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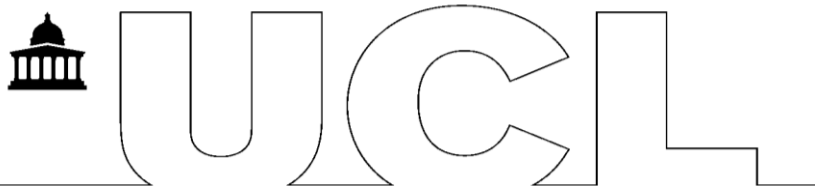

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Entrepreneurial Dynamics and Higher Education Institutions: Evidence from the Post-Communist World

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ENTREPRENEURIAL DYNAMICS AND HIGHER EDUCATION INSTITUTIONS: EVIDENCE FROM THE POST-COMMUNIST WORLD

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ABSTRACT

Drawing on the institutional and regional entrepreneurship literature this study develops a conceptual framework to analyse the impact of higher education institutions on entrepreneurial dynamics across the cities of the Commonwealth of Independent States (CIS) during 1995-2008. Extending upon Scott (1995) and Stenholm's (2011) multi-pillar institutional concept, we posit that higher education institutions may influence entrepreneurial dynamics through various channels such as (1) the human capital development; (2) shaping a system of societal values and norms which cultivate a positive attitude towards entrepreneurship; (3) affecting perceptions of the knowledge and skills necessary to start up a business; and (4) knowledge spillovers. The empirical counterpart of this study utilizes a unique dataset to study education institutions as a driving force behind the growth in stock of small businesses, employing the System Generalised Method of Moments technique. We show that while formally constructed within the regulative pillar and mandated by national laws on education, higher education institutions are embedded in the other three pillars, notably normative, cognitive and conducive, to foster entrepreneurial dynamics. This embeddedness of higher education institutions within all four institutional pillars and their ability to affect entrepreneurial dynamics through these multiple institutional dimensions means they play an important role in explaining entrepreneurial dynamics in the region.

Keywords: Entrepreneurial dynamics, SMEs, regional entrepreneurship, higher education institutions, CIS cities

INTRODUCTION

It has long been acknowledged that education plays an important role in the economic development, with entrepreneurship being identified as a firm-specific channel through which education may affect economic growth (Agarwal et. al., 2007; Audretsch and Keilbach, 2008; Doms et al. 2010). Generally, education has been shown to influence entrepreneurship through the education of business owners (individual level), and the average education in the local labour market and 'knowledge spillovers' (regional level) (Acs et al., 2007; Doms et al. 2010).

At the individual level better educated individuals are more likely to start businesses and succeed, exhibiting higher rates of survival and growth (see Parker, 2009 for literature overview). At the regional level the relationship between education and entrepreneurship may be observed through the regional level of education ('labour pooling' effect) and 'knowledge spillovers' ('information sharing' effect). In the first instance, entrepreneurs may benefit from access to a pool of more educated workers at a lower cost (Freedman, 2008; Doms et al., 2010). In the second instance, exchange of ideas both within and across industries may generate new ideas that can help create and sustain businesses (Jacobs, 1969; Saxenian, 1994). Entrepreneurship opportunities, and so entrepreneurial activity, tend to flourish in contexts richer in knowledge (Acs and Armington, 2006; Audretsch and Keilbach, 2007, 2008).

The academic research on the influence of education (human capital) on entrepreneurship in the regional perspective remains fairly scarce and fragmentary, primarily looking at the education of business owners either at the individual or regional levels (see Rauch, 1993; Moretti, 2004; Fairlie and Robb, 2008; Doms et al., 2010) or knowledge spillovers (Armington and Acs, 2002; Acs et al, 2007), and being predominantly US contextualised. The objective of our study is to develop a conceptual framework to analyse the integrated complexity of the impact of higher education establishments on variation in entrepreneurial dynamics across cities of emerging economies.

Using cities as a unit of analysis allows greater focus on heterogeneity across urban regions. This is in contrast to studies that focus on regions of a higher level of aggregation, often comprising both urban and rural locations where entrepreneurship has different characteristics. The incidence of entrepreneurship tends to be higher in urban agglomerations (Tödtling and Wanzenböck, 2003). Furthermore, cities as a unit of study are also interesting from the point of view of economic development: higher concentrations of human capital, knowledge owners, and its potential users, and a high degree of cultural, industrial and

economic diversity in urban areas, all suggest that cities play an important role in facilitating economic growth calling upon the academic community to build in the regional dimension into strategic analysis (Acs and Plummer, 2005). This makes cities a particularly interesting and important unit of analysis for studying entrepreneurial dynamics across cities.

We choose the rate of change in the number of small businesses as our outcome variable to capture entrepreneurial dynamics, attempting to unveil the role of education for 'growth stock regions' (Brixy and Grotz, 2007). According to Brixy and Grotz (2007: 296) regions which exhibit both high rates of new-firm formation activity and high rates of survival can be regarded as economically successful. Entrepreneurial dynamism has been argued to be particularly vital for transition economies (Jackson et al., 1999).

With the collapse of communism, which was characterised by the suppression of private initiative, transition economies have undergone a colossal change involving comprehensive institutional reforms as they moved towards a market economy. The institutional reform of higher education institutions, whose role has been largely overlooked so far in transition economies, can be regarded as playing a prominent role in driving entrepreneurial dynamics in the region. Through undergoing an institutional change, higher education institutions have emerged to counterbalance the Soviet legacies to the benefit of entrepreneurship development in the region.

Our conceptual framework extends upon Scott (1995) and Stenholm's et al. (2011) concept of institutions. Based on these, we posit that higher education institutions may influence entrepreneurial dynamics through various channels such as (1) the human capital development; (2) shaping a system of societal values and norms which cultivate a positive attitude towards entrepreneurship; (3) affecting individuals' perceptions about knowledge and skills necessary to start up a business; and (4) knowledge spillovers. These correspond to Stenholm's et al. (2011) four pillars of institutions: (1) regulative; (2) normative; (3) cognitive and (4) conducive. Formally placed within the regulative environment and mandated by national laws on education, higher education institutions have become increasingly sustained by other pillars that, taken jointly, are likely to accelerate entrepreneurial dynamics in the region.

The empirical counterpart of this analysis is based on a sample of 98 cities in 7 CIS countries: Russia, Ukraine, Belarus, Moldova, Georgia, Armenia and Azerbaijan. We employ the System Generalised Method of Moments (SYSGMM) technique, to test our hypotheses.

Our study makes several contributions to the field of entrepreneurship and institutional literature. First of all, we adopt a more comprehensive approach in studying the impact of higher education institutions on entrepreneurship developments, drawing on the institutional

and regional entrepreneurship literature. Second, we offer a multidimensional perspective on the role of higher education institutions, unveiling different institutional channels via which HEIs are likely to influence entrepreneurial dynamics in the region. This allows us to argue that the effect of higher education establishments goes beyond the regional level of human capital development, and manifests through other aforementioned channels. Thus, we extend Stenholm's et al. (2011) institutional framework by developing some theoretical insights on the crucial role of higher education institutions in accelerating entrepreneurship developments in the CIS region; the multi-level institutional embeddedness of higher education institutions makes them well placed to accelerate the development of environment conducive to positive entrepreneurial dynamics. We also posit that it is important to adopt an integrated approach in studying the effect of higher education rather than narrowing it down to its single aspects (i.e. knowledge spillovers; owner-level education and regional education). This fills some gaps in the regional literature so far primarily focused on empirically testing only single aspects of education (Doms et al., 2010). Third, we further contribute to the knowledge spillover theory providing empirical evidence on the role of higher education establishments as the source for endogenous knowledge which can be potentially exploited further by would-be-entrepreneurs or facilitate the learning process of newly registered businesses increasing their chances for survival. Fourth, this is the first empirical multi-level study of its kind on entrepreneurial dynamics in the context of the CIS cities.

The paper proceeds as follows. The next section discusses theoretical concepts which set the basis for developing our conceptual framework, and it formulates our main hypotheses. The two subsequent sections discuss data and methodology, and empirical results, whereas the last section elaborates on the key findings of the study, and outlines some agenda for future research.

THEORETICAL CONCEPTS, HYPOTHESES AND CONTROLS

Under human capital theory, education has been seen as a key determinant of economic performance (Becker, 1964). In the past decade, increasing numbers of developed and emerging economies have re-considered their growth patterns to be based on knowledge, technology and innovation to boost productivity levels[1]. Knowledge is seen as firms' most strategically important resource (Grant, 1996). This can be divided into tacit knowledge, which is difficult to transfer as it is non-codified and can only be observed through application, and explicit knowledge, which is a piece of information which can be written down and is conveyed in procedures, processes and institutions such as higher education institutions (ibid.).

Entrepreneurial decisions and complex problem solving utilizes an interaction of tacit and explicit knowledge (Davidsson and Honing, 2003). Thus education is expected to affect entrepreneurship in a much more complex and integrated way than has been previously assumed.

Human capital and Entrepreneurial Dynamics: a Spatial Context

Based on academic research looking at the relationship between human capital and entrepreneurship we could broadly identify three ways education may influence entrepreneurial activity, namely (a) owner-level education; (b) area-level education; and (c) knowledge spillovers (Acs et al., 2007; Doms et al. 2010).

