

# Firms' growth in European transition countries: which factors matter?\*

Angela S. Bergantino<sup>†</sup>      Claudia Capozza<sup>‡</sup>

This version: May 15, 2014.

## Abstract

This paper empirically examines the effect of bank concentration on entrepreneurship in Eastern and Central European countries for eight industrial sectors at 3-digit level, using 2000 to 2007 data. Results suggest a (U-inverted) non-monotonic relationship: bank concentration promotes entrepreneurship when it is relatively low but there is a turning point where higher concentration starts to be harmful. Between sectors' analysis shows that high-tech sectors are less reactive to changes in the concentration level. Furthermore, the analysis shows that in these countries, well-developed financial markets, government's quality, property rights protection and corruption preventing policies play a significant role in favouring entrepreneurship.

*Key words:* bank concentration, transition economies, firm creation rate, high tech sectors.

*JEL:* G20, O16, P20, P34

---

\*Special thanks to Marco Alderighi, Michele Bernasconi, Paolo Coccorese, Tom Mickiewicz and Ulrich Woitek for very useful comments and suggestions. The authors would also like to thank Christian Fons-Rosen and participants at the 40<sup>th</sup> EARIE Conference as well as participants at the 53<sup>rd</sup> ERSa Congress, at the 21<sup>st</sup> MBF Conference, Ramazan Gencay and participants at the 4<sup>th</sup> Quantitative Finance Workshop in Rimini and participant at the 33<sup>rd</sup> AISRe Conference for very helpful discussion and comments. All remaining errors are ours.

<sup>†</sup>University of Bari Aldo Moro, Largo Abbazia Santa Scolastica 53, 70124, Bari, Italy. Email: angelastefania.bergantino@uniba.it.

<sup>‡</sup>University of Bari Aldo Moro, Largo Abbazia Santa Scolastica 53, 70124, Bari, Italy. Email: claudia.capozza@uniba.it.

# 1 Introduction

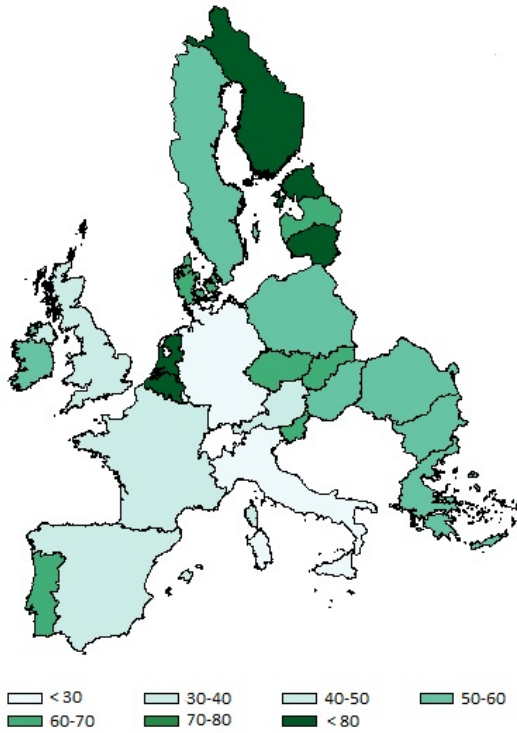
The role of financial systems in fostering economic growth has been explored since the beginning of the twentieth century. Schumpeter (1911) argues that financial intermediaries provide services that stimulate the long-run growth. Many years later, Goldsmith (1969) performs the first empirical study showing the positive correlation between financial development and growth. King and Levine (1993), by testing the Schumpeterian theory, demonstrate that “finance matters”: a higher financial development boosts economic growth, capital accumulation and firm productivity. Moreover, well-developed financial systems are found to encourage industrial growth (Rajan and Zingales, 1998) and to promote firm entry into a market (Aghion et al., 2007). A debated issue in the specialised literature relates to the influence of the banking market structure on industrial growth through the quantity of credit supplied and the efficiency of its allocation. It is argued<sup>1</sup> that in competitive banking sectors, investment decisions are market driven and resource allocation is always efficient. However, banks could seek short-run profits, thus disregarding valuable projects yielding returns only in long-run. Instead, in more concentrated banking sectors, it is more likely that investment decisions are based on the expected long-run capacity of firms to repay the debt since banks have incentive to enter into a lending relationship entailing a stable profit-sharing in the future. Nonetheless, totally ignoring market signals could lead to granting funds to firms unable to maximise the value of the investment.

This paper aims at shedding light on the empirical relationship between banking concentration and entrepreneurship in Central and Eastern European countries, the so-called transition economies, whereas past contributions on a similar topic focused with a few exceptions on either the US banking system or on world-wide applications. The relevance of exploring this issue with respect to European transition countries emerges clearly looking at Figure 1 and Figure 2, reported below.

---

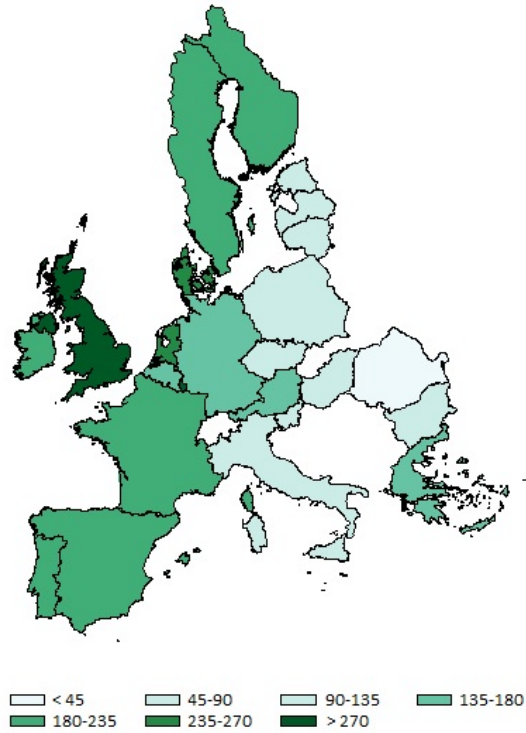
<sup>1</sup>See Rajan and Zingales (2001) for a survey.

Fig. 1: Bank Concentration



Source: European Central Bank.

