email addresses:
w.carlin@ucl.ac.uk
Paul.Seabright@dial.pipex.com
J.E.Haskel@qmw.ac.uk

Understanding "the essential fact about capitalism": markets, competition and creative destruction[1]

Wendy Carlin, University College London, Jonathan Haskel, Queen Mary, University of London & CEPR and Paul Seabright, University of Cambridge, IDEI, Université de Toulouse-1 & CEPR.

Abstract

This paper examines two ways in which competition works in modern capitalist economies to improve productivity. The first is through *incentives*: encouraging improvements in technology, organisation and effort on the part of existing establishments and firms. The second is through *selection*: replacing less-productive with more productive establishments and firms, whether smoothly via the transfer of market shares from less to more productive firms, or roughly through the exit of some firms and the entry of others. We report evidence from the UK suggesting that selection is responsible for a large proportion of aggregate productivity growth in manufacturing, and that much of this is due in turn to selection between plants belonging to multi-plant firms. We also investigate whether the nature of the selection process varies across the business cycle and report evidence suggesting that it is less effective in booms and recessions. Finally, although in principle productivity catch-up by low-income countries ought to be easier than innovation at the frontier, in the absence of a well functioning competitive infrastructure (a predicament that characterises many poor countries), selection may be associated with much more turbulence and a lower rate of productivity growth than in relatively prosperous societies. We report results of a survey of firms in transition economies suggesting that, particularly in the former Soviet states (excluding the Baltics), poor output and productivity performance has not been due to an unwillingness on the part of firms to change and adapt. On the contrary, there has been a great deal of restructuring, much new entry and large reallocations of output between firms; but such activity has been much more weakly associated with improved performance than we would expect in established market economies.

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"The fundamental impulse that sets and keeps the capitalist engine in motion comes from the new consumers' goods, the new methods of production or transportation, the new markets, the new forms of industrial organisation that capitalist enterprise creates. … [This is a] process of industrial mutation – if I may use that biological term – that incessantly revolutionises the economic structure *from within*, incessantly destroying the old one, incessantly creating a new one. This process of Creative Destruction is the essential fact about capitalism." (*Capitalism, Socialism and Democracy* 1943 (1976 edition, p. 83).

Introduction

How does competition affect productivity and innovation in a modern capitalist economy? In this paper we seek to document the comparative contribution of two main ways in which competition works. The first is through *incentives*: encouraging improvements in technology, organisation and effort on the part of existing establishments and firms. The second is through *selection*: replacing less-productive with more productive establishments and firms, whether smoothly via the transfer of market shares from less to more productive firms, or roughly through the exit of some firms and the entry of others. An important part of modern microeconomics has studied incentives and has had nothing significant to say about the allocation of resources between firms (typically because it assumes a representative firm). A rival tradition, notably associated with the work of Schumpeter[2] but also with evolutionary economists such as Nelson and Winter (1982), has emphasised the crucial role of selection, not just as a threat to the position of existing firms but as a quantitatively important contributor in its own right to economic growth. Furthermore, Schumpeter vividly underlined the turbulence associated with this process, using a language of incessant gales of creative destruction. If accurate, this vision of competition implies that productivity change will be associated with more turbulence, with higher human costs of adjustment, and perhaps with a greater potential for unanticipated errors and crises than are envisaged in a theory that assumes that competition influences productivity principally by creating incentives for productive behaviour on the part of the representative firm.

A natural response to the Schumpeterian vision might be to accept that while innovation – the process by which society's production frontier moves forward – is an inherently hazardous and turbulent process, dissemination – the process by which the rest of society catches up with the frontier – is likely to be much less so. This is because it comes about principally through imitation, the copying of best practice through licensing, reverse engineering or outright plagiarism. The more that firms and societies lag behind best practice, the more likely it appears that incentives should be capable of improving their performance and that if selection operates, it will do so in a productivity-enhancing fashion. In advanced societies more firms will be at or near the productivity frontier, and their development is likely to require genuine innovation. But in low-income or transition economies, almost all firms will be a long way behind the frontier: it should be easy for those firms with adequate incentives to

[2] Our purpose in this paper is not to assess the accuracy of Schumpeter's theories but rather to consider the character and respective contributions of incentives and selection in the competitive process. This was certainly part of the Schumpeterian vision though we do not pretend to exegetical fidelity.

know what to do, while the operation of selection is much more likely to weed out the incompetent rather than the merely unlucky.

In fact the evidence we report not only demonstrates clearly that selection plays a major role in productivity change, but also that catch-up can be if anything an even more turbulent process than is innovation at the frontier. We begin by documenting what is known about the way 'internal' and 'external' restructuring contribute to productivity growth in an advanced market economy in the late 20th century. We document many of these features by reference to existing studies and by using representative longitudinal data on survivors, entrants and exitors in the UK manufacturing sector from 1980 to 1992. We look at the contributions to productivity growth that come from improvements within surviving establishments, from the reallocation of market shares between them and from the processes of entry and exit. When a new product or process is introduced, is the human and physical capital in the existing plant remodelled or is it scrapped and replaced in a new plant?

Second, what is the role of competition in this process? One part of the answer is that replacement of some firms by others is simply one of the facets of competition: it could not be happening without a competitive process in place. Another part is that the process of selection is the credible threat that provides the performance incentive for existing firms. Finally, entry and exit may, by themselves, raise average productivity. The evidence clearly establishes that selection substantially raises average productivity, by working against firms with lower than average productivity and in favour of those with higher than average productivity. This might not have been so (and the metaphor of "gales" is hardly encouraging on this point), but the evidence shows that it is so. Furthermore, although selection does act to raise average productivity, competition does not work only through selection: incentive effects within existing firms are important too. Although in principle unchallenged monopolists may be no less keen on productivity and profits than firms that face a credible competitive challenge, we show that in practice a degree of credible competition is needed as much for incentives as for selection to work. This does not mean "the more competition the better" (as we discuss below). Indeed, Schumpeter emphasised that some prospect of temporary market power is necessary as a spur to innovation. But it does mean that market power that is not expected to be temporary is an encouragement to stagnation and inefficiency.

The third task of this paper is to investigate whether there can in some sense be too much turbulence in the process of creative destruction. By "turbulence" we refer to those aspects of industrial restructuring that involve substantial fixed costs: most notably the entry and exit of firms and plants, but also the breaking of business relationships that represent significant specific investments, and the abandonment of fixed or intangible assets. The former aspect (entry and exit) we shall refer to below as "turnover", while the breaking of business relationships and the abandonment of assets we shall refer to as "disruption"; there may be disruption without turnover, though there will rarely be turnover without disruption. Entry and exit of plants and firms are lumpy processes, and they create casualties. The immediate liquidation value of a firm's assets is rarely anything like the firm's value as a going concern, even if these assets may eventually be redeployed in more productive combinations elsewhere. Furthermore, senior creditors have incentives to initiate liquidation proceedings that may impose externalities on other stakeholders in the firm. Entry

may be constrained by imperfections in capital markets as well as in markets for products, services and human resources. Overall, both entry and exit involve gambles: the disruption of existing productive relationships in the hope that new relationships will be more productive than the old. The circumstances in which these gambles take place may significantly affect the probability of their success.