Owner-level education

Individuals with higher educational attainments are more likely to start a business (Minniti et al*.,* 2005). Through formal education would-be-entrepreneurs may acquire abilities to learn about markets and technologies that enables them to better spot opportunities and launch a venture to exploit them (Shane, 2000). Better-educated business owners are also more likely to survive and grow their businesses (Fairlie and Robb, 2008; Doms et al., 2010). Education will help them develop learning aptitudes and organizational skills so as to be better organized and to be able to exploit those opportunities (Grant, 1996). Individuals with higher level of education attainment could also be able to gather necessary information in a more efficient way and learn faster to adapt to changing market conditions that will raise their chances of survival (Baptista et al., 2012). Entrepreneurs with higher human capital could convey a positive signal to potential customers, lenders, and business suppliers (Doms et al., 2010); increase their ability to solve problems and make decisions (Davidsson and Honin, 2003); as well as access social networks (Ucbasaran et al., 2008; Doms et al., 2010). These are all factors that positively affect both entry decision and subsequent success of venture.

Area-level education

Regional differences have been increasingly seen to play an important role in the formation, survival and growth of new firms. Agglomerations offer the resource base and the cultural environment that facilitates the creation of new firms and ensures their sustainability (Armington and Acs, 2002; Acs et al., 2007; Brixy and Grotz, 2007). The area-level education benefits entrepreneurs through the ‘labour pooling’ effect: they get access to a pool of more educated

workers that have better access to information, and are better at implementing new ideas and adopting new technologies (Wozniak, 2006; Doms and Lewis, 2006; Doms et al., 2010). Agglomeration of educated and skilled workers will also reduce the cost of searching for specialised skills (Freedman, 2008; Doms et al., 2010). Clustering of entrepreneurial activities may also speed the rate of interactions and thus promote more rapid learning increasing entrepreneurs' chances to survive and succeed (Glaeser, 1999; Freedman, 2008).

Regional studies looking at the effect of human capital on start-up formation and performance tend to either focus on owner-level education (Bates, 1990; Fairlie and Robb, 2008) or regional education (Armington and Acs, 2002; Acs et al. 2007) given some constraints of datasets such as that business owner characteristics are often absent from statistical business data, whereas firm or individual-level surveys lack data on regional levels of education (Doms et al., 2010). While Doms et al. (2010) attempts to address this limitation they only find that an area's average education level is positively associated with entrepreneurial activity which tends to be an individual-level, and not an aggregate phenomenon; more educated individuals are more likely to be self-employed. Our study fills this gap through unveiling various channels of the effect of higher education as an institution that helps to capture both owner-level and area-level impacts among others.

Knowledge spillovers of entrepreneurship

While earlier studies on regional variation in entrepreneurial entry and outcomes have largely focused on standard set of regional characteristics such as unemployment, population density, availability of finance and industrial restructuring, more recent scholarly work in the field has been motivated by the new economic geography and endogenous growth literatures (respectively, Krugman, 1991, and Romer, 1990) where localised knowledge spillovers are seen as a driving force of the new economy and city sustainability (Armington and Acs, 2002). This literature has also motivated the development of knowledge spillover theory of entrepreneurship (Acs and Armington, 2006; Audretsch and Keilbach, 2007, 2008).

The theory posits that knowledge created by incumbent organisations and research institutions serves as an important source of entrepreneurial opportunities. By commercialising knowledge (that otherwise would remain uncommercialized) entrepreneurship serves as a conduit of knowledge spillovers. Since knowledge spillovers tend to be spatially bounded within the close proximity to the source of that knowledge (Jaffe, 1989; Audretsch and Feldman, 1996) entrepreneurship opportunities, and so entrepreneurial activity, are greater in the contexts which are richer in knowledge (Audretsch and Keilbach, 2007; 2008).

Knowledge spillovers are seen as a central element to strategic entrepreneurship (Agarwal *et. al.*, 2010). However, possessing knowledge is not sufficient for generation of innovative output. Agarwal, Audretsch and Sarkar (2007) develop a model of 'creative construction' which shows how knowledge spillovers combined with an entrepreneurial action, enabling knowledge appropriation, leads to new firm creation and explains the success of industries and regions and the growth of economy as a whole. Focusing on localized knowledge spillovers Gambardella and Giarratana (2010: 323) show how their intensity increases the supply of knowledge to benefit more individuals who have better education and greater skill or in other words individuals with the highest "absorptive capacity to use this knowledge". This increases the productivity gap across skills and increases regional heterogeneity in terms of skill endowments with regions characterized by intense knowledge spillovers being more populated by 'skilled-intense organizations that generally are smaller and oriented toward entrepreneurial ventures' (Gambardella and Giarratana, 2010: 324).

Regions which are richer in educated people have been found to have more start-up activity and higher rate of survival in non-service industries, although the latter is more driven by the stronger negative impact of higher non-service establishment intensity on formation rates of short-lived firms (imitative businesses) than on formation rates of surviving firms calling for further research which could inform policy-makers on policies regarding new-firm formation and survival (Acs et al., 2007). New firms' contribution to economic growth is much stronger if they survive, succeed and grow (Acs and Plummer, 2005). Therefore, both high rates of firm birth and survival can be regarded as desirable for the economy, signalling 'growing markets that provide sufficient niches and demand so that competition amongst the many new firms does not lead to a high edging out' (Brixy and Grotz, 2007: 296).

Drawing on the transition experience Jackson et al (1999) argue that the process of new venture creation, survival and growth are particularly vital to 'successful transformations [from a planned economy to a market economy] at critical points when the existing enterprises are not well suited to market conditions'. Emerging economies of Eastern Europe and Russia generally exhibit lower rates of new firm creation than observed in most developed and developing market economies, with the difference being even more pronounced for the Commonwealth of Independent States (CIS) compared to Central and Eastern Europe (CEE) (Kontorovich, 1999; Estrin and Mickiewicz, 2011). New firms in transition economies also have relatively high rates of death (Smallbone and Welter, 2001; 2006).

Notably, moderate start-up survival rates are not a phenomenon typical just of transition and emerging economies. It is a well-established fact that young ventures confront higher probabilities of exit with about 20-40 per cent of start-ups failing within the first two years of

their existence (Bartelsman et al., 2005). However, while in the market context negative correlation between entry and survival can be often seen as a result of rising competition among new entrants with less efficient firms being ousted out from the market (Brixy and Grotz, 2007), in the context of transition economies new firms often have to struggle for market shares with already established firms. These are not always economically more efficient than their counterparts with a number of them still remaining vertically integrated and benefiting from preferential treatment by local authorities (Aidis et al., 2009). In this case, any decrease in the stock of small businesses can be often seen as a result of unhealthy competition. Therefore, it is economically vital for a region to ensure not only the creation of as many new firms as possible but also the sustainability of new firms to make it a 'growing stock region' (Brixy and Grotz, 2007).

Brixy and Grotz (2007) argue that regions which exhibit high birth rates should also have high survival rates given that a favourable environment for the founding of new firms should also stimulate the development of these firms. They find evidence for the 'supportive environment' thesis in the manufacturing sector. In the next section we develop the argument of how education could facilitate the formation of the environment conducive for entrepreneurial dynamics in the region.

Entrepreneurship in Emerging Markets: An Institutional Perspective

According to Johannisson (1993), 'contextual differences' play an important role in explaining spatial variations in entrepreneurship. Earlier scholarly work has disregarded the importance of the context for studying entrepreneurship developments (Zahra and Wright, 2011). Acknowledging the importance of differences in institutional arrangements in explaining variations in the types and rates of the firms being created, and their evolution over time, an increasing amount of entrepreneurial research literature has focused on examining how the institutional context shapes entrepreneurship and defines its success (Bruton *et. al.,* 2010; Zahra and Wright, 2011; Estrin *et al.*, 2012).

The institutional theory has proven particularly useful in examining variations in entrepreneurial activity and entrepreneurs' strategies in transition countries (Aidis *et al.*, 2008; Manolova, *et al.* 2008; Estrin and Mickiewicz, 2011; Estrin et al., 2012). Estrin and Mickiewicz (2011) show that lower rates of entrepreneurial activity in the region as compared to developed economies are attributed to the negative effect of the legacy of communist planning, which needs to be replaced with market-supporting institutions. Implementing institutional reforms has aimed at establishing market-oriented institutions in these countries. With the longer prevalence

of the communist rule in Former Soviet Union countries the erosion of institutional memory in this region has taken them longer than their counterparts in Central and Eastern Europe to build up a well-functioning institutional framework conducive to entrepreneurship development (ibid).

With a slow pace CIS economies have progressed in various aspects of institutional reforms. However, establishing a well-functioning set of new formal institutions takes longer given that informal institutions, comprised of values and norms, are more durable and slowest to change (North, 1990). As Estrin and Mickiewicz (2011) argue, the legacy of communism was not conducive to entrepreneurship, 'as reflected not just in the remnants of the command economy' (typically seen in Belarus[2]), 'but more importantly by the social attitudes shaped during the communist period' (see also Estrin *et al.*, 2006; Schwartz and Bardi, 1997). By viewing generalised trust as an important prerequisite to entrepreneurship[3], Estrin and Mickiewicz (2011) argue that it was particularly negatively influenced by the prevalence of a system of norms and values associated with communism. The conditions of surveillance and detailed monitoring of citizens in soviet times triggered distrust that was often in contradiction to the official ideology promoting cooperation and trust (ibid.). The authors conclude that given the slow pace of change in informal institutions rebuilding generalized trust may be delayed until after full generational change.