Fig. 2: Financial Development



Source: WDI, World Bank.

Figure 1 shows 5-Bank Concentration Ratio ( $CR_5$ ), i.e. the sum of the total asset of the five largest banks in each country, averaged by the period 2001-2007, stemming from the European Central Bank. Banking markets are more concentrated in transition countries than in most of the other European countries. Actually, the  $CR_5$  is substantially higher for transition economies over the period considered. For instance, Estonia (98.1 percent) and Lithuania (82.2 percent) have the highest  $CR_5$ , while Poland (50.2 percent) and Bulgaria (52.5 percent) have the lowest  $CR_5$  among transition countries which is, still, close to the average  $CR_5$  for the other countries in Europe (54.9 percent).

Figure 2 reports the Rajan and Zingales' (1998) measure of financial development, i.e. the sum of domestic credit to the private sector as a percent of GDP and stock market capitalization as a percent of GDP, averaged by the period 2000-2007, collected from the World Development Indicators (WDI) database by the World Bank. It is worthwhile noting that Figure 2 is almost the reciprocal of Figure 1. This would indicate that, besides a

highly concentrated banking market, transition countries are characterised by less-developed financial markets which, thus, do not constitute an effective substitute for banking credit.

It follows that the concentration level in the banking market and the resulting supply of credit are crucial elements in the firms creation process and that being these elements quite differentiated between developed and transition countries and among transition countries, it is interesting to analyse their impact in the targeted area.

We perform a cross-industry cross-country analysis using data the on number of firms, collected from Eurostat Structural Business Statistics (SBS) according to the *Nomenclature statistique des Activités économiques dans la Communauté Européenne* (NACE) Rev. 1.1. to construct the variable *Entrepreneurship* as the gross flow of firms of industry  $j$  in country  $k$ , averaged by 2000 to 2007. Data are available for the following Central and Eastern European countries: Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Republic and Slovenia and for the following sectors at 3-digit level: Mining and quarrying (C), Manufacturing (D), Electricity, gas and water supply (E), Construction (F), Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods (G), Hotels and restaurants (H), Transport, storage and communication (I), Real estate, renting and business activities (K). Further, this paper distinguishes among the general effect of bank concentration and the specific effect on high-tech industries. These require, in general, a greater amount of financial resources, are riskier than traditional industries and provide returns in the long-run. It is worthwhile, thus, verifying whether there is an heterogeneity of the effect for high-tech industries with respect to other industries.

Existing papers do not place, to our advice, sufficient emphasis to these elements. Among other things, this paper explores the net effect of bank concentration when economies move forward in the transition stage, accounting, in particular, for the socioeconomic context, the institutional and the regulatory environment. Central and Eastern European countries, in fact, are passing from a planned to a market-oriented economy and are still in the process of restructuring their financial system. Before the transition process began, the only financial

institutions were banks, mere extensions of the governments, granting funding to state-owned firms with no risk evaluation. The transition process started in the early nineties. The banking reform has led to the creation of the Central Bank, in charge of the monetary policy, and commercial banks, initially state-owned and thereafter gradually privatised to serve the functions of modern banks (Bonin and Wachtel, 2003). For all these reasons, it might be useful for policy design to capture the effect of bank concentration on entrepreneurship in the historical period we investigate.

This work provides evidence in favour of the non-monotonic (U-inverted) influence of bank concentration in Central and Easter European transition countries on entrepreneurship. Indeed, bank concentration promotes entrepreneurship at lower levels but there is a turning point where higher concentration starts to be harmful. One might argue that when concentration increases, banks are more willing to finance new firms since the market power arising from more concentrated markets allows banks to extract future profits from successful firms easily. Therefore, banks can charge lower interest rates to new firms and accept, at the beginning, lower returns, being rewarded later for the risk assumed (see Petersen and Rajan, 1995). However, in our analysis high-tech sectors are found to be less reactive to changes in the concentration level. Actually, both the positive and the negative effect occurring beyond the turning point appear to be fairly lower for the high-tech sectors. Financing firms in high-tech industries is riskier, requires greater resources and produces returns in the long-run, thus, as one might expect, banks are reluctant to grant credit for such projects, particularly when involving small or new firms. Finally, the results show that when countries become more internationally integrated or move forward in the transition stage, the benefits of more concentrated banking markets begin to shrink and even the banking sector needs to restructure and become more competitive.

The remainder of the paper unfolds as follows. Section 2 surveys the literature. Section 3 presents the empirical strategy and in Section 4 a description of data and variables is given. In Section 5 the empirical findings are shown and discussed and Section 6 draws some

tentative conclusions. The robustness check is reported in the Appendix.

## 2 Literature review

The economic theory does not make a clear prediction on the effect of banking market structure and industrial growth. In fact, there are two mainstream theories.<sup>2</sup>

The traditional theory of Industrial Organisation provides arguments in favour of banking competition. In a competitive environment banks are price takers, minimise costs and supply the maximum quantity of credit at the lowest interest rate. As banks gain market power, their ability to set prices above marginal cost increases and credit supply reduces. Then, concentrated banking markets have a detrimental effect on industry. The alternative approach claims that the banking industry is different from the other industries since it provides financial services to enable firms to undertake their business. A profitable bank can provide more credit and sturdier lending relationships in the event of financial crises, thus allowing for some degree of market power, with the aim of preserving banking sector stability, does not necessarily have a negative effect on the other industrial sectors. Moreover, Cetorelli and Peretto (2000) prove that the optimal banking market structure is neither monopoly nor competition but an intermediate oligopoly. They identify two major effects of banking market structure on economic growth, leading to a tradeoff between the size and the efficiency of the credit market. Indeed, as long as the number of banks reduces, the quantity of credit available to entrepreneurs reduces too. But the incentive to produce information on entrepreneurs increases<sup>3</sup> and, thus, the proportion of funds allocated to high quality entrepreneurs.

Even the few theoretical papers on banking competition in transition countries provide no clear-cut answer. Schnitzer (1999a) shows that bank competition has a positive effect

---

<sup>2</sup>See Northcott (2004) for an extensive survey. Some of the issues she points out are discussed here.

