human capital approach more than three decades ago. Today it seems a simple and obvious formulation, given the profuse empirical evidence relating education to earnings increase - i.e. more educated individuals get higher pay, accordingly. However, what might be considered a "simple" idea in fact has provided economics with a powerful analytical tool which has attracted a vast array of empirical follow-ups as well as a wide range of criticism.

Human capital theory, based on some neoclassical assumptions [GORDON (1972)],

i) equivalence of worker's earnings and marginal productivity over the duration of job tenure,

ii) homogeneity of labour,

iii) free labour mobility,

implies a correspondence between the distribution of human capital across individuals and the earnings distribution. Based on the empirical evidence that associates higher wages with higher educational levels, human capital theorists argue that increases in the worker's stock of human capital always brings increases in wages, *ceteris paribus*.

It is assumed that human capital is the result of previous investment which relates income to education through

an internal rate of return. Wages today include the returns from investment in human capital in the past. Such investment involves not only formal education but also experience and on-the-job training. The underlying basis for this argument is that individuals make decisions (when to leave school and enter the labour market, whether to change jobs, go for a job training programme, etc.) on the basis of their expectations concerning future gains. Direct costs of education (to refer to the most noticeable) and forgone earnings are considered the main investment costs related to accumulation of human capital. It is worth mentioning, for the sake of clarity, that this definition of the value of one's human capital understood as the present value of one's future labour earnings requires two analytical distinctions (FALLON & VERRY, 1988, p. 137):

i) The one between "innate" human capital (correspondent to the individual's physical and mental strength and which is usually subsumed within the single notion of ability) and "acquired" human capital, the additional units of (human) capital steadily accumulated during the individual's productive life, as a result of deliberate investments in education, training, health;

ii) The difference between stock and value of human capital: the former is all investment made up to a certain point in time and the latter is the present value at that date of the expected future earnings yielded by one's enhanced capacity. Since the individual will eventually retire, that value decreases as the individual ages, given the diminishing number of remaining earnings flows - not to mention the

reduction in the value of the return itself after the individual's peak age.

The complexity of the approach is related to the sources of generation and enhancement of an individual's human capital stock. Schematically, there exist three main institutions in society which generate and enhance the economy's human capital stock (BECKER, 1975, p. 15). They are: the family, the school and the labour market.

The family provides individuals with several factors which give rise to their personal characteristics: inherited genetic factors (intelligence or learning ability, preference for arts or business, or mathematics, etc), an environment that stimulates (or not) intellectual curiosity, and family socio-economic background, among others that one could think of.

The school is a source of accumulation of what is the most prominent example of human capital - education. In this case, the national policy for education is the main macro-factor to determine the **quality** of formal education to be provided for society.

The labour market is the place where other important items of human capital are acquired and accumulated, e.g. experience, general and specific training, information. The point here is that also the quality of additional "units" of human capital acquired can depend on working conditions in specific labour markets.

Of course the above systematization is not comprehensive and one important item - health - has not been explicitly

mentioned. However, health and medical care have determinants in the family, in the labour market, in one's decisions and personal care and also in the same sphere with which education has strong links - government. At any rate, what is being pursued so far is just to identify the main sources of generation and accumulation of human capital in order to pave the way for further analysis. These sources then point to formal education and on-the-job training (general and specific) as the main types of investment in human capital.

5.3 Criticisms

5.3.1 General criticism

Given the nature of the human capital model, the bulk of criticism is concentrated on the empirical side and on policy implications. Apart from the general recognition by neoclassicals, dualists and radicals, of the evidence that education is associated with higher levels of income (GORDON, 1972, p. 117), the rest is an intensive debate.

SLM studies contend that the human capital approach cannot explain inequalities associated with secondary workers, who can hardly enter a primary market. There are sources of inequalities, linked to sectoral differences, which cannot be explained by differences in human capital. Furthermore, since the mobility of labour is not free as hypothesised in the competitive model, secondary workers tend to suffer the effects of a "negative feedback" which tends to wear out their skills. Inequalities associated with discrimination (against women, black people, and minorities) play a central role in

this respect, and are considered a real challenge to neoclassical formulations even by CAIN (1976), who made a solid defence of the neoclassical paradigm.

5.3.2 The screening hypothesis

The main criticism of the proposed relationship between education and productivity comes from the SLM hypothesis of education as a "screening device", in what is sometimes treated as the "credentialist" approach. This view, in its "pure" version, states that education does not enhance labour productivity. Instead, the level of schooling is a signal used by employers as a way of screening the more productive workers, or more specifically, identifying individuals that are and would have been more productive or abler than others, even if they had not reached a specific level of formal education (FALLON & VERRY, 1988, p. 147).

The debate involving these two extreme ideas - the pure human capital proposal that explains earnings via productivity augmented by education and the pure screening hypothesis, which reserves to education a mere signalling role in identifying the abler individuals - is bound to be endless, given that empirical tests of both hypotheses are not easily feasible.

There are however two strong arguments against a pure signalling view. First, the point considered by LAYARD and PSACHAROPOULOS (1974) and correctly recalled by CAIN (1976, p. 1245): education is too costly a business to serve just as a mere signalling device - that is, some important role in terms

of productivity has to be played: otherwise it would be incompatible with a minimum of economic rationality. The second argument arises when a distinction among occupational groups is made. Indeed, the employees usually are the group on which the great bulk of empirical research is based, and in that case there is a clear way for a dispute between the two views - again, if taken as extreme and opposed explanations. Whereas employees are supposedly screened by employers, who screens whom in the case of the self-employed and employers? How are the abler self-employed and employers identified and assigned to positions that yield higher earnings? In that case, the observed association between more educated and higher pay earners could be related to enhanced productivity, although other important factors could be in action here, e.g., differences amongst employers (or self-employed) concerning the previous stock of wealth or the value of the initial stock of capital. Would it not be sensible to admit that for these two occupational groups - whose individual positions bear much more personal freedom than in the case of an employee subjected to the rules and constraints of a productive process - the role of personal abilities is much more important? If taken so, education is expected to improve individual capacities such as initiative, mathematical ability, entrepreneurship, leadership, etc. and, therefore, augments productivity.

SPENCE (1981, p. 335) refers to the self-employed by arguing briefly that e.g. doctors, dentists and lawyers have to signal to customers. But the process here is much more

atomised and the process of "screening" (if any) would be much more difficult to effect. An employer has at his disposal an ample range of employees to screen and can easily devise systematic criteria for doing so. For a consumer, the decision to swap dentists or to choose another plumber is not so easily taken. Inertia and scarce information to judge and compare are key factors in action here, and changes tend to occur in extreme or accidental cases instead of in a systematic way. Perhaps it is more sensible to admit that screening and human capital are not so opposed and in fact both can be reconciled. No one could sensibly deny that some screening indeed must occur, e.g. in the public sector. But direct empirical confirmation is still lacking[17].

We now propose a reconciliatory approach and discuss the issue further, given its relevance to a central element of the investigation conducted in this thesis - estimation of rates of return to education as one way of looking at segmented labour markets.

Assuming that neither a pure signalling nor a pure productivity-based view can on its own describe reality fully and satisfactorily, in which situation can screening be thought of as a reasonable part of the explanation for positive rates of return to education? One possible answer can be drawn from a comparison between wage employment and self-

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[17] der GAAG & VIJVERBERG (1989), for example, examining determinants of wages in Côte d'Ivoire, have not found strong evidence in favour of a pure credentialist approach - after looking at the relative importance of years of schooling and diplomas obtained. We shall further (Chapter V) try to provide some (indirect) evidence of screening in the case of male employees.

employment.

Employers might have some reasons to use education as a screening device. First, they have imperfect information about the abilities and prospective productivity of job applicants. Second, looking at information about degrees and diplomas as well as at years of schooling would be the less costly way of getting the necessary knowledge about future employees. Third, it might be reasonable to expect that, on average, those who invest more in education are the more able workers. As a complement to these assumptions one could say that, knowing that employers use education to screen job applicants, employees themselves would invest in education in order to signal to employers[18].

On the other hand, the self-employed operate in an atomised market, under completely different production process and managerial arrangements, and it is hardly conceivable any process of screening could be conducted by those who demand their services. Furthermore, one can assume that self-employed workers know their own productivities and their decisions on investment will based on that. Also, as already suggested, those who go into self-employment may have particular talents and ability above average. Hence, they would not need to use schooling as a signal to buyers of their services; they would rather need to perform their task the better they could in

[18] It is also reasonable to expect that screening is not equally important in all sectors of the labour market; screening can be more important for some occupations. The general level of the discussion conducted here is, however, sufficient for our analytical purposes. A well-known approach to this issue in the literature on screening was put forward by RILEY (1979).

order to secure their share in the market - and that would basically depend on each individual's talent and ability, personal characteristics which can be enhanced by schooling. Higher earnings associated with higher levels of schooling of the self-employed might then be reasonably explained by the human capital hypothesis - putting aside for a moment the estimation problems involved.

The net result of this discussion is that, in the presence of educational screening, the average rate of return for employees would be greater than that of the self-employed[19]. It also follows from the above discussion that self-employed would be, on average, less educated than employees. We will examine whether this is the case when we undertake empirical analysis, by comparing returns to schooling associated with these two employment statuses. A further assumption will thus be necessary: individuals know their future employment status at the time they make the investment.

5.3.3 The radical emphasis on ideological issues

More ambitious is the criticism by radicals who relate education to the State and the role of the former in spreading the dominant ideology which fits the necessity for accumulation in the capitalist system. Here, the ideological nature of the discussion in general brings a passionate debate

[19] "Private returns to schooling according to the screening hypothesis should be greater in those situations where the hiring mechanism could readily rely on schooling as a screen" [SCHULTZ (1988), p. 583]. That is, it should be greater in the wage-employment sector.

which sometimes obscures the real substance of the criticism. In fact there can be some sort of ideological role in education, but it is in the universities where most of the criticism of the "system" is generated.

5.3.4 The neoclassical critique

The strongest attack on empirical studies based on the human capital model comes from the neoclassical side. It was CAIN (1976) who formulated the question of "truncation bias" associated with estimates of earnings functions. That refers to the bias involved in samples which are truncated when the researcher splits them into two "segments". The worst is that the sample split is usually based on variables strongly correlated with earnings, the dependent variable (McNABB and RYAN, 1990, p. 164)[20].

5.3.5 Other criticisms

Other reappraisals of the human capital model and of its utilisation in empirical studies on segmented labour markets point to the important issues of: i) the role played by the labour market itself; ii) policy implications.

CRAIG *et al* (1982, p. 92) contends that:

> We have argued that most jobs could be done by most people, and therefore the use of educational qualifications as a discriminant within the mass of manual and white collar jobs must be seen primarily as a means of on the one hand restricting the supply of labour available for the limited number of 'good jobs', and the other legitimising the inequalities in pay between jobs

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[20] This issue will be considered in more detail in Chapter VI.

> of similar content. The means by which pay inequality is legitimised may be more important to an understanding of the structure and operation of the labour market than has yet been recognised by labour segmentation theorists".

More for the concluding part of the argument than for the whole statement, it could be said that it matches the important analytical view of the labour market as a possible source of inequality and not just a mirror which reflects the interaction of supply and demand in a system which tends to equilibrium.

MAZUMDAR (1981, p. 84) puts a somewhat rhetorical question although with a critical content (emphasis in the original):

> The transition from the demonstration of an **association** between education and earnings to a **causal connection** between them is a difficult one. If education can be shown statistically to be the single most important determinant of earnings, does it follow that giving more education to the poor is the best way of lifting them out of poverty?".

5.4 A discussion on earnings functions

Since the first ethical and moral reactions to treating human beings as a stock of capital at the beginning of the sixties, the dust has settled and a great number of empirical studies have fruitfully used the human capital model. Earnings equations in general reproduce Jacob Mincer's original model of 1958 (ATKINSON, 1980, p. 100) or some adaptation of it.

Considering the assumptions of the human capital approach and empirical evidence that relates higher earnings to higher levels of education, the question of how to evaluate the

proposed relationship is tackled by estimating an earnings function. It is necessary, however, to discuss the possible shortcomings inherent in this approach.

First, there is the question of what an earnings function really estimates. Does the rate of return to education relate directly to an increase in the individual's productivity or does it represent the result of screening criteria as postulated by the credentialist approach? To put it another way: how much of the return is due to enhanced productivity or to screening? What about the rate of return from experience? If a non-zero value for the latter is estimated, it probably reflects returns to post-schooling investment (on-the-job training - general or specific) and, therefore, the labour productivity is being affected by this sort of investment in human capital.

Second, the problem related to unmeasured variables. Say the "true" function for a population is (LAYARD and PSACHAROPOULOS, 1974, p. 987):

P=f(S, A), where P=individual's marginal productivity, S=schooling and A=vector of abilities, comprising a set of other human capital variables.

Taking now an usually estimated function of the form below, to be estimated with basis on a sample of the population:

Y=g(S, OA) + u , where Y=earnings or income, or wages, replacing productivity, S=years of schooling, OA=vector of **observed** abilities, and u=error term resultant from the omission of variables.

Ideally, OA should be the best proxy for A, to avoid or minimise the upward bias caused by a positive correlation between schooling and elements of A not comprised by OA. It is well known, however, that in practice there are difficulties in getting a reasonable measure of ability. Moreover, a sample split has usually attached to it a non-random criterion - aggravating the bias problem.

Thirdly, the limitation of using years of schooling without any measure for **quality** of education.

A last point to be mentioned is that the earnings function is in fact a reduced-form equation, i.e., it represents the final result from the interaction of demand and supply forces in the labour market (BLAUG, 1976, pp. 839 and 843).

5.5 A summing-up

Taken to its limit, the human capital approach contends that inequalities in the distribution of personal income could be explained by the set of human capital of individuals. More specifically, if two individuals bearing the same "qualifications" (including on-the-job training) earn different wages, the difference could be reasonably explained by different levels of ability, intelligence and other personal endowments. Since the question depends in practice on the measurement of non-observable characteristics, the answer is far from being readily obtainable. It is necessary to say, however, that the more formal elaboration of this theory emerged in response to existing gaps in the mainstream of

economic theory. In fact, empirical findings such as the increase in earnings that comes with accumulation of education, the increase in earnings at a decreasing rate as the individual ages, demanded a consistent explanation. That was the primary impulse to the elaboration of Becker's prime work in the mid sixties (BECKER, 1975, p. 16). Since then, or more specifically since the first more systematic formulations on human capital by the end of the fifties, studies on the role of education on economic matters have given rise to a profitable debate and there is no indication that the theme has been exhausted.

Yet few would deny the important role played by education in the formation and distribution of earnings nor the basic proposition that, on average, schooling brings with it increases in individual wages. It could even be recalled here that today, more than ever, education and human capital are under the spotlight of policy-makers all over the world. Even in Third World countries there is a determination to break with the historical neglect of education, which is now regarded as a key factor in welfare and economic development.

It should also be mentioned that, despite the many controversial points involved, the basic human capital model has been fruitfully used worldwide in works on education and income distribution - including studies committed to the segmentation hypothesis (e.g. UTHOFF, 1986). The more serious limitation involving a strict understanding of the model is the virtual disregard for the relationship between structural aspects (labour demand characteristics) and labour

productivity.

Summing up: apart from the unresolvable issue of the (causal) connection between education and income, and other controversies, the whole debate on segmentation has brought some points of convergence. It is recognised that SLM studies do not represent a total break with the neoclassical approach. DOERINGER and PIORE (1985, p. 7), FINE (1987) - from a Marxist point of view - and even neoclassical authors [e.g. TAUBMAN and WACHTER (1986)], who see points of clear interaction linking both approaches, are examples of that. In other words: neither the tough Hicks' statement that "unskilled labour" is paid what it deserves, because "it is worth so appallingly little" (quoted in McNABB and RYAN, 1990, p. 156), nor the complete disregard of the human capital approach is appropriate.

6. Further remarks

This section makes additional considerations to complement or enhance points of the discussion brought out in the previous sections. Firstly, general remarks are put into the present context of crisis of the theory magnified by the reality of crisis in capitalist and "socialist" economies. Secondly, empirical issues are discussed.

6.1 General comments

i) SLM studies, which emerged in the context of worries about poverty and unequal income distribution, remain essential in the academic debate - although they do not bear

the status of a theoretical paradigm. Perhaps because of its nearness to policy issues and emphasis on institutional aspects of the economy, the SLM view constitutes a fundamental contribution. Indeed, it is now indisputable that free market economies cannot dismiss policy interventions. On the other hand, the social-democracy - the best historical combination of market and State - is also facing a deep crisis and that points to the need for a review[21].

ii) A weak point in the radical approach is the attempt at reconciling an essentially macro apparatus (Marxism) with a microanalysis of labour markets. In fact, one of the greatest merits of Marxist analysis is a profound diagnosis of capitalism and its contradictions (the social character of the productive process **versus** the private appropriation of the labour product, irreconcilable difference of interests between capitalists and workers, the tensions generated by the constant tendency to accumulate, etc.). But some Marxist contributions to a microanalytical approach are in constant critical reappraisal nowadays by Marxists themselves. Even the core of the Marxist economic analysis - the labour theory of value - is considered difficult to hold theoretically. Yet Marxist authors have decreed its failure (given the concept of

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[21] Sweden, a historical "social-democracy paradise", is now tackling recession with traditional policy tools. Countries like New Zealand and England are also facing the need for a reform of the welfare state system. For the case of Sweden, see e.g. Isabel Hilton's 'Trouble in Paradise', **The Independent** Friday 19 April 1991, p. 21 and 'Recession seen as deep and long in Sweden', **Financial Times** Weekend April 20/April 21 1991, p. 2. On the other hand, long-term unemployment in Europe has set in - reminding policy makers of the need for new policies.

labour and its exclusive role as the only source of value) or its inadequacy to tackle heterogenous labour. ELSTER (1986, p. 192), for example, states (emphasis is ours):

> The labor theory of value is intellectually bankrupt. The very concept of the labor content of a commodity is ill **defined** in the presence of heterogeneous labor or heterogeneous work tasks. Even assuming that the concept could be defined, it has no useful role to perform. The equilibrium prices and rate of profit can be determined without invoking labor values. If any connections obtains, it is rather the other way around: **Prices must be known before we can deduce labor values.**

It is beyond the scope of this chapter to cover the whole discussion on the Marxist theory of labour and heterogeneous labour. CATEPHORES (1981)'s and McKENNA (1981)'s criticism of BOWLES and GINTIS (1977)'s attempt to reconcile the two things, and subsequent reply (BOWLES and GINTIS, 1981) provide a detailed and profound, though inconclusive, discussion of the controversy. The unfinished character of this specific debate is clearly shown by two opposed conclusions by the critics of BOWLES and GINTIS's. CATEPHORES (1981, p. 280) admits that the challenge posed (since E. Bohm-Bawerk's **Karl Marx and the Close of his System**) to the Marxist theory of labour value is still unsolved whereas for McKENNA (1981) there is no "heterogeneous labour" since "skill differences" can be analytically dealt with through the reduction of skilled or complex labour to multiple units of simple (unskilled) labour ("basic abstract labour"), following Marx's original formulation[22].

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[22] A classical and critical essay on Marx's reduction of complex labour to multiples of simple labour, with additional complications for the theory of creation of surplus value by

For our purposes it is enough to add that although Marx's intellectual heritage - like other contributions by the classical economists - has anticipated some modern specific discussions, there are some unfinished theoretical formulations which lead to difficulties mainly on the side of microanalysis[23].

iii) The immediate and net result of the crisis referred to in the previous paragraphs could be a reinforcement of the status of the neoclassical model as a paradigm since this theory is actually the only one which academically constitutes an entire entity. Nonetheless, things are not as simple as that and the labour market role in distribution and inequality issues remains a complex matter, where measures of macro-economic policy are not enough to cope with social problems of poverty and inequality. In such a context, empirical studies on specific labour market problems preserve their validity. Labour market segmentation analyses can well contribute on

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labour, is **Skilled Labour in the Marxist System** by Bob Rowthorn (ROWTHORN, 1984, p. 231-239). In this matter, as in some others, it seems Marx has left a reasonable degree of ambiguity. See ELSTER, 1987, p. 127-132. Once more, the inconclusive character of the discussion about heterogeneous labour and the labour theory of value is clear.

[23] Another contribution of Marx which is considered theoretically inconsistent is his writings on wages. See Bob Rowthorn's **Marx's theory of wages**, in ROWTHORN (1984, pp. 182-230). Jon Elster, another unorthodox Marxist, also recognises contradiction and inconsistency in Marx's writings on another important issue, which has implications for microeconomic analysis ("rate of exploitation" and its determinants). ELSTER (1987, p. 191) argues: "Prima facie, these various [Marx's] views [about the determinants of the rate of exploitation] contradict one another in a number of ways. I am not saying that some of the contradictions could not be removed by a more refined analysis, but it would be an abuse of the principle of charity in textual interpretation to absolve Marx of responsibility for these confusions".

this, given their close linkage to policy. Against the emergence of a dominating neoclassical mode of thought in the academic kingdom, there is the historical evidence that most of the successful achievements of capitalism in terms of social benefits are due to ideological and political pressures from theorists, institutional groups and political activists demanding from the State measures towards social welfare.

6.2 Empirical issues

The major conceptual puzzle of SLM theories is right at the core of its theoretical formulation: the segmentation hypothesis. The relevant points are: i) how to distinguish primary from secondary markets? and ii) how to test the crucial hypothesis of little or no labour mobility between sectors?

Since the strong neoclassical criticism of SLM approach in response to these challenges - WACHTER(1974) and CAIN(1976), SLM formulations have developed a great deal of flexibility. But we shall first consider the criticism of earlier SLM studies.

The understanding of segmentation in a strict dualist sense implies a serious empirical question. Indeed, clear evidence of dual segmentation requires a bimodal frequency distribution of jobs either based on some measure of job quality (CAIN, 1976, p. 1231) or job rewards (McNABB and RYAN, 1990, p. 155) or yet more simply, earnings. Had some such sort of convincing evidence come about somewhere, the current debate on segmentation would have developed rather

differently.

But why, on the other hand, has the lack of such evidence not eliminated the idea of segmented labour markets? Certainly because other challenges to the dominant neoclassical paradigm - summarised by the word "inequalities" - remained without satisfactory responses. Discrimination and underemployment are among these fundamental issues. Moreover, the contribution of SLM studies to the discussion of policy issues also explains their place amongst labour market theories.

Sexual and racial discrimination can be technically defined as the situation in which workers, supposedly equally productive, are paid different remuneration, as a result of racial or sexual factors.

Discrimination is recognised even by neoclassicists (CAIN, 1976, p. 1234) as an issue not yet satisfactorily tackled. However, the earlier SLM view with stress on the conspiratorial collective behaviour of some against minorities is probably an exaggeration of the problem. Extreme cases such as a state policy of **apartheid**, e.g., tend to be historically overcome. The absence of extreme situations, however, surely would not imply a steady tendency to equilibrium. More specifically, the problems concerning racial discrimination could be summarised as follows:

1) The gap between the earnings of black and white workers has been reduced, but not eliminated, and probably tends to be relatively greater in less developed countries;

2) Despite the overall reduction of that gap there are still controversial points such as whether the differences are

more severe for older black males (CAIN, 1976, p. 1235);

3) Neoclassical arguments such as taste for discrimination and cost of discrimination (meaning the economic agent who discriminates ends up paying for it) are not enough to give a satisfactory theoretical response;

4) The present aggravation of the migration problem in Europe, with serious political consequences, certainly will raise renewed worries and demands for the tightening of anti-discrimination policies;

5) Finally, the worldwide adoption of this kind of policy means that market forces alone cannot cope with the problem (or in a more rigorous judgement: the labour market tends to sanction inequalities if no remedial policy is taken).

A similar summary could be made for sex discrimination, although cultural aspects of the problem would have to be also considered, mainly in less developed countries. For example, when one intends to compare male and female returns to education, housework versus market-work decisions play an important analytical role (CAIN, 1976). Differences between developed and developing economies have to be considered. Reduction in the proportion of female housework - due to factors such as reduction in family size, home-sector technological innovations, increasing participation of husbands in housework, among others (CAIN, 1976, p. 1236) - in a country like Brazil, for example, is a phenomenon related to a minor part of the middle classes.

Underemployment is another crucial issue to which SLM studies have drawn the attention of specialists. The basic

disagreement here was the refusal of SLM authors to accept neoclassical emphatic explanation for the phenomenon through the matching of "bad" jobs and unskilled or low human capital workers, specifically teenagers, newcomers with poor education, females in part-time employment and low-skill workers in general. Underemployment for SLM authors was a more pervasive question, chiefly meaning "good" workers trapped in "bad" jobs (WACHTER, 1974, pp. 659-660)[24].

Problems brought about by the functioning of labour markets, such as those summarised above, have helped to keep the validity of SLM formulations.

Probably as a result of the debate and criticism, SLM formulations have gained some flexibility. Strict duality and the dichotomy, bad jobs/good jobs, are no longer considered essential elements of SLM approach (TAUBMAN and WACHTER, 1986, p. 1198). Instead, the use of a primary/secondary cut-off more as a "heuristic convenience" (McNABB & RYAN, 1990, p. 154) has predominated. That means the practical recognition of an unavoidable degree of arbitrariness. The crucial point, however, is that the demarcation line (in general, a ceiling level of income for secondary workers) brings serious

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[24] The recent experience of developing countries which have not managed to stabilise their high-inflation economies after several economic plans, have magnified the problem of underemployment. Intervals of recession have made workers suffer long spells of unemployment and engage in "precarious" jobs or even become "discouraged". In Brazil this phenomenon has been registered in the literature, although estimates of its dimension are rare. HUMPHREY (1991) examines new Brazilian (non-official) statistical estimates of that as a proportion of total unemployment (about 30% in 1987). Instead of underemployment HUMPHREY utilises the concept of "disguised unemployment".

limitations to empirical experiments. The "truncation bias" pointed out by CAIN (1976), and referred to before, is the most serious limitation. Nevertheless, the adoption of a heuristic demarcation has been generalised and has produced other trials based on other variables, although there is no guarantee of an ideal solution to the truncation problem. UTHOFF (1986), by establishing a clear-cut line based on occupational position and other variables in the study of changes in earnings inequalities in Metropolitan Santiago (Chile), is an example. However, the limitation remains as he included schooling (maximum of 12 years for "independent non-professional workers") among the elements for the demarcation line between formal and informal sectors.

Recent Brazilian experience has produced new proposals for identifying informal/formal segmentation. One of them stresses production relations: formal = salaried workers; informal = own-account workers (CAMARGO, 1989). Another one is institutional: the possession of the work card (or the contribution to the national system of social security) is the demarcation line and all non-work card workers (or non-contributors) are considered informal[25]. The latter has the advantage of being, in terms of results, much closer to several empirical researches on the Brazilian informal sector,

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[25] The work card is a sort of little notebook officially registered at the Ministry of Labour and which must be obtained by an individual as he/she enters the labour market. It is a professional identification and it is supposed to contain all information concerning the worker, i.e. beginning and ending of each job contract, salary, holidays, among others. It is compulsory for each employer to "sign the work card". Contribution to social security is the Brazilian equivalent to the national insurance contribution in Britain.

particularly the surveys based on firms. The set of small firms, most illegal, and the mass of workers in precarious jobs tend to bear no institutional relations.

The latest studies on segmentation in Brazil (SEDLACEK, BARROS and VARANDAS, 1990, for example) have in fact incorporated the heuristic approach of SLM formulations. Although no strong evidence of barriers to mobility has been detected, considerable differences of remuneration between workers of different status (with and without work card) keep alive the idea of segmentation. The possibility of multiple segmentation is even admitted and the use of a breakdown based on the work card is due to frequent empirical findings of "wage differentials even when several observable attributes are controlled".

These developments meet the recent defence of SLM approach made by McNABB and RYAN (1990, pp. 157-158). They argue that "the high pay of primary workers cannot be explained simply in terms of quality of labour". "Productivity is seen as an attribute of the job rather than the worker, depending upon the equipment available and the product market served".

This link between technological resources/market conditions and labour productivity is a key argument for the survival of SLM formulations. Taking that into account, there seems to exist some exaggeration in the zeal with which CAIN(1976, pp. 1235 and 1237), trying to lessen the dimension of some empirical findings, makes claims for "accurate" measures of productivity (certainly a practical impossibility)

in experiments which point to the earnings differentials between blacks and whites or men and women.

The question of the extent of intersectoral mobility is more difficult to resolve since empirical evidence on this matter still depends upon data availability. Longitudinal data are not easily obtainable. Surveys which resort to retrospective questions are not frequent, either[26]. And trials based on cross-section data give only a limited idea of the phenomenon. In fact, labour mobility, understood as change of occupational status and consequent earnings alterations, requires a medium or long-term perspective. Otherwise it is just labour turnover and gives a minor dimension of the question, saying little about consequences on the welfare of workers.

Current empirical findings about mobility are rather inconclusive and the SLM hypothesis on labour mobility cannot be discarded without question as seems to be the position expressed by, e.g., CAIN (1976, p. 1231).

A study by METCALF and NICKELL (1982) - a research on occupational mobility in Great Britain for the period 1965-1975 - led to important results although some could be considered, 10 years later, rather obvious. However, one cannot be sure that current findings on labour mobility go

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[26] Labour mobility is a very complex issue and a very difficult one to test empirically, as recognised by many. Sociologists have drawn a great deal of attention to the theme in a very ample perspective involving more than one generation or detailed occupational histories of individuals. LIPSET and BENDIX (1964) is a classic study of this kind, based on research carried out in California (USA) in 1949. A more recent study on mobility is METCALF and NICKELL (1982), commented on below.

much further. The study was based on a sample of about 18,000 individuals, involving 396 KOS ("key occupations for statistical purposes") and extracted from the NTS (National Training Survey). Recognising the difficulty of testing mobility hypotheses, METCALF and NICKELL traced an arbitrary but logical line between primary and secondary occupations (and a "doubtful" category)[27]. The results pointed to: i) an overall tendency to stability, reflecting that, for some reasons, barriers to mobility do exist; ii) the young are, obviously, more likely to move than the old; iii) the importance of experience and qualification in explaining moves. It is worth noticing, furthermore, the important relation between occupation and mobility. For some secondary occupations the probability of moving to primary positions is clearly higher (chefs, barmen and some repair services). For others (e.g. postmen, porters) to get stuck to the job is more likely. The point is that it is not easy to identify the reasons behind such events. Evidence of discrimination unfavourable to black workers was also found.

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[27] The criterion was based on hourly earnings rankings.

CHAPTER III. THEORETICAL AND METHODOLOGICAL APPROACH - THE ANALYTICAL FRAMEWORK

1. Introduction

This chapter aims at establishing the theoretical guidelines which will support the empirical analysis to be conducted in the remainder of this thesis. More specifically, it sets out to discuss the theoretical foundations of the empirical investigation into the earnings-education relationship in two selected urban labour markets in metropolitan Brazil: Recife, in the less developed northeastern area and Sao Paulo, at the heart of Brazilian developed South-East. It is anticipated here that the usual and simplest way to conduct an empirical analysis of this sort is by outlining and estimating a suitable earnings function under assumptions of the human capital approach - such an earnings function will be fully specified in Chapter V. Yet one should be aware of the limitations and possibilities inherent in this paradigm[1].

The body of this chapter is divided into two main sections, besides this introduction. Section 2 presents key theoretical assumptions and central ideas that constitute the core of our general analytical framework. Section 3 discusses the foundations of a specific theoretical model whose background is formed by our interpretation of the Brazilian segmented (urban) labour markets.

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[1] A detailed examination of the limits and possibilities of the human capital model was made in Chapter II.

2. General analytical framework

A general understanding which underlies the analytical framework of this study can be depicted as follows.

Since the first of our main concerns is with segmentation of labour markets, dual labour market formulations constitute a basic theoretical source of the analysis. The specialised literature has emphasised the fragmented nature of the SLM approach as a paradigm and the consequent lack of some more formally elaborated assumptions. In compensation for this flaw, neoclassical theorists who abandoned a pure competitive view and took account of the SLM critique of the neoclassical approach - particularly aspects related to institutional factors - have made important contributions towards filling the theoretical gaps in SLM formulations. Determination of wages is one of these missing points. The model outlined below, therefore, is by no means the result of a strict commitment to a pure SLM approach. On the other hand, considering the objective of this study - to investigate the relationship between education and earnings across segments and occupational groups - the human capital approach constitutes an important part of its theoretical foundations.

The analytical framework adopted here is not committed to embracing all the neoclassical assumptions, although it incorporates neoclassical critiques of SLM studies. It is a hybrid containing elements of SLM theory and neoclassical human capital theory.

It will be assumed that there are two major segments in the labour market: the primary and the secondary markets. Such

dichotomy is, for analytical purposes, roughly identified with the formal-informal divide. Empirically, this duality will be modelled for the Brazilian case by distinguishing groups of labour market participants according to an institutional (legal) characteristic - i.e. whether or not the individual contributes to the existing national system of social security, or whether or not he/she bears the work card[2].

It should be noted that in adopting such a dual structure we do not take into account that the primary sector does not have a complete correspondence with internal labour markets. Indeed, as already seen in Chapter II, the latter is constructed via within-firm rules and can occur even in departments of a company that also operates in the secondary market, whether or not on a regular basis. Such a primary-internal identification, however, is assumed in most of the studies on segmentation, either in pure SLM studies such as in the classic DOERINGER & PIORE (1975) and followers, or in analyses of segmentation that bear a commitment to a neoclassical approach (e.g. WACHTER, 1974; BULOW & SUMMERS, 1986). We judge that this primary-secondary dichotomy - taken as a reference - is not incompatible with a distinction based on an institutional criterion like the one to be adopted in this study[3].

The primary and secondary markets are conventionally

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[2] For the specifics of these institutional criteria see Chapter IV.

[3] See Chapter IV for the discussion of several formal/informal breakdown criteria in Brazilian studies on urban labour markets.

characterised as follows. In the former, there occurs the predominance of higher wages, promotion ladders, unionisation, and institutional practices carried out chiefly by oligopolies, unions and professional associations that lead to the formation of internal labour markets. The secondary market pays lower wages, there is little or no unionisation, and working conditions are worse than those prevalent in the primary market.

Having outlined the above, our analytical framework requires now the discussion of assumptions involving: a) the determination of wages in both sectors; b) labour mobility between sectors and equilibrium; c) the problem of assignment of individuals to one or the other segment.

2.1 Determination of wages

The relevant analytical question here is: why does the formal-informal wage gap tend to persist? Why is there no convergence of average wages towards a single mean?

Considering that an answer based on a pure competitive view does not cope with this challenge, one should resort to other theoretical sources. Here we reckon that SLM studies and the neoclassical criticism of the segmentation approach take up the challenge. Thus we begin by making two assumptions.

A first general assumption is that in both segments individual wages or earnings are determined by marginal productivity. Further comments on this will be made.

A second general assumption is that labour productivity depends on the individual's wage and on working conditions.

The implicit argument is that human behaviour is responsive to incentives and an individual will work better and produce more if his/her wage and working conditions improve. Wage is the more visible item of working conditions and thus is taken as the relevant parameter[4].

In the primary sector, this wage-productivity relationship reflects the efficiency wage principle[5]. There are at least four different ways of explaining such a principle[6] but its rationale can be summarised in a very simple idea: employers need to motivate workers and productivity depends on wage. So, even in the presence of unemployment, some firms may not be willing to lower wages, fearing unfavourable effects on productivity that would end up increasing costs per unit of labour, considered the balance wage reduction **versus** a fall in productivity. Then, paying more than the "going wage" for some jobs could be more profitable for some firms (BULOW & SUMMERS, 1986, p. 377). The "efficiency wage", which makes firms ignore an excess supply,

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[4] Although wage and non-wage job characteristics might be negatively correlated in theory, favourable working conditions and higher wages are both positively correlated with labour productivity.

[5] Part of the above exposition of the efficiency wage principle is based on a didactic discussion of the theme found in FALLON & VERRY (1988, pp. 90-91 and 215-217).

[6] See e.g. KRUEGER & SUMMERS (1988, p. 261) and WADHWANI & WALL (1988, pp. 3-4). Possible motivations for the efficiency wage principle to rule are: i) minimisation of turnover costs; ii) elicitation of workers' effort; iii) increase in the workers' sense of loyalty (they would feel benefited from some rent-sharing); iv) higher wages would attract more qualified workers. All these reasons have, directly or indirectly, a positive relation with labour productivity.

is then "the wage which minimises wages costs per efficiency unit" (FALLON & VERRY, 1988, p. 215). The "going wage" is understood as the level which would result from the prevalence of a competitive demand-supply mechanism.

It could be added that the development of job-specific skills can also constitute a positive factor in making primary sector firms try to keep hold of workers.

Another factor in explaining the persistence of higher wages in the primary market is the action of unions and professional associations pursuing "protection" of their various workers' categories.

Finally, as pointed out by RYAN (1981), a possible explanation for the persistence of a segmented labour market structure can be sought in a fact that would turn the idea of internal labour market into something more than just a descriptive category; *'insiders'* are treated more advantageously than comparable *'outsiders'* (RYAN, 1981, p. 16)[7]. The reasons for that may relate to more accurate information - learned on the job - about the productivity of insiders. Putting it another way: homogeneous workers being evaluated differently in different segments of the market.

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[7] RYAN (1981) concedes little analytical weight to the existence of promotions and job ladders in primary jobs as an important differentiation between the two markets. The author refers to "the occasional occurrence of job ladders in low-wage employment" as one evidence against the idea of identifying internal labour market with promotions opportunities. However, we think that the existence of promotion criteria is a valid general characteristic of primary or formal markets. If the description cannot lead to a precise distinction in practical terms, the inherent weakness of any analytical breakdown (particularly those based on income) may be to blame.

That is, inequality generated within the marketplace.

Turning now to the secondary sector. The wage-productivity relationship in this sector could, in an extreme interpretation, reflect the negative feedback - as hypothesised by the SLM approach. Low wages and bad working conditions would cause low productivity and (consequently) low wages, a mechanism through which secondary labour market experience de-qualifies workers and induces them to develop "bad" habits. In practice this relation is not so generalised and empirical findings - as referred to in Chapter II - point to the existence of some "informal" workers getting higher pay than they could expect in the primary sector. Nevertheless, the idea of negative feedback is useful in helping to explain the reality of the secondary market or informal activities and provides an analytical instrument to identify a contradiction in the most traditional SLM analysis. Indeed, when recommending policies (creation of "good jobs"), SLM authors often postulate that secondary workers are close substitutes (WACHTER, 1974) to primary workers, when in fact the negative feedback can ultimately lead to a premature depreciation of an individual's endowments. If that is true, the longer the labour market experience of an individual in secondary jobs, the more unsuitable he/she becomes for primary jobs. To conclude this point, it needs to be said that an extreme version of the negative-feedback hypothesis leads to an implicit admission of formation of "negative" human capital (TAUBMAN & WACHTER, 1986, p.1196).

One cannot, however, rule out the possibility of an

individual building up his entire working career in the secondary sector, where he could move to better-paid positions during part or the whole of his working life. In that case, the idea of negative-feedback would not hold and, therefore, the formation of negative human capital would not be possible. Empirically, this possibility of an employee developing his/her whole working lifetime in informal jobs could be real for e.g. some specialised own-account workers.

Low levels of on-the-job training in the secondary market would be another element in the explanation for low wages in the secondary sector. Employers would anticipate turnover, hiring employees based on "loose" criteria and not providing (or providing little) subsequent on-the-job training (WACHTER, 1974, p. 653). Consequently, turnover tends to press wages down.

Under the assumption of no barriers to entry, the magnitude of an individual's wage or income in the secondary sector would depend on the number of participants in the market. More specifically, competitive conditions will predominate and earnings will be flexible - determined by labour supply and demand. That is, they will not have the rigidity that internal-labour-market practices and the efficiency-wage-principle lend to wages in the primary sector. It does not follow, of course, that personal endowments would not affect earnings and that human capital would not be rewarded (they may be relatively less important in the secondary sector). Among those occupations which are typical of this segment, own-account workers engaged in more

specialised services and some wage workers in manufacturing are examples of cases where human capital is clearly important. Some specialised services require skills (as well as an initial stock of instruments of work) that are not easily obtained by every individual that seeks to enter that market. Also, some occupations in manufacturing[8] require some skills not readily found in "representative" migrants to this segment. Thus, these individuals are bound to earn more than those who do not possess the same skills - although they may be subject to specific demand conditions. Therefore, the most general hypothesis for the determination of wages in this sector is the one which relates earnings to labour productivity. This assumption taken, competitive forces will operate.

2.2 Labour mobility between sectors and equilibrium

The difficult point concerning labour-mobility assumptions is that while there is no irrefutable evidence of inter-sectoral immobility, the idea of a completely free labour mobility is not undisputed either. In fact, some intuitive analysis in examining this question is perhaps unavoidable. One can sensibly argue that the informal sector

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[8] By way of an example, one could think of the polisher in the metalworking/blacksmithing manufacturing. In interviews with informal micro-entrepreneurs carried out in 1985 (a follow-up to a more comprehensive survey in 1980), ARAUJO (1986, pp. 150-158) found that the polisher was a special case of scarce labour, because of the skills this occupation requires. The polishing defines the final quality of the product (belt buckle was one of the pieces then produced) and requires a particular ability on the part of the worker. Also, the polisher's wage was much higher than the average wage in the informal sector - even matching the formal standard.

is as heterogeneous as the formal and, therefore, is formed by different market structures instead of a single competitive market[9]. The most visible part of the informal sector, however, is constituted by activities or occupations such as small commerce, street vendors, low skill-services and odd jobs of several sorts. During periods of recession, it is exactly this part of the informal sector that tends to expand by absorbing those shed from the formal sector. But occupations which require some skill, in manufacturing and in services (plumber, electrician, carpenter, etc.), do not constitute an immediate option for new entrants unless they bring from previous activities the necessary qualification. The crucial point - in terms of the present discussion - relates to the possibility of some of these workers being able to go back to formal positions after a period engaged in informal activities. That would depend, however, on the depth and duration of the economic downturn and, consequently, on the magnitude of any possible "negative feedback" that could de-qualify the worker.

Further related aspects can be examined. Although, for the sake of argument, two flows of mobility have been taken into account - **from** the primary and **from** the secondary sector, in practice this has no relevance if one is just trying to detect segmentation. Indeed, if a "photograph" of the market is taken at a certain moment (say, during recession) and there are fresh, former primary workers in secondary positions,

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[9] E.g. TOKMAN (1987) has both competitive and non-competitive markets operating in the informal sector.

these individuals could not be differentiated from existing secondary workers. In fact they would be regarded as secondary workers with equivalent endowments to some in primary positions. A classical case of segmentation would be characterised: individuals with equivalent human capital endowments getting different earnings. Again, depending on how long this situation persists, and in the presence of a negative-feedback, these individuals could get trapped in the secondary sector. One would then be looking at a labour market which **generates** inequalities.

To sum up the discussion conducted so far:

i) some job changes might occur between sectors, mainly in periods of recession and subsequent recovery, when primary workers might look for temporary jobs and later go back to their original sector;

ii) there is also the possibility of secondary workers moving to primary positions (at least in the way suggested above), although - as already said - convincing empirical evidence on that is the missing element.

But if the possibility argued in item i) is a realistic one, how can it be reconciled with the efficiency-wage principle? Indeed, as pointed out by BULOW & SUMMERS (1986), one fundamental assumption of a dual model based on that principle is that employers in the primary sector will not hire workers other than those who are unemployed (that is, "secondary" workers would not be hired). Secondary workers desire primary jobs (and would accept wages at the efficiency-level **or less**), but primary wages are not bid down, because

employers want to minimise the possibility of workers being negligent at work, which would affect productivity adversely. On the other hand, qualified primary workers may not want to accept secondary jobs, fearing they might suffer some process of de-qualification that would make them less likely candidates for primary positions.

One possible answer to the above question is that when a clear-cut criterion is adopted (such as the institutional breakdown used in this study), the resultant formal segment is not entirely comprised of firms that stick to efficiency-wage considerations. In fact, as already pointed out in Chapter II, we do not expect that internal market criteria are widely adopted in the segment usually characterised by researchers as the primary market[10]. In the sector empirically identified as formal, there exist small and medium size firms legally registered where internal market rules are absent, whereas it is in bigger firms where such rules tend to predominate. Therefore, it is intuitive to conclude that some secondary workers could migrate to those formal medium size firms where internal labour market practices do not occur[11].

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[10] At least in Brazilian urban labour markets, there is no evidence of a thorough prevalence of internal market principles in what is empirically identified as the formal sector. But findings which report evidence of internal labour markets or of efficiency-wage considerations in Brazil do exist. See e.g. SAVEDOFF (1990), CACCIAMALI & FREITAS (1992) and MORLEY, BARBOSA and SOUZA (1979). It is clear from studies such as these, however, that internal labour market rules tend to be associated with big firms.

[11] Empirical studies on Brazil, following the criteria of possession or not of the work card, have found that changes of status occurred in one year-period, although the detected mobility could not be characterised as widespread. See e.g. SEDLACECK, BARROS & VARANDAS (1990).

A second possible answer to the above question is that an unemployed primary worker - aware of the cost of accepting a temporary secondary job - would try to minimise the secondary sector interval and make himself unemployed again in order to seek a primary position. Such a possibility is ruled out by e.g. BULOW & SUMMERS (1988, p. 404), because "as an empirical matter workers who lose primary-sector jobs appear to be very unlikely to accept stopgap jobs in the secondary sector and to maintain high reservation wages. Only rarely do secondary workers leave their jobs to become unemployed and seek primary-sector work". We judge that that will depend on the duration and severity of the economic downturn. In Brazil, where informal activities historically have a significant share in the labour market, BULOW & SUMMERS' assumptions might appear to be strong. However, the lack of evidence on a clear pattern of mobility in Brazilian labour markets, apart from the examples already referred to in this study[12], make it

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[12] As a matter of fact, BULOW & SUMMERS' reasoning to explain the assumption that primary employers only hire workers from the pool of the unemployed appears to lack some degree of precision. From pages 384 and 404 one can collect the following pieces of argument. First, workers will desire primary-sector jobs, but they will not be able to bid for those positions by being willing to accept **lower wages**. If they were hired, they would have an incentive to be negligent. Therefore, primary employers will not offer **lower wages**. Second, unemployed primary-sector workers are unlikely to accept secondary stopgap jobs **and** to maintain **high** reservation wages. Third, firms will hire from the unemployed because such workers will require **lower wages** (to satisfy the "no shirking condition") **than will other workers**. It is implicit that firms will try to minimise the level of the efficiency-wage, but it is not clear how to reconcile the third bit of the argument with the other two.

difficult to reject categorically Bulow & Summers' assumptions.

The heuristic character of any analytical segmentation criterion - and that fully applies to the institutional breakdown used in this study - is thus inescapable. That is, we resort to such analytical separations assuming that general characteristics describe both segments and differentiate between them, but bearing in mind that there exist "twilight" areas to which any general criterion does not apply straightforwardly.

Inter-sectoral wage differentials tend to persist. Given this fact as a background to the above discussion, we are led to the idea of imperfect mobility.

As to the factors which prevent labour mobility being completely "free" one could name: i) characteristic institutional practices of primary markets, e.g. job ladders, wage premiums, unionism - generating "protected" markets; ii) inter-firms criteria for keeping workers through a policy of non-competing wages that prevent workers from quitting or from "shirking" (BULOW & SUMMERS, 1986); iii) negative feedback leading to some individuals becoming gradually unable to compete for primary positions.

Although it is assumed that individuals will try to get to primary jobs, one might consider that individual preferences related to non-pecuniary aspects of jobs ("independence", flexibility, "freedom") might lead some workers to stay in a secondary position. But that could be another effect of the negative feedback - people getting used

to the "bad", but "flexible", working conditions. However, there are also attractive non-pecuniary aspects in the primary sector: fringe benefits, paid holidays and those resultant from legal coverage. Ignoring for the moment that the latter probably outweighs the former, it could be said that, all in all, the overall result of the two opposite influences in individuals' decisions will depend on the earnings gap between the two sectors. More formally, if we assume (realistically) that the non-pecuniary advantages in sector F (formal) outweigh those in sector I (informal), then even if $earnings_F$ = $earnings_I$, an individual would still prefer a formal job, because overall he/she would get a greater return in this sector. In other words, the condition for an individual to prefer to stay in the secondary sector is that the inter-sectoral earnings gap be great enough. In a straightforward formalisation, consider the general notation "E" for earnings, "NP" for non-pecuniary benefits and subscripts F and I for formal and informal segments, respectively. Assuming that $NP_F > NP_I$, a statement for describing the usual earnings relation between the two segments is as follows:

$$E_F + NP_F > E_I + NP_I$$

If $E_F = E_I$ the above relation still holds, given the assumption of greater non-pecuniary benefits in segment F. The expression can be rearranged to:

$$E_F + NP_F - NP_I > E_I \quad \text{or} \quad E_I - E_F < NP_F - NP_I$$

This expression illustrates the fact that to reverse the sign of the relation, E_I has not only to be greater than E_F but great enough to compensate for the difference in favour of

non-pecuniary benefits in the primary sector in comparison with those obtainable in the secondary.

The analysis above has not taken account of two aspects. The first is the variance of earnings in both sectors, that could influence the overall result. If that variance is greater in the secondary sector, then this can be regarded as another factor favouring the primary segment. However, the variance of earnings is not readily observable information. Therefore, it could not have any role in the individual's decisions. Indeed, it is reasonable to expect that, if an individual faces a choice between two different jobs, the more visible elements attached to each position (direct and indirect earnings) are enough for a decision to be taken. The second aspect is that if there is no barrier to entry in the secondary sector, any occasional higher level of earnings (compared with the primary sector) would not hold for long: the average earnings would decrease as a result of new entrants in this sector.

From this discussion, the more sensible assumption is that individuals in the secondary sector are bound to pursue primary positions (again it must be remembered that for some of them, scarred by a long stay in secondary jobs, that possibility might not exist in practice). The probability of finding a better position, however, will depend, ceteris paribus, on the job tenure in secondary positions - the longer the individual's working experience in the informal sector, the lower the probability of reaching a primary position. By the same token, this probability could also be influenced by

the extension of the unemployment period.

Let us turn now to the question of equilibrium.

Although the labour market was a concept established for quite a long time in the literature, the idea of "a labour market" as a strict theoretic apparatus gathered strength with the neoclassical theory. In its pure form it implies perfect competition, perfect access to information, free labour mobility. Under these assumptions, the market wage-rate would be the equilibrium wage-rate reached by the interaction of supply of and demand for labour.

This kind of equilibrium could be reasonably fitted into most of the secondary or informal sector discussed above. As a general idea to be widely used to analyse labour market issues, however, it is not an adequate one.

In the real world, things are different from such a scheme. Imperfections do exist in the labour market and that is taken into account by those who put aside the idea of a pure competitive model. Government interventions (wage policies), monopolistic practices by large firms, unions' practice of market "reserve", barriers to mobility - are the most common examples of labour-market imperfections. Gender and race discrimination, as well as segmentation, could be thought of as extreme cases of "imperfection"[13].

Regarding our specific discussion, one could contend that if workers have different abilities and skills they will be

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[13] Such topics are extensively covered in the literature which go beyond the limits of a pure competitive model. They are mentioned here just to put things into context; our focus is on segmentation issues.

paid differently - and this is not incompatible with competitive assumptions. But when considering a group of (supposedly) homogeneous workers, it is possible to think of a situation where apparently identical workers get different pay depending on which **segment** of the market they are allocated to. That would be the description of labour market segmentation in the terms understood here.

As a result, one could be in the presence of a dual equilibria: one in the primary market, where the efficiency wage principle holds; and a competitive equilibrium in the secondary sector.

One could speculate that any observed disequilibrium is temporary and that a trend to an equilibrium at some earnings rate would be in place. However, that only holds if the assumption of free labour mobility holds (which requires that mobility costs be counterbalanced by e.g. positive wage differentials and/or compensating non-wage benefits and absence of barriers to entry in the targeted segment of the market).

If the assumption of free labour mobility does not hold, the disequilibrium can persist and the result be a dual equilibria. In fact, if the segmentation becomes generalised then it would the case for a multiple equilibria. In other words we would be facing a multitude of labour markets with imperfections leading to partitions within each of these markets. The discussion of that theoretical possibility, however, is beyond the scope of the present analysis.

2.3 Assignment of individuals to the primary or the secondary market

As already mentioned, the adoption of a clear-cut criterion to separate out two segments in the labour market is one which should carry a heuristic content. That is the general idea behind the use of an "institutional" criterion (the individual's legal status as a worker) in the analysis conducted in the following chapters.

But whatever be the analytical breakdown, the question always arises of how individuals are assigned to each sector. This is a two-fold question:

i) which factors determine the allocation of an individual to a specific segment?

ii) if the analytical assignment of individuals to different sectors is non-random, methodological difficulties may emerge - that is the "selection bias" issue.

The econometrics of the discussion will be dealt with in Chapter VI. We focus here on its theoretical component.

On its most abstract level, the starting point of the discussion could be defined by the choice an individual should make between a formal and an informal job[14] - based on utility maximisation criteria. Several factors could be thought of as

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[14] One could, more rigorously, contend that the choice is in fact four-fold: formal or informal employment, own-account occupation and the option of unemployment. We prefer to discuss the general choice of market and introduce occupational position in due time. On the other hand, we judge that the interpretation of unemployment as voluntary is not a realistic one. This point is examined in more detail in Chapter VI. It should also be taken into account that there are factors on the demand-side (i.e. aspects related to the behaviour and characteristics of firms), not contemplated here, which could affect individual decisions.

influencing such a decision.

It is necessary to establish, in the first place, that the choice can be determined by observed and unobserved characteristics of the individual. The researcher has here a basic limitation as important variables - intelligence, ability, socio-economic background - are not easily measurable. It is expected that the more able, the more intelligent, or socially better-off as well as the more educated the individual, the greater the probability of a choice for better jobs, that is, for the formal labour market. The issue is still more complex since each factor can involve differentiations, i.e. different sorts of ability, differentiated types and quality of education, etc, which can lead to distinct initial decisions[15]. In general, if an individual has an innate ability to be an artist (painter, sculptor, musician, etc) this will influence his/her decision - although he/she will not necessarily become an artist.

Another pillar of the analytical departure point is whether the decision is currently being taken regarding the **first job**. It is logical to assume that socio-economic background and level of education can play a key role here. The development of innate abilities will be easier for those who are from a wealthy family. Associated with that, the level of education can also determine the opportunity for an

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[15] A specialised education would favour the development of an innate ability. But one could claim that in such a case the decision would have been taken prior to the engagement of the individual in some educational training course. Again, the role of social background has to be stressed; for well-off individuals it is easier to seek specialised education before entering the labour market.

individual to develop an innate ability. The nature of the first job (formal/informal), in its turn, can influence future decisions in the labour market. Finally, it can be argued that even if the individual does not have a favourable socio economic background, further education can play a positive role in his working career in the future.

It can also be contended that, once the aforementioned factors have led an individual to decide for wage employment or for self-employment, the same factors will still be in place in further decisions given the occupational position chosen. In the case of an own-account career, individual abilities will probably be considerably influential.

In practice, however, the researcher faces several limitations since important individual characteristics are unobserved and the analysis involves decisions taken by individuals already engaged in the labour market. Furthermore, information on the first job is not commonly available and longitudinal data are costly to obtain.

In the present study, however, information on some important individual characteristics is available and make it possible to conduct an analysis with satisfactory effectiveness, as will be seen in Chapters V and VI. The focus is on the case of male employees, and this is taken into account in the remainder of this discussion.

We argue that education is a very important determinant in the engagement of a worker in the formal sector, and that

is probably more evident in developing countries[16]. That is, we expect that education will help an individual to make better choices in the labour market - even if he comes from an adverse socio-economic or family background - either by enhancing his productivity or by working as an indicator of his potential skill to employers. The fact that we do not have a measure of family background is of course a limitation; since there must exist a significant correlation between this variable and schooling, the absence of the former in an estimation model could lead to an overestimation of the effect attributed to education (although the inclusion of both variables could, in principle, bring problems of collinearity[17]).

Other individual attributes work positively for an individual to enter the formal labour market and measures of it are also available in our data set. If the worker is a head of household, this is expected to favour his entry into the formal segment of the market. Heads are normally more educated and have traits of responsibility, factors valued positively by formal employers. Experience is also a positive factor, as it tends to be more valued in formal activities. Having a second income source is also an indicator of the possibilities of an individual being in the formal labour market. But in

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[16] Later in this chapter and in the following chapters we shall refer to findings on the importance of education to Brazilian urban labour markets.

[17] Since socio-economic background precedes education, the inclusion of both variables in a recursive model would be a satisfactory alternative. See e.g. BOISSIERE, KNIGHT & SABOT(1985).

this case the relationship is not straightforward. Several possibilities could be thought of: the worker has a formal job and a complementary income-source in the informal sector; the individual is well qualified and can have two jobs in the formal; the individual is retired or earns a living from property rent, besides having an informal (or formal) occupation. If the data set does not allow for differentiation between such alternatives - as is the present case - the role played by this attribute in the allocation of the worker between segments cannot be anticipated clearly. Furthermore, the decision to have a second job or to have a job (if the individual lives from property rent, for example) could change with the economic cycle. Thus, further considerations on that - and on the individual's occupation or sector of activity - will be left to Chapter VI.

3. Analytical model

3.1 Introduction

This section establishes the fundamentals of a theoretical and empirical model whose concrete basis is the reality of Brazilian urban labour markets. Of course it contains elements of a general interpretation of urban labour markets in developing countries, but it is meant to be a model more adequate for an analysis of the Brazilian case. Sub section 3.2 conducts a brief discussion on recent academic interpretations of urban labour market issues in Brazil, including a tentative approach to a "national labour market". Sub-section 3.3 establishes more specific elements of the

analytical model, recalling the general theoretical considerations discussed in the previous section and the analytical elements of the Brazilian case discussed in the second segment of the present section.

3.2 Recent urban labour market developments in Brazil

Here we do not attempt to evaluate the "state of the art" of labour market studies in Brazil. We rather pinpoint elements of an ample and diverse discussion[18], and that is done within the limits and to the extent that it helps to build up the analytical model which underlies our empirical investigation.