Academic research looking at the role of the institutional context in transition economies has primarily focused on studying the effects of government activism, property rights protection, availability of finance, business regulation, the level of corruption, and social networks as fundamental institutional domains affecting new firm formation and growth (Pissarides *et al*., 2003; Klapper *et al*., 2002; Aidis et al., 2008; Manolova et al., 2008; Estrin and Mickiewicz, 2011). The effect of human capital in general and higher education institutions in particular on entrepreneurial activity in the region has gained little attention to date. However, the institutional reform of higher education institutions plays a more important role in driving entrepreneurial dynamics in the region than government policies promoting rule of law and property rights protection, and we aim to show this below. Our investigation of the role of higher education institutions on entrepreneurial dynamics across CIS cities builds upon the theoretical institutional framework originated by Scott (1995) and developed further in Stenholm et al. (2011).

Higher education institutions and entrepreneurial dynamics: a multiple-pillar institutional approach

Scott (1995) proposes the following three crucial elements of institutions: (1) 'regulative' framework comprising regulations, laws and sanctions which are legally binding; (2) 'normative' context underpinning social values, norms and beliefs which are morally governed and culturally supported; and (3) 'cognitive' pillar constituting the 'shared logics of action' among individuals and organizations which they use in interpreting available information and formulating their expectations and response strategies. Stenholm et. al. (2011) extend Scott's three-pillar model to include the 'conducive' dimension - a 'fourth institutional pillar' – which captures the conditions that primarily affect the quality of entrepreneurial activity and forms the grounds for generation and dissemination of innovative ideas and technologies, stimulating the rate of high-impact entrepreneurship, regarded as an essential part of Baumol's productive entrepreneurship (Ireland et. al., 2003; Agarwal et al., 2007; Audrestch and Keilbach, 2007; Stenholm et. al., 2011).

Scott (2008:54) argues that 'institutions supported by one pillar may as time passes and circumstances change, be sustained by different pillars'. While formally constructed within the regulatory pillar, higher education institutions are embedded in the other three pillars, notably normative, cognitive and conducive, to foster entrepreneurial activity. It is precisely this embeddedness of higher education institutions within all four institutional pillars and their ability to affect entrepreneurial dynamics through these multiple institutional dimensions that allows them to play an important role in entrepreneurship developments in the region.

Regulative pillar

Mandated by national laws on education, universities are established to facilitate the rate of human capital formation, which is an important factor influencing entrepreneurial dynamics from the area-level perspective discussed in more detail earlier. Along with affecting the supply of highly-educated entrepreneurs, higher education establishments will affect the resources available to entrepreneurs reducing the cost of highly-skilled labour through the labour pooling effect. Respectively, we postulate our first hypothesis.

H1: Cities with stronger presence of higher education establishments are likely to have higher rate of growth in the number of small businesses.

Normative pillar

The normative institutions influence social behaviour through a system of values, beliefs and norms. They are typically viewed as the standards of behaviour established, for example, by close social networks (family and friends), professional associations and business groups, which underlie organizational goals and objectives (Scott, 1995; Manolova *et al.*, 2008; Bruton *et al*., 2010). Values and beliefs of social groups influence entrepreneurial intentions to the extent of communicating a message to individual entrepreneurs of the relative desirability of their activity (Krueger *et al.*, 2000). Such beliefs may be embedded in a wider setting of social references underpinned by national culture (Stenholm et. al., 2011).

In the former Soviet Union until 1988 any kind of private business activity was regarded as illegal, and the society had a hostile attitude to entrepreneurs regarding them as speculators and associating small business with theft from the community rather than the creation of wealth and prosperity (Smallbone and Welter, 2001). This soviet legacy, embedded in the socio-cultural setting of CIS countries, negatively affected entrepreneurial orientations at the start of transition. It is argued that among other things a country can cultivate a positive image of entrepreneurship through the educational system (Verheul *et al.,* 2002).

The whole academic tradition of the Soviet-style higher education was rigidly teacher-controlled, exam-driven and hierarchical, allowing little personal contact and limited opportunities for active learning. Lecturers primarily relied on rote learning principle based on memorisation of concepts and they discouraged critical thinking. 'Teaching students how to think' was lacking in the Soviet tradition of higher education. The past two decades have seen some profound changes in the higher education system across the region. Neoclassical economics advocating free markets and the associated system of values (e.g. individualistic orientation, earning on merit, different thinking, risk tolerance) conducive to entrepreneurship, as well as business-related modules, including marketing, management and entrepreneurship, have become increasingly integrated in the higher education curriculums. Furthermore, the whole teaching-learning approach has undergone a significant change with rote learning principles being replaced with critical thinking, stimulating innovative ideas and creativity, and an individualistic approach.

It has been argued that cultural values - including the degree to which people prefer to work as individuals rather than in groups, their willingness to accept inequality, tolerate risk and favour virtues of assertiveness, competition and success - influence entrepreneurial orientation[4] (Kreiser *et al.,* 2010). More individualistically-oriented cultures with positive perceptions of uncertainty and risk taking have been shown to have a higher entrepreneurship orientation and greater appreciation of entrepreneurship (Bowen and De Clercq, 2008; Kreiser *et al*., 2010). Incorporating these insights into our discussion of higher education institutions we

argue that a rapidly changing educational system in CIS countries assumes an important role of cultivating positive social attitudes towards entrepreneurial activities through communicating the benefits of entrepreneurship as an alternative occupational choice to students, and in general through a new teaching-learning approach which underlies a change in a system of values more conducive to entrepreneurship. Altogether this makes entrepreneurial activity more socially desirable. Respectively, our next hypothesis reads as follows.

H2: The national level of higher education (independently of the effect of regional level of human capital development) is positively associated with entrepreneurial dynamics.

Cognitive pillar

The cognitive environment represents a common set of references, schemas and scripts specific to a socio-cultural context, and typically learned and adopted through social interactions (Scott, 1995; Bruton *et al*., 2010; Stenholm *et al*., *2011*). Busenitz *et al.* (2000: 995) define the cognitive dimension as comprised of 'the knowledge and skills possessed by the people in a country pertaining to establishing and operating a new business'. They continue to argue that within some countries this knowledge becomes institutionalized and is shared widely across individuals. Individuals' perceptions of knowledge and skills to start a new business are shown to direct abilities of entrepreneurs to identify new opportunities and exploit them (Shane, 2000; Baron, 2007).

One of Busenitz's *et al.* (2000) findings suggests that perceived knowledge about starting new businesses may be particularly prevalent among individuals with higher education attainment. Education may affect individuals through providing them with a sense of autonomy and the skills which are necessary for discovering entrepreneurial opportunities (Verheul *et al.,* 2002). Educational capital does not only explain entrepreneurial entry but also the type of entrepreneurial activity, being found to positively affect high-growth expectations among entrepreneurs (Bowen and De Clercq, 2008), and so business success as motivations are positively associated with entrepreneurial outcomes (Covin and Wales, 2011). They argue that it is also important to distinguish between 'general education' and 'specific education' promoting specific entrepreneurial skills, suggesting that it is the extent of education capital targeted specifically at entrepreneurship which determines the allocation of entrepreneurial effort within a country.

Smallbone and Welter (2006) argued that entrepreneurs in post-communist economies have higher educational attainment but lack entrepreneurial knowledge and skills given the

soviet legacy of suppressed private initiative (see also Zhuplev *et al.,* 1998). A large number of highly-educated entrepreneurs were struggling to match knowledge and skills acquired through higher education with market opportunities, often starting up low-skilled and low-value-adding businesses such as retail trade or low-tech services. With educational institution reform there is an increasing scope for integrating entrepreneurship-related modules in nationwide education curriculums that makes higher educated individuals acquire not only general knowledge and skills but also marketing and business management skills that is expected to enhance their entrepreneurial orientation. Similarly to some Western European countries entrepreneurship and business-oriented programmes have been widely introduced in higher education establishments in many transition economies, including the large majority of CIS countries, throughout the 2000s with the view of introducing entrepreneurship education programmes in higher education establishments targeting both business and non-business students.

Drawing on these insights we argue that the educational system, in particular business-related education, influences entrepreneurial activity by affecting individuals' perceived knowledge and skills needed to start-up a new venture and survive. Given that opportunity costs of going into entrepreneurship are higher for highly educated individuals, they are generally expected to do better as entrepreneurs than in paid jobs, being more capable of spotting attractive opportunities and also obtaining greater success in business through better-informed decision-making, adapting faster to changes in the business environment and accessing better social networks that they are likely to develop through the years of their education (Doms et al., 2010; Baptista et al., 2012). Thus, our next hypothesis is formulated as follows.

H3: The greater availability of specific (business-oriented) educational programmes is likely to have a positive effect on growth in stock of small businesses.

Conducive pillar

The conducive environment, proposed by Stenholm *et al*. (2011) to solve the puzzle of how the three institutional pillars shape entrepreneurial behaviour to direct entrepreneurs' efforts to productive ends, is comprised of conditions which underlie the environment filled with new opportunities created by knowledge spillovers as discussed earlier (Acs and Armington, 2006; Audretsch and Keilbach, 2007; 2008). Building upon other institutional pillars the conducive dimension captures how institutional factors shape the quality of entrepreneurial activity, or more precisely high-impact start-ups with focus on innovation and growth (Stenholm *et al.*,

2011). This implies that high-impact entrepreneurs do not solely benefit from regulations, normative or cognitive schemas, but their behaviour is intensified by an environment that provides 'support and interplay between innovation, skills, and resources', generating the foundation for innovativeness and dissemination of creative ideas and encouraging productive entrepreneurship (Stenholm et. al., 2011: pp.7-8). Such conditions include 'feeder' industries and institutions; the availability of high-skilled labour, the proximity to high-quality universities; and the intensity of collaboration of higher education institutions and industry that all facilitate the allocation of entrepreneurial efforts towards more productive ends in the pursuit of innovative products and services, and growth (ibid, p. 7). By seeing it as interaction of different forces, including institutions which facilitate knowledge generation and exchange, and the availability of resources and skills needed for pursuit of innovative projects, the conducive institutional dimension should be viewed in a broader context, beyond the resource endowment. This pillar determines the institutional capability by a country, region or city to develop 'strategic entrepreneurship' defined as activities based on the search of competitive advantage which through generation of new products, processes, markets, and organizational forms can lead to wealth creation sustainable in the long run (Hitt *et al*., 2001; Ireland *et al.,* 2003; Agarwal *et al.,* 2007; 2010).