As a first step, therefore, we look at booms and recessions to see whether these highly different macroeconomic circumstances affect the success of turnover in raising productivity. It might be, for instance, that recessions expose firms to a more effective pressure to raise internal productivity, and discriminate more effectively between productive and unproductive firms in the selection process; if so, periodic recessions might be a necessary price of an innovative and dynamic economy. It might also be that booms encourage entrants that in some sense "deserve" to be in a market but cannot enter in normal years due to problems in obtaining finance. If both of these hypotheses were true then a volatile business cycle might be preferable – from a productivity point of view – to stable periods of middling growth. We use evidence from the analysis of the longitudinal micro data on UK manufacturing and from a survey of British firms in the recession of the early 1990s (Geroski and Gregg, 1997) to investigate these questions. This evidence tends to suggest that on the contrary, booms and recessions are a bad combination: booms encourage in entrants who lack staying power, while recessions lower internal productivity growth and increase the frequency of exit without improving the effectiveness of selection. Large fluctuations appear to involve higher turbulence than is needed to achieve given levels of productivity growth.

The fourth main task of this paper is to investigate whether societies "catching-up" with the rest rely more or less on selection, and whether selection is a more or less turbulent process, than in established industrialised countries. A natural laboratory in which to investigate this question consists of the societies that abandoned central planning a decade ago. In these societies, resource allocation via the plan was halted, the price mechanism and the profit motive were allowed to operate and competition from foreign suppliers was introduced. We look for evidence of the response of firms to the transition, and the role of competition in influencing this response. Unfortunately the available data do not allow us to make direct comparisons of the role of selection in market and transition economies, but it appears that turbulent activity has been an extremely important feature of the transition. We consider whether the massive output fall in many transition countries (especially in the former Soviet Union) can be seen as a consequence of excessive turbulence. Have the major failures of state institutions, the absence of basic market infrastructure, and the instability of the macroeconomy prevented these economies from capturing the benefits of creative destruction?

The paper is organised in three parts: part one analyses advanced market economies and part two examines transition economies. In part three, we bring together the insights from both to ask whether the empirical findings on the role of turbulence and competition in productivity growth are helpful in designing policy.

1. Creative destruction in advanced market economies[3]

1.1 Data

Almost all productivity growth studies for advanced market economies are conducted at the industry or aggregate level. To answer our questions, we must turn to micro data. UK work uses the ARD data (Annual Census of Production Respondents Database), the micro data collected for the *Census of Production*[4]. The database is an unbalanced[5] panel with around 140,000 manufacturing establishments per year, 1980-1992. Although not all the establishments provide the full range of output and input information, over 80% of manufacturing employment is covered by those that do so. This is the most comprehensive UK manufacturing data set available.

Crudely, the data are arranged by establishment, with unique identifiers for each establishment and a unique identifier linking each establishment with the firm that owns it (if it is a multi-establishment firm).

In this paper, ARD data are used at their most disaggregated level: the establishment is the unit of analysis. This provides the most comprehensive picture of the transfer of market shares between establishments and of the entry and exit of plants. This implies that some market share transfer and turnover of plants is occurring between establishments but within a firm. Although it can be argued that the firm rather than the establishment is the appropriate unit of analysis for some of our questions, we are able to identify the establishments that belong to multi-establishment firms. This enables us to separate the contribution of entry and exit of single establishment firms from that of plants within multi-establishment firms. Entry is tracked if an establishment appears with a new reference number, exit if a reference number disappears and survival if the number is the same. If there is no error in recording, a change of ownership of an establishment will not be recorded as entry or exit. Since each establishment has information on gross output, labour, capital and material inputs, both labour productivity and TFP can be constructed[6].

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[3] Much of the following draws on work reported in Disney, Haskel and Heden (2000) and Barnes and Haskel (2000) which contains more information on the data; see also Oulton (1997)..

[4] Other similar work for other countries is the US (McGuckein and Pascoe, 1988, Foster, Haltiwanger and Krizan, 1998), Canada (Baldwin, 1998), France (Kramartz, 1999), Korea (Aw, Chen and Roberts, 1999), and Israel (Griliches and Regev, 1995). Bartelsman and Doms (2000) provide a survey.

[5] Since units enter and exit, the panel does not contain the same units in each time period.

[6] DHH compute changes in both labour or total factor productivity ($\Delta \ln Y/L$, or $\Delta \ln TFP$). They define log of labour productivity $\ln(Y/L)$ as real gross output per person hour, calculated using a four-digit industry output price deflator. Y and L are available directly from the Census, but only (two-digit) manual hours are available. Log of TFP is calculated as

$\ln TFP_{it} = \ln Y_{it} - \alpha_K \ln K_{it} - \alpha_L \ln L_{it} - \alpha_M \ln M_{it}$ where Y is real gross output, K real capital, L are worker hours, and M is the volume of materials used, the αs are shares of each factor in gross output and i denotes establishment. M and L are recorded directly from the ARD, but capital stock is estimated by perpetual inventory methods using establishment-level data on investment in plant, vehicles and buildings, with the starting values and depreciation rates taken from O'Mahony and Oulton (1990). Labour input is person hours as above. Capital and materials are deflated by the appropriate four-digit industry price deflator. Following Foster, Haltiwanger and Krizan (1998), DHH calculate the factor shares at the four-digit industry level to minimise the effects of measurement error (see below).

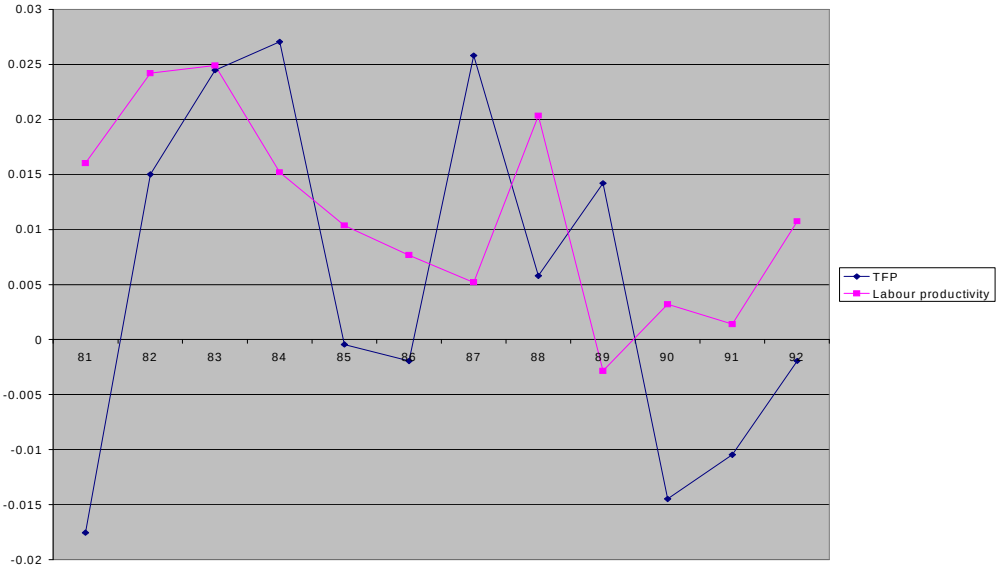


Figure 1
Growth of labour and total factor productivity in UK manufacturing

Source: ARD data.