Focusing on questions of wage determination and heterogeneity in the labour market[19], it could be contended that the mainstream controversy stems from the challenge posed by explanations committed to the human capital approach. LANGONI (1973) - a representative of such explanations - is at the heart of this debate, which centres on the issue of income

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[18] A selective but general enough survey of the studies on urban labour markets produced during the seventies and the eighties in Latin America can be found in JATOBÁ (1989b). In Brazil there is a diversified research production on labour market issues, characterized by controversies under broad headings such as regional aspects, labour market and income distribution (mainly the discussion about the influence of minimum wage policies on the personal income distribution) and an extensive production of studies on informal labour markets. SEDLACECK & BARROS (1989) contains a good sample of recent developments and old debates, centred on distributional aspects of the labour market.

[19] For broader topics related either to the structure or to macro-economic aspects of the dynamics of urban labour markets, see JATOBÁ (1989b).

distribution[20].

The central theoretic cleavage arises from the answer to the question: should inequality factors be looked for in the labour market or elsewhere? This other *locus* from where one could seek alternative explanations is the productive structure of the economy, which underlies the functional income distribution. Here we focus on the personal income distribution; of course we recognise the importance of the functional distribution, but this is not in place in our analysis[21]. It would not be sensible to deny that, as far as the labour market is concerned, there exist factors in the market place which affect the personal income distribution - and their importance is of course not negligible.

The debate fuelled by the persistent increase in the income inequality in Brazil in the sixties and seventies can then be seen as having two main alternative explanations [RAMOS & REIS (1991, pp. 33-41)]. First, the human capital view and second, the view which emphasises economic policy aspects[22].

LANGONI (1973)'s approach stresses: a) changes in the

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[20] Probably it is not by chance that distributional aspects are the focus of attention. Brazil is usually regarded as having the worst income distribution in the developing world, and academic researchers have put a great deal of effort into discussing it during the last two decades - just when the indices reveal an ever-increasing inequality. Relevant figures for this country are quoted in Chapter IV.

[21] One should not fail to consider the role played by high inflation as it works against those with no means to protect themselves against it (e.g. financial investments available to middle classes).

[22] Echoes of that debate in Brazil reached the academic environment abroad. See e.g. FISHLOW (1972).

demographic composition of the workforce (in personal attributes such as gender and age) and in its sectoral and regional allocation; b) an acceleration in the demand for a higher educated labour force - as a result of the economic boom, particularly in the second half of the sixties -, which had not been matched by the corresponding supply; hence an increase in inequality favouring skilled labour with inelastic supply in the short run. That explanation assumed, therefore, a temporary disequilibrium in the labour market with a tendency to be self-corrective in the long run. As seen by recent indicators of personal income distribution, time played its role in showing that such an hypothesis had no solid empirical foundations. Indeed - apart from other structural factors which may contribute to the exacerbation of inequality - if demand continues to outstrip supply of highly educated labour the disequilibrium could persist for quite some time. On the other hand, RAMOS & REIS (1991) recognise that changes in e.g. distribution of education cannot be ruled out as an explanatory factor.

As to the second group of explanations, the legal minimum wage in the context of a restrictive wage policy and changes in the wealth distribution (brought about by economic policies which end up favouring property income to the detriment of wages[23]) play a key role in the diagnosis of the problem.

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[23] Such emphasis on the role of restrictive economic policies focuses on the stabilisation policy of the years 1964-1967, and is to some extent applied to subsequent phases of a 25-year period of military dictatorship. Restrictive wage policies and fiscal policies which favour profits are the main factors usually claimed. Although a broad macro-analysis is beyond the scope of this thesis, it should be mentioned that

Those who highlight the role of the minimum wage policy claim that restrictive policies have systematically decreased the real value of the minimum leading to a deterioration of the wages of unskilled workers. The emphasis on the minimum wage has two weaknesses [RAMOS & REIS (1991, p. 40-41)]: a) the existence of a large informal labour market where illegal practices tend to predominate (turning the minimum wage law into an almost useless device), and b) the statistical fact that despite the increase in inequality (and decrease in the real value of the minimum wage) every decile of the income distribution showed a **real** increase in the average income between 1960 and 1970. Moreover, although many tend to adopt the interpretation which attributes to the minimum wage policy a key role in global income re-distribution policies (by raising basic wages), such an explanation is far from well established[24].

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in Brazil the State, or more specifically public policies, also play an important role in worsening social inequality. That is mainly due to mismanagement of social programmes. Considering what is directly related to our topic of research - education - two facts quite well known constitute indicators of an anti-distributive role of public policies: i) just 52 of 100 **cruzeiros** allocated to basic education programmes reach the final target - the school itself - the rest being held up in bureaucracy expenditure and mismanagement through political patronage (basically in benefit of social elites) according to a study by IPEA, referred to in the Brazilian weekly magazine VEJA (no. 25 of 23/6/93, p. 50); ii) the majority of those who go to a federal university, which provides the best in terms of higher education, are middle class and people on the top of the income distribution who thus get for free what most of the poor simply do not receive at all. The access to a federal university of those socially best gifted is in practice guaranteed by attending expensive preparatory courses for the university entry examinations.

[24] See e.g. VELLOSO (1990) for a fuller discussion and critique of the minimum wage hypothesis.

More recent attempts to elucidate the relationship between earnings, income distribution and education in Brazil have been developed by, among others, a team of economists at IPEA (National Institute of Economic Research and Planning).

For example, REIS & BARROS (1991) investigated the relationship between education and wage inequality in metropolitan Brazil, utilising the Brazilian Annual Household Survey (PNAD), a data set which covers a significant part of urban Brazil[25].

Taking a sample of almost a quarter of a million male individuals aged 25 to 50, covering a 10 year-period (1976-1986, 1980 excluded) and comprising nine metropolitan areas, they examine: i) the relationship between the distribution of education and the level of wage inequality; ii) to what extent regional differences in wage inequality can be explained by **regional variations** in a) the distribution of workers by educational category, b) the average wage by educational category and c) the degree of wage inequality also by educational category.

By using a decomposition of Theil's second measure of inequality, REIS & BARROS (1991) have found that: i) the regional differences in the distribution of education do not

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[25] The sample is restricted to employed persons earning a positive income and working more than 20 hours per week in the main job. The universe from which the sample was drawn represented 7.5% of Brazilian population aged 10 years and over and "about 25% of the labour force in Brazil" [REIS & BARROS (1991, p. 122)]. Unfortunately, they do not mention if this includes all occupational groups (employees, self-employed and employers), although we believe it is not restricted to employees only. However, the role played by occupational position is not discussed by the authors.

enable one to explain satisfactorily the "sharp" regional differences in "wage-inequality"[26]; ii) the differences in wage-inequality were shown to be intrinsically associated with differences in the steepness of the wage-education profiles; iii) regarding the overall contribution of education to the level of inequality, they assess that, in metropolitan Brazil, education accounts for almost 50 percent of the inequality in wages. In more specific terms: " holding constant the distribution of education and wage inequality within educational categories, overall wage inequality would be reduced by almost 50% if differences in average wage across educational categories were eliminated" (pp. 133-134). It is by any standard a remarkable finding concerning the influence of education on earnings.

To sum up this discussion, one can therefore conclude that, although incomplete, analyses that do not explicitly consider macro-factors influencing the general income distribution can also produce relevant results.

3.3 A model of the formal-informal dichotomy in Brazilian urban labour markets

As already explained, the labour market will be regarded as constituted of two main segments: the one which comprises those who contribute to the national system of social security and the segment constituted of non-contributors. Since we

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[26] The authors used "wage" , "income" and "earnings" interchangeably, although the implicit inclusion of other occupational groups than employees would recommend sticking to a more general category such as earnings or income.

consider that any attempt to get a precise definition of the informal sector is bound to be flawed, we chose one which is unambiguous and practical. In order to forestall possible criticisms of a "mere" legal approach, we anticipate two comments on this line of criticism. First, consistent with our general theoretical view of segmented labour markets presented in Chapter II, the labour market is not expected to be formed by separated and disconnected segments, under conditions of complete absence of intersectoral labour mobility. Secondly, there is a considerable amount of empirical evidence showing that, in the Brazilian case, levels and distribution of labour earnings differ strongly for individuals distinguished by legal status - contribution to social security or possession of a work card. It could be added that such an institutional criterion is not weaker than any other of those usually discussed in Brazil[27].

Two more general points need to be made, before going further. First, our approach identifies the two segments - distinguished in the way above - as roughly corresponding to the primary and secondary sectors usually taken in the literature. The formal and informal terms are kept instead, since they are more appropriate to the Brazilian context. Doing so, it is necessary to be aware of structural elements of the labour market not explicitly covered by the analysis (different degrees of competition, different levels of technology, distinct market organisations, and so on). At any

[27] A discussion of these legal devices as clear-cut criteria for separating out the formal and informal sectors is undertaken in Chapter IV.

rate - and this is the second general point - the data to be examined do not have the firm as unit of analysis; indeed, the individual is the basis and, consequently, the information is concentrated on personal characteristics. Demand factors are approximated through variables such as working hours, occupational position, sector of activity. Since the analytical instrument to be used is the earnings function derived from the human capital model, the greater number of variables related to individual endowments is not unwelcome.

Having established the above, we shall now discuss the reasons for the expected differences in earnings between the two labour market segments.

3.3.1 About the reasons for the expected differences in earnings distributions between segments

It is now time to make it explicit that individuals and firms in Brazilian urban labour markets are assumed to have maximisation goals. The former seek to maximise utilities and the latter seek maximisation of profits. Moreover, from the discussion in section 2.2 above it clearly follows that individuals in informal jobs aim at positions in the formal sector. This maximising utility function could be outlined as follows:

$$U = F(E,B)$$

where E = expected wage or earnings and B = non-pecuniary benefits, valued as greater for formal jobs in comparison with the informal sector.

As already argued, in both segments of the market the

wage is determined by the marginal productivity of labour. The particularities are the discussed efficiency wage principle used by firms in the formal sector and the downwards effect on earnings of an increasing number of participants in the informal sector, given the assumption of no barriers to entry in this sector. Theoretically, employment in the informal sector would increase up to the point where the *per capita* income approximates the opportunity cost of labour; the latter would be given by the subsistence level of the individual [TOKMAN (1981), pp. 947-948].

Differences in earnings distributions between groups of workers or, more generally, between distinct segments of the labour market, are probably influenced by such a broad array of factors that one could not think of considering all of them at the same time. The reason for that is not only a question of methodological difficulties but also availability of data. In any case, and keeping close to the objectives being sought, the researcher can discuss the principal determinants of such differences.

These factors could in its simplest schematic way be related to either the worker or the job. In other words, they could lie on the supply-side or on the demand side. The analysis of demand-factors requires information about technology, market organization, firm size, and so on. In the present case, we recognise the limitation of the data available - and also the limits of the study itself - and concentrate on aspects concerning the personal characteristics of participants in the labour market. The demand-side is dealt

with through some sensible assumptions already explained earlier in this chapter. In other words, the investigation carried out here deals with some of the elements that could explain earnings inequalities in Brazilian urban labour markets. In that sense, it is in advance admitted that it is a partial explanation.

Assuming that the labour market is segmented, one could think about the possible reasons for differences in earnings between segments. Some interpretations which could be thought of include:

i) differentials in favour of the formal sector not explained by individual endowments (e.g. due to different valuation, by formal employers, of employees' personal attributes);

ii) differences explained by different sectoral distributions of education;

iii) differentials that come from different distributions of abilities by sector;

iv) differences originated from unobserved or unmeasured individual abilities[28].

If the comparison is between regions, to the

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[28] This last point is of methodological nature and will be discussed as such in Chapter VI, when the empirical analysis is extended to aspects not covered in Chapter V. The others involve considerations which are empirically detectable, although they cannot be easily separated. As to differences between distributions of ability in each segment, that tends to be more a matter of speculation as it is very difficult to produce empirical measures of it. Differentials relating to "segmentation" (item "i" above) will be identified by use of the well-known Blinder's decomposition technique [BLINDER (1973)] in Chapter V. As to differentials concerning different sectoral income distributions (item "ii), it is expected they can be indirectly related to our empirical results.

interpretations ii) and iii) can be added a component related to different levels of development.

Another source of inequality can be mentioned here. Assuming that individuals are homogeneous, one possible explanation for differences in earnings distributions is that abilities are valued differently in different sectors; i.e. individuals with the **same** observable attributes may have different earnings depending on their sector of employment[29]. Such a possibility leaves open the question of why intersectoral mobility does not eliminate such differentials. In practice, of course, both individuals and jobs are likely to be heterogeneous, which makes the empirical analysis a complex task (BARROS, 1988).

It is necessary to point out that usually the researcher utilises a static approach, i.e., a cross-section analysis carried out at a given moment. If longitudinal data for a sample of individuals existed, one could have an empirical basis for the investigation of a possibility considered in this Chapter; that in periods of deep economic recession - such as those faced by the Brazilian economy in two different moments of the last 10 years - highly qualified workers sacked from formal jobs can seek an informal job. The return to a primary position will depend on the duration and severity of the recession and, as a consequence, of the newcomer's job tenure in an informal occupation. If that job

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[29] BARROS (1988) discusses that possibility in statistical models which include heterogeneous "hedonic" functions expected to represent different valuations of abilities by sectors (firms).

tenure is long enough to make the possible effects of a negative feedback significant, some of those workers could become unable to get back to primary positions. Only individual working histories could give enough information for a more precise evaluation. But if a "photograph" (a cross-section survey) is taken at a given point in time, at that moment one could detect a typical case of strict segmentation. That would arise from the comparison between sacked primary workers engaged in an informal occupation and workers who managed to remain in the formal sector, both bearing the same measured human capital attributes. One would then be in the presence of a strict theoretical case of segmentation[30].

Summing up the last result of this discussion. A pure case of segmentation could be described as follows: two individuals with the same schooling level and the same observable abilities earning different wages. If the jobs were different, that could be attributed to structural or demand-market characteristics. If somehow the jobs were "similar" (in reality they are different), one could still think of the possibility of different valuations by employers with regard to the same kind of job. But even if that kind of inequality existed, one might ask still another question: for how long would the inequality persist? Is there any "solution" through e.g. mobility from the lower-wage job to the other job? How costly is it to move from one job to another? Are there wage or non-wage compensations which could offset mobility costs?

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[30] The above theoretical possibility would be weakened if "getting sacked" were a proxy for possessing some unmeasured negative characteristics.

A proper answer to such questions obviously depends on empirical evidence not easily obtainable. On the theoretical level, however, it has already been assumed that mobility is not completely free, for reasons relating to internal market practices in the formal sector and for negative-feedback effects in the informal. Putting it in a prosaic way: workers changing jobs is quite different from consumers shifting between different brands of toothpaste, for example.

3.3.2 Segmentation examined via differences in returns to education

Having argued about possible reasons for earnings differences between segments, we can now address some words regarding the specific issue of **why** human capital attributes would be rewarded differently in each segment of the market.

Schooling, as already seen, is a key factor to explain wage inequalities in Brazilian urban labour markets and thus education will be kept as the main focus of the discussion. What would then explain possible differences in returns to education between the formal and informal sectors?

Some formal employers may be able to reduce turnover by offering improved pecuniary and non-pecuniary benefits to their workers; something more easily achievable the more unionised is the market. Also, practices of promotions, premiums and job ladders in the formal sector tend to lend importance to formal education and experience, as well as to productivity; perhaps because there is a general belief that level of education inform about general productive attributes

of individuals (more than that: the more educated would fare better in specific training and in the daily practice of work). This latter set of factors might make screening relatively more important in the formal segment. That is, although it would not be reasonable to think of the complete absence of screening in the informal sector[31], part of the possible difference in returns to schooling between sectors, in favour of the formal one, might be due to a relatively greater importance of screening in the latter.

The relatively minor importance of on-the-job training in the informal sector is a factor which should lead to also lower returns to experience in this sector. A generally more simple production process, involving low technological levels, makes turnover relatively less costly to employers. In such an environment, accumulation of work experience and corresponding returns tend to play a reduced role as compared with the formal sector.

Therefore, a relatively lower return to human capital attributes might be expected in the informal sector.

We shall, however, now make explicit that we are aware of the limits of looking at segmentation via marginal returns (rather than the *level* of rewards for factors of production).

The issue is raised by RYAN (1981), who distinguishes between the "incremental" and "non-incremental" formulations. The core of his criticism is that segmentation could be

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[31] One could think of a pervasive importance of education as an indicator of social status (the more educated would be more talented) in less developed areas. That would help to admit that screening can occur also in the informal sector.

characterised via differences in the level of earnings (of comparable individuals) - non-incremental approach - rather than through the way increments in individual human capital attributes are rewarded. He contends that the incremental formulation (via comparisons of e.g. returns to schooling) is neither necessary nor sufficient condition to prove market segmentation. To illustrate his reasoning, the author resorts to comparisons of hypothetical earnings-experience relationships for manual workers in different industries, shown in a graph which we reproduce below (Figure 1). Comparing chemical with steel, the segmentation would be proved by the difference in the level of earnings, whilst there would exist no gap between the marginal rewards to experience in the two industries, as shown by the same slope of the two lines (the incremental formulation not necessary); when the contrast is between steel and cars, "although the steel industry rewards work experience well in comparison to its automotive counterpart, it does not follow from this fact alone that steel offers better rewards for comparable workers on a lifetime basis" (RYAN, 1981, p. 13) - the incremental formulation not sufficient.

Clearly RYAN is correct in that average earnings could vary between sectors even if marginal returns to schooling and/or experience do not. But, besides the fact that this approach is not completely discarded (RYAN, 1981, pp. 14-15), one can raise some arguments in defence of the incremental formulation.

First, when it comes to being rigorous about empirical

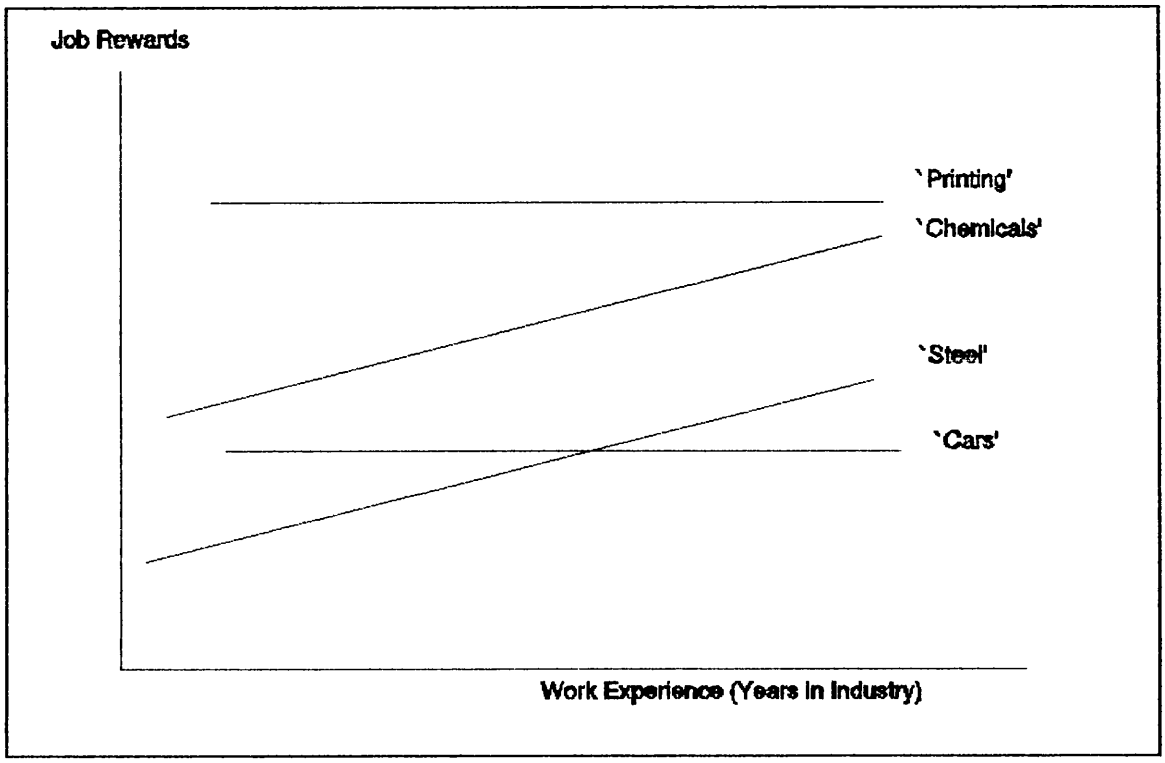

Figure 1

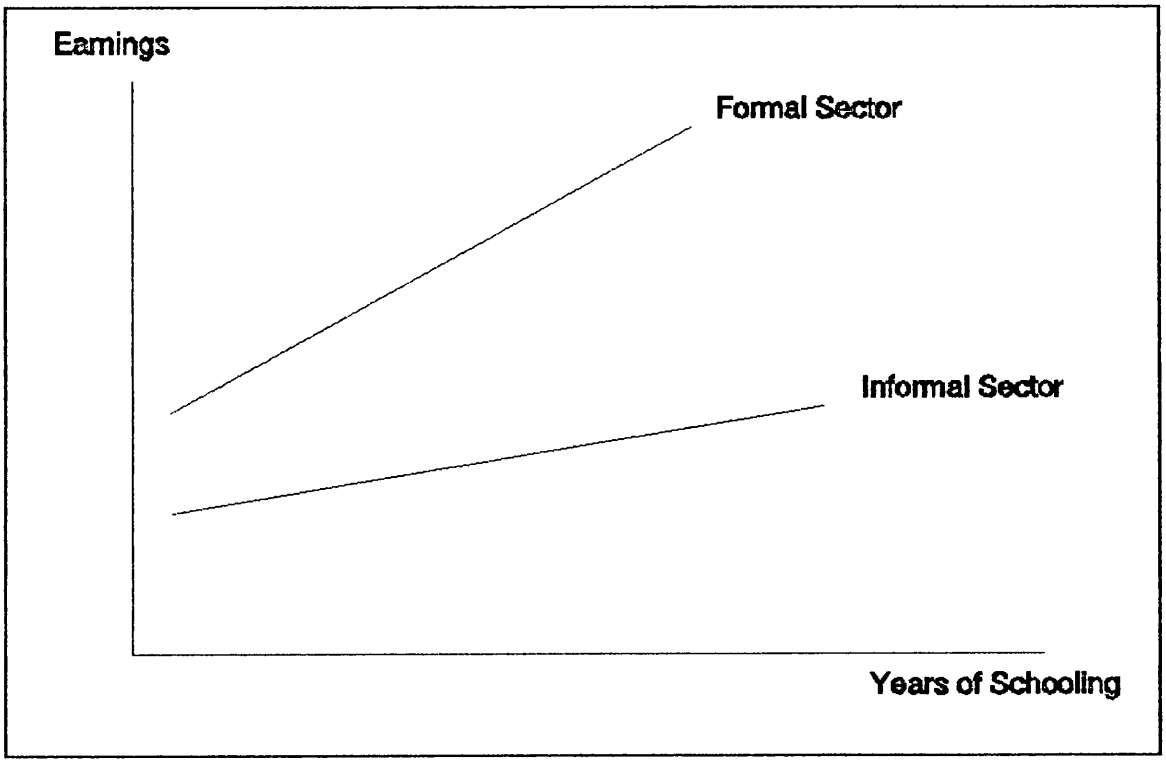

Figure 2

tests of the segmentation hypothesis a question arises: in the example being discussed, are the manual workers in different industries really comparable? When splitting the sample according to industries, would it not be necessary to consider the earnings differences between e.g chemicals and steel as partly explained by differences in, say, compensatory fringe benefits in the two activities? For the criticism to the incremental formulation to be more solid, one would thus need to provide some similar evidence for a 'homogeneous' group of workers in a given industry, divided into segments via some reasonable analytical breakdown.

Second, when considering the comparison between steel and cars, RYAN argues that "in a competitive market, even if people were tied for life to particular segments, the starting rate in the wage-growth segments would be bid down (or up) by an excess supply of (or demand for) applicants until the reward streams became equivalent on a lifetime basis" (p. 13). The competitive market assumption, however, implies free labour mobility and suppresses segmentation factors linked to different market structures.

Third, the marginal return to schooling could in fact tell something relevant about the way in which a key productive factor such as education is being rewarded. That is, if education of comparable individuals is **persistently** rewarded unequally this would provide useful clues to the different **functioning** of two segments of the market.

Furthermore, if a reasonable and 'neutral'[32] analytical breakdown provides evidence like, e.g. the hypothetic situation illustrated in Figure 2 above, would not that be sufficient for one to consider the incremental approach as one way of looking at segmentation, mainly if the differences shown tend to be kept over time? That is, if the reward for education is, on average, persistently lower for comparable individuals placed in different segments - each one comprising several sorts of economic activities and thus different production processes - that will be informing about two **qualitatively** different markets; i.e. two different and pervasive standards of reward for schooling.

Figure 2 would then illustrate that segmentation could, in some cases, be seen both via differences in the level of rewards and in the marginal returns to human capital attributes.

[32] In the sense that it is not based on earnings or on other variable strongly correlated with schooling.

CHAPTER IV. THE EMPIRICAL BACKGROUND TO THE ANALYSIS

1. Introduction

This chapter sets out to present and discuss the empirical background to our investigation. Following this introduction, there will be four sections. Section 2 sets up a discussion on empirical findings from Brazilian studies on earnings and education in urban labour markets. Section 3 examines several criteria for distinguishing the formal and informal sectors in Brazil and makes the choice of the criterion to be used in our empirical analysis. Section 4 describes the data set, defines a basic sample, presents summary statistics and reports on some preliminary analysis. Finally, a two-fold section 5 seeks to characterise regional differences (Recife versus Sao Paulo) and sectoral dissimilarities (formal/informal). The first part of this last section resorts to published data and previous studies in order to highlight the relevant distinctions between the two metropolitan areas. The second part examines the formal-informal dichotomy in both regions through indicators such as average age, schooling, hours worked and earnings for groups differentiated on the basis of the status as formal or informal. Indices of income inequality - Gini coefficient - complete the set of indicators used.

2. Findings from previous studies on urban labour markets in Brazil

This section will, when appropriate, draw on the

discussion conducted in Chapter 2 on the issue of segmented urban labour markets. Hence studies which focus on the segmentation hypothesis or on the education-earnings relationship constitute the bulk of the references.

Regardless of being considered a complete paradigm or just a heterogeneous set of studies with common elements, the SLM approach has been a distinctive reference in several studies on Brazilian labour markets over the past several years, either to corroborate or to negate the segmentation hypothesis. It has been recognised that there is no historical precedent in the early stages of the present developed countries for the high degree of wage-inequalities observed in Brazil during the past three decades. Furthermore, such wage-inequalities are not fully explicable by differences in labour endowments[1].

Yet, in the Brazilian case, there are two institutional indicators that in practice establish important differences of status in the labour market: to possess or not the "work card" and to contribute or not to the national system of social security. Those workers without the work card (or who do not contribute to the social security system) have lower average wages and in principle do not have access to the legal benefits guaranteed to a registered labourer (holidays, an extra-salary a year - the so called "thirteenth salary" -, among others). Most of those engaged in the "informal sector", regardless of the clear-cut criterion adopted, are found to be

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[1] Fresh examples of empirical findings which point in that direction are SEDLACEK, BARROS and VARANDAS (1990) and COUTROT (1990).

non-registered workers. Therefore, there is an incidental availability of an institutional formal-informal breakdown which is widely utilised, as in several studies we refer to in this chapter.

Despite the reasonably fruitful debate in Brazil over the past several years on issues of segmentation, some important points remain to be further explored.

One crucial aspect for segmentation is the extent of intersectoral labour mobility. The point, however, is how to detect it empirically. Ideally, longitudinal data about the same individuals involving part of their lifetime would be the best bet. Nevertheless, securing such data requires expensive and time-consuming direct surveys - and this constitutes a serious limitation. Alternatively, mobility data may be obtained from surveys carried out on a certain date and seeking retrospective information[2]. This kind of survey, however, is rare and involves complexities that prevent it from being used by official institutions while conducting population censuses or labour market surveys. So, at present, information on this particular problem depends on indirect measures based on cross-section analysis.

We shall comment on some attempts - based on cross-section data - to detect labour mobility and segmentation in Brazilian labour markets.

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[2] In Brazil an example of survey with retrospective questions is the one quoted in TOLOSA(1975, p. 5) and carried out in 1972 by the Federal University of Minas Gerais (UFMG/CEDEPLAR. The survey, developed in 1972, allowed for the examination of mobility between the formal and informal sectors in Belo Horizonte Metropolitan Area. Quoted in SEDLACEK, BARROS and VARANDAS (1990, p. 91).

CUNHA (1977) analysed a sample of 289 low-income male workers in Rio de Janeiro, examining lifetime history questionnaires applied in 1969. He defined three groups of workers according to skills (unskilled, semi-skilled and skilled) and studied movements between and within groups. A total of 624 job changes occurring during the period 1914-1969 were examined. The dependent variable was the number of years in the last job, in a semi-log model which included experience, schooling and socio-economic origin, among others. The results pointed to: a) the predominance of movements intra-groups; b) the apparently small influence of human capital attributes (education and experience) on job changes - although peculiarities of the sample (low-income individuals) do not allow for a generalization of such an outcome.

COUTROT (1990), using data from the 1988's Brazilian Annual Household Survey (PNAD 1988), split the sample (47,007 observations) into formal and informal workers taking as a clear-cut variable the possession of the work card and contribution to the federal institution of social security. Those without any legal links were considered informal workers. A hypothesis of segmentation was then tested following the steps below:

a) the construction of a variable (named "comfort") which could represent permanent income and built up by a set of dummy variables representing: number of rooms in the household, the existence of running water, the possession of electrical appliances and water filter, and the existence of the public service of litter collection in the neighbourhood;

b) formulation and test of the hypothesis of mobility of workers from one occupational status to another. The basic idea in COUTROT's formulation is: in case of strict segmentation an individual would be unable to leave the informal sector and, therefore, would be - during all his working career - earning less than an individual with equivalent personal endowments but working in the formal sector. Thus the permanent income of the former would be lower than the latter's (similar to the difference found regarding personal earnings at the moment of the survey). The test performed was then to evaluate how much the estimated permanent income would be affected by the formal-informal breakdown adopted (legal status as work card holder or contributor to social security). The result pointed to the rejection of a rigid segmentation hypothesis, although a "smooth" mobility could not be stated either. In other words, a reasonable likelihood of mobility in the long run was admitted.

Another related finding that is worth mentioning is the one obtained by SEDLACEK, BARROS and VARANDAS (1990), in examining the hypothesis of mobility between occupational positions with and without work card in Sao Paulo Metropolitan Area. The authors managed to construct longitudinal data (although for one year interval only) based on Brazilian PME (Monthly Survey on Employment) for the years 1984 to 1987[3] .

They found that "almost 50%" (in fact 45.8%) of the non-

[3] The PME is based on a sample rotation system which leads to the same household being interviewed twice within an interval of one year between.

work-card workers in the first interview managed to be in work-card jobs one year after that. Considering this the most important finding in their work, they negated the hypothesis that the "non-work-card" situation was permanent. Unfortunately, they did not say a word about the other 54.2% of workers who remained in jobs without a work card, a proportion great enough to lead to a "symmetrical" conclusion. Instead, they estimated that a worker with no work card would stay in the same job only two years, on average. For the work-card holder that average would be 21 years.

The point regarding these estimates is that a strong assumption is made: that the likelihood for a worker to remain in the same status depended on the present situation and was **independent of previous situations.** The assumption and the estimates are too bold considering the heterogeneity of situations and occupational activities in the informal sector. It should not be expected, for instance, that a worker with no work card, employed in a backyard manufacturing unit - where he has been working for several years - would be able to change status in a short period of time as easily as a street vendor probably would, especially when this street vendor was a former wage worker unemployed as a result of recession. Furthermore, a one-year interval is too short a period to enable strong conclusions to be drawn about mobility, unless one is interested only in labour-force turnover.

In Brazil, the occasional resort to illegal employment relations by formal firms as a way of reducing costs is not a rare event. Such practices have increased as government

credibility has fallen and the fairness of federal tributes has been questioned in the last several years as a consequence of economic and political crisis. Part of the mobility detected by SEDLACEK *et al* could be explained by such relations. In other words, part of the informal sector could be the place for more stable relations, even illegal ones.

At the moment, the available data do not permit us to say much more about mobility. An additional comment: the period 1984-1987 is one of economic recovery and, therefore, part of the detected changes from informal to formal positions could correspond to unemployed formal workers getting back to previous positions (not necessarily in the same firm, of course).

Empirical results of the kind discussed above have driven us towards further examination of structural aspects linked to the hypothesis of segmentation. We do not think the present findings are the last word on the question. We could even consider results which question the general idea of lower average earnings in the informal sector, at least as something systematic and widespread (KATZ, 1980; CACCIAMALI, 1983; ARAUJO, 1986). ARAUJO (1986) found - in a comparison between 1980's average earnings in the Brazilian Northeastern manufacturing (published official data) and those in a sample of informal manufacturing surveyed in 1980 - that only the more modern segments of the formal industry (e.g. chemicals and equipment) presented a higher average pay compared with the corresponding informal industrial segment. That means some occupations in that sector could bring a reward even greater

than in similar position in the formal one, leading to an absence of wish for migration to the latter, at least for some time.

Two important counter-arguments to this line of reasoning could be raised. Firstly, the reported finding might just be a transitory result obtained at a particular time (apart from restrictions related to comparing samples of different sizes drawn under certainly different sampling procedures). In the Brazilian case, this might be particularly important considering that relative prices and relative wages could be liable to suffer significant changes given high rates of inflation and an erratic economic policy. In fact, the year 1980 happens to be the historical start of the current long period of 3-digit (now 4-digit) change in annual price indices. Secondly, even if informal earnings for some individuals can be shown to be higher than what they could obtain in a formal job, surely there is little probability of that being true for a "representative" individual.

As a matter of fact, the kind of comparison mentioned above could only be appropriately conducted with resort to longitudinal data, preferably about the same population and by using a formal-informal breakdown. The question is raised chiefly to remind us of the variety of situations that can be detected in the so-called informal market.

The relationship between earnings and education is, in this context, an issue to be further explored and for that we intend to stress the following aspects not yet sufficiently examined in Brazil: i) differences in the earnings-education

relationship between sectors; ii) the role played by occupational position (employee or self-employed); and iii) interregional comparisons.

Further consideration of relative earnings in the formal and informal sectors is necessary. Let us take COUTROT (1990) and CACCIAMALI (1983) as two cases where this issue is referred to. The sample examined by the first included civil servants, who were wholly assigned to the formal sector, an adequate procedure given the peculiarities of this segment of the labour market. Indeed, public administration displays, on average, greater levels of education. Furthermore, in the case of civil servants, defined promotion rules can coexist with political patronage for allocating workers and jobs - something that in the end brings that segment close to internal labour market procedures. Another aspect is that amongst civil servants different legal contracts coexist, which include a particular class of non-work-card-employees, the so-called "estatutarios" - although they could not be assigned to the informal sector. COUTROT, using analysis of variance, has detected a strong negative influence of the informal status on the employees' wages, a result that points to the general idea of lower earnings in the informal sector.

He has tried to qualify that result by examining the relationship between age and earnings in both sectors. Observing that informal employees are on average younger - and adding that income increases with age - he speculates that part of the difference in favour of formal workers comes from the difference in age. Pursuing that further, COUTROT

postulates that the rule of decreasing earnings after a certain age (he fixes 50) works for formal but not for informal workers. However, such a result was achieved by use of cross-tabulations between age intervals and lower/upper limits for wages (below 1 and above 5 minimum monthly wages). A regression of earnings on a linear and a quadratic terms for age would probably have produced a different outcome, confirming the parabolic shape of the age-earnings profile also for informal workers.

CACCIAMALI used as data-source a household-survey carried out in January, 1980 (804 units, 3,200 individuals), based on "open structured interviews". As referred to above, she found that the worst working conditions and the lowest earnings were not a general feature of the informal sector. That leads to the obvious conclusion: if **average** earnings are lower in the informal sector, as compared with the formal, some singular cases of a reverse position cannot be ruled out. Since the understanding of intersectoral labour mobility is considered far from satisfactory, this point can be of importance depending on how many such reverse cases occur. More rigorously: given the tricky question involved in allocating individuals to one or another sector (any analytical breakdown carries its flaws), reverse cases could in part reflect the weakness of the selection criterion.

We shall now consider some evidence from statistical measures of income inequality in Brazil. It is not our aim to go through the whole debate on education and income distribution in that country, one with a strong academic

tradition, particularly during the seventies - after a sharp increase in income-inequality indices from the middle sixties onwards. Surveys of this kind have been done elsewhere [TOLIPAN & TINELLI(1975)] and we would rather concentrate on recent contributions, more in tune with our specific analytical targets[4].

For the moment it is necessary just to mention that, measured by the Gini coefficient, inequality among the economically active population (PEA) has increased in Brazil during the last decades and years. Using data on individual income (earnings from all sources), BONELLI & SEDLACEK (1991, p. 57) found - based on demographic censuses - that the Gini coefficient increased from 0.497 in 1960, to 0.565 in 1970 and to 0.590 in 1980. They also found that during the eighties this coefficient increased steadily, despite some reduction during the Cruzado Plan (1986) and a decrease in the first year of that decade (1981). Between 1983 and 1989, the Gini coefficient (for the PEA, i.e. employed persons earning positive income) started from 0.592 and peaked in the last two years: 0.612 in 1988 and 0.635 in 1989 [BONELLI & SEDLACEK (1991, pp. 64-65)]. Taking decile shares as another inequality indicator, the top 10% kept a share of about 49% of the total income in 1988 whilst the bottom 10% had a share of less than 1% of the total income [BONELLI & SEDLACEK (1991, Table 3, pp.52-53)]. There is no doubt, therefore, that income

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[4] A recent survey on matters of income distribution in Brazil was conducted by RAMOS & REIS (1991). Furthermore, we have already referred to general aspects of this debate in Chapter III.

inequality has, by any standard, worsened in Brazil in recent years - shifting the debate once more to the role played by education, since it is known that increase in inequality does not occur in the same proportion for different demographic and social groups: some tend to benefit from the process of income concentration, in general those at the top of the distribution and sometimes those with higher level of education.

3. A discussion on the formal/informal dichotomy

It might be hoped that as a result of decades of debate about informal sector and segmentation a dominant and convincing clear-cut criterion would exist. In fact, depending on the researcher's objective and on the data available, different criteria can be adopted.

This section tackles the question of how to demarcate empirically the formal and informal segments, in particular through the use of WCD and SS as clear-cut indicators in studies on Brazilian urban labour markets[5].

We start by discussing several criteria, often mentioned in the Brazilian academic environment.

Distinct formal/informal segmentation approaches have been adopted worldwide since the concept established by ILO (1972), based on the characteristics of the firm (small-scale operation, labour intensive technology and family ownership, among others). Further studies following the ILO tradition added a maximum number of employees (5, sometimes 10) as a

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[5] WCD: possession of the work card. SS: contribution to the national system of social security.

distinctive characteristic of small businesses.

Studies based on household surveys, in general, resort to a ceiling income limit or even a schooling limit, assigning low-income and low-schooling people to the informal segment.

The most obvious implication of these definitions is their tautological nature. Indeed, the demarcation of a maximum level of income [sometimes education - see UTHOFF (1986)] leads to such findings as that informal workers have lower relative level of earnings. So, conclusions about informal characteristics can in fact be drawn from *a priori* assignments. In practical terms, quantitative limits also constitute another weak point of these approaches: why "5 employees"? or "maximum of 1 minimum salary of income" and not other near limits?

Approaches based on a Marxist tradition have tried to relate segmentation and production relations ("formal" = capitalistic relations, meaning waged employment and generation of "value"). In that sense, salaried employees are assigned to the formal sector whereas self-employed and family workers are assigned to the informal sector. This definition at first seems to be more theoretically rigorous as it centres on production relations - a qualitative indicator - and not on *a priori* quantitative limits. Yet some controversial aspects remain when one faces the reality of empirical research. Indeed, a rigorous application of the rule would, for example, assign a self-employed architect to the informal sector and a non-work-card individual employed in an illegal backyard manufacturing unit to the formal sector. So, if the objective

is to examine segmentation, this definition is not suitable.

A fourth approach has been adopted no less frequently than the above and is based on the empirical evidence that what has been identified as informal segment in several studies (under different methodologies) is characteristically associated with illegal relations and low earnings, although the latter is not a universal feature. The practical advantage of this definition lies in the qualitative nature of the clear-cut variables used (possession of the work card or contribution to the national system of social security - institutional variables). Yet this definition is not completely free from limitations. Indeed, some of the illegal relations that occur in the labour market are sometimes given a boost when economic agents try to evade taxes as a way of alleviating the burden on their budgets. When that happens, part of those "without work card" or "non-contributors to social security" could be individuals that otherwise would be naturally assigned to the formal sector.

However, the use of clear-cut institutional variables could reduce the bias on the estimation of earnings functions, if WCD or SS were a characteristic of the job rather than a personal attribute. Despite being something very difficult to be checked empirically, this issue merits further discussion.

What would in practice determine the status of individuals as being or not work card holders/contributors to social security?

As already mentioned in Chapter II[6], the work card is

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[6] See footnote 25 in that chapter.

meant to be compulsory: by law, every employer should sign it. Job applicants are also advised to get the work card at the Ministry of Labour. Once the employee is legally registered, he/she will also be a contributor to the federal system of social security. In practice, both employer and employees may not follow rigorously the rules and thus establish illegal relations, involving some mutual advantages: the firm reduces costs by evading the payment of its share in social contributions and the individual gets a gross wage with no deductions, above the net value obtainable from a legal contract[7]. On the other hand, the work card does not apply for self-employment, but an own-account worker (as well as a non-WCD employee) can choose to be a contributor. The remaining discussion will thus have as reference the more strict SS criterion for defining the formal/informal status.

From what has just been said, one could identify factors which would characterise SS as a job-related feature. Besides the legal imposition, modern and more organised firms, run by employers with a clear sense of entrepreneurship - amongst other characteristics more easily found in the primary sector of the labour market -, would naturally chose to establish formal labour contracts. Of course, as already mentioned, this can to some extent be blurred by tax-evading behaviour, but in

[7] In fact, the immediate advantage for the employee involves the risk of getting nothing in the future in terms of pension and all benefits secured by contributors to the system. Employers also face a concrete risk of the illegal employee later suing the firm and asking for compensation. In such cases, the normal outcome is the firm being forced to pay for all outstanding legal contributions and wages-related items in values adjusted for inflation.

general the job applicant is required to be registered with the Ministry of Labour.

On the other hand, the (first) choice of sector might be related to the socio-economic background of the individual. Those who come from less wealthy families and whose relatives are already engaged in the informal market would be more likely to choose this sector. Conversely, a similar pattern would work for those from more wealthy families, making them choose the formal sector. This would make SS an individual rather than job-related trait.

The choice of sector might be related also to the individual's ability and degree of risk-aversion. Indeed, not being a formal worker implies risks of e.g. instability (turnover) and about future well-being (pension, retirement, sick-leave benefits, etc.). This, besides putting SS as personal trait, also points to a potential source of selection-bias: the more able and more risk-averse self-selecting themselves into the formal sector.

Which of the factors aforementioned would play a major role in defining SS as a personal or job-related characteristic is open to question. However, one could try to make the data tell something about it. From figures which can be easily worked out from Tables 4-A to 8-B in the appendix to this chapter, one can compare the respective shares of SS contributors amongst employee and self-employed. They are displayed below, on a year-on-year basis (%):

	SÃO PAULO		RECIFE	
Year	Eyee	SE	Eyee	SE
1981	89.7	55.9	82.8	36.3
1983	87.5	56.9	76.8	29.4
1985	86.7	51.3	76.9	24.8
1987	88.4	51.9	76.7	27.0
1989	86.7	56.3	78.0	29.1

Without questioning the existence of a personal-related content in the SS status, it could be said that where 'external' factors are in action (legal enforcement, firm interests, etc.) individuals (employees) are predominantly SS contributors. As for the self-employment segment, where the SS/non-SS status might be related to the job contents (more on that shortly), the proportion of SS contributors is much smaller. In São Paulo, the employee SS share is close to an overall 90% whereas the self-employed SS share is something between 51 and 57%. In Recife, the discrepancy is still greater: an overall SS share just close to 80% amongst employees compared with an overall 30% amongst the self-employed.

The SS status amongst the self-employed might be linked to the contents of the job. Taking, for example, the cases of an architect and a plumber, the former is more likely to be a SS contributor, and the explanation for that should be sought in the fact that professionally it may suit him better to have a place (even his home) to be used as the business address; also, the income his job provides may justify the cost of contributing to the social security system; moreover, it may be convenient to have a legal registration given the characteristics of the demand he faces. In the case of a

plumber, these factors would not hold: he does not need a "business address" , his income may not justify extra costs such as the SS contribution, and there is no social pressure upon him to get a legal registration (his customers would be less demanding about it). All of this could be considered as "characteristics of the job".

The figures presented above also enable us to seek arguments by comparing the two regions. The much smaller proportion of SS contributors among the self-employed in Recife might reflect local labour market conditions and the general situation of more poverty.

The net result of this discussion is that there is scope for thinking of SS as a job-related characteristic, although personal-related factors may also operate. That is, it is not just the e.g. architect/plumber job differences, but also - when one looks at the self-employed as a category - it is worth noting that the age and schooling gaps between SS and non-SS is much greater among the self-employed than among the employees (see again Tables 4-A to 8-B). That is, younger and less educated people in the self-employment sector would be more likely to have the more precarious occupational situations and (forced?) to be less risk-averse. But again personal differences would put the more able and more educated people into the formal segment (either in the wage-employment or the self-employment sector). A potential selection-bias is, as already mentioned, almost unavoidable when any analytical or institutional split is adopted.

In any case, and despite the elusive character of the

issue discussed, we can contend that the institutional criterion - by eliminating the problem of the demarcation-line being based on a variable included in the set of regressors - is perhaps the least weak of the potential segmentation variables available.

4. About the data

4.1 General description and sample screening

The data cover the years 1981, 1983, 1985, 1987 and 1989 for Recife and Sao Paulo, two Brazilian metropolitan areas. The first two years correspond to a period of economic recession, whereas the following years characterise a period of recovery, although not a steady one[8]. Recife is a good representative of a less developed area (North-East). Sao Paulo is in fact the heart of modern Brazilian capitalism and is the capital of the most developed area (South-East) - dissimilarities between these regions are examined in section 5 below. Data are drawn from a larger sample extracted from PNAD surveys (involving nine metropolitan areas), comprising 325,556 observations for the whole period (Table 4-01 below) - the economically active population[9] . Recife and Sao Paulo have, respectively, a share of around 9% and 16% in the whole

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[8] Brazilian GNP presented the following rates of increase during the eighties, according to data produced by IPEA and quoted in the weekly magazine VEJA (3/11/93), in annual percentages:

1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
9.2	-4.5	0.5	-3.5	5.3	7.9	7.6	3.6	-0.1	3.3

[9] From the population covered by PNAD surveys was generated the large sample referred to above - comprising just the workforce (males and females).

TABLE 4-01
SAO PAULO, RECIFE & ALL METROPOLITAN AREAS
Workforce in the sample and in the population
1981/1989

YEARS	SAMPLE			POPULATION			PROPORTIONS (%)	
	ALL MAs (a)	S PAUL (b)	RECIFE (c)	ALL MAs (A)	S PAULO (B)	RECIFE (C)	(b)/(B)	(c)/(C)
1981	72 794	12 796	7 212	14 728 316	5 748 154	835 355	0.22	0.86
1983	77 060	13 602	7 267	15 829 460	6 124 201	892 859	0.22	0.81
1985	82 853	14 518	7 486	17 501 728	6 825 87	998 870	0.21	0.75
1987	46 122	7 731	4 385	19 226 167	7 464 70	1 088 117	0.10	0.40
1989	46 727	7 095	4 206	20 319 320	7 748 77	1 132 300	0.09	0.37

SOURCES: Sample - BRASIL/PNAD, magnetic tapes for public use; Population - FIBGE, Pesquisa Nacional por Amostragem de Domicilios/Brazilian Annual Household Surveys, several volumes.

sample of nine metropolitan areas. As shown in Table 4-01, the PNAD sample for all metropolitan areas constitutes a proportion of 0.5% of the metropolitan working population (decreasing to 0.2% in the last two years). The sample constituted by Sao Paulo and Recife together corresponds to a universe of analysis of almost 9 million people in 1989 - or around 44% of the metropolitan workforce (16% of the Brazilian working population).

The results analysed in this chapter are based on a sample of all individuals, in Recife and Sao Paulo, who bear the following characteristics: male; employee, self-employed or employer; urban activities; aged 10+ years. Additional filters involve the subtraction of non-paid workers and odd cases of people with an unknown level of education, both in very small proportion. The complete sample screening is depicted in Table 4-02 below. The total number of individuals (observations) for each year and area, which constitute the basic sample examined in this chapter, is shown in the final row of Table 4-02.

The data set utilised in this study comes from household surveys carried out annually in Brazil since the beginning of the seventies. It is considered a very good "asset" by any standard. The publication of results of those surveys on a regular basis have been providing material extensively and intensively used in studies of Brazilian labour markets. The utilisation of primary data from the same source, however, is still much less frequent, although it tends to become more widespread as computing resources become more and more

TABLE 4-02
SAMPLE SCREENING
From the total labour force to the basic sample referred to in this chapter. 1981/1989

SPECIFICATION	SAO PAULO					RECIFE				
	1981	1983	1985	1987	1989	1981	1983	1985	1987	1989
All	12796	13602	14518	7731	7095	7212	7267	7486	4385	4206
Male	8344	8792	9177	4889	4501	4579	4637	4733	2670	2660
Employed	7784	8022	8695	4639	4339	4188	4264	4504	2478	2497
Urban activities	7723	7979	8643	4610	4318	4038	4096	4344	2394	2437
Less non-paid workers	7651	7916	8585	4593	4301	3981	4028	4250	2384	2413
Less persons with unknown level of education	7640	7915	8583	4593	4300	3967	4022	4241	2383	2412

SOURCE: BRASIL/PNAD. Magnetic tapes for public use.

NOTE: NOTE: The last row shows the size of the basic sample on which this chapter is based. For details of the screening process see page 121. Further filtering was done for the sample used in Table 4-05 and in regressions via the dropping of cases of "ill-defined" sector of activity.

available. Primary data from those surveys, obtained in SAS-files stored in magnetic tapes, are the raw material for the analysis in this study[10].

Notwithstanding the excellence of the data available, one should point out its limitations and compensations for purposes such as the one pursued in the present study.

The limitations are those inherent in cross-section surveys of its kind:

i) Coming from household surveys the data set does not contain information about characteristics of firms (size, technology, etc.) that could allow for evaluation of institutional aspects of labour market segmentation;

ii) It is not possible to construct a panel (which would be useful for examining labour mobility, for example)[11];

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[10] The following must be observed:

i) The sampling rate defined in PNAD surveys ranges from 1/50 to 1/400, across regions and over time. From 1986 onwards the FIBGE (Brazilian Foundation of Geography and Statistics) reduced considerably the size of PNAD samples.

ii) All Tables and results analysed here involve weighted values. The sample contains a variable (named "weight") which tells the representativeness of each individual in relation to the population. Calculations performed in the following chapters are also weighted. SAS version 6.07 (mainframe) and STATA were the software utilised. The whole data set is stored in the Manchester Computing Centre.

[11] Recent efforts in trying to overcome this limitation of cross-section data led to the idea [put forward by BROWNING & IRISH (1985)] of generating a pseudo panel data from a cross-section data set. The authors do that by using age cohorts. In the present case this does not constitute a way out, given our splits by segment and region and occupational position. The introduction of cohorts would add many partitions and probably generate some empty cells. It would bring more problems than advantages.

iii) Absence of information on unionisation, another important aspect concerning segmentation.

As compensation for these flaws, availability of data on occupational employment status, sector of activity, position in the household, years of schooling (allowing for the use of it as a continuous variable or as dummy variables *per* educational level), region, weekly hours worked, non-labour income, unemployment, among others, provides a fruitful data set for a fairly detailed study on segmentation. The sectoral variables allow for grouping, through which we can discern Manufacturing, Civil Construction, Commerce, Services, Transport, Finance and Public Sector. It should be added that the data permit the construction of a reasonable formal/informal breakdown, as will be seen later in this chapter. Finally, it is worth mentioning that the sample is big enough to bear splits into distinct subsets if need be and, therefore, allows for several useful econometric experiments and procedures. Of course, such possibilities are not boundless, and the separations required by this study have already established the limitations in this respect.

4.2 Choice of regions and some summary statistics of the variables available

Recife, in the North-East, and São Paulo, in the South-East, are two typical metropolitan areas, which represent two distinctly different regions in terms of level of development. The former, despite having benefited from industrial incentive policy which helped to establish modern industries, belongs in

a state where the traditional sugar-cane industry has still a strong economic and political weight. High levels of poverty, unemployment and underemployment are salient characteristics. Although São Paulo is not free from unemployment and underemployment problems, it is the heart of modern Brazilian capitalist economy and the leading national economic pole. Together the two regions constitute a classical illustration of uneven regional development in Brazil. Therefore, these two metropolitan areas are quite appropriate to the type of analytical comparison pursued in this thesis. In the next section, both regions are contrasted by use of selected indicators.

For a general view of the respective distributions concerning basic variables, Table 4-02A below displays - for male employees, self-employed and employers[12] - means and standard deviations of age, education, weekly hours worked and earnings, the latter described by actual monthly figures and by standardised earnings, i.e. the amount each individual would earn if worked 40 hours *per* week - the modal value.

[12] Here we just make a general characterisation of the distributions of basic variables. To save the reader the burden of massive tables, we opted for presenting measures for pooled data across years. Earnings values are adjusted for monetary reforms in Brazil (two cuts of three zeros between 1986 and 1989) and for inflation - the latter according to indices elaborated by Getulio Vargas Foundation. Means and standard deviations for annual data are available in the Appendix to this chapter (Tables 4-02B, 4-02C and 4-02D). Statistics concerning female employees are presented in due course, when this group is incorporated into the analysis. Employers are included just to show how widespread is the occurrence of informal relations. Male employees, however, are the basic group which constitutes the main concern of this thesis.

TABLE 4-02A

SAO PAULO and RECIFE: Summary statistics for male employees, self-employed and and employers. Pooled data across years. Contributors and non-contributors to social security

REGIONS/SEGMENTS/ GROUPS		N.Obs	Age		School.(years)		W.Hours		Earnings(Cr$)		StdEarnings(Cr$)	
			MEAN	S.DEV	MEAN	S.DEV	MEAN	S.DEV	MEAN	S.DEV	MEAN	S.DEV
SAO PAULO												
Employees	All	26498	31.9	11.95	6.56	4.21	45.94	9.71	1.696	2.320	1.566	2.366
	Contrib	23281	32.4	11.47	6.79	4.28	45.93	9.08	1.838	2.419	1.695	2.466
	Non-contrib	3217	27.9	14.34	4.92	3.24	46.07	13.34	0.679	0.897	0.639	1.071
Self-employed	All	4803	40.8	13.13	5.51	4.21	50.13	15.75	1.891	2.456	1.672	2.893
	Contrib	2615	41.6	11.57	6.35	4.45	52.20	15.46	2.448	2.967	2.129	3.551
	Non-contrib	2188	39.8	14.70	4.51	3.66	47.66	15.73	1.229	1.390	1.129	1.665
Employers	All	1660	41.9	11.68	9.27	4.68	53.80	15.07	4.940	5.124	4.165	5.281
	Contrib	1521	41.7	11.41	9.40	4.67	54.12	14.98	5.027	5.206	4.167	5.213
	Non-contrib	139	44.2	14.12	7.87	4.51	50.39	15.70	4.023	4.070	4.147	5.979
RECIFE												
Employees	All	12727	32.2	12.40	6.29	4.34	45.29	10.54	1.063	1.736	1.033	2.028
	Contrib	9984	33.8	11.67	6.86	4.41	45.26	9.71	1.247	1.905	1.213	2.227
	Non-contrib	2743	26.3	13.15	4.27	3.35	45.40	13.11	0.405	0.509	0.390	0.747
Self-employed	All	3255	38.9	14.97	4.42	3.98	47.08	15.83	1.067	2.341	0.977	2.376
	Contrib	956	42.6	12.00	6.04	4.71	50.43	15.09	1.985	3.871	1.783	3.972
	Non-contrib	2299	37.4	15.78	3.76	3.44	45.71	15.92	0.693	1.061	0.649	1.068
Employers	All	564	41.8	12.27	9.11	4.76	49.77	13.61	4.357	5.564	3.822	5.067
	Contrib	433	41.3	11.68	9.67	4.70	49.06	12.92	4.990	6.089	4.384	5.532
	Non-contrib	131	43.2	13.90	7.35	4.51	51.99	15.44	2.362	2.558	2.055	2.474

VARIABLES / STATISTICS

Basic Data SOURCE: BRASIL/PNAD. Magnetic tapes for public use.

NOTE: Schooling: years of education
W. Hours: weekly hours worked
Earnings: actual monthly values
Std Earnings: 4-hour week standardised earnings
Earnings in real Cr$ of 1985, adjusted for inflation (Fundacao Getulio Vargas indices) and monetary reforms
For summary of ANNUAL statistics, see Tables 4-02B, 4-02C and 4-02D in Appendix to Chapter IV

5. A characterisation of the duality in São Paulo and Recife metropolitan areas

This section draws up relevant regional and sectoral dissimilarities in order to provide the background to our analysis of the earnings-education relationship in Chapter 5. The first part of this section deals with general indicators of differences between the two metropolitan areas or between the two macro-regions - North East (Recife) and South East (Sao Paulo) - where the metropolitan spaces are located, based on official published data. The second subsection examines how distinct are the formal and informal segments in each area, according to average measures of age, schooling, hours worked and earnings - all extracted from the basic sample used in the present study.