<sup>3</sup>Banks incur a cost when they engage in the screening activity to discriminate between high and low quality entrepreneurs. However, competitors can extract information about the screened entrepreneurs by simply observing whether the bank grants or denies the loan. Therefore, the free-riding problem weakens banks' incentives of screening in a competitive banking market. See Fisher (2000) for empirical evidence.

on the efficiency of credit allocation since it induces firms to restructure and to have good performances in order to obtain credit. However, Schnitzer (1999b) reveals a downside as restructuring generates positive externalities. Restructuring has a positive influence on the profitability of the entire banking sector, which also non-restructuring firms benefits. If firms can benefit from restructuring without incurring the costs, then they are induced to leave the restructuring to the other firms. Finally, Hainz (2003) demonstrates banks with market power harm social welfare by requiring higher guarantees and interest rates, not only to solve the moral hazard problem but also to extract rents.

The empirical evidence is mixed too. We contribute to that by shedding light on the empirical relationship between banking concentration and entrepreneurship in Central and Eastern European transition countries. To date this issue remains under-researched in the context of transition countries - especially at the level of industry aggregation of the data - since past papers focused mainly on the US banking market or on a specific EU country or contained world-wide analysis.

We believe that the effects of banking market structure combine in different ways, depending on the level of concentration in the market, giving rise, overall, to a positive or a negative outcome. Basically, our hypothesis is that bank concentration might have a non-monotonic influence on entrepreneurship. Actually, there are two country-specific contributions supporting our hypothesis. Bonaccorsi di Patti and dell'Arriccia (2004), using industry level data on Italy, show that bank concentration boosts the creation of new firms but too much concentration becomes harmful.<sup>4</sup> Fernandez de Guevara and Maudos (2009), using province level data on Spain, show that banking market power produces the greatest effect on firms' sale growth at the intermediate levels.

Hereafter, we provide a picture of the empirical research on the related topic. Petersen and Rajan (1995), using data on US firms, provide the first empirical evidence that young

---

<sup>4</sup>The effect is heterogeneous across industries as concentration discourages the growth of more informationally transparent industries. As indicator of opaqueness, the authors use the ratio of gross total assets to gross physical assets. On a similar issue, Ratti et al. (2008) show that when bank concentration increases, the credit constraints decrease for firms in less opaque industries.

firms receive more finance in concentrated credit markets since creditors smooth interest rates over the firm's life cycle, charging a lower-than-competitive rate when the firm is young and a higher-than-competitive rate when the firm is old. This is possible because creditors in concentrated markets are assured of obtaining future surplus from the firm and, thus, are willing to accept lower returns during the start-up phase. On the contrary, Cetorelli and Gambera (2001) show a general detrimental impact of bank concentration on industrial growth on a world-wide sample of countries, but an industry-specific beneficial impact, supported by Claessens and Laeven (2005), as concentration is found to promote the growth of more financially dependent sectors by facilitating credit access to younger firms.<sup>5,6</sup> Using Cetorelli and Gambera's (2001) dataset, Deidda and Fattouh (2005) find out that the general negative effect of banking concentration is limited to low-income countries, suggesting that in high-income countries well-developed financial markets are an effective alternative source of funds and exert a competitive pressure on banks.

With regard to the ease of access to credit, Bonaccorsi di Patti and Gobbi (2001) show a negative impact of bank concentration on the volume of credit for small and medium firms in Italy. Also Berger et al. (2001) find a positive impact of new bank entry on small business lending in US and Yongjin (2008) notes that in more concentrated banking sectors, the quantity of loans made available to small firms falls. Consistently, Beck et al. (2004), using a world-wide sample of countries, show that firms, especially the smaller ones, find barriers to obtain credit in more concentrated banking markets. However, barriers are lower in countries with less corruption, a more efficient legal system and disappear for countries with well-developed financial markets. Cetorelli and Strahan (2006) support Beck et al. (2004) as they find that, in the local US banking market, banks with market power create financial barriers to firm entry in order to keep their borrowers highly profitable. Finally, Brown and Maurer (2005), using data on Eastern Europe and the former Soviet Union,

---

<sup>5</sup>Consistently, Pellényi and Borkó (2009) find that banking competition in the enlarged European market has a positive impact on the number of more financially dependent firms.

<sup>6</sup>Cetorelli (2001) shows that concentration in the banking sector stimulates concentration in other industrial sectors, especially in sectors which are highly dependent on external finance.



provide evidence that an intermediate level of competition maximises the quantity of credit supplied to small firms.

The relevance of exploring this issue with respect to European transition countries clearly emerges if one considers that the latter are characterised by concentrated banking markets *and* less-developed financial markets. Thus, since in these countries financial markets do not represent an effective alternative to banking credit, it is interesting to verify the extent of the relationship between the firm creation process and the banking market structure, which in transition countries, for the reasons just presented, strongly influences the quantity of credit available. This work, in addition, places emphasis to differences that can occur due to the varying socioeconomic and institutional context. Indeed, it studies the net effect of bank concentration when economies move forward in the transition stage.

### 3 Empirical strategy

To explore the effect of banking concentration on entrepreneurship, cross-industry cross-country data, averaged over the period 2000-2007, are used. The cross-sectional model takes the following form:

$$\begin{aligned}
 \textit{Entrepreneurship}_{jk} &= \alpha + \theta \cdot f(\textit{Bank Concentration}_k) & (1) \\
 &+ \gamma \textit{Country Controls}_k \\
 &+ \psi \textit{Industry Dummies}_j \\
 &+ \varepsilon_{jk}.
 \end{aligned}$$

where  $j$  indexes the industry,  $k$  the country and  $\varepsilon$  is the error term.

The dependent variable *Entrepreneurship* is defined as:  $\frac{N_t - N_{t-1}}{N_{t-1}}$ , where  $N_t$  is the number of existing firms of industry  $j$  in country  $k$  in a given year and  $N_t$  is the total number of firms of industry  $j$  in country  $k$  in a given year and  $N_{t-1}$  is the number of existing firms of industry  $j$  in country  $k$  in the previous year. Basically, *Entrepreneurship* is the gross flow of

firms of industry  $j$  in country  $k$ , averaged then by the period 2000-2007 in order to get rid of the effect of macroeconomic shocks which might influence the growth rate of firms in the overall business environment.<sup>7</sup>

We employ two measures for *Bank Concentration*:<sup>8</sup>

- the 5-Bank Concentration Ratio ( $CR_5$ ): the sum of market shares measured in total assets of the five largest banks in each country;
- the Herfindahl–Hirschman Index ( $HHI$ ): the sum of the square of market shares measured in total assets of all the banks in each country.