Aggregate data for $\Delta \ln Y/L$ and $\Delta \ln TFP$ are set out in Figure 1. In the early 1980s both labour productivity and TFP grew but the rate of growth slowed over the period.[7]. Calculating how much of these changes are due to the effects of selection, within-firm growth and entry and exit is our key objective.

1.2 Entry, exit and the productivity spread in UK establishments

We begin with the question of how much entry and exit there is in UK manufacturing. To set the scene, column 1 in Table 1 shows that on average each year there were around 140,000 establishments, of which almost 120,000 were free-standing single-owned establishments whilst around 24,000 belonged to groups of more than one establishment. To calculate entry and exit, establishments of all sizes are used[8]. Of these establishments, almost 90,000 were survivors, 26,000 establishments had entered and there were around 28,000 exitors. Of the entrants and exitors about 2,000 and 3,500 respectively were part of a larger enterprise. Thus around one in five establishments in UK manufacturing have either just entered or are about to exit.

The vast majority of these are tiny firms that in total account for less than 5% of employment. The second column of Table 1 shows the employment accounted for by each component. Although there are many single establishments, they account for 23% of total employment: 77% of total employment is in multi-establishment firms. Note too that among entrants and exitors, multi-establishment firms account for around half of employment.

[7] The measure of TFP depends on measuring capital accurately, in particular to take account of disappearance of capital in the early 1980s due to exit. Since our capital is measured at the plant level we take explicit account of this.
[8] The Census is built up from a register of companies based on accounting records, VAT records and other information. We deleted firms with zero employees, negative gross output and other clearly incorrect observations.

Table 1 Survivors, entrants and exitors in UK manufacturing industry: averages per year (1986-1992)

		Number of establish-ments	Percent of number		Employ-ment total	Percent of employment		Avge size
			total	sub group		Total		
Establishments		142,722	100		4,585,700	100		32
of whom	Single estab.	119,207		83.6	1,064,100		23.2	9
	Part of enterprise	23,515		16.4	3,521,600		76.8	150
Survivors		89,231	62.6		4,092,500	89.3		46
of whom	Single estab.	71,208		79.8	843,500		20.6	12
	Part of enterprise	18,023		20.2	3,249,000		79.4	180
Entrants		25,890	18.1		194,200	4.2		8
of whom	Single estab.	23,963		92.6	106,900		55.0	4
	Part of enterprise	1,927		7.4	87,300		45.0	45
Exitors		27,601	19.3		299,000	6.5		11
of whom	Single estab.	24,036		87.0	113,700		38.0	5
	Part of enterprise	3,565		13.0	185,300		52.6	52

Source: DHH (2000)
Note: Selected and non-selected data for the period 1986-1992. Figures are averages for each year. An entrant is an establishment that is new in time *t*, a survivor was present in *t* and *t-1*, and an exitor was present in *t-1* but absent in *t*.

In order to assess the challenge that entry presents to incumbent firms, we are interested in the heterogeneity of productivity levels across the economy and how that of entrants compares with incumbents and exiting firms. Table 2 contains some key facts. The first row reports on all UK manufacturing establishments in existence at any time between 1980 and 1992. As the row shows, there were 157,660 of them, producing on average just over £24 worth of output per worker per hour (at 1990 prices). The final column computes the ratio of the productivity of the establishment at the 90th percentile of the ranking with the establishment at the 10th percentile of the ranking. In this sample the establishment at the 90th percentile is producing almost five times per worker hour as much as the establishment at 10th percentile.[9]

What explains such a spread? We examine whether this apparent heterogeneity is an artefact of combining data from establishments from across the manufacturing sector over a period of more than a decade. Does it disappear when we look more closely, disaggregating by year, industry, product, region and input mix? To test this, the second row shows data for 1980 and the third row for 1992. Clearly the average level of productivity has grown, but the spread is almost exactly the same. Rows 4-6 re-calculate the differentials for progressively finer product definitions within the clothing industry, while row 7 provides information for a particular region (the Northwest). Rows 8 and 9 show variations in capital/labour and skill intensities, and Row 10 the consequent levels of total factor productivity for the most precisely defined product and geographical category. Differences in TFP are just above a factor of 2. This is clearly less than the labour productivity differences, as would be

[9] The lowest and highest percentile were removed to avoid the calculation being dominated by outlying plants, which could reflect measurement error.

expected, but it means that even establishments in like industries, in like areas, using like inputs still have very different levels of productivity[10].

Table 2 The productivity spread.

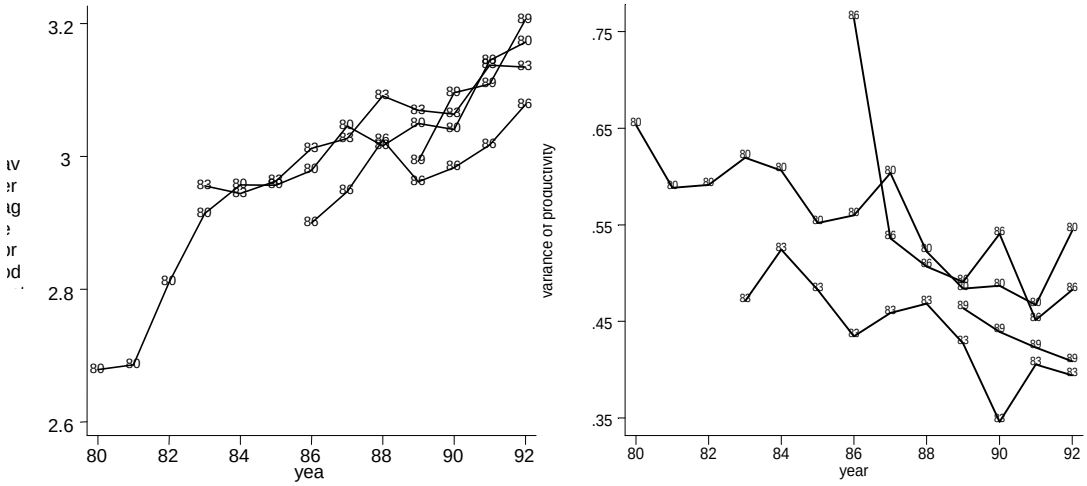
	Establishments	Number of establishments	Mean productivity (£ per person per hour, 1990 prices)	Productivity of establishment at 90th percentile relative to that at the 10th percentile
1	All establishments 1980-92	157,660	£24.1	4.8
2	1980	10,981	£18.4	4.4
3	1992	10,795	£27.9	4.5
4	All establishments, clothing (outerwear, underwear, hats, gloves)	2,402	£11.1	3.2
5	Men's outerwear (jackets, coats, trousers)	1,154	£10.0	2.7
6	Women's outerwear (jackets, coats, skirts, trousers)	716	£12.3	4.1
7	Men's outerwear, establishments in Northwest	148	£10.2	2.5
	Inputs			
8	Men's outerwear, establishments in Northwest, capital/labour ratio	148		3.6
9	Men's outerwear, establishments in Northwest, white collar/blue collar ratio	148		5.5
10	Men's outerwear, establishments in Northwest, TFP	148		2.1

Source: Haskel (2000).