5.1 São Paulo and Recife. Selected indicators of regional differences

The share of the South East in the Brazilian industrial output in 1980 was about 69%. In the same year, the North East accounted for less than 10% of the national industrial output. On the other hand, whereas in the South East a third of the industrial product consisted of capital goods, for the North East the same ratio reached only 8% - also in 1980, according to official data from the Federal Bureau of Statistics and Getulio Vargas Foundation, quoted in GUIMARAES NETO (1991, pp. 151-154). These proportions show very clearly how different as economic spaces the two regions are and in fact reflect the evidence that the South East constitutes the heart of

Brazilian industrial capitalism and the North East (particularly the state of Pernambuco, whose capital is Recife) is a peripheral economy in the national context. Although emphasis have been put here on industrial activity, in terms of agriculture, the North-East's relative position is also peripheral.

It is worth displaying other indicators, of a demographic and social nature.

According to data on resident population in 1989, Sao Paulo shared 37.3% (17,149, 384 inhabitants) of the total of the nine largest metropolitan areas, whereas Recife had a share of 6.5% (2,980,700 inhabitants). Considering the economically active population (PEA), still for the year 1989, Sao Paulo (with 13,613,809 people) had a proportion of 34.7% and Recife (with 2,335,533 people) shared 6.0%[13] (also in respect of the total for the nine metropolitan areas).

Unemployment rates also give an important feature of the Recife metropolitan area as compared with Sao Paulo[14]. Between 1982 and 1989, Recife had the highest rate of open unemployment in Brazil (from about 7% to 5.6%), above the national average and systematically greater than the rate for Sao Paulo (from 5.2% to 3.7%). In 1983, at the climax of the recession, while the unemployment rate in Sao Paulo peaked at 6.8% in Recife the unemployed figure increased to 8%. Even today and despite all industrial advancement boosted by more

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[13] All information extracted from PNADs publications by FIBGE.

[14] Data from FIBGE/PME (Monthly Survey on Employment), quoted in CHAHAD (1990).

than 25 years of federal government incentives to the Northeastern economy, Recife is still an economy where sugar-cane-based activity plays a considerable role, economically and politically.

Another important indicator of the level of Recife underdevelopment is the proportion of the public sector in the formal labour market. Data for 1985 showed that, while in the state of Sao Paulo the public sector accounted for 14% of the jobs and 13.6% of the formal payroll, in Pernambuco these ratios were, respectively, 27.9% and 32.7% (the corresponding proportions for Brazil as a whole were 22.9% and 24.5%)[15]. The public sector share in the formal labour market of Recife metropolitan area, also in 1985, was even more salient: about 40% of the jobs and more than half the total amount of the wage bill[16].

As pointed out by ARAUJO & SOUZA (1990, p. 99), this strong proportion of the public sector in the formal labour market in Pernambuco might reflect the fragility of the local private economy.

To complete this portrayal of differences between the two areas, it is worth recalling REIS & BARROS (1991, p. 134) for

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[15] According to ARAUJO & SOUZA (1990, p. 94).

[16] GOVERNO DO ESTADO DE PERNAMBUCO/SEPLAN (1987, pp. 296-297). The official data source is RAIS (Relaçao Anual de Informações Sociais/Social Data Annual Report), produced by the Ministry of Labour. However, in 1985 the RAIS coverage had not yet reached 100% of the formal segment (although well above half of it), despite its being compulsory for each employer to produce the information required by the federal government. This comparison between the states of Pernambuco and Sao Paulo is anyhow enough to show the nature and dimension of the problem.

a dissimilarity found in a wider context: "The contribution of education to wage inequality does vary considerably across metropolitan areas. It tends to be positively correlated with the level of wage inequality and negatively correlated with the level of development. The contribution of education to wage inequality is higher in the least developed metropolitan areas located in the Northeast (Fortaleza and Recife)". Such dissimilarity is important because it is directly related to the object of this thesis.

Having examined regional differences in the level of development, we shall now turn to some indicators of income distribution in both regions.

In the South East in 1983, the Gini coefficient was 0.581 and the richest 10% appropriated 44.25% of the total income. For the North East the indicators were, respectively, 0.601 and 49.69%, whereas in national terms they reached 0.597 and 46.23% [JATOBÁ (1989, p. 64, Table III.3)][17].

ROMAO (1991, p. 116, Table 9) displays estimates of proportions of persons below the "poverty line" in the metropolitan regions. Such proportions were, in 1986, 39.9% for Recife and 16.9% for Sao Paulo[18].

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[17] In JATOBÁ (1989) it is not stated whether the Gini coefficients refer to all incomes or just labour income. However, we think they are based on income from all sources, as this is the usual way of presenting such indices in empirical studies on income distribution in Brazil. BONELLI & SEDLACEK (1991), for example, quote a Gini of 0.5917 for 1983 (in national terms), explicitly based on income from all sources. The data source (PNAD) is the same in both studies.

[18] There is no point in detailing here the methodology behind these estimates, based on standards established by the World Bank, the United Nations and the World Health Organization. It is enough to know that this poverty line

These social indicators are enough to differentiate the two metropolitan regions and it might be expected that regional differences in returns to education could in some way be related to regional dissimilarities of the magnitude portrayed here.

5.2 Characterisation of the duality formal/informal in Recife and São Paulo

This subsection examines the differences between the formal and informal segments of the labour market, as a result of the sample split according to the institutional criterion adopted.

Having already commented on the institutional device frequently used in Brazilian studies on segmentation (section 3), we start by outlining its application to our data.

The formal-informal breakdown was established as follows:

i) Employees who do not contribute to the federal system of social security are considered informal. Contributors are assigned as formal.

ii) Self-employed and employers who do not contribute to the national system of social security are taken as informal. Contributors are considered formal.

iii) A segmentation of employees also according to possession of the work card was deliberately included. The different results for employees (when the social security contribution or the work card criteria are applied - compare

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means something well below the legal minimum salary, whose monthly value is, in 1994, equivalent to less than US$ 100.

employees in Tables 4-03 and 4-04 below)[19] - might suggest that one should tighten the rules and regard as informal those employees without the work card **and** who do not contribute to social security. Indeed, the social security rule already represents such a strict criterion, since all non-contributing employees also do not have the work card. On the other hand, part of those without the work card can voluntarily contribute to social security as own-account workers. If one compares, for example, the absolute shares of employees for Sao Paulo, year 1983, according to the two rules - Table 1 and Table 5-A in the Appendix - one can see that the number of non-contributors is less than the number of individuals without the work card, the number of contributors is greater than the number of work card holders, and the total of employees is the same in both cases[20].

iv) In Brazil, a proportion of civil servants live under an old system in which they neither contribute to the federal system of social security nor have a work card. They are the so-called "estatutarios". Also, there are some groups (e.g. the military) which have their own social security system. Along with other groups they belong to the public administration and, therefore, they must be allocated to the formal sector.

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[19] We opted for including in this section only the relative values of the relevant measures. The corresponding absolute values are displayed in the Appendix (Tables 1, 2, 3 and 4-A to 8-B).

[20] A SAS job with the strict criterion - no work card **and** no contribution to social security -, applied to the year 1987, yielded the same number of informal employees as had already been found when the social contribution rule was used.

TABLE 4-03

SAO PAULO, RECIFE, metropolitan areas - 1981/1989
Summary of selected statistics for non-contributors to the national system of social security (percentages)

	SAO PAULO					RECIFE				
	Share	Age	Schooling	W.Hours	Earnings	Share	Age	Schooling	W.Hours	Earnings
1981										
Eyee	10.3	85.8	75.9	99.4	36.8	17.2	78.3	62.0	99.7	33.1
SE	44.1	96.8	72.9	89.3	50.1	63.7	84.3	71.4	85.0	42.0
Eyer	7.7	101.4	92.0	96.2	63.7	15.5	115.4	64.2	107.8	37.9
All	14.9	98.2	71.8	97.4	44.3	25.4	90.0	59.9	96.4	37.8
1983										
Eyee	12.5	85.4	71.7	102.0	37.9	23.2	81.2	59.9	102.0	33.6
SE	43.1	93.2	66.9	91.2	43.9	70.6	89.7	66.0	90.6	43.1
Eyer	5.8	102.9	75.7	90.8	51.2	20.7	114.8	60.0	91.5	71.6
All	16.8	94.7	67.9	100.6	42.3	33.5	92.6	58.7	99.8	43.5
1985										
Eyee	13.3	83.0	71.3	99.9	34.2	23.1	76.5	63.2	102.5	34.7
SE	48.7	92.4	66.8	87.0	53.3	75.2	87.2	60.0	94.8	41.7
Eyer	10.4	97.4	79.3	101.5	83.7	30.0	98.3	79.7	105.8	54.7
All	18.2	94.7	68.5	97.8	47.2	33.8	90.5	60.4	104.1	42.4
1987										
Eyee	11.6	91.3	70.9	99.3	40.4	23.3	75.3	60.8	97.1	31.1
SE	48.1	98.3	74.5	92.3	55.9	73.0	86.3	62.9	91.1	25.2
Eyer	10.9	120.7	95.4	82.0	103.7	22.5	94.3	68.6	103.8	43.9
All	17.0	103.6	71.1	99.4	56.9	33.3	89.0	59.3	97.0	39.6
1989										
Eyee	13.3	84.4	72.9	101.1	42.7	22.0	77.8	64.0	100.5	41.4
SE	43.7	96.0	72.6	96.1	45.2	70.9	90.1	53.9	89.1	30.9
Eyer	8.5	104.1	69.9	96.1	86.4	28.4	107.4	88.6	112.6	52.9
All	17.5	95.9	70.7	102.6	50.8	31.1	91.9	60.2	100.0	43.1

SOURCE: Tables 4-A to 8-B - Appendix

NOTES: Share - proportion of non-contributors in the total of each occupational group
Age - age index (contributor's average age = 100)
Schooling - schooling index (contributor's average years of schooling = 100)
W. Hours - hours worked index (contributor's average hours worked = 100)
Earnings - earnings index (contributor's average earnings = 100)

TABLE 4-04
SAO PAULO, RECIFE - metropolitan areas
Summary of selected statistics for non-work-card-employees
1981/1989 (percentages)

	SAO PAULO					RECIFE				
YEARS	Share	Age	Schooling	W.Hours	Earnings	Share	Age	Schooling	W.Hours	Earnings
1981	12.6	90.1	81.1	99.7	49.6	19.7	81.8	65.1	99.7	40.2
1983	14.1	89.9	75.0	101.3	45.4	25.1	83.5	62.5	101.9	37.9
1985	15.3	89.1	75.3	100.0	42.1	25.5	80.2	65.2	102.8	40.4
1987	14.0	94.1	76.6	100.0	51.2	25.1	77.4	64.0	98.1	34.8
1989	15.2	88.0	76.4	102.1	53.4	24.4	80.2	68.7	101.5	42.2

SOURCE: Tables 1,2,3 - Appendix

NOTES: Share - proportion of non-work-card-bearers in the total of employees;

Age - age index (work-card-employee's average age=100)

Schooling - schooling index (contributor's average years of schooling = 100)

W. Hours - work hours index (work-card-employee's average hours worked=100

Earnings - earnings index (work-card-employee's average earnings=100)

Table 4-03 displays results for employees, self-employed and employers following the social security rule. Table 4.04 presents the results for employees only, according to the work card rule. Both Tables give results for individuals in informal positions in relation to the ones with formal status and allow for overall temporal and regional comparisons. The basic measures selected were, besides the informal ratio, average values of age, schooling, working hours and earnings for each occupational group.

From the examination of the actual values (Tables 1, 2, 3 and 4-A to 8-B in the Appendix) and of Tables 4.03 and 4.04 above, the following findings can be extracted:

a) The value of the wage or income of the WCD and contributors groups is much greater than the corresponding earnings of the informal groups. This is true in each year, for both Recife and Sao Paulo and for all occupational groups. It confirms what has been found in previous studies.

b) The group with the highest proportion of people without legal occupation links (no contribution to social security) is the self-employed. This result is related to the previous findings about the close relation between being self-employed and having an informal status.

c) The proportion of non-work-card-workers is regularly around 12-15% in Sao Paulo and between 20 and 25% in Recife, pointing to the greater dimension of the informal sector in less developed areas in comparison with developed ones. Taking the self-employed alone, the fraction of non-contributors to social security is more than 40% (less than 50%) in Sao Paulo

and more than 60% (around 75% in 1985) in Recife.

d) The overall fraction of non-contributors to social security across years ranges from 14.9% (1981) to 18% (1985) in Sao Paulo and from 25.4% (1981) to 33.8% (1985) in Recife.

e) There is no clear trend in the informal share during the 1980s, either in Sao Paulo or Recife, for any of the occupational groups. That is true whether we check the social security rule or the work card rule. It could be said, however, that in the case of Recife that share is much greater from 1983 onwards, for all occupational groups. For example, amongst the employees the informal ratio jumps from around 17% in 1981 - SS rule - to around 22-23% in the subsequent years. Considering the WCD rule, this proportion also jumps from around 20% in 1981 to around 25% in the following years, among the employees. That also happens for the two other occupational groups in Recife. This jump might be explained by a worsening of the local labour market conditions in Recife from the trough of recession (1983) onwards, perhaps due to the fragility of the local economy, which would be more vulnerable to a downturn - factors that might also explain the persistent higher rates of unemployment in that region.

A further general comment is necessary before looking at more detailed aspects. Considering employees - the only occupational group to which the two institutional criteria can be applied - the overall difference in the indices when one or the other criterion holds is remarkable. With the exception of working hours, the informal status defined by contribution to social security carries average relative values of the

selected attributes well below those prevalent for the formal status. Being specific:

i) according to the social security criterion, informal workers would be up to 17% younger than the formal ones, in Sao Paulo (up to 24.7% in Recife), Table 4-03 - compared with a maximum differential of 12% (Sao Paulo) and 22.6% (Recife), when the work-card criterion holds (Table 4.04);

ii) informal workers would have up to 29.1% less education than the formal ones in Sao Paulo (up to 39.2% in Recife), according to the first criterion - against maximum differentials of 25% in Sao Paulo and 37.5% in Recife, when the work card clear-cut is applied;

iii) the first rule puts average earnings for informal employees up to 65.8% less than those in the formal sector in Sao Paulo (up to 68.9% in Recife) - whereas the maximum average wage differentials would be 57.9% in Sao Paulo and 65.2% in Recife according to the second criterion.

Therefore, the strict criterion of complete absence of legal coverage - comprising those who do not contribute to social security nor, as already seen, bear the work card - produces two groups with quite sharp differences in terms of personal attributes and earnings.

On the other hand, it is worth stating that the closeness of the average hours worked for formal and informal employees - regardless of the clear-cut criterion adopted - matches findings of a direct survey carried out in the Recife metropolitan area in 1980, when it was noticed that, despite the peculiarities of the informal sector, 48 hours *per* week

was the predominant pattern - the contrast with the formal sector not being remarkable [ARAUJO & SOUZA (1983, p. 129-131)][21].

We now turn to some more detailed results:

A) Age and working hours.

Regarding these two variables, Table 4-03 yields the results below:

i) Considering the overall proportion - regardless of occupational position - people in informal jobs are younger than those in formal positions, this being clearer in the case of Recife. For self-employed and employers, though, the picture is not so clear, as in both regions the indices corresponding to informal positions are closer to the formal ones (in comparison with the case of employees) or even greater as is the case with employers in Sao Paulo and in Recife, in several years.

ii) The remarkable aspect about working hours is that, on average, informal workers would be working less than those in the formal segment. It might be expected that those who earn less would try to work more in order to make up for the earning gap, if the income effect outstripped the substitution

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[21] It should be stated that tests of significance of differences between means [FREUND & WILLIAMS (1967, pp. 237-240)] performed for working hours have found the differences not significant. For the other variables above discussed, the differences in means were found significant (estimates calculated in a few cases only, as a case by case check was not necessary). It is worth adding that both possession of work card and social security contribution are found significant when treated as dummy variables in estimated preliminary earnings equations.

effect[22]. It ought to be noted, however, that considering the overall indices (i.e. not taking account of the different occupational positions) the average hours worked are quite similar in formal and informal positions as revealed by the "all" indices in Table 4-03. Furthermore, as already mentioned, tests have shown that these differences are not systematically and convincingly significant.

B) Earnings and schooling.

We shall start with the relative indices of earnings for employees. Overall, the degree of inequality between informal and formal sector workers is greater in Recife (smaller relative wage indices of non-contributors) than in Sao Paulo, although these relative indices get closer in 1989, as shown in Table 4-03. The relative wage indices of employees according to the WCD rule provide less clear results. In the year 1985 a NWCD worker's pay in Sao Paulo was about 42% of the other group's average level, whereas that relation is kept in the interval 45-53% for the other years - Table 4-04. At the present stage of analysis there is no particular explanation for a quite distinct index in that year. The wage indices of NWCD workers in Recife enable less clear conclusions to be drawn, as can be seen by looking at the relevant column in Table 4-04.

Taking now the other two occupational groups, the results point to a generally similar picture, both in terms of

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[22] We return to this issue in Chapter V. A comparison based solely on average values does not enable one to go any further. Moreover, the above sectoral differences in average hours worked might be reflecting the more common occurrence of part-time jobs in the informal sector.

segmentation and in terms of regional comparisons, although some slight differences occur (Table 4-03). Except for the year 1983 (employers group) the relative indices of income clearly show a smaller inequality in Sao Paulo in comparison with Recife, with a clear trend towards improvement across years among the employers. Corresponding with that, the inequality of schooling is systematically smaller in Sao Paulo, for these two groups (except in just two years: 1985 and 1989, for employers). As to the segmentation aspect, informal employers and self-employed present as sharp differences as those found for employees. In Sao Paulo, informal self-employed have, on average, up to 33.2% less education than the formal own-account workers; in terms of earnings that differential goes up to 56.1% (1983) to the disadvantage of informal self-employed. For informal employers in Sao Paulo, the differentials go up to 30% concerning education (1989) and up to 48.8% (1983) concerning earnings (with an odd exception in 1987, when informal employers would have earned roughly 4% more than formal ones). In Recife, the average disadvantages of informal self-employed reaches a maximum of 46% in terms of schooling (1989) and an extraordinary 75% in terms of earnings (1987); for employers the respective top negative differentials are 40% (schooling, 1983) and 62% (earnings, 1981).

Still regarding the variables depicted in Tables 4.03 and 4.04 (Tables 1,2,3 and 4-A to 8-B in the Appendix), two further points are worth noting.

First, although relative regional indices of schooling

were not constructed, it is observable (Tables 1, 2, 3 and 4-A to 8-B in the Appendix) that average years of education do not differ strongly from region to region for any occupational group or institutional status.

It is also worth observing that the differences between groups with distinct institutional statuses in the labour market do not necessarily mean strict segmentation, since there are also marked dissimilarities in terms of personal endowments. The general picture, therefore, points to remarkable differences with regard to occupational position and institutional status.

To conclude we shall now comment on the Gini coefficients for the earnings distribution of male employees in both regions - shown in Table 4-05, below[23]. It is observed that:

i) The indices show a greater inequality amongst those in the formal than those in the informal sector[24]. That is true for all years in Sao Paulo and for all but one year (1989) in Recife[25].

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[23] Calculation made for hours-worked-standardised values of earnings, i.e., each individual's earnings correspond to what he would earn *per* month if he worked 40 hours *per* week. That is, the calculations are equivalent to examining inequality in hourly earnings.

[24] A similar result has been produced for other countries in Central and Latin America (e.g. Colombia, Republica Dominicana, El Salvador and Paraguay). See TOKMAN (1981, pp. 951-952).

[25] The increase in the Gini for Recife informal sector in 1989 might be due to outlying observations rather than a genuine widening of income gaps; but in fact there occurred an overall increase in inequality in both regions in that year: in São Paulo, both formal and informal sectors present higher indices and narrower inter-segment gap than in the previous years. Therefore, the increase in inequality is more general, not just a characteristic of the informal sector in Recife.

TABLE 4-05

RECIFE, SAO PAULO : Gini coefficient
for male employees, contributors and non-contributors to
social security. 1981/1989

YEARS	SAO PAULO			RECIFE		
	All	Contrib	Non-contrib	All	Contrib	Non-contrib
1981	0.508	0.497	0.441	0.557	0.545	0.416
	(6130)	(5501)	(629)	(3082)	(2552)	(530)
1983	0.504	0.490	0.436	0.559	0.544	0.409
	(6301)	(5514)	(787)	(2969)	(2279)	(690)
1985	0.517	0.502	0.421	0.573	0.551	0.475
	(6930)	(6013)	(917)	(3048	(2346)	(702)
1987	0.506	0.494	0.473	0.580	0.563	0.444
	(3682)	(3257)	(425)	(1779)	(1365)	(414)
1989	0.537	0.527	0.490	0.618	0.597	0.610
	(3455)	(2996)	(459)	(1849)	(1442)	(407)

Basic data SOURCE: BRASIL/PNAD. Magnetic tapes for public use.

Note:number of observations between brackets

ii) 1989 is a year in which there occurred a sharp increase in earnings inequality, corroborating findings concerning overall inequality in the Brazilian metropolitan areas.

iii) The greater inequality among those in the formal, as compared with the informal sector, combined with higher earnings in the former (Tables 1, 2, 3, and 4-A to 8-B in the Appendix), constitute a result which reinforces findings from previous studies [BARROS (1988), p. 10].

iv) Inequality is much greater in Recife, the less developed area, than in Sao Paulo - as one would expect.

v) The overall results point to sharp differences in the distribution of earnings between regions and between sectors[26].

[26] It is worth noting that qualitative similar results were obtained when alternative indices of inequality such as Atkinson's index and Theil's first measure were used.

CHAPTER V. RATES OF RETURN TO EDUCATION IN RECIFE AND SÃO PAULO

1. Introduction

This chapter aims at analysing sectoral and regional differences in rates of return to education. Using the theoretical framework and the empirical background established in previous chapters, the investigation will look at: i) formal versus informal distinctions in each region and ii) regional differences in terms of the formal-informal dichotomy. Given the availability of information for five years (1981, 1983, 1985, 1987 and 1989), some results in terms of temporal analysis are also presented.

The study will take the employees as the basic group and work first with a standard Mincerian earnings function. Once the coefficients are estimated, we resort to Blinder's methodology [BLINDER (1973)] for the decomposition of the effects of education on earnings. Later an extended model will be examined by adding new variables from the data set available.

The next four sections carry the bulk of the analysis. Section 2 discusses and establishes the earnings function specification. Section 3 examines the results from the estimation of the standard model. The results from the estimated extended model are dealt with in section 4. In section 5, earnings differentials are broken down in order to understand better the respective contributions of education and personal endowments. Finally, section 6 contains additional comments on the empirical results analysed in the

three previous sections.

2. The earnings-function specification

The general shape of the basic model corresponds to the well known standard earnings function of the kind Y = f(S,U), where:

Y stands for individual earnings,

S represents schooling or formal education,

and U is a vector of variables representing individual characteristics.

Some points about this basic formulation need to be considered before proceeding. Firstly, "Y" will always be read in its general sense of earnings, instead of in the strict meaning of "wages". That leads us to interpret it conveniently as wage or salary or income, although the basic group defined in Chapter IV comprises only employees. Secondly, the contents of "U" should, according to the original formulation, include ability or intelligence, labour market experience, family background, socio-economic status of origin, among several others in a wide range of human capital variables. Since most of the variables of this kind are not readily observable, the standard contents of "U" are experience or age and the corresponding quadratic term - although many particular studies add variables according to availability (e.g. race, region of residence, family background, amongst others). Gender could be included in "U" if one were considering male and female individuals in the same sample. However, given discontinuities in women's labour market career and the usual

lack of information on that, additional shortcomings arise regarding the standard estimation of experience via the proxy "age **minus** five **minus** years of schooling" . Therefore, women should be dealt with in a separate estimation, following the most common procedure.

This basic formulation is then the first to be estimated here. In later stages, other variables will be included, such as:

i) sector dummy variables;

ii) individual's position in the household;

iii) dummy for other income source than the main job.

A third point is that, in its rigorous conception, an earnings function should tell what would be the increase in an individual's earnings if that individual had an additional year of education - a relation of **causality** that involves an observed variable and a hypothetical one[1]. An alternative to that would be to observe individual working histories and elaborate an *ex-post* picture of the relationship between earnings and education plus other human capital variables. No doubt, this alternative is in reality so ideal as to be almost impossible to achieve. The solution is then to resort to cross-section data and work on the assumption that earnings differentials of a group of individuals with similar

[1] Clearly the above statement is closer to the human capital assumption than to the screening hypothesis. However, it is necessary to be reminded that an earnings function just portrays a clear positive relationship between education and earnings. Whether that could be explained either through enhanced labour productivity or via some screening role performed by education, or both together, is always open to argument. This point was dealt with in more detail in Chapter II.

characteristics and different levels of schooling are a reasonable proxy for that hypothetical increment in the earnings of a single individual (who also had characteristics similar to those of that group) if that individual had an extra year of schooling - an **association** between education and gains. Undoubtedly, this procedure leads to other general shortcomings of estimations based on cross-section data not mentioned before[2].

Without dealing for the moment with the discussion about the possible alternative forms of the general function mentioned above, our choice falls on a semi-log function with the following specification:

Log Y = a + bS + cEX + dEXSQ + u, where

Log Y = log of monthly earnings

S = years of schooling or a vector of education dummy variables,

EX = labour market experience, defined as "age - 5 - years of schooling",

EXSQ = Experience squared, u = disturbance term.

The general procedure is to estimate the model for each sector of the market (formal and informal), in each region (Recife and Sao Paulo), for each year (1981, 1983, 1985, 1987,

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[2] About the more general limitations of estimating earnings functions through the use of cross-section data and about this passage from "causality" to "association" see MAZUMDAR, 1981, p. 84 and ATKINSON, 1980, pp. 100-101. Also, RAMOS (1991, p. 13). For a detailed discussion of earnings functions see Chapter II. Further points related to shortcomings in the use of cross-section data are specifically considered in Chapter IV, where we evaluate the strengths and weaknesses of our data set.

1989).

At the first stage the basic model above will be applied. At later stages, variables such as sectoral-dummies (manufacturing, construction, commerce, services, transport, financing) and dummies for the individual's position in the household will be added. In its expanded form, the model has the following shape:

$$LogY = \alpha + \beta S + \beta_1 EX + \beta_2 EXSQ + \beta_j SECT + \beta_9 POSH + \beta_{10} SECDY + u,$$

where $j = 3,4,\ldots,8$ and

SECT = vector of 6 sectoral dummy variables,

POSH = dummy for head of the household,

SECDY = dummy for a second income source.

Unlike previous studies on the same subject, no upper limit is imposed on the age range of the sample. On the other hand, and also unlike previous analyses of urban labour markets in Brazil, the lower limit is set at the age of 10, the same as that accepted for the economically active population. This is due to the key role played by the informal sector in the study. As is well known, this sector is bound to have in its labour force a considerable contingent of minors (specifically 10 to less then 18 years old) as well as people above 65 years of age, for example retired workers seeking to complement personal or family income.

Another question to be addressed in this section is that of working with annual or monthly earnings instead of wage rates. In a broad sense, the use of annual earnings in a wage equation may conceal effects from the relationship between variations in earned income and those in labour supply. More

specifically, as pointed out by SCHULTZ (1988, p. 591), the choice by individuals of working more or fewer hours may be affected by their respective levels of education. Therefore, different estimates of rates of return to education will come out whether one uses annual earnings or hourly (daily) wage rates as measure of labour supply. UTHOFF (1985, p.304) tries to overcome that by putting log of supply units (days worked) on the right-hand side of the equation and, noting that the coefficient of this variable may be interpreted as the partial elasticity of earnings in respect of units of labour supplied, he argues that when the (estimated) value of that coefficient is equal to unity, the specification is equivalent to using log of wage rates[3]. Nevertheless, it is worth recalling that "to introduce measures of labor supply among the right-hand-side explanatory variables in the wage function is also inappropriate, unless they are treated as endogenous" [SCHULTZ (1988), p. 592], that is, unless one applies simultaneous equations analysis - but the robustness of an empirical model of this sort also depends on how wide is the range of variables available.

In the present case we use a formulation that is equivalent to taking log of wage rate as the dependent

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[3] In fact, the relevant coefficient being equal to unity is a particular case which would reveal the equivalence of that procedure to using wage rate. Just as an exercise, we have tried UTHOFF's formulation on our data (male employees). The results (all values below unity) point to a much greater value of the elasticity of earnings with respect to hours worked in the informal than in the formal sector, in both regions, for all years. Although the experiment is not enough for deep conclusions, this might be in line with more flexible work rules in informal jobs.

variable. "Y" is treated as log of standardised earnings, defined as :

(40/individual's weekly hours worked) X monthly earnings, meaning that every individual's income corresponds to what a person would earn *per* month if he/she worked 40 hours *per* week.

40 is taken because that is the modal value of weekly working hours in both regions and both sectors. The formulation above is equivalent to just calculating the hourly wage.

Regressions were also performed with **actual** monthly earnings (log) as the dependent variable, without including labour supply as explanatory variable. The results - presented in Table APP-V.01 in appendix - point to lower rates of return to schooling than those obtained with log (standardised earnings) - Table 5-01 in this chapter, and that appears to be more evident for the formal sector. The values of R^2 do not differ strongly between the two specifications, although they are, overall, greater in the specification with actual monthly earnings, mainly in the informal sector in some years[4]. As to the coefficients on the terms for experience, their absolute values are systematically greater in the specification reported in Table APP-V.01. The more important result for our discussion, however, is that if it is assumed [SCHULTZ (1988, p. 592)] that the more educated may choose to work fewer hours in response to increased wage, the non

[4] All values of R^2 quoted here and in the next chapter are adjusted for degrees of freedom.

standardised (monthly) earnings equation would be underestimating the returns to education. Therefore, the lower rates of return in Table APP-V.01 (compared with results from the hours-worked standardised specification, Table 5-01) would be reflecting that. In other words, if returns to schooling of the more educated individuals were partly materialised in more spare time for non-market activities, the corresponding effect would not be detected by an equation based on annual (monthly) earnings. Note that general assumptions in SCHULTZ's reasoning (on which our discussion is chiefly based) for explaining the labour supply of the more educated - a less developed loan market for investment in human capital and greater inequality in family wealth, present in less developed countries - clearly apply to the case under analysis.

This line of reasoning carries implicit analytical support for the empirical possibility that the income effect of increased earnings by the more educated would be strong enough to offset the substitution effect (i. e. the supply of longer hours of work in response to higher earnings). This is investigated below.

Even without the construction of a proper simultaneous model - a possibility to be investigated further -, a simple labour-supply equation has been estimated, in order to seek a preliminary complement to the discussion above concerning the offer of working hours by more educated individuals. Taking log of working hours as the dependent variable, against a set of explanatory variables formed by log of hourly earnings, schooling, age, age squared, sector of activity dummy

variables, second income source and position in the household, the following findings should be mentioned:

i) The value of R^2 is not low, reaching up to almost 30% in the formal sector and up to 20%-21% in the informal, although this pattern tends to change in the last two years (1987 and 1989), with the informal equation presenting higher R^2 or about the same coefficient of determination of the formal;

ii) the dummy variable for position in the household is systematically significant and positive in the formal but there is no clear pattern for the informal sector, although Sao Paulo shows a more regular pattern also in the informal. That is, the overall result points to the fact that household heads offer more hours of work, in comparison with non-heads;

iii) the coefficient on schooling is not systematically significant (perhaps because schooling is correlated with other regressor, earnings) and does not allow for clear conclusions to be drawn regarding the direct relationship between education and hours worked;

iv) the value of the coefficient on log (hourly earnings) is systematically negative and significant in both sectors and regions, although the t-statistics are higher for the formal sector and for Sao Paulo. Here there exists a much clearer indication of an inverse relationship between labour supply and earnings. This points to the confirmation that, overall, the income effect outstrips the substitution effect of increased earnings - and that would be stronger in the formal sector (where average schooling is higher), as shown by the

higher values of the t-statistics.

This latter conclusion, however, may not bear the necessary robustness, given that it is not drawn from the estimation of a simultaneous equation model.

3. Results from the estimation of the standard model

3.1 A note on heteroscedasticity

Given the lack of measures for important variables such as ability and socio-economic background in our data set, we decided to investigate how realistic is the implicit hypothesis of constant errors-variance in the estimated statistical earnings function. Such an investigation can be summarised as follows.

i) Taking a sample of male employees - the same defined in Chapter IV - in one of the regions, Sao Paulo (data for 1989), four tests for heteroscedasticity were applied to each sectoral equation (formal and informal): Goldfeld-Quandt's, Szroeter's, Glejser's and White's[5]. All are suitable for large samples and Goldfeld-Quandt's was applied with the rigour suggested by KOUTSOYIANNIS (1977, p. 186): the central observations taken out amounted to a quarter of the total.

ii) All tests rejected the null hypothesis of homoscedasticity. However, several plots involving the errors and either linear or quadratic forms of each dependent variable (and also the plot of residuals versus the predicted

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[5] For Goldfeld-Quandt's and Glejser's tests the analysis is based on MADDALA (1989) and KOUTSOYIANNIS (1977). For Szroeter's test see JUDGE *et al* (1985) and DIELMAN (1991) and SZROETER (1978). The procedure for White's test follows BERNDT (1991, p. 209).

values of the dependent variable) did not reveal any clear picture of heteroscedasticity.

iii) As to the correction of the problem, Glejser's test suggested that education was the "key" variable and that the form $Var(u_i) = \sigma^2.Z$ - where Z is the quadratic form of the earnings function estimated, i.e. a linear combination of all dependent variables - was the best approximation to the specific form of heteroscedasticity. The t-statistics in the transformed equation were still very high and similar to those from the original regression; the standard errors were not much higher than those obtained in the first place. The same procedure was followed for the other region, Recife, same year and also for the year 1985. All results confirmed what had been suggested by the plotting of residuals against the predicted values of Y. Thus, it would not be worth re-estimating the whole set of earnings equations. We therefore kept the output from the original regression, whose parameters and statistics are those depicted in the Tables below.

One could offer an interpretation for the fact that the detected heteroscedasticity appears to be so weak. It could be the result of two opposite forces: a) the more educated the population, the more **stable** will be the earnings, leading to smaller variations; but b) for greater values of earnings the **variance will be magnified.**

3.2 Analysis of the results

Table 5-01 below displays the estimates from the specification with log of standardised earnings as the

dependent variable, covering five years between 1981 and 1989 - for each region. Three specific regressions were calculated: i) a pooled regression with no distinction between formal and informal (not shown) - it corresponds to the "restricted model" considered for the F-test, i.e., under the hypothesis that the relevant coefficients are the same for "formal" and "informal"[6]; ii) an equation for contributors to social security, that is, the formal sector; and iii) an equation for non-contributors, the informal sector. The respective equations in ii) and iii) constitute the "unrestricted model". Therefore, the null hypothesis is the one that establishes four restrictions, $\alpha=\alpha'$, $\beta=\beta'$, $\beta_1=\beta_1'$, $\beta_2=\beta_2'$ (constant term, schooling, experience & experience squared coefficients). The t-statistics are greater in the case of Sao Paulo, where they can be as high as 80.0 for the coefficients on education (formal sector). They are also greater in the regressions for the formal labour market as compared with the informal one. The lowest t-ratio (4.4) occurs for the variable EXSQ in the informal segment in Recife (in 1989). In short, all the estimates are highly significant.

Before going further in examining the results from the basic model, we shall look briefly at the estimates of pooled regressions across segments in each region, i.e. one equation estimated for all employees, with a dummy variable for segment (formal sector = 1); a schooling*segment interaction variable is also included. Table 5-01A below presents the results.

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[6] Since it is an equation constructed just for the F-test, we decided to omit it from the table. Instead, we present the pooled equations described in Table 5-01A.

TABLE 5-01

SAO PAULO & RECIFE: statistics from regressions on the basic model
Formal and informal labour markets. Male employees. Dependent variable: lnY
1981/1989, selected years

YEARS/ EQUATIONS	SAO PAULO R sq	Intercept	School.	Exp	Expsq	N.Obs	RECIFE R sq	Intercept	School.	Exp	Expsq	N.Obs
1981												
Formal	0.5205	8.1	0.1545	0.087	-0.00117	5501	0.525	7.74	0.1592	0.069	-0.00083	2552
		(248.9)	(74.4)	(39.1)	(-29.1)			(150.2)	(52.6)	(20.2)	(-13.9)	
Informal	0.3736	7.87	0.135	0.071	-0.0009	629	0.3231	7.42	0.1331	0.0782	-0.00098	530
		(98.2)	(17.5)	(12.2)	(-9.4)			(78.7)	(14.4)	(11.2)	(-9.1)	
1983												
Formal	0.5435	9.42	0.1590	0.085	-0.0011	5514	0.532	8.96	0.1627	0.081	-0.00098	2279
		(291.1)	(78.7)	(39.8)	(-28.3)			(157.5)	(50.0)	(21.5)	(-14.6)	
Informal	0.3069	9.43	0.1156	0.068	-0.0009	787	0.305	9.03	0.1221	0.063	-0.00073	690
		(127.1)	(16.6)	(13.3)	(-10.6)			(110.7)	(15.8)	(11.1)	(-8.0)	
1985												
Formal	0.5292	11.71	0.1613	0.084	-0.00113	6013	0.517	11.32	0.1641	0.078	-0.00092	2346
		(359.9)	(79.7)	(38.6)	(-28.0)			(196.7)	(49.0)	(20.6)	(-14.0)	
Informal	0.3198	11.61	0.1171	0.069	-0.000899	917	0.3207	11.04	0.1384	0.082	-0.00107	702
		(172.3)	(17.0)	(13.8)	(-9.9)			(121.5)	(15.8)	(11.7)	(-8.5)	
1987												
Formal	0.5258	7.01	0.1544	0.082	-0.001088	3257	0.4957	6.55	0.1608	0.065	-0.000709	1365
		(166.1)	(57.6)	(28.8)	(-20.5)			(82.1)	(36.4)	(11.9)	(-7.2)	
Informal	0.315	7.03	0.1249	0.062	-0.00083	425	0.2956	6.27	0.1229	0.083	-0.00108	414
		(69.8)	(12.0)	(8.4)	(-6.5)			(56.5)	(10.7)	(9.9)	(-7.8)	
1989												
Formal	0.4549	4.91	0.1548	0.071	-0.0009	2996	0.482	4.26	0.1668	0.054	-0.00052	1442
		(101.1)	(47.9)	(21.8)	(-14.8)			(56.6)	(36.1)	(10.5)	(-5.7)	
Informal	0.2878	4.86	0.1248	0.062	-0.00077	459	0.3304	4.01	0.1484	0.061	-0.00067	407
		(47.6)	(11.6)	(8.5)	(-6.4)			(34.5)	(13.3)	(6.8)	(-4.4)	

SOURCE: BRASIL/PNAD. Magnetic tapes for public use.
NOTES:

Formal: contributors to social security
Informal: non-contributors to social security
t-statistics in brackets

TABLE 5-01A
SAO PAULO & RECIFE: statistics from regressions on pooled equations across segments. Male employees
Dependent variable: lnY. 1981/1989, selected years

REGIONS/ VARIABLES	YEARS 1981	1983	1985	1987	1989
SAO PAULO					
R sq	0.5551	0.5737	0.5722	0.5447	0.4808
Intercept	7.7 (167.3)	9.2 (217.1)	11.5 (270.9)	6.8 (111.6)	4.8 (71.0)
Schooling	0.1388 (20.0)	0.1277 (20.7)	0.1229 (19.4)	0.1328 (14.4)	0.1283 (12.9)
Experience	0.085 (41.0)	0.083 (42.2)	0.082 (40.8)	0.079 (29.9)	0.070 (23.7)
Exp sq	-0.001127 (-30.6)	-0.001068 (-30.7)	-0.001094 (-29.7)	-0.001059 (-21.7)	-0.000880 (-16.4)
Segment	0.3917 (9.1)	0.2719 (7.1)	0.2754 (7.1)	0.2452 (4.2)	0.1758 (2.7)
SegmentXSchooling	0.0154 (2.2)	0.0298 (4.7)	0.0375 (5.8)	0.0201 (2.1)	0.0259 (2.5)
N. observations	6130	6301	6930	3682	3455
RECIFE					
R sq	0.5721	0.5772	0.5745	0.5534	0.5270
Intercept	7.5 (142.0)	8.9 (173.0)	11.0 (196.8)	6.3 (87.0)	4.0 (55.1)
Schooling	0.1307 (16.5)	0.1291 (18.5)	0.1406 (18.3)	0.1239 (11.7)	0.1486 (14.7)
Experience	0.071 (23.6)	0.076 (24.5)	0.079 (23.6)	0.072 (15.8)	0.056 (12.7)
Exp sq	-0.00087 (-17.0)	-0.0008998 (-17.0)	-0.000951 (-16.3)	-0.000848 (-10.7)	-0.000565 (-7.3)
Segment	0.2258 (4.8)	0.1784 (4.1)	0.2980 (6.1)	0.1477 (2.2)	0.2051 (3.0)
SegmentXSchooling	0.0288 (3.5)	0.0319 (4.3)	0.0223 (2.7)	0.0366 (3.3)	0.0178 (1.7)
N. observations	3082	2969	3048	1779	1849

SOURCE: BRASIL/PNAD. Magnetic tapes for public use.
NOTE: T-statistics in brackets
segment = 1, formal; 0, informal

The overall intersectoral gap in log (earnings) in favour of the formal sector - reflected in the positive and highly significant coefficient on the variable segment - shows a declining trend in the case of Sao Paulo (from 39% in 1981 to about 18% in 1989, with a sharp drop in the last year); in Recife, it is about 20%-30% - showing an increase from 1987 through to 1989. Although being a suggestive outcome, it does not enable us to go much further - ideally, for the examination of temporal trends in earnings differentials we should use data for complete and perhaps lengthier series; it would be useful to know if oscillations in the values of the coefficient on segment, particularly in the case of Recife, would enable one to be more categoric about trends[7].

On the other hand, the interaction variable segment*schooling illustrates clearly that the effect of schooling on log(earnings) will depend on the segment of the market the individual is in. True, the coefficients on this variable are always positive and highly significant, with one exception in 1989 (Recife) - although it is significant at 10%. The effect of schooling on log(earnings) will be greater if the individual is in the formal. As for the coefficients on all other variables, their signs are those expected from the theory. These results, therefore, provide a solid basis for the analysis based on separate earnings equations which follows.

F-tests performed for the regressions in Table 5-01

[7] Studies on urban labour markets in Brazil have not so far provided any solid evidence of a decreasing formal-informal wage gap.

yielded very high values of F, showing that the estimated differences in the coefficients are significant at all conventional levels[8].

The values of R^2 are about 50% or more in the formal labour market in both regions, showing an extremely reasonable goodness-of-fit for regressions of this kind. It is a very good result given that other determinants of earnings known to be important are not in fact included in the equation: ability, socio-economic background and demand-side variables (sector of activity, local labour market conditions, etc.). So, education and experience alone would explain about half the observed inequality in earnings as measured by the variance of log-income. As to the informal segment, the R^2 of about 30% are in line with what might be expected: education and experience are less important as determinants of earnings in the informal sector.

It is worth adding that a simple least squares regression of (log) earnings on education produced very high values of the coefficient of determination. For the year 1989 the values of R^2 were 30.8% in the formal labour market of Sao Paulo and 36.4% in the same segment in Recife. As to the informal, the values of R^2 went to 13% and 18% for the same regions respectively[9]. Such results also corroborate previous findings

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[8] Tests for 1989 yielded F = 22.1 in the regressions for São Paulo and F = 12.6 in the case of Recife.

[9] Such values of R^2 from simple regressions of (log) earnings on schooling are extremely high by any standards, MINCER (1974), quoted in BERNDT (1991, pp.172-173), found a R^2 of just 6.7% from a regression of this kind. Of course, for being a result for a developed economy (USA) it is not strictly comparable with ours, although Sao Paulo taken alone

which show that in Brazil the contribution of education to the causes of inequality appears to be **positively** correlated with the level of earnings inequality and **negatively** correlated with the level of economic development [REIS & BARROS (1991, p. 134)].

Indeed, the rates of return produced by the regression of the basic model are higher in the formal sector than in the informal, and also in the less developed area (Recife) as compared with the developed Sao Paulo. This matches the findings in Chapter IV regarding the greater inequality in the formal, overall, and in Recife compared with Sao Paulo - and greater rates of return to education can be associated with greater earnings inequality.

The coefficients which represent returns to experience in the labour market, defined here according to the conventional "age **minus** 5 **minus** schooling", may allow for some comparisons. It is in Recife where returns to experience, for a given level of experience, tend to be greater in the informal than in the formal[10]. One might suggest that there is a sort of

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would not be so inadequate for such a parallel. As to the coefficients of determination depicted in Table 5-01, mainly those for the formal sector, they are clearly very high as one can gather from what was found in a recent broad survey: "The wage function is a powerful device for summarizing data on individual wages or earnings. Even the most simplified semi-logarithmic function, conditioned on years of schooling and a quadratic in post-schooling years of experience, accounts for a **remarkable one-quarter to one-half** of the log variance in male wages across most national labor markets" (SCHULTZ, 1988, p. 616).

[10] A brief exercise, by considering (say) EX=10, showed that returns to experience are, in the case of São Paulo, systematically greater in the formal sector than in the informal. In Recife, the reverse occurs in 1981, 1987 and 1989. Overall, there is no marked difference in these returns

compensation for a lower return to education in informal positions, although such an interpretation would require much clearer evidence than that found here.

The extent to which the estimated rates of return to education could be upward-biased is another point worth noting. As is well known, the omission of the individual's ability and family background variables - expected to be correlated with education - might imply that the coefficient on education will also reflect effects of these omitted variables. Thus, the estimated rates of return to education would be higher than the real ones, or higher than they would be if these variables were included. In respect of this, some qualifications are made.

Firstly, we are mainly concerned with **comparisons** between sectors and regions - case in which problems involving the level of returns have their importance reduced.

Secondly, there are less often mentioned factors which account for overestimation of coefficients on education (omitted earning-shares derived from non-human capital factors such as ownership of means of production) and those are not in action in our model since self-employed and employers are excluded from the sample.

Thirdly, our data set does not include information on fringe benefits; that is, monthly earnings represent the monetary value of paid salaries. As a consequence, the estimated rates of return are likely to be biased downwards because the value of fringe benefits probably increases with

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between the two segments.

the individual's level of education. Since it is not unreasonable to suppose that (monetary and non-monetary) fringe benefits are higher for those in the formal than for people in the informal labour market, the downward bias will be greater in the estimation of the formal sector equation[11]. Therefore, the gap between the sectoral rates of return to education is narrower than otherwise it would be. In other words, if the rates of return to education are overestimated as a result of omitted-variables-bias the **sectoral gap**, the most relevant result in terms of our analysis, will in fact be **underestimated**[12].

4. Results from the estimation of the extended model

4.1 A note on the new variables

Tables 5-02 and 5-03 below display, for Sao Paulo and Recife respectively, the results from the regressions after sector dummy variables (SECTs), and dummies for head of household (POSH) and another income source (SECDY) than the job have been added to the basic equation. The vector of sectoral dummies contains the only demand-related variables

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[11] Strictly, one should allow for the possibility of the **increase** in returns to education from the inclusion of fringe benefits being greater in the informal than in the formal sector. But, intuitively, we do not see any reason to expect that.

[12] As a matter of fact, PNAD data do not include values of the so-called "thirteenth salary", an extra monthly payment legally guaranteed to every employee in the formal sector - something unattainable in the informal. Thus, apart from other fringe benefits which may vary from firm to firm, there exists in our data set the omission of an extra-salary payable to those in the formal sector - and that clearly pushes downwards the estimated rates of return to education in this sector.

TABLE 5-02

SAO PAULO: Statistics from regressions on the extended model
Formal and Informal labour markets. Male employees. Dependent variable: lnY
1981/1989, selected years

YEARS/ EQUATIONS	R sq	Interc.	School.	Exp	Exp sq	SECT2	SECT3	SECT4	SECT5	SECT6	SECT7	POSH	SECDY	N.Obs
1981														
Formal	0.5605	8.30	0.1461	0.0703	-0.0010	-0.1824	-0.2925	-0.2215	-0.2141	0.1330	-0.2703	0.2325	0.1555	5501
		(248.4)	(67.3)	(27.5)	(-22.7)	(-5.7)	(-10.9)	(-9.3)	(-6.4)	(4.0)	(-9.8)	(10.8)	(6.7)	
Informal	0.3826	8.03	0.1335	0.0610	-0.0008	0.0123	-0.2232	-0.1178	0.0102	0.0344		0.1004	-0.0136	629
		(82.8)	(16.4)	(8.5)	(-7.2)	(0.2)	(-3.2)	(-1.8)	(0.1)	(0.2)		(1.4)	(-0.2)	
1983														
Formal	0.5884	9.66	0.1472	0.0659	-0.0008	-0.3433	-0.2758	-0.2680	-0.1705	0.0915	-0.1837	0.2620	0.1848	5514
		(289.8)	(70.7)	(26.7)	(-21.0)	(-11.6)	(-11.1)	(-11.9)	(-5.5)	(3.2)	(-7.2)	(12.6)	(7.8)	
Informal	0.3285	9.58	0.1092	0.0626	-0.0009	-0.1339	-0.1609	-0.1475	-0.1597	0.5235		0.1258	0.0571	787
		(112.6)	(15.0)	(10.0)	(-9.0)	(-2.1)	(-2.5)	(-2.6)	(-1.5)	(3.4)		(2.1)	(0.7)	
1985														
Formal	0.5685	11.95	0.1514	0.0613	-0.0008	-0.2436	-0.2597	0.0280	-0.1869	0.0585	-0.1608	0.2264	0.1135	6013
		(356.1)	(72.5)	(23.9)	(-18.6)	(-7.4)	(-10.1)	(-12.8)	(-5.8)	(2.0)	(-6.1)	(9.9)	(6.3)	
Informal	0.3333	11.76	0.1100	0.0548	-0.0007	-0.0111	-0.1425	0.0098	-0.0785	0.1745		0.2323	0.0281	917
		(150.4)	(15.3)	(8.9)	(-7.4)	(-0.2)	(-2.5)	(0.2)	(-0.7)	(1.2)		(3.7)	(0.3)	
1987														
Formal	0.5549	7.21	0.1464	0.0628	-0.0008	-0.2443	-0.2267	-0.1518	-0.1868	0.0445	-0.1618	0.1916	0.1326	3257
		(164.3)	(53.0)	(18.6)	(-14.6)	(-5.3)	(-6.9)	(-5.0)	(-4.2)	(1.0)	(-4.4)	(6.2)	(5.3)	
Informal	0.3196	7.15	0.1220	0.0487	-0.0007	0.0257	-0.0960	-0.0454	0.1101	0.2163		0.2341	-0.0743	425
		(58.7)	(10.9)	(5.4)	(-4.7)	(0.3)	(-1.0)	(-0.5)	(0.5)	(1.1)		(2.4)	(-0.7)	
1989														
Formal	0.4781	5.08	0.1466	0.0555	-0.0007	0.0901	-0.1975	-0.1614	-0.0287	0.2633	-0.1540	0.2058	0.0345	2996
		(97.5)	(43.0)	(14.1)	(-10.6)	(1.5)	(-4.9)	(-4.7)	(-0.6)	(5.1)	(-3.4)	(5.6)	(1.2)	
Informal	0.2908	5.00	0.1193	0.0486	-0.0006	-0.0670	-0.0207	-0.0728	0.2025	0.1020		0.2268	-0.0236	459
		(40.0)	(10.3)	(5.5)	(-4.8)	(-0.6)	(-0.2)	(-0.9)	(1.2)	(0.4)		(2.2)	(-0.2)	

Basic data SOURCE: BRASIL/PNAD. Magnetic tapes for public use
NOTE: SECTs represent respective dummy variables for: Construction, Commerce, Services, Transport, Finance, Public Sector - the basic variable is Manufacturing; POSH=dummy variable for head of household; SECDY=dummy variable for individuals wiht other income source than his job.
t-statistics in brackets For summary statistics of the variables, see Table 5-02A in appendix

TABLE 5-03

RECIFE: Statistics from regressions on the extended model
Formal and Informal labour markets. Male employees. Dependent variable: lnY
1981/1989, selected years

YEARS/ EQUATIONS	R sq	Interc.	School.	Exp	Exp sq	SECT2	SECT3	SECT4	SECT5	SECT6	SECT7	POSH	SECDY	N.Obs
1981														
Formal	0.5585	7.94	0.1426	0.0503	-0.0006	-0.0590	-0.1357	-0.1645	0.0537	0.3495	0.0269	0.2843	0.2550	2552
		(143.9)	(42.0)	(13.1)	(-10.1)	(-1.5)	(-3.3)	(-4.3)	(1.0)	(6.1)	(0.8)	(9.0)	(5.2)	
Informal	0.3738	7.60	0.1329	0.0602	-0.0008	0.1884	-0.2534	-0.1278	0.0053	-0.0554		0.3091	-0.1355	530
		(68.1)	(14.0)	(7.7)	(-6.9)	(2.1)	(-2.9)	(-1.6)	(0.0)	(-0.3)		(3.7)	(-1.1)	
1983														
Formal	0.5742	9.16	0.1501	0.0620	-0.0008	-0.1048	-0.2097	-0.1641	-0.0933	0.4741	-0.0945	0.3107	0.1944	2279
		(153.2)	(42.8)	(14.6)	(-10.7)	(-2.3)	(-5.0)	(-4.1)	(-1.7)	(7.8)	(-2.6)	(8.9)	(3.3)	
Informal	0.3200	9.21	0.1189	0.0500	-0.0006	-0.0076	-0.0993	-0.1816	-0.0184	0.2848		0.2158	-0.1183	690
		(89.3)	(14.8)	(7.3)	(-5.9)	(-0.1)	(-1.2)	(-2.4)	(-0.2)	(1.0)		(3.0)	(-1.0)	
1985														
Formal	0.5477	11.50	0.1533	0.0603	-0.0007	-0.0961	-0.2312	-0.1625	-0.0626	0.3586	0.0314	0.3258	-0.0686	2346
		(188.4)	(43.5)	(14.1)	(-10.4)	(-2.0)	(-5.4)	(-4.0)	(-1.1)	(5.1)	(0.8)	(8.4)	(-2.3)	
Informal	0.3583	11.30	0.1303	0.0601	-0.0008	0.0899	-0.1375	-0.1904	-0.0229	0.6735		0.3311	0.0133	702
		(102.2)	(14.4)	(7.7)	(-6.2)	(1.0)	(-1.6)	(-2.5)	(-0.2)	(2.7)		(4.5)	(0.1)	
1987														
Formal	0.5222	6.66	0.1529	0.0535	-0.0006	-0.0533	-0.1120	-0.1933	0.1271	0.4648	0.0216	0.2278	-0.0461	1365
		(79.8)	(33.1)	(8.7)	(-5.6)	(-0.7)	(-1.9)	(-3.4)	(1.7)	(5.2)	(0.4)	(4.6)	(-1.2)	
Informal	0.3276	6.59	0.1116	0.0635	-0.0008	0.0416	-0.2951	-0.1966	0.2104	0.1919		0.2155	-0.0465	414
		(45.2)	(9.1)	(6.2)	(-5.3)	(0.4)	(-2.8)	(-1.97)	(1.4)	(0.7)		(2.1)	(-0.3)	
1989														
Formal	0.5183	4.46	0.1527	0.0382	-0.0004	-0.0591	-0.2409	-0.1804	0.0225	0.4967	0.1164	0.2454	-0.0026	1442
		(55.8)	(32.0)	(6.6)	(-3.7)	(-0.9)	(-4.0)	(-3.5)	(0.3)	(5.7)	(2.2)	(5.0)	(-0.1)	
Informal	0.3586	4.26	0.1350	0.0511	-0.0006	-0.1254	-0.2839	-0.1328	0.1194	1.0579		0.1993	0.2326	407
		(29.0)	(11.6)	(4.8)	(-3.8)	(-1.0)	(-2.4)	(-1.2)	(0.7)	(2.8)		(1.7)	(1.3)	

Basic Data SOURCE: BRASIL/PNAD. Magnetic tapes.
NOTE: SECTs represent respective dummy variables for: Construction, Commerce, Services, Transport, Finance, Public Sector - the basic variable is Manufacturing; POSH=dummy variable for household head; SECDY=dummy variable for individuals with other income source than his job.
t-statistics in brackets For summary statistics of the variables, see Table 5-03A in appendix

available. In several empirical results elsewhere, sector variables are in general significant and play an important role in the determination of earnings; in general there exist sharp differences in wages related to activity and occupation, mainly due to different technologies, different market structure, distinct levels of unionization, or even the existence or not of internal labour market rules, characteristically more frequent in modern activities.

As to POSH and SECDY, both must be correlated with education in the sense that: i) head of households tend to be more educated, to have access to better jobs and, therefore, to be the ones with greater monetary contribution towards the household expenditure; ii) second income sources are in general held by those whose education level or family background allow them to obtain rents from home renting or other kind of property or by selling (qualified?) services simultaneously to the main job activities. In regard to this it is worth noting that second income sources in our data comprise retirement, rent (rental property), pension, amongst others.

Although this kind of information is usually coupled to some caveats (many respondents to a survey tend to omit information about income, especially "extra" income), it is useful to look at some evidence from tabulations of our data. It has been found that, overall, there is a large predominance of the response "others" in the range of second income sources, and this brings us to more speculation (e.g. that part of "others" could be formed by services selling, as

already referred to).

The second more important secondary source of income is rent or retirement. In terms of our sectoral dichotomy, the item "others" in the formal and retirement income in the informal are the most common sources of secondary income. This finding is in line with what one would expect. Indeed, retired workers form one of the demographic groups found to be characteristic of informal activities.

Another important association derives from cross-tabulations with level of education. Those who belong to the groups which declared rent or "others" as second income are, respectively, the ones whose years of schooling average is greater or close to the population's average level of education. That occurs in both formal and informal sectors and, of course, the level of education is greater in the former. Furthermore, the number of people with second income ("others", rent) is, in absolute terms, much larger in the formal than in the informal. On the other hand, a small fraction of the sample declared another income source than the job: in 1989 the second incomes represented, overall, 37.9% of those in the formal and 10% in the informal, in the Sao Paulo sample; in the Recife sample, also for 1989, these respective proportions amounted to 31.7% and 7%.