A functional form on *Bank Concentration* is not imposed *a priori*.

Standard errors are clustered at country-industry level as observations from the same industrial sector in each country might not be independent.

*Bank Concentration* could potentially be an endogenous variable. Actually, Cetorelli and Gambera (2001) claim that 'bank market structure simply adjusts to a level that is optimal for a country's industrial structure'.<sup>9</sup> On the same line, Bonaccorsi di Patti and dell'Ariccia (2004) state that banking market structure 'is partly endogenous if banks tend to enter local markets where the rates of firm creation are higher for exogenous reasons'.<sup>10</sup> If these arguments apply in this sample, the OLS estimate of coefficients will be biased and inconsistent. To deal with the endogeneity due to simultaneity or reverse causality, the instrumental variables technique is used. Instruments are *Rule of Law* and *Banking*

---

<sup>7</sup>The cross-sectional model has been conceived drawing on Rajan and Zingales (1998), analysing the role of financial markets in promoting industrial growth, thereafter revisited to explore the impact of banking market structure on industrial growth (Cetorelli and Gambera, 2001; Claessens and Laeven, 2005), and on firm creation (Bonaccorsi di Patti and dell'Ariccia, 2004). The cross-sectional design has been used also to explore different but related topics. See, among the others, Ayyagari et al. (2008), Beck et al. (2008; 2011), Chong et al. (2013), Fernández et al. (2013), Scott and Dunkelberg (2010).

<sup>8</sup>Cetorelli and Gambera (2001) use the 3-Bank Concentration Ratio and the 5-Bank concentration Ratio reaching the same results. Cetorelli (2001), Beck et al. (2004), Deidda and Fattouh (2005) and Ratti et al. (2008) adopt the same measure. Claessens and Laeven (2005) use, in addition, the H-statistics: the sum of the elasticities of the total revenue of the banks with respect to the bank's input prices. Bonaccorsi di Patti and dell'Ariccia (2004) employ, among others, the Herfindahl index of deposits and the share of deposits held by locally chartered banks.

<sup>9</sup>See pag. 626.

<sup>10</sup>See pag. 231.

*Applications.* The former is widely adopted in the literature<sup>11</sup> and measures the legislative enforcement. The latter is a new instrument introduced by the authors, defined as the ratio of accepted applications to applications sent to the competent authorities to exercise banking activity in the year 2000. The intuition is that this variable captures the entry into the banking market but it is not simultaneously determined with the dependent variables since the necessary legal requirements to operate as a bank are settled by authorities in each country and, once defined, are stable over the years. Further, the year 2000 is chosen for excluding the potential correlation with entrepreneurship over the period considered.

Instrumental variables are used according to the potential endogenous variables. For instance, if the square of *Bank Concentration* is included in the model, then the square of *Banking Applications* and the square of *Rule of Law* are also added to the set of instruments. This is intended to make the model over-identified in order to perform the test for the validity of instruments.

As the model is over-identified and standard errors are clustered, the Generalized Method of Moment (GMM) estimator is used as it is more efficient than Two Stage Least Square (2SLS) estimator.

In the specific, after each estimation the following tests on the set of instruments are performed:

- First, the Kleibergen-Paap test for the weakness of instruments. It verifies whether instruments are weak, that means poorly correlated with the endogenous regressors. If instruments are found to be weak, then GMM estimates are biased toward OLS estimates.
- Second, the Hansen J test for the validity of the instruments.<sup>12</sup> Denoted by  $z_j$  the set of instruments, the null hypothesis is that the conditional moment restriction is satisfied:  $E(\varepsilon_{ij}|z_j) = 0$ .

---

<sup>11</sup> *Rule of Law* has been previously adopted as instrument for financial structure. See, for instance, Cetorelli and Gambera (2001), Cetorelli (2001) and Deidda and Fattouh (2005).

<sup>12</sup>The cluster-robust analog of the Sargan test which, instead, assume i.i.d. errors.

- Third, the C test for the endogeneity of *Bank Concentration*.<sup>13</sup> The null hypothesis is that regressors can be treated as exogenous. If the null is not rejected, then the GMM estimator is still consistent but less efficient than OLS estimator.

*Country Controls* is a set of regressors at country level, introduced to reduce the possibility of model misspecification. These regressors are listed and described in Section 4. *Industry Dummies* is the set of dummy variables capturing industry-specific effects.

At first, estimations are run on the entire sample of country-industry observations, in order to point out the general impact of *Bank Concentration* on *Entrepreneurship*. Then, the focus is restricted to the subsample of high-tech industries. It is worthwhile verifying whether there is a specific effect for high-tech industries which, generally, require a greater amount of financial resources, are riskier than traditional industries and provide returns in the long-run.

## 4 Data and variables description

Data on number of firms are collected from Eurostat, Structural Business Statistics (SBS), classified according to the *Nomenclature statistique des Activités économiques dans la Communauté Européenne* (NACE) Rev. 1.1. Data are available for the following Central and Eastern European countries: Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Republic and Slovenia. Previous contributions focus on manufacturing, whereas this work extends the analysis to the other sectors for which data are available in SBS: Mining and quarrying (C), Manufacturing (D), Electricity, gas and water supply (E), Construction (F), Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods (G), Hotels and restaurants (H), Transport, storage and communication (I), Real estate, renting and business activities (K).

Data from 1999 to 2007 are used in order to compute the variable *Entrepreneurship* as the gross flow firms in industry  $j$  of country  $k$  averaged from 2000 to 2007. The focus

---

<sup>13</sup>Hayashi (2000), page 220.

of this work is on pre-crisis period since from 2008 the global financial crisis has led to a structural break and has definitely influenced the birth and death of firms. In addition, the NACE classification has been modified from 2008 and, given the level of data disaggregation available in Eurostat for the countries under investigation, it is not possible to make a proper matching between the former and the new classification.