We would expect competition to even out productivity spreads such as these, either through selection of firms over time or through catch-up by poorly-performing firms. Figure 2 shows that the variance of productivity does indeed decline as each cohort ages.

[10] Another hypothesis is that there are in fact no real productivity differences but the data shows some due to measurement error. If this were the case, measured productivity would be uncorrelated with economic variables that would be expected to affect productivity. However, measured productivity falls as cohorts age (as would be expected if there were selection) and is positively correlated with inputs and negatively correlated with competition variables (DHH, 2000). Whilst there surely is some measurement error in these (as in any) data we doubt that the bulk of the measured productivity differences reflects error.

Figure 2. Average labour productivity and variance of labour productivity, by cohort



Source: Haskel (2000)

Is this due to selection or to catch-up? We compare the productivity of entrants, exitors and survivors. Figures 3a and 3b show (smoothed) data for the individual years. In most years the productivity of exitors, whether measured by labour productivity or TFP is lower than survivors, particularly in the sharp recession of the early 1980s. This is not true in the last three years of data but for most of the period, the net effect of entry and exit seems to be contributing positively to productivity. The next section quantifies the contributions of entry and exit more formally.

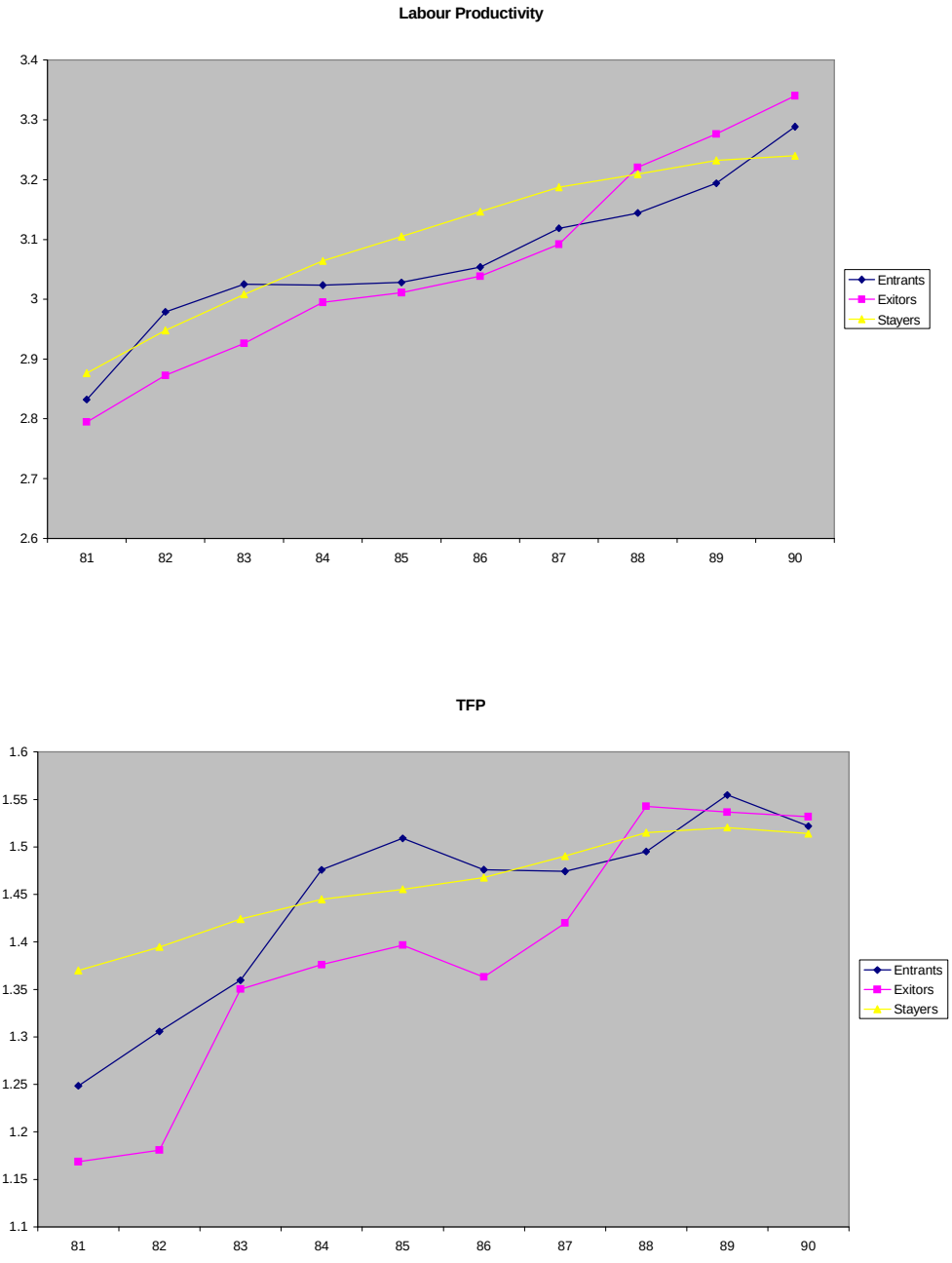


Figure 3a and 3b. Average annual productivity by establishment type: Labour productivity (top) and TFP (bottom)

Note: Population weighted. Smoothed by three year moving averages.
Source: DHH (2000)

1.3 Decomposing productivity growth : entry, exit, selection and within-firm effects

The findings above of considerable heterogeneity of productivity levels across establishments, the reduction in the variance in productivity as a cohort ages and the relative productivity levels of entrants, exitors and survivors together are consistent with the idea that a process of creative destruction is at work that raises overall productivityHow much does turnover contribute to productivity growth as compared with the less costly within-establishment and market selection effects? Manufacturing-wide productivity in year *t*, P_t, is a weighted average of establishment productivity in each period, so $P_t=\Sigma_i\ \theta_{it}\ p_{it}$ where θ_i is the share of establishment *i* (output or employment shares) and P_t and p_{it} are ln*TFP* or ln*(Y/L)*. Since the roots of productivity growth lie at the level of the establishment, we look at the following components: changes in *P* due to changes in the weights, changes in establishment productivity, and entry and exit of establishments. Following Foster, Haltiwanger and Krizan (1998) (FHK) one can write this formally as

$$\Delta P_t = \sum_{i\in S}\theta_{it-k}\Delta p_{it} + \sum_{i\in S}\Delta\theta_{it}(p_{it-k}-P_{it-k}) + \sum_{i\in S}\Delta\theta_{it}\Delta p_{it} + \sum_{i\in N}\theta_{it}(p_{it}-P_{it}) - \sum_{i\in X}\theta_{it-k}(p_{it-k}-P_{it-k}) \quad \textbf{(1)}$$

where S is the set of surviving establishments (present at the beginning of the period and still present at the end); N is the set of entrants (not present at the beginning but present at the end) and X is the set of exitors (present at the beginning but not present at the end).