Turning to considerations about the head of household group, cross-tabulations with education show the following:

a) in the Sao Paulo sample, 1989, heads of households formed 59% of the whole population, and that proportion went to 63% in the formal and 34.4% in the informal (in which 48.6%

of the individuals were in the position of sons). On the other hand, in the formal sector, heads of household had, on average, 6.82 years of schooling whereas in the informal the average was 4.72 years;

b) 1989 Recife sample revealed an overall proportion of heads of household of about 56%, represented by 64% in the formal and 28% in the informal (in which 57% of the individuals were in the position of sons). As to schooling, the respective averages amounted to 6.75 and 3.98 years.

The relevant findings described above can be summarised as follows:

i) there is a clear positive correlation between holding a second income source and level of education;

ii) there is also a positive correlation between an individual's position as head of household and level of education;

iii) the overall proportion of second incomes is much smaller in the informal sector and that occurs in both regions; in other words, that proportion is greater in the sector where the average level of education is higher;

iv) the more developed region (Sao Paulo) has also the greater proportion of second incomes;

v) secondary members of a household are more likely to hold informal positions in the labour market, i.e., the formal sector has a much larger proportion of heads of household.

4.2 Results from the regressions

The estimates and statistics displayed in Table 5-02 and

Tables 5-03 above yield the following.

Results for Sao Paulo:

i) the values of R^2 have not increased greatly, in comparison with the ones produced by the estimation of the basic model. This means that in the labour market being examined most of the inequality in earnings is explained by the basic human capital variables (education and general experience in the labour market)[13].

ii) the reduction in the coefficients on schooling, after the addition of the new variables, is quite small: around one percentage point in the formal and less than that in the informal. The t-statistics are very high, particularly in the formal sector, with the smallest value of 43.0 in 1989. In the informal sector, these statistics range from 10.3 to 16.4. That is, there is no doubt about the great significance of the estimates of the returns to education. The formal-informal gap is, of course, kept wide;

iii) the coefficients on experience and experience squared, as already found for the basic model, have the signs predicted by the human capital approach. Their values represent reasonably high returns and tend to be greater in the formal sector across the years. The formal-informal

[13] We should recognise that with a collinear set of variables the order in which such variables are added to the equation will affect the addition to R^2. Taking that into account, we run successively the following regressions (Recife, year 1989, formal sector): i) first, including just the sector of activity variables; ii) second, adding position in the household and second income; iii) finally, adding education and experience variables. The respective R^2 were: 10%, 14% and 50.3%. Hence, even considering the problem of collinearity, the point made in the text still holds satisfactorily.

difference in returns to experience does not suggest the existence of substantially different patterns in the role of general experience for the determination of earnings between the two segments of the labour market;

iv) the coefficients on the sector of activity dummies have the expected signs in most cases and the respective t-statistics show their significance at 5% or less. Only in the finance sector (SECT6) - which holds modern banking activities - are average earnings greater than in the manufacturing sector (which is the basic variable). Commerce (SECT3) and Construction (SECT2) present the largest negative earnings differential in relation to manufacturing (peaks of 30% or more). SECT7, which represents the public sector (public administration, predominantly), has negative parameters reflecting the fact that, in that sector, earnings are frequently below those prevalent in the private sector. This outcome is in line with what one would have expected, given that public administration is the segment of public sector where salaries tend to be kept down, chiefly as a result of extensive hiring policies. As to the t-statistics, the results show an overall high degree of significance in the formal segment but not in the informal;

v) the dummies for position in the household and second income source display a clear pattern. Indeed, the respective coefficients are systematically positive and significant in the formal sector (the same does not occur in the informal), revealing a greater level of earnings of heads of household and those with a second income. In some years, the earnings

differential is quite high (e.g. in 1983, when coefficients on POSH and SECDy exhibit respective earnings differentials of 26.2% and 18.5% related to secondary members of household and individuals with no second income source). The t-statistics (formal segment) are consistently high, mainly those for POSH parameters. SECDY presents just one case of a non-significant parameter (formal sector) in 1989. As to the informal sector, only the dummy for head of household has significant coefficients. In that segment of Sao Paulo labour market SECDY is unequivocally not significant;

vi) finally, it is worth restating that the rates of return to education present values very close to those obtained from the estimation of the basic model and that the sectoral gap is kept unequivocally large.

Results for Recife:

a) Regarding the values of R^2 and rates of return to education, the picture is quite similar to what was found for Sao Paulo. The pattern of reduction in the returns to education (related to the basic model) is similar to what was found for Sao Paulo. Again, the formal-informal sectoral gap is also maintained.

b) there is no clear pattern in terms of returns to experience when the formal and informal segments are compared, although in three years (1981, 1987 and 1989) the informal presents higher returns to experience in the labour market, for a given level of experience.

c) the signs of the coefficients on the sectoral dummies are as expected, but the degree of significance is not so

generally robust as is the case of the formal sector of Sao Paulo. In Recife, only Commerce (SECT3), Services (SECT4) and Finance (SECT6), in the formal segment, present t-values which are systematically high across years. What is distinctively noticeable here is the very high earnings differential in the Finance sector against manufacturing, which practically reaches 50% in 1989 (formal sector). The high differentials in Finance in the informal sector in some years (1985 and 1989) constitute quite a surprising result, given that it is difficult to conceive what in practical terms would be "informal" in banking and financing activities. In respect of this, it could be added that, in the Brazilian case, it is not rare to find illegal "contracts" between firms and skilled labour force (a way of evading social security obligations) - although this is not a predominant practice. This, therefore, could be part of the explanation for these odd results, since individuals in such a situation would be found in a household survey as employees in e.g. financing or banking activities, getting relatively high pay, but not contributing to the federal system of social security. Another noticeable outcome is the positive sign of parameters on the public sector dummies, except in 1983. Although significant coefficients occur for just two years (1983 and 1989, with different signs), this predominance of a positive parameter indicating another way round in the public-private labour market earnings relationship matches the findings already quoted elsewhere in this study about the pre-eminence of the public sector in the Recife labour market. This, however, should not be given an

exaggerated importance, since constant changes in relative wages between public and private sector might not be so rare in a country with erratic economic policies and frequent alterations in wage policies;

d) the coefficients on POSH and respective t-values reinforce the evidence of higher earnings of heads in comparison with secondary members of the household. The differential ranges from 20% to 30% or more in both the formal and the informal sectors. The outcome related to the second income dummies is not convincing in terms of suggesting a trend. Moreover, the parameters are mostly not significant (formal segment) or systematically not significant (informal).

5. Breakdown of earnings inequalities

5.1 About the methodology used

It has been found that there exists a considerable gap in formal-informal individual earnings and that education is rewarded differently in different segments of the labour market in the two Brazilian metropolitan cities researched.

The task now is to evaluate to what extent such differentials could be explained by education. The procedure is to decompose the formal-informal earnings differentials in order to separate what might come from differences in education and other personal endowments and what might be assigned to factors generated within the labour market. The empirical device which makes such decomposition possible is a simple and well-known technique founded on a basic property of the least-squares estimator according to which the fitted

regression line passes through the point of sample means [BERNDT (1991), p. 183]. This method was given an extended interpretation by BLINDER (1973), who has applied it to studies of gender and race discrimination. Before proceeding with the analysis itself, a description of the technique is made below.

We shall take the respective earnings equations for the formal and informal sectors as considered in this study,

$$\ln Y^F_i = \alpha^F + \sum_{j=1}^{n} \beta^F_j \, Z^F_{ji} + u^F_i$$

$$\ln Y^I_i = \alpha^I + \sum_{j=1}^{n} \beta^I_j \, Z^I_{ji} + u^I_i \ ,$$

where

i = individuals or observations 1, 2, 3, ...,N

j = observable individual characteristics 1, 2, 3, ...,n

Z = vector of individual endowments and other information about each individual (education as a continuous variable, experience in the labour market and its squared term, up to six sector of activity dummies, head of household dummy and second income source dummy).

Blinder's technique consists in calculating the overall difference $\overline{\ln Y}^F_i - \overline{\ln Y}^I_i$ and decomposing it into a part explained by the regression,

$$\sum_j^n \beta^F_j . \overline{Z}^F_j - \sum_j^n \beta^I_j . \overline{Z}^I_j \qquad (1)$$

where $\overline{Z}$ = sample mean of each individual characteristic, and the part embodied in the intercepts, $\alpha^F - \alpha^I$. The first part

may also be decomposed into two parts - and that is a further step in Blinder's formulation. One portion consists of differences in the average attributes and the other comes from differences in the coefficients,

$$\sum_j^n \beta_j^F(\overline{Z}_j^F - \overline{Z}_j^I) \qquad (2)$$

$$\sum_j^n \overline{Z}_j^I(\beta_j^F - \beta_j^I) \qquad (3)$$

Using still the convenient notation used by Blinder, (1) will be denoted by "R" (raw differential), (2) will be "E" (endowments) and (3) will be named "C" (coefficients). The portion of the earnings differential due to the difference in the intercepts is called "U" (part unexplained by the regression). So, R = E + C + U.

It would be tempting - in full parallel to Blinder's treatment of it as reflection of discrimination - to associate here the part (C + U) with "segmentation". There are some reasons why one should not do that.

First, note that "C" and "U" may reflect segmentation but they might also incorporate effects of unmeasured human capital attributes, besides many other factors which could be reflected in the unexplained component. Second, it would not be reasonable to expect no effects of segmentation in endowments as well (e.g. via the "negative feedback", as referred to in chapters II and III). The association of (C +

U) solely to segmentation would imply attributing endowments differences to competition. As already made clear before, a positive income-schooling relationship is compatible with both competitive and segmentation approaches; and in practice it is very difficult to identify the difference between the two. Thus, the breakdown carried out here aims chiefly at evaluating the role played by education.

Note that (2), or "E", may be read as the value of the advantage in endowments possessed by formal workers **as evaluated by the formal sector equation** and (3) or "C" represents the difference **between** how the **formal sector would value the characteristics of informal workers** and how the informal equation actually values them[14]. Thus, "C" has behind it the assumption that identical personal endowments and traits may be differently evaluated if possessed by a formal or an informal worker or, putting it another way: the two segments of the labour market might have differing hedonic functions.

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[14] Formulated as above, the decomposition is standardised by the formal sector. It is in fact a two-fold choice that brings about "index-number problems", as Blinder himself admits. There is no "ideal" solution to this problem and, whilst writing the equations above according to the normalisation by the formal sector, we also do the normalisation by the informal; moreover, we present the estimates based on something between the two standardisations, i.e., taking the average values of the rates of return to schooling (and of the other coefficients) between the two segments (Tables 5-04 and 5-05). See JONES (1983) for a detailed examination of the weaknesses of Blinder's technique.

5.2 Analysis of the formal-informal earnings differentials for male employees

The application of the methodology discussed above yields the results shown in Table 5-04 and Tables 5-05 below, which display the decomposition of formal-informal earnings differentials according to three different standardisations: formal sector, informal sector and "average" as the standard.

Table 5-04 pictures the decomposition of the overall earnings differentials based on the standard model. The raw differential in favour of formal employees across the years is systematically greater in Recife as compared with Sao Paulo, not an unexpected result in the light of what was revealed by the indices of income inequality in Chapter IV. The average total differential ranges from 90% to more than 100% in the less developed region, whereas in Sao Paulo it is generally in the range of 77-90%, with a peak of 96% in 1985 when the earnings advantage of formal workers in Recife also peaked.

A really striking result is that the amount attributable to differences in personal endowments (education and experience in the labour market) is a very high proportion of the raw differential. Again, it is in Recife where that proportion is even greater - and this might be related to a greater inequality in the distribution of education in the less developed area. The relative proportion of endowments effects in the overall differential which can be obtained from Table 5-04 (according to the standardisation by the formal sector) varies from a minimum of 49% (44.6/90.6) in 1981 to a maximum of 61% (47.0/77.3) in 1989 in the case of Sao Paulo;

TABLE 5-04
RECIFE and SAO PAULO
Decomposition of the overall formal-informal earnings differentials based on the basic model estimates (figures in percentage)
- Formal and informal sectors respectively taken as the standard, and average. 1981 to 1989, selected years

YEAR/ REGION	Total	DISCRIMINATION						
		Endowments			Coefficients			Intercept
		I	II	III	I	II	III	
1981								
Sao Paulo	90.6	44.6	38.1	41.4	22.5	28.9	25.7	23.5
Recife	96.0	61.4	57.4	59.4	2.7	6.8	4.8	31.9
1983								
Sao Paulo	87.0	46.4	34.8	40.6	41.0	52.5	46.7	-0.4
Recife	92.4	63.4	48.5	55.9	35.6	50.5	43.1	-6.6
1985								
Sao Paulo	96.4	51.5	39.7	45.6	35.1	46.9	41.0	9.8
Recife	102.7	63.7	56.1	59.9	10.9	18.5	14.7	28.1
1987								
Sao Paulo	79.7	45.8	36.4	41.0	36.5	45.9	41.2	-2.6
Recife	98.7	67.2	60.0	63.6	3.7	10.9	7.3	27.8
1989								
Sao Paulo	77.3	47.0	38.9	42.9	25.3	33.4	29.4	5.0
Recife	90.1	61.2	57.6	59.4	3.9	7.5	5.7	25.0

SOURCE: Table 5-01 and average values of the variables
NOTE: I - Formal sector as the norm
II - Informal sector as the norm
III - Average

TABLE 5-05A
SAO PAULO & RECIFE, 1981
Decomposition of the formal-informal earnings differentials
(Figures in percentage)
- *Formal and informal sectors respectively taken as the standard, and average*

REGIONS/ COMPONENTS		FACTORS						
SAO PAULO		School.	Exp.	Sector of Activity	POSH	Second Income		
Total		28.3	23.2	-1.5	11.6	2.3	R = 90.6	U = 26.7
Endowments								
	I	22.3	17.0	6.8	6.9	0.2	E = 53.2	
	II	20.4	15.0	5.0	3.0	0.0	E = 43.4	
	III	21.4	16.0	5.9	5.0	0.1	E = 48.3	
Coefficients								
	I	6.0	6.2	-8.3	4.7	2.1	C = 10.7	
	II	7.9	8.2	-6.5	8.6	2.3	C = 20.5	
	III	7.0	7.2	-7.4	6.7	2.2	C = 15.6	
RECIFE								
Total		39.0	6.8	4.1	9.5	2.7	R = 96.1	U = 34.0
Endowments								
	I	35.1	15.9	6.5	10.3	-0.1	E = 67.7	
	II	32.7	18.7	3.8	11.2	0.0	E = 66.4	
	III	33.9	17.3	5.2	10.8	-0.1	E = 67.1	
Coefficients								
	I	3.9	-9.1	-2.4	-0.8	2.8	C = -5.6	
	II	6.3	-11.9	0.4	-1.7	2.7	C = -4.3	
	III	5.1	-10.5	-1.0	-1.3	2.8	C = -5.0	

SOURCE: Tables 5-02 & 5-03 and average values of the variables.

NOTE: I - Formal as the norm
II - Informal as the norm
III - Average

TABLE 5-05B
SAO PAULO & RECIFE, 1983
Decomposition of the formal-informal earnings differentials
(Figures in percentage)
- Formal and informal sectors respectively taken as the standard, and average

REGIONS/ COMPONENTS		FACTORS						
SAO PAULO		School.	Exp.	Sector of Activity	POSH	Second Income		
Total		45.8	19.4	-1.0	12.8	1.6	R = 87.0	U = 8.4
Endowments								
	I	27.7	12.8	10.1	7.2	0.4	E = 58.2	
	II	20.5	11.9	8.6	3.5	0.1	E = 44.7	
	III	24.1	12.4	9.4	5.4	0.3	E = 51.5	
Coefficients								
	I	18.1	6.6	-11.1	5.6	1.2	C = 20.4	
	II	25.2	7.5	-9.6	9.3	1.5	C = 33.9	
	III	21.7	7.0	-10.4	7.5	1.4	C = 27.2	
RECIFE								
Total		52.7	27.5	1.2	14.4	1.7	R = 92.4	U = -5.1
Endowments								
	I	40.3	15.0	5.6	11.0	-0.4	E = 71.5	
	II	31.9	12.4	5.3	7.6	0.2	E = 57.4	
	III	36.1	13.7	5.5	9.3	-0.1	E = 64.5	
Coefficients								
	I	12.4	12.5	-4.4	3.4	2.1	C = 26.0	
	II	20.8	15.1	-4.1	6.8	1.5	C = 40.1	
	III	16.6	13.8	-4.3	5.1	1.8	C = 33.1	

SOURCE: Tables 5-02 & 5-03 and average values of the variables.
NOTE: I - Formal as the norm
II - Informal as the norm
III - Average

TABLE 5-05C
SAO PAULO & RECIFE, 1985
Decomposition of the formal-informal earnings differentials
(Figures in percentage)
- Formal and informal sectors respectively taken as the standard, and average

REGIONS/ COMPONENTS		FACTORS						
SAO PAULO		School.	Exp.	Sector of Activity	POSH	Second Income		
Total		49.3	22.6	-7.1	7.1	5.7	R = 96.6	U = 19.0
Endowments								
	I	29.3	14.9	8.3	7.3	5.0	E = 64.8	
	II	21.3	13.3	2.6	7.6	1.2	E = 46.0	
	III	25.3	14.1	5.5	7.5	3.1	E = 55.4	
Coefficients								
	I	20.0	7.7	-15.4	-0.2	0.7	C = 12.8	
	II	28.0	9.4	-9.8	-0.5	4.5	C = 31.6	
	III	24.0	8.6	-12.6	-0.4	2.6	C = 22.2	
RECIFE								
Total		49.0	21.8	2.0	12.5	-3.0	R=102.5	U = 20.2
Endowments								
	I	39.0	16.8	7.3	12.7	-2.8	E = 73.0	
	II	33.1	14.3	5.5	12.9	0.6	E = 66.4	
	III	36.1	15.6	6.4	12.8	-1.1	E = 69.7	
Coefficients								
	I	10.0	5.0	-5.3	-0.2	-0.2	C = 9.3	
	II	15.9	7.5	-3.5	-0.4	-3.6	C = 15.9	
	III	13.0	6.3	-4.4	-0.3	-1.9	C = 12.6	

SOURCE: Tables 5-02 & 5-03 and average values of the variables.
NOTE: I - Formal as the norm
II - Informal as the norm
III - Average

TABLE 5-05D
SAO PAULO & RECIFE, 1987
Decomposition of the formal-informal earnings differentials
(Figures in percentage)
- Formal and informal sectors respectively taken as the standard, and average

REGIONS/ COMPONENTS		FACTORS						
		School.	Exp.	Sector of Activity	POSH	Second Income		
SAO PAULO								
Total		42.0	27.9	-6.3	2.8	7.5	R = 79.6	U = 5.7
Endowments								
	I	29.9	10.9	5.7	4.5	4.5	E = 55.5	
	II	24.9	8.6	2.6	5.5	-2.5	E = 39.1	
	III	27.4	9.8	4.2	5.0	1.0	E = 47.3	
Coefficients								
	I	12.1	17.0	-12.0	-1.7	3.0	C = 18.4	
	II	17.1	19.3	-8.9	-2.7	10.0	C = 34.8	
	III	14.6	18.2	-10.5	-2.2	6.5	C = 26.6	
RECIFE								
Total		59.6	14.8	9.8	8.9	-1.5	R = 98.8	U = 7.2
Endowments								
	I	42.0	19.0	7.0	8.5	-1.5	E = 75.0	
	II	30.6	19.6	6.6	8.1	-1.5	E = 63.4	
	III	36.3	19.3	6.8	8.3	-1.5	E = 69.2	
Coefficients								
	I	17.6	-4.2	2.8	0.4	0.0	C = 16.6	
	II	29.0	-4.8	3.2	0.8	0.0	C = 28.2	
	III	23.3	-4.5	3.0	0.6	0.0	C = 22.4	

SOURCE: Tables 5-02 & 5-03 and average values of the variables.
NOTE: I - Formal as the norm
II - Informal as the norm
III - Average

TABLE 5-05E
SAO PAULO & RECIFE, 1989
Decomposition of the formal-informal earnings differentials
(Figures in percentage)
- Formal and informal sectors respectively taken as the standard, and average

REGIONS/ COMPONENTS		FACTORS						
SAO PAULO		School.	Exp.	Sector of Activity	POSH	Second Income		
Total		42.3	21.7	-1.2	5.2	1.5	R = 77.7	U = 8.2
Endowments								
	I	28.3	13.3	2.6	5.9	1.0	E = 51.1	
	II	23.0	11.6	3.2	6.5	-0.7	E = 43.6	
	III	25.7	12.5	2.9	6.2	0.2	E = 47.4	
Coefficients								
	I	14.0	8.4	-3.8	-0.7	0.5	C = 18.4	
	II	19.3	10.2	-4.5	-1.3	2.2	C = 25.9	
	III	16.7	9.3	-4.2	-1.0	1.4	C = 22.2	
RECIFE								
Total		47.1	4.9	9.8	10.1	-1.8	R = 90.1	U = 20.0
Endowments								
	I	39.0	13.3	10.2	8.8	-0.1	E = 71.2	
	II	34.5	15.5	10.3	7.1	5.7	E = 73.1	
	III	36.8	14.4	10.3	8.0	2.8	E = 72.2	
Coefficients								
	I	8.1	-8.4	-0.4	1.3	-1.7	C = -1.1	
	II	12.6	-10.6	-0.5	2.9	-7.4	C = -3.0	
	III	10.4	-9.5	-0.5	2.1	-4.6	C = -2.1	

SOURCE: Tables 5-02 & 5-03 and average values of the variables.
NOTE: I - Formal as the norm
II - Informal as the norm
III - Average

Recife presents a minimum of 62% (63.7/102.7) in 1985 and a maximum of 69% (63.4/92.4) in 1983. That leaves 39% to 51% attributable to segmentation and other factors in Sao Paulo labour market, and roughly 30% to 40% in the case of Recife.

The standardisation by the informal sector, despite the expected effect of changing the proportions of "E" and "C", does not alter dramatically the overall picture of the qualitative results. The figures in columns "III", corresponding to the average standardisation, point to absolute values of endowment effects of about 40% in São Paulo and 60% in Recife (relative proportions of, roughly, 50% and more than 60% of the total overall difference).

It is worth bearing in mind that these results come from the basic model estimates, where education and experience are the only independent variables included; several potential explanatory factors are ignored[15]. Decomposition based on the extended model, to be analysed below, can lead to more detailed results.

Tables 5-05A/5-05E display the results based on the extended model - which includes important dummy variables for sector of activity in which each individual is placed, position in the household (POSH) and possession of a second income source.

Looking first at the overall relative proportion of endowments in the earnings differential in favour of formal

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[15] Our data set neither includes measures of e.g. family background variables or ability nor does it allow for the construction of proxies to such variables. This is a serious limitation to any attempt at assembling a good recursive model.

employees across the years (taking standardisation I), it is found that: i) Recife presents a clear upward trend in that proportion - from 73% (67.7/96.1) in 1981 to 79% (71.2/90.1) in 1989; ii) in Sao Paulo that trend is not so clear given a drop in the endowments proportion in 1989, to 66% (from 70% in 1987) although it is above the ratio for 1981 (59%). In other words, the average relative earnings advantage of formal employees in both regions is to a very large extent explainable by their superior endowments. The portion attributable to segmentation (e.g. different valuation of identical personal attainments by different segments of the labour market) and other factors was about 20% in Recife and 30% in Sao Paulo in 1989.

A closer examination of Tables 5-05 shows that education and employment conditions (experience) are the attributes which explain most of the formal employees' relative advantage in earnings, as one can see by looking at the column "endowments". Indeed, education, with more than 20 to about 30 percentage points of the endowments effect in Sao Paulo and more than 35 to above 40 in Recife, illustrates the decisive role played by this personal attribute in the formal-informal earnings differential. Note that, in relative terms, education alone accounted for 55% of the endowment effect in Recife (39.0/71.2) and in Sao Paulo (28.3/51.1) in 1989, and for 43% (39.0/90.1) of the raw differential in Recife (36% in Sao Paulo: 28.3/77.7) also in 1989 - see Table 5-05E; once again, the data corroborate the important role played by schooling in

Brazilian labour markets[16]. The attribute of being head of household also accounts for a considerable part of the endowment effect. Since this variable is in turn positively correlated with education, the role performed by the latter is bound to be even more pervasive.

6. Additional remarks

Some highlights from the empirical findings analysed in previous sections and also some results not yet referred to are now mentioned in order to complete the investigation conducted in this chapter.

Firstly, it has been found that regional differences in rates of return to education are not as sharp as those verified for the partition formal-informal. The results achieved here, however, contrast clearly with those found by PSACHAROPOULOS (1987, p. 15) in a study on Brazil, based on the 1980 Brazilian Census. Indeed, he has estimated virtually identical returns to education across regions and for formal and informal activities, the latter devised following the same criterion used here - contribution to the national system of social security. While the regional differences detected here can be considered negligible, the formal-informal gap in both regions is nevertheless wide and statistically significant, as already seen.

Secondly, it should be highlighted that the returns to

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[16] The above results concerning the relation between education and income inequality in Brazilian labour markets are very similar to others found in previous studies. REIS & BARROS (1991, p. 134) have achieved results and also quoted previous findings with which ours are much in line.

experience in the labour market do not differ between the formal and informal segments as much as do the rates of return to education. As to the flatness of the experience-earnings profile, interpretable through the coefficients on the quadratic term for experience, there are neither marked formal-informal differences nor clear regional variation. On the other hand, the results concerning sector-of-activity-dummy variables - which might be related to experience in the sense that different industries imply different skills and job experiences - do not show any remarkable regional difference, either. This might well be explained by a relatively free geographical labour mobility[17] and also might be reflecting the existence of a "national" labour market. The diverse result (across years, see Tables 5-02 and 5-03) concerning the sign of the sectoral dummies, however, might be mirroring the fact that relative wages in Brazil displayed substantial fluctuation in the 80s as a result of high inflation and erratic macroeconomic policy. Yet concerning the issue of labour-market experience it is unfortunate that PNAD data do not include information on formal training programmes which could shed some light on it. Indeed, it is known that a Brazilian workforce training programme (SENAI, Serviço Nacional de Aprendizagem Industrial/National Programme of

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[17] Apart from transport costs and family constraints, there is no limit to regional labour mobility in Brazil, despite its continental dimension. Availability of transport infrastructure and the fact that there are no marked regional differences in production technology operate in favour of workforce mobility. Recife and Sao Paulo, or Northeast and Southeast, constitute a case in point.

Industrial Apprenticeship)[18] - basically funded by private companies, although it also receives public funds - is well regarded by employers as an efficient programme of its kind. If a variable for training were available, probably the experience issue could be given a more fruitful interpretation since, broadly speaking, formal workers have better access to training programmes whereas informal jobs commonly rely on a "learning by doing" apprenticeship.

Another point to be commented on here refers to the human capital model's postulate which states that, if there is a correlation between abilities and education and if the more educated receive more on-the-job training (given the employers' expectation on the superior ability to learn of those with more years of schooling), then the experience-earnings profile of the more educated will be steeper than that of the less educated individuals (BERNDT, 1991, p. 163). To investigate that, regressions with an interaction variable between education and experience were performed. The results are presented in Table 5-06 below[19].

By differentiating this new equation in respect of experience one finds that the effect of experience on log earnings will depend on the level of schooling. Then, as stated by BERNDT (1991, p. 163), the experience-earnings profile of the more educated will be steeper as long as the

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[18] For a brief history of SENAI and its role in labour training in Brazil see e.g. BRASIL.MINISTERIO DO TRABALHO/INSTITUTO DE ECONOMIA INDUSTRIAL (1987, chapter 11).

[19] A squared term for education was also included in the equations, as its coefficient reflects how steep is the earnings-education profile.

TABLE 5-06

SAO PAULO and RECIFE: Statistics from regression including schooling squared and schooling-experience interaction variable
Male employees. 1981/1989, selected years

YEARS/ EQUATIONS	SAO PAULO R sq	Interc.	School.	Exp	Exp sq	Sch sq	Sch-exp	RECIFE R sq	Interc.	School.	Exp	Exp sq	Sch sq	Sch-exp
1981														
Formal	0.5307	8.07	0.1248	0.0969	-0.0013	0.0032	-0.0010	0.5539	8.24	0.0326	0.0581	-0.0007	0.0075	0.0004
		(133.6)	(13.3)	(29.7)	(-27.4)	(7.2)	(-5.3)		(84.8)	(2.4)	(11.0)	(-10.2)	(12.6)	(1.4)
Informal	0.3827	8.03	0.0691	0.0694	-0.0009	0.0049	0.0001	0.3283	7.57	0.0640	0.074	-0.0010	0.0056	0.0006
		(65.4)	(2.6)	(9.3)	(-8.6)	(3.2)	(0.2)		(62.0)	(2.0)	(9.6)	(-8.7)	(2.5)	(0.8)
1983														
Formal	0.5499	9.50	0.1188	0.0887	-0.0011	0.0030	-0.0005	0.5561	9.15	0.0767	0.0861	-0.0011	0.0062	-0.0005
		(147.9)	(12.3)	(26.5)	(-24.6)	(7.0)	(-2.4)		(87.1)	(5.4)	(15.3)	(-13.6)	(9.7)	(-1.8)
Informal	0.3168	9.75	0.0244	0.0567	-0.0008	0.0055	0.0012	0.3094	9.08	0.0860	0.0644	-0.0008	0.0035	-0.0003
		(78.9)	(0.9)	(8.2)	(-8.5)	(3.6)	(2.1)		(79.2)	(3.6)	(8.8)	(-7.3)	(2.3)	(-0.5)
1985														
Formal	0.5404	11.71	0.1241	0.0948	-0.0013	0.0035	-0.0010	0.5377	11.75	0.0515	0.0714	-0.0009	0.0067	0.0003
		(177.8)	(12.6)	(27.3)	(-25.8)	(8.0)	(-4.9)		(103.0)	(3.3)	(11.7)	(-10.8)	(9.9)	(0.8)
Informal	0.3382	11.72	0.0548	0.0730	-0.0009	0.0062	-0.0009	0.3316	11.10	0.0845	0.0852	-0.0011	0.0060	-0.0007
		(108.3)	(2.2)	(11.5)	(-9.7)	(4.0)	(-1.7)		(85.0)	(3.0)	(9.9)	(-8.2)	(3.1)	(-1.1)
1987														
Formal	0.5392	6.97	0.1215	0.0952	-0.0012	0.0035	-0.0012	0.5224	6.74	0.0687	0.0720	-0.0008	0.0068	-0.0007
		(84.4)	(9.6)	(22.2)	(-20.2)	(6.1)	(-4.8)		(48.2)	(3.6)	(9.5)	(-7.5)	(7.7)	(-1.9)
Informal	0.3547	6.75	0.1374	0.0895	-0.0011	0.0036	-0.0031	0.3210	6.09	0.1174	0.1058	-0.0014	0.0046	-0.0030
		(41.8)	(3.8)	(9.5)	(-8.0)	(1.6)	(-4.5)		(37.4)	(3.4)	(9.5)	(-8.5)	(2.0)	(-3.3)
1989														
Formal	0.4660	5.17	0.0775	0.0715	-0.0009	0.0049	-0.0002	0.4981	4.62	0.0673	0.0512	-0.0005	0.0061	0.0000
		(52.3)	(5.0)	(14.1)	(-13.0)	(7.1)	(-0.7)		(31.3)	(3.2)	(6.6.)	(-4.9)	(6.6)	(0.1)
Informal	0.2956	5.07	0.0483	0.0593	-0.0008	0.0061	-0.0000	0.3327	4.17	0.0892	0.0572	-0.0006	0.0044	0.0003
		(28.1)	(1.2)	(5.9)	(-5.4)	(2.5)	(-0.02)		(23.4)	(2.4)	(4.8)	(-3.7)	(1.8)	(0.3)

Basic data SOURCE: BRASIL/PNAD. Magnetic tapes for public use
T-statistics in brackets
NOTE: to save space, number of observations (same as before) are omitted from this table

coefficient on the interaction term is positive. Our results concerning the sign and significance of the interaction term are mixed: the overall picture across the years is not conclusive. Most of the time, the coefficient can be not significant and its sign be either positive or negative, as in Recife, formal and informal sectors. In Sao Paulo it tends to be negative and significant in the formal sector, but not significant in the informal. In this sector the coefficient is in most cases not significant (in both regions)[20].

On the other hand, the coefficient on education squared is always positive and in all but two exceptions (informal sector) is significant. This result clearly points to increasing returns to education (not found in Mincer's classical example), a similar outcome to those produced in e.g. VIJVERBERG & van der GAAG (1987, pp. 8-9), a study on Côte d'Ivoire labour market, and in PSACHAROPOULOS (1987, p. 10), a study on Brazil's labour market. Furthermore, taking the value of the coefficient on education squared as an indicator of the steepness of the earnings-education profile, these results corroborate the findings by REIS & BARROS (1991) regarding a less steep wage-education profile in the more developed Brazilian metropolitan areas (in the Southeast). What has been revealed by the decomposition of earnings

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[20] The coefficients on the interaction variable are also sensitive to the equation specification. If the variables POSH and SECDY and the sector of activity dummies are included, there occur changes in the sign and significance of the coefficients - although the overall picture is about the same, particularly concerning the informal sector. The shortcomings of the proxy to experience and problems of collinearity might be part of the explanation for such results.

differential regarding the striking role played by education is certainly reinforced by these latter results.

Finally, we shall address further comments on the formal-informal differences in returns to education and experience.

There is no doubt, as already seen, about the statistical significance of the estimated formal-informal gap; yet education is highly rewarded in the informal sector.

What is noticeable here is that, in comparison with findings from studies on the American labour market [e.g. DICKENS & LANG (1985)], the returns to education in the informal sector estimated here are very high: above 10% *per* extra year of schooling. That is, instead of the "dead end" jobs of the secondary markets in America, the Brazilian informal sector would have peculiar characteristics which would make it a market where education and ability might play an important part. One could venture the hypothesis that, given the pervasive importance of education in Brazilian labour markets (as detected in this and in previous studies), the importance of educational screening, as part of the explanation for positive returns to schooling, is widespread - operating, to a non-trivial extent, also in the informal sector. Education in less developed countries, marked by sharp social inequalities, can be a symbol of status - perhaps making the association 'more educated-more talented' play an overvalued role in social terms.

On the other hand, returns to experience were not found to be markedly distinct between sectors - although systematically smaller in the informal sector of São Paulo.

That would suggest another difference in nature between the Brazilian informal sector and the secondary market of developed economies.

Notwithstanding this, since the gap exists and does not tend to narrow over time, we think that the reasons advanced in chapter III for a higher return to education in the formal sector (internal labour market practices, union effects, not completely free intersectoral labour mobility) are likely to be important. We shall readdress the issue in the next chapter - after we correct the estimates for bias selection.

CHAPTER VI. SUPPLEMENTARY ANALYSES

1.Introduction

The persistent earnings differentials observed in Brazilian urban labour markets between formal and informal workers still merit more detailed analysis despite data limitations. The purpose of this chapter is thus to proceed with further analyses of four main issues:

i) to extend our analysis also to women employees and male self-employed, whose OLS estimates should be compared to those obtained for male employees in chapter V - the necessary qualifications being made while conducting the comparisons;

ii) to extend and deepen our examination of rates of return to education by obtaining selectivity bias-corrected parameters, accounting for problems arising from the application of the formal-informal breakdown;

iii) to include the unemployed in the analysis, taking account also of the selectivity bias produced by their previous exclusion;

iv) to look at returns to schooling by level of education (Primary, Secondary, High School and College) in order to examine aspects which are not apparent when schooling is taken as a continuous variable.

Two larger sections will constitute the analytical bulk of this chapter. Section 2 deals with returns to schooling of female employees and male self-employed in the two regions being studied. Section 3 tackles the problem of selection bias in the case of male employees, by introducing the issue of

unemployment and jointly correcting for the unemployed-omission bias and the segmentation bias. A labour supply function is estimated together with a wage equation - for each segment of the labour market. Heckman's 2-step model for bias correction - originally constructed for analysis of female labour supply - is the method of estimation used[1]. We shall then be able to look at probabilities of employment in the formal and informal segments of the labour market. Finally, section 3 is also concerned with rewards to schooling by level of education.

2. Returns to education of female employees and male self-employed

2.1 Conceptual issues

It is well known in the empirical literature that wages or salaries are clearly related to individual attributes such as education and age, and that this relationship is particularly solid in the case of male employees (wage workers). In the case of females, the relationship is more complex because of family factors in operation. Indeed, female labour supply will be affected by at least three factors: a) marital status; b) number of children; c) the husband's wage. Consequently, work experience of single women tends to be less interrupted than that of married women, who have to spend some

[1] In fact, the method of estimation chosen is that which BERNDT (1991, pp. 617-629) classifies as "procedure VIII" in a range of eight kinds of "second generation studies" mainly concerned with estimation of labour supply parameters when, as is frequently the case, data on wage of non-workers (in the general economic sense of "non-participants") are not observable.

time on raising children. The husband's wage could be a factor of declining importance given the feminine emancipation of recent times, that is, for middle class women it would be increasingly more important to develop a career in the labour market regardless of how much the husband earns. Availability of children's nurseries, a resource not easily obtainable particularly in developing countries, could play a role in changing the influence of marital status on female labour supply. But, all in all, work experience of single women tends to be more extensive than that of married women. Therefore, comparison between men and women in respect of returns to education and labour market experience should be looked at bearing in mind these limitations.

Unfortunately, the sample used in this study contains only individual-based information[2], the only family-related variable being "position in the household" - and a distinction by marital status is thus not feasible; also, information about number of children is not available. However, the empirical analysis conducted here focuses on gender comparisons of formal-informal gaps in returns to education rather than on direct contrast of rate of returns by gender. This lessens the importance of such limitations.

Qualifications should also be made regarding returns to education of male self-employed. What could be considered the most serious restriction is the separate estimation for employees and self-employed, on account of selection bias.

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[2] The original, larger, PNAD data set includes information on households.

Such a line of criticism is taken by e.g. VIJVERBERG (1985), who uses a two-step procedure by incorporating an individual's choice equation for the "not mutually exclusive" alternatives market work/self-employment and estimating a selection bias-corrected "wage" equation for each activity. Underlying his model is the assumption that individuals choose between wage employment and self-employment based on relative potential earnings. One could, however, argue that the choice between wage and self-employment could be strongly related to the individual's socio-economic background and to prior possession of means of production. Therefore, if the selection equation does not contain any variable related to these factors the criticism may not be fully valid. In fact, VIJVERBERG's study has land ownership as one of the explanatory variables, which is regarded as increasing the likelihood of an individual being self-employed. But this might well be a particular characteristic of the sample, which mixes individuals from rural and urban areas. Other important means of production (equipment) are absent from the analysis. In the case of a sample of urban individuals[3], the complete absence of information on possession of means of production is the rule. Thus, a satisfactory solution to the problem of dealing with the self-employed would not be feasible. A more general objection to the joint estimation of earnings of wage

[3] In fact, another source of bias might be related to urban location or, more generally, to region of residence, as this may not be a real exogenous variable. Considering that those who migrate (from rural areas or from other urban centres) are normally more able, they may also be more educated. In the present study, we cannot correct for this as information on migration is not available.

employees and self-employed is that two conceptually different sorts of earnings are being mixed: wage or salaries and income generated by the use of capital (and possibly the application of entrepreneurship). It the end, it might well be the case that the human capital Mincerian earnings function is not appropriate for examining earnings other than labour income. In the present study we estimate separate earnings functions for employees and self-employed, based mainly on the conceptual difference between the two kinds of earned income. Our emphasis is on segmentation issues in a metropolitan socio-economic environment of a developing country, where the wide occurrence of low-earning self-employment jobs (plumbers, street vendors, etc) - mainly in the informal sector - provides us with concrete reasons for examining the formal-informal differences in respective estimates for each occupational group.

2.2 Results

We shall now turn to examining the OLS estimates presented in Tables 6-01 to 6-04 below - from regressions on female employees and self-employed earnings functions for Sao Paulo and Recife.

A first salient finding is the even higher (than for men) R^2 obtained for female employees in both regions (Tables 6-01 and 6-02 compared with Tables 5-02 and 5-03), mainly for the formal sector, where it reaches over 60% in Recife (1981, 1983 and 1987) and Sao Paulo (1983). However, that clearly does not hold for the whole period. As before, the explanatory

TABLE 6-01

SAO PAULO: Statistics from regressions on the extended model

Formal and Informal labour markets. Female employees. Dependent variable: lnY

1981/1989, selected years

YEARS/ SEGMENTS	EQUATIONS													
	R sq	Interc.	School.	Exp	Exp sq	SECT2	SECT3	SECT4	SECT5	SECT6	SECT7	POSH	SECDY	N.Obs
1981														
Formal	0.5839	8.27	0.1459	0.0511	-0.0006	0.1803	-0.2645	-0.2429	-0.0277	0.1784	-0.0918	-0.0242	0.0736	2693
		(200.3)	(51.9)	(17.3)	(-11.2)	(2.0)	(-7.4)	(-9.8)	(-0.3)	(4.7)	-2.9	(-0.8)	(2.3)	
Informal	0.3107	7.75	0.1197	0.0609	-0.0008		0.2972	-0.0265	0.2058	0.2396		0.0148	0.0929	705
		(79.3)	(14.4)	(11.3)	(-8.5)		(3.1)	(-0.4)	(0.5)	(1.3)		(0.2)	(1.1)	
1983														
Formal	0.6075	9.53	0.1480	0.0586	-0.0008	0.0706	-0.2621	-0.2259	0.1135	0.2350	-0.0838	0.0347	0.0498	2920
		(237.6)	(54.5)	(21.2)	(-14.9)	(0.6)	(-8.0)	(-9.8)	(1.3)	(6.6)	(-2.8)	(1.3)	(1.5)	
Informal	0.3775	9.17	0.1433	0.0609	-0.0007	-0.0262	-0.1399	-0.2238	0.4807	0.0563		-0.0666	0.0929	842
		(95.6)	(19.5)	(12.2)	(-7.8)	(-0.1)	(-1.5)	(-3.5)	(1.5)	(0.3)		(-0.9)	(1.1)	
1985														
Formal	0.5765	11.78	0.1523	0.0532	-0.0007	0.0445	-0.2161	-0.2408	-0.0590	0.1657	-0.0372	0.0576	0.1008	3176
		(275.2)	(53.8)	(17.4)	(-11.8)	(0.4)	(-6.1)	(-9.5)	(-0.7)	(4.7)	(-1.2)	(2.0)	(4.7)	
Informal	0.3365	11.59	0.1313	0.0478	-0.0005	0.0804	0.0761	-0.3063	0.2114	-0.0272		0.0610	0.0163	1011
		(130.0)	(18.4)	(9.1)	(5.3)	(0.2)	(0.8)	(-5.4)	(0.6)	(-0.1)		(0.9)	(0.2)	
1987														
Formal	0.5685	7.23	0.1386	0.0419	-0.0005	-0.2502	-0.1594	-0.0718	0.0130	0.2001	0.0254	0.0372	0.1168	1797
		(144.8)	(39.5)	(12.2)	(-8.4)	(-1.8)	(-3.7)	(-2.3)	(0.1)	(4.1)	(0.6)	(1.8)	(4.3)	
Informal	0.2939	6.75	0.1343	0.0503	-0.0005		0.1573	0.0860	0.1781	0.5380		0.0108	-0.0775	454
		(48.8)	(13.1)	(6.7)	(4.0)		(1.3)	(0.9)	(0.5)	(1.8)		(0.1)	(-0.8)	
1989														
Formal	0.4897	4.86	0.1470	0.0469	-0.0005	0.1979	-0.0799	-0.0815	0.1353	0.2651	-0.0216	0.1071	0.0116	1722
		(78.2)	(34.0)	(10.8)	(-6.4)	(0.9)	(-1.5)	(-2.1)	(1.0)	(4.5)	(-0.5)	(2.4)	(0.3)	
Informal	0.3141	4.49	0.1514	0.0605	-0.0008	0.1878	-0.0707	-0.0093	-0.4151	0.4006		-0.1046	-0.0189	396
		(29.0)	(12.4)	(6.5)	(-4.6)	(0.4)	(-0.5)	(-0.1)	(-0.6)	(1.6)		(-0.9)	(-0.1)	

Basic Data SOURCE: BRASIL/PNAD. Magnetic tapes.

NOTE: SECTs represent respective dummy variables for: Construction, Commerce, Services, Transport, Finance - the basic variable is Manufacturing; POSH=dummy variable for head of household; SECDY=dummy variable for individuals with other income source than her job.

t-statistics in brackets For summary statistics of the variables, see Table 6-01A in appendix

TABLE 6-02
RECIFE: Statistics from regressions on the extended model
Formal and Informal labour markets. Female employees. Dependent variable: lnY
1981/1989, selected years

YEARS/ SEGMENTS	R sq	Interc.	School.	Exp	Exp sq	SECT2	SECT3	SECT4	SECT5	SECT6	SECT7	POSH	SECDY	N.Obs
						EQUATIONS								
1981														
Formal	0.6044	7.87	0.1492	0.0349	-0.0004	0.2452	-0.2451	-0.2134	-0.0944	0.1219	0.0073	0.0611	0.1549	1170
		(95.8)	(32.3)	(6.7)	(-3.6)	(1.5)	(-3.9)	(-4.3)	(-0.8)	(1.5)	(0.1)	(1.2)	(2.6)	
Informal	0.3213	7.43	0.1391	0.0571	-0.0008	0.0162	-0.1833	-0.4268	1.2370	-0.3176		-0.1351	0.0636	641
		(40.2)	(15.4)	(7.8)	(-6.2)	(0.0)	(-1.0)	(-2.7)	(1.8)	(-0.6)		(-1.4)	(0.5)	
1983														
Formal	0.6121	9.15	0.1584	0.0369	-0.0004	-0.3207	-0.1188	-0.0878	0.0841	0.5425	0.0877	-0.0126	0.1448	1141
		(105.7)	(32.5)	(7.1)	(-4.4)	(-1.5)	(-1.8)	(-1.6)	(0.5)	(6.3)	(1.5)	(-0.2)	(2.0)	
Informal	0.3249	8.37	0.1228	0.0686	-0.0009	-0.4200	0.3166	-0.0637	1.6640	1.5641		-0.1466	0.1669	568
		(46.5)	(12.8)	(8.4)	(-6.2)	(-0.9)	(1.8)	(-0.4)	(2.4)	(4.3)		(-1.5)	(1.2)	
1985														
Formal	0.5738	11.39	0.1621	0.0393	-0.0004	-0.5278	-0.2031	-0.2667	0.0776	0.4430	0.1478	0.0322	0.1590	1100
		(116.1)	(29.2)	(7.1)	(-4.0)	(-1.6)	(-2.7)	(-4.1)	(0.3)	(4.2)	(2.2)	(0.6)	(3.6)	
Informal	0.3408	11.11	0.1384	0.0465	-0.0005	0.1178	-0.4180	-0.8284	1.2263	0.3172		0.1732	-0.5923	585
		(58.7)	(12.7)	(5.7)	(-3.4)	(0.2)	-2.2)	(-5.4)	(2.2)	(0.8)		(1.5)	(-3.9)	
1987														
Formal	0.6130	6.60	0.1495	0.0336	-0.0004	-0.1953	-0.0296	-0.1546	-0.0354	0.6289	0.2695	0.0541	0.0697	731
		(58.9)	(23.6)	(5.2)	(-3.0)	(-0.8)	(-0.3)	(-2.2)	(-0.2)	(4.8)	(3.6)	(0.9)	(1.4)	
Informal	0.3647	6.00	0.1439	0.0557	-0.0007	0.1938	0.3290	-0.1195		0.7665		-0.0954	0.1525	387
		(29.4)	(12.5)	(5.9)	(-4.1)	(0.5)	(1.6)	(-0.8)		(2.5)		(-0.7)	(1.1)	
1989														
Formal	0.5106	4.37	0.1521	0.0226	-0.0001	0.3157	-0.2266	-0.1719	0.1139	0.7359	0.0424	0.1210	0.1111	722
		(34.6)	(20.4)	(2.8)	(-0.4)	(1.0)	(-2.5)	(-2.1)	(0.4)	(4.9)	(0.5)	(1.6)	(1.9)	
Informal	0.3131	3.79	0.1192	0.0635	-0.0008	0.2422	0.0019	-0.3802		0.9853		0.0028	0.0861	340
		(17.0)	(9.5)	(5.9)	(-4.1)	(0.4)	(0.0)	(-2.1)		(2.3)		(0.0)	(0.5)	

Basic Data SOURCE: BRASIL/PNAD. Magnetic tapes.
NOTE: SECTs represent respective dummy variables for: Construction, Commerce, Services, Transport, Finance - the basic variable is Manufacturing;POSH=dummy variable for head of household; SECDY=dummy variable for individuals with other income source than her job.
t-statistics in brackets For summary statistics of the variables, see Table 6-02A in appendix

TABLE 6-03

SAO PAULO: Statistics from regressions on the extended model

Formal and Informal labour markets. Male self-employed. Dependent variable: lnY

1981/1989, selected years

YEARS/ SEGMENTS		EQUATIONS											
	R sq	Interc.	School.	Exp	Exp sq	SECT2	SECT3	SECT4	SECT5	SECT6	POSH	SECDY	N.Obs
1981													
Formal	0.3282	9.44	0.1050	0.0088	-0.0000	-0.3800	-0.2044	-0.1828	-0.3350	-0.0925	0.2465	0.2926	604
		(45.3)	(13.0)	(0.9)	(-0.1)	(-2.6)	(-1.5)	(-1.3)	(-2.2)	(-0.4)	(2.8)	(4.3)	
Informal	0.2515	8.57	0.1046	0.0390	-0.0005	-0.0051	0.0883	0.0075	-0.0788	0.2261	0.2222	-0.0507	477
		(42.4)	(10.8)	(4.3)	(-3.9)	(-0.0)	(0.5)	(0.0)	(-0.4)	(-0.8)	(2.6)	(-0.6)	
1983													
Formal	0.2387	10.72	0.0904	0.0235	-0.0003	-0.1133	-0.1066	0.0935	0.1749	-0.0371	0.1607	0.0296	678
		(51.7)	(11.2)	(2.6)	(-2.5)	(-0.7)	(-0.7)	(0.6)	(1.1)	(-0.2)	(1.7)	(0.4)	
Informal	0.2577	10.16	0.1031	0.0271	-0.0004	-0.0526	-0.1362	-0.1368	-0.0449	0.3761	0.2681	0.1062	513
		(60.9)	(11.0)	(3.5)	(-3.6)	(-0.4)	(-1.0)	(-1.0)	(-0.3)	(1.6)	(3.1)	(1.2)	
1985													
Formal	0.3059	12.81	0.1094	0.0257	-0.0003	0.0151	0.1661	0.0983	0.3200	0.3491	0.0040	0.0211	635
		(59.4)	(13.7)	(2.6)	(-2.5)	(0.1)	(1.1)	(0.7)	(1.9)	(1.6)	(0.0)	(0.3)	
Informal	0.3510	12.44	0.1202	0.0380	-0.0005	-0.4582	-0.3998	-0.1983	-0.0519	0.1810	0.3850	0.0009	603
		(65.0)	(12.5)	(4.3)	(-4.1)	(-3.1)	(-2.6)	(-1.3)	(-0.3)	(0.5)	(4.4)	(0.0)	
1987													
Formal	0.2455	8.50	0.0894	0.0227	-0.0003	-0.1266	-0.1753	-0.0214	0.1637	-0.0678	0.0331	0.3121	350
		(29.8)	(7.4)	(1.5)	(-1.4)	(-0.6)	(-0.9)	(-0.1)	(0.8)	(-0.2)	(0.3)	(2.9)	
Informal	0.2964	8.31	0.0952	0.0197	-0.0004	-0.2110	-0.2955	-0.2429	-0.0409	0.9918	0.2915	0.0118	325
		(32.7)	(7.4)	(1.9)	(-2.8)	(-1.1)	(-1.5)	(-1.3)	(-0.2	(2.4)	(2.8)	(0.1)	
1989													
Formal	0.3047	6.40	0.1315	0.0019	0.0001	-0.1259	-0.2052	-0.2801	-0.0257	0.5771	0.1432	0.0549	348
		(18.1)	(10.4)	(0.1)	(0.3)	(-0.5)	(-0.9)	(-1.2)	(-0.1)	(1.3)	(0.9)	(0.5)	
Informal	0.2115	5.51	0.1053	0.0317	0.0004	0.1509	0.1331	0.1941	0.0518	0.5592	0.1757	0.0308	270
		(20.1)	(7.2)	(2.4)	(-2.5)	(0.8)	(0.7)	(1.0)	(0.2)	(1.2)	(1.3)	(0.2)	

Basic Data SOURCE: BRASIL/PNAD. Magnetic tapes.

NOTE: SECTs represent respective dummy variables for: Construction, Commerce, Services, Transport, Finance - the basic variable is Manufacturing; POSH=dummy variable for head of household; SECDY=dummy variable for individuals with other income source than his job.

t-statistics in brackets

For summary stattistics of the variables, see Table 6-03A in appendix

TABLE 6-04

RECIFE: Statistics from regressions on the extended model

Formal and Informal labour markets. Male self-employed. Dependent variable: lnY

1981/1989, selected years

YEARS/ SEGMENTS	EQUATIONS												
	R sq	Interc.	School.	Exp	Exp sq	SECT2	SECT3	SECT4	SECT5	SECT6	POSH	SECDY	N.Obs
1981													
Formal	0.3205	8.17	0.1077	0.0266	-0.0004	0.2563	0.2328	0.1830	0.7330	0.5015	0.4730	0.2294	253
		(22.5)	(8.23)	(1.73)	(-1.9)	(0.9)	(0.9)	(0.7)	(2.8)	(1.3)	(2.9)	(1.7)	
Informal	0.2774	8.13	0.0947	0.0426	-0.0005	0.0609	-0.1173	0.0960	0.1330	1.7659	0.1652	-0.4747	444
		(44.6)	(7.9)	(4.6)	(-3.9)	(0.4)	(-0.8)	(0.6)	(0.7)	(5.1)	(1.6)	(-4.2)	
1983													
Formal	0.3553	10.84	0.1185	0.0697	-0.0001	-0.5836	-0.4534	-0.4398	-0.3446	-0.3951	0.3039	0.1446	252
		(25.4)	(9.3)	(0.4)	(-0.3)	(-1.7)	(-1.5)	(-1.4)	(-1.1)	(-0.9)	(1.8)	(0.4)	
Informal	0.2380	9.55	0.1174	0.0291	-0.0003	0.2017	-0.0220	0.0513	0.0798	0.2832	0.2382	0.0597	605
		(43.9)	(11.2)	(3.4)	(-2.7)	(1.0)	(-0.1)	(0.3)	(0.4)	(0.9)	(2.5)	(0.6)	
1985													
Formal	0.3194	11.78	0.1470	0.0638	-0.0008	-0.1739	-0.4147	-0.3822	-0.2364	0.3693	0.2496	-0.0468	199
		(25.6)	(8.1)	(3.4)	(-3.2)	(-0.5)	(-1.4)	(-1.3)	(-0.7)	(0.4)	(1.1)	(-0.3)	
Informal	0.2553	11.58	0.1303	0.0495	-0.0006	-0.1064	-0.2434	-0.3136	-0.2276	0.8764	0.2358	-0.3210	602
		(40.8)	(10.7)	(4.9)	(-4.1)	(-0.4)	(-1.0)	(-1.3)	(-0.9)	(2.1)	(2.1)	(-2.6)	
1987													
Formal	0.3572	6.02	0.1696	0.0543	-0.0006	0.8015	0.7359	0.6121	1.3343	0.9744	0.3349	-0.1722	127
		(9.4)	(7.2)	(2.0)	(-1.5)	(1.6)	(1.7)	(1.4)	(2.5)	(1.2)	(1.0)	(-0.6)	
Informal	0.2344	6.82	0.1071	0.0538	-0.0006	-0.1354	0.0478	-0.0053	0.0656	1.0211	0.2369	-0.3907	343
		(23.8)	(6.9)	(4.2)	(-3.5)	(-0.6)	(0.2)	(-0.0)	(0.2)	(2.4)	(1.9)	(-2.4)	
1989													
Formal	0.3083	6.24	0.1017	-0.0310	0.0004	0.0874	0.0477	0.3042	0.1050	0.5636	0.2756	-0.5469	125
		(8.3)	(4.3)	(-1.1)	(1.1)	(-0.2)	(0.1)	(0.7)	(0.2)	(0.5)	(0.9)	(-2.4)	
Informal	0.2094	5.04	0.1293	0.0324	-0.0003	-0.4059	-0.6165	-0.3930	-0.3621		0.2868	-0.3838	305
		(13.2)	(7.1)	(2.1)	(-1.5)	(-1.2)	(-1.9)	(-1.2)	(-1.0)		(1.8)	(-2.3)	

Basic Data SOURCE: BRASIL/PNAD. Magnetic tapes.

NOTE: SECTs represent respective dummy variables for: Construction, Commerce, Services, Transport, Finance - the basic variable is Manufacturing; POSH=dummy variable for head of household; SECDY=dummy variable for individuals with other income source than his job.

t-statistics in brackets

For summary statistics of the variables, see Table 6-04A in appendix

power of the earnings equation decreases over time. In 1989, the male and female equations have very similar values of R^2 which are quite high for earnings functions - about 50% of the inequality in earnings in the formal sector being explained by human capital factors.