Start-ups are inevitably about new ideas, and the ability of some agglomerated locations to foster new ideas is one potential reason why they become centres of entrepreneurship …. Ideas are often outcomes of 'knowledge intensive environments', i.e. groupings of large and small firms interacting with public research organisations and providers of knowledge intensive services. Spatial concentrations boost entrepreneurship by supporting the transfer of old ideas and the creation of new ones. Saxenian (1994) argues how the flow of ideas helped to create the entrepreneurial cluster of Silicon Valley. In her more recent work she extends her analysis by looking at how mobility of information and highly skilled workers with work experience and connections to Silicon Valley and related American technology centres contributed to the success of the economies of Taiwan and Israel, turning them from peripheral regions specialising in low-skill labour-intensive manufacturing into centres of technology entrepreneurship (Saxenian, 2007). She argues that not all peripheries can climb this ladder of success, but only those which have invested heavily in higher education. Based on the insights we formulate our last hypothesis.

H4: The effect of higher education institutions on entrepreneurial dynamics is reinforced through university-manufacturing industry collaboration.

Drawing on the above discussion highlighting the role of higher education institutions on entrepreneurial dynamics within the four institutional dimensions, we further adopt an integrated approach in studying its effect on entrepreneurship across CIS cities. Through undergoing an institutional change higher education establishments emerge to counterbalance the Soviet legacies to the benefit of entrepreneurship development in the region. They may influence entrepreneurial dynamics through various channels such as (1) human capital development at a regional level; (2) shaping a system of societal values and norms which cultivate a positive attitude towards entrepreneurship; (3) affecting individuals' perceptions about knowledge and skills necessary to start up a business and to adapt to changes to survive via offering more business-oriented courses; (4) knowledge spillovers occurring to manufacturing industry through closer university-industry collaboration. The embeddedness of higher education institutions within all four institutional pillars makes them well placed to accelerate the development of environment conducive to growth in stock of small businesses.

Control variables

Earlier academic research on regional variation in entrepreneurship shows that a number of factors are likely to influence cross-city variation. These can be broadly grouped as follows: city socio-economic characteristics; business environment; urbanisation economies; and industrial structure.

Socio-economic characteristics

We introduce a city-level GDP per capita to control for the city economic development stage. We expect a decrease in stock of small businesses with an increase in a city-level GDP per capita, reflecting growth of established businesses and the importance of economies of scale. This will raise the competitive pressure, driving less efficient firms out of the market. We also introduce the GDP annual growth rate variable (at city level) to control for cyclical economic performance. Gloomy economic prospects may discourage individuals from undertaking entrepreneurial activity in a recession, unless they see it as the only available occupational alternative. The rate of business failure is also likely to be higher during an economic downturn contributing to the lower survival rates of small businesses.

Along with the level of income and GDP growth rate, we also consider unemployment as part of the socio-economic characteristics of cities to be a likely determinant of entrepreneurial dynamics. The effect of the rate of unemployment is ambiguous. On the one hand, it may have

a push effect with entrepreneurship being seen as the only available occupational alternative. In this case the rate of new firm formation is likely to increase driving the overall growth in the number of SMEs. However, entrepreneurial entry in this case is most likely to be necessity-driven and associated with basic low-scale business activities (Mandelman and Montes-Rojas, 2009). It is important to note here that necessity-driven entrepreneurship is more likely to take a form of self-employment, implying that the unemployment effect may not necessarily show up, or it may be inversely associated with entrepreneurship when proxied by small businesses. Furthermore, unemployment is a cyclical phenomenon and may simply mirror economic recession and demand deficiency, making entrepreneurial entry unlikely, and negatively affecting business survival rates. In this case the overall effect of unemployment on the rate of change in small businesses is expected to be negative.

We also control for capital investment to GDP ratio at a city level to capture the availability of financial resources in CIS cities. Although generally expected to have a positive effect on both entrepreneurial entry and survival, the role of capital investment in the context of the CIS cities may be ambiguous, and the possibility of a crowding out effect as a result of public funds being channelled to support large-scale state-owned enterprises is not excluded.

The level of criminality in cities is likely to affect the growth in stock of small businesses, negatively reflecting the higher probability of asset expropriation by private parties. According to Rosenthal and Ross (2010) entrepreneurs will choose the safest location for doing their business. Central to their analysis is the idea that different sectors of the economy will sort into high- and low-crime areas depending on their relative sensitivity to crime. We expect a negative effect of city criminality on entrepreneurial dynamics in the region.

Business environment

Formal regulative structures may simultaneously enhance entrepreneurial activity and constrain it. Based on earlier empirical research on entrepreneurship we identify the following dimensions of business environment which are likely to affect the rate of change in SMEs: property rights protection; size of the government associated with its ability to transfer wealth via taxation and corruptive practices; banking sector reform; and business regulation.

Strong property rights are important for entrepreneurial activity to the extent that in the first place property rights guarantee the status quo via providing crucial security of private property against an arbitrary action of the executive branch of the government (Acemoglu and Johnson, 2005).

Acemoglu and Johnson (2005) discuss the two key aspects of property rights, namely *vertical* which is related to the risk of expropriation by the government, and *horizontal*, related to 'contracting institutions' which enable private contracts between citizens. They regard the former to be more fundamental for economic activity: effective restrictive measures on constraining arbitrary behaviour and expropriation by the state and elites ensure the protection and stability of property rights. Weingast (1995) regards such constraints as the constitutional foundation for entrepreneurship. While deficiencies of contracting institutions can be mitigated by individuals adjusting the terms of their contracts, it is much harder to alleviate the risk of expropriation by arbitrary government in a similar way (Acemoglu and Johnson, 2005).

Based on this we expect strong property rights protection to incentivise entrepreneurial dynamics in CIS cities.

Another important aspect of the regulatory environment is the level of government activity (Estrin *et al.* 2012). Fogel *et al.* (2006) and Aidis *et. al.* (2012) place government activism at the institutional level, below property rights and the legal regime, viewing it as an institution that affects resource allocation in the economy. As the state sector grows, it crowds out private activity, absorbing a larger proportion of the resources of the economy with competition for inputs driving supply prices up for crucial resources needed by private businesses, affecting entrepreneurs the most because, unlike existing businesses, they lack networks, contacts and experience (Estrin *et al.* 2012). The size of the government is claimed to be an appropriate measure of government activity, and it has been seen to adversely influence entrepreneurship (see Fogel *et al*., 2006; Estrin *et al*., 2012; Aidis *et al.* 2012).

A larger government activity requires higher state revenues. Higher tax income, associated with greater government expenditures, and respectively higher marginal tax rates for higher earners reduce the expected returns to entrepreneurs and discourages entrepreneurship (Parker, 2009). At the same time higher tax income can also be associated with a more generous welfare provision system, implying among other things higher unemployment benefits, expected to increase the opportunity cost of going into entrepreneurship.

A larger state may also reflect government's higher ability to transfer wealth through a differential tax policy applied by regional authorities, and other corruptive practices (Aidis *et al.*, 2012; Aidis *et. al.,* 2009). This can be particularly detrimental to start-ups compared to incumbent firms, which over time adapt their behaviour to the respective norms, via employing various strategies. This includes, for example, developing necessary contacts, or choosing to invest in unrelated businesses instead of growing their core businesses before 'beginning to attract too much attention of the wrong sort' (Welter and Smallbone, 2011)[5] .

Accordingly we expect a greater size of the government will reduce the rate of change in SMEs.

Better developed financial institutions, to the extent of mitigating external finance constraints, are found to disproportionally benefit smaller and medium-sized firms (Beck *et al.,* 2005). With wider supply of finance and competition, the financial institutions are pushed to choose more risky financial options including entrepreneurial finance (Korosteleva and Mickiewicz, 2011)[6]. This is particularly topical for transition economies, for which scarcity of financial resources is documented as one of the major obstacles for starting-up a new venture (Pissarides, 1999; Pissarides *et al*., 2003; Klapper *et al*., 2002). Financial constraints were found to be not only detrimental to entrepreneurial entry, but also for SMEs' growth (Klapper *et al*., 2002; Pissarides *et al.*, 2003). Based on the above discussion we expect that a more developed banking sector will increase credit availability to SMEs, mitigating external finance constraints as an obstacle for starting-up new ventures. Respectively, we expect that progress in banking reform is positively associated with entrepreneurial dynamics in CIS cities.