The first term shows the contribution to productivity growth of growth within the surviving establishments (weighted by their base market shares). The second term shows the contribution when survivor market shares increase for those with above-average base year productivity. The third term is a covariance term that is positive when market share increases (falls) for establishments with growing (falling) productivity. The final terms capture the turnover effects, which are positive when there is entry (exit) of above- (below-) average productivity establishments.[11] Table 3 reports the results from these decompositions for a number of years and studies. The between and cross terms are combined under the heading of market selection and the net contribution of entry and exit is shown, along with the individual contributions in parentheses (note that in accordance with (1), a negative sign on the exit effect signifies that exitor productivity is below the average).

[11] This method is only one of a number of different methods proposed in the literature, see FHK and DHH for a review and discussion of the different methods and DHH for decompositions using UK data of each of these methods.

Table 3 Productivity decompositions, Labour productivity and Total factor productivity: results for the UK

1	2	3	4	5	6	7
Measure	**Study**	**Years**	**Growth rate (% pa)**	**Within**	**Market selection**	**Net entry**
ΔlnY/L						
	DHH (2000)	1980-92	4.53	48	3	49
	DHH (2000)	1982-89	4.75	64	-7	43
	BH (2000)	1994-97	1.69	46	-1	55
TFP growth						
	DHH (2000)	1980-92	1.06	5	41	54
	DHH (2000)	1982-89	2.02	38	23	39

Note: All values in columns 5-7 are per cent of column 4 annual growth rate. BH is Barnes and Haskel. Within, and net entry refer to the respective terms on the right-hand side of equation (1), with net entry the combined effect of the last two terms. Market selection is the sum of the between and cross terms.

The labour productivity calculations show that within-establishment growth accounted for half or slightly more, and net entry for half or slightly less of overall productivity growth, both in the high-growth years of the 1980s and the slower-growth years of the mid-1990s. TFP growth, however, seems to have been systematically related to the overall growth rate of the economy: within-firm growth accounted for more, and net entry for less, during the boom years of the mid-1980s[12].

It is difficult to get an international perspective since different countries use different data sets, population weighting and decompose over different years. DHH compare UK and US manufacturing 1977-87 and find very similar net entry effects, but a somewhat larger US within effect for growth in labour productivity and TFP.

The decomposition analysis identifies a substantial accounting contribution of net entry to productivity growth. But does this contribution come mainly from the rise and fall of single-establishment firms or from the opening and closure of establishments by multi-plant firms? To answer this question, Table 4 presents the decomposition of productivity growth for firms that are single establishments and those where firms are multi-establishment, for the 1980-92 period. The top row decomposes $\Delta \ln(Y/L)$. The first two columns show the within effect for survivors, split into productivity growth within single establishment survivors and productivity growth within surviving establishments that are part of multi-establishment firms. As the table shows, single surviving establishments had almost no productivity growth.

[12] These findings are corroborated by figures from the 1970s, a period of slow growth in which the contribution from within-firm growth was negative.

By contrast, survivors who were part of a group accounted for 45 percent of overall productivity growth.

Looking at the net entry column, net entry by singles raised productivity growth, accounting for about 16% of the overall increase. This reflects the fact that although single establishment entrants are very small initially and many fail and exit during the sample period, there is a significant contribution to overall productivity growth over the 12 years from those that survive and prosper. Nevertheless, the net entry effect of establishments that are a part of a multi-plant firm accounts for about double this amount, so around a third of productivity growth was due to the closure of low productivity establishments within existing firms and the opening of high productivity establishments. The figures for TFP show a similar picture.

Table 4 Productivity decompositions, Labour productivity and Total factor productivity 1980-92: Singles and Groups

	Within		**Market selection**		**Net entry**	
Average labour productivity growth 4.53% per annum.						
	Single	Group	Single	Group	Single	Group
Δln*(Y/L)*	1	45	0.1	1	16	33
Average *TFP* growth 1.16% per annum.						
	Single	Group	Single	Group	Single	Group
Δln *TFP*	0.2	4	0.5	38	13	41

Note: There are two extra within and between terms not displayed in the table for stayers who change from single to group and vice versa. For labour productivity they sum to 4.59%, and for total factor productivity they sum to 3.92%. Data are employment weighted. Decomposition method described in equation (1).
Source: DHH (2000)

1.4 Turbulence and productivity growth: booms and recessions

Whether by entry and exit, or the transfer of market shares, the process through which resources are reallocated between establishments accounts for a sizeable fraction of productivity growth. Entry and exit have the most consistent effects, at around 30-60% of overall productivity growth.

We now pursue the question of whether the different components of the productivity growth process make the same contribution over the business cycle. The final row in Table 3 provides a perspective on this by calculating TFP growth for the boom period 1982-89. Comparing the contribution of within productivity growth to the full period contribution shown in the penultimate row of table 3, the data show that the within contribution is larger in the boom as compared with the full period, which includes recession years. This suggests that booms are periods when productivity growth and in particular, TFP growth, is boosted by high within establishment growth whilst recessions are periods during which there is little within establishment growth, but a high contribution from turbulence.

This turns out to be a consistent feature of both these data (DHH, 2000) and US data (FHK), namely that the contribution of net entry is less in booms. This is consistent with sorting among entrants. In recessions, the marginal entrant is likely to have to be of relatively higher quality than in booms. Hence in booms one would expect the contribution of net entry to be lower, which is what we find[13].

Can we find more direct evidence that the business cycle affects the sorting efficiency of entry and exit? DHH report regressions of hazard rates (conditional probabilities of exit) for firms as a function of their TFP level relative to that of the industry in the year concerned. TFP is significantly negatively related to the exit probability, which indicates that low-productivity firms have a higher probability of exiting in any given year than do high-productivity firms. However, when TFP is interacted with year of exit, there is no significant variation from year to year. Boom and recession years do not appear to make any difference to the sorting efficiency of the exit mechanism.

A second way to consider the question is to estimate hazard regressions in which the year of entry appears as an explanatory variable: if entry is less efficient in boom years, then the hazard rates of boom-year entrants should be higher than others. Table 5 shows the cohort effects for for cohorts 1986 to 1991 (the omitted dummy is the 1986 cohort); the comparison is difficult for earlier years due to sampling changes. The three boom-year cohorts 87-9 do indeed have significantly higher exit probabilities than the control cohort and than the recession cohort 1990. The recession cohort 1991 also has a higher exit probability, which is somewhat puzzling though may be due to another sampling change. A notable feature of the table is that group establishments do not show higher hazard rates for boom-year entrants, which corroborates the impression from Table 4 that multi-plant firms prosper better on average from the turnover gamble than do single-plant establishments.