The rates of return to education for women do not show the same sharp difference between segments as those found from male earnings functions, although the overall pattern is of higher rates of return in the formal segment. In Sao Paulo the formal and informal labour markets present about the same return to education in three years of the whole period, around 14-15% (1983, 1987 and 1989). In Recife the same occurs in 1981 and 1987. For the other years, the formal-informal gap in returns to schooling in this region reaches similar magnitude as that obtained for men. Returns to education in the formal sector are about the same (14-15%) in both regions, the same outcome produced in PSACHAROPOULOS (1987, p. 16) for non-segmented samples of males and females based on the 1980 Brazilian Census. However, these gender comparisons should take into account the fact that the proxy used for experience (age - 5 - years of education) is ill-specified in the case of women, for reasons already discussed. Furthermore, sharp gender differences in schooling and other variables, shown in Table 6-05 below, should also be considered. For all years in both regions, female employees assigned to the formal sector have a higher average years of education than male employees do, despite the fact of the former being younger. This corroborates the finding frequently quoted in the

TABLE 6-05
SAO PAULO, RECIFE, metropolitan areas - 1981/1989
Age, education, work hours and wages of male and female employees
(averages)

YEARS,SEGMENTS, GENDER	REGIONS, VARIABLES							
	SAO PAULO				RECIFE			
	Age	Educ (years)	WHours (weekly)	Wage (monthly)*	Age	Educ (years)	WHours (weekly)	Wage (monthly)*
1981								
FORMAL								
Male	32.3	6.3	47.2	44.1	33.7	6.4	45.7	28.9
Female	29.6	7.5	42.7	26.3	31.8	8.5	40.7	19.6
INFORMAL								
Male	27.7	4.8	47.0	16.2	26.4	4.0	45.6	9.6
Female	27.7	4.1	43.3	9.5	25.9	3.3	47.8	4.7
1983								
FORMAL								
Male	32.5	6.6	46.4	179.0	34.0	6.7	46.0	128.8
Female	30.3	7.7	42.4	104.4	32.7	8.6	41.0	88.1
INFORMAL								
Male	28.1	4.8	47.3	68.1	27.6	4.0	46.9	43.2
Female	27.9	4.2	45.6	41.0	27.0	3.6	49.2	21.0
1985								
FORMAL								
Male	32.3	6.8	46.9	1794.8	34.1	6.9	45.9	1373.0
Female	30.3	8.0	42.9	1138.9	32.8	9.3	39.9	1014.3
INFORMAL								
Male	26.8	4.8	46.8	615.0	26.1	4.4	47.1	477.6
Female	27.8	4.5	44.1	379.9	27.3	4.1	53.5	171.7
1987								
FORMAL								
Male	32.3	7.0	45.7	15.0	33.6	7.0	45.8	10.1
Female	30.5	8.1	41.7	9.5	34.2	9.1	41.1	7.5
INFORMAL								
Male	29.4	5.0	45.5	6.1	25.3	4.3	44.5	3.1
Female	30.3	5.0	41.3	4.4	26.4	3.9	46.5	1.8
1989								
FORMAL								
Male	32.7	7.1	43.9	1774.4	33.8	7.1	43.2	981.1
Female	30.8	8.2	40.9	1131.0	33.3	9.1	40.1	753.6
INFORMAL								
Male	27.6	5.1	44.4	760.3	26.3	4.6	43.4	348.4
Female	30.6	4.6	41.0	513.4	28.9	4.3	43.3	190.6

Basic Data SOURCE: BRASIL/PNAD. Magnetic tapes.
(*) Before 1987, in thousands of Cruzeiros; 1987, in thousands of Cruzados; 1989, in New Cruzados. The Brazilian currency suffered 3 successive cuts of 3 zeros during that period. Since the focus is on gender comparisons in each year - inter-temporal comparisons are not in place - transformation into real monetary values is not considered.
NOTE: number of observations not shown, for limitations of space. Please see other Tables in this chapter.

empirical literature about the selectivity process whereby, to enter the labour market and compete for positions with their male counterparts, women need to obtain a relatively higher educational attainment[4]. It should be noted that a different result is produced when gender comparisons are made for the informal sector. Certainly, average educational attainment of women in the informal sector is lower or close to that of men in the same segment of the labour market. As to women's average wages, they are systematically lower than men's in both sectors and in both regions, suggesting that if gender discrimination does occur it is widespread[5]. One necessary qualification is that the gender gaps in wages shown here would be smaller if corrected for differences in average weekly working hours which, for women, are systematically fewer than for men. Although gender differences are not the main focus of this study, it is worth adding that in the informal sector of the less developed area, Recife, female employees are at their worst relative position. There they work more to get much less than their male counterparts in the informal (but, unlike women in the formal sector, they are less educated then men). The pattern of relatively lower average hours worked for females holds for the formal and informal sectors in Sao Paulo and the formal sector in Recife but not for the informal in the latter. This is indeed a

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[4] The above may lead one to wonder whether the screening hypothesis plays a more important role in the case of women.

[5] It has been found by BARROS *et al* (1992) that in Brazilian urban labour markets gender gaps in wages are substantially high. The data used in that study is generated from the same source (PNAD) as ours.

curious regional difference. (See Table 6-05).

As to male self-employed, Tables 6-03 and 6-04 lead to quite clear differences from estimates obtained for male employees. First, the R^2 are much smaller. Second, the formal-informal gap in returns to education is not as evident as that found for male employees. As expected from the theory, the wage equation of the self-employed is markedly different from the one for employees. In short, the Mincerian earnings function does not seem to fit well in this case, perhaps because important factors are missing in the equation, e.g. prior possession of equipment or means of production in general and also ability.

Individual talent (for selling services on an own-account basis) might play a more influential role here than in the case of an employee who is given a certain task amongst a team that performs the same routine. Also, whereas employed people need to educate themselves (say, in order to screen themselves) and collect the return from their ability, that does not happen to the same extent in the case of the self-employed. An own-account worker instead needs to build up his reputation by seeking to perform his tasks as best as he can. Additional aspects could be considered regarding the specification of the earnings equation in this case: the measurement of hours worked and of experience in the labour market.

In the case of the employed worker, the number of working hours is precisely determined by the firm (i.e. the production process) and the start of the experience period can be fixed

by the date of the first employment. For self-employed, both measures tend to be established in a looser way. Since in practical terms hours worked have to be measured in the same way for different occupational groups and since the proxy for experience is frequently the same, the estimates for self-employed may end up being affected by problems of misspecification.

3. The problem of the selection biases

3.1 Conceptual issues

The question of comparing earnings or wage distributions, or earnings inequalities, between different groups of workers - more generally, between different segments of the labour market - is always complicated by the issue of how people are selected for the analytically distinguished segments or sectors. A crucial point is that, depending on how the selection takes place, observed differences between distributions (between returns to education, as is the case here) might, or might not, have a satisfactory **causal** interpretation[6]. Typically, we are able only to make

[6] BARROS (1988), analysing observed differences in wage distributions for a specific group of civil construction workers in Brazil, conducts a detailed statistical discussion of this question. He argues that, even if the selection were random, analytical caveats would still be in place. Three segmentation models based on alternative assumptions are evaluated: i) first, jobs are assumed to be equally good and workers' abilities to be equally valuable in both segments, but there would occur a non-random selection and thus wage distributions differences would be due to different distributions of abilities across segments; ii) in the second model, it is assumed a random selection (equal distribution of abilities across segments) and jobs are considered homogeneous, but workers - whose abilities would be differently evaluated by employers across segments - are

association between detected empirical differences, an important obstacle to a deeper interpretation being the lack of information on variables such as ability and socio-economic background. On top of that, one faces the problem of censoring, since the full sample upon which the estimation is based comprises both the employed and the unemployed.

As is well known in the specialised literature, the bias produced in the OLS estimates derives from the fact that their estimation is based on the assumption that the expected value of the random error term in the sample is zero (and its variance is constant) - as may happen for the whole population. However, if a selection criterion is introduced or any censoring rule is applied, a non-random process is used. Consequently, the error term in the sample is bound not to have zero mean. Considering the case of restricting the sample to the employed lot, to withdraw the unemployed means to make a **systematic rather than random** exclusion of observations (those with a precise characteristic, i.e. hours worked = zero); therefore, that assumption (vital to OLS) is violated and the resulting estimates are biased. By the same token, one can do the reasoning in the case of an **external** selection rule, which will always be non-random[7] - the issue being

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assumed heterogeneous; iii) finally, workers are taken as homogeneous (equally able), the selection as random, but there would exist differences in the distribution of jobs by quality across segments (job heterogeneity). He concludes that observed differences in earnings distributions are consistent with the three models, but their interpretation would vary depending on the model considered.

[7] The whole discussion is based on considerations made in FALLON & VERRY (1988, p. 67) and BERNDT (1991, pp. 190-91) and TAUBMAN & WACHTER (1986), WACHTER (1974), DICKENS & LANG

whether the basis for exclusion is correlated with the error term. One way of correcting the bias so produced is the widely used Heckman's 2-step procedure which is briefly summarised below, according to the original formulation of Heckman's selectivity model for obtaining a bias corrected-wage equation[8]:

i) First, the estimation of a probit equation, for the whole sample of "workers and non-workers", involving the probability of an individual being "participant in the labour force" related to a set of factors found to be relevant to that participation. The inverse Mill's ratio ("hazard rate") - defined as a quotient based on the standard normal probability density and cumulative distribution functions - is then estimated with basis on the maximum likelihood-estimated probit equation;

ii) in a second step, the calculated hazard rate is appended as a regressor to the earnings (wage) equation fitted to the restricted sample of workers. The estimates so found are considered consistent. The significance of the OLS bias which arises from estimation on a truncated sample could be associated to the extent to which the appended hazard rate-regressor differs from zero (BLUNDELL, 1990, p. 20).

The estimation method used in this study is in fact an extension of the above procedure, taking into account a wage

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(1985), MADDALA (1989), VIJVERBERG (1985).

[8] Most of our specific discussion of estimation problems above follows BERNDT (1991), BLUNDELL (1990, mainly pp. 17-29). See also MADDALA (1992) and BLUNDELL, HAM and MEGHIR (1987).

equation and a labour supply equation for each segment of the labour market (formal and informal) . In the remainder of this section we will detail the model and comment on the results of the estimation of the wage and labour supply equations, corrected for the biases due to the sample split and to the exclusion of the unemployed.

3.2 Establishing the model

As already made clear in Chapter III, we are assuming that individuals in Brazilian urban labour markets pursue objectives of maximisation. Therefore, those in informal positions would not miss an opportunity of moving to a formal job where, besides greater average wages, the worker finds institutional coverage which brings "fringe benefits" not available in the informal. The estimation model described below considers two options or situations in the labour market: to be in the formal or in the informal segment. In whichever position an individual is placed, he/she can face unemployment[9]. Therefore, the probability of being unemployed (employed) is conditional on the choice of market[10].

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[9] In the data set used, there is an item which allows the researcher to know if an individual used to have a signed work card in the last job. That is the only case where we use possession of work card as a segmentation device - given that the information about social security contribution is not available for the unemployed. Note that, in principle, an individual can contribute to the social security system even being unemployed, if he/she wants. That contributes to a (although "meagre") future retirement allowance.

[10] A quite different approach is used by PRADHAN & van SOEST (1993), who consider "three labour market states: working in the formal sector, working in the informal sector and not working" and apply two models (a ordered probit and a multinomial logit model), in a study on urban areas of

The estimated model deals simultaneously with the individual's formal-informal allocation and employment status (employed/unemployed). For each region and each segment of the labour market, two reduced form equations are established: one for segment selection and the other for employment status. In addition, a wage equation and an hours-worked equation are established - also for each region and each segment. The explanatory variables are the same as the ones used before, a minor difference being the change of denomination of the dummy variable for head of household, for the sake of clarifying: from POSH (position in the household) to just HEAD.

The labour supply equation has a structural form in the sense that log(wage) is amongst the explanatory variables. The wage equation, as is the case with the selection and employment status equations, is a reduced form function. The set of equations, with the estimation procedures already incorporated, is thus the following:

(1) Pr(segment) = f(EDUC, EX, EXSQ, SECT, HEAD, SECDY)

(2) Pr(empl) = g_k(EDUC, EX, EXSQ, SECT, HEAD, SECDY), in fact describing two conditional probability equations, that is, probability of employment **given** the segment in which the worker belongs.

(3) lnY = h_k(EDUC, EX, EXSQ, SECT, SECDY, λ_k, λ_t) + u_1

(4) lnWKH = i_k(lnY, EDUC, EX, EXSQ, SECDY, λ_k, λ_t) + u_2

where:

Bolivia. PRADHAN & van SOEST do explicitly what most of the empirical studies do implicitly: overlook the concept of involuntary unemployment and use participation in a different sense from that commonly understood in basic economics. We comment further on this below.

segment = 1 if individual is in the formal

= 0 if individual is in the informal segment,

empl = 1 if individual is employed

= 0 in individual is unemployed,

λ_j and λ_t are respectively the inverse Mill's ratios for segmentation and for unemployment, with k = 1 (formal), 2 (informal) and t = 3 (formal), 4 (informal),

SECT = a vector of sector of activity dummies, comprising CONSTR (Civil Construction), COMSERV (Commerce and Services) and TrpFinPS (Transport, Finance and Public Sector)[11] and the other variables have already been defined (Chapter V).

The conditions for identification are guaranteed by the fact that the SECT variables are kept in the wage equation and dropped from the labour supply equation, and both form a recursive structure which allows for an OLS estimation. Also, HEAD is kept in the probit equations and omitted from the wage and labour supply equations. The economic reasoning for these decisions is:

i) inter-sectoral wage differentials could be important, since efficiency wage mechanisms might be in operation;

ii) head of household is an important characteristic to

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[11] In order to avoid dropping of observations in the probit for employment in the informal sector (the smallest sub-sample) and also to keep public sector workers (allocated to the formal) in the sample, the sectoral dummies were reduced from six to just the three above. Note that we tried to keep together activities that are not "too heterogeneous" in regard to the formal-informal composition. That facilitates the interpretation of the estimates. E.g. coefficients on COMSERV in the probit for segmentation are expected to be negative (Manufacturing is still the basic variable).

locate individuals in formal activities, but it is not so important in determining the wage the individual is to get in the market;

iii) a second income source might play an important role in determining the wage an individual gets and also his supply of hours worked, depending on the value of the second income. Unfortunately, we are working with a quite crude approximation to that economic relationship by using a yes/no dummy for the existence of a second income source. But this sort of limitation is not exclusive to this study, rather being a frequent feature in empirical works on labour economics[12].

The above is the identification procedure adopted and taken into account for obtaining the estimates presented in Tables 6-08 and 6-09 below. A second identification procedure was tried and the corresponding estimates are those depicted in Tables 6-08A and 6-09A. This second procedure, by dropping the sector of activity dummies from the wage equation, makes the heroic assumption that inter-industry wage differentials

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[12] Our data set allows for the identification of the several kinds of second incomes, the main ones being rent and retirement. One might think of explicitly incorporating rent into the estimation and that possibility was considered. But some tabulations revealed a serious limitation: the proportion of those who reported non-zero values for rent or even for all second incomes together is much smaller than the proportion of those who reported having a second income. This is understandable, since people tend to omit that sort of information in order to evade tax payment. As already referred to elsewhere in this study, in Brazil this is quite common behaviour that periodically is aggravated in context of economic crisis and economic policy mismanagement. At any rate, it could be expected that the proportion of second income occurrences in the sample is a reasonable approximation, given that the omission-response to a less specific item of a survey tends to be occasional and thus could be considered minimal. As to the proportions of second incomes in the sample, they have been quoted in Chapter V.

are not important. But given the existing narrow range of options, this second identification technique was used as a way of examining the sensitivity of the estimation technique to different identification criteria.

As to the estimation method used for obtaining the results presented here, it can be summarised as follows:

i) The first step is to estimate a probit likelihood function for segmentation applied to the whole sample of formal and informal workers and another for unemployment (conditional on the segment selection), applied to the full sample of employed and unemployed - both reduced form equations;

ii) In a second step, the lambda for segmentation and for unemployment - based on the respective probit equations - are calculated for each sector and appended as a regressor to the wage equation (3), applied to the restricted sample of employed workers in each sector;

iii) The third step involves not only appending the lambda to the hours worked equation (4) above, but also implementing an instrumental variable estimation with lnY (which represents actual standardised wages, as already seen) being replaced by predicted values of wage obtained from the wage equations estimated in the previous step.

The resulting estimates are bias-corrected and considered to be consistent.

3.2.1 More on conceptual issues

Further questions need to be addressed, related to the concept of participation as currently used in works which focus on the estimation of the labour supply function.

By dividing the population and the sample into participants and non-participants, or workers and non-workers, the participation decision rule is usually established as follows.

Consider a wage equation and an hours-worked equation of the following kind, where wage (W) and work hours (H) must be read in logarithm form [BERNDT (1991); MAGNAC (1987)]:

$W = \alpha + \beta X + u$ (I)

$H = aW + bZ + v$ (II) if the individual works, where $a>0$ and X = a vector of human capital variables related to the determination of the individual's wage

Z = vector of variables which determine the individual's reservation wage

and H = 0 (individual does not work), or

$H = a(\alpha + \beta X) + bZ + V > 0$ if the individual works; $(V = au + v)$.

By making H = 0 in (II) and solving for W [(BERNDT (1991, p. 616)], the reservation wage W* is obtained.

The participation decision rule is then settled as:

$$H > 0 \text{ if } W > W^*$$

Underlying all this procedure there is the assumption and this is a crucial point - that all those who are not working are **voluntarily** unemployed, which is rather unrealistic concept particularly in developing countries. In

the Brazilian case, where during the period analysed here the unemployment benefit system was not yet in operation[13], an important factor for a person to stay unemployed until he/she found a job which matched his/her "reservation wage" was thus absent. Moreover, the majority of those out of work in Brazil usually come from the less educated labour force: if it were the contrary (the more educated being the predominant group amongst the unemployed), one could hazard the hypothesis that people were unemployed because their reservation wage was not being matched by the market wage. They would search longer for a job because their higher education level would yield higher relative returns[14] - and that would be reflected in the unemployment rates measured at a **given** moment. Going deeper into that, one could think of a more complex model which allowed for a worker to search a formal job while working (temporarily) in the informal. In this case, the informal sector would play the role normally attributable to the welfare system, and the individual would be bearing a reservation wage not matched by the (formal) market wage. But for that to be theoretically upheld, one needs a minimum of empirical evidence of such a **transitional** characteristic of an informal job. A model of that sort would require unequivocal

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[13] In fact, the unemployment benefit started operating from March 1986, but in 1990 it covered about 5% of the whole number of unemployed in the country [CHAHAD (1990, p. 79)]

[14] FALLON (1983) has found some evidence of positive correlation between education and longer search explicable via higher expected returns, by applying a "dual" model to a sample of job seekers in India. Also, JATOBÁ (1990) has found that in Brazil the more educated suffer less the uncertainty of unemployment during recession periods.

evidence of labour mobility from the informal to the formal[15]. Although this kind of mobility cannot be ruled out for e.g. an unemployed formal worker doing casual work in moments of economic recession, there is not convincing proof, so far, of a clear pattern of formal-informal labour mobility in Brazilian labour markets, as already referred to elsewhere in this study. Moreover, the persistence of a sizeable formal-informal wage gap over time shows that there is something of **permanent** in the differences in the determination of earnings between the two segments of the labour market.

To sum up this discussion, the assumption of voluntary unemployment is definitely not contemplated in this study, since there seems to exist little supporting evidence of it in the reality of Brazilian labour markets.

Coupled with this question there is the usual understanding of the unemployed as "non-participants", in clear contrast to the notion of "participation in the labour market", well established in the basic economic literature. BLUNDELL, HAM & MEGHIR (1987) address this question by extending the above standard labour supply model to one which incorporates the involuntarily unemployed (i.e. those seeking

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[15] Besides the above, one needs to assume that an informal job cannot be considered as employment, rather being **underemployment**. That would introduce even more complicated conceptual matters as, in economic activities typically considered as informal, there exist occupations with very similar characteristics to those of a formal job, except for the unlawful status and the informal relationship amongst those there engaged. As an additional limitation to a step in the direction discussed above, our data set does not allow for a model with elements of job-search to be constructed since the relevant information is available only for those who are unemployed.

a job but unable to find it). However, the authors are chiefly concerned with a solution to the estimation problem rather than a discussion on the conceptual question, which is just referred to by pointing out the divergence of the term "participation" in relation to the calculation of labour force statistics. But the participation decision concept is indeed widely used and some authors do it with explicit disregard for the idea of involuntary unemployment[16]. In fact, the participants versus non-participants idea rigorously requires the empirical evidence of an individual with all the necessary qualifications to enter the labour market (age, skills, education, etc) but who does not want to because his reservation wage is not outstripped by the market wage: it is as if he has the information and then decides not to look for a job in that specific market, dedicating all his spare time to leisure activities. This eventually would lead the researcher to seek to identify amongst the whole population the following components: employed workers, involuntarily unemployed workers, the voluntarily unemployed and even the discouraged workers. There is no doubt that the empirical detection of the third component is quite difficult except perhaps in the case of some married women and perhaps some eccentric individuals whose valuation of leisure is very different from that of most of people (in other words, for such an individual the disutility of working would clearly

[16] E. g. PRADHAN & van SOEST (1993, p. 3): "We [thus] do not distinguish between, for example, those looking for a job and those not looking for a job. We use the term non-participants for all non-workers, including the involuntary unemployed".

surpass the utility obtainable from monetary reward of working)[17].

In this study the concept of participation is taken in a more conceptually rigorous approach to supply of hours worked **conditional on labour force participation**, as pointed out by FALLON & VERRY (1988, p. 17), with both employed and unemployed considered as **participants** in the labour market. Therefore, the probabilities estimated in equations (2) above represent strict employment (unemployment) probabilities.

3.3 Analysis of the results

3.3.1 Accuracy of the segment-predicting equation

In analyses of the kind conducted here, it is important to evaluate how statistically strong is the breakdown used to split the sample. Table 6-06 below allows us to do that. The table shows, for both regions and all years, the probabilities of the variable segment being equal to 1 (one) - as predicted by the probit equations - for the two groups into which the observations were classified[18]. The second column gives the

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[17] In fact, a key factor for the occurrence of voluntary unemployment is the availability of unemployment benefit and related income support schemes in developed countries such as England. Some people may prefer to keep using the benefits from the welfare system rather than get a paid job and, consequently, lose the benefits - if the prospective wage does not represent a compensatory trade-off. Two qualifications are, however, necessary: a) we do not believe this is "the" explanation for the unemployment phenomenon, even in developed economies; b) one might argue that, if some people prefer to stay unemployed, it is because the economy is not creating jobs attractive enough to make them prefer otherwise.

[18] The statistical procedure to obtain the above probabilities was performed by use of STATA package, as follows: i) in a first step, for each probit for segmentation a predicted variable (called "form") was created; ii) in the

"p" actual shares of the formal sector in the sample across years and regions. The third and fourth columns present the respective probabilities of segment being = 1 (formal) for those classified as "formal" and for those classified as "informal". As we can see, the overall probabilities reveal that around 70-75% of those classified as formal were predicted as formal by the equations. Just around 20% of those we allocated to the informal would be formal according to the probit predictions. Thus we can be reasonably satisfied with the accuracy of the segment-predicting equation.

3.3.2 Probabilities of employment

An examination of the probit equations estimates[19] reveals some general features which are worth looking at before discussing the specific probabilities.

Observing first the probit equations with education as a continuous variable (Tables APP-VI.02 and APP-VI.03 in the Appendix), it is clear that education is an extremely important attribute for one to be employed, as shown by a positive and significant coefficient on schooling (most of the time at any level). But this holds only for the formal sector. When one looks at the informal, the relationship between

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second step, a binary variable (called "probs") was generated given the condition "probs=(form>=p)", where "p" is the share of the formal sector in the sample, according to our clear-cut criterion; iii) in the third and final stage we did a cross-tabulation "probs x segment", the latter as defined in equations (1) above. The results produce the probabilities shown in Table 6-06.

[19] The probit equations, not included in the body of the chapter in order to make it easier for the reader, can be found in the Appendix, Tables APP-VI.01 to APP-VI.06.

TABLE 6-06
SAO PAULO & RECIFE. MALE EMPLOYEES, 1981/1989
Formal-informal proportions in the sample and probit predictions of the variable segment being equal to unity(%)

YEAR/ REGION	FORMAL SHARE IN THE SAMPLE(*)	PROBIT PREDICTIONS	
		Prob(segment=1) - Formal(*)	Prob(segment=1) - Informal(*)
1981			
S Paulo	89.0	72.0	26.0
Recife	83.0	73.0	21.0
1983			
S Paulo	87.0	71.0	23.0
Recife	77.0	73.0	20.0
1985			
S Paulo	87.0	72.0	16.0
Recife	77.0	72.0	15.0
1987			
S Paulo	88.0	73.0	22.0
Recife	77.0	76.0	14.0
1989			
S Paulo	87.0	68.0	23.0
Recife	78.0	72.0	17.0

SOURCE: Probit equations (see Appendix, Tables ...). Calculations performed using the STATA statistical package. See footnote no. 14.
(*) According to the research criterion based on the individual's contribution to the national system of social security. The other two columns refer to the respective probabilities of the variable segment being equal to unity for those with prior assignment to the formal or to the informal sector.

education and probability of being employed is positive (although not significant) in the case of Sao Paulo, but oddly negative across years in the case of Recife (frequently not significant, and virtually zero in 1989). There is no plausible explanation for that, although one could suggest that the informal segment of the labour market bears very peculiar relationships, including regional differences, not fully explainable by the human capital model. The positive association between higher levels of schooling and the probability of being employed can be examined in greater detail when the probit estimations are performed by level of education. Less educated workers are clearly less likely to be employed. But again there are some exceptions to the general pattern. There is a striking change in the signs of the coefficients on the education dummies across years. Considering the formal segment, educated workers are more likely to be employed than the illiterate in 1981 and 1983 in both regions, and in 1985 in Sao Paulo, whereas for other years (1985 in Recife and 1987/1989 in both regions) the education dummies have a negative sign.

These changes can be better understood when one examines the distributions of employed and unemployed by level of education in the formal sector. Taking the respective proportions of workers amongst the total (employed + unemployed) and amongst the unemployed, by level of education, it is found that from 1985 onwards in Recife and from 1987 in Sao Paulo, illiterate workers have a smaller relative share among the unemployed than in the total, as compared with those

in upper levels of education. Putting it more precisely: if one compares the rates of unemployment in each education level in the formal sector (figures presented in Table 6-07 below) the illiterate have usually the lowest rate - and the difference from the other levels (particularly Primary and Secondary) is often statistically significant. Thus, after 1985 there occurred a change in the demographic composition of the unemployed. The extent to which the reasons for that are on the demand side or on the behaviour of individuals is hard to figure out. However, if we take the illiterate level as a proxy for non-skilled labour there is a clear association with the cycle: this group is more affected by unemployment in recessionary periods and improves its relative position vis-a-vis the more educated during the phase of economic recovery[20]. Table 6-07 provides us with two other findings worth mentioning: i) middle-educated groups of workers (Primary and Secondary) tend to present the highest rate of unemployment throughout the whole period[21]; ii) the smallest rate of unemployment is found amongst College educated workers, except

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[20] It might be suggested that the above is a sort of validation of the "labour hoarding" hypothesis (that non-skilled workers tend to suffer higher rates of unemployment - and higher relative wage losses - during economic downturns). We do not have enough empirical elements to sustain that, though. A more complete approach to this issue is taken by RAMOS (1991a). Incidentally, by analysing a national sample (PNAD) of individuals (aged 18-65) engaged in urban activities in Brazil during 1976/1981 and 1982/1985 - respectively "expansion" and "contraction" according to the author - RAMOS has found that the labour hoarding hypothesis (referred to earnings) is not confirmed for the group of illiterates.

[21] The prominence of unemployment amongst middle educated workers in developing countries is referred to by FALLON (1983), who found evidence that highly-educated workers can afford to search longer.

TABLE 6-07
SAO PAULO and RECIFE metropolitan areas
Rates of unemployment within educational category - formal sector (%)
Male employees. 1981/1989, selected years

YEARS/ REGIONS	EDUCATIONAL GROUPS				
1981	Illit.	Primary	Second.	H.School	College
Sao Paulo	5.58	6.81	9.10	5.31	2.51
	(22/394)	(171/2499)	(136/1495)	(46/866)	(16/638)
Recife	7.77	9.34	9.07	8.35	2.77
	(22/283)	(87/931)	(67/739)	(45/539)	(8/289)
1983					
Sao Paulo	11.79	9.15	10.06	7.50	4.51
	(46/390)	(220/2404)	(156/1551)	(74/987)	(32/710)
Recife	8.10	8.52	10.60	7.07	1.51
	(20/247)	(64/751)	(78/736)	(34/481)	(4/264)
1985					
Sao Paulo	4.38	4.70	6.22	3.71	1.66
	(18/411)	(109/2321)	(108/1736)	(39/1050)	(13/782)
Recife	2.71	3.87	4.69	3.50	3.46
	(6/221)	(26/671)	(35/746)	(18/514)	(10/289)
1987					
Sao Paulo	0.55	5.22	7.38	3.40	1.57
	(1/180)	(62/1188)	(73/989)	(21/618)	(7/446)
Recife	5.36	8.19	9.84	3.76	3.28
	(6/112)	(34/415)	(43/437)	(12/319)	(6/183)
1989					
Sao Paulo	1.16	3.44	4.69	2.96	1.27
	(2/172)	(33/960)	(47/1001)	(17/574)	(5/393)
Recife	5.55	7.25	7.62	6.96	0.57
	(7/126)	(25/345)	(42/551)	(24/345)	(1/174)

SOURCE: BRASIL/PNAD. Magnetic tapes.
NOTE: Illiterate: less than 1 year of schooling; Primary: 1 to 4; Secondary: 5 to 8
High School: 9 to 11; College: 12 or more

in the final years when the illiterate indeed have the lowest proportion of unemployed.

With regard to the informal sector, again the results are quite different and suggest that education is not a strong factor in determining employment in that segment of the labour market - and this reinforces the dualism hypothesis. However, one should take into account that the size of the sample (determined by the split into segments) may not entitle us to give excessive credit to such an outcome[22].

At any rate, the results point to the overall positive association between higher levels of education (from the Primary level upwards) and higher probabilities of employment - as one would expect. Specific examples of this relationship will be now examined.

Using the coefficients from the probit equations for employment in the formal and informal sectors, one can - following standard procedure described in most econometrics textbooks [e.g. GREENE (1993, pp. 639-641)] - estimate average probabilities of employment (unemployment) for specific groups of workers or for "representative" individuals.

Considering the extreme years of the period under analysis, the probabilities of employment for a formal worker in the manufacturing sector, head of household, with no second income source and having the following respective levels of education are (%):

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[22] Indeed, it is possible that if the probit equations were estimated for a sample of all metropolitan regions, or at least for the largest ones, the results would be different.

	SAO PAULO		RECIFE	
	1981	1989	1981	1989
Primary	94.5	94.7	93.2	91.2
Secondary	94.7	95.4	94.9	91.3
High School	97.2	97.1	96.0	91.8
College	98.3	98.5	98.5	99.2

The increasing probability of employment as one goes up the education levels is, therefore, once again attested by the above example[23].

The probit results (Appendix, Table APP-VI.02) show - as one would expect - that being head of household increases the probability of employment in the formal sector. The respective coefficient is always positive and significant in both regions across years. But the coefficients on the second income dummy describe an unequivocal change from 1981-1983 to the following period. First, they are negative and significant - as expected from the theory. But in the second period they turn out to be positive and significant. Considering that 1981-1983 was a period of recession and that after 1985 a recovery took place, the change can be clearly related to the economic cycle. However, the sort of relationship which can be thought of is not clear. One could hint that - taking property rent as the representative second income - during economic downturns civil construction is one of the first sectors to suffer, thus reducing the supply of new properties and consequently leading to higher rents - and those who make a living from property rent would not to be motivated to seek employment. But

[23] These differences are less than in developed countries, reflecting probably the more general availability of income support for the unemployed in such countries.

property letting in Brazil is an activity highly regulated by governments, usually resulting in depreciated real values of rent - not necessarily in the same direction of the cycle. As we do not possess enough information to sustain the argument fully, it is not possible to go any further. At any rate, the finding is enough to indicate that economic cycle factors are in operation and might explain other changes in the results on a year-on-year basis.

By way of having a background to the probabilities of employment discussed here it is worth looking at the figures in Table 6-07A below, describing actual rates of unemployment in the sample. The figures are systematically higher in the informal segment than in the formal, in both regions - and this might be mirroring a greater instability of informal employment or, more specifically, showing that the absence of a legal status leaves the worker more vulnerable to labour market conditions[24]. Contrasting the formal sector by regions, Recife presents a higher rate of unemployment than Sao Paulo most of the time, confirming an historical trend[25]. If one looks again at the example given above of probabilities of

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[24] In fact, the costs of sacking a worker must be higher for a firm in the formal sector, which has to fulfil all the legal requirements attached to it.

[25] According to data from the PME (Monthly Survey on Employment)/IBGE, the rates of unemployment in Sao Paulo and Recife metropolitan areas during the eighties were (%):

	1982	1983	1984	1985	1986	1987	1988	1989
Sao Paulo	5.20	6.83	6.80	5.02	3.34	3.75	4.01	3.71
Recife	6.96	8.08	8.50	7.20	4.39	5.18	5.56	5.63 ,

as quoted in CHAHAD (1990, p. 75).

TABLE 6-07A
SAO PAULO and RECIFE metropolitan areas
Sample proportions of unemployed in the formal and informal segments
Male employees. 1981/1989, selected years

YEARS/ SEGMENTS	PROPORTIONS BY REGIONS (%)	
	Sao Paulo	Recife
1981		
Formal	6.6 (391)	8.2 (229)
Informal	12.5 (90)	12.4 (75)
1983		
Formal	8.7 (528)	8.1 (200)
Informal	15.6 (145)	11.4 (89)
1985		
Formal	4.6 (287)	3.9 (95)
Informal	8.6 (86)	6.9 (52)
1987		
Formal	4.8 (164)	6.9 (101)
Informal	10.0 (47)	9.4 (43)
1989		
Formal	3.3 (104)	6.4 (99)
Informal	6.1 (30)	7.1 (31)

SOURCE: BRASIL/PNAD. Magnetic tapes.
NOTE: Figures in brackets are number of observations. To work out the size of the expanded sample, one just needs to add the above absolute figures to the respective number of male employees shown in previous tables.

employment for an individual with certain attributes, it is noticeable that College education seems to compensate for less favourable local labour market conditions in Recife. Indeed, whereas for the basic and intermediate education levels the probabilities of employment are smaller in Recife than in Sao Paulo (matching the picture hinted at by overall rates of unemployment), having a College education would equalise across regions the probabilities of a head of household being employed.

Finally, it should be noted that the actual values of the above probabilities of employment are high and this can be explained by the relatively low overall rates of unemployment in Brazilian labour markets - in the international context - mainly in periods not marked by deep economic recession[26].

3.3.3 Biases-corrected rates of return to education[27]

As one can see by looking at the probit equations for segmentation in the Appendix, the signs, the values and the statistical significance levels of the variables suggest that human capital variables (education and labour market experience) play a large part in determining whether an individual is in the formal sector or not. The sector of activity dummies also have the expected sign and confirms that

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[26] In fact, until 1980 the overall unemployment rate in Brazil was about 2-3%. From the eighties the country started suffering higher rates of unemployment - about 5-7% (period 1982-1989) in the six largest metropolitan areas [CHAHAD (1990, pp. 70 and 75)].

[27] This section presents only the estimates of the wage equations. The probit equations and the labour supply equations are in the Appendix.

those in civil construction and tertiary activities (Commerce and Services) have, as related to manufacturing, a much smaller probability of being in the formal sector. Heads of household are also more likely to be in formal positions than those who are secondary members of the household. As already noted for the employment probit, the coefficients on the second income dummies change over time - following the same pattern found before: negative and significant in 1981 and 1983 and positive, also significant, in the following years. Furthermore, the probit for employment in the informal reveal that SECDY is generally not important: in fact, when its coefficient is significant it is also negative.

As for the rates of return to education, their bias corrected estimates - obtained according to the two-fold identification procedure referred to above (Tables 6-08, 6-09, 6-08A and 6-09A)[28] - lead to the following conclusions:

i) Overall, the biases are found to make a corrective procedure necessary, i.e. one should not be content with OLS estimates;

ii) The formal-informal gap in returns to education, obtained by simple OLS estimation, are proved to be solid. The new results might even suggest that the gap is larger than at first one might think. The values of returns to education in the formal sector are not very different from those estimated

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[28] Reminding the reader: procedure I consists in keeping the sector of activity dummies in the wage equation; whereas they are dropped from that equation according to procedure II (the head of household dummy is kept instead). The dummy variable for second income source (SECDY) is kept throughout the system.

TABLE 6-08

SAO PAULO: Estimates from wage equations corrected for segmentation and unemployment biases. Formal and Informal labour markets. Male employees.

Dependent variable: lnY. *Procedure I for identification

1981/1989, selected years

YEARS/						EQUATIONS						
SEGMENTS	R sq	Interc.	School.	EX	EXSQ	CONSTR	COMSERV	TrpFinPS	SECDY	L1	L3	N.Obs
1981												
Formal	0.5505	8.79	0.1361	0.0691	-0.0010	-0.2261	-0.3479	-0.2228	0.1904	0.0685	-1.6981	5501
		(120.4)	(45.0)	(19.9)	(-16.9)	(-4.5)	(-8.5)	(-10.3)	(8.0)	(0.4)	(-8.3)	
Informal	0.3836	7.02	0.1161	0.0441	-0.0004	0.3510	0.2313	0.0386	0.0752	0.4726	1.2650	629
		(7.9)	(4.4)	(1.9)	(-1.6)	(2.0)	(1.0)	(0.1)	(0.8)	(2.0)	(0.6)	
1983												
Formal	0.5803	10.15	0.1360	0.0701	-0.0010	-0.1747	-0.2756	-0.2062	0.2549	-0.1007	-1.4202	5514
		(156.2)	(45.6)	(22.2)	(-17.8)	(-4.1)	(-7.5)	(-9.4)	(10.4)	(-0.7)_	(-7.5)	
Informal	0.3221	12.02	0.1644	0.0775	-0.0011	-0.8467	-0.7492	-0.2054	-0.4193	-0.9278	-3.9193	787
		(11.1)	(4.7)	(4.3)	(-4.1)	(-2.1)	(-2.3)	(-1.7)	(-1.9)	(-1.7)	(-2.5)	
1985												
Formal	0.5589	12.07	0.1528	0.0759	-0.0010	-0.3403	-0.3407	-0.1013	0.0452	0.2733	-1.5366	6013
		(131.4)	(49.4)	(26.5)	(-19.4)	(-7.8)	(-12.5)	(-5.1)	(0.8)	(2.9)	(-3.5)	
Informal	0.3229	10.46	-0.0107	-0.0178	0.0005	0.8371	0.7271	-0.4760	-1.4550	1.7536	0.4292	917
		(21.4)	(-0.2)	(0.6)	(0.9)	(2.7)	(2.5)	(-2.4)	(-2.6)	(2.8)	(0.7)	
1987												
Formal	0.5473	7.32	0.1478	0.0750	-0.0010	-0.2313	-0.2247	-0.1600	0.0545	0.0594	-1.0342	3257
		(75.9)	(42.2)	(16.3)	(-11.6)	(-3.7)	(-5.2)	(-4.6)	(0.8)	(0.4)	(-2.3)	
Informal	0.3182	5.55	0.0537	0.0009	0.0003	0.9800	0.6612	-0.1405	-0.7452	1.3409	0.5189	425
		(5.0)	(1.3)	(0.02)	(0.4)	(1.5)	(1.4)	(-0.6)	(-1.9)	(1.7)	(0.5)	
1989												
Formal	0.4667	5.34	0.1430	0.0625	-0.0008	-0.0122	-0.1861	-0.0074	-0.0258	0.0289	-1.9864	2996
		(36.2)	(26.0)	(13.0)	(-9.5)	(-0.1)	(-3.8)	(-0.2)	(-0.5)	(0.1)	(-2.2)	
Informal	0.2946	3.60	0.0171	-0.0147	0.0004	0.9087	0.6443	-0.0943	-0.7595	1.6064	0.1973	459
		(4.4)	(0.3)	(-0.3)	(0.5)	(1.8)	(1.8)	(-0.3)	(-1.8)	(1.8)	(0.2)	

Basic Data SOURCE: BRASIL/PNAD. Magnetic tapes.

NOTE: CONSTR=dummy variable for Construction; COMSER=dummy variable for Commerce and Services; TrpFinPS=dummy variable for Transport, Finance and Public Sector (Manufacturing is the basis).

L1 =lambda1, inverse Mill's ratio for segmentation - formal; L3=lambda3, inverse Mill's ratio for unemployment - formal; L2 and L4 are respectively the same for the informal segment. T-statistics in brackets.

TABLE 6-08A

SAO PAULO: Estimates from wage equations corrected for segmentation and unemployment biases. Formal and Informal labour markets. Male employees.

Dependent variable: lnY. *Procedure II for identification

1981/1989, selected years

YEARS/					EQUATIONS					
SEGMENTS	R sq	Interc.	School.	EX	EXSQ	POSH	SECDY	L1	L3	N.Obs
1981										
Formal	0.5493	7.72	0.1598	0.0641	-0.0008	0.5107	0.1190	-0.4598	2.6558	5501
		(75.1)	(43.9)	(22.5)	(-17.8)	(12.0)	(4.8)	(-6.7)	(8.9)	
Informal	0.3813	7.41	0.1376	0.0673	-0.0008	0.0741	0.0178	0.1022	1.1914	629
		(34.5)	(10.4)	(6.6)	(-5.8)	(0.9)	(0.2)	(1.1)	(2.1)	
1983										
Formal	0.5795	9.83	0.1373	0.0451	-0.0005	0.3030	0.1768	-1.0282	1.1742	5514
		(169.5)	(52.1)	(15.4)	(-10.3)	(9.7)	(7.1)	(-15.3)	(6.1)	
Informal	0.3185	9.79	0.0893	0.0450	-0.0006	-0.0598	-0.0134	0.2189	-0.9227	787
		(28.0)	(9.3)	(5.3)	(-4.6)	(-0.5)	(-0.1)	(3.1)	(-1.2)	
1985										
Formal	0.5567	11.54	0.1588	0.0469	-0.0005	0.2914	0.4059	-0.5000	3.1451	6013
		(127.3)	(51.4)	(16.3)	(-10.4)	(11.4)	(7.6)	(-8.3)	(7.8)	
Informal	0.3310	11.40	0.1097	0.0529	-0.0006	0.2987	-0.1723	0.0933	1.1456	917
		(75.4)	(11.2)	(7.5)	(-5.0)	(4.0)	(-1.4)	(1.2)	(2.1)	
1987										
Formal	0.5484	7.15	0.1448	0.0469	-0.0005	0.2150	0.2776	-0.5106	1.5483	3257
		(92.2)	(45.2)	(11.5)	(-7.5)	(6.6)	(5.3)	(-5.8)	(4.4)	
Informal	0.3201	6.94	0.1248	0.0475	-0.0006	0.2832	-0.0647	0.0350	0.5429	425
		(35.8)	(6.4)	(4.9)	(-3.8)	(1.7)	(-0.3)	(0.2)	(0.5)	
1989										
Formal	0.4644	4.63	0.1370	0.0507	-0.0006	0.1452	-0.0535	-0.3703	-1.0001	2996
		(35.4)	(25.8)	(11.8)	(-8.7)	(3.0)	(-1.0)	(-3.4)	(-1.2)	
Informal	0.2943	4.77	0.1072	0.0359	-0.0004	0.2531	-0.1345	0.2369	0.5072	459
		(27.0)	(7.2)	(2.7)	(-2.0)	(1.8)	(-0.9)	(1.7)	(0.6)	

Basic Data SOURCE: BRASIL/PNAD. Magnetic tapes.

NOTE : POSH is a dummy for head of household; SECDY, also as before, is a dummy for second income source

L1 =lambda1, inverse Mill's ratio for segmentation - formal; L3=lambda3, inverse Mill's ratio for unemployment - formal; L2 and L4 are respectively the same for the informal.

T-statistics in brackets.

TABLE 6-09

RECIFE: Estimates from wage equations corrected for segmentation and unemployment biases. Formal and Informal labour markets. Male employees.

Dependent variable: lnY. *Procedure I for identification

1981/1989, selected years

YEARS/						EQUATIONS						
SEGMENTS	R sq	Interc.	School.	EX	EXSQ	CONSTR	COMSERV	TrpFinPS	SECDY	L1	L3	N.Obs
1981												
Formal	0.5576	7.93	0.1560	0.0805	-0.0011	-0.1193	-0.4208	-0.0257	0.3347	1.1111	-2.2738	2552
		(77.5)	(33.7)	(17.0)	(-15.1)	(-2.9)	(-9.8)	(-0.8)	(6.4)	(8.6)	(-9.8)	
Informal	0.3624	7.80	0.1035	0.0409	-0.0005	0.3254	-0.1275	-0.1975	0.0062	0.3674	-0.9982	530
		(29.7)	(2.6)	(1.5)	(-1.4)	(3.1)	(-0.6)	(-1.5)	(0.03)	(1.4)	(-0.9)	
1983												
Formal	0.5524	9.20	0.1649	0.0840	-0.0011	-0.0661	-0.4172	-0.1161	0.2263	0.7846	-1.9376	2279
		(89.7)	(32.1)	(16.8)	(-13.7)	(-1.2)	(-7.9)	(-3.3)	(3.4)	(5.1)	(-7.5)	
Informal	0.3162	9.07	0.0836	0.0344	-0.0003	0.1490	-0.0116	-0.0603	0.1221	0.3587	0.3045	690
		(57.9)	(4.1)	(2.8)	(-2.0)	(1.1)	(-0.1)	(-0.6)	(0.8)	(2.4)	(0.4)	
1985												
Formal	0.5402	11.65	0.1685	0.0842	-0.0011	-0.0919	-0.3751	0.0406	-0.2478	0.5794	-4.0364	2346
		(103.4)	(37.1)	(19.3)	(-14.8)	(-1.8)	(-8.7)	(1.1)	(-4.0)	(5.3)	(-7.5)	
Informal	0.3593	9.97	-0.0364	0.0153	0.0001	0.6021	0.1613	-0.3641	-1.7076	1.5965	6.3687	702
		(25.0)	(-1.0)	(1.1)	(0.4)	(4.7)	(1.5)	(-2.5)	(-4.4)	(5.1)	(2.8)	
1987												
Formal	0.5062	6.66	0.1579	0.0702	-0.0008	-0.1233	-0.2544	0.0295	-0.0428	0.2742	-0.8224	1365
		(37.2)	(25.4)	(9.9)	(-6.7)	(-1.4)	(-3.4)	(0.4)	(-0.5)	(1.6)	(-1.4)	
Informal	0.3275	6.28	0.1083	0.0698	-0.0007	0.0026	-0.2404	0.6032	-0.2615	-0.1707	2.0648	414
		(36.7)	(2.6)	(2.1)	(-1.4)	(0.01)	(-1.3)	(2.4)	(-0.7)	(-0.4)	(2.2)	
1989												
Formal	0.5108	4.50	0.1574	0.0700	-0.0009	-0.3279	-0.4597	0.0613	-0.0295	0.6939	-2.4486	1442
		(28.5)	(24.2)	(9.5)	(-6.9)	(-3.5)	(-6.5)	(1.2)	(-0.6)	(3.8)	(-4.7)	
Informal	0.3488	4.00	0.0803	0.0031	0.0001	0.2657	0.1242	0.0784	-0.2133	0.7030	0.6635	407
		(15.4)	(2.4)	(0.1)	(0.3)	(1.1)	(0.6)	(0.4)	(-0.7)	(2.0)	(0.6)	

Basic Data SOURCE: BRASIL/PNAD. Magnetic tapes.

NOTE: CONSTR=dummy variable for Construction; COMSER=dummy variable for Commerce and Services; TrpFinPS=dummy variable for Transport, Finance and Public Sector (Manufacturing is the basis).

L1=lambda1, inverse Mill's ratio for segmentation - formal; L3=lambda3, inverse Mill's ratio for unemployment - formal; L2 and L4 are respectively the same for the informal segment. T-statistics in brackets

TABLE 6-09A

RECIFE: Estimates from wage equations corrected for segmentation and unemployment biases. Formal and Informal labour markets. Male employees.

Dependent variable: lnY. Procedure II for identification

1981/1989, selected years

YEARS/ SEGMENTS	R sq	Interc.	School.	EX	EXSQ	EQUATIONS POSH	SECDY	L1	L3	N.Obs
1981										
Formal	0.5440	7.74	0.1536	0.0503	-0.0006	0.3511	0.1896	0.0009	0.3832	2552
		(62.4)	(30.5)	(10.8)	(-7.7)	(5.9)	(3.1)	(0.01)	(1.1)	
Informal	0.3752	7.16	0.1071	0.0458	-0.0005	0.5094	-0.0396	0.0101	2.3379	530
		(50.9)	(6.6)	(3.7)	(-3.2)	(4.9)	(-0.3)	(0.1)	(4.8)	
1983										
Formal	0.5511	9.06	0.1534	0.0542	-0.0006	0.3941	0.1961	-0.2515	0.7262	2279
		(95.1)	(33.9)	(11.1)	(-7.3)	(7.9)	(3.0)	(-2.6)	(3.1)	
Informal	0.3177	8.94	0.0823	0.0357	-0.0003	0.1370	0.0626	0.2796	1.0714	690
		(76.0)	(5.0)	(3.7)	(-2.3)	(1.6)	(0.5)	(2.3)	(2.4)	
1985										
Formal	0.5324	11.17	0.1599	0.0528	-0.0006	0.4433	0.1167	-0.0830	1.9690	2346
		(89.4)	(36.4)	(10.6)	(-6.8)	(7.7)	(1.7)	(-1.0)	(3.1)	
Informal	0.3418	11.21	0.1051	0.0538	-0.0008	0.2663	-0.2488	0.2845	-0.1132	702
		(35.8)	(4.3)	(5.7)	(-4.3)	(3.2)	(-1.0)	(1.7)	(-0.1)	
1987										
Formal	0.5035	6.77	0.1519	0.0469	-0.0005	0.2202	-0.0698	-0.1928	0.1351	1365
		(47.0)	(25.2)	(6.8)	(-4.0)	(4.3)	(-1.1)	(-1.7)	(0.3)	
Informal	0.3027	6.49	0.0774	0.0445	-0.0005	0.1301	-0.3322	0.3246	0.3342	414
		(46.1)	(3.1)	(2.4)	(-1.7)	(1.1)	(-1.3)	(2.1)	(0.5)	
1989										
Formal	0.4942	4.26	0.1663	0.0235	-0.0001	0.3737	0.0550	-0.2914	1.6518	1442
		(23.5)	(22.0)	(3.2)	(-0.6)	(4.5)	(1.0)	(-2.6)	(2.6)	
Informal	0.3489	4.05	0.1059	0.0201	-0.0001	0.0868	-0.1057	0.4212	0.9445	407
		(26.7)	(5.6)	(1.4)	(-0.3)	(0.7)	(-0.5)	(2.6)	(1.2)	

Basic Data SOURCE: BRASIL/PNAD. Magnetic tapes.

NOTE:

L1 =lambda1, inverse Mill's ratio for segmentation - formal; L3=lambda3, inverse Mill's ratio for unemployment - formal; L2 and L4 are respectively the same for the informal segment. T-statistics in brackets

before, whereas in the informal they tend to be considerably lower. In fact, for Recife in 1985 and Sao Paulo in 1985, 1987 and 1989 the reward for education in the informal sector is virtually zero.

iii) When the second identification procedure is used, the results go systematically in the direction of confirming a bigger formal-informal gap in the reward for education, and that is even more clear in the case of Recife (Tables 6-08A and 6-09A).

3.3.4 Returns to schooling by level of education

We now turn to the examination of the wage equation estimates displayed in Tables 6-10, 6-11 (identification procedure I) and Tables 6-10A, 6-11A (procedure II) below.

Whichever is the identification criterion, the results point to remarkable increasing wage differentials as one goes up the educational ladder. Referred to the illiterates, the average wage differential is no less than above 20% for those in the Primary level and around 100% or more for those with College education - and this fully applies to the formal sector, where the education variables are systematically significant at any level and where there is no dropping of observations for the College level in the probit estimations for employment.

Wage differentials in Recife are still more prominent - corroborating previous findings in this study about the greater earnings inequality in the less developed region.

Differences in the wage differentials by level of

TABLE 6-10

SAO PAULO: Estimates from wage equations corrected for segmentation and unemployment biases. Formal and Informal labour markets. Male employees.

Dependent variable: lnY. *EDUCATION TAKEN AS CATEGORICAL VARIABLE

1981/1989, selected years *Conditions for identification: Procedure I

YEARS/ SEGMENTS	Interc.	EDUC1	EDUC2	EDUC3	EDUC4	EQUATIONS EX	EXSQ	CONSTR	COMSERV	TrpFinPS	SECDY	L1	L3
1981													
Formal	8.87	0.4114	0.8104	1.3269	2.0026	0.0716	-0.0010	-0.3309	-0.4053	-0.2186	0.2132	0.3075	-2.0595
	(113.8)	(11.6)	(19.9)	(26.4)	(39.3)	(19.5)	(-17.3)	(-6.4)	(-9.5)	(-9.9)	(8.8)	(2.0)	(-9.7)
Informal	7.87	0.2394	0.5873	0.7896	dropped	0.0340	-0.0004	0.2577	0.0388	-0.1572	0.0766	0.4627	-0.5335
	(15.2)	(1.1)	(4.0)	(3.4)	(*)	(1.2)	(-1.2)	(1.4)	(0.2)	(-0.6)	(0.8)	(1.9)	(-0.3)
1983													
Formal	10.35	0.2881	0.6932	1.1916	1.8923	0.0710	-0.0010	-0.1939	-0.2525	-0.2012	0.2785	-0.1785	-1.4291
	(141.4)	(8.5)	(17.6)	(24.7)	(37.7)	(19.9)	(-16.8)	(-4.3)	(-6.4)	(-8.9)	(11.1)	(-1.2)	(-7.2)
Informal	11.22	0.3234	0.9394	1.0985	1.6537	0.0639	-0.0009	-0.5366	-0.4578	-0.2534	-0.2938	-0.4205	-3.0341
	(14.4)	(2.8)	(3.0)	(4.2)	(5.3)	(3.8)	(-3.7)	(-1.7)	(-1.8)	(-2.0)	(-1.6)	(-1.0)	(-2.4)
1985													
Formal	12.35	0.3637	0.7593	1.3508	2.1255	0.0751	-0.0011	-0.3940	-0.3428	-0.0964	0.0168	0.2005	-1.7010
	(131.8)	(11.0)	(20.8)	(30.6)	(43.3)	(24.7)	(-19.3)	(-8.9)	(-12.3)	(-4.7)	(0.3)	(2.1)	(-3.7)
Informal	10.80	0.2438	0.1558	0.3351	dropped	0.0002	0.0002	0.6118	0.5037	-0.3252	-0.9917	1.2573	0.0682
	(17.9)	(3.1)	(0.9)	(0.9)	(**)	(0.005)	(0.3)	(1.86)	(1.76)	(-1.64)	(-1.796)	(2.047)	(0.106)
1987													
Formal	7.43	0.4555	0.8333	1.3628	2.1786	0.0722	-0.0010	-0.2468	-0.1838	-0.1335	0.0861	-0.0984	-0.6480
	(86.5)	(7.9)	(12.6)	(21.5)	(34.8)	(15.7)	(-11.8)	(-3.8)	(-4.4)	(-4.1)	(1.533)	(-0.601)	(-1.741)
Informal	4.16	0.6652	0.3987	0.3748	dropped	-0.0374	0.0010	1.6040	1.0394	-0.3225	-1.0487	2.1066	1.2812
	(3.1)	(2.9)	(2.9)	(1.2)	(***)	(-0.9)	(1.3)	(2.4)	(2.2)	(-1.2)	(-2.5)	(2.5)	(1.3)
1989													
Formal	5.58	0.4827	0.7960	1.2513	2.0942	0.0558	-0.0008	0.0254	-0.1524	-0.0110	-0.0386	-0.2508	-1.8637
	(43.7)	(7.3)	(11.2)	(16.3)	(26.4)	(11.0)	(-8.6)	(0.2)	(-3.1)	(-0.3)	(-0.7)	(-1.2)	(-2.2)
Informal	3.88	0.2493	0.3401	0.3074	dropped	0.0051	0.0000	0.6478	0.5119	-0.0001	-0.5165	1.1985	-0.1459
	(3.8)	(1.6)	(1.7)	(0.6)	(****)	(0.1)	(0.06)	(1.2)	(1.4)	(-0.000)	(-1.2)	(1.3)	(-0.1)

Basic Data SOURCE: BRASIL/PNAD. Magnetic tapes.

NOTE: EDUC1 =Primary, EDUC2=Secondary, EDUC3=High School, EDUC4=College (Illiterate is the basic variable)

As to the other variables definitions and no. of observations: see previous tables

T-statistics in brackets Values of Rsq, not very different from those obtained before, are omitted for limitations of space

(*) 27, (**) 21, (***) 15, (****) 14 observations dropped from the probit for unemployment

TABLE 6-10A

SAO PAULO: Estimates from wage equations corrected for segmentation and unemployment biases. Formal and Informal labour markets. Male employees.