Data on industries at 3-digit level are generally used. However, if observations are missing at this level, data at the 2-digit level are employed. The dataset comprises 1,439 country-industry observations. In Table 1 (see the Appendix) we report the list of industrial sectors together with the indication of high-tech sectors according to Eurostat.

In Table 2 descriptive statistics on the variable *Entrepreneurship* decomposed by countries are reported. Slovenia and Poland seem to be the countries with the lowest gross flow of firms. Indeed, they exhibit the lowest mean (-0.003 and 0.005, respectively) and more than half of industry observations have a negative rate (52.4 percent and 55.5 percent, respectively). On the contrary, Slovakia and Hungary are the countries with the greatest entrepreneurial dynamism. Actually, they show the highest mean (0.547 and 0.826, respectively) and the lowest percentage of industry observations with a negative gross flow of firms (0 percent and 1.3 percent, respectively). The other countries lie in between these two extremes, with the lowest gross flow of firms varying between 0.033 and 0.150 and the percentage of industry observations with a negative gross flow of firms ranging between 16.1 and 35.4 percent.

Table 2. Entrepreneurship by countries.

	<i>Obs</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Min</i>	<i>Max</i>	<i>Neg. Obs (%)</i>
Bulgaria	147	0.042	0.087	-0.141	0.432	35.4
Czech Republic	157	0.033	0.079	-0.185	0.379	35
Estonia	141	0.089	0.111	-0.143	0.458	17.7
Hungary	157	0.826	1.306	-0.139	12.002	1.3
Latvia	149	0.142	0.199	-0.319	1.032	16.1
Lithuania	150	0.150	0.286	-0.093	1.076	26
Poland	137	0.005	0.062	-0.081	0.405	55.5
Romania	140	0.088	0.122	-0.322	0.458	22.1
Slovakia	114	0.547	0.699	0.014	3.055	0
Slovenia	147	-0.003	0.070	-0.214	0.366	52.4

In Table 3 descriptives on the variable *Entrepreneurship* are decomposed by industrial sectors. Specifically, the sector *Real estate, renting and business activities* is characterised by the highest gross flow of firms and a few industry observations having a negative rate (8.4 percent). Similarly, the sector *Construction* has a relative high gross flow of firms and the lowest percentage of observations with a negative flow (4.6 percent). Further, *Wholesale and retail trade* appears to be the most dynamic as, at the same time, it shows a relative greater gross flow of firms and a high percentage of industry observations with a negative flow (24.5 percent). The other industrial sectors seem to have similar patterns. The lowest gross flow of firms ranges from 0.118 to 0.260 and the percentage of industry observations with a negative gross flow of firms varies from 17.1 to 30.3 percent.

Table 3. Entrepreneurship by industrial sectors.

	<i>Obs</i>	<i>Mean</i>	<i>Std.Dev.</i>	<i>Min</i>	<i>Max</i>	<i>Neg.Obs (%)</i>
Mining and quarrying	49	0.119	0.152	-0.139	0.529	20.4
Manufacturing	945	0.118	0.253	-0.322	2.272	30.3
Electricity, gas and water supply	35	0.125	0.132	-0.053	0.436	17.1
Construction	44	0.305	0.447	-0.014	2.124	4.6
Wholesale and retail trade	188	0.350	1.112	-0.123	12.219	24.5
Hotels and restaurants	9	0.187	0.329	-0.014	0.955	22.2
Transport, storage and communication	62	0.260	0.564	-0.185	3.379	21
Real estate, renting and business activities	107	0.500	0.980	-0.141	6.430	8.4

In the set of *Country Controls*, there is the *Logarithm of per-capita GDP* in 2000 for capturing the convergence effect of the economy toward its steady state. It is expected to have a negative coefficient since countries that have grown more in the past, should grow less in the future. Further, the *Initial Share of Industry* in 2000 is included in order to account for the fact that new firms are less likely to entry in more crowded markets, and thus a negative coefficient is expected. The variable *Financial Development* in 2000 is expected to have a positive coefficient as it narrows the cost difference between internal and external finance and stimulates growth, especially for more financially dependent firms.

Among the controls, *Government Effectiveness* is introduced to take account for the role of governments in stimulating the entrepreneurial activity, *Control of Corruption* to capture the effect of corruption prevention and *Property Rights* to control for the effect of laws to

protect private property. All these variables are intended to favour the entrepreneurship, and then are expected to have positive coefficients.

In addition, some control variables related to the banking capital structure and regulation are considered, namely *Foreign Bank Ownership* and *Government-Owned Banks* to control for the presence of foreign banks and the state in the banking sector. About the coefficient of *Foreign Bank Ownership* is expected to have a positive sign since foreign investors improve the quality of financial intermediation services by bringing capital and knowledge (Haas and van Lelyveld, 2004). As far as concern the coefficient of *Government-Owned Banks* is expected to have a negative sign since it may occur that state-owned banks grant credit simply to state-owned firms and not to firms with the most valuable entrepreneurial project as Bonin and Wachtel (2003) point out. The variable *Activity Restriction* is also included to control for the regulatory environment in which banks operate.

Finally, two socio-economic variables are considered, *Globalization* and *Privatization*, with the aim of testing whether the openness to international markets and progress in transition stage affect the entrepreneurship. We might expect a positive influence from both variables since an easier access to the international financial markets and transition from a planned toward a market-oriented economy should stimulate the entrepreneurship.

In Table 4 the formal definitions of each variable with the data sources are reported (see the Appendix) and in Table 5 the descriptive statistics are shown.

Table 5. Descriptive statistics.