Finally, we consider business regulations. According to the public interest theory of regulation, a stricter business regulation, requiring a proper screening of new firms will allow for the entry of only those firms which meet minimum standards for providing a quality product or service that should benefit the society. On the other hand, the public choice theory views regulation as benign and socially inefficient. One strand of this theory (see Stigler, 1971) argues that regulation is acquired by the industry, and industry incumbents (large established firms) are likely to benefit the most. Once they are able to influence the regulation in their favour, incumbents increase their power in a way that restrains entry of new firms and negatively affects business survival rates through unhealthy competition . Another strand of the public choice theory advocates that regulation is pursued for the benefit of politicians and bureaucrats who use it to create rents and to extract them via corruptive practices (De Soto, 1990; Shleifer and Vishny, 1999). Respectively, we posit that more flexible business regulations encourage new entry and ensure its survival.

Urbanization economies

Building on Duranton and Puga (2004), Rosenthal and Strange (2004) and Glaeser *et. al*. (2010) we posit that local interactions give rise to agglomeration forces for entrepreneurship and affect productivity through availability of a larger pool of workers and their skill diversity, co-location of firms across diverse industries, and the proximity of customers and suppliers. While we have the regional level of education to capture the effect of pooling skilled workers, we also

introduce population density as a proxy for a market size to control for the effect of consumer demand. Additionally air pollution is used to capture the effect of industrial agglomeration in CIS cities.

Finally, we control for industry composition, country, and time effects.

DATA AND METHODOLOGY

Sample Description

To investigate variation of entrepreneurship across CIS cities, we utilise the 1995-2008 data collected from the Offices of National Statistics in Russia, Ukraine, Belarus, Moldova, Georgia, Armenia and Azerbaijan. The data was collected by local research officers formally employed by the respective Regional Statistical offices. This initiative was funded by project No 09-9031 entitled 'Driving urban economic growth – evidence from transition economies' which was a part of the larger project – 'Cities: An Analysis of the Post-Communist Experience' (2009-2010), supported by the Economics Education and Research Consortium in co-operation with the Global Development Network. Additional data collection on CIS cities was accomplished in the course of the Fulbright Scholarship project entitled 'Entrepreneurship and the City: Evidence from Europe and Beyond' sponsored by the Institute of International Education, Department of State and hosted at Indiana University, Institute of Development Strategies (2011).

The dataset contains urban audit indicators across various domains specific to our study, including higher education institutional measures at a city level related to our main hypotheses (e.g. presence of higher education establishments in a city; number of MBA programmes); and economic and social characteristics of cities and other indicators used as controls in our study. We merge these statistical data with institutional country-level data, derived from the Polity IV dataset[7], Heritage Foundation[8], EBRD transition indicators (EBRD Transition Reports, various issues), to also shed some light on the effect of institutional settings at a country level on entrepreneurial dynamics. More specifically, the dataset is represented by 98 cities[9] covering Russia (54 cities), Belarus (6 cities), Ukraine (26 cities), Moldova (1 city-capital), Georgia (5 cities), Armenia (5 cities), Azerbaijan (1 city-capital).

Variable Definition

We use the rate of change in the number of small businesses as our dependent variable, proxied by the difference between the natural logarithms of the current level of small businesses and its level in the previous year. Figure 1 illustrates the change in the number of small businesses over the period 1995-2006.

According to national statistical offices small businesses are defined as firms with 50 employees or less (100 employees respectively in manufacturing sector). Our measure of entrepreneurial dynamics effectively measures the positive balance between new registrations and exits during the period, and therefore it captures two processes - entrepreneurial entry and survival of small business.

Cities with negative entrepreneurial dynamics over the period of analysis include Syktyvkar (-0.02), Cherkessk, Veliky Novgorod, Ivanovo, Elista, Nalchik and Volgograd (-0.03), Bryansk (-0.04), Orenburg and Murmansk (-0.05). Cities exhibiting the highest stock growth rates are Kishinev and Makhachkala (0.10), Simferopol (0.09), Zaporozhye (0.08), Hrazdan and Yerevan (0.07), Kiev, Vagarshapat and Gyumri (0.06).

We use the number of universities in the CIS cities (regional level) obtained from the "Universities in CIS" and "Universities worldwide information resources" databases[10] to test *Hypothesis 1*. We introduce the tertiary education enrolment rate, proxied by the logarithm of the number of students enrolled in tertiary education per 100,000 residents (country level) to test *Hypothesis 2*. This variable originates from UNESCO Institute for Statistics. We test the effect of specific (business-oriented) education by proxying it by the number of MBA programmes offered by business schools and other higher education establishments in each city (*Hypothesis 3*). This variable is obtained from the MBA studies guide and Global MBA and Master Programs Directory. Finally, we interact the university variable with manufacturing/energy and mining industry control variable to capture the effect of university-industry collaboration (*Hypothesis 4*).

For the strength of property rights we use the Polity IV measure of efficient constraints on the arbitrary power of the executive branch of the government, named "constrains on executive" (Estrin et al., 2012). To measure the size of the local government we use city-level government expenditures as a proportion of city-level GDP. Government expenditures to GDP as a measure for government activism have been operationalized in the earlier scholarly research on entrepreneurship (Fogel *et al.* 2006; Estrin *et. al*., 2012; Aidis *et al*., 2012). To control for the effect of banking reform we employ EBRD transition indicators, scored from 1 denoting little progress from a socialist banking system apart from the separation of the central bank and commercial banks to 4+ representing a fully-fledged market economy with the institutional standards and norms of an industrialised market economy. This measure has been

utilized by other scholars looking, for example, at banking reform and economic development in transition economies (see Fries and Taci, 2002). We use the Heritage Foundation business freedom index which measures the rigidity of business regulation. It reflects various barriers to start, operate and exit business, and it scores from 0 to 100 with 100 denoting the highest degree of business freedom (Beach and Kane, 2008).

Table 1 reports variable definitions, including other control variables. Table 2 shows the correlation matrix between variables and descriptive statistics used in this study.

Methodology

We use the following model to examine the determinants of entrepreneurial activity in a panel of 98 cities during 1995-2008.

$S_{it=} \beta_1 S_{it-1} + \beta_2 X_{it} + \beta_3 Z_{it} + u_{it}$ (1), i=1,..., N; t=1,...,T

$u_{it} = v_i + e_{it}$ (2)

where S_{it} is our natural logarithm of the number of small businesses and S_{it-1} is its lagged value (predetermined variable). X_{it} is a vector of our four potentially endogenous variables, namely GDP per resident, GDP growth rate, the rate of unemployment, and the ratio of capital expenditure to GDP. Z_{it} is a vector of strictly exogenous control variables listed in Table 1. The error term u_{it} consists of the unobserved city-specific effects, v_i and the observation-specific errors, e_{it}.

The dynamic structure of equation (1) makes both the OLS and fixed effects estimators upwards and downwards biased respectively, and inconsistent, since the predetermined variable and endogenous variables are correlated with the error term. Therefore, to estimate equation (1) we use the System Generalised Method of Moments (SYS GMM) estimator (Arellano and Bond, 1991; Arellano and Bover, 1995; Blundell and Bond 1998). The use of this estimator allows us to address econometric problems which arise from the estimating equation (1). These include (a) the problem of potential endogeneity of some of our regressors; (b) the presence of predetermined variables - the lagged dependent variable S_{it-1} that gives rise to measurement error as it is correlated with past errors; (c) the presence of fixed effects which may be correlated with the regressors; (d) our finite sample. SYS GMM allows the predetermined and endogenous variables in levels to be instrumented with suitable lags of their own differences (Roodman, 2006).

Our study may be subject to a potential multicollinearity problem between a tertiary education enrolment variable and unemployment rate (see correlation matrix reported in Table 2). We take a cut-off point of 0.7 and above to identify multicollinearity (for similar approach see also Estrin *et al.*, 2012). We check the robustness of our results to inclusion/exclusion of the rate of unemployment from specifications containing a tertiary education enrolment variable. In the absence of the rate of unemployment economic cyclicality is controlled via GDP growth rate (for discussion of the results see next section).

EMPIRICAL RESULTS AND DISCUSSION

Our empirical results are summarized in Table 3 reporting the results based on the three estimation methods, notably pooled OLS (specification 1); (2) panel fixed effects (specification 2); and (3) System GMM estimation (specifications 3-7). Comparing the results of all three estimators used, one can see that the results obtained from the System GMM model (specification 3) are superior given that: (a) the autoregressive term is positive and significant, and its value lies between the respective terms obtained by fixed effects (which provides the lower bound) and OLS (which provides the upper bound); (b) there are gains in efficiency; (3) the instrument set is valid as evidenced by the Hansen test of overidentified restrictions; (4) all variables of interest have expected signs. Thus the discussion of our results proceeds based on specifications (3-7). More specifically, specification (3)-(7) reports the results related to our hypotheses 1-4. Below we discuss these results.

We find that entrepreneurial dynamics in CIS cities are largely explained by the presence of higher education institutions in a city (*Hypothesis 1*) (Spec 3). This is likely to be attributed to the level of human capital development at a regional level, affecting both the demand and supply side of entrepreneurship. Thus, the increased presence of higher education establishments will increase the supply of highly-educated entrepreneurs, as well as affecting the availability of highly-skilled labour to entrepreneurs reducing the cost of such labour through the labour pooling effect (see Doms et al., 2010).

We also find support for our *Hypothesis 2*, implying that the more students enrolled in tertiary education at the national level, the higher is the rate of growth in the number of small businesses in a city. The rapidly changing higher education system is likely to breed a new generation of individuals possessing skills and knowledge that make them appreciate entrepreneurship and communicate its benefits to other members of the society. The higher the

rate of nationwide enrolment in tertiary education, the faster is the change in the system of values more conducive to entrepreneurship.