Dependent variable: lnY. *EDUCATION TAKEN AS CATEGORICAL VARIABLE

1981/1989, selected years *Conditions for identification: Procedure II

YEARS/			EQUATIONS										
SEGMENTS	R sq	Interc.	EDUC1	EDUC2	EDUC3	EDUC4	EX	EXSQ	POSH	SECDY	L1 (L2)	L3 (L4)	N.Obs
1981													
Formal	0.5223	8.08	0.3074	0.6761	1.3811	2.1702	0.0615	-0.0008	0.5004	0.1547	-0.4937	2.4116	5501
		(81.7)	(9.0)	(17.8)	(27.9)	(40.1)	(20.5)	(-17.3)	(11.4)	(6.1)	(-7.0)	(7.9)	
Informal	0.2901	7.77	0.1334	0.5994	0.9423	dropped	0.0652	-0.0008	0.0438	0.0608	0.1662	0.6100	602
		(47.8)	(1.4)	(6.1)	(6.6)	(*)	(6.1)	(-5.5)	(0.5)	(0.6)	(1.8)	(1.3)	
1983													
Formal	0.5561	10.05	0.3599	0.7363	1.2057	1.9626	0.0462	-0.0006	0.2690	0.2081	-1.0336	0.9078	5514
		(145.7)	(10.4)	(18.8)	(26.7)	(40.4)	(14.7)	(-10.8)	(8.2)	(8.1)	(-15.1)	(4.6)	
Informal	0.2937	9.78	0.1670	0.4070	0.7584	1.2319	0.0433	-0.0006	0.0119	0.0121	0.2508	-0.6378	787
		(35.8)	(2.2)	(3.3)	(5.8)	(7.8)	(5.6)	(-4.9)	(0.1)	(0.1)	(3.5)	(-0.9)	
1985													
Formal	0.5347	11.83	0.4076	0.7396	1.4092	2.2280	0.0448	-0.0006	0.2888	0.3847	-0.5919	3.0872	6013
		(126.4)	(12.4)	(20.3)	(31.9)	(45.4)	(14.8)	(-10.5)	(10.9)	(6.7)	(-9.7)	(7.2)	
Informal	0.2768	11.69	0.1787	0.4265	0.9550	dropped	0.0476	-0.0006	0.2752	-0.1269	0.1177	0.7161	896
		(75.9)	(2.4)	(4.9)	(8.5)	(*)	(6.6)	(-4.7)	(3.8)	(-1.0)	(1.5)	(1.4)	
1987													
Formal	0.5265	7.50	0.3636	0.6771	1.2195	2.0357	0.0499	-0.0006	0.1887	0.1652	-0.5889	0.8431	3257
		(100.0)	(6.8)	(11.3)	(20.9)	(34.5)	(12.1)	(-9.0)	(5.8)	(3.5)	(6.6)	(2.7)	
Informal	0.2808	6.89	0.3641	0.5763	1.1677	dropped	0.0479	-0.0006	0.3751	0.0549	0.0186	1.1353	410
		(33.6)	(2.7)	(4.2)	(5.6)	(*)	(5.0)	(-4.0)	(2.3)	(0.3)	(0.1)	(1.3)	
1989													
Formal	0.4481	5.62	0.4239	0.7157	1.1632	2.0060	0.0451	-0.0006	0.1656	-0.0539	-0.5201	-0.8009	2996
		(45.6)	(6.4)	(10.5)	(16.8)	(27.4)	(10.0)	(-8.0)	(3.5)	(-1.0)	(-4.8)	(-1.0)	
Informal	0.2267	4.84	0.2901	0.6144	0.9629	dropped	0.0414	-0.0005	0.2029	-0.0506	0.2252	0.2788	445
		(18.9)	(2.0)	(3.8)	(4.6)	(*)	(3.1)	(-2.5)	(1.4)	(-0.3	(1.7)	(0.4)	

Basic Data SOURCE: BRASIL/PNAD. Magnetic tapes.

NOTE: EDUC1 =Primary, EDUC2=Secondary, EDUC3=High School, EDUC4=College (Illiterate is the basic variable)

The other variables: as defined before in previous tables. (*) See NOTE on Table 6-10

T-statistics in brackets

TABLE 6-11

RECIFE: Estimates from wage equations corrected for segmentation and unemployment biases. Formal and Informal labour markets. Male employees.

Dependent variable: lnY. *EDUCATION TAKEN AS CATEGORICAL VARIABLE

1981/1989, selected years *Conditions for identification: Procedure I

YEARS/						EQUATIONS							
SEGMENTS	Interc.	EDUC1	EDUC2	EDUC3	EDUC4	EX	EXSQ	CONSTR	COMSERV	TrpFinPS	SECDY	L1	L3
1981													
Formal	8.13	0.4511	0.8025	1.4567	2.3120	0.0760	-0.0011	-0.1633	-0.3756	-0.0230	0.3371	0.9732	-2.2065
	(68.6)	(9.0)	(13.3)	(19.3)	(28.6)	(14.5)	(-13.5)	(-3.96)	(-8.2)	(-0.7)	(6.3)	(6.9)	(-9.1)
Informal	7.88	0.3733	0.7083	1.1959	1.5156	0.0451	-0.0006	0.2982	-0.2155	-0.2557	-0.0086	0.3502	-1.4503
	(39.2)	(1.7)	(2.2)	(2.8)	(2.6)	(1.7)	(-1.6)	(2.8)	(-1.0)	(-1.8)	(-0.04)	(1.351)	(-1.433)
1983													
Formal	9.49	0.3480	0.7673	1.4364	2.3439	0.0789	-0.0011	-0.0983	-0.3276	-0.0974	0.2909	0.4692	-1.4329
	(79.4)	(6.6.)	(11.2)	(16.7)	(28.0)	(14.6)	(-12.4)	(-1.7)	(-6.0)	(-2.8)	(4.5)	(2.9)	(-5.3)
Informal	9.11	0.2601	0.4003	0.6881	1.6945	0.0291	-0.0003	0.2018	0.0383	-0.0900	0.1428	0.4182	0.1434
	(56.7)	(3.3)	(2.8)	(2.9)	(6.7)	(2.5)	(-1.8)	(1.5)	(0.4)	(-0.8)	(1.0)	(2.9)	(0.2)
1985													
Formal	11.90	0.4654	0.8756	1.4951	2.5048	0.0794	-0.0011	-0.1281	-0.3498	0.0332	-0.2617	0.4750	-4.0154
	(102.4)	(8.6)	(14.2)	(21.0)	(32.4)	(17.6)	(-14.2)	(-2.5)	(-8.0)	(0.9)	(-4.2)	(4.2)	(-7.5)
Informal	10.20	0.0937	-0.2246	-0.3430	dropped	0.0111	0.0001	0.5914	0.1968	-0.3788	-1.5984	1.5086	4.8887
	(21.8)	(1.1)	(-1.1)	(-0.8)	(*)	(0.8)	(0.3)	(4.4)	(1.8)	(-2.6)	(-3.9)	(4.8)	(2.1)
1987													
Formal	6.86	0.2939	0.6475	1.2879	2.3024	0.0704	-0.0009	-0.2106	-0.1986	0.0589	-0.0029	0.1774	-0.3729
	(39.5)	(3.7)	(7.4)	(13.3)	(22.3)	(9.5)	(-6.9)	(-2.3)	(-2.7)	(0.9)	(-0.037)	(1.048)	(-0.7)
Informal	6.39	0.1487	0.2898	-0.2348	dropped	0.0231	-0.0001	0.2717	-0.0258	0.4805	-0.5395	0.3906	2.2141
	(27.9)	(1.1)	(1.3)	(-0.4)	(**)	(0.7)	(-0.1)	(1.1)	(-0.1)	(1.8)	(-1.542)	(0.955)	(2.3)
1989													
Formal	4.64	0.3906	0.8115	1.5627	2.2200	0.0683	-0.0009	-0.2813	-0.3997	0.0864	-0.0349	0.4956	-2.1152
	(26.6)	(5.1)	(9.0)	(14.4)	(20.7)	(8.6)	(-6.6)	(-3.0)	(-5.6)	(1.7)	(-0.7)	(2.6)	(-4.3)
Informal	3.92	0.1454	0.3570	0.5518	dropped	0.0018	0.0002	0.3482	0.2650	0.0861	-0.3089	0.6867	1.3753
	(13.6)	(1.2)	(1.6)	(1.5)	(***)	(0.06)	(0.4)	(1.5)	(1.2)	(0.4)	(-1.0)	(1.992)	(1.1)

Basic Data SOURCE: BRASIL/PNAD. Magnetic tapes.

NOTE: EDUC1 =Primary, EDUC2=Secondary, EDUC3=High School, EDUC4=College (Illiterate is the basic variable)

As to the other variables definitions and no. of observations see previous tables

T-etatistics in brackets Values of Rsq, not very different from those obtained before, are omitted for limitations of space

(*) 13, (**) 9, (***) 13 observations dropped from the probit for unemployment

TABLE 6-11A

RECIFE: Estimates from wage equations corrected for segmentation and unemployment biases. Formal and Informal labour markets. Male employees.

Dependent variable: lnY. *EDUCATION TAKEN AS CATEGORICAL VARIABLE

1981/1989, selected years *Conditions for identification: Procedure II

YEARS/			EQUATIONS										
SEGMENTS	R sq	Interc.	EDUC1	EDUC2	EDUC3	EDUC4	EX	EXSQ	POSH	SECDY	L1 (L2)	L3 (L4)	N.Obs
1981													
Formal	0.5302	8.28	0.3075	0.6191	1.2079	2.1617	0.0470	-0.0006	0.2262	0.2447	-0.0006	-0.3392	2552
		(65.4)	(6.5)	(11.3)	(17.7)	(26.6)	(9.6)	(-8.0)	(3.9)	(4.0)	(-0.01)	(-0.99)	
Informal	0.3485	7.42	0.0517	0.4268	1.0101	1.5250	0.0411	-0.0005	0.4602	0.0142	0.0949	1.9342	530
		(53.2)	(0.5)	(3.3)	(5.4)	(4.7)	(3.3)	(-3.0)	(4.3)	(0.1)	(0.7)	(4.1)	
1983													
Formal	0.5539	9.55	0.2531	0.5663	1.1878	2.1945	0.0528	-0.0007	0.2960	0.2687	-0.3266	0.4928	2279
		(90.7)	(5.1)	(9.8)	(17.0)	(29.4)	(10.6)	(-7.9)	(6.1)	(4.2)	(-3.4)	(2.2)	
Informal	0.3206	9.04	0.3005	0.4525	0.7650	1.8976	0.0351	-0.0004	0.1937	0.0166	0.2228	0.8352	690
		(73.2)	(4.0)	(3.7)	(4.0)	(8.3)	(3.7)	(-2.5)	(2.2)	(0.1)	(1.876)	(1.899)	
1985													
Formal	0.5260	11.66	0.3369	0.6496	1.2992	2.2868	0.0519	-0.0006	0.4013	0.0306	-0.1450	1.1611	2346
		(93.9)	(6.4)	(11.2)	(19.4)	(31.3)	(10.5)	(-7.8)	(7.1)	(0.5)	(-1.758)	(1.921)	
Informal	0.2930	11.56	0.1457	0.4449	1.2089	dropped	0.0496	-0.0008	0.3677	-0.0840	0.1630	-0.6479	689
		(32.7)	(1.8)	(3.2)	(4.2)	(*)	(5.2)	(-4.4)	(4.3)	(-0.3)	(1.0)	(-0.4)	
1987													
Formal	0.4979	7.09	0.2635	0.5691	1.1811	2.1943	0.0458	-0.0005	0.2332	-0.0735	-0.2527	0.2705	1365
		(47.8)	(3.5)	(7.0)	(12.8)	(22.2)	(6.5)	(-4.3)	(4.5)	(-1.2)	(-2.2)	(0.7)	
Informal	0.2290	6.74	0.0416	0.1731	0.2208	dropped	0.0317	-0.0004	0.1521	-0.3844	0.4239	0.5124	405
		(37.8)	(0.4)	(1.2)	(0.6)	(*)	(1.8)	(-1.3)	(1.3)	(-1.6)	(2.8)	(0.7)	
1989													
Formal	0.4954	4.82	0.2664	0.5535	1.2399	2.3014	0.0234	-0.0002	0.3293	0.0144	-0.4182	1.2566	1442
		(28.2)	(3.5)	(6.7)	(13.0)	(19.6)	(3.2)	(-1.3)	(4.1)	(0.3)	(-3.6)	(2.2)	
Informal	0.2584	4.17	0.1964	0.5791	0.9334	dropped	0.0294	-0.0003	0.1843	-0.0520	0.2382	1.1605	394
		(24.8)	(1.7)	(3.8)	(4.5)	(*)	(2.0)	(-1.2)	(1.4)	(-0.3)	(1.464)	(1.540)	

Basic Data SOURCE: BRASIL/PNAD. Magnetic tapes.

NOTE: EDUC1 =Primary, EDUC2=Secondary, EDUC3=High School, EDUC4=College (Illiterate is the basic variable)

The other variables: as defined before in previous tables. (*) See NOTE on Table 6-11

T-statistics in brackets

education arise more clearly when one examines marginal returns to schooling in each educational group. Such figures were worked out as described below, in a similar way to what is done by PSACHAROPOULOS (1987, p. 8).

Taking into account that the difference between any two ß education coefficients in the regressions estimated here yields the percentage earnings difference between the two compared groups, the marginal return ("r") from an extra year of schooling per level of education is given by:

$$r = \frac{\beta_i - \beta_j}{S_i - S_j},$$

where "i" and "j" represent respective different educational levels, S is the mean years of schooling for each group and $j<i$ ("i" and "j" ranging from 1 to 5).

Average years of schooling in each region are displayed in Tables 6-12 and 6-13 below, and the final results in Tables 6-14 and 6-15.

There occur noticeable changes in the marginal returns to schooling from one identification procedure to the other. Just to remind the reader, the criteria involve either keeping the sector of activity dummies in the wage equation (procedure I) or dropping them (procedure II) - the trade-off being made with the variable HEAD - whilst SECDy (thought to be economically more relevant for inclusion in the hours-worked equation) is kept throughout the system.

It is clear then that the estimates of marginal returns to schooling are sensitive to the identification procedure used - as one can see by examining Tables 6-14 and 6-15.

TABLE 6-12
SAO PAULO: Average years of schooling by level of education
Formal and informal male employees
1981/1989

YEARS/ SEGMENTS	DEGREES									
	ILLITERATE		PRIMARY		SECONDARY		HIGH SCHOOL		COLLEGE	
	P	School.	P	School.	P	School.	P	School.	P	School.
1981										
Formal	6.8	0.0	42.3	3.28	24.7	6.90	14.9	10.49	11.3	14.64
Informal	12.1	0.0	45.0	3.16	31.5	6.43	7.1	10.16	4.3	14.30
1983										
Formal	6.2	0.0	39.6	3.41	25.3	6.92	16.6	10.49	12.3	14.66
Informal	11.7	0.0	46.5	3.24	29.7	6.30	8.4	10.36	3.7	13.83
1985										
Formal	6.5	0.0	36.8	3.43	27.1	6.88	16.8	10.55	12.8	14.63
Informal	8.8	0.0	46.9	3.14	32.8	6.40	9.2	10.29	2.3	13.90
1987										
Formal	5.5	0.0	34.6	3.40	28.1	6.88	18.3	10.52	13.5	14.69
Informal	8.0	0.0	48.5	3.27	31.3	6.45	8.7	10.22	3.5	13.67
1989										
Formal	5.7	0.0	30.9	3.42	31.8	6.79	18.6	10.48	13.0	14.75
Informal	9.2	0.0	39.0	3.23	40.7	6.45	8.1	10.49	3.0	13.64

Basic Data SOURCE: BRASIL/PNAD. Magnetic tapes.
NOTE: Primary = 1 to 4, Secondary = 5 to 8, High School = 9 to 11 and College = 12 or more years of schooling.
P = proportion, in each segment, of people with the respective degree.

TABLE 6-13
RECIFE: Average years of schooling by level of education
Formal and informal male employees
1981/1989

YEARS/ SEGMENTS	DEGREES									
	ILLITERATE		PRIMARY		SECONDARY		HIGH SCHOOL		COLLEGE	
	P	School.	P	School.	P	School.	P	School.	P	School.
1981										
Formal	10.2	0.0	33.1	3.15	26.3	6.62	19.4	10.52	11.0	14.82
Informal	23.0	0.0	40.0	2.88	25.9	6.40	9.8	10.17	1.3	14.14
1983										
Formal	10.0	0.0	30.1	3.21	28.9	6.72	19.6	10.61	11.4	14.83
Informal	23.3	0.0	40.1	3.03	26.2	6.19	8.0	10.27	2.3	14.56
1985										
Formal	9.2	0.0	27.5	3.35	30.3	6.52	21.1	10.63	11.9	14.77
Informal	18.5	0.0	40.7	3.24	29.9	6.29	9.0	10.09	1.9	13.62
1987										
Formal	7.8	0.0	27.9	3.08	28.9	6.53	22.5	10.54	13.0	14.66
Informal	14.5	0.0	44.9	3.03	32.8	6.18	5.6	10.30	2.2	14.11
1989										
Formal	8.2	0.0	22.2	3.18	35.3	6.53	22.3	10.53	12.0	14.72
Informal	16.2	0.0	38.3	3.01	32.7	6.02	9.6	10.31	3.2	14.15

Basic Data SOURCE: BRASIL/PNAD. Magnetic tapes.
NOTE: Primary = 1 to 4, Secondary = 5 to 8, High School = 9 to 11 and College = 12 or more years of schooling.
P = proportion, in each segment, of people with the respective degree.

TABLE 6-14
SAO PAULO and RECIFE: marginal returns to schooling by level of education, for male employees in the FORMAL sector, according to the different identification procedures
1981/1989

YEARS/ SEGMENTS	MARGINAL RETURNS TO SCHOOLING (%) (*) SAO PAULO				RECIFE			
	Primary	Second.	H. School	College	Primary	Second.	H. School	College
1981								
Proc. I	12.5	11.0	14.4	16.3	14.3	10.1	16.8	19.9
Proc. II	9.4	10.2	19.6	19.0	9.8	9.0	15.1	22.2
1983								
Proc. I	8.4	11.5	14.0	16.8	10.8	11.9	17.2	21.5
Proc. II	10.6	10.7	13.1	18.2	7.9	8.9	16.0	23.9
1985								
Proc. I	10.6	11.5	16.1	19.0	13.9	12.9	15.1	24.4
Proc. II	11.9	9.60	18.2	20.1	10.1	9.9	15.8	23.9
1987								
Proc. I	13.4	10.9	14.5	19.6	9.5	10.2	16.0	24.6
Proc. II	10.7	9.0	14.9	19.6	8.6	8.9	15.3	24.6
1989								
Proc. I	14.1	9.3	12.3	19.7	12.3	12.6	18.8	15.7
Proc. II	12.4	8.7	12.1	19.7	8.4	8.6	17.2	25.3

SOURCE: Tables 6-10, 6-10A, 6-11, 6-11A, 6-12 & 6-13
(*) Marginal returns estimated as follows: $r = [(Bi - Bj)/(Si - Sj)].100$,
where Bi and Bj are the "b" coefficients on education dummies of two different degrees, Si and Sj are mean years of schooling of the same pair of different groups and $j < i$.
Returns are calculated for each degree in relation to the preceding one: Prim./Illit., Second./Prim., and so on

TABLE 6-15

SAO PAULO and RECIFE: marginal returns to schooling by level of education, for male employees in the INFORMAL sector, according to the different identification procedures

1981/1989

YEARS/ SEGMENTS	MARGINAL RETURNS TO SCHOOLING (%) (*)							
	SAO PAULO				RECIFE			
	Primary	Second.	H. School	College	Primary	Second.	H. School	College
1981								
Proc. I	7.6	10.6	5.4	-	13.0	9.5	12.9	8.0
Proc. II	4.2	14.3	9.2	-	1.8	10.7	15.5	13.0
1983								
Proc. I	10.0	20.1	3.9	16.0	8.6	4.4	7.0	23.5
Proc. II	5.2	7.8	8.7	13.6	9.9	4.8	7.7	26.4
1985								
Proc. I	7.8	-0.03	4.6	-	2.9	-10.4	-3.1	-
Proc. II	5.7	7.6	13.6	-	4.5	9.8	20.1	-
1987								
Proc. I	20.3	-6.3	-0.01	-	5.0	4.5	-12.7	-
Proc. II	11.1	6.7	15.7	-	1.4	4.2	1.2	-
1989								
Proc. I	7.7	2.8	-0.01	-	4.8	7.0	4.5	-
Proc. II	9.0	10.1	8.6	-	6.5	12.7	8.3	-

SOURCE: Tables 6-10, 6-10A, 6-11, 6-11A, 6-12 & 6-13

(*) Marginal returns estimated as follows: $r = [(Bi - Bj)/(Si - Sj)].100$,
where Bi and Bj are the "b" coefficients on education dummies of two different degrees, Si and Sj are mean years of schooling of the same pair of different groups and $j < i$.
Returns are calculated for each degree in relation to the preceding one: Prim./Illit., Second./Prim., and so on

Notwithstanding that, a general pattern is identifiable. The figures for the formal segment (Table 6-14) are quite similar according to both procedures, and in fact they are the same or almost identical in some cases, in both regions - mainly for higher levels of education. Marginal returns *per* an extra year of schooling are very high for those with College education (around 20% in Sao Paulo and well above 20% in Recife), results not far from those estimated by PSACHAROPOULOS (1987, p. 10) for the country as a whole in 1980. As to the informal sector, the figures show very discrepant results as it goes from one identification procedure to the other (Table 6-15). However, it should be noted that the most odd results are just in the levels of education where the corresponding parameters are not significant (procedure I; see Table 6-11).

Given the possibility of demand factors related to the economic cycle being behind the changes in the estimators - as has been already suggested here -, the sensitivity of the marginal returns to education in respect of the identification criterion might not come as a surprising outcome. Indeed, the key variables involved in the econometric procedures - dummies for sectors of activity - may pick out demand-side influences via intersectoral wage differentials[29]. We might now think

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[29] This sensitivity of the results to the identification criterion does not seem to be exclusive to our model. According to VIJVERBERG & van der GAAG (1989, p. 24), DICKENS & LANG (1985)'s model of segmentation also yields estimates whose quality depends on "how the issue of identification is resolved". DICKENS & LANG developed a model of "switching regression with unknown regimes" along lines similar to those of the present model: two wage equations (one for each segment) and a switching equation with a "latent variable" y*; if y*>0 the individual's wage will be determined by the "formal" wage equation and by the "informal equation" if

about another reason for the sensitivity of the estimates. Given the narrow range of variables available, there were not many choices in terms of which variable might be dropped from the wage equation in order to secure conditions for identification. Since both sets of variables used for this purpose, head of household and sector of activity dummies, must be correlated with education (the latter in the sense that choice of occupation might depend on the individual's level of schooling), the resultant estimates were bound to change with different identification criteria[30].

3.3.5 Further comments

Tables 6-08B, 6-08C 6-09B and 6-09C in the Appendix display a great variability in the actual values and signs of the coefficients on the variable WAGE - with a different pattern across regions. Considering just the results for the formal sector, one can observe that in Sao Paulo, apart from differences in the actual values of the parameters, there is a general pattern of a positive value for the coefficient on

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otherwise. Our model is different in the sense that the selection rule is well known and determined by an institutional factor (although we are not able to say if this factor is really endogenous or exogenous to the individual's "choice" of sector).

[30] It is worth mentioning that we made other attempts to detect possible reasons for the sensitivity of the parameters. Wage equations were estimated after the exclusion of observations which could be considered "outliers", identified by plots of earnings **versus** experience both in the formal and informal sectors (about 6 or 7 outliers in each sector). Experiments were also made for the "prime-age group" (15-65); in this case, the observations dropped went up to almost 100 in the informal sector. Both experiments led to the same qualitative result produced before.

WAGE. In Recife, such coefficient is systematically negative according to procedure I and positive according to the second identification procedure. Therefore, the systematic inverse relation found by simple OLS estimation in Chapter V - suggesting a "backward bending" labour supply curve, a standard outcome in estimations of the kind - does not appear to be robust.

On the other hand, the interpretation of such equations as representing labour supply curves is not straightforward. In fact, a rigorous interpretation would imply that the researcher cannot be certain about it. The information on hours worked surveyed might reflect something which is determined by the firms rather than related to the individual's will.

Thus we can classify as inconclusive the results from the estimation of hours worked - a topic which is not a central concern of this study.

The analysis conducted in this Chapter has yielded some important results which we summarise in Table 6-16 below.

Apart from odd results regarding procedure I in 1985 (Recife and São Paulo), in 1989 (São Paulo) - when returns to education are virtually zero in the informal sector[31] - and in 1983 in São Paulo (when the informal segment presents higher returns than the formal), the general pattern is for keeping or even widening the intersectoral gap in returns to education. Considering procedure II, the overall result is

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[31] Note that the corresponding t-statistics attest the non-significance of the parameters (Tables 6-08 and 6-09).

TABLE 6-16

SAO PAULO and RECIFE: a synthesis of results. Rates of return to education of male employees according to OLS and bias-corrected estimates (%)

1981/1989

YEARS/ SEGMENTS	SAO PAULO			RECIFE		
	OLS	PROC. I	PROC. II	OLS	PROC. I	PROC. II
1981						
Formal	14.61	13.61	15.98	14.26	15.60	15.36
Informal	13.35	11.61	13.76	13.29	10.35	10.71
1983						
Formal	14.72	13.60	13.73	15.01	16.49	15.34
Informal	10.92	16.44	8.93	11.89	8.36	8.23
1985						
Formal	15.14	15.28	15.88	15.33	16.85	15.99
Informal	11.00	-1.07	10.97	13.03	-3.64	10.51
1987						
Formal	14.64	14.78	14.48	15.29	15.79	15.19
Informal	12.20	5.37	12.48	11.16	10.83	7.74
1989						
Formal	14.66	14.30	13.70	15.27	15.74	16.63
Informal	11.93	1.71	10.72	13.50	8.03	10.59

SOURCE: Tables 5-02, 5-03, 6-08, 6-08A, 6-09 and 6-09A

much more consistent and points to larger discrepancy (compared with ordinary OLS estimates) in the reward for education between the two segments of the labour market. The idea of dualism is therefore reinforced.

Other relevant findings:

i) For both male and female employees the returns to education are higher in the formal than in the informal segment. Average returns *per* extra year of schooling do not vary greatly across regions. In the formal, the actual value of average returns to education is about 15%, the same level found in other studies on Brazil for non-segmented samples;

ii) women have a higher average level of education than men, corroborating previous findings on Brazil and in line with international standards. Suggestions of discrimination against women were also detected;

iii) a Mincerian earnings function does not seem to explain satisfactorily earnings inequality in the case of male self-employed;

iv) education is also important in determining the probability of one being employed. Such probability is greater the higher is an individual's level of education. More specifically, human capital attributes play a large part in determining employment for an individual in the formal sector. As to the informal, the outcome points to a lessened role for education;

v) marginal returns to schooling are very high, mainly at the College level - and even higher in the less developed area.

Finally, we should consider two findings of a methodological nature. First, it is clear that correction for selectivity bias improves considerably the robustness of the results, although there is a sensitivity of the outcome to the statistical and economic assumptions underlying the identification procedure adopted. Second, this thesis reinforces the analytical usefulness of "contribution to social security" as an institutional breakdown for segmentation studies in Brazil.

CHAPTER VII. CONCLUSIONS

In the first of the four sections of this chapter, we suggest a theoretical synthesis which is built up on a two-fold basis: i) by drawing on the discussion conducted in Chapter II and ii) by seeking inspiration in the general outcome of our empirical analysis. Section 2 consolidates the main specific findings from the empirical study - examining its theoretical implications, discusses points not contemplated in the somewhat outsized Chapters V and VI and readdresses some issues. Policy matters are examined in the third section. Finally, section 4 suggests topics for future research.

1. Towards a synthesis

The whole discussion conducted in Chapter II - and revisited on several occasions during the empirical investigation - allows us to point to certain elements of convergence of theoretical approaches to the reality of segmented labour markets. Thankfully, such a "convergence" does not mean absence of controversy. We contend here that:

1. Neoclassical theorists have made some criticism of their own model and, abandoning the pure competitive model of the labour market, have given more advanced treatment of institutional aspects and demand-related factors.

2. Segmented labour markets (SLM) theorists have made more flexible early rigid hypotheses (good versus bad jobs, strict absence of labour mobility) in favour of taking

advantage of the use of the human capital model, particularly through the use of earnings functions in empirical studies. So, more importantly, strict dualism is abandoned in favour of duality as a heuristic device in the approach to a broader idea of segmentation.

3. Contributions from the screening hypothesis have been considered and several theorists admit it can be a complement to, rather than a refutation of, the human capital model.

4. The most ambitious attempt to build up an alternative explanation to the neoclassical approach - the "radical" theory[1] - does not appear to have delivered what it sought to deliver. The historical accuracy and analytical consistency of the whole theoretic apparatus is not considered satisfactory, although the general analysis is regarded as highly stimulating[2]. Furthermore, as pointed out in Chapter II, the attempt by the radical theorists to reconcile an essentially "macro" apparatus with a microeconomic analysis of the labour market seems to present difficulties. But the critical content of the radical theory has been successful in helping to put institutional aspects at the heart of the discussion on labour market issues.

5. Some researchers - e.g. the so-called "Cambridge school of SLM" [FINE (1987)], represented by Jill Rubery and others [RUBERY(1978), RUBERY (1981), CRAIG *et al* (1982)] - have highlighted, amongst other aspects, the role played by

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[1] Most conspicuously represented by GORDON *et al* (1982).

[2] See, for example, the sympathetic but rigorously critical appraisal made by GALLIE (1982) and BRODY (1984).

education in reinforcing inequalities generated **within** the labour market. As seen in Chapter II, by arguing that most jobs could be done by most workers, they assert that formal educational requirements have a double function: helping to adjust labour supply to a small number of "good" jobs **and** "legitimising" pay inequalities between "similar" jobs. At present, the relevance of this issue is recognised by researchers of distinct affiliations. This study fuels the debate on education **and** inequality, as will be discussed further in this Chapter.

6. Despite all the criticism levelled at neoclassical formulations, the competing explanations lack the consistency which could enable them to be regarded as an alternative paradigm. As a result, an adapted neoclassical approach is still the predominant and more complete analytical view of the labour market, when the focus is on microeconomic issues[3].

The confirmation of the segmentation hypothesis and other relevant hypotheses by our empirical analysis - as will be seen in the next section - arises from a study which, like others referred to throughout this thesis, is a hybrid of neoclassical and SLM theoretical assumptions. That is a natural approach given the present "state of the art" of labour economics. Few researchers would deny the importance of SLM studies in helping to shape the present configuration of empirical investigations on key labour market issues (gender

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[3] Some studies which inspire us to highlight such an idea of convergence are: WACHTER (1974), TAUBMAN & WACHTER (1986), BLAUG (1976), DICKENS & LANG (1985), BOISSIERE, KNIGHT & SABOT (1985) and McNABB & RYAN (1990).

and race discrimination, unionisation) and in drawing attention to policy issues. On the other hand, it is also clear that some neoclassical theoretical contributions (the efficiency-wage principle, the demand-supply mechanism, the human capital theory), although not embraceable without restrictions, are relevant to explain the working of labour markets.

2. Extended analysis and summary of the main findings

This thesis has examined several aspects of the relationship between earnings and education in two typical metropolitan areas in Brazil, Recife and Sao Paulo, in the period 1981/1989:

i) How the formal-informal divide affects that relationship in both regions;

ii) how that relationship behaves when different occupational positions (wage employment, self-employment) are considered;

iii) and, in a smaller degree of detail, what can be said about gender differences concerning returns from education.

This section sets out to consolidate these topics and to proceed with further analysis of directly related issues.

Our empirical study has detected sharp, persistent earnings inequalities amongst workers. Every time one observes a result of this sort, it can be argued that such differentials might be entirely explained by different productive traits of heterogeneous individuals. However, in this study a significant proportion of the differences

remained unexplained even when we controlled for important observed individual attributes (education, experience in the labour market, position in the household, amongst others).

Several hypotheses were tested and the results - as will be seen below - can be regarded as relevant to the understanding of the functioning of urban labour markets in Brazil, particularly in respect of the role played by education.

The following are the main specific results of our investigation:

a) First, we stress that the criterion of contribution to social security proved to be a very fruitful instrument for the analytical formal-informal split of urban labour markets in Brazil.

b) Although segmentation is hard to identify statistically, it can be said that the formal-informal segmentation hypothesis is confirmed in both regions; perhaps the best evidence for it coming in the overall 'coefficients' effect (including but surely not limited to schooling effects) in the earnings decomposition undertaken in chapter V. Segmentation might also be reflected in an unknown component of the 'endowments' effect. On the other hand, despite the unavoidable shortcomings of the method, segmentation can also be illustrated by the inter-sectoral gap in returns to education, and by the differentiated role played by education in generating earnings inequality, in determining the probability of employment and in determining entry into each sector in the first place.

c) There is no strong evidence of geographical segmentation (rates of return to schooling do not differ sharply between regions), although the influence of education on inequality is found to be greater in the less developed area.

d) Returns to education differ markedly according to occupational position (self-employment and wage employment).

e) There is no clear evidence of differentiation in returns to education by gender (men and women would obtain similar rates of return in the formal sector; things are less clear in the informal sector), although the relatively poor "fit" of the wage equation for women does not enable one to regard this result as robust. On the other hand, gender discrimination is found to be important - women earn less than men despite being, on average, more educated. Such a result might have its importance lessened if one considered that returns from education for women could also reflect less market experience. But this cannot be adequately evaluated, as the "age - 5 - years of schooling" proxy for experience, used for both men and women, may not pick out properly the particular characteristics of female labour supply.

f) Returns to education increase by level of schooling, contrary to what is usually expected in the human capital literature. This result corroborated the findings of previous studies on Brazil.

g) Ordinary least squares standard estimates do not reveal any marked difference, either in sectoral or regional terms, in the earnings-experience profile - as seen through

the actual values of the quadratic term on experience. The picture changes when one observes the estimates from the bias-corrected wage equations. On a year-on-year basis, the coefficients on experience square show a changeable pattern, although the evidence suggests a flat experience-earnings profile (very low actual values of those coefficients) in the informal sector of Recife. In Sao Paulo, the flatness of the experience-earnings profile in the informal sector is less clear cut[4].

h) The breakdown of the earnings differential (by use of Blinder's technique) has shown that personal endowments explain up to 70-80% of the overall differential in favour of the formal sector, leaving a minimum of 20% to be attributed to segmentation factors. Education alone would explain 30-40% of the "endowments effect", and its influence is greater in the less developed area (Recife).

i) The estimated earnings equations explain 50% to more than 60% of the inequality in earnings, the latter being a

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[4] We checked this result by running regressions on pooled data across years, after adjusting the values of earnings for several monetary reforms in Brazil during the relevant period (cuts of 3 zeros). We then calculated real monetary values by correcting for inflation the actual figures, using national indices published by the Getulio Vargas Foundation. The pooled regressions (with log of real standardised earnings as the dependent variable), to which we incorporated dummy variables for year (taking 1985 as the basis) - also bias-corrected according to the same identification procedures as before - confirmed all the qualitative results from the annual wage equations. The coefficients of determination in these regressions increased to more than 60% in the formal sector and to over 40% in the informal (almost 50% in Recife). We shall make further comments on pooled-data estimates, also obtained through standard OLS regressions.

result from regressions on pooled data across years[5]. Education alone accounts for about 65% (Sao Paulo) to 71% (Recife) of the explained log-variance in the formal sector, an outcome that corroborates previous findings of studies on Brazilian metropolitan labour markets. As to the informal segment, education accounts for about 44% (São Paulo) to 50% (Recife) of the explained log-variance[6].

j) Another striking result is that marginal returns to education by level of schooling in the formal sector are very high, in particular those for College education (in the region of 20%), with a tendency to be even greater in the less developed area. Marginal returns in the informal sector do not show a clear cut picture[7].

k) Education is found to be a major influence not only on earnings inequality but also on entry to the formal market, i.e. on the probability of being employed in that sector. The latter might lead one to think about a 'hidden' portion of the return to education: having a higher level of schooling would

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[5] See previous footnote.

[6] These proportions are based on OLS regressions for 1989. For findings from previous studies see REIS & BARROS (1991, p. 134).

[7] It is worth mentioning that estimates of marginal returns to education based on pooled data make more clear what was just hinted by the annual estimates: i) returns to High School education, formal sector, of about 15% (São Paulo) and 16% (Recife); ii) returns to university education over 20% in the case of Recife and almost 20% in Sao Paulo, also for the formal sector. Another result is that returns to College education are even higher in the informal sector of both regions. This latter outcome hints at a thorough importance of university education; if some screening process occurs, this might be indirect evidence of it. For the complete results, see Tables 6-14 & 6-15 (Chapter VI) and APP-VII.01 (Appendix to Chapter VII).

be a passport to more job stability via entry in the formal sector. We return to this issue later, by discussing some simulations.

l) College education appears to compensate for unfavourable labour market conditions in Recife, by equalising across regions the probabilities of a head of household being employed in the formal sector. For those with lower level of schooling, the probability of employment (in the formal segment) is smaller in Recife.

m) Finally, pooled-data-OLS equations have confirmed the overall results of the year-on-year analysis made for women; that is, rates of return to education of about 15% in the formal segment (as for men) and an unclear picture in terms of segmentation; in Sao Paulo, returns of about 14% in both sectors whilst in Recife the estimates are 15.3% in the formal and 13.7% in the informal[8]. Thus, there is a suggestion of some sectoral segmentation in Recife but not in Sao Paulo.

We shall now make further comments on some concluding points and address supplementary issues.

2.1 Consolidating results on rates of return to education

This study has consistently shown that in the case of male employees, education gets an average reward of about 15% per extra year of schooling in the formal sector, with a minimum sectoral difference of around 2-3 percentage points in relation to the average return in the informal sector. The gap

[8] Very high values of the F and the Wald test statistics have attested the significance (at any level) of the difference between these two rates of return to education.

is even greater when estimates are corrected for the unemployment and segmentation biases. Estimates from bias-corrected equations based on pooled data across years show that returns to education in both regions would be (%)[9]:

	FORMAL		INFORMAL	
	Proc. I	Proc. II	Proc. I	Proc. II
SÃO PAULO	14.0	15.0	6.0	12.0
RECIFE	16.0	16.0	6.0	8.0

These consolidated results bring more consistency to the picture revealed by estimates calculated on a year-on-year basis. It is worth observing the fact that, despite the sensitivity of the estimates to the identification procedures[10], particularly those of the hours worked equations - as seen in Chapter VI -, the figures for the formal sector are found to be consistently around 15%, the same level of return estimated elsewhere for the country as a whole [PSACHAROPOULOS (1987); LEAL & VERLANG (1991)[11]. The conclusion is now unequivocal: education is much better rewarded in the formal sector and appears to play a relatively minor role in the informal; the 12% return suggested by

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[9] Complete results from pooled-data estimations are in the Appendix to Chapter VI, Tables APP-VI.07 and APP-VI.08.

[10] We should remind the reader that the criteria for identification involved either keeping the sector of activity dummies in the wage equation (procedure I) or dropping them (procedure II) - in a trade-off with the head of household dummy. The dummy variable for a second income source (SECDY), thought to be economically more appropriate (compared with the sectoral dummies) for inclusion in the hours worked equation, was kept throughout the system.

[11] It should be also noted that our study is based on several annual cross-section surveys - not on just a single-year data-set.

procedure II for the informal sector in São Paulo does not constitute strong evidence against this conclusion, given the implausibility of its construction (i.e. the removal of the industry variables). It is clear that, despite the lack of direct evidence on inter-sectoral labour mobility, this outcome - along with the findings listed above - provides strong support for the segmentation hypothesis.

This contrasts sharply with qualitative results from PSACHAROPOULOS (1987) - a study based on a large sample drawn from the 1980 Brazilian Census[12], where the return to schooling was found to be about the same in both sectors.

The evidence against regional segmentation corroborates the explanation that inter-regional labour mobility must have equilibrated the reward for education in different urban labour markets throughout the country [PSACHAROPOULOS (1987)][13].

2.2 Investigation into educational screening

It is now time readdress the issue, raised in chapter II, of comparing returns to schooling for employees and self-employed as a means of detecting educational screening. From

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[12] The analytical formal-informal breakdown is exactly the same as ours - based on contribution to social security. The age range (15-65) is different, though. PSACHAROPOULOS does not make any reference to the possible source of bias regarding the exclusion of individuals aged less than 15 or more than 65. As we know, the proportion of informal workers tend to be relatively greater in the groups of minors and aged persons.

[13] This is an indication of the existence of an "integration" of "the" national labour market, perhaps more solid than the evidences sought by e.g. SALM & SILVA (1987) in support for their "integration hypothesis".

the credentialist hypothesis it is argued that returns to education for the former should be greater than for the latter, and the difference might be due to the occurrence of screening in the wage-employment sector.

We shall recall the main assumptions made concerning those in self-employment:

i) they know their own productivities and decisions on investment are based on that;

ii) they have particular talents and abilities, including entrepreneurship, which must be enhanced by education;

iii) education would not be used for screening; they would rather try to perform their tasks the best they could in order to secure demand;

iv) they know their future employment status at the time the investment is made.

To test for the occurrence of screening we chose to compare the rates of return to schooling (estimated for pooled data across years) of formal employees and formal self-employed, as these two groups may be more suitable for such a comparison (also, we avoid peculiarities of the informal sector).

The estimated rates of return were 10.9% for the formal self-employed in São Paulo and 13.4% in the case of Recife[14]. These figures should be compared with (also pooled across years) OLS standard estimates of returns to schooling of formal employees in the two regions: 14.9 and 15.3%,

[14] Earnings equations specified as before: with inclusion of the dummies for sector of activity, position in the household and the 'year' dummies.

respectively[15].

On the other hand, average age and years of education of the two occupational groups are[16]:

	Formal employees		Formal self-employed	
	Age	Schooling	Age	Schooling
SÃO PAULO	32.4	6.79	41.6	6.35
RECIFE	33.8	6.86	42.6	6.04

Self-employed are older and less educated than employees; therefore, they invest less in education. Coupled with two (four) percentage-points difference in the rates of return to schooling in São Paulo (Recife), these results seem to illustrate the screening hypothesis.

Of course the returns to education of the self-employed are probably overestimated, given that important explanatory factors are ignored - as already pointed out elsewhere in this thesis.

2.3 'Adjusted' rate of return to education in the informal sector

We have recognised that the possibility of education being used as a screening device cannot be ruled out; more than that: screening can be part of the explanation for positive rates of return to schooling, as verified in the previous sub-section. We now explore the issue further, by discussing some simulations concerning an 'adjusted' rate of return to education in the informal sector.

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[15] Figures obtained from Tables APP-VI.07 and APP-VI.08 in Appendix to Chapter VI.

[16] Figures obtained from Table 4-02A in chapter IV.

We start by discussing possible answers to the question: if an individual in the informal sector, with average 'informal' characteristics, increases schooling by one year, what is the expected return? One might say this will be given by the already estimated within-segment return. This is not the full story, however: an increase in schooling could also increase the employment probability of an individual who migrates to the formal sector; if screening occurs, the individual can exhibit his educational credentials and there would be an increased likelihood of him being incorporated into the formal sector. Therefore, the adjusted rate of return would be the within-segment one **plus** the return associated to his passage to the other market.

To estimate this 'hidden' portion of the return we begin by establishing the following definitions:

adjusted rate of return = adj ror = within-segment return(r) + (average earnings gain associated with intersegment mobility at a given level of schooling)*(incremental probability of being in the formal segment **as a result of an increase in schooling**), or

adj ror = r + EG*ΔP.

Using regressions for pooled data, the portion "ΔP" is obtainable by differentiating (in respect of schooling) the probit for segmentation equations, whose estimates are presented in Table 7-01 below[17]. It is known from econometrics

[17] Coefficients from standard OLS regressions and from bias-corrected equations based on pooled data are presented in Tables APP-VI.07 and APP-VI.08, in Appendix to Chapter VI.

TABLE 7-01
SAO PAULO and RECIFE: Estimates from probit equations for segmentation. Pooled data across years
Male employees

VARIABLES	REGIONS / PARAMETERS	
	SAO PAULO	RECIFE
Interc.	0.1453	-1.0179
	(3.09)	(-15.11)
School.	0.0807	0.1328
	(21.87)	(27.59)
EX	0.0581	0.0896
	(17.15)	(19.49)
EXSQ	-0.00096	-0.00130
	(-18.21)	(-18.40)
CONSTR	-0.8299	-0.6189
	(-21.74)	(-13.12)
COMSERV	-0.6569	-0.5811
	(-25.92)	(-15.41)
TrpFinPS	0.2384	0.3378
	(6.07)	(6.97)
POSH	0.3109	0.4715
	(9.73)	(11.77)
SECDY	0.4528	0.5083
	(13.95)	(10.49)
N. Obs	26498	12727

Basic Data SOURCE: BRASIL/PNAD. Magnetic tapes
- For variables definitions, see notes on other Tables

textbooks that the analytical function which describes the probit model is a cumulative Normal distribution function, $P = F(\beta X)$, and that $d(P)/dX = \beta F'(\beta X) = \beta f(\beta X)$; $f(\beta X)$ being the **standard Normal probability density function** (pdf). The estimate of such function is given by:

$$(1/\text{sqrt}(2\pi))*\exp((-1/2)*Z^2)^{18},$$

where $Z = \hat{\beta}X$ is the statistically predicted value of the estimated Pr(segment) function[19]. Thus, the value of the incremental probability of being in the formal sector as a result of an increase in schooling (ΔP) comes from the product $\hat{\beta}$ * estimated pdf, where $\hat{\beta}$ is the coefficient on schooling from equations depicted in Table 7-01.

The gain associated to migration (EG) will be estimated as follows:

i) Assuming that an individual in the informal sector, with average characteristics $\bar{X}_j$, could migrate to the formal sector, we will first predict his log(earnings) in the sector he is in; call it pY^I_{inf} or "A";

ii) After moving to the formal, his earnings would be the result of the combination of his average 'informal' characteristics with formal coefficients. He would be in another environment and thus he would be evaluated differently by formal employers. Call these predicted log(earnings) Py^F_{inf}, or "B".

EG will be the difference B - A. The adjusted rate of return to education in the informal sector would thus result

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[18] See e.g. GREENE (1993, pp. 54-58).

[19] Calculations performed with STATA package.

from

$$\text{adj ror} = r + \Delta P^*(B - A)$$

and the product $\Delta P^*(B - A)$ will reflect the informal sector return associated with movement into the formal sector.

The resultant adjusted returns to schooling were (marginal probabilities obtained from Table 7-01 above):

for Recife, adj ror = 0.1279 + 0.0291*0.242 = 0.1349

for São Paulo, adj ror = 0.1187 + 0.0136*0.317 = 0.1230

Therefore, adjusted returns would represent an increase in the reward for education of those from the informal sector who succeeded in getting a job in the formal sector, but the gross return would still be below the 15% return obtainable in the latter. That is, the inter-segment gap in returns to schooling is maintained even after adjusting for the earnings gain related to inter-sectoral mobility.

It is important to observe that the above results also inform that a representative informal worker, with average attributes, would increase his earnings by 24% (in Recife) or 32% (in Sao Paulo) if he successfully moved to a job in the formal sector. This is a very reassuring result in favour of the segmentation hypothesis: not only the reward for education differ between segments, but the *level* of pay for statistically comparable endowments also does; by moving to the formal market, a representative informal worker would get a substantial increase in earnings.

One should note that these results might be affected by selection-bias; indeed, additional schooling and the decision to seek to migrate to the formal sector would be normally

associated with higher ability and thus the adjusted return to schooling could be overestimated.

2.4 Discussing gender discrimination

The examination of average values of years of education, earnings and hours worked[20] has shown that in the formal sector women are, on average, more educated than men but earn less (by comparison of non-standardised values of monthly wages). Even when one accounts for the fact that average hours worked of women are fewer than those of males, the net result is a much lower average wage for women. The relatively higher level of schooling of female employees confirms the suggestion [e.g. by PSACHAROPOULOS (1987, p. 17)] that, to enter the labour market and face discrimination, competing for positions with their male counterparts, women need to have a higher relative educational attainment.

Some simulations have been made in order to investigate better the issue of gender discrimination. By attributing to female employees the entire wage equation of male employees - and using average values of female characteristics - we calculated the average predicted wage of females ($\hat{W}_F$). This result was compared with the actual women's average wage (W_F). The resultant ratio ($\hat{W}_F/W_F$) was named Q_1 for the formal sector and Q_2 for the informal. The exercise, made for pooled data, led to the following outcome:

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[20] See Chapter VI.

	RATIOS	
	Q_1	Q_2
SÃO PAULO	1.17	0.99
RECIFE	1.10	1.35

The conclusion drawn from the examination of male-female differentials in individual attributes is then reinforced. There seems to be more discrimination in the formal than in the informal sector of Sao Paulo - that is, male coefficients would provoke a greater impact on female wages in the former. But in Recife the picture is sharply different; a greater sex discrimination is apparent in the informal sector: there, the impact of male coefficients on female wages would be much greater than in the formal sector. Therefore, the finding that women in the informal sector of Recife are the most disadvantaged is corroborated by these results[21].

2.5 Regional differences in probabilities of employment

Valuable findings are suggested by estimates from probit for employment equations based on pooled-data - presented in Table 7-02 below.

Apart from the expected confirmation of the overall outcome from the year-on-year estimations, the year dummies - which are, most of the time, highly significant - clearly show

[21] There is no explanation for this apparently inverted pattern of sex discrimination in regional terms. But what we really want to stress here is the confirmation of a greater discrimination in the informal sector of Recife. Evidence of widespread sex discrimination in Brazilian metropolitan labour markets has been recently found by BARROS and SANTOS (1992).

TABLE 7-02
SAO PAULO and RECIFE: Estimates from probit equations for employment in the formal and informal segments - pooled data across years. Male employees

VARIABLES	*REGIONS/SEGMENTS*			
	SAO PAULO		RECIFE	
	Formal	Informal	Formal	Informal
Interc.	1.100 (16.09)	1.132 (8.86)	0.952 (8.49)	1.729 (10.24)
School.	0.031 (7.10)	0.022 (2.03)	0.038 (6.18)	-0.029 (-2.69)
EX	-0.008 (-1.64)	-0.009 (-0.93)	-0.004 (-0.55)	-0.034 (-2.73)
EXSQ	0.0002 (2.46)	0.0003 (1.94)	0.0002 (1.83)	0.0009 (3.74)
CONSTR	-0.038 (-0.68)	0.018 (0.19)	-0.142 (-2.21)	-0.103 (-0.99)
COMSERV	0.096 (12.90)	0.075 (1.08)	0.160 (3.15)	0.115 (1.28)
TrpFinPS	0.231 (5.90)	-0.027 (-0.21)	0.303 (5.58)	-0.283 (1.88)
POSH	0.378 (10.06)	0.353 (3.85)	0.490 (9.32)	0.114 (1.16)
SECDY	0.434 (10.54)	0.069 (0.52)	0.419 (6.31)	-0.292 (-1.68)
YEAR1	-0.048 (-1.07)	-0.234 (-2.44)	-0.226 (-3.22)	-0.352 (-3.16)
YEAR2	-0.222 (5.10)	-0.387 (-4.41)	-0.244 (-3.41)	-0.281 (-2.67)
YEAR3	0.006 (0.14)	-0.118 (-1.29)	-0.253 (-3.63)	-0.1546 (-1.50)
YEAR4	0.197 (4.17)	0.171 (1.80)	-0.196 (-2.87)	-0.011 (-0.10)
N. Obs	24755	3615	10708	3033

NOTE: The YEAR dummies represent, respectively, the years 1981, 1983, 1987 and 1989
1985 is the basic variable.

an association with the economic cycle[22]. There is noticeably less likelihood of a worker being employed in the formal sector of São Paulo during the years 1981 and 1983, a period of deep economic recession, but a greater probability of employment in the years of positive increase in the GDP (1987 and 1989). In contrast, less favourable labour market conditions predominate in the informal sector, where the probability of employment is positive only in 1989 (compared with 1985). There is a clear regional difference in this matter, as in Recife the probabilities of employment are systematically reduced in relation to the middle year (1985), with no striking differences between the formal and informal segments[23].

These results also point to the negation of the commonly quoted idea of the informal sector as a "buffer zone" in times of recession. Indeed, as already seen in chapter IV, the formal-informal share in these two typical urban labour markets in Brazil does not show any tendency to diminish over time or to be clearly related to the economic cycle; this finding is thus supported by the above comparison of probabilities of employment in the formal and informal

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[22] Note that 1985 was taken as the basic variable and that, as stated before, that year was a middle point between negative and positive rates of increase in the GDP.

[23] These results reinforce the suggestion made in Chapter VI about the some possible influence of factors related to the economic cycle in the detected sensitivity of the estimates (particularly in the hours-worked equations) to the identification procedures. Although we do not have enough elements to offer a more categorical explanation for this, the consolidated results referred to above lead to conclusions which reinforce the analysis based on the annual equations.

sectors.

2.6 Distribution of education

To conclude this section we shall examine the distribution of education in Recife and São Paulo and its possible link with inequality in earnings[24].

It is commonly expected that, as a result of an improvement in the workforce's educational level, earnings inequality will be eventually reduced; even though the immediate impact might be an increase in inequality (via wage increases for scarce, better-educated workers) the final outcome could be a reduced degree of inequality provided that such educational expansion is sufficiently widespread to reduce the **relative wages** of the now less scarce educated workers[25].

In Brazil, most of the increase in inequality of earnings during the sixties was attributed by LANGONI (1973) to changes in the educational distribution of the workforce: a remarkable reduction in the proportion of illiterates, from about 40% to 30%, and an also remarkable expansion in the share of High School (from 2.7% to 5.2%) and College levels (from 1.4% to

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[24] We will resort here to the examination of conventional statistic measures of the distribution of education (displayed in Table 7-03 below) and try to make associations with earnings inequality. In order to lessen the limitations inherent in this approach, we will compare our results with those from a more rigorous statistical analysis conducted elsewhere for the nine largest Brazilian metropolitan areas [REIS and BARROS (1991)].

[25] Such a line of reasoning implicitly assumes a perfect functioning of the demand-supply mechanism; if for any reason this mechanism does not work well (e.g. due to internal labour market practices), the final outcome might be different.

2.5%)[26]. That could have been explained by a "temporary disequilibrium" in the labour market (a more rapid increase in the demand for skilled workers than in the corresponding supply) [RAMOS & REIS (1991)].

The behaviour of the personal income distribution in Brazil during the seventies and the eighties, as already discussed elsewhere in this thesis, has clearly proved the disequilibrium hypothesis to be wrong. There has been a large increase in the average level of education in the Brazilian urban working population since the seventies [BARROS & RAMOS (1992)], but earnings inequality has worsened.

The relevant information gathered in this thesis has shown that: a) the earnings inequality is greater in Recife than in São Paulo and in the formal sector than in the informal in both regions; b) between 1981 and 1989 the Gini coefficient in Recife increases steadily year-on-year, reinforcing the idea of a much worse inequality in the less developed area.

As for the distribution of education, the coefficient of variation and the Gini coefficient, estimated using pooled data (Table 7-03 below)[27], reveal a greater inequality in the distribution of education in Recife, whereas the average levels of schooling do not differ markedly between regions. In

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[26] Quoted in RAMOS & REIS (1991).

[27] In this table, the coefficient of skewness is given by: $m_3 m_2^{-3/2}$, where m_2 is the variance and m_3 is the third moment, $m_3 = (1/n)\sum_{i=1}^{n} w_i(X_i - \bar{X})^3$; w_i being the weight variable.

TABLE 7-03
SAO PAULO and RECIFE: Selected statistics from the distributions of education for male and female employees. Formal and informal sectors. Pooled data

REGIONS/SECTORS	STATISTICS				
	Mean(*)	C.V. (**)	Gini	Sk'ness (***)	4 yrs sch. or less(%)
SAO PAULO					
Male employees					
All	6.56	0.642	0.362	0.569	45.4
Formal	6.79	0.630	0.357	0.511	44.0
Informal	4.92	0.658	0.365	0.756	55.6
Female employees					
All	7.22	0.618	0.355	0.273	39.3
Formal	7.95	0.558	0.322	0.085	32.7
Informal	4.50	0.735	0.400	0.919	63.1
RECIFE					
Male employees					
All	6.29	0.689	0.393	0.471	42.9
Formal	6.86	0.643	0.369	0.342	38.1
Informal	4.27	0.786	0.439	0.765	60.4
Female employees					
All	7.22	0.681	0.395	0.136	38.7
Formal	8.94	0.518	0.297	-0.288	24.0
Informal	3.88	0.916	0.503	0.947	67.2

SOURCE: BRASIL_PNAD. Magnetic tapes for public use. STATA computation
NOTES:
(*) Average years of schooling
(**) Coefficient of Variation
(***) For the definition of the measure of skewness, see footnote 23
The last column displays the proportion, in each segment, of those with 4 years of schooling or less

terms of sectors, it is in the informal where education is more unequally distributed, and that is true for both regions. When it comes to the case of female employees, an even more unequal distribution of education occurs in the informal compared with the formal sector, besides the fact that the gap in average years of schooling is really impressive, particularly in Recife.

Whereas in regional terms the greater overall inequality in earnings in Recife might be related to its more unequal distribution of education, the same association could not be made in sectoral terms; education is more evenly distributed in the formal (as shown by all calculated measures), but this sector has greater inequality in earnings. This suggests that we should look for other explanatory factors, generated within the labour market itself. Again, one may venture the hypothesis that inequality is largely created by market imperfections (e.g. internal labour market practices and discrimination).

It is also worth mentioning that from a year-on-year analysis our data has documented an expansion of the educational level of the working population, with higher relative increases in the proportion of secondary and high school levels; university education has not, somewhat surprisingly, increased markedly its share in the total of the workforce. On the other hand, the relative earnings of those

with high school and College education[28] have increased enormously and that is true especially in the case of Recife; this reflects the greater steepness of the education-earnings profile in the less developed area.

Finally, inter-sectoral comparisons suggest that having a higher educational attainment might represent a passport to entering the formal sector. This is particularly true in the case of women.

3. Policy issues

The analysis conducted so far raises an immediate question: what could be done to reduce inequality in Brazilian urban labour markets?

It is necessary to state at the outset that, given its natural limits, the analysis conducted here cannot offer a definitive answer to the above question. We are aware that several other factors influence the personal income distribution. The detected segmentation and the evident part education appears to play in it, however, provide elements for an appropriate response.

Three different categories of policy are usually considered: i) those directed at making the economic agents fulfil legal requirements more strictly, that is, to secure that all firms have their employees legally hired and, consequently, to eliminate the categories of non-contributors

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[28] Defined as multiple of the average earnings of the illiterate workers.

to the national system of social security and non-work-card employees; ii) introduction of mechanisms to give easier access to primary positions; and iii) educational policies with re-distributive aims.

As to the first kind of policy, let us assume for a moment that implementation and control of strict legal rules were possible. The effect could be quite different from that expected by policy makers. The worker's legal status was proven to be a clear demarcation line in the labour market; but it does not follow that eliminating the legal divider would bring more "good" jobs. Illegal small business might not be able to cope with all the costs of legal registration. The net result could be more unemployment instead of "better" jobs. On the other hand, perhaps the "unprotected" workers would resist a rigorous application of the law for fear of losing jobs. The conclusion is that the stricter-rules strategy is unlikely to succeed.