<i>Variables</i>	<i>Obs.</i>	<i>Mean</i>	<i>St. Dev</i>	<i>Min</i>	<i>Max</i>
5-Bank Concentration Ratio	1,439	0.66	0.14	0.50	0.98
Herfindahl–Hirschman Index	1,439	0.14	0.09	0.07	0.39
Activity Restriction	1,439	2.32	0.35	2.00	3.03
Control of Corruption	1,439	0.42	0.35	-0.19	0.99
Financial Development	1,439	0.42	0.20	0.10	0.69
Foreign Bank Ownership	1,439	0.72	0.23	0.20	0.99
Globalization	1,439	75.11	9.03	58.03	89.36
Government Effectivness	1,439	0.65	0.37	-0.13	1.01
Government-Owned Banks	1,439	0.11	0.12	0.00	0.41
Intial Share of Industry	1,439	0.01	0.03	0.00	0.47
GDP per capita	1,439	4,253.85	2,239.40	1,563.02	9,854.56
Privatization	1,439	3.67	0.33	3.00	4.00
Property Rights	1,439	55.06	13.14	30.00	72.05
Banking Application	1,439	0.91	0.10	0.74	1.00
Rule of Law	1,439	0.58	0.37	-0.10	0.99

## 5 Results

In this section the GMM estimates are shown and commented. In addition, the OLS and the first stage regression results are reported in the Appendix.

Regressions are organised as follows. In the first regression set, some contextual variables that might affect the overall business environment are included in the set of controls. Then, in the second regression set, some control regressors related to the banking capital structure and regulation are introduced. Finally, in the third regression set, some socio-economic variables are added and also interacted with *Bank Concentration* in order to point out its net effect, varying some macroeconomic indicators. For each regression, the three tests described in Section 3 are performed to verify the consistency of estimations. The discussion is provided at the end of this section.

As shown in Table 6, it emerges a (U-inverted) non-monotonic influence of concentration in the banking sector on entrepreneurship in Central and Eastern European countries. Actually, *Bank Concentration* has a positive and highly significant coefficient, while the *Bank Concentration*<sup>2</sup> has a negative and highly significant coefficient. This finding also occurs on



the subsample of high-tech sectors, however the magnitude of the effect is smaller.

Overall, the non-monotonic influence would suggest that bank concentration promotes entrepreneurship up to a certain level. Actually, there is a turning point from where higher concentration starts to be harmful.

Table 6. Banking Concentration and Entrepreneurship. GMM estimates.

	5-Bank Concentration Ratio			Herfindahl–Hirschman Index				
	<i>All</i> (1)	<i>High-tech</i> (2)	<i>All</i> (3)	<i>High-tech</i> (4)	<i>All</i> (5)	<i>High-tech</i> (6)	<i>All</i> (7)	<i>High-tech</i> (8)
<i>Bank Concentration</i>	6.997*** (1.393)	3.151*** (1.137)	9.276*** (1.830)	3.809*** (1.275)	7.218*** (1.381)	3.868*** (1.112)	9.563*** (1.560)	4.820*** (1.154)
<i>Bank Concentration</i> <sup>2</sup>	-4.566*** (0.949)	-1.877** (0.778)	-6.280*** (1.335)	-2.482*** (0.940)	-16.589*** (3.199)	-8.062*** (2.558)	-22.553*** (3.907)	-10.742*** (2.906)
<i>Initial Share of Industry</i>	-0.378 (0.634)	-0.436 (0.951)	-0.632 (0.676)	-0.513 (0.952)	-0.541 (0.634)	-0.411 (0.922)	-0.230 (0.683)	-0.643 (0.921)
<i>Log(GDP)</i>	-0.574*** (0.100)	-0.261*** (0.070)	-0.514*** (0.118)	-0.220** (0.086)	-0.765*** (0.125)	-0.377*** (0.088)	-0.712*** (0.138)	-0.328*** (0.100)
<i>Financial Development</i>	0.881*** (0.259)	0.524*** (0.198)			1.147*** (0.304)	0.640*** (0.234)		
<i>Government Effectiveness</i>	0.404*** (0.107)	0.091 (0.082)			0.584*** (0.101)	0.224*** (0.076)		
<i>Property Rights</i>			0.011*** (0.003)	0.005*** (0.002)			0.016*** (0.003)	0.008*** (0.002)
<i>Control of Corruption</i>			0.492*** (0.156)	0.184 (0.118)			0.690*** (0.179)	0.278** (0.132)
Kleibergen-Paap Stat.	178.975	51.287	146.584	41.931	101.184	23.615	197.984	58.419
Hansen J Stat.	0.361	2.440	1.399	2.865	0.359	2.523	0.508	1.805
Hansen J p-value	0.835	0.295	0.497	0.238	0.836	0.283	0.776	0.406
Endogeneity Stat.	42.061	24.085	38.502	26.214	43.692	23.314	40.338	22.092
Endogeneity p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Observations	1,439	355	1,439	355	1,439	355	1,439	355
R <sup>2</sup>	0.148	0.122	0.162	0.164	0.176	0.178	0.178	0.197

Note: Industry dummies are always included but not reported. Cluster-robust standard errors in parentheses.

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.10.

The coefficient estimates appear to be robust to the inclusion of banking capital structure and regulation variables, as shown in Table 7.<sup>14</sup>

Table 7. Banking Concentration and Entrepreneurship. GMM estimates.