Given that these results may be subject to multicollinearity between tertiary education enrolment and the rate of unemployment (discussed in the methodology section) we test their robustness by excluding the rate of unemployment from our model (specification 5). Our results remain robust.

We also confirm our *Hypothesis 3*, showing the important role of targeted (business-oriented) education (specification 6). We excluded our university variable from this specification given the high correlation between the number of MBA programmes in a specific city and the high presence of higher education establishments. These findings suggest that formal university education is also likely to influence individuals' perceived knowledge and skills needed to start-up a new venture and succeed. Interpreting these results jointly with the results related to *Hypothesis 1* we can argue that the institutional approach to studying the effect of higher education allows us to capture the effect of human capital from the regional ('labour pooling' view) and individual (entrepreneurial cognition) perspectives.

Finally, in specification 7 we further test whether the effect of higher education institutions could be further reinforced through university-manufacturing industry collaboration captured via the interaction term between university and manufacturing variables (*Hypothesis 4*). Indeed, we confirm that the effect of the higher presence of universities in a city is strengthened by university-manufacturing industry collaboration which retains its significance in the presence of the control for human capital. We interpret this result as some evidence of the importance of agglomeration economies in terms of higher concentration of knowledge, which may lead to intensified exchange of ideas via collaboration between small businesses and research institutions. This is an important advancement given centralisation of research and development activities in the past. Even nowadays the research and development systems in some CIS countries (e.g. Belarus) still largely reflects the Soviet legacy with extra-mural R&D organizations - not business enterprises - remaining the main and often only source of R&D (UNECE, 2010). In summary, tighter links between universities and industry may facilitate the development of strategic entrepreneurship in the region (Stenholm *et al.* 2011; Agarwal *et. al*., 2007; 2010).

Overall, we provide evidence that higher education institutions are likely to affect entrepreneurial dynamics though various channels that have been overlooked in earlier research.

As regards other control variables we fail to find any evidence of the significance of market size, proxied by the logarithm of population density. We find a significant and positive effect of air pollution, used as a proxy for industrial agglomeration effects. Our results do not show any significant effect of capital investment and the rate of unemployment. The rate of entrepreneurial activity appears to be negatively associated with the level of GDP per capita. This reflects that CIS cities exhibit signs of an efficiency-driven stage of economic development, where economies of scale prevail that appear to be an obstacle not only for new entry, but also for survival making start-ups unable to compete with larger established businesses. We also find some fragmentary support for the GDP growth rate showing that many businesses are still driven into entrepreneurship by seeing it as the only available occupational alternative. We fail to find any significant effect of the rate of criminality.

Now we turn to the discussion of the business environment. Similarly to Aidis *et al.* (2012) we also find some support for the effect of property rights protection on the rate of change in the number of small businesses.

Our findings related to government activism suggest that larger size of the state discourages growth in stock of SMEs. As previously argued, larger state will discourage entrepreneurship because of a crowding out effect, disincentivising effect of higher marginal tax rate and extensive welfare support. Furthermore, greater state activism may be associated with authorities' higher ability to transfer wealth through a differential tax policy applied by regional authorities, and other corruptive practices (Aidis *et al.,* 2009). Such policies of wealth transfer are short-sighted as tax increases can only generate short-term benefits for certain governmental officials, and can trigger many small and medium-sized businesses moving to the informal sector of the economy.

We find evidence that entrepreneurial dynamics are positively associated with the progress in banking reform. To the extent that the banking reform promotes financial development via elimination of financial market frictions, reduction in transaction costs and risks associated with financing start-ups, it eases borrowing constraints which can be particularly severe for small businesses. Our results are consistent with Beck *et al.* (2005), showing that developed financial institutions are beneficial for small firms.

Our results also provide some fragmentary weak support for more flexible business regulations encouraging growth in stock of SMEs (Djankov *et al.*, 2002). Perhaps, the effect of business regulation was stronger in the early or mid years of transition, but with many CIS countries making significant progress in liberalising business entry regulation by the end of 1990s, as evidenced by the Heritage Foundation data on business freedom and World Bank Doing Business Indicators of entry regulation, business regulatory environment has become

less of an obstacle compared to the issues of external finance availability and cost; or rent-seeking practices employed by the state).

Finally, our findings are robust to controlling for industry effects. The industrial effects on their own reveal that growth in stock of SMEs is less likely to happen in the education sector given the public nature of these institutions and the importance of economies of scale in this industry.

CONCLUSIONS

In this study we develop a comprehensive framework showing the effect of higher education institutions on entrepreneurial dynamics in the spatial context of Commonwealth of Independent States. We focus on the entrepreneurial dynamics, proxied by the rate of change in the number of SMEs, as our outcome variable. This follows Brixy and Grotz's (2007) argument of growth in stock of SMEs being positively associated with economic success of the region.

To develop our conceptual framework we draw upon the institutional concept proposed by Scott (1995) and Stenholm et al. (2011) advocating that the institutional environment is comprised of four key pillars including regulatory, normative, cognitive and conducive domains. We extend this theory to highlight the important role assumed by higher education institutions which, while formally constructed within the regulative pillar, are embedded within the other three pillars to facilitate the creation of the environment conducive to formation of new firms and their sustainability.

We argue that higher education institutions are likely to affect entrepreneurial dynamics through the following channels: (1) human capital development; (2) shaping a system of societal values and norms which cultivate a positive attitude towards entrepreneurship; (3) affecting individuals' perceptions about knowledge and skills necessary to start up a business and to adapt to changes to survive; and (4) knowledge spillovers which occur through close collaboration between small businesses and research institutions, and which have been actively promoted now in the CIS region via establishment of clusters as part of Europe's agenda to encourage sustainable growth via innovation and entrepreneurship in the region, including EU neighbourhood countries. Some examples of such cluster initiatives include the Skolkovo innovation hub in Moscow, and its equivalent in Minsk. Saxenian (1994) argues that small firms benefit the most from positive knowledge spillover effects, citing examples of Silicon Valley in California and the successful transformation of the Hsinchu-Taipei region of Taiwan.

Overall, the embeddedness of higher education institutions within all four institutional pillars makes them well placed to accelerate the development of environment conducive to positive entrepreneurial dynamics. We also posit that it is important to adopt an integrated approach in studying the effect of higher education rather than narrowing it down to its single aspects (i.e. knowledge spillovers; owner-level education and regional education). This addresses the gap in the regional literature so far primarily focused on studying single aspects of education (see Doms et al., 2010). Finally, by focusing on higher education establishments we also contribute to the knowledge spillover theory, providing empirical evidence of the role of HEIs in the knowledge spillover process with further implications for new firm creation and survival. Previous research largely focused on knowledge/ideas originating from incumbent firms.

In addition, our results provide evidence on the importance of some other domains of regulatory environment for studying entrepreneurial dynamics in the region. More specifically, we provide some evidence that greater government activism, associated with a higher ability of governmental officials to transfer wealth through various corruptive practices, reduces growth in stock of SMEs, whereas progress in banking reform and secure property rights enhances it. We also find some fragmentary support for the positive role of flexible business regulations on entrepreneurial dynamics in CIS region.

Our findings have important policy implications. To promote sustainable growth in the region local authorities should invest heavily in higher education. As advocated by Bowen and De Clercq (2008) and Saxenian (2007) to generate higher returns, this investment should specifically target entrepreneurial education, but should not be confined to business students only (see further discussion below). Furthermore, to promote strategic entrepreneurship the local authorities should concentrate on encouraging cluster development between universities and local businesses.

While entrepreneurship has typically been perceived as the domain of individuals with a business educational background, non-business educated people with engineering or IT backgrounds are also capable of starting successful high-tech businesses once they have some general understanding of specific business subjects (Cieślik, 2011). Students' enrolment in 'hard' science subjects such as physics, biology, mathematics and engineering has traditionally been high in CIS countries. Looking at entrepreneurship and business-related programmes which target non-business students could be potentially interesting and could be addressed in subsequent research. Unfortunately, such data is not currently available in public domain, including CIS universities' web-sites, many of which still remain largely underdeveloped. However, with higher education establishments in CIS countries strongly determined to further integrate themselves into the international education community, we

envisage that such information will gradually become more transparent and easily accessible. This will allow more sophisticated research into the role of targeted education in the region.

NOTES:

1. The issues of innovation, efficiency and productivity became central in the discussion of the Lisbon Agenda of the European Union. This was linked to the concern that European countries were lagging behind the US in technological terms and to catch-up they would need higher productivity, more innovation, and more flexible and skilled labour markets. The Europe 2020 strategy has further re-emphasized this, viewing knowledge, innovation and entrepreneurship as the key drivers for smart, sustainable and inclusive growth. A number of emerging economies have followed suit establishing innovation hubs akin in Silicon Valley in California and investing heavily in education and training.

2. See Korosteleva and Lawson (2010) for further discussion of this.

3. Estrin and Mickiewicz (2011) argue that trust is an underlying element of cooperation which defines many aspects of entrepreneurship, including reliance on networks of contacts in start-up stage; in relation to entrepreneurial finance or establishment of relationship with suppliers in terms of, for example, securing trade credit from them.

4. These values broadly reflect Hofstede's (1980) four cultural dimensions, namely individualism, power distance, uncertainty avoidance, masculinity.

5. To illustrate this, Welter and Smallbone (2010:111) discuss the case of the owner of a successful business involved in managing and letting advertising hoarding space in Minsk, Belarus, who was considering opening a coffee shop rather than expanding her key business. She explained this, referring to a business-expansion strategy as 'being too risky because her successful enterprise was beginning to attract too much attention of the wrong sort'.