The second sort of policy does face serious limitations at the start as it would not be possible to "abolish" all internal labour market practices[29]. But there is also a question of social fairness and this is surely enough to make it a desirable set of policies. The crucial point is that one should not expect much in terms of consequent reduction in

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[29] One cannot rule out, however, that regulations which try to prevent gender and race discrimination can play a positive role in improving the relative position of those suffering discrimination. The orthodox assumption that equilibrium conditions would, in the long term, eliminate earnings differentials due to discrimination has no support in reality. For an idea of the extent to which these issues have meant a real challenge to the orthodox view, see CAIN (1976).

personal income inequality. Direct intervention (say, to tell firms which hiring criteria to adopt, to impose a minimum share of ethnic minorities amongst the employees, etc) is always of limited effect; it is difficult, for example, to eliminate subjective subtleties of promotion criteria adopted by firms, which may discriminate against minorities. Furthermore, how to cope with the heterogeneity of labour market structures? Would it be feasible to have differentiated rules according to different market structures? Given the reality of internal labour markets, how to secure the entry of an "external" worker? The point is that improving labour market conditions of course does not depend on the policy maker's goodwill. There is enough room, however, for what has been already adopted in developed countries in terms of general rules to protect against discrimination in the labour market; this is surely something to be generally embraced by developing countries.

We are left with the alternative of educational policies, if we want to build up something more effective in terms of trying to reduce inequality.

Broadly speaking, nowadays there is little, if any, doubt about the overall importance of education in economic development[30].

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[30] The international experience has made that obvious and there is little value in quoting here particular countries. However, given the apparent lack of commitment of Third World countries' governments to tackling the issue of education, it is worth mentioning that recent estimates [LAU *et al* (1993)] provide evidence that human capital accounted for about 25% of the growth in Brazilian GDP during the seventies (technical progress explained 40%). Despite the natural limitations of estimations based on an aggregate production function, it is -

Higher earnings differentials were found to be inversely related to the level of development: Recife, the less developed area, presents higher indices of inequality. Sao Paulo, the core of modern capitalism in Brazil, presents an overall better distribution of education. Of course this line of argument might appear to bear a tautological trait: social inequality leads to unequal access to education which leads to earnings inequality... But the crucial question is: would it be possible to devise ways of making education play a positive distributive role?

This study has also found that education alone explains a considerable proportion of inequality in the earnings distribution. On the other hand - despite inconclusive evidence about the relationship between the earnings and education distributions in Brazil - we intuitively assume that reducing inequality in access to education helps to reduce earnings inequality; this is particularly true if a selective expansion in education (favouring basic levels) is taken and if it is coupled with measures towards the reduction of discrimination and all unfair labour market practices.

Finally, it is worth mentioning the well-known fact of the overall reduction in the illiteracy rate in Brazil[31], as

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in Brazil - a rare, relevant finding.

[31] Illiteracy for the country as a whole is about 20%, with considerable differences between regions. In the North-East it is above this figure, whereas the South and South-East have a smaller proportion of illiterate people. Illiteracy rates in our sample were, in 1989, 10% in Recife and 6% in Sao Paulo. These percentages, for metropolitan areas, are not strictly comparable with the overall rate just mentioned, which correspond to the whole population (urban and rural areas); global rates being much higher.

a natural result of the expansion of the educational system. But, as already stated above, the connection between the education and the earnings distributions is not sufficiently clear to enable us to deduce the impact of this reduction in illiteracy on earnings inequality.

We shall now extend this discussion by making more explicit the social dimension of education and by seeking additional analytical support in a final empirical exercise.

A) **Education as a social investment.** The high, increasing (by level of schooling) rates of return to education clearly implies that investment in education in Brazil still gives a very high reward, which suggests that alternative investments would need to yield a minimum return of 15-16% a year to be an equivalent alternative. It is true that Brazil is a country with serious shortcomings in sectors such as health and infra-structure; we do not know how much a social investment of this kind would yield, although, given the dimension of these shortcomings, it should bring a very significant return. On the other hand, it is also true that our estimates are probably higher than "real" social returns to education, although this is not an easy concept to be satisfactorily represented by a single number. Indeed, computing social costs of providing education (subsidies, administrative costs, grants, etc) may not be enough for a good estimate of the social return, if we are not able to evaluate well the impact of education on productivity and economic growth. All in all, the evidence gathered here is enough to highlight education as an outstanding investment.

Another aspect to be considered is that our results do not support the argument raised by LEAL and VERLANG (1991) that the funding of university education should be curtailed **because its return is *lower* than that of basic levels.** We have seen that College education presents the highest marginal returns. Certainly the distribution of the education funding needs to be changed in favour of basic levels, but this conclusion does not arise from inter-level differences in returns. Such a change is needed for other reasons, related to a better allocation of public resources in general and educational funding in particular, based on grounds of equity. In fact, as already mentioned[32], the socially unfair character of university funding in Brazil leaves room for changes that might include the implementation of a selective scheme of university fees which would help to save resources in favour of basic schools. This, however, is not "the" solution, as advocated by LEAL and VERLANG (1991) - but part of it. The high returns to College education could also be used as an argument for the government to seek some way of getting the contribution from private companies for financing education (e.g. buying direct sponsorship by giving them some financial compensation from the Inland Revenue)[33].

A more critical comment on the issue of tertiary education is that its return might not properly reflect true

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[32] See footnote 23 in Chapter III.

[33] This would be particularly convenient in the case of Brazil, given the general recognition of the urgent need for a broad fiscal reform. A new related project could contemplate the above suggestion.

social marginal products. Behind higher returns to tertiary education could also be the advantages brought by market imperfections (internal labour market practices) to those with university education. But given that the possibility of screening cannot be ruled out either, such a line of reasoning gets somewhat blurred[34].

B) **Education and the labour market.** Education was found to be a relatively minor influence in the informal sector - where the return is lower and the individual's level of schooling does not significantly affect the probability of employment in that segment. This finding does not reinforce the idea of specific education and training **geared to the informal sector.** This is not, of course, to recommend no educational programme at all. In fact, schemes such as the SENAI programme - already mentioned elsewhere in this study - should be stimulated whilst general improvement in the educational system takes place.

C) **Education and inequality.** Comparisons based on log-variances have shown that about 60% of the earnings-inequality would be explained by the earnings equation (OLS estimates). We now use simulations based upon these earnings equations to further explore the issue of inequality. Table 7-04 below describes the results of an exercise in which Gini coefficients were calculated for earnings distributions generated according to alternative assumptions about the

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[34] The very high returns to College education in the **informal sector** in both regions, as already mentioned (see footnote 7), might be an indirect indicator of the occurrence of screening.

TABLE 7-04

SAO PAULO and RECIFE: Gini coefficients for simulated male employees earnings distributions, according to different statistical assumptions 1981/1989, selected years

YEARS/ REGIONS	INDICES						
	CASE 1 (*)			CASE 2(*)			ACTUAL GINI (**)
	OLS	Proc. I	Proc. II	OLS	Proc. I	Proc. II	
1981							
Sao Paulo	0.396	0.344	0.347	0.385	0.335	0.346	0.508
Recife	0.424	0.371	0.358	0.404	0.401	0.344	0.557
1983							
Sao Paulo	0.401	0.333	0.329	0.390	0.329	0.349	0.504
Recife	0.433	0.372	0.366	0.421	0.389	0.359	0.559
1985							
Sao Paulo	0.406	0.369	0.367	0.393	0.355	0.369	0.517
Recife	0.441	0.412	0.401	0.422	0.413	0.382	0.573
1987							
Sao Paulo	0.392	0.352	0.351	0.385	0.346	0.358	0.506
Recife	0.434	0.378	0.372	0.418	0.366	0.355	0.580
1989							
Sao Paulo	0.384	0.355	0.352	0.375	0.347	0.356	0.537
Recife	0.436	0.393	0.379	0.424	0.406	0.375	0.618

NOTE: (*) Case 1: distributions in which the predicted values were generated by keeping the respective formal and informal wage equations parameters; case 2: formal wage equation parameters were imposed on the informal wage equations
(**) From Table 4-05 (column "All")

"benchmark" case[35]. "Case 1" shows the outcome for earnings distributions in which the predicted values of wage were calculated by keeping the respective formal and informal wage equation parameters. "Case 2" was obtained by attributing to the **informal** wage equation the coefficients from the **formal** wage equation. That is, in this case an equalisation of returns to schooling across segments is assumed.

By comparing case 1 indices with the actual Gini, we note that, according to OLS estimation, the model would explain about 70-80% of the earnings inequality. When the comparison involves the simulation based on bias-corrected estimates, such proportion is about 65-70%; this reinforces the previous result, based on the log-variance.

A comparison between the two cases could hint at an answer to the question: what would happen if some policy towards the equalisation of returns to education across sectors were implemented? If the parallel were based on "OLS-indices", the deduction is that we would have an overall reduction in inequality in **both** regions. But "bias corrected-indices" would recommend some prudence regarding such "equalisation policy". Although an overall picture of reduction in inequality could still hold, the possibility of getting opposite effects between regions could not be ruled out. This would be a more realistic expectation, given that regional differences in patterns of development may interfere

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[35] In this exercise (under both sets of assumptions; cases 1 & 2) the technique implies the elimination of the stochastic component of the distribution; that is, we work with the systematic part of the equation.

with and act against a single national "equalisation policy".

Unfortunately, the results depicted in Table 7-04 do not suggest a picture clear enough to enable one to be more categoric. Even for estimations based on pooled data (not shown here), the results do not allow for a straight answer to the question posed above. Notwithstanding this, we have gathered enough elements to venture a hypothesis; equalising rates of return across sectors (if practical measures aiming at this could be thought of) may put the more educated of both sectors in close positions in the earnings distribution, but at the same time this could generate more within-sector inequality. That would, therefore, lead us to the more sensible idea of improvement in the distribution of education (via easier access, subsidies, sponsorship, etc) as the best way to help reduce the overall inequality. Once more we shall contend that such a policy would be more effective if coupled with measures to reduce discrimination and market imperfections.

Finally, we reckon that the detected inverse association between level of development and earnings inequality may be telling us that specific policies cannot do much if the government does not persist in global policies towards the reduction of regional disparities. On the other hand, we have seen that there is a clear association between a higher level of economic development and a lower share of the informal sector; this suggests that if economic development took place more evenly in regional terms, the overall result might be a smaller informal sector.

4. Potential new lines for future research

To conclude, it may be useful to indicate some topics which merit further analysis in the near future. We will limit the range to those we regard as following naturally from the analysis conducted here.

The persistent formal-informal differences captured by this study beg for future clarification of the labour mobility issue. If inter-sectoral mobility of the workforce is not significantly constrained, why do the differentials persist?

The second topic concerns the specifics of local labour markets. Recife shows a historical tendency to have the highest unemployment rates amongst all Brazilian metropolitan areas. This issue has been referred to several times in this thesis. Research into possible explanations of the phenomenon would make a valuable contribution to the understanding of how an important local labour market works.

A third and final topic relates to trying to overcome some of the data limitations which inhibit studies of Brazilian labour markets. Research institutions, universities included, should look for ways of financing surveys which supplied information on e.g. fringe benefits, ability, race, social background and family-related variables. Research institutions could pool their efforts to carry out surveys which would generate longitudinal data - this would improve and expand enormously the possibilities for high-quality research.

APPENDIX TO CHAPTER IV

TABLES 1, 2, 3, 4-A to 8-B, 4-02B, 4-02C, 4-02D

NOTES TO TABLES 1, 2, & 3:

1) WCD: WORKING CARD GROUP
2) NWCD: NO WORKING CARD GROUP
3) (Schooling: years average)

NOTES TO TABLES 4-A TO 8-B:

1) C: CONTRIBUTORS
2) NC: NON-CONTRIBUTORS
3) (Schooling: years average)
4) Differences between the totals in these Tables and those in Table 4.02 are due to a further filtering for individuals whose sector of activity is not classified ("ill-defined", according to PNAD dictionary). This additional screening was required by the tightening of the formal-informal breakdown resultant from placing all public administration in the formal sector.

SOURCE: BRASIL/PNAD. Magnetic tapes for public use.

TABLE 1 - SAO PAULO, RECIFE
1981/1983 EMPLOYEE: NUMBER OF PEOPLE AND AVERAGE VALUES OF AGE, SCHOOLING, WORKING HOURS AND EARNINGS

SAO PAULO 1981

	RELEVANT CHARACTERISTICS OF EACH GROUP				
	Number	Age	Schooling (years)	Hours worked	Wage (Cr$)
WCD	5,357	32.3	6.31	47.23	44,028.97
NWCD	772	29.1	5.12	47.11	21,846.56
All	6,129	31.9	6.16	47.22	41,234.86

RECIFE 1981

	RELEVANT CHARACTERISTICS OF EACH GROUP				
	Number	Age	Schooling (years)	Hours Worked	Wage (Cr$)
WCD	2,476	33.6	6.48	45.74	29,019.38
NWCD	606	27.5	4.22	45.62	11,671.79
All	3,082	32.4	6.03	45.72	25,608.10

SAO PAULO 1983

	RELEVANT CHARACTERISTICS OF EACH GROUP				
	Number	Age	Schooling (years)	Hours worked	Wage (Cr$)
WCD	5,414	32.7	6.64	46.44	178,967.20
NWCD	892	29.4	4.98	47.04	81,267.56
All	6,306	32.3	6.41	46.53	165,163.40

RECIFE 1983

	RELEVANT CHARACTERISTICS OF EACH GROUP				
	Number	Age	Schooling (years)	Hours Worked	Wage (Cr$)
WCD	2,225	33.9	6.69	46.03	129,046.00
NWCD	774	28.3	4.18	46.92	48,852.32
All	2,969	32.5	6.06	46.26	108,959.40

TABLE 2 - SAO PAULO, RECIFE
1985/1987 EMPLOYEE: NUMBER OF PEOPLE AND AVERAGE VALUES OF AGE, SCHOOLING, WORKING HOURS AND EARNINGS

SAO PAULO 1985

	RELEVANT CHARACTERISTICS OF EACH GROUP				
	Number	Age	Schooling (years)	Hours worked	Wage (Cr$)
WCD	5,871	32.2	6.77	46.86	1,797,669.00
NWCD	1,061	28.7	5.10	46.85	756,126.50
All	6,932	31.6	6.51	46.86	1,638,246.00

RECIFE 1985

	RELEVANT CHARACTERISTICS OF EACH GROUP				
	Number	Age	Schooling (years)	Hours Worked	Wage (Cr$)
WCD	2,272	33.9	6.93	45.89	1,375,023.00
NWCD	777	27.2	4.52	47.18	556,184.70
All	3,049	32.2	6.31	46.22	1,166.320.00

SAO PAULO 1987

	RELEVANT CHARACTERISTICS OF EACH GROUP				
	Number	Age	Schooling (years)	Hours worked	Wage (Cr$)
WCD	3,170	32.3	7.01	45.66	15,012.72
NWCD	515	30.4	5.37	45.65	7,679.81
All	3,685	32.0	6.78	45.66	13,987.91

RECIFE 1987

	RELEVANT CHARACTERISTICS OF EACH GROUP				
	Number	Age	Schooling (years)	Hours Worked	Wage (Cr$)
WCD	1,332	33.6	7.01	45.73	10,130.06
NWCD	447	26.0	4.49	44.87	3,528.78
All	1,779	31.7	6.38	45.52	8,471.32

TABLE 3 - SAO PAULO, RECIFE
1989
EMPLOYEE: NUMBER OF PEOPLE AND AVERAGE VALUES OF AGE, SCHOOLING, WORKING HOURS AND EARNINGS

SAO PAULO

	RELEVANT CHARACTERISTICS OF EACH GROUP				
	Number	Age	Schooling (years)	Hours worked	Wage (Cr$)
WCD	2,933	32.6	7.08	43.85	1,763.31
NWCD	524	28.7	5.41	44.77	941.39
All	3,457	32.0	6.82	43.99	1,638.73

RECIFE

	RELEVANT CHARACTERISTICS OF EACH GROUP				
	Number	Age	Schooling (years)	Hours Worked	Wage (Cr$)
WCD	1,397	33.8	7.10	43.13	980.33
NWCD	452	27.1	4.88	43.76	413.79
All	1,849	32.2	6.56	43.29	841.83

TABLE 4-A

SAO PAULO 1981: Contributors and non-contributors to social security. Number of people and average values of age, schooling, working hours and earnings by occupational groups

	Employee				
	Number	Age	Schooling (years)	Hours worked	Wage (Cr$)
C	5,502	32.3	6.31	47.25	44,086.43
NC	629	27.7	4.79	46.97	16,238.09
All	6,131	31.9	6.16	47.22	41,229.24

	Self-employed				
	Number	Age	Schooling (years)	Hours Worked	Wage (Cr$)
C	604	40.6	5.58	52.04	49,966.91
NC	477	39.3	4.07	46.46	25,024.28
All	1,081	40.0	4.91	49.58	38,961.29

	Employer				
	Number	Age	Schooling (years)	Hours worked	Wage (Cr$)
C	385	42.2	8.36	56.05	103,140.60
NC	32	42.8	7.69	53.94	65,718.75
All	417	42.2	8.30	55.89	100,272.20

	All				
	Number	Age	Schooling (years)	Hours Worked	Wage (Cr$)
C	6,491	33.7	6.36	48.22	48,137.04
NC	1,138	33.0	4.57	46.95	21,312.11
All	7,629	33.6	6.10	48.03	44,135.13

TABLE 4-B

RECIFE 1981: Contributors and non-contributors to social security. Number of people and average values of age, schooling, working hours and earnings by occupational groups

	Employee				
	Number	Age	Schooling (years)	Hours worked	Wage (Cr$)
C	2,552	33.7	6.45	45.74	28,938.60
NC	530	26.4	4.00	45.61	9,574.46
All	3,082	32.4	6.03	45.72	25,608.10

	Self-employed				
	Number	Age	Schooling (years)	Hours Worked	Wage (Cr$)
C	253	43.4	5.07	50.75	34,047.85
NC	444	36.6	3.62	43.13	14,316.88
All	697	39.1	4.15	45.89	21,478.69

	Employer				
	Number	Age	Schooling (years)	Hours worked	Wage (Cr$)
C	120	42.2	9.90	47.08	113,508.30
NC	22	48.7	6.36	50.77	43,045.45
All	142	43.2	9.35	47.65	102,531.10

	All				
	Number	Age	Schooling (years)	Hours Worked	Wage (Cr$)
C	2,925	34.9	6.48	46.23	32,851.95
NC	996	31.4	3.88	44.62	12,418.34
All	3,921	34.0	5.82	45.82	27,659.76

SAO PAULO 1983: Contributors and non-contributors to social security. Number of people and average values of age, schooling, working hours and earnings by occupational groups

	Employee				
	Number	Age	Schooling (years)	Hours worked	Wage (Cr$)
C	5,516	32.9	6.64	46.41	179,076.40
NC	790	28.1	4.76	47.33	67,836.57
All	6,306	32.3	6.41	46.53	165,163.40

	Self-employed				
	Number	Age	Schooling (years)	Hours Worked	Wage (Cr$)
C	678	41.4	6.34	53.39	241,411.30
NC	513	38.6	4.24	48.72	106,028.00
All	1,191	40.2	5.43	51.38	183,088.30

	Employer				
	Number	Age	Schooling (years)	Hours worked	Wage (Cr$)
C	391	41.2	9.36	54.61	463,253.00
NC	24	42.4	7.08	49.68	236,708.30
All	415	41.3	9.23	54.32	450,081.30

	All				
	Number	Age	Schooling (years)	Hours Worked	Wage (Cr$)
C	6,586	34.2	6.77	47.62	202,195.50
NC	1,327	32.4	4.60	47.91	85,609.45
All	7,912	33.9	6.41	47.67	182,807.30

RECIFE 1983: Contributors and non-contributors to social security. Number of people and average values of age, schooling, working hours and earnings by occupational groups

	Employee				
	Number	Age	Schooling (years)	Hours worked	Wage (Cr$)
C	2,279	34.0	6.68	46.04	128,845.10
NC	690	27.6	4.00	46.96	43,243.28
All	2,969	32.5	6.06	46.26	108,959.40

	Self-employed				
	Number	Age	Schooling (years)	Hours Worked	Wage (Cr$)
C	252	41.6	5.73	51.15	172,430.40
NC	605	37.3	3.78	46.32	74,386.08
All	857	38.5	4.35	47.74	103,197.30

	Employer				
	Number	Age	Schooling (years)	Hours worked	Wage (Cr$)
C	87	41.9	9.89	52.60	397,855.30
NC	23	48.0	5.96	48.09	281,739.10
All	110	43.1	9.11	51.62	370,010.30

	All				
	Number	Age	Schooling (years)	Hours Worked	Wage (Cr$)
C	2,619	35.0	6.70	46.76	141,903.60
NC	1,318	32.4	3.93	46.69	61,681.77
All	3,936	34.1	5.77	46.73	115,077.50

SAO PAULO 1985: Contributors and non-contributors to social security. Number of people and average values of age, schooling, working hours and earnings by occupational groups

	Employee				
	Number	Age	Schooling (years)	Hours worked	Wage (Cr$)
C	6,013	32.3	6.77	46.86	1,794,852.00
NC	919	26.8	4.83	46.83	613,656.00
All	6,932	31.6	6.51	46.86	1,638,246.00

	Self-employed				
	Number	Age	Schooling (years)	Hours Worked	Wage (Cr$)
C	635	42.2	6.57	52.87	2,311,764.00
NC	603	39.0	4.39	45.99	1,231,967.00
All	1,238	40.7	5.51	49.52	1,785,913.00

	Employer				
	Number	Age	Schooling (years)	Hours worked	Wage (Cr$)
C	362	41.9	10.03	54.42	4,778,017.00
NC	42	40.8	7.95	55.26	3,997,619.00
All	404	41.8	9.82	54.51	4,696,758.00

	All				
	Number	Age	Schooling (years)	Hours Worked	Wage (Cr$)
C	7,010	33.7	6.92	47.80	1,995,667.00
NC	1,564	31.9	4.74	46.73	942,963.80
All	8,574	33.4	6.52	47.60	1,803,656.00

RECIFE 1985: Contributors and non-contributors to social security. Number of people and average values of age, schooling, working hours and earnings by occupational groups

	Employee				
	Number	Age	Schooling (years)	Hours worked	Wage (Cr$)
C	2,346	34.1	6.90	45.95	1,372,965.00
NC	703	26.1	4.36	47.10	476,892.00
All	3,049	32.2	6.31	46.22	1,166,320.00

	Self-employed				
	Number	Age	Schooling (years)	Hours Worked	Wage (Cr$)
C	199	42.9	6.30	52.63	1.696,880.00
NC	602	37.4	3.78	49.90	707,244.40
All	801	38.7	4.41	50.58	953,233.20

	Employer				
	Number	Age	Schooling (years)	Hours worked	Wage (Cr$)
C	91	40.0	9.40	49.90	4,488,935.00
NC	39	39.3	7.49	52.77	2,453,333.00
All	130	39.8	8.82	50.77	3,879,599.00

	All				
	Number	Age	Schooling (years)	Hours Worked	Wage (Cr$)
C	2,636	34.9	6.94	46.59	1,504,859.00
NC	1,344	31.6	4.19	48.52	637,456.40
All	3,980	33.8	6.01	47.24	1,212,037.00

SAO PAULO 1987: Contributors and non-contributors to social security. Number of people and average values of age, schooling, working hours and earnings by occupational groups

	Employee				
	Number	Age	Schooling (years)	Hours worked	Wage (Cr$)
C	3,257	32.3	7.02	45.69	15,028.59
NC	428	29.5	4.98	45.38	6,068.50
All	3,685	32.0	6.78	45.65	13,987.91

	Self-employed				
	Number	Age	Schooling (years)	Hours Worked	Wage (Cr$)
C	350	41.4	6.51	51.99	21,398.35
NC	325	40.7	4.85	47.99	11,953.19
All	675	41.1	5.71	50.07	16,850.72

	Employer				
	Number	Age	Schooling (years)	Hours worked	Wage (Cr$)
C	188	41.1	9.98	54.87	44,436.60
NC	23	49.6	9.52	45.00	46,086.96
All	211	42.0	9.93	53.79	44,616.48

	All				
	Number	Age	Schooling (years)	Hours Worked	Wage (Cr$)
C	3,795	33.6	7.12	46.73	17,072.85
NC	776	34.8	5.06	46.46	9.719.16
All	4,571	33.8	6.77	46.68	15,824.47

RECIFE 1987: Contributors and non-contributors to social security. Number of people and average values of age, schooling, working hours and earnings by occupational groups

	Employee				
	Number	Age	Schooling (years)	Hours worked	Wage (Cr$)
C	1,365	33.6	7.02	45.83	10,090.28
NC	414	25.3	4.27	44.49	3,133.98
All	1,779	31.7	6.38	45.52	8,471.32

	Self-employed				
	Number	Age	Schooling (years)	Hours Worked	Wage (Cr$)
C	127	43.0	6.30	49.33	26,266.19
NC	343	37.0	3.93	45.86	6,634.25
All	470	38.6	4.57	46.21	11,938.59

	Employer				
	Number	Age	Schooling (years)	Hours worked	Wage (Cr$)
C	62	40.6	9.47	49.60	42,798.39
NC	18	38.3	6.50	51.50	18,803.33
All	80	40.1	8.80	50.02	37,411.45

	All				
	Number	Age	Schooling (years)	Hours Worked	Wage (Cr$)
C	1,554	34.6	7.06	46.26	12,716.38
NC	776	30.8	4.19	44.86	5,040.09
All	2,330	33.4	6.10	45.80	10,061.04

TABLE 8-A

SAO PAULO 1989: Contributors and non-contributors to social security. Number of people and average values of age, schooling, working hours and earnings by occupational groups

	Employee				
	Number	Age	Schooling (years)	Hours worked	Wage (Cr$)
C	2,996	32.7	7.08	43.92	1,774.40
NC	461	27.6	5.16	44.40	757.01
All	3,457	32.0	6.82	43.98	1,368.73

	Self-employed				
	Number	Age	Schooling (years)	Hours Worked	Wage (Cr$)
C	348	42.3	6.61	50.98	3,037.58
NC	270	40.6	4.80	48.98	1,372.17
All	618	41.6	5.82	50.11	2,309.93

	Employer				
	Number	Age	Schooling (years)	Hours worked	Wage (Cr$)
C	195	41.9	9.30	51.21	6,265.33
NC	18	43.6	6.50	49.22	5,411.11
All	213	42.1	9.06	51.04	6,192.99

	All				
	Number	Age	Schooling (years)	Hours Worked	Wage (Cr$)
C	3,539	34.1	7.16	45.02	2,146.05
NC	749	32.7	5.06	46.17	1,090.63
All	4,288	33.9	6.79	45.22	1,961.70

TABLE 8-B

RECIFE 1989: Contributors and non-contributors to social security. Number of people and average values of age, schooling, working hours and earnings by occupational groups

	Employee				
	Number	Age	Schooling (years)	Hours worked	Wage (Cr$)
C	1,442	33.8	7.12	43.24	981.09
NC	407	26.3	4.56	43.45	348.45
All	1,849	32.2	6.56	43.29	841.83

	Self-employed				
	Number	Age	Schooling (years)	Hours Worked	Wage (Cr$)
C	125	42.5	6.75	48.81	1,803.27
NC	305	38.3	3.64	43.47	557.04
All	430	39.5	4.54	45.02	919.38

	Employer				
	Number	Age	Schooling (years)	Hours worked	Wage (Cr$)
C	73	41.8	9.70	47.61	6,725.59
NC	29	44.9	8.59	53.62	3,559.45
All	102	42.6	9.38	49.32	5,825.74

	All				
	Number	Age	Schooling (years)	Hours Worked	Wage (Cr$)
C	1,640	34.8	7.21	43.86	1,299.51
NC	741	32.0	4.34	43.86	560.03
All	2,381	33.9	6.31	43.86	1,069.32

TABLE 4-02B

SAO PAULO and RECIFE: summary statistics for male employees. Formal and informal sectors. 1981/1989

REGIONS/YEARS/SEGMENTS		N.Obs	VARIABLES/STATISTICS Age		School.(years)		W.Hours		Earnings(Cr$1,000)		StdEarnings(Cr$1,000)	
			MEAN	S.DEV	MEAN	S.DEV	MEAN	S.DEV	MEAN	S.DEV	MEAN	S.DEV
SAO PAULO	1981											
	Formal	5501	32.35	11.76	6.31	4.26	47.24	10.24	44.09	49.30	40.36	51.19
	Informal	629	27.70	14.56	4.79	3.43	46.97	13.86	16.24	16.54	15.00	17.93
	1983											
	Formal	5514	32.54	11.36	6.64	4.28	46.41	8.82	179.03	232.80	163.02	227.15
	Informal	787	28.09	13.63	4.76	3.33	47.33	12.54	68.12	117.02	63.09	122.85
	1985											
	Formal	6013	32.35	11.09	6.77	4.29	46.86	9.05	1794.85	2204.75	1633.60	2173.73
	Informal	917	26.83	13.44	4.83	3.14	46.81	13.89	614.99	650.23	546.37	569.89
	1987											
	Formal	3257	32.33	11.36	7.02	4.30	45.69	9.01	15.03	17.43	14.14	19.93
	Informal	425	29.40	15.33	4.98	3.19	45.50	13.70	6.11	5.68	6.22	11.94
	1989											
	Formal	2998	32.67	11.79	7.08	4.22	43.92	8.02	1.77	2.62	1.68	2.49
	Informal	459	27.64	14.57	5.15	3.19	44.45	12.62	0.76	1.18	0.72	1.16
RECIFE	1981											
	Formal	2552	33.67	11.79	6.45	4.47	45.74	10.64	28.94	39.54	28.45	52.78
	Informal	530	26.38	14.22	3.99	3.42	45.61	13.13	9.57	8.24	9.02	10.21
	1983											
	Formal	2279	33.99	11.49	6.68	4.45	46.04	9.91	128.85	173.03	122.40	182.91
	Informal	690	27.62	13.51	4.00	3.46	46.96	13.84	43.24	38.37	39.51	40.52
	1985											
	Formal	2346	34.07	11.71	6.90	4.39	45.95	9.19	1372.97	1869.75	1315.60	2003.38
	Informal	702	26.13	12.06	4.36	3.26	47.12	13.16	477.57	733.76	423.18	692.05
	1987											
	Formal	1365	33.57	11.37	7.02	4.45	45.83	9.53	10.09	14.29	9.80	15.33
	Informal	414	25.35	12.69	4.27	3.14	44.49	12.41	3.13	2.84	3.01	3.73
	1989											
	Formal	1442	33.82	11.93	7.12	4.29	43.24	9.05	0.98	1.69	1.00	1.87
	Informal	407	26.34	13.50	4.56	3.48	43.45	12.83	0.35	0.62	0.43	2.04

(*) Variations in earnings figures are due to high inflation and to monetary reforms in the period

TABLE 4-02C

SAO PAULO and RECIFE: summary statistics for male self-employed. Formal and informal sectors. 1981/1989

REGIONS/YEARS/SEGMENTS		N.Obs	VARIABLES/STATISTICS Age		School (years)		W.Hours		Earnings(Cr$1,000)		StdEarnings(Cr$1,000)	
			MEAN	S.DEV	MEAN	S.DEV	MEAN	S.DEV	MEAN	S.DEV	MEAN	S.DEV
SAO PAULO	1981											
	Formal	604	40.56	11.51	5.58	4.16	52.04	16.13	49.97	54.17	47.24	90.92
	Informal	477	39.34	14.76	4.07	3.55	46.46	15.94	25.02	21.86	24.42	32.76
	1983											
	Formal	678	41.40	12.09	6.34	4.32	53.39	14.59	241.41	327.26	192.69	290.16
	Informal	513	38.58	14.96	4.24	3.53	48.71	15.54	106.03	123.45	92.50	116.14
	1985											
	Formal	635	42.19	11.71	6.57	4.62	52.87	16.57	2311.76	2745.68	1938.65	2375.97
	Informal	603	39.04	14.85	4.39	3.70	45.99	15.47	1231.97	1514.16	1169.57	2127.89
	1987											
	Formal	350	41.39	11.12	6.51	4.37	51.99	15.45	21.40	21.27	19.44	26.97
	Informal	325	40.74	14.66	4.85	3.66	47.99	15.47	11.95	13.35	10.61	12.63
	1989											
	Formal	348	42.31	11.44	6.61	4.63	50.99	14.68	3.04	3.80	2.54	3.09
	Informal	270	40.64	14.30	4.80	3.76	48.98	16.10	1.37	1.32	1.23	1.40
RECIFE	1981											
	Formal	253	43.36	12.08	5.07	4.40	50.75	16.21	34.05	39.83	30.07	47.74
	Informal	444	36.65	15.33	3.62	3.27	43.13	15.74	14.32	14.11	14.50	16.30
	1983											
	Formal	252	41.58	10.80	5.73	4.63	51.15	15.32	172.43	157.34	149.73	148.95
	Informal	605	37.27	15.26	3.78	3.57	46.32	15.69	74.39	96.55	70.62	109.43
	1985											
	Formal	199	42.87	12.26	6.30	4.46	52.63	14.47	1696.88	2149.86	1471.65	2040.79
	Informal	602	37.40	16.15	3.78	3.41	49.90	16.35	707.24	1260.67	639.63	1328.83
	1987											
	Formal	127	42.97	13.10	6.30	4.95	49.33	13.91	26.27	62.88	24.96	64.06
	Informal	343	37.01	15.30	3.93	3.51	45.08	15.42	6.63	10.59	5.79	8.54
	1989											
	Formal	125	42.50	11.80	6.75	4.89	48.82	15.29	1.80	2.40	1.56	2.05
	Informal	305	38.27	16.66	3.64	3.37	43.47	15.57	0.56	0.81	0.56	0.80

(*) Variations in earnings figures are due to high inflation and to monetary reforms in the period

TABLE 4-02D

SAO PAULO and RECIFE: summary statistics for male employers. Formal and informal sectors. 1981/1989

REGIONS/YEARS/SEGMENTS		N.Obs	VARIABLES/STATISTICS Age		School.(years)		W.Hours		Earnings(Cr$1,000)		StdEarnings(Cr$1,000)	
			MEAN	S.DEV	MEAN	S.DEV	MEAN	S.DEV	MEAN	S.DEV	MEAN	S.DEV
SAO PAULO	1981											
	Formal	385	42.19	11.12	8.36	4.71	56.05	15.27	103.14	98.52	85.21	115.64
	Informal	32	42.81	14.03	7.69	5.35	53.94	18.60	65.73	64.76	64.27	95.25
	1983											
	Formal	391	41.17	11.03	9.36	4.58	54.61	13.92	463.25	503.67	370.09	416.85
	Informal	24	42.36	13.01	7.08	4.36	49.68	14.53	236.71	204.25	229.07	255.86
	1985											
	Formal	362	41.95	11.66	10.03	4.74	54.43	14.22	4777.94	3999.15	3867.44	3733.35
	Informal	42	40.76	15.30	7.95	4.37	55.27	16.85	3997.10	5068.29	3361.40	4611.48
	1987											
	Formal	188	41.10	11.65	9.98	4.76	54.87	16.23	44.44	43.52	36.70	39.42
	Informal	23	49.65	15.02	9.52	4.01	45.00	14.90	46.09	34.04	59.46	74.60
	1989											
	Formal	195	41.94	11.58	9.30	4.44	51.21	14.76	6.27	7.02	5.62	7.55
	Informal	18	43.56	11.33	6.50	4.29	49.22	11.96	5.41	5.69	4.59	4.48
RECIFE	1981											
	Formal	120	42.21	10.75	9.90	4.71	47.08	12.21	113.46	105.22	102.28	92.73
	Informal	22	48.72	17.10	6.37	4.65	50.74	18.31	43.02	35.44	35.96	31.30
	1983											
	Formal	87	41.94	11.39	9.88	4.35	52.60	16.60	397.86	323.73	348.22	397.78
	Informal	23	48.12	18.58	5.94	4.64	48.07	11.49	281.10	323.03	224.27	191.50
	1985											
	Formal	91	40.04	10.74	9.40	5.16	49.90	13.40	4489.92	4802.98	3880.42	3942.21
	Informal	39	39.34	12.52	7.49	4.69	52.78	14.36	2456.15	2596.52	2090.31	2457.34
	1987											
	Formal	62	40.59	12.36	9.47	4.73	49.60	10.33	42.81	47.34	36.78	42.68
	Informal	18	38.33	6.99	6.50	4.15	51.50	17.50	18.80	21.05	19.13	30.05
	1989											
	Formal	73	41.75	12.58	9.70	4.65	47.62	12.38	6.73	12.68	5.90	11.40
	Informal	29	44.90	13.50	8.59	4.36	53.62	15.51	3.56	4.07	3.02	3.68

(*) Variations in earnings figures are due to high inflation and to monetary reforms in the period

APPENDIX TO CHAPTER V

TABLES APP-V.01, 5-01B, 5-02A and 5-03A

TABLE APP-V.01
SAO PAULO & RECIFE: statistics from regressions on standard earnings equations.
1981/1989, selected years. Male employees. Dependent variable: log(actual monthly earnings)

	SAO PAULO						RECIFE					
YEARS/ EQUATIONS	R sq	Intercept	School.	Exp	Expsq	N.obs	R sq	Intercept	School.	Exp	Expsq	N.obs
1981												
Formal	0.5164	8.27	0.1406	0.093	-0.0013	5501	0.5051	7.93	0.1424	0.073	-0.00091	2552
		(268.6)	(71.6)	(44.3)	(-33.7)			(163.6)	(50.0)	(22.6)	(-16.2)	
Informal	0.3694	7.89	0.1216	0.090	-0.0012	629	0.3106	7.39	0.1215	0.092	-0.00115	530
		(95.8)	(15.3)	(15.1)	(-12.7)			(73.6)	(12.3)	(12.4)	(-10.0)	
1983												
Formal	0.5349	9.57	0.1472	0.091	-0.0012	5514	0.4942	9.19	0.1451	0.084	-0.0010	2279
		(307.1)	(75.6)	(44.2)	(-32.4)			(165.3)	(45.7)	(22.7)	(-16.1)	
Informal	0.3401	9.48	0.0996	0.084	-0.0012	787	0.3125	9.03	0.1095	0.078	-0.0009	690
		(134.2)	(15.0)	(17.4)	(-14.7)			(110.1)	(14.1)	(13.5)	(-10.2)	
1985												
Formal	0.5136	11.89	0.1477	0.090	-0.0012	6013	0.4691	11.57	0.1431	0.082	-0.0010	2346
		(379.0)	(75.7)	(42.7)	(-31.8)			(205.0)	(43.6)	(22.1)	(-15.9)	
Informal	0.3747	11.45	0.1258	0.093	-0.0013	917	0.3631	10.91	0.1423	0.104	-0.0014	702
		(162.9)	(17.5)	(17.7)	(-13.5)			(117.0)	(15.8)	(14.6)	(-10.9)	
1987												
Formal	0.527	7.15	0.1421	0.087	-0.0012	3257	0.4704	6.77	0.1436	0.068	-0.0008	1365
		(180.0)	(56.3)	(32.5)	(-23.7)			(89.5)	(34.3)	(13.2)	(-8.5)	
Informal	0.3623	6.93	0.1092	0.091	-0.0013	425	0.3138	6.17	0.1126	0.105	-0.0014	414
		(69.6)	(10.6)	(12.3)	(-10.2)			(52.8)	(9.3)	(11.8)	(-9.7)	
1989												
Formal	0.4593	4.97	0.1489	0.077	-0.0010	2996	0.4556	4.45	0.1513	0.055	-0.0006	1442
		(105.7)	(47.6)	(24.3)	(-16.8)			(61.4)	(34.1)	(11.1)	(-6.5)	
Informal	0.3299	4.80	0.1221	0.078	-0.0011	459	0.3665	3.89	0.1451	0.079	-0.0010	407
		(48.2)	(11.6)	(11.1)	(-9.1)			(35.2)	(13.6)	(9.1)	(-6.8)	

SOURCE: BRASIL/PNAD. Magnetic tapes for public use.
NOTES:

Formal: contributors to social security
Informal: non-contributors to social security

TABLE 5-01B
SAO PAULO and RECIFE: Summary statistics of variables in pooled regressions across segments. Male employees. 1981/1989

		YEARS				
REGIONS/VARIABLES		1981	1983	1985	1987	1989
SAO PAULO						
Schooling	Mean	6.16	6.40	6.51	6.78	6.82
	S. Dev	4.21	4.22	4.21	4.24	4.15
Exp	Mean	20.71	20.58	20.10	20.21	20.18
	S. Dev	13.28	13.00	12.75	12.99	13.41
Exp sq	Mean	605.36	592.49	566.93	577.11	586.99
	S. Dev	723.44	708.37	672.44	695.44	725.55
Segment	Mean	0.89739	0.87528	0.86767	0.88457	0.86715
	S. Dev	0.30348	0.33044	0.33888	0.31958	0.33946
Segment*schooling	Mean	5.66514	5.81116	5.87246	6.20779	6.13689
	S. Dev	4.47010	4.56701	4.61086	4.62493	4.60894
Number of observations		6130	6301	6930	3682	3455
RECIFE						
Schooling	Mean	6.03	6.06	6.32	6.38	6.56
	S. Dev	4.40	4.39	4.29	4.34	4.26
Exp	Mean	21.39	21.45	20.93	20.28	20.62
	S. Dev	13.66	13.32	13.16	12.94	13.47
Exp sq	Mean	643.96	637.67	610.99	578.40	606.55
	S. Dev	776.58	752.31	728.94	719.93	755.76
Segment	Mean	0.82801	0.76769	0.76964	0.76727	0.77988
	S. Dev	0.37744	0.42237	0.42113	0.42269	0.41444
Segment*schooling	Mean	5.34429	5.12964	5.31181	5.38442	5.55431
	S. Dev	4.73899	4.81436	4.82585	4.89576	4.80287
Number of observations		3082	2969	3048	1779	1849

SOURCE: BRASIL/PNAD. Magnetic tapes for public use.
NOTE: segment = 1, formal; 0, informal

TABLE 5-02A

SAO PAULO: Summary statistics of all variables used in regressions (Chapter V)

Male employees. 1981/1989

VARIABLES		YEARS/SEGMENTS 1981		1983		1985		1987		1989	
		Formal	Informal	Formal	Informal	Formal	Informal	Formal	Informal	Formal	Informal
Schooling	Mean	6.31	4.79	6.64	4.76	6.77	4.83	7.02	4.98	7.08	5.15
	S. Dev	4.26	3.43	4.28	3.32	4.29	3.14	4.30	3.19	4.22	3.19
lnWKH	Mean	3.83194	3.79513	3.82053	3.81283	3.82891	3.78751	3.80204	3.75600	3.76676	3.74800
	S. Dev	0.22283	0.33936	0.18474	0.33112	0.19428	0.38974	0.21357	0.39985	0.17994	0.33033
lnY	Mean	10.18833	9.28250	11.59599	10.72560	13.87804	12.91288	9.13758	8.34165	6.94385	0.16960
	S. Dev	0.84729	0.76884	0.83238	0.69689	0.86011	0.73075	0.85860	0.78282	0.90476	0.82266
Exp	Mean	21.03	17.91	20.90	18.34	20.58	17.00	20.31	19.42	20.59	17.49
	S. Dev	12.97	15.44	12.72	14.65	12.44	14.22	12.54	16.03	13.06	15.28
Exp sq	Mean	610.66	559.01	598.46	550.62	578.51	491.00	569.75	633.49	594.37	538.83
	S. Dev	697.65	917.98	684.83	854.85	655.50	770.50	660.57	918.85	693.32	907.70
SECT2	Mean	0.06489	0.16854	0.06895	0.19581	0.05571	0.14938	0.05557	0.17177	0.04473	0.13723
	S. Dev	0.24636	0.37464	0.25339	0.39708	0.22939	0.35666	0.22913	0.37763	0.20675	0.34450
SECT3	Mean	0.09489	0.22729	0.10403	0.18415	0.09645	0.23884	0.11790	0.21412	0.11014	0.18517
	S. Dev	0.29308	0.41941	0.30533	0.38786	0.29795	0.42661	0.32254	0.41069	0.31312	0.38886
SECT4	Mean	0.13107	0.30364	0.13361	0.32281	0.14967	0.29117	0.14092	0.31529	0.16388	0.34858
	S. Dev	0.33750	0.46020	0.34026	0.46785	0.35678	0.45455	0.34800	0.46518	0.37023	0.47704
SECT5	Mean	0.05799	0.02704	0.06225	0.04576	0.05804	0.03816	0.05926	0.02353	0.06442	0.04793
	S. Dev	0.23375	0.16233	0.24163	0.20909	0.23384	0.19169	0.23614	0.15176	0.24554	0.21386
SECT6	Mean	0.06091	0.01908	0.07991	0.01906	0.08232	0.02180	0.06233	0.03058	0.06409	0.01961
	S. Dev	0.23918	0.13690	0.27118	0.13683	0.27487	0.14612	0.24179	0.17239	0.24495	0.13880
SECT7	Mean	0.09525		0.10195		0.09713		0.09119		0.08645	
	S. Dev	0.29359		0.30261		0.29615		0.28792		0.28107	
POSH	Mean	0.65166	0.35458	0.68411	0.40865	0.67888	0.35765	0.64661	0.40941	0.62917	0.34423
	S. Dev	0.47649	0.47877	0.46491	0.49190	0.46695	0.47957	0.47810	0.49231	0.48311	0.47563
SECDY	Mean	0.13651	0.12405	0.11252	0.08893	0.52639	0.08505	0.48204	0.14589	0.37850	0.10022
	S. Dev	0.34336	0.32990	0.31603	0.28483	0.49934	0.27911	0.49975	0.35341	0.48509	0.30062
Sch. sq	Mean	58.03	34.70	62.41	33.70	64.24	33.20	67.74	34.94	67.95	36.67
	S. Dev	68.38	46.61	70.19	44.12	70.50	40.07	71.65	42.68	70.44	41.15
School_exp	Mean	108.77	66.58	113.16	67.19	114.02	66.38	119.19	80.65	121.11	74.32
	S. Dev	96.53	78.62	94.34	71.15	92.51	73.61	98.97	89.15	98.36	83.28

SOURCE: BRASIL/PNAD. Magnetic tapes for public use.

NOTE:(Variables definitions) - lnWKH=log(weekly hours worked); lnY=log(hours-worked-standardised earnings);SECT2(Construction), SECT3(Commerce), SECT4(Services), SECT5(Transports), SECT6(Finance), SECT7(Public Sector) - Manufacturing as basic variable

POSH=head of household dummy; SECDY=dummy for second income source; School_ex=interaction variable schooling*experience

TABLE 5-03A
RECIFE: Summary statistics of all variables used in regressions (Chapter V)
Male employees. 1981/1989

VARIABLES		YEARS/SEGMENTS 1981		1983		1985		1987		1989	
		Formal	Informal	Formal	Informal	Formal	Informal	Formal	Informal	Formal	Informal
Schooling	Mean	6.45	3.99	6.68	4.00	6.90	4.36	7.02	4.27	7.12	4.56
	S. Dev	4.47	3.42	4.45	3.46	4.39	3.26	4.45	3.14	4.29	3.48
lnWKH	Mean	3.79596	3.76386	3.80640	3.79507	3.80636	3.80194	3.80181	3.74391	3.74436	3.70871
	S. Dev	0.23973	0.38517	0.22193	0.36205	0.21402	0.35556	0.22348	0.35343	0.21840	0.41894
lnY	Mean	9.75231	8.79157	11.21330	10.28919	13.57092	12.54438	8.64784	7.66082	6.29007	5.38790
	S. Dev	0.87309	0.78729	0.89287	0.75417	0.90960	0.85318	0.92296	0.80510	0.95254	0.89254
Exp	Mean	22.21	17.39	22.31	18.62	22.17	16.78	21.55	16.08	21.70	16.78
	S. Dev	13.17	15.20	12.82	14.52	13.02	12.75	12.48	13.53	13.02	14.33
Exp sq	Mean	667.04	532.86	662.00	557.28	661.01	443.86	620.07	441.03	640.49	486.31
	S. Dev	733.59	949.88	705.02	886.75	733.36	688.59	684.08	805.44	724.80	846.56
SECT2	Mean	0.13754	0.19623	0.09741	0.24935	0.09804	0.19511	0.06959	0.19566	0.08599	0.20147
	S. Dev	0.34448	0.39752	0.29658	0.43295	0.29744	0.39657	0.25455	0.39719	0.28045	0.40159
SECT3	Mean	0.11127	0.21897	0.13518	0.19850	0.13597	0.20940	0.14067	0.25359	0.12690	0.23343
	S. Dev	0.31453	0.41394	0.34199	0.39916	0.34284	0.40717	0.34781	0.43559	0.33298	0.42353
SECT4	Mean	0.14187	0.32829	0.14656	0.31859	0.16069	0.34477	0.14872	0.30915	0.19764	0.33170
	S. Dev	0.34899	0.47003	0.35374	0.46521	0.36732	0.47563	0.35594	0.46270	0.39836	0.47140
SECT5	Mean	0.06229	0.06030	0.06320	0.08117	0.06563	0.06692	0.06815	0.06523	0.05964	0.06633
	S. Dev	0.24173	0.23827	0.24337	0.27329	0.24768	0.25006	0.25209	0.24723	0.23690	0.24917
SECT6	Mean	0.05014	0.02078	0.05266	0.00724	0.03922	0.01140	0.04541	0.01450	0.04854	0.00983
	S. Dev	0.21828	0.14279	0.22340	0.08487	0.19417	0.10622	0.20828	0.11970	0.21499	0.09877
SECT7	Mean	0.22923		0.25398		0.23872		0.26667		0.21914	
	S. Dev	0.42042		0.43538		0.42639		0.44238		0.41381	
POSH	Mean	0.66855	0.30763	0.71222	0.35844	0.71364	0.32337	0.66444	0.28985	0.63938	0.28012
	S. Dev	0.47083	0.46195	0.45283	0.47989	0.45215	0.46810	0.47236	0.45424	0.48035	0.44961
SECDY	Mean	0.06661	0.07174	0.04830	0.06834	0.44335	0.04277	0.39782	0.06521	0.31761	0.07126
	S. Dev	0.24940	0.25830	0.21444	0.25251	0.49689	0.20247	0.48963	0.24720	0.46571	0.25757
Sch. sq	Mean	61.61	27.63	64.46	27.97	66.91	29.64	69.00	28.05	69.12	32.87
	S. Dev	70.19	38.14	70.49	41.85	70.62	37.65	71.60	37.97	69.28	44.45
School_exp	Mean	116.30	49.17	123.04	54.26	127.11	59.26	128.10	52.83	131.66	58.93
	S. Dev	105.38	65.81	108.83	68.51	107.15	69.95	111.55	63.66	112.33	78.13

SOURCE: BRASIL/PNAD. Magnetic tapes for public use.
NOTE: For variable definitions, see note on Table 5-01A

APPENDIX TO CHAPTER VI

TABLES: 6-01A, 6-02A, 6-03A, 6-04A
6-08B, 6-08C, 6.09B, 6.09C
APP-VI.01, APP-VI.02, APP-VI.03
APP-VI.04, APP-VI.05, APP-VI.06
APP-VI.07, APP-VI.08, APP-VI.09

TABLE 6-01A
SAO PAULO: Summary statistics of variables used in regressions (Chapter VI)
Female employees. 1981/1989

VARIABLES		YEARS/SEGMENTS 1981		1983		1985		1987		1989	
		Formal	Informal	Formal	Informal	Formal	Informal	Formal	Informal	Formal	Informal
Schooling	Mean	7.51	4.12	7.72	4.22	8.05	4.47	8.09	4.97	8.20	4.57
	S. Dev	4.45	3.15	4.44	3.11	4.44	3.37	4.47	3.38	4.42	3.40
lnY	Mean	9.87173	8.95627	11.25519	10.36293	13.58058	12.57509	8.85168	8.18562	6.64844	5.93331
	S. Dev	0.76822	0.68116	0.76863	0.69481	0.82964	0.77334	0.77210	0.74302	0.85879	0.83738
Exp	Mean	17.06	18.63	17.62	18.68	17.25	18.36	17.40	20.29	17.64	21.02
	S. Dev	12.01	14.02	12.53	13.30	12.03	13.40	12.49	14.57	12.51	14.24
Exp sq	Mean	435.17	543.38	467.55	525.58	442.23	516.49	458.84	623.60	467.59	643.92
	S. Dev	576.16	754.45	603.62	713.34	573.71	704.20	622.21	794.67	606.83	763.35
SECT2	Mean	0.01151		0.00616	0.00237	0.00693	0.00396	0.00779		0.00465	0.00505
	S. Dev	0.10668		0.07827	0.04870	0.08296	0.06280	0.08794		0.06802	0.07096
SECT3	Mean	0.08950	0.07661	0.09622	0.07124	0.09604	0.07717	0.10184	0.11014	0.09640	0.09343
	S. Dev	0.28551	0.26615	0.29494	0.25738	0.29470	0.26699	0.30252	0.31341	0.29522	0.29141
SECT4	Mean	0.27145	0.75457	0.30587	0.81235	0.28210	0.75668	0.30550	0.75110	0.29210	0.70455
	S. Dev	0.44479	0.43065	0.46853	0.39066	0.45009	0.42930	0.46075	0.43285	0.45486	0.45682
SECT5	Mean	0.01560	0.00284	0.01027	0.00357	0.01197	0.00297	0.01224	0.00881	0.01394	0.00253
	S. Dev	0.12393	0.05324	0.10085	0.05965	0.10875	0.05441	0.11000	0.09355	0.11727	0.05027
SECT6	Mean	0.08466	0.01702	0.08489	0.00950	0.10706	0.01087	0.07791	0.01102	0.08653	0.02272
	S. Dev	0.27843	0.12943	0.27876	0.09704	0.30924	0.10376	0.26811	0.10450	0.28122	0.14921
SECT7	Mean	0.16672		0.17163		0.17975		0.16194		0.18932	
	S. Dev	0.37279		0.37713		0.38404		0.36850		0.39187	
POSH	Mean	0.12812	0.11491	0.15114	0.09859	0.14671	0.11177	0.14079	0.15859	0.16202	0.13890
	S. Dev	0.33428	0.31914	0.35825	0.29829	0.35387	0.31523	0.34790	0.36570	0.36857	0.34628
SECDY	Mean	0.11215	0.08228	0.08083	0.07112	0.35320	0.08902	0.33000	0.12996	0.21080	0.10354
	S. Dev	0.31560	0.27498	0.27263	0.25718	0.47804	0.28491	0.47035	0.33663	0.40800	0.30505
Number of Obs		2693	705	2920	842	3176	1011	1797	454	1722	396

SOURCE: BRASIL/PNAD. Magnetic tapes for public use.

TABLE 6-02A
RECIFE: Summary statistics of variables used in regressions (Chapter VI)
Female employees. 1981/1989

VARIABLES		YEARS/SEGMENTS 1981		1983		1985		1987		1989	
		Formal	Informal	Formal	Informal	Formal	Informal	Formal	Informal	Formal	Informal
Schooling	Mean	8.48	3.35	8.59	3.55	9.29	4.11	9.07	3.92	9.15	4.32
	S. Dev	4.70	3.39	4.75	3.48	4.53	3.48	4.60	3.56	4.56	3.72
lnY	Mean	9.54422	8.11291	11.02064	9.59047	13.45579	11.52601	8.52168	7.15128	6.16368	4.81643
	S. Dev	0.86210	0.79707	0.92280	0.80265	0.99550	0.93709	0.95274	0.84561	0.96439	0.90766
Exp	Mean	18.36	17.54	19.08	18.48	18.49	18.15	20.09	17.53	19.20	19.63
	S. Dev	11.75	12.94	12.63	12.87	12.17	13.23	12.06	13.01	12.22	14.03
Exp sq	Mean	475.18	474.86	523.53	506.97	489.62	503.99	548.63	476.15	517.94	581.79
	S. Dev	563.24	708.85	644.41	684.85	622.19	736.03	618.16	714.84	606.75	809.19
SECT2	Mean	0.01027	0.00156	0.00703	0.00352	0.00363	0.00512	0.00822	0.01033	0.00693	0.00588
	S. Dev	0.10084	0.03952	0.08361	0.05924	0.06020	0.07144	0.09035	0.10123	0.08299	0.07659
SECT3	Mean	0.11711	0.05462	0.13068	0.07395	0.13906	0.07180	0.10942	0.06200	0.16067	0.09413
	S. Dev	0.32168	0.22742	0.33719	0.26191	0.34617	0.25838	0.31238	0.24146	0.36748	0.29243
SECT4	Mean	0.31883	0.91108	0.30852	0.87675	0.28001	0.86501	0.32971	0.85795	0.33241	0.83234
	S. Dev	0.46622	0.28485	0.46208	0.32901	0.44921	0.34200	0.47043	0.34956	0.47140	0.37412
SECT5	Mean	0.02138	0.00156	0.00964	0.00177	0.00819	0.00341	0.01504		0.00831	
	S. Dev	0.14470	0.03952	0.09774	0.04202	0.09104	0.05834	0.12181		0.09085	
SECT6	Mean	0.05725	0.00312	0.05877	0.00705	0.05001	0.00855	0.03693	0.01808	0.03601	0.01177
	S. Dev	0.23242	0.05584	0.23529	0.08373	0.21806	0.09213	0.18871	0.13340	0.18644	0.10799
SECT7	Mean	0.32221		0.34426		0.38455		0.36665		0.31440	
	S. Dev	0.46752		0.47533		0.48671		0.48222		0.46460	
POSH	Mean	0.16155	0.09678	0.16115	0.13033	0.15730	0.12134	0.18199	0.10074	0.16344	0.13236
	S. Dev	0.36819	0.29589	0.36783	0.33696	0.36425	0.32680	0.38610	0.30137	0.37002	0.33939
SECDY	Mean	0.09317	0.05305	0.06223	0.05987	0.30544	0.05979	0.31190	0.07750	0.27839	0.10882
	S. Dev	0.29080	0.22430	0.24168	0.23745	0.46080	0.23730	0.46359	0.26773	0.44852	0.31187
Number of Obs		1170	641	1141	568	1100	585	731	387	722	340

SOURCE: BRASIL/PNAD. Magnetic tapes for public use.