	5-Bank Concentration Ratio					Herfindahl-Hirschman Index						
	All (9)	High-tech (10)	All (11)	High-tech (12)	All (13)	High-tech (14)	All (15)	High-tech (16)	All (17)	High-tech (18)	All (19)	High-tech (20)
<i>Bank Concentration</i>	7.051*** (1.402)	3.860*** (1.055)	6.889*** (1.471)	3.289*** (1.139)	6.365*** (0.999)	3.358*** (0.660)	7.174*** (1.468)	3.788*** (1.026)	7.118*** (1.476)	4.056*** (1.126)	3.063*** (0.850)	1.681** (0.704)
<i>Bank Concentration</i> <sup>2</sup>	-4.637*** (1.030)	-2.585*** (0.802)	-4.494*** (1.002)	-1.973** (0.780)	-5.383*** (0.708)	-2.812*** (0.499)	-16.599*** (3.188)	-8.783*** (2.271)	-16.373*** (3.401)	-8.522*** (2.577)	-11.575*** (2.132)	-6.132*** (1.561)
<i>Initial Share of Industry</i>	-0.365 (0.647)	-0.673 (0.928)	-0.391 (0.644)	-0.455 (0.963)	-0.552 (0.584)	-0.744 (0.754)	-0.531 (0.642)	-0.623 (0.905)	-0.546 (0.642)	-0.440 (0.930)	-0.767 (0.569)	-0.663 (0.776)
<i>Log(GDP)</i>	-0.603*** (0.223)	-0.490*** (0.183)	-0.619*** (0.195)	-0.263* (0.156)	-1.143*** (0.149)	-0.692*** (0.101)	-0.783*** (0.149)	-0.553*** (0.151)	-0.800*** (0.201)	-0.362** (0.155)	-1.043*** (0.141)	-0.650*** (0.092)
<i>Financial Development</i>	0.881*** (0.260)	0.609*** (0.194)	0.923*** (0.302)	0.543** (0.231)	0.109 (0.135)	0.179 (0.140)	1.149*** (0.303)	0.741*** (0.233)	1.177*** (0.332)	0.649** (0.257)	0.459** (0.187)	0.361** (0.178)
<i>Government Effectiveness</i>	0.465 (0.449)	0.514 (0.353)	0.451** (0.207)	0.085 (0.167)	2.431*** (0.318)	1.446*** (0.236)	0.622* (0.333)	0.539** (0.265)	0.621*** (0.199)	0.199 (0.157)	1.948*** (0.276)	1.216*** (0.218)
<i>Government Owned-Bank</i>	0.066 (0.473)	0.460 (0.367)					0.048 (0.407)	0.394 (0.315)				
<i>Foreign Bank Ownership</i>			-0.044 (0.165)	0.006 (0.134)					-0.036 (0.167)	0.029 (0.133)		
<i>Activity Restriction</i>					0.823*** (0.118)	0.558*** (0.093)					0.669*** (0.109)	0.485*** (0.095)
Kleibergen-Paap Stat.	21.442	6.384	147.358	43.388	2364.856	635.059	34.351	9.790	99.744	27.737	292.769	
Hansen J Stat.	0.362	1.667	0.296	2.369	2.301	2.001	0.356	1.625	0.316	2.414	5.109	3.794
Hansen J p-value	0.548	0.197	0.586	0.124	0.316	0.368	0.551	0.202	0.574	0.120	0.078	0.150
Endogeneity Stat.	30.150	13.828	41.915	26.426	24.749	6.541	34.805	16.474	42.830	25.768	32.230	10.863
Endogeneity p-value	0.000	0.003	0.000	0.000	0.000	0.038	0.000	0.001	0.000	0.000	0.000	0.004
Observations	1,439	355	1,439	355	1,439	355	1,439	355	1,439	355	1,439	355
R <sup>2</sup>	0.155	0.245	0.150	0.125	0.329	0.434	0.180	0.261	0.178	0.180	0.276	0.395

Note: Industry dummies are always included but not reported. Cluster-robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

<sup>14</sup>In the set of endogenous variables are also included the *Government Owned-Bank* and *Foreign Bank Ownership*. Since they are computed using data on banking assets, then the same arguments on the endogeneity of *Bank Concentration* hold for them.

Using coefficients from regressions reported in Table 6 and Table 7, it is estimated that the turning point occurs, on average, at the value of *5-Bank Concentration Ratio* equal to 0.73 for the full sample and equal to 0.76 for the subsample of high-tech sectors and at the value of *Herfindahl–Hirschman Index* equal to 0.20 for the full sample and equal to 0.21 for the subsample of high-tech sectors.<sup>15</sup> Beyond the turning point, the effect of bank concentration on the gross flow of firms is no longer positive.

In the non-linear case, the marginal effect of *Bank Concentration* on *Entrepreneurship* depends on the level of *Bank Concentration* and it is given by:  $\frac{\partial Entrepreneurship_{jk}}{\partial Bank\ Concentration_k} = \theta_1 - 2\theta_2 Bank\ Concentration_k$ , where  $\theta_1$  and  $\theta_2$  are the estimated coefficients of the variable of degree one and of the variable of degree two, respectively. Using the average coefficients on the regressions (1) to (20), the marginal effects are computed setting the variables *5-Bank Concentration Ratio* and the *Herfindahl–Hirschman Index* equal to the mean value, the 5<sup>th</sup>, the 10<sup>th</sup>, the 90<sup>th</sup> and the 95<sup>th</sup> percentile (see Table 8).<sup>16</sup>

Table 8. The marginal effect of Bank Concentration.

	5 <sup>th</sup> centile	10 <sup>th</sup> centile	Mean	90 <sup>th</sup> centile	95 <sup>th</sup> centile
<i>5-Bank Concentration Ratio</i>					
All Sectors	2.234	1.990	0.651	-1.023	-2.636
High-tech Sectors	1.119	0.899	0.411	-0.363	-1.109
<i>Herfindahl–Hirschman Index</i>					
All Sectors	4.450	4.350	2.107	-0.002	-6.061
High-tech Sectors	2.430	2.109	1.260	0.196	-2.863

<sup>15</sup>Specifically, for the CR<sub>5</sub> the lowest turning point across regression is 0.59 for all sectors and 0.60 for high-tech sectors, while the highest is 0.77 for all sectors and 0.84 for high-tech sectors. For the HHI the lowest turning point across regression is 0.13 for all sectors and 0.14 for high-tech sectors, while the highest is 0.22 for all sectors and 0.24 for high-tech sectors.

<sup>16</sup>For the CR<sub>5</sub>, the 5<sup>th</sup> percentile is 0.501, the 10<sup>th</sup> percentile is 0.525, the mean is 0.657, the 90<sup>th</sup> percentile is 0.822 and the 95<sup>th</sup> percentile is 0.981. For the HHI, the 5<sup>th</sup> percentile is 0.071, the 10<sup>th</sup> percentile is 0.074, the mean is 0.141, the 90<sup>th</sup> percentile is 0.204 and the 95<sup>th</sup> percentile is 0.385.

In Central and Eastern European countries, the concentration in the banking sector seems to stimulate entrepreneurship (up to a certain level). As Petersen and Rajan (1995) argue, this can be explained considering that when concentration increases, banks are more willing to finance new firms. Generally, new firms are riskier and not able to pay high interest rates to obtain credit. The market power allows banks to extract profits from successful firms, thus, they can charge lower interest rates to new firms and accept, at first, lower returns, being rewarded later for the risk assumed. One might also argue that market power gives incentive to banks to engage in a more accurate screening because the returns of new projects have a direct impact on their future profits (Cetorelli and Gambera, 2000).