6. Bank managers typically regard entrepreneurial ventures as highly risky given a higher asymmetry in information, lack of accounting records and credible reputation, associated with entrepreneurial projects (Huyghebaert and Van de Gucht, 2007; Korosteleva and Mickiewicz, 2011). They also find it costly to monitor small businesses given their small scale, although with the advances in the risk scoring techniques the banking sector is better capable of handling the entrepreneurial finance than in the past (De la Torre *et al.,* 2008).

7. See M. Marshall and K. Jaggers, 2009. Polity IV Project: Political Regime Characteristics and Transitions, 1800-2008, Dataset Users' Manual, available from http://www.systemicpeace.org/polity/polity4.htm.

8. For discussion see Beach and Kane (2008)

9. We use NUTS3 city level data.

10. For more detailed information please see http://univer.in and http://univ.cc.

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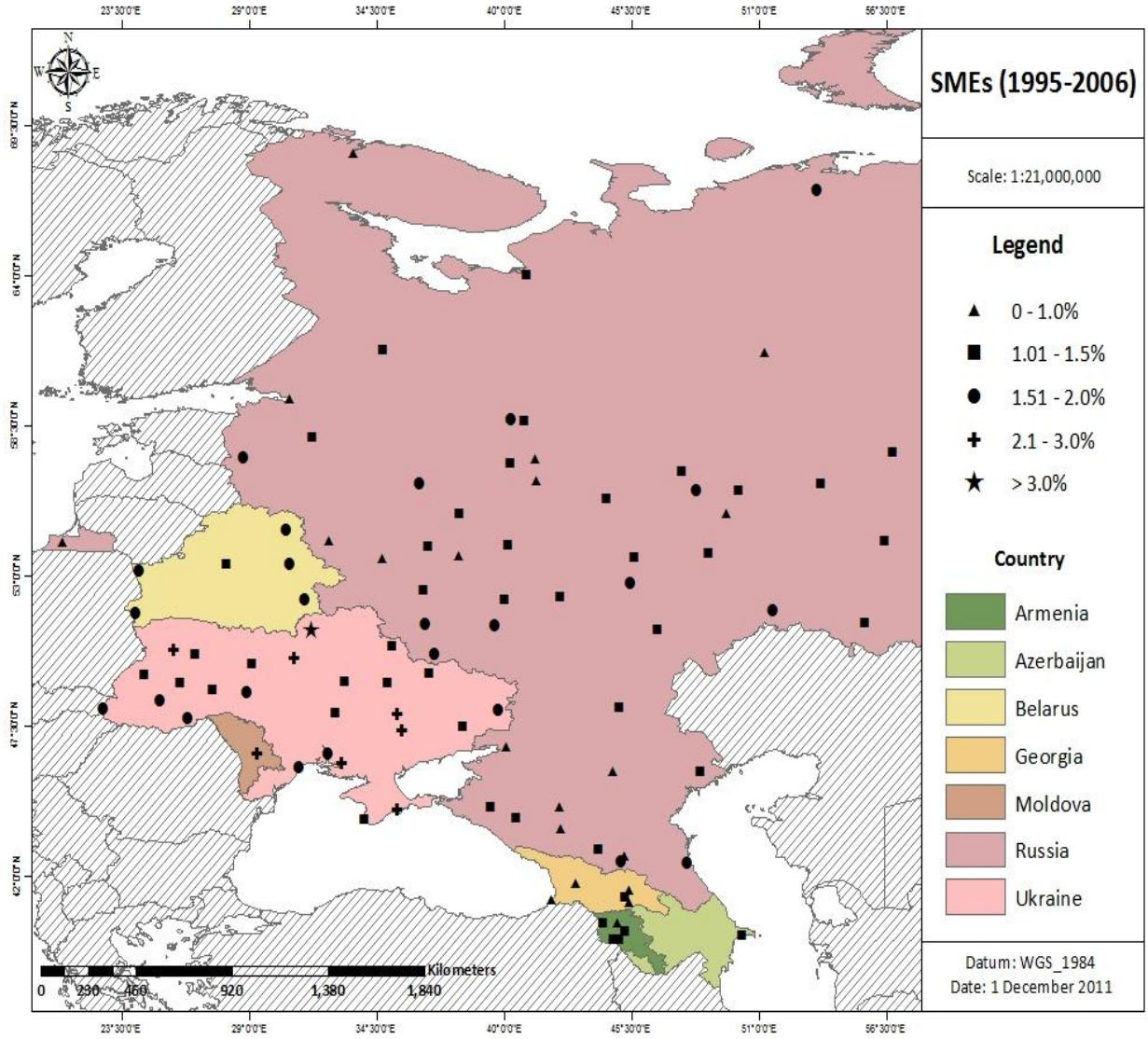
Figure 1: Growth in the number of Small Businesses Registered in a City, 1995-2006



Note: Year 2006 is included instead of 2008 for compatibility of cities with the base year 1995. Data on small businesses in 2008 is missing for twenty out of 96 cities. WGS_1984 stands for World Geodetic System 1984, the reference coordinate system used by the Global Positioning System.

Table 1: Definitions of the variables

Variable	Definition
dLnSMEs	The rate of change in the number of small and medium-sized businesses registered, logarithm (city level)
LnSMEs lagged	Number of small and medium-sized businesses registered taken in logs, first lag (city level)
University	Number of high educational establishments in a city
Tertiary education	Number of students enrolled in tertiary education per 100,000 residents, logarithm (country level)
MBA	The number of MBA programmes taught in a city
University* Manufacturing	Interaction between number of high educational establishments and a share of manufacturing/energy/mining sector in GDP of a city
Controls: socio-economic characteristics of cities	
GDP per capita	GDP per capita in constant 2005 USD, millions, logarithm (city level)
GDP growth	GDP annual growth rate,% (city level)
Unemployment rate	Unemployment rate - % (city level)
Capital investment	Capital investment to GDP ratio (city level)
Criminality	Number of crimes per 1000 residents, logarithm (city level)
Controls: urbanization economies	
Population density	Population density in the city per sq. km, logarithm
Air pollution	Air pollution, 1000 tons per city resident
Controls: business environment	
Executive constraints	Polity IV project. 'Executive constraints' where 1 represented 'unlimited authority' and 7 'executive parity'(country level)
Public expenditure	Public expenditure to GDP ratio (city level)
Banking reform	EBRD. Banking reform and interest rate liberalization from 4- to 4+, where 1 represents no progress in reform and 4 - major advances (country level)
Business Freedom Index	The Heritage Foundation. The Business freedom index ranges between 0 and 100 with 100 denoting the freest business environment (country level)
Controls: industrial structure	
Manufacturing	Industry contribution to GDP (%) - Manufacturing, energy & mining (city level)
Agriculture/fishery	Industry contribution to GDP (%) - Agriculture and fishery (city level)
Trade	Industry contribution to GDP (%) - Trade (city level)
Construction	Industry contribution to GDP (%) - Construction (city level)
Transport	Industry contribution to GDP (%) – Transport (city level)
Finance	Industry contribution to GDP (%) - Finance (city level)
Education	Industry contribution to GDP (%) – Education (city level)

Source: CIS Urban Audit 1995-2008. Data on the number of MBA programmes across CIS cities are obtained from the MBA programs worldwide guide (Accessed on April 15, 2012 at ***http://www.find-mba.com***); MBA studies guide (Accessed on April 15, 2012 at: ***http://www.masterstudies.com/MBA***) and Global MBA and Master Programs Directory (Accessed on April 15, 2012 at: ***http://www.mba-spectrum.com/courses/course-search-result.php***). Data on the number of students enrolled in tertiary education per 100,000 residents originate from UNESCO Institute for Statistics. Available at: ***http://stats.uis.unesco.org/unesco/TableViewer***.

Table 2: Descriptive statistics and Correlation matrix

	No of obs.	Mean	St. dev.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
dLnSMEs (1)	746	0.02	0.24	1.00																				
University (2)	746	7.58	14.2	0.02	1.00																			
Tertiary education enrolment (3)	746	8.42	0.32	0.02	0.06*	1.00																		
MBA (4)	746	0.41	1.41	0.02	0.94*	0.02	1.00																	
GDP per capita (5)	746	7.47	0.65	-0.05	0.33*	0.34*	0.31*	1.00																
GDP growth (6)	746	0.07	0.31	-0.09*	0.02	0.23*	0.02	0.29*	1.00															
Unemployment (7)	720	2.79	2.76	0.03	-0.1*	-0.7*	-0.05	-0.3*	0.02	1.00														
Capital investment (8)	746	0.22	0.14	-0.02	0.01	0.13*	0.01	-0.05	0.07*	0.04	1.00													
Criminality (9)	746	2.74	0.52	-0.07*	-0.1*	0.24*	-0.1*	0.15*	-0.1*	-0.4*	-0.2*	1.00												
Population density (10)	746	7.70	0.56	0.04	0.36*	-0.1*	0.33*	0.14*	0.02	0.19*	-0.01	-0.3*	1.00											
Air pollution (11)	746	0.28	0.52	-0.04	-0.1*	0.06	-0.1*	0.34*	-0.02	-0.1*	-0.1*	0.26*	-0.05	1.00										
Executive constraints (12)	746	4.56	1.06	0.05	0.02	0.57*	0.02	0.08*	0.48*	-0.2*	0.24*	-0.2*	0.15*	-0.1*	1.00									
Public expenditure (13)	746	0.59	0.40	0.05	-0.3*	0.09*	-0.2*	-0.4*	-0.04	-0.05	0.10*	-0.1*	-0.3*	-0.05	-0.1*	1.00								
Banking reform (14)	746	2.18	0.41	0.05	0.01	0.23*	0.01	0.40*	0.29*	0.06*	0.25*	-0.4*	0.21*	-0.1*	0.44*	-0.1*	1.00							
Business Freedom (15)	746	55.7	6.57	-0.11*	-0.03	-0.4*	0.00	-0.02	0.05	0.31*	-0.01	0.06*	-0.04	-0.01	-0.4*	0.02	-0.3*	1.00						
Manufacturing (16)	746	12.7	9.16	0.00	-0.2*	-0.2*	-0.1*	-0.4*	-0.05	0.17*	0.24*	-0.1*	-0.1*	-0.2*	-0.1*	0.18*	-0.1*	0.03	1.00					