On balance, therefore, it seems likely that the quality of entrants is indeed affected by the business cycle (in the sense that boom years encourage low-productivity single-plant entrants), whereas the quality of exitors is comparatively independent of the cycle. In particular, large business cycle fluctuations could be said to encourage marginal entrants whom subsequent recessions will only remove. However, boom years see a much greater growth of productivity within surviving firms.

[13] Note that we are not able to measure the opportunity cost of the resources employed by the entrant; the overall contribution of entry to the economy is the productivity of these resources after entry net of their opportunity cost. It is possible that this opportunity cost also varies across the cycle, but if so it is likely to vary pro-cyclically (in recessions resources have a lower probability of productive employment elsewhere). This means that the cost to the economy of low-productivity entry in booms is likely to be greater than our calculations make it appear.

Table 5 Hazard regressions, conditional probability of exit.

	Single establishments		Group establishments	
Covariates	Coeff	t-stat	Coeff	t-stat
σ*AGE	0.02	3.42	0.04	1.43
Cohort87	0.07	6.53	-0.06	-1.60
Cohort88	0.24	15.05	-0.08	-1.80
Cohort89	0.13	11.69	-0.01	-0.01
Cohort90	-0.01	-0.82	-0.04	-0.80
Cohort91	0.21	11.72	-0.21	-3.19
Number of observations	318,094		31,372	
Log likelihood	-1,202,429		-62,420.741	

Notes: Estimates are coefficients from Cox proportional hazard estimates. Also included, but not reported are size, size squared, initial size, initial size squared, demand (the change in manufacturing sales) and all of the above variables interacted with age, two digit industry dummies, and register change dummies. Absolute robust t-statistics reported. Size is log employment and AGE is age since entry, σ is the change in manufacturing sales.
Source: Disney, Haskel and Heden (1999).

We can pursue the question of how effective recessions are in boosting productivity in *survivor* firms by referring to the results of a detailed survey of the impact of the early 1990s recession on British firms (Geroski and Gregg (1997)). Discussions of creative destruction sometimes suggest that the adversity faced by firms as demand contracts in a recession has the same beneficial effect on incentives to restructure as the contraction of their market due to more intense competition from innovative rivals. The evidence accumulated by Geroski and Gregg casts doubt on the hypothesis that recessions promote restructuring that enhances the firm's innovative capacity.

They find that recession is not the most important driver of organisational change and that such changes as do occur in response to recession are not those most conducive to long term growth. In particular, they find that firms badly affected by the recession concentrate on cost restructuring, with the most common responses being the closure of a plant, cuts in employment and reduction in wage costs. Such firms emerge leaner from the recession but their evidence suggests that they are only temporarily fitter. By comparing the answers to their questions on the impact of recession with results of surveys on responses to the competitive threat from new entry, Geroski and Gregg conclude that 'firms feel unable to modify the effects of major shocks like recessions on the demand for their products, however confident they are of coping with changes in the demand for their products induced by changes in competition.' (p. 77). The innovating firms in their sample were those that did not view the firm to have been severely affected by the recession or thought the recession was over.

To summarise, it appears that booms tend to lead to entry of less efficient firms and that recessions do not select firms for exit more effectively than 'normal times'. The message from the survey results is that recessions are not the crucible of innovation.

1.5 Market conditions and survivor productivity growth

In an economy with heterogeneous cost firms, an improvement in the competitive infrastructure would be expected to raise productivity through the net entry and selection effects. It is also possible that more intense competition may raise productivity growth among the survivors.[14] A number of recent studies have attempted to use panel data to see if productivity growth is affected by product market competition.[15] The following equation is typical

$$\Delta \ln Y_{it} = \alpha_1 \Delta \ln I_{it} + \beta_1 \Delta Z_{1it} + \beta_2 Z_{2it} + \varepsilon_{it} \qquad if\ i \in S \qquad (2)$$

where growth in inputs is given by $\Delta \ln I$ and S is the set of survivor firms i.e. present in all years. The Z variables are various measures of competition, and β_1 (β_2) shows whether competition affects the level (growth) of estimated ln*TFP*. Nickell (1996) extends the earlier studies and uses the (lagged) change in the firm's market share and a measure of (lagged) rents (profits as a proportion of sales) entered as both a difference and a level regressor in estimating (2). He finds that companies with monopolistic power (measured as those that have made high lagged abnormal profits) have lower productivity and those with a fall in lagged market share have faster productivity growth. Thus competition seems to affect both the level and growth of productivity. Similar results are obtained in DHH using the larger sample of establishments discussed above.[16]

1.6 Summary

The evidence we have gathered about developed market economies can be summarised as follows.

1. There is considerable heterogeneity in the productivity levels of plants in UK manufacturing even when differences in product, region and inputs are taken into account.
2. Such heterogeneity plays an important role in how competition works and productivity advances. Only about one-half of productivity growth takes place within surviving establishments, with net entry accounting for about another 30%. Although the entry and exit of single establishment firms makes a limited impression on an annual basis, the survival and growth of some entrants and the cumulative impact of exit have a significant effect on productivity growth over a decade or more. An even more important contribution comes from the net effect of the opening and closure of plants by multi-plant firms.
3. There are signs that in booms, entry is less selective and that recessions are not better than 'normal times' at expediting the exit of poorly performing

[14] For formal models of the effect of competitive infrastructure on selection and incentives, see Aghion and Schankerman (1999), (2000).

[15] Haskel and Szymanski (1992) estimated (2) for a panel of privatised UK firms with (lagged) market share as a measure of Z. They found a negative effect, suggesting that firms with monopolistic power have lower productivity. Similar findings were reported in Nickell, Wadhwani and Wall (1992) using a panel of about 600 quoted companies. Other relevant studies include Nickell, Nicolatsis and Dryden (1997), Ng & Seabright (2000), Blundell, Griffith and Van Reenen (1995, 1999) and Baily and Gersbach (1995). The effects of competition from imports vary in their significance between studies.

[16] DHH also show that the within firm effect of competition is overstated when only survivor firms are included in the estimation. Nickell finds for example that a 10% increase in market share lowers TFP by 3.5% and a firm earning abnormal profits at the 80% percentile of the abnormal profit distribution has TFP growth 4% lower than one at the 20% percentile of the distribution; DHH find effects of 2% and 1% respectively.

establishments. Recessions also tend to leave survivor firms leaner but not necessarily fitter and do not promote innovation.

4. More competition in the product market at the level of the firm raises both the level and growth of productivity.

2. Competition and restructuring in transition economies

Both competition and turnover through entry and exit were absent from the planned economies. The widespread presence of soft budget constraints meant that differences in productivity between production units exerted no significant influence over the subsequent allocation of resources. Nickell (1996) notes that a compelling piece of broad brush evidence of the importance of competition for productivity growth comes from the planned economies: 'the low level of productivity in Eastern Europe relative to that in Western Europe is an impressive example of what can be achieved by repressing the forces of market competition.' (p.728). This makes the analysis of the consequences for productivity of the reintroduction of competition in the transition countries especially tantalising.