As shown in Table 8, high-tech sectors are found to be less reactive to the changes in the concentration level. Actually, both the positive effect and the negative effect occurring beyond the turning point appear to be fairly lower. Financing firms in the high-tech industries is riskier, requires a greater amount of resources and produces returns in the long-run. Banks seem to be reluctant in investing in the high-tech, particularly when this involves small or new firms (World Bank, 2005).

About the control variables,  $\text{Log}(GDP)$  has the expected sign. It is negative and significant since it captures the convergence effect of the economy to its steady state. Even the variable *Initial Share of Industry*, although not statistically different from zero, has the expected negative sign since new firms are less likely to enter in crowded industries. *Financial Development* has positive and significant effects, underlying that well-developed financial markets boost the net creation rate of new firms.<sup>17</sup> Likewise, *Government Effectiveness* has a positive and significant impact, suggesting that high quality governments stimulate entrepreneurship. Moreover, *Control of Corruption* has a positive and significant impact, meaning that governments enforcing, to a greater extent, this kind of control stimulate the entrepreneurship. Consistently, the variable *Property Rights* is positive and significant: a more effective property rights protection fosters entrepreneurship. Contrary to expectations,

---

<sup>17</sup>Consistently with Rajan and Zingales (1998).

the coefficient of *Government-Owned Banks* and *Foreign Bank Ownership* is not statistically different from zero. Finally, *Activity Restriction* has a positive and significant impact on firms creations: the lower the activity diversification, the greater the amount of credit that banks can address to traditional banking activity.

Table 9 collects results of regression testing whether the effect of banking concentration varies depending on some macroeconomic indicators, namely the level of globalization and the progress reached in the transition stage by each country.

Table 9. Bank Concentration and Entrepreneurship. GMM estimates.

	5-Bank Conc. (21)	Ratio (22)	Herf.–Hirsc. (23)	Index (24)
<i>Bank Concentration</i>	8.020*** (1.770)	7.508*** (2.796)	12.670*** (3.000)	13.779*** (4.208)
<i>Globalization</i>	0.085*** (0.014)		0.041*** (0.006)	
<i>Bank Concentration*Globalization</i>	-0.107*** (0.022)		-0.166*** (0.036)	
<i>Privatisation</i>		1.350*** (0.452)		0.897*** (0.170)
<i>Bank Concentration*Privatisation</i>		-1.770** (0.719)		-4.818*** (1.188)
<i>Initial Share of Industry</i>	-1.396** (0.673)	-0.206 (0.741)	-1.354** (0.669)	-0.522 (0.690)
<i>Log(GDP)</i>	-0.230** (0.093)	-0.102 (0.225)	-0.209** (0.082)	0.199 (0.131)
<i>Financial Development</i>	0.117 (0.321)	0.380 (0.589)	0.048 (0.263)	-0.420 (0.352)
Kleibergen-Paap Stat.	658.195	70.985	1702.681	45.085
Hansen J Stat.	5.337	1.884	4.734	2.402
Hansen J p-value	0.069	0.390	0.094	0.301
Endogeneity Stat.	36.911	39.493	37.790	39.138
Endogeneity p-value	0.000	0.000	0.000	0.000
Observations	1,439	1,439	1,439	1,439
R <sup>2</sup>	0.201	0.133	0.174	0.174

Note: Industry dummies always are included but not reported. Cluster-robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

The variable *Globalization* is positive and significant, suggesting that a higher level of globalization promotes the entrepreneurship. For instance, firms can more easily get in

touch with foreign lenders and also access the international financial markets, which, basically, constitute an alternative to the banking credit. The interaction term (*Bank Concentration\*Globalization*) is included with the aim of testing whether the effect of *Bank Concentration* differs for more internationally integrated countries. The interaction is negative and significant, hence the effect of *Bank Concentration* reduces for more globalized countries. The variable *Privatization* has a positive and significant impact, meaning that the transition from a planned toward a market-oriented economy stimulates the entrepreneurship. In addition, the interaction term (*Bank Concentration\*Privatization*) is negative and significant: the positive impact of banking concentration is lower for countries that are in a more advanced stage of the transition process.

One might argue that the greater lender-borrower cooperation, which more likely takes place in concentrated banking markets, stimulates entrepreneurship. However, when countries become more internationally integrated or move forward in the transition stage and in the stage of economic development, the benefits of more concentrated banking markets begin to shrink and the banking sector needs to restructure and become more competitive.

In the bottom of each table the results of the tests performed are reported. The Kleibergen-Paap statistic is greater than the critical value, allowing to reject the null of weakness of instruments.<sup>18</sup> Further, the results of the Hansen J test fail to reject the null that the overidentifying restrictions are valid: the instruments are orthogonal to the error term. Finally, the results of the C test lead to reject the null that endogenous regressors can be actually treated as exogenous, therefore, GMM estimator is required.

---

<sup>18</sup>The critical value with 5% maximal relative bias is equal to 11.04. The critical value has not be provided by Stock and Yogo (2005) for the case of three endogenous regressors and four instruments (see regressions 9 to 12 and 15 to 18). It has also to be noted that the critical value is computed under the assumption of i.i.d. errors.

## 6 Conclusions

This paper fills a gap in the literature by providing empirical evidence - the theory does not make clear predictions - on the relation between banking concentration and entrepreneurship at industry-level in Central and Eastern European transition countries, over the period 2000 to 2007. We are motivated in studying this topic on European transition countries because real data would suggest that banking credit is even more crucial for entrepreneurship in the countries investigated than in the rest of Europe. In fact, transition economies have, on average, more concentrated banking markets than other European countries and, at the same, less-developed financial markets which, basically, cannot be an effective alternative source of funding for firms.

We find out a (U-inverted) non-monotonic influence of bank concentration, heterogeneous across industries. Banking concentration stimulates firm creation up to a level from which, henceforth, it starts to be detrimental. Furthermore, the total effect is mitigated for high-tech sectors: both the positive and the negative influence are fairly lower.

Overall, our results provide empirical evidence in favour of what is claimed by Rajan and Zingales (2001) on the relationship between