Agriculture/ fishery (17)	746	22.7	13.8	-0.02	-0.2*	-0.2*	-0.1*	0.16*	-0.1*	0.08*	-0.1*	0.33*	-0.1*	0.32*	-0.3*	-0.1*	-0.4*	0.23*	-0.2*	1.00				
Trade (18)	746	6.67	3.61	0.04	0.11*	-0.1*	0.15*	0.06	0.04	0.22*	0.22*	-0.1*	0.13*	-0.1*	0.14*	-0.1*	0.18*	0.06	0.35*	-0.1*	1.00			
Construction (19)	746	14.4	7.92	-0.02	0.58*	-0.1*	0.53*	0.05	-0.04	0.05	0.06*	-0.01	0.16*	-0.2*	-0.2*	-0.1*	-0.3*	0.29*	0.11*	0.00	0.09*	1.00		
Transport (20)	746	10.9	3.67	-0.06	0.05	0.21*	-0.01	0.20*	-0.1*	-0.4*	-0.2*	0.34*	-0.1*	0.21*	-0.1*	-0.1*	-0.2*	-0.01	-0.1*	-0.1*	-0.2*	0.03	1.00	
Finance (21)	746	1.00	2.15	0.09*	0.43*	-0.04	0.44*	0.07*	0.06	0.11*	0.16*	-0.4*	0.20*	-0.1*	0.24*	0.09*	0.26*	-0.05	0.08*	-0.2*	0.37*	0.15*	-0.2*	1.00
Education (22)	746	4.15	1.38	-0.03	-0.2*	0.16*	-0.3*	-0.4*	-0.01	-0.1*	0.06*	0.01	-0.3*	-0.2*	0.11*	0.29*	0.13*	-0.1*	0.40*	-0.5*	0.00	-0.2*	0.01	-0.1*

Note: Level of statistical significance is 5%. Source: CIS Urban Audit 1995-2008. Data on the number of MBA programmes across CIS cities are obtained from the MBA programs worldwide guide (Accessed on April 15, 2012 at http://www.find-mba.com); MBA studies guide (Accessed on April 15, 2012 at: http://www.masterstudies.com/MBA) and Global MBA and Master Programs Directory (Accessed on April 15, 2012 at: http://www.mba-spectrum.com/courses/course-search-result.php). Data on the number of students enrolled in tertiary education per 100,000 residents originate from UNESCO Institute for Statistics. (Accessed on May 12, 2012 at: http://stats.uis.unesco.org/unesco/TableViewer). All variables are taken in logarithms excluding ratios and binary variables. Table is based on a sample used within specifications 5-7 in Table 3.

Table 3: Regression results
Dependent variable: the rate of change in the No. of SMEs (dLnSME)

Specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Estimation method	Pooled	Fixed Effects	System GMM	System GMM	System GMM	System GMM	System GMM
Variables related to research hypothesis							
LnSMEs lagged	-0.090*** (0.03)	-0.624*** (0.03)	-0.396*** (0.08)	-0.453*** (0.12)	-0.370*** (0.10)	-0.368*** (0.10)	-0.408*** (0.10)
University	0.004** (0.00)	-0.009 (0.01)	0.019*** (0.00)	0.025*** (0.01)	0.028*** (0.00)	-	0.027*** (0.01)
Tertiary education	-	-	-	0.764*** (0.27)	0.916*** (0.27)	0.696** (0.33)	0.824*** (0.29)
MBA	-	-	-	-	-	0.232*** (0.05)	-
University * manufacturing	-	-	-	-	-	-	0.001* (0.00)
City-specific control variables							
GDP per capita	-0.034 (0.03)	0.015 (0.05)	-0.474** (0.21)	-0.730*** (0.19)	-0.879*** (0.17)	-0.893*** (0.18)	-0.869*** (0.18)
GDP growth	-0.324 (0.24)	-0.108** (0.04)	-0.423** (0.20)	-0.256 (0.18)	-0.333* (0.19)	-0.293 (0.21)	-0.242 (0.19)
Unemployment rate	-0.003 (0.01)	-0.003 (0.01)	-0.010 (0.01)	-0.001 (0.01)	-	-	-
Capital investment	-0.0587 (0.06)	-0.139* (0.08)	0.506 (0.31)	0.153 (0.39)	-0.304 (0.31)	-0.251 (0.35)	-0.259 (0.31)
Criminality	-0.027 (0.02)	-0.018 (0.03)	-0.072 (0.06)	-0.041 (0.07)	-0.018 (0.10)	-0.015 (0.10)	-0.001 (0.10)
Urbanisation economies							
Population density	-0.030* (0.02)	0.623*** (0.08)	-0.009 (0.08)	-0.003 (0.09)	-0.070 (0.09)	-0.021 (0.09)	-0.032 (0.10)
Air pollution	-0.012 (0.01)	-0.012 (0.07)	0.104 (0.07)	0.034 (0.07)	0.186* (0.09)	0.179* (0.10)	0.191** (0.09)
Business Environment							
Executive constraints	0.041 (0.05)	0.001 (0.03)	0.118** (0.05)	0.165** (0.08)	0.157** (0.07)	0.156** (0.08)	0.145* (0.07)
Public expenditure	-0.058 (0.04)	-0.046 (0.06)	-0.415** (0.19)	-0.468** (0.22)	-0.370* (0.21)	-0.400* (0.23)	-0.320 (0.20)
Banking reform	0.033 (0.11)	0.167 (0.11)	0.787*** (0.29)	0.644** (0.28)	0.638** (0.25)	0.661** (0.26)	0.617** (0.26)
Freedom of doing business	-0.001 (0.00)	-0.0023 (0.00)	0.006* (0.00)	0.006 (0.00)	0.010** (0.00)	0.008* (0.00)	0.008* (0.00)
Industrial controls							
Manufacturing/energy/mining	0.002** (0.00)	-0.006 (0.00)	0.003 (0.00)	0.006 (0.00)	0.008** (0.00)	0.004 (0.00)	-0.001 (0.01)
Agriculture/fishery	0.001 (0.00)	0.001 (0.00)	0.006 (0.00)	0.012** (0.01)	0.017* (0.00)	0.016** (0.01)	0.015** (0.01)
Trade	0.001 (0.00)	0.014** (0.01)	0.003 (0.01)	0.006 (0.01)	0.016 (0.01)	0.017 (0.01)	0.010 (0.01)
Construction	0.001 (0.00)	0.006 (0.00)	0.003 (0.00)	0.005 (0.01)	0.007 (0.01)	0.014 (0.01)	0.009 (0.01)
Transport	0.001 (0.00)	0.001 (0.01)	0.013 (0.00)	0.009 (0.01)	0.020 (0.01)	0.023 (0.01)	0.014 (0.01)
Finance	0.004 (0.01)	-0.012 (0.02)	0.026 (0.02)	0.018 (0.02)	-0.027 (0.02)	-0.015 (0.03)	-0.047 (0.03)
Education	-0.038*** (0.01)	0.012 (0.02)	-0.114** (0.05)	-0.147** (0.06)	-0.149*** (0.04)	-0.143*** (0.05)	-0.149*** (0.04)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Country controls	Yes	No	Yes	Yes	Yes	Yes	Yes
Number obs.	725	725	720	725	746	746	746
R-square	0.20	0.53					
Pr>z AR(1) / Pr>z AR(2)			0.00/ 0.91	0.00/ 0.04	0.00/0.104	0.01/0.12	0.01/0.11
Hansen test of overid. restrictions, Chi2 (Pr.>chi2)			49.31 (0.785)	42.78 (0.933)	50.70 (0.293)	50.96 (0.29)	46.13 (0.47)

Source: Authors' calculations based on CIS Urban Audit dataset 1995-2008.

Notes: Level of statistical significance is * 0.1%. ** 0.05% and ***, 0.01%. Excluded instruments two: employment and unemployment. Year type dummies are supressed to safe space, only those important in interpreting the research hypothesis such as sector controls are kept for demonstrative purposes. Standard errors (in parentheses) are robust to heteroskedasticity. The figures reported for the Hansen test and Difference Hansen test are the p-values for the null hypothesis: valid specification. Instruments for first differences equation GMM-type [L(2/.).(SMEs lagged Unemployment rate GDP per capita Capital investment)] collapsed. Instruments for levels equation: GMM-type [DL SMEs lagged Unemployment rate GDP per capita Capital investment) collapsed and all other regressors, including time controls, used as standard instruments here. Note: the autocorrelation test shows that the residuals are an AR(1) process which is what is expected. The test statistic for second-order serial correlation is based on residuals from the first-difference equation.