TABLE 6-03A
SAO PAULO: Summary statistics of variables used in regressions (Chapter VI)
Male self-employed. 1981/1989

VARIABLES		YEARS/SEGMENTS 1981		1983		1985		1987		1989	
		Formal	Informal	Formal	Informal	Formal	Informal	Formal	Informal	Formal	Informal
Schooling	Mean	5.58	4.07	6.34	4.24	6.57	4.39	6.51	4.85	6.61	4.80
	S. Dev	4.16	3.55	4.32	3.53	4.62	3.70	4.37	3.66	4.63	3.76
lnY	Mean	10.31958	9.78068	11.80909	11.10103	14.06725	13.48482	9.46555	8.94367	7.34423	6.75593
	S. Dev	0.80552	0.75819	0.78421	0.75763	0.88026	0.92978	0.83379	0.76817	0.97766	0.82922
Exp	Mean	29.98	30.27	30.06	29.34	30.62	29.66	29.88	30.89	30.70	30.84
	S. Dev	12.78	15.45	13.88	15.80	13.38	15.53	12.80	16.08	13.38	15.49
Exp sq	Mean	1061.85	1154.56	1095.96	1110.17	1116.58	1120.21	1056.03	1211.92	1120.74	1190.21
	S. Dev	823.67	1036.39	890.83	1088.19	881.45	1016.60	803.40	1088.84	904.76	1103.35
SECT2	Mean	0.16723	0.35427	0.11499	0.35496	0.12601	0.28359	0.15428	0.34461	0.13793	0.31111
	S. Dev	0.37349	0.47879	0.31924	0.47897	0.33212	0.45112	0.36173	0.47597	0.34353	0.46381
SECT3	Mean	0.25827	0.21380	0.22851	0.20839	0.25356	0.28524	0.24857	0.19077	0.22703	0.20001
	S. Dev	0.43805	0.41042	0.42019	0.40655	0.43539	0.4519	0.43280	0.39351	0.41951	0.40075
SECT4	Mean	0.38246	0.29563	0.43666	0.29237	0.45036	0.31011	0.42286	0.32000	0.44827	0.35924
	S. Dev	0.48639	0.45680	0.49634	0.45530	0.49792	0.46292	0.49472	0.46720	0.49803	0.48067
SECT5	Mean	0.12085	0.07969	0.16379	0.06634	0.09134	0.06135	0.10572	0.09539	0.13217	0.05185
	S. Dev	0.32622	0.27109	0.37036	0.24911	0.28832	0.24017	0.30792	0.29421	0.33917	0.22213
SECT6	Mean	0.02815	0.01469	0.01917	0.01952	0.03149	0.00995	0.01714	0.00923	0.01437	0.01111
	S. Dev	0.16554	0.12042	0.13722	0.13848	0.17478	0.09936	0.12998	0.09577	0.11917	0.10501
SECT7	Mean	0.00331									
	S. Dev	0.05747									
POSH	Mean	0.87584	0.73376	0.88359	0.75669	0.85352	0.74791	0.86857	0.75692	0.88507	0.76295
	S. Dev	0.33004	0.44246	0.32096	0.42950	0.35387	0.43457	0.33835	0.42960	0.31940	0.42606
SECDY	Mean	0.21029	0.18872	0.19316	0.14016	0.25037	0.17245	0.19143	0.23691	0.20115	0.14815
	S. Dev	0.40785	0.39169	0.39507	0.34749	0.43357	0.37809	0.39399	0.42585	0.40143	0.35591
Number of Obs		604	477	678	513	635	603	350	325	348	270

SOURCE: BRASIL/PNAD. Magnetic tapes for public use.

TABLE 6-04A
RECIFE: Summary statistics of variables used in regressions (Chapter VI)
Male self-employed. 1981/1989

VARIABLES		YEARS/SEGMENTS 1981		1983		1985		1987		1989	
		Formal	Informal	Formal	Informal	Formal	Informal	Formal	Informal	Formal	Informal
Schooling	Mean	5.07	3.62	5.73	3.78	6.30	3.78	6.30	3.93	6.75	3.64
	S. Dev	4.40	3.27	4.63	3.57	4.46	3.41	4.95	3.51	4.89	3.37
lnY	Mean	9.85148	9.22409	11.51155	10.70771	13.61094	12.76025	9.08757	8.19463	6.73708	5.77518
	S. Dev	0.89044	0.84256	0.90140	0.88295	1.04161	1.00401	1.23412	0.93336	1.10283	1.03980
Exp	Mean	33.28	28.03	30.85	28.49	31.57	28.61	31.67	28.09	30.74	29.63
	S. Dev	13.35	16.32	12.36	16.34	13.94	17.16	14.72	16.43	13.55	11.76
Exp sq	Mean	1285.16	1051.30	1103.88	1078.12	1190.17	1112.45	1217.67	1058.10	1127.31	1192.45
	S. Dev	945.16	1098.31	790.84	1092.23	972.77	1146.99	996.42	1068.74	936.01	1224.55
SECT2	Mean	0.09481	0.22516	0.07146	0.17033	0.07039	0.14282	0.11021	0.20407	0.10400	0.19018
	S. Dev	0.29353	0.41816	0.25811	0.37624	0.25644	0.35018	0.31439	0.40361	0.30649	0.39309
SECT3	Mean	0.37149	0.36258	0.48406	0.40830	0.41215	0.36883	0.40941	0.38486	0.36798	0.35411
	S. Dev	0.48416	0.48129	0.50074	0.49193	0.49346	0.48289	0.49367	0.48727	0.48420	0.47903
SECT4	Mean	0.31626	0.25443	0.28957	0.30576	0.38184	0.31893	0.34657	0.27989	0.39201	0.35735
	S. Dev	0.46594	0.43603	0.45446	0.46111	0.48706	0.46645	0.47776	0.44960	0.49016	0.48001
SECT5	Mean	0.15417	0.07895	0.11118	0.07102	0.08034	0.13620	0.07086	0.06997	0.08800	0.06886
	S. Dev	0.36183	0.26997	0.31498	0.25707	0.27251	0.34328	0.25761	0.25547	0.28444	0.25363
SECT6	Mean	0.02377	0.01128	0.01993	0.01323	0.00502	0.01162	0.01574	0.01457	0.00800	
	S. Dev	0.15263	0.10573	0.14005	0.11435	0.07086	0.10725	0.12496	0.11999	0.08944	
SECT7	Mean					0.00502					
	S. Dev					0.07086					
POSH	Mean	0.88924	0.67572	0.90467	0.72428	0.89455	0.68609	0.92337	0.67926	0.92000	0.67868
	S. Dev	0.31446	0.46863	0.29423	0.44725	0.30791	0.46445	0.28241	0.46744	0.27239	0.46775
SECDY	Mean	0.18984	0.12840	0.09919	0.14082	0.17605	0.13457	0.14955	0.11369	0.19197	0.14427
	S. Dev	0.39295	0.33491	0.29951	0.34812	0.38183	0.34154	0.35804	0.31789	0.39544	0.35194
Number of Obs		253	444	252	605	199	602	127	343	125	305

SOURCE: BRASIL/PNAD. Magnetic tapes for public use.

TABLE 6-08B
SAO PAULO: Estimates from the hours worked equations corrected for segmentation and unemployment biases. Formal and informal labour markets. Male employees.
Conditions for identification: Procedure I
1981/1989, selected years

YEARS/ SEGMENTS	R sq	Interc.	Wage	Education	EX	EXSQ	SECDY	L1	L3	N.Obs
					EQUATIONS					
1981										
Formal	0.1002	3.02	0.1056	-0.0303	-0.0020	-0.0000	-0.0403	0.1519	-0.3373	5501
		(11.8)	(3.6)	(-7.5)	(-0.9)	(-0.4)	(-3.7)	(4.7)	(-5.6)	
Informal	0.0837	4.42	-0.0948	-0.0046	0.0213	-0.0003	-0.0707	0.0648	0.0292	629
		(2.4)	(-0.4)	(-0.1)	(1.2)	(-1.6)	(-1.4)	(1.1)	(0.1)	
1983										
Formal	0.1208	2.73	0.1023	-0.0219	0.0036	-0.0001	-0.0486	0.2856	-0.1557	5514
		(8.7)	(3.3)	(-5.3)	(1.8)	(-3.3)	(-4.5)	(8.1)	(-3.6)	
Informal	0.0827	4.26	-0.0499	-0.0080	0.0201	-0.0003	-0.0376	-0.0268	-0.0838	787
		(2.0)	(-0.2)	(-0.4)	(1.8)	(-2.2)	(-0.7)	(-0.4)	(-0.3)	
1985										
Formal	0.1198	3.49	0.0338	-0.0190	0.0065	-0.0001	-0.0567	0.1487	-0.6071	6013
		(11.7)	(1.3)	(-4.8)	(3.7)	(-5.9)	(-3.2)	(6.4)	(-5.0)	
Informal	0.0727	8.71	-0.4676	0.0570	0.0502	-0.0006	-0.3203	0.1613	0.7541	917
		(3.3)	(-2.0)	(2.3)	(3.3)	(-3.1)	(-4.1)	(2.8)	(2.6)	
1987										
Formal	0.0855	3.63	0.0163	-0.0122	0.0049	-0.0001	0.0573	0.1468	0.1174	3257
		(8.6)	(0.3)	(-1.4)	(1.3)	(-2.1)	(2.5)	(3.3)	(0.9)	
Informal	0.1143	1.24	0.3218	-0.0607	0.0044	-0.0001	-0.0281	0.0784	0.1545	425
		(0.6)	(1.0)	(-1.8)	(0.3)	(-0.6)	(-0.2)	(0.7)	(0.3)	
1989										
Formal	0.0568	4.28	-0.1107	0.0121	0.0144	-0.0002	0.0138	0.1382	-0.4280	2996
		(14.0)	(-2.0)	(1.7)	(4.6)	(-5.1)	(0.9)	(3.8)	(-2.0)	
Informal	0.0856	3.98	-0.0491	0.0114	0.0275	-0.0004	-0.1774	-0.1105	-0.5947	459
		(4.2)	(-0.2)	(0.5)	(2.5)	(-3.0)	(-2.5)	(-1.4)	(-2.1)	

Basic Data SOURCE: BRASIL/PNAD. Magnetic tapes.
NOTE: As explained in the text, WAGE is the predicted values of lnY in the wage equations. The other variables defined as before (see notes to previous tables in this Chapter)
T-statistics in brackets.

TABLE 6-08C

SAO PAULO: Estimates from the hours worked equations corrected for segmentation and unemployment biases. Formal and informal labour markets. Male employees. Conditions for identification: Procedure II

1981/1989, selected years

YEARS/ SEGMENTS	R sq	EQUATIONS Interc.	Wage	Education	EX	EXSQ	SECDY	L1	L3	N.Obs
1981										
Formal	0.1014	2.72	0.1400	-0.0348	-0.0043	0.0000	-0.0478	0.1773	-0.3245	5501
		(10.1)	(4.5)	(-8.2)	(-1.9)	(0.5)	(-4.3)	(5.3)	(-5.4)	
Informal	0.0860	-2.07	0.7818	-0.1237	-0.0386	0.0004	-0.0945	-0.0529	-0.9408	629
		(-0.5)	(1.3)	(-1.5)	(-0.9)	(0.7)	(-1.8)	(-0.6)	(-1.3)	
1983										
Formal	0.1249	1.75	0.1996	-0.0346	-0.0023	-0.0000	-0.0716	0.3736	-0.1421	5514
		(5.3)	(6.0)	(-7.9)	(-1.1)	(-0.6)	(-6.5)	(10.2)	(-3.3)	
Informal	0.0828	7.20	-0.3549	0.0197	0.0343	-0.0005	-0.0322	0.0392	-0.2575	787
		(0.7)	(-0.3)	(0.2)	(0.7)	(-0.8)	(-0.6)	(0.2)	(-0.4)	
1985										
Formal	0.1227	2.35	0.1306	-0.0339	0.0005	-0.0001	-0.0810	0.1998	-0.7299	6013
		(7.1)	(4.7)	(-7.7)	(0.3)	(-2.7)	(-4.6)	(8.3)	(-6.0)	
Informal	0.0790	-2.47	0.4973	-0.0454	-0.0104	0.0002	-0.2507	0.0381	0.7899	917
		(-1.4)	(3.2)	(-2.6)	(-1.0)	(1.1)	(-3.3)	(0.7)	(2.7)	
1987										
Formal	0.0918	1.89	0.2565	-0.0469	-0.0093	0.0001	0.0012	0.2756	-0.0704	3257
		(4.9)	(4.8)	(-6.0)	(-2.7)	(1.6)	(0.06)	(6.5)	(-0.6)	
Informal	0.1136	1.33	0.3086	-0.0594	0.0051	-0.0001	-0.0319	0.0817	0.1429	425
		(0.5)	(0.9)	(-1.6)	(0.3)	(-0.5)	(-0.2)	(0.7)	(0.3)	
1989										
Formal	0.0592	1.96	0.3022	-0.0422	-0.0082	0.0001	0.0620	0.3215	0.6100	2996
		(3.9)	(3.4)	(-3.6)	(-1.7)	(1.2)	(3.7)	(6.7)	(2.2)	
Informal	0.0856	3.46	0.0582	0.0002	0.0220	-0.0004	-0.1629	-0.1347	-0.5475	459
		(2.9)	(0.2)	(0.008)	(1.6)	(-2.1)	(-2.2)	(-1.6)	(-1.8)	

Basic Data SOURCE: BRASIL/PNAD. Magnetic tapes.

NOTE: As explained in the text, WAGE is the predicted values of lnY in the wage equations. The other variables defined as before (see notes to previous tables in this Chapter)

T-statistics in brackets.

TABLE 6-09B

RECIFE: Estimates from the hours worked equations corrected for segmentation and unemployment biases. Formal and Informal labour markets. Male employees.

Conditions for Identification: Procedure I.

1981/1989, selected years

YEARS/ SEGMENTS	R sq	EQUATIONS Interc.	Wage	Education	EX	EXSQ	SECDY	L1 (L2)	L3 (L4)	N.Obs
1981										
Formal	0.1041	4.93	-0.1373	0.0057	0.0150	-0.0002	0.0142	0.1274	-0.2446	2552
		(16.4)	(-3.8)	(1.1)	(5.5)	(-5.9)	(0.6)	(3.5)	(-2.6)	
Informal	0.0792	5.09	-0.1904	-0.0174	0.0030	0.0000	-0.0467	0.2457	0.4187	530
		(4.5)	(-1.2)	(-1.1)	(0.3)	(0.1)	(-0.6)	(3.0)	(1.3)	
1983										
Formal	0.1164	4.28	-0.0436	-0.0084	0.0078	-0.0001	-0.0296	0.1132	-0.2085	2279
		(11.1)	(-1.1)	(-1.3)	(2.3)	(-3.3)	(-1.2)	(3.4)	(-3.1)	
Informal	0.0821	4.44	-0.0851	-0.0259	0.0042	-0.0000	-0.0546	0.2125	0.3418	690
		(1.5)	(-0.3)	(-1.0)	(0.3)	(-0.2)	(-0.7)	(1.6)	(0.8)	
1985										
Formal	0.1848	5.45	-0.1338	0.0026	0.0151	-0.0002	-0.0011	0.0876	-0.4928	2346
		(15.0)	(-4.3)	(0.5)	(5.7)	(-6.8)	(-0.1)	(3.4)	(-3.3)	
Informal	0.0724	1.98	0.1140	-0.0388	0.0103	-0.0001	-0.2880	0.1840	1.9647	702
		(1.9)	(1.3)	(-2.5)	(1.5)	(-0.7)	(-2.2)	(2.1)	(2.2)	
1987										
Formal	0.1291	5.76	-0.2908	0.0313	0.0219	-0.0003	0.0415	-0.0194	0.2293	1365
		(13.8)	(-4.8)	(3.3)	(5.4)	(-5.5)	(2.0)	(-0.5)	(1.9)	
Informal	0.0786	3.23	0.0445	0.0015	0.0298	-0.0004	0.0208	-0.1457	0.0286	414
		(4.2)	(0.4)	(0.1)	(2.8)	(-2.7)	(0.1)	(-1.7)	(0.1)	
1989										
Formal	0.0917	4.63	-0.1735	0.0126	0.0096	-0.0001	0.0114	0.0004	-0.0759	1442
		(25.7)	(-4.7)	(2.2)	(3.9)	(-3.8)	(0.7)	(0.01)	(-0.6)	
Informal	0.0268	3.78	-0.0643	0.0139	0.0221	-0.0003	-0.1814	-0.0498	0.3386	407
		(2.5)	(-0.2)	(0.3)	(1.9)	(-2.1)	(-1.5)	(-0.3)	(0.6)	

Basic Data SOURCE: BRASIL/PNAD. Magnetic tapes.

NOTE: As explained in the text, HEAD is the predicted values of lnY in the wage equations. The other variables defined as before (see notes to previous tables in this Chapter).

T-statistics in brackets.

TABLE 6-09C

RECIFE: Estimates from the hours worked equations corrected for segmentation and unemployment biases. Formal and Informal labour markets. Male employees.

Conditions for Identification: Procedure II

1981/1989, selected years

YEARS/ SEGMENTS	R sq	Interc.	Wage	Education	EQUATIONS EX	EXSQ	SECDY	L1 (L2)	L3 (L4)	N.Obs
1981										
Formal	0.1048	1.63	0.2654	-0.0504	-0.0091	0.0001	-0.1349	0.0627	0.2935	2552
		(3.0)	(4.0)	(-5.4)	(-2.1)	(1.5)	(-4.3)	(1.7)	(2.5)	
Informal	0.0766	3.98	-0.0389	-0.0300	-0.0029	0.0001	-0.0619	0.1920	0.2358	530
		(4.4)	(-0.3)	(-2.1)	(-0.3)	(0.7)	(-0.8)	(2.5)	(0.8)	
1983										
Formal	0.1189	2.73	0.1220	-0.0327	-0.0041	-0.0000	-0.0803	0.1352	-0.1382	2279
		(6.7)	(2.8)	(-4.9)	(-1.2)	(-0.02)	(-3.1)	(4.0)	(-2.0)	
Informal	0.0823	2.28	0.1585	-0.0440	-0.0044	0.0000	-0.0843	0.1210	0.0608	690
		(0.7)	(0.4)	(-1.6)	(-0.3)	(0.3)	(-1.0)	(0.8)	(0.1)	
1985										
Formal	0.1805	2.71	0.1003	-0.0336	-0.0021	-0.0000	0.0365	0.1195	-0.1577	2346
		(5.7)	(2.5)	(-5.3)	(-0.6)	(-0.8)	(1.9)	(4.6)	(-1.0)	
Informal	0.0719	1.27	0.1758	-0.0456	0.0067	-0.0000	-0.2712	0.1621	2.0593	702
		(0.7)	(1.1)	(-2.2)	(0.7)	(-0.2)	(-2.0)	(1.6)	(2.3)	
1987										
Formal	0.1182	2.54	0.1810	-0.0399	-0.0049	-0.0000	0.0685	0.0860	0.2883	1365
		(4.9)	(2.4)	(-3.5)	(-1.0)	(-0.007)	(3.2)	(2.1)	(2.3)	
Informal	0.0787	4.77	-0.1937	0.0184	0.0404	-0.0006	-0.0774	-0.0556	0.1698	414
		(1.7)	(-0.4)	(0.6)	(1.9)	(-2.1)	(-0.3)	(-0.3)	(0.4)	
1989										
Formal	0.0803	3.14	0.1406	-0.0341	-0.0033	-0.0000	0.0260	0.1121	0.0830	1442
		(9.5)	(2.0)	(-3.3)	(-1.0)	(-0.6)	(1.6)	(2.7)	(0.7)	
Informal	0.0270	2.50	0.2517	-0.0188	0.0152	-0.0003	-0.1457	-0.1971	0.0796	407
		(0.7)	(0.3)	(-0.2)	(0.7)	(-1.7)	(-1.0)	(-0.5)	(0.1)	

Basic Data SOURCE: BRASIL/PNAD. Magnetic tapes.

NOTE: As explained in the text, HEAD is the predicted values of lnY in the wage equations. The other variables defined as before (see notes to previous tables in this Chapter). T-statistics in brackets.

TABLE APP-VI.01
SAO PAULO and RECIFE: Estimates from probit equations for segmentation
Education as a continuous variable. Male employees
1981/1989, selected years

YEARS/ REGIONS	Interc.	School.	EX	EXSQ	EQUATIONS CONSTR	COMSERV	TrpFinPS	POSH	SECDY	N.Obs
1981										
Sao Paulo	0.227	0.079	0.071	-0.0011	-0.832	-0.717	0.301	0.364	-0.195	6130
	(2.19)	(9.76)	(9.32)	(-9.39)	(-10.48)	(-13.02)	(3.31)	(5.32)	(-2.47)	
Recife	-1.260	0.164	0.121	-0.0016	-0.329	-0.621	0.299	0.408	-0.598	3082
	(-8.34)	(14.44)	(11.82)	(-10.57)	(-3.37)	(-7.62)	(2.82)	(4.81)	(-4.26)	
1983										
Sao Paulo	0.006	0.097	0.061	-0.0009	-0.894	-0.706	0.226	0.430	-0.111	6301
	(0.06)	(12.37)	(8.44)	(-8.04)	(-12.18)	(-13.36)	(2.90)	(6.74)	(-1.35)	
Recife	-1.007	0.144	0.081	-0.0011	-0.843	-0.629	0.262	0.666	-1.000	2969
	(-7.01)	(14.19)	(8.31)	(-7.25)	(-8.81)	(-7.88)	(2.67)	(8.15)	(-7.26)	
1985										
Sao Paulo	-0.186	0.096	0.063	-0.0010	-0.682	-0.596	0.318	0.089	1.003	6930
	(-1.94)	(12.58)	(9.01)	(-8.88)	(-8.73)	(-11.80)	(4.05)	(1.38)	(15.84)	
Recife	-0.897	0.129	0.054	-0.0007	-0.480	-0.481	0.441	0.397	1.134	3048
	(-6.46)	(13.24)	(5.70)	(-4.74)	(-4.86)	(-6.19)	(4.33)	(4.77)	(11.67)	
1987										
Sao Paulo	0.388	0.069	0.047	-0.0009	-0.866	-0.659	0.237	0.228	0.673	3682
	(3.13)	(7.09)	(5.18)	(-6.49)	(-8.24)	(-9.45)	(2.13)	(2.56)	(8.02)	
Recife	-1.391	0.149	0.114	-0.0016	-0.728	-0.620	0.359	0.241	1.015	1779
	(-7.53)	(11.18)	(8.76)	(-8.38)	(-5.33)	(-6.02)	(2.77)	(2.18)	(7.78)	
1989										
Sao Paulo	0.139	0.082	0.049	-0.0008	-0.822	-0.574	0.170	0.216	0.562	3455
	(1.12)	(8.34)	(5.65)	(-5.78)	(-7.34)	(-8.49)	(1.65)	(2.42)	(6.36)	
Recife	-0.858	0.118	0.085	-0.0013	-0.765	-0.533	0.327	0.412	0.616	1849
	(-5.11)	(9.97)	(7.32)	(-7.11)	(-6.02)	(-5.39)	(2.52)	(3.80)	(5.13)	

Basic Data SOURCE: BRASIL/PNAD. Magnetic tapes.
NOTE: CONSTR=dummy variable for Construction; COMSER=dummy variable for Commerce and Services; TrpFinPS=dummy variable for Transport, Finance and Public Sector (Manufacturing is the basis).
T-statistics in brackets

TABLE APP-VI.02
SAO PAULO and RECIFE: Estimates from probit equations for employment in the FORMAL sector. Male employees
1981/1989, selected years

YEARS/ REGIONS	Interc.	School.	EX	EXSQ	EQUATIONS CONSTR	COMSERV	TrpFinPS	POSH	SECDY	N.Obs
1981										
Sao Paulo	0.763	0.041	0.009	-0.0001	0.086	0.208	0.236	0.522	-0.116	5892
	(6.51)	(4.82)	(0.96)	(-0.35)	(0.79)	(3.11)	(3.17)	(7.23)	(-1.37)	
Recife	0.505	0.050	0.008	0.0001	-0.095	0.070	0.308	0.614	-0.542	2781
	(2.75)	(4.21)	(0.59)	(0.50)	(-0.88)	(0.73)	(2.98)	(6.55)	(-3.66)	
1983										
Sao Paulo	0.873	0.034	-0.012	0.0003	-0.308	0.065	0.359	0.531	-0.182	6042
	(7.84)	(4.64)	(-1.45)	(2.05)	(-3.75)	(1.11)	(5.16)	(8.30)	(-2.30)	
Recife	0.555	0.048	-0.007	0.0005	-0.547	0.117	0.345	0.785	-0.640	2479
	(2.57)	(3.67)	(-0.44)	(1.62)	(-4.52)	(1.09)	(2.99)	(7.52)	(-3.36)	
1985										
Sao Paulo	1.088	0.039	-0.010	0.0003	0.211	0.093	0.092	0.114	0.861	6300
	(8.04)	4.090	(-0.97)	(1.57)	(1.53)	(1.31)	(1.16)	(1.40)	(10.77)	
Recife	1.452	0.009	-0.026	0.0005	-0.147	0.160	0.100	0.344	0.974	2441
	(6.06)	(0.60)	(-1.49)	(1.73)	(-0.86)	(1.19)	(0.73)	(2.53)	(5.58)	
1987										
Sao Paulo	1.357	0.020	-0.031	0.0006	-0.003	0.158	0.369	0.169	0.973	3421
	(7.89)	(1.69)	(-2.32)	(2.39)	(-0.02)	(1.68)	(3.03)	(1.60)	(8.19)	
Recife	0.482	0.049	0.008	0.0000	0.018	0.225	0.497	0.142	1.093	1466
	(1.78)	(2.93)	(0.41)	(0.12)	(0.09)	(1.67)	(3.37)	(1.00)	(5.49)	
1989										
Sao Paulo	1.327	0.033	-0.004	0.0002	0.622	0.004	0.038	0.202	0.490	3100
	(6.67)	(2.33)	(-0.28)	(0.77)	(1.67)	(0.04)	(0.30)	(1.56)	(3.78)	
Recife	0.991	0.038	-0.023	0.0005	0.131	0.227	0.244	0.452	0.357	1541
	(3.88)	(2.43)	(-1.21)	(1.43)	(0.68)	(1.74)	(1.75)	(3.11)	(2.51)	

Basic Data SOURCE: BRASIL/PNAD. Magnetic tapes.
NOTE: CONSTR=dummy variable for Construction; COMSER=dummy variable for Commerce and Services; TrpFinPS=dummy variable for Transport, Finance and Public Sector (Manufacturing is the basis).
T-statistics in brackets

TABLE APP-VI.03
SAO PAULO and RECIFE: Estimates from probit equations for employment in the INFORMAL sector. Male employees
1981/1989, selected years

YEARS/ REGIONS	Interc.	School.	EX	EXSQ	EQUATIONS CONSTR	COMSERV	TrpFinPS	POSH	SECDY	N.Obs
1981										
Sao Paulo	0.505	0.032	0.024	-0.0001	0.045	0.305	0.437	-0.016	0.069	719
	(2.00)	(1.37)	(1.14)	(-0.32)	(0.24)	(2.14)	(1.15)	(-0.08)	(0.26)	
Recife	1.300	-0.035	-0.027	0.0005	-0.131	0.309	0.268	0.277	0.154	605
	(4.48)	(-1.56)	(-1.20)	(1.33)	(-0.65)	(1.74)	(0.93)	(1.33)	(0.39)	
1983										
Sao Paulo	0.590	0.012	0.019	-0.0003	0.055	0.061	0.352	0.346	0.337	932
	(2.86)	(0.65)	(1.26)	(-1.27)	(0.35)	(0.50)	(1.35)	(2.25)	(1.41)	
Recife	1.684	-0.036	-0.036	0.0010	-0.495	-0.118	0.199	0.181	0.102	779
	(5.38)	(-1.76)	(-1.41)	(1.93)	(-2.40)	(-0.62)	(0.65)	(1.02)	(0.26)	
1985										
Sao Paulo	1.291	0.014	-0.023	0.0011	-0.233	0.034	-0.161	0.260	-0.537	1003
	(4.99)	(0.62)	(-0.90)	(1.86)	(-1.23)	(0.24)	(-0.63)	(1.33)	(-2.32)	
Recife	1.605	-0.025	-0.012	0.0007	-0.000	-0.126	0.086	0.130	-0.285	754
	(4.71)	(-1.02)	(-0.40)	(1.02)	(-0.00)	(-0.62)	(0.26)	(0.60)	(-0.51)	
1987										
Sao Paulo	1.092	0.022	0.041	0.0010	0.444	0.241	-0.059	0.389	0.510	472
	(3.48)	(0.73)	(-1.41)	(1.58)	(1.58)	(1.27)	(-0.17)	(1.53	(1.11)	
Recife	1.890	-0.055	-0.057	0.0015	0.049	0.082	0.793	-0.102	-0.617	457
	(4.50)	(-1.88)	(-1.59)	(1.97)	(0.18)	(0.37)	(1.66)	(-0.41)	(-1.64)	
1989										
Sao Paulo	2.013	0.033	-0.063	0.0013	-0.308	-0.391	-0.553	0.627	0.245	489
	(4.96)	(0.91)	(-1.96)	(1.80)	(-0.92)	(-1.53)	(-1.38)	(2.08)	(0.45)	
Recife	1.656	0.003	-0.067	0.0017	0.063	0.390	0.195	0.111	-0.683	438
	(3.82)	(0.09)	(-1.66)	(1.95)	(0.22)	(1.56)	(0.52)	(0.36)	(-1.44)	

Basic Data SOURCE: BRASIL/PNAD. Magnetic tapes.
NOTE: CONSTR=dummy variable for Construction; COMSER=dummy variable for Commerce and Services; TrpFinPS=dummy variable for Transport, Finance and Public Sector (Manufacturing is the basis).
T-statistics in brackets

TABLE APP-VI.04
SAO PAULO and RECIFE: Estimates from probit equations for segmentation
Education as a categorical variable. Male employees
1981/1989, selected years

YEARS/ REGIONS	Interc.	EDUC1	EDUC2	EDUC3	EDUC4	EX	EXSQ	CONSTR	COMSERV	TrpFinPS	POSH	SECDY	N.Obs
							EQUATIONS						
1981													
Sao Paulo	0.253	0.237	0.445	1.005	0.954	0.071	-0.0011	-0.856	-0.721	0.290	0.389	-0.190	6130
	(2.04)	(2.73)	(4.46)	(8.19)	(6.90)	(9.10)	(-9.29)	(-10.72)	(-13.07)	(3.19)	(5.72)	(-2.41)	
Recife	-1.317	0.593	1.163	1.744	2.392	0.119	-0.0016	-0.341	-0.626	0.302	0.427	-0.587	3082
	(-8.11)	(6.26)	(10.30)	(12.69)	(9.86)	(11.59)	(-10.28)	(-3.48)	(-7.69)	(2.86)	(5.07)	(-4.15)	
1983													
Sao Paulo	0.086	0.201	0.536	1.026	1.135	0.063	-0.0009	-0.929	-0.708	0.217	0.457	-0.090	6301
	(0.70)	(2.37)	(5.47)	(8.95)	(8.38)	(8.43)	(-8.24)	(-12.59)	(-13.41)	(2.80)	(7.22)	(-1.10)	
Recife	-0.938	0.406	0.907	1.530	1.699	0.077	-0.0011	-0.852	-0.620	0.280	0.703	-0.926	2969
	(-6.16)	(4.56)	(8.84)	(11.74)	(9.2)	(7.97)	(-7.05)	(-8.86)	(-7.80)	(2.87)	(8.68)	(-6.84)	
1985													
Sao Paulo	0.107	-0.070	0.340	0.731	1.075	0.065	-0.0010	-0.737	-0.607	0.319	0.104	1.014	6930
	(0.90)	(-0.81)	(3.50)	(6.58)	(7.50)	(9.13)	(-9.25)	(-9.39)	(-12.02)	(4.06)	(1.61)	(16.05)	
Recife	-0.723	0.153	0.665	1.268	1.558	0.055	-0.0008	-0.526	-0.490	0.441	0.417	1.165	3048
	(-4.75)	(1.59)	(6.38)	(9.93)	(8.70)	(5.78)	(-5.01)	(-5.30)	(-6.31)	(4.32)	(5.03)	(11.88)	
1987													
Sao Paulo	0.675	-0.181	0.115	0.478	0.648	0.053	-0.0010	-0.916	-0.653	0.242	0.216	0.681	3682
	(4.03)	(-1.40)	(0.81)	(2.98)	(3.49)	(5.64)	(-7.08)	(-8.63)	(-9.35)	(2.17)	(2.43)	(8.10)	
Recife	-1.119	0.170	0.632	1.566	1.683	0.113	-0.0017	-0.781	-0.623	0.348	0.269	0.988	1779
	(-5.32)	(1.24)	(4.21)	(8.41)	(6.94)	(8.69)	(-8.51)	(-5.65)	(-6.03)	(2.68)	(2.44)	(7.64)	
1989													
Sao Paulo	0.335	0.003	0.296	0.679	0.957	0.052	-0.0008	-0.855	-0.581	0.160	0.226	0.573	3455
	(2.08)	(0.03)	(2.26)	(5.05)	(5.23)	(5.81)	(-6.12)	(-7.63)	(-8.57)	(1.55)	(2.53)	(6.47)	
Recife	-0.728	0.153	0.697	1.155	1.298	0.083	-0.0013	-0.765	-0.536	0.342	0.444	0.612	1849
	(-3.82)	(1.19)	(5.09)	(7.21)	(6.08)	(7.23)	(-7.08)	(-6.03)	(-5.43)	(2.66)	(4.12)	(5.09)	

Basic Data SOURCE: BRASIL/PNAD. Magnetic tapes.
NOTE: CONSTR=dummy variable for Construction; COMSER=dummy variable for Commerce and Services; TrpFinPS=dummy variable for Transport, Finance and Public Sector (Manufacturing is the basis).
T-statistics in brackets

TABLE APP-VI.05

SAO PAULO and RECIFE: Estimates from probit equations for employment in the FORMAL sector. Education as a categorical variable. Male Employees 1981/1989, selected years

YEARS/ REGIONS	Interc.	EDUC1	EDUC2	EDUC3	EDUC4	EX	EXSQ	CONSTR	COMSERV	TrpFinPS	POSH	SECDY	N.Obs
						EQUATIONS							
1981													
Sao Paulo	1.020	-0.060	-0.045	0.248	0.470	0.006	-0.0001	0.040	0.209	0.236	0.533	-0.111	5892
	(6.63)	(-0.52)	(-0.35)	(1.72)	(2.83)	(0.66)	(-0.33)	(0.37)	(3.12)	(3.17)	(7.38)	(-1.31)	
Recife	0.693	0.036	0.182	0.295	0.719	0.004	0.0002	-0.124	0.076	0.318	0.616	-0.554	2781
	(3.35)	(0.27)	(1.25)	(1.80)	(3.27)	(0.26)	(0.65)	(-1.14)	(0.79)	(3.09)	(6.55)	(-3.70)	
1983													
Sao Paulo	0.879	0.177	0.229	0.356	0.525	-0.015	0.0003	-0.313	0.065	0.361	0.540	-0.177	6042
	(6.35)	(1.83)	(2.12)	(2.99)	(3.93)	(-1.74)	(2.24)	(-3.78)	(1.11)	(5.18)	(8.47)	(-2.23)	
Recife	0.833	0.057	0.045	0.244	0.849	-0.014	0.0005	-0.603	0.110	0.335	0.785	-0.660	2479
	(3.47)	(0.38)	(0.28)	(1.35)	(3.07)	(-0.85)	(1.80)	(-4.95)	(1.03)	(2.91)	(7.48)	(-3.45)	
1985													
Sao Paulo	1.265	0.012	0.044	0.269	0.489	-0.011	-0.0003	0.176	0.089	0.084	0.113	0.864	6300
	(7.34)	(0.10)	(0.32)	(1.76)	(2.74)	(-1.06)	(1.47)	(1.27)	(1.25)	(1.06)	(1.38)	(10.80)	
Recife	1.651	-0.183	-0.209	-0.053	-0.083	-0.024	0.0005	-0.176	0.155	0.093	0.346	0.981	2441
	(5.60)	(-0.84)	(-0.93)	(-0.21)	(-0.31)	(-1.34)	(1.48)	(-1.03)	(1.15)	(0.68)	(2.54)	(5.60)	
1987													
Sao Paulo	2.481	-0.981	-1.091	-0.841	-0.576	-0.031	0.0005	-0.125	0.159	0.368	0.161	0.970	3421
	(6.01)	(-2.53)	(-2.77)	(-2.08)	(-1.36)	(-2.20)	(1.97)	(-0.75)	(1.68)	(2.99)	(1.50)	(8.06)	
Recife	0.868	-0.219	-0.171	0.333	0.240	0.009	-0.0000	-0.063	0.220	0.492	0.153	1.095	1466
	(2.53)	(-0.89)	(-0.67)	(1.16)	(0.76)	(0.43)	(-0.04)	(-0.30)	(1.62)	(3.30)	(1.07)	(5.47)	
1989													
Sao Paulo	1.888	-0.449	-0.384	-0.177	0.088	-0.005	0.0002	0.596	-0.002	0.032	0.205	0.498	3100
	(5.56)	(-1.53)	(-1.28)	(-0.56)	(0.26)	(-0.31)	(0.66)	(1.58)	(-0.02)	(0.26)	(1.59)	(3.81)	
Recife	1.341	-0.100	-0.091	-0.060	0.938	-0.265	0.0004	0.082	0.244	0.236	0.474	0.374	1541
	(4.33)	(-0.44)	(-0.40)	(-0.25)	(2.19)	(-1.37)	(1.35)	(0.42)	(1.86)	(1.68)	(3.22)	(2.60)	

Basic Data SOURCE: BRASIL/PNAD. Magnetic tapes.

NOTE: CONSTR=dummy variable for Construction; COMSER=dummy variable for Commerce and Services; TrpFinPS=dummy variable for Transport, Finance and Public Sector (Manufacturing is the basis).

T-statistics in brackets

TABLE APP-VI.06
SAO PAULO and RECIFE: Estimates from probit equations for employment in the INFORMAL sector. Education as a categorical variable. Male employees
1981/1989, selected years

YEARS/						EQUATIONS							
REGIONS	Interc.	EDUC1	EDUC2	EDUC3	EDUC4	EX	EXSQ	CONSTR	COMSERV	TrpFinPS	POSH	SECDY	N.Obs
1981													
Sao Paulo	0.932	-0.507	-0.299	-0.282	*	0.031	-0.0003	0.043	0.361	0.477	-0.054	0.090	692
	(2.75)	(-1.94)	(-1.04)	(-0.79)		(1.45)	(-0.76)	(0.23)	(2.48)	(1.25)	(-0.27)	(0.33)	
Recife	1.545	-0.435	-0.489	-0.504	-0.437	-0.028	0.0005	-0.135	0.327	0.295	0.280	0.157	605
	(4.69)	(-2.09)	(-2.08)	(-1.69)	(-0.68)	(-1.23)	(1.26)	(-0.67)	(1.84)	(1.01)	(1.33)	(0.39)	
1983													
Sao Paulo	0.836	-0.077	-0.295	0.271	0.205	0.014	-0.0003	0.018	0.066	0.378	0.333	0.354	932
	(3.16)	(-0.40)	(-1.39)	(0.92)	(0.55)	(0.90)	(-1.09)	(0.11)	(0.54)	(1.42)	(2.16)	(1.47)	
Recife	1.694	-0.051	-0.292	-0.506	-0.201	-0.038	0.0011	-0.492	-0.089	0.241	0.177	0.103	779
	(5.00)	(-0.28)	(-1.44)	(-1.88)	(-0.44)	(-1.50)	(1.98)	(-2.39)	(-0.46)	(0.77)	(1.00)	(0.26)	
1985													
Sao Paulo	1.460	-0.134	-0.085	-0.063	*	-0.024	0.0011	-0.243	0.039	-0.161	0.265	-0.570	982
	(4.07)	(-0.50)	(-0.30)	(-0.19)		(-0.95)	(1.88)	(-1.28)	(0.28)	(-0.62)	(1.35)	(-2.42)	
Recife	1.547	0.048	-0.124	-0.318	*	-0.013	0.0007	-0.003	-0.122	0.056	0.118	-0.355	741
	(4.04)	(0.20)	(-0.49)	(-1.05)		(-0.42)	(1.06)	(-0.01)	(-0.60)	(0.16)	(0.53)	(-0.62)	
1987													
Sao Paulo	0.987	0.398	0.175	0.369	*	-0.047	0.0010	0.435	0.207	-0.132	0.442	0.544	457
	(2.30)	(1.18)	(0.49)	(0.85)		(-1.61)	(1.69)	(1.54)	(1.08)	(-0.38)	(1.70)	(1.13)	
Recife	1.580	0.074	0.048	-0.947	*	-0.051	0.0015	0.110	0.126	0.880	-0.131	-0.434	448
	(3.17)	(0.26)	(0.15)	(-2.54)		(-1.39)	(1.82)	(0.39)	(0.55)	(1.78)	(-0.51)	(-1.11)	
1989													
Sao Paulo	1.730	0.380	0.473	0.377	*	-0.061	0.0013	-0.292	-0.367	-0.535	0.631	0.197	475
	(3.59)	(1.17)	(1.37)	(0.79)		(-1.83)	(1.78)	(-0.86)	(-1.42)	(-1.33)	(2.06)	(0.36)	
Recife	1.688	-0.000	-0.042	-0.219	*	-0.066	0.0017	0.059	0.406	0.202	0.120	-0.605	425
	(3.34)	(-0.00)	(-0.13)	(-0.54)		(-1.63)	(1.87)	(0.20)	(1.60)	(0.53)	(0.39)	(-1.27)	

Basic Data SOURCE: BRASIL/PNAD. Magnetic tapes.
NOTE: CONSTR=dummy variable for Construction; COMSER=dummy variable for Commerce and Services; TrpFinPS=dummy variable for Transport, Finance and Public Sector (Manufacturing is the basis).
T-statistics in brackets (*) Dropped. See notes on Tables 6-10 and 6-11

TABLE APP-VI.07
SAO PAULO: Estimates from wage equations and hours worked equations for pooled data across years, according to different econometric procedures.
Formal and Informal segments. Male employees

	LNYr	School.	EX	EXSQ	CONSTR	COMSERV	TrpFinPS	POSH	SECDY	YEAR1	YEAR2	YEAR3	YEAR4
FORMAL	(WAGE)												
- OLS													
Wage eq.		0.1486	0.0609	-0.0008	-0.184	-0.229	-0.084	0.219	0.097	0.628	0.157	0.010	-0.634
		(138.4)	(46.9)	(-36.7)	(-10.7)	(-23.8)	(-8.3)	(19.2)	(9.9)	(47.9)	(11.9)	(0.9)	(-53.3)
Hours eq.	-0.097	0.0023	0.0096	-0.0002				0.060	0.001	0.057	0.002	-0.022	-0.118
	(-48.3)	(5.3)	(23.0)	(-22.8)				(16.8)	(0.4)	(13.5)	(0.5)	(-5.9)	(-30.3)
-PROC.I													
Wage eq.		0.1424	0.0714	-0.0010	-0.214	-0.308	-0.161		0.003	0.658	0.274	0.007	-0.699
		(96.2)	(43.6)	(-33.9)	(-8.7)	(-17.3)	(-14.5)		(0.3)	(50.0)	(18.6)	(0.6)	(-55.1)
Hours eq.	0.083	-0.021	0.0033	-0.0001					-0.007	-0.051	-0.013	-0.024	-0.011
	(5.28)	(-9.7)	(3.2)	(-6.3)					(-1.6)	(-4.6)	(-2.3)	(-6.3)	(-1.1)
-PROC.II													
Wage eq.		0.1474	0.0484	-0.0006				0.315	0.155	0.609	0.063	0.012	-0.576
		(99.8)	(32.9)	(-22.0)				(18.1)	(11.4)	(45.6)	(4.0)	(1.0)	(-44.5)
Hours eq.	0.232	-0.0418	-0.0057	0.0000					-0.015	-0.148	-0.042	-0.026	0.085
	(13.1)	(-16.9)	(-5.0)	(1.6)					(-3.7)	(-12.1)	(-7.3)	(-6.7)	(7.0)
INFORMAL													
- OLS													
Wage eq.		0.1187	0.0544	-0.0007	-0.031	-0.089	0.097	0.189	-0.014	0.591	0.165	0.142	-0.464
		(30.6)	(17.0)	(-14.7)	(-0.8)	(-3.3)	(1.9)	(5.6)	(-0.3)	(15.8)	(4.7)	(4.2)	(-14.3)
Hours eq.	-0.161	0.0130	0.0272	-0.0004				0.081	-0.096	0.110	0.043	-0.005	-0.104
	(-17.2)	(5.6)	(15.4)	(-15.9)				(4.5)	(-4.3)	(5.3)	(2.3)	(-0.3)	(-5.8)
-PROC.I													
Wage eq.		0.0574	0.0073	0.0001	0.649	0.470	-0.135		-0.393	0.532	0.065	0.114	-0.434
		(4.3)	(0.6)	(0.4)	(4.0)	(3.5)	(-1.8)		(-4.1)	(10.0)	(0.9)	(2.9)	(-11.2)
Hours eq.	0.026	-0.0121	0.0168	-0.0003					-0.103	0.014	0.039	-0.024	-0.026
	(0.2)	(-1.0)	(2.6)	(-3.4)					(-3.7)	(0.2)	(1.0)	(-0.9)	(-0.4)
-PROC.II													
Wage eq.		0.1224	0.0486	-0.0006				0.337	-0.043	0.469	-0.047	0.085	-0.394
		(17.6)	(13.3)	(-9.3)				(4.6)	(-0.9)	(8.4)	(-0.6)	(2.2)	(-9.8)
Hours eq.	0.281	-0.0380	0.0037	-0.0001					-0.077	-0.148	-0.025	-0.066	0.099
	(2.3)	(-3.0)	(0.6)	(-1.4)					(-2.8)	(-1.8)	(-0.6)	(-2.4)	(1.6)

NOTE: 23281 and 3217 observations in all regressions for the formal and informal sectors, respectively

TABLE APP-VI.08

RECIFE: Estimates from wage equations and hours worked equations for pooled data across years, according to different econometric procedures.

Formal and Informal segments. Male employees

	LNYr	School.	EX	EXSQ	CONSTR	COMSERV	TrpFinPS	POSH	SECDY	YEAR1	YEAR2	YEAR3	YEAR4
FORMAL	(WAGE)												
- OLS													
Wage eq.		0.1529	0.0507	-0.0006	-0.064	-0.181	0.075	0.269	-0.007	0.468	0.046	-0.159	-0.971
		(89.4)	(23.9)	(-16.4)	(-2.7)	(-10.6)	(4.5)	(15.1)	(-0.4)	(21.9)	(2.1)	(-8.0)	(-50.0)
Hours eq.	-0.095	-0.0029	0.0062	-0.0001				0.048	0.000	0.029	0.001	-0.018	-0.150
	(-30.0)	(-4.0)	(8.9)	(-10.1)				(8.3)	(0.05)	(4.1)	(0.2)	(-2.7)	(-21.5)
-PROC.I													
Wage eq.		0.1619	0.0787	-0.0010	-0.178	-0.444	-0.026		-0.031	0.574	0.168	-0.052	-0.896
		(70.3)	(31.0)	(-24.3)	(-6.4)	(-17.4)	(-1.4)		(-1.6)	(25.8)	(7.4)	(-2.4)	(-44.1)
Hours eq.	-0.127	0.0039	0.0126	-0.0002					0.010	0.055	0.016	-0.015	-0.177
	(-7.5)	(1.5)	(10.2)	(-12.0)					(1.6)	(4.8)	(2.1)	(-2.1)	(-10.1)
-PROC.II													
Wage eq.		0.1588	0.0450	-0.0004				0.352	0.029	0.431	0.006	-0.198	-1.008
		(68.1)	(18.3)	(-10.5)				(13.2)	(1.5)	(18.7)	(0.3)	(-9.2)	(-49.2)
Hours eq.	0.170	-0.0401	-0.0046	-0.0000					0.017	-0.099	-0.012	0.025	0.108
	(6.7)	(-10.6)	(-2.8)	(-0.3)					(2.7)	(-6.6)	(-1.5)	(3.2)	(4.3)
INFORMAL													
- OLS													
Wage eq.		0.1279	0.0561	-0.0007	0.033	-0.188	0.116	0.249	0.008	0.538	0.133	-0.059	-0.832
		(29.5)	(14.9)	(-12.4)	(0.8)	(-5.2)	(2.1)	6.300	(0.1)	(12.1)	(3.2)	(-1.5)	(-21.5)
Hours eq.	-0.130	0.0113	0.0241	-0.0003				0.057	-0.146	0.046	0.008	-0.051	-0.186
	(-1.30)	(4.3)	(11.7)	(-10.4)				(2.7)	(-4.3)	(1.9)	(0.4)	(-2.5)	(-8.4)
-PROC.I													
Wage eq.		0.0572	0.0140	0.0000	0.275	0.124	0.044		-0.342	0.388	0.013	-0.122	-0.837
		(4.4)	(1.5)	(0.005)	(4.5)	(1.96)	(0.6)		(-3.8)	(5.6)	(0.2)	(-2.7)	(-21.7)
Hours eq.	-0.001	-0.0100	0.0137	-0.0002					-0.171	-0.041	-0.023	-0.051	-0.079
	(-0.01)	(-1.1)	(3.1)	(-3.2)					(-3.3)	(-0.9)	(-0.9)	(-1.8)	(-0.9)
-PROC.II													
Wage eq.		0.0761	0.0267	-0.0002				0.194	-0.295	0.314	-0.040	-0.152	-0.834
		(9.7)	(4.7)	(-1.7)				(4.4)	(-4.1)	(5.5)	(-0.8)	(-3.6)	(-21.6)
Hours eq.	0.094	-0.0168	0.0109	-0.0002					-0.141	-0.074	-0.021	-0.037	0.001
	(0.8)	(-1.7)	(2.3)	(-2.9)					(-2.5)	(-1.4)	(-0.8)	(-1.3)	(0.009)

NOTE: 9984 and 2743 observations in all regressions for the formal and informal sectors, respectively

TABLE APP-VI.09

SAO PAULO, RECIFE: Summary statistics of other variables for regressions in Chapter VI

	CONSTR		COMSERV		TrpFinPS		EDUC1		EDUC2		EDUC3		EDUC4	
	Mean	S.Dev	Mean	S.Dev	Mean	S.Dev	Mean	S.Dev	Mean	S.Dev	Mean	S.Dev	Mean	S.Dev
SAO PAULO														
1981														
Formal	0.06489	0.24636	0.22595	0.41825	0.21415	0.41027	0.42318	0.49411	0.24706	0.43134	0.14907	0.35619	0.11307	0.31671
Informal	0.16854	0.37464	0.53093	0.49944	0.04612	0.20991	0.44990	0.49788	0.31475	0.46479	0.07154	0.25794	0.04293	0.20287
1983														
Formal	0.06895	0.25339	0.23764	0.42568	0.24411	0.42960	0.39633	0.48918	0.25274	0.43463	0.16542	0.37159	0.12310	0.32858
Informal	0.19581	0.39708	0.50697	0.50027	0.06482	0.24636	0.46530	0.49911	0.29699	0.45722	0.08378	0.27723	0.03687	0.18857
1985														
Formal	0.05571	0.22939	0.24812	0.43196	0.23749	0.42558	0.36786	0.48226	0.27075	0.44439	0.16813	0.37401	0.12790	0.33400
Informal	0.14938	0.35666	0.53001	0.49937	0.05997	0.23755	0.46889	0.49930	0.32830	0.46985	0.09158	0.28859	0.02290	0.14967
1987														
Formal	0.05557	0.22913	0.25882	0.43806	0.21277	0.40933	0.34571	0.47567	0.28124	0.44967	0.18330	0.38697	0.13479	0.34155
Informal	0.17177	0.37763	0.52941	0.49973	0.05412	0.22651	0.48471	0.50036	0.31294	0.46424	0.08706	0.28225	0.03529	0.18474
1989														
Formal	0.04473	0.20675	0.27403	0.44609	0.21495	0.41086	0.30941	0.46233	0.31842	0.46594	0.18591	0.38910	0.12950	0.33581
Informal	0.13726	0.34450	0.53376	0.49940	0.06754	0.25123	0.38997	0.48828	0.40742	0.49189	0.08061	0.27253	0.03050	0.17214
RECIFE														
1981														
Formal	0.13754	0.34448	0.25314	0.43490	0.34167	0.47436	0.33077	0.47058	0.26335	0.44054	0.19352	0.39513	0.11009	0.31306
Informal	0.19623	0.39752	0.34726	0.49823	0.08108	0.27321	0.39994	0.49035	0.25885	0.43820	0.09817	0.29782	0.01320	0.11422
1983														
Formal	0.09741	0.29658	0.28174	0.44994	0.36984	0.48287	0.30146	0.45899	0.28864	0.45323	0.19613	0.39715	0.11422	0.31815
Informal	0.29935	0.43295	0.51440	0.50016	0.08841	0.28410	0.40139	0.49053	0.26234	0.44023	0.07962	0.27091	0.02321	0.15068
1985														
Formal	0.09804	0.29744	0.29667	0.45689	0.34357	0.47500	0.27496	0.44659	0.30306	0.45968	0.21140	0.40839	0.11892	0.32377
Informal	0.19511	0.39657	0.55417	0.49741	0.07832	0.26886	0.40737	0.49170	0.29919	0.45823	0.08973	0.28600	0.01851	0.13489
1987														
Formal	0.06959	0.25455	0.28939	0.45365	0.38023	0.48562	0.27911	0.44873	0.28862	0.45329	0.22492	0.41768	0.12968	0.33608
Informal	0.19566	0.39719	0.56274	0.49665	0.07974	0.27121	0.44929	0.49802	0.32851	0.47024	0.05556	0.22934	0.02178	0.14606
1989														
Formal	0.08599	0.28045	0.32454	0.46837	0.32732	0.46940	0.22190	0.41567	0.35299	0.47807	0.22261	0.41614	0.11997	0.32504
Informal	0.20147	0.40159	0.56512	0.49635	0.07616	0.26558	0.38330	0.48679	0.32679	0.49962	0.09581	0.29469	0.03193	0.17604

NOTE: (dummy variables) - COMSERV, COMSERV, Commerce+Services; CONSTR, Civil Construction; TrpFinPS, Transports+Finance+Public Sector (Manufacturing basic variable)
EDUC1 =Primary School; EDUC2=Secondary; EDUC3=High School; EDUC4=College (Illiterate as basic variable)

APPENDIX TO CHAPTER VII

TABLES APP-VII.01 and APP-VII.02

TABLE APP-VII.01

SAO PAULO and RECIFE: marginal returns to schooling by level of education, for male employees
From wage equations estimated on pooled data across years

REGIONS/ PROCEDURES	MARGINAL RETURNS TO SCHOOLING (%) (*)							
	FORMAL				INFORMAL			
	Primary	Secondary	H. School	College	Primary	Secondary	H. School	College
SAO PAULO								
OLS	11.5	11.1	16.2	19.8	7.4	10.4	13.4	22.3
Proc. I	11.0	11.1	13.6	18.2	7.0	3.2	4.7	21.0
Proc. II	9.2	9.6	15.1	19.6	7.9	8.7	13.0	26.3
RECIFE								
OLS	9.4	9.7	16.1	22.9	8.1	11.4	14.3	18.6
Proc. I	13.1	12.1	16.7	21.0	2.7	2.8	2.5	24.2
Proc. II	8.7	9.0	16.0	24.1	4.5	5.7	4.7	28.9

SOURCE: wage equations and average years of schooling for pooled data
(*) Marginal returns estimated as follows: $r = [(Bi - Bj)/(Si - Sj)].100$,
where Bi and Bj are the "b" coefficients on education dummies of two different
degrees, Si and Sj are mean years of schooling of the same pair of different groups and $j < i$.
Returns are calculated for each degree in relation to the preceding one: Prim./Illit., Second./Prim., and so on

TABLE APP-VII.02
SAO PAULO and RECIFE: Summary statistics of variables from
regressions on pooled data across years. Male employees. Formal and informal sectors

VARIABLES	REGIONS/SEGMENTS/STATISTICS							
	SAO PAULO				RECIFE			
	FORMAL		INFORMAL		FORMAL		INFORMAL	
	Mean	S.Dev	Mean	S. Dev	Mean	S.Dev	Mean	S. Dev
lnYr	0.13305	0.91976	-0.77715	0.80966	-0.29989	0.99778	-1.29358	0.90438
School.	6.70	4.28	4.87	3.26	6.78	4.42	4.21	3.36
EX	20.72	12.73	17.89	14.98	22.06	12.94	17.24	14.06
EXSQ	591.58	678.38	544.31	861.73	654.17	719.08	494.91	834.89
CONSTR	0.05958	0.23671	0.16568	0.37185	0.10236	0.30314	0.20999	0.40737
COMSERV	0.24526	0.43025	0.52502	0.49945	0.28156	0.45151	0.54575	0.49799
TrpFinPS	0.22718	0.41902	0.05875	0.23519	0.35176	0.47754	0.08130	0.27334
POSH	0.66260	0.47283	0.37426	0.48401	0.68429	0.46482	0.31753	0.46580
SECDY	0.31098	0.46291	0.10382	0.30508	0.23247	0.42243	0.06234	0.24182
YEAR1	0.23629	0.42481	0.19552	0.39667	0.25561	0.43622	0.19322	0.39490
YEAR2	0.23685	0.42516	0.24464	0.42994	0.22827	0.41974	0.25155	0.43398
YEAR3	0.13989	0.34689	0.13211	0.33866	0.13672	0.34357	0.15093	0.35805
YEAR4	0.12869	0.33486	0.14268	0.34980	0.14443	0.35154	0.14838	0.35554
N. Obs	23281		3217		9984		2743	

Basic Data SOURCE: BRASIL/PNAD. Magnetic tapes

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