It is therefore all the more striking and disturbing that rapid catch-up with market economies has not occurred in the decade since the start of transition. With the exception of Poland, no large transition economy has seen a rapid and unambiguous growth of GDP, and even Poland endured an initial recession of considerable severity[17]. This might have been because firms that had become used to central planning were too rigid and slothful to take advantage of new opportunities, a description that might be thought particularly to characterise state-owned firms or those privatised to their management and workforce. But evidence we report from an EBRD-World Bank survey shows clearly that this is not the explanation. Quite the contrary: there has been substantial reallocation of resources between firms[18], and firms themselves have been undertaking a great deal of restructuring activity, including opening and closing plants, changing suppliers, customers and sources of finance, and introducing new products and processes. These restructuring activities have been highly responsive to the state of competition, in ways we describe below.

Why therefore has all this activity not borne fruit in the form of sustained productivity and income growth across the transition economies? The answer appears to be that it has involved a very large degree of disruption. In market societies, as we argued above, the disruption associated with competition may have an important productivity payoff. But because of an environment of weak property rights with imperfectly functioning market signals, it seems that transition economies have endured the disruption with much less assurance of a productivity payoff. Although we cannot measure the costs of such disruption directly, we present indirect evidence that suggests that the arrival of competition in transition economies has been associated with a much more extreme form of the disorderly turbulence that characterises recessions in the UK. This is in spite of the fact that the task facing such societies has

[17] Apart from Poland, recorded real GDP was back to its 1989 level by 1998 in only two small economies (Slovenia and Slovakia) (EBRD *Transition Report* 1999, p.73).

[18] There has also been substantial reallocation of resources between industrial sectors, but as Carlin, Fries, Schaffer and Seabright (2000) discuss, this has played an entirely minor role in overall productivity growth.

primarily been one of catching up with market economies by implementing well understood technologies and organizational structures rather than innovation in the strict sense.

To date, a comprehensive decomposition analysis of the sources of productivity growth at the firm or establishment level has not been undertaken for any transition economy. As is clear from the analysis reported in section 1, the data requirements for such work are very demanding. However, one such study has been carried out for a middle-income country, namely, Israel (Griliches and Regev, 1995). The comparison with the results in section 1 may provide a pointer to the likely problems that transition countries face in establishing an effective competitive infrastructure. Griliches and Regev examine a period of weak aggregate productivity growth from 1979-88 and conclude that in spite of the large amount of turnover and churning in firms and jobs that was observed, most of the productivity growth occurred within survivors. Although one must be cautious in comparing the results, there is at least a suggestion here that the competitive process at work in an advanced market economy, where net entry makes a substantial contribution to aggregate productivity growth over a decade, was not operating fully in the Israeli case in this period. The result for Israel contrasts with evidence from Taiwan, where the percentage of the market captured over five years by new entrants is even higher than in advanced economies (Tybout, 2000). This appears to be linked to the competitive infrastructure in the sense that in Taiwan the entry costs in the form of discriminatory business regulation and tax treatment for firms moving into higher size categories are very low. The evidence from advanced and developing countries suggests that the state of the competitive infrastructure is important for the incentive effects of competition to boost within-firm productivity and for market selection to raise productivity via entry, exit and selection effects.

2.1 Restructuring and competition: a description

For transition countries, there is an absence of suitable census data for conducting similar analyses to those reported above. In particular, this means that we cannot quantify the contribution of incentive and selection effects. In an attempt to uncover how surviving firms have restructured and the role that has been played by new entrants and by the introduction of competition across a wide range of transition countries, a set of questions was devised for the 'Business Environment' survey conducted jointly by the World Bank and the EBRD in the summer of 1999. We turn now to what that survey reveals about restructuring and competition. More detailed results are provided in Carlin, Fries, Schaffer and Seabright (CFSS, 2000).

The EBRD survey included over 3,500 firms in 25 transition countries. In contrast to the data sources used for the UK analysis (and for many of the previous studies on transition), this survey spanned the entire economy. The only sector that was dropped from the analysis is agriculture. Firms were selected randomly from company registers to reflect the sectoral composition of output, although quotas were imposed to ensure that large and state-owned firms were represented. Approximately 125 firms were surveyed in each country, with larger samples in Russia, Poland and Ukraine. The sample was divided about evenly between old firms, i.e. those that existed in some form in the planned economy and new firms (Table 6). Amongst the old firms, nearly two-thirds had been privatised. Over half of the firms were small, i.e. with less

than 50 employees. Just under half of the firms were in industry, with the rest in services. Nearly one-third were from the Central and Eastern European region, including the Baltics, one quarter from South Eastern Europe and the rest from the CIS (Commonwealth of Independent States).

Table 6 Real sales and productivity growth by ownership and size of firm

	Proportion of firms by category in sample (%) Number of firms = 3,498			
Ownership	**Old firms**		**New firms (i.e. with no state-owned predecessors)**	**All firms**
	State-owned	**Privatised**		
	16.0	29.1	54.9	
Real sales growth (%)	-1.0	-2.0	6.2	2.6
'Productivity' growth (%)	8.9	8.2	-3.1	2.2

Source: CFSS Tables 1 and 2. Real sales growth refers to the reported growth of sales in real terms over the previous three years (mean log growth). Productivity growth is calculated from the reported growth of real sales and in employment over the previous three years (mean log growth).

The survey gathered information about the change in sales in real terms over the previous three years and the change in employment. Just under one-half of firms (46.3%) reported that they had experienced positive growth of sales; 23.8% reported no change and 30.8% reported a decline. In Table 6, the average growth and 'productivity' performance (calculated from reported changes in real sales and in employment) of the sample firms is shown. Old firms (i.e. state-owned and privatized ones) have falling real sales but quite rapidly rising 'labour productivity', whereas the converse is true for new firms. Note that this does not mean that new firms have been 'inefficient' (something we could not assess without total factor productivity evidence that is beyond the scope of the survey). Rather, it indicates that they have been employing new labour even faster than they have been experiencing rising sales. This may or may not be to their advantage in the long run; what it does suggest, however, is that new firms are the agents of a large redeployment of human resources into new activities, whether or not these activities are ultimately productive ones.

In the enterprise survey, we sought to find out the frequency with which firms in transition economies undertake a broad range of restructuring actions. It is immediately obvious from Table 7 that there is a great deal of restructuring going on within firms in the transition economies, even state-owned ones. In terms of defensive cost-cutting measures such as substantial labour shedding and plant closures, state firms have, if anything, been doing slightly more than privatized ones. Where ownership change appears to matter is in the introduction of new products, the opening of new plants and expansion of employment, and in changing the customer base and suppliers. We note that although the balance between defensive and more future-oriented restructuring differs between state-owned and privatized firms, they report similar rates of 'productivity' growth. We need to investigate whether these

patterns are is a function of ownership or of a different competitive environment for state and privately owned firms.

Table 7 Enterprise Restructuring Activities in Transition Economies
(In proportion of firm type, %)

	Old firms		**New firms**	**All firms**
	SOE	**Privatised**		
Employment decreases	47.7	44.6	18.2	30.6
Closure of plant	11.1	11.0	5.8	8.2
Employment increase	14.5	21.9	36.8	28.9
Opening of new plant	15.7	22.7	19.1	19.6
New product line	26.8	33.0	28.2	29.4
Upgrading of product line	41.4	42.6	37.3	39.5
Change supplier	16.2	21.1	21.6	20.6
Change customer	17.9	27.3	23.7	23.8
Change main bank	15.4	17.9	14.0	15.3
Change organisational structure	7.8	12.4	8.4	9.5

Source: CFSS Table 3.
Notes: All restructuring indicators refer to changes in the previous three years. Employment decrease/increase refers to a decrease/increase of employment of more than 10%. 'New product line' refers to the successful development of a major new product line. 'Upgrade' refers to the upgrading of an existing product line. 'Change supplier'; 'Change customer' is change of identity of main supplier/ main customers (>20% of sales). 'Change organisational structure' means firm has had a completely new organisational structure.

We turn now to the competitive environment in which firms in transition countries operate. We posed questions that were designed to elicit an assessment by the manager of the firm of the extent of competitive pressure under which he or she was operating. Managers were asked to concentrate on the firm's major product line and to identify the number of competitors it faced: zero, between one and three and more than three. Secondly, the manager was asked to estimate the elasticity of demand faced by the firm's main product. Would a 10% rise in the real price of the firm's product lead to a fall in demand for the product?

The results demonstrate a clear difference in the competitive environment faced by state as compared with private firms. Over one-quarter of state owned firms claimed to have no competitors in the market for their main product – this is true of less than 10% of privatised and of only 5% of new private firms. A very similar pattern was revealed by the answers to the question on the response of product demand to an increase in own price (see Panel B of Table 8). When asked to indicate the importance of the pressure from domestic or foreign competitors in influencing the decision to introduce new products or enter new markets, we once again observed a split between the state owned and private firms. Competitive pressure was much more frequently identified as very important by privately owned firms. For privatised firms, the impact

of foreign competition appeared greater than for new firms, probably reflecting the difference in average size of the firm[19].

Table 8 Competition in the Product Market

	Old firms		**New firms**	**All firms**
	SOE	**Privatised**		
Panel A. Strength of competition (in proportion of firm type, %)				
Zero competitors	26.7	8.8	5.0	9.6
One to three competitors	18.3	13.3	11.8	13.2
More than three	55.0	77.9	83.2	77.2
Panel B. 10% price test (in proportion of firm type, %)				
Many customers would switch to other suppliers	26.5	36.2	39.5	36.5
No change in sales	24.5	11.4	10.9	13.2
Panel C. Pressure from domestic and foreign competitors in decisions to develop new products and markets (in proportion of firm type, %)				
Domestic competition	18.8	22.9	28.1	25.1
Foreign competition	17.5	21.1	15.3	17.4

Source: CFSS Table 7.
Note. The question asked in Panel A was 'Thinking of your firm's major product line in the domestic market, how many competitors do you face?'; in Panel B: 'If you were to raise prices of your main product line 10% above their current level (after allowing for any inflation and assuming that your competitors maintained their current prices), which of the following would best describe the result?' Answers to two of the four possible responses are shown; in Panel C, the proportion of each type of firm reporting that pressure from domestic or foreign competitors is 'very important' is shown.

It is likely that the ability of a competitive market environment to enhance productivity growth depends on other aspects of the institutional environment. Even in the presence of a high degree of initial dispersion of productivity between firms, some features of the economic environment may prevent selection from working effectively. In transition countries budget softness is the primary factor that suppresses productivity differentials. By budgetary softness we mean direct budgetary subsidies for current operations, access to subsidised finance for investment and the condoning of tax arrears and arrears to state-owned utilities. State owned firms finance more than one-fifth of their investment from state finance, whereas this is negligible for other firms. In terms of the more general concept of budgetary softness captured by arrears, the big difference was between old and new firms rather than according to ownership (see CFSS Table 6). Old firms reported markedly greater budgetary softness than did new firms and this suggests that the productivity-enhancing impact of a given level of competitive pressure would be less than for new firms. In practice a major channel through which this is likely to have operated is in slowing down the exit of poorly performing old firms.

[19] The proportion of firms that identifed foreign competition as very important increased with the size of the firm and the proportion that identified domestic competition fell with the size of firm (CFSS Table 7).

The institutional infrastructure refers to the governance of firms and financial institutions, the functioning of factor and goods markets and the role of the state in providing legal and regulatory structures and raising taxation to finance public services. It is very difficult to measure the quality of the institutional infrastructure that firms face. Nevertheless, managers were asked to identify the importance of a set of regulations (e.g. business licensing, tax administration, customs and foreign trade regulation) and other dimensions of the business environment (e.g. policy instability, corruption, functioning of the judiciary, organised crime) for the operation and growth of their business. We found that the experience of the business environment not only varied across countries but also across ownership types. The survey responses showed that state owned firms experienced a more favourable business environment than did private firms. This will have impinged on the effectiveness of competitive pressure as a spur to improved performance in private firms and it will have weakened the process of market selection. The poor quality of the business environment will also have hampered the efficient selection of new entrants. The survey data confirmed that the presence of soft budget constraints and of a poor business environment was much more prevalent in the CIS countries than in the non-CIS ones.

2.3 The introduction of markets, competition and turbulence in the transition

By freeing firms to set prices and to enter into contracts, liberalisation in the transition economies both created the opportunity for the benefits of competition to be realised and set in train a potentially damaging process of disorganisation. The ability to reap the benefits of competition whilst minimizing the associated disorganisation appears to be strongly related to the quality of the institutional infrastructure. We look first at the role of competition in performance and then at disorganisation.

When looking at performance in terms of sales growth, the survey results suggest that competition in the product market plays an important role. Both competitive pressure and some degree of market power in the product market appear to characterise the firms with the best sales growth performance.[20] Specifically, the presence of one to three competitors, only a modest loss of demand in the face of a 10% price increase and the recognition that pressure from foreign suppliers and customers has prompted the introduction of new products all appear to play a role in accounting for good performance (for details of regression results and a survey of previous results for the effect of competition on performance in transition countries, see CFSS). This combination comes close to Schumpeter's description of the interplay between competitive pressure and market power. Furthermore, it appears to be foreign and not domestic competition that is relevant. Competition also appears to be related to productivity growth in the same way as it is to sales growth.

[20] A very few studies for advanced countries consider the possibility emphasized by Schumpeter that competitive pressure may have a non-linear or even non-monotonic relation to efficiency. Green & Mayes (1991) show on UK data what was earlier demonstrated by Caves & Barton (1990) for the US, namely a non-monotonic relation between the 5-firm concentration ratio and efficiency, in which the greatest efficiency is associated with intermediate levels of concentration. Bresnahan & Reiss (1991) find a (weakly) monotonic but decidedly non-linear effect of entry on prices, with most of the competitive impact coming from the first two entrants to challenge a monopolist, and a levelling out once market participants number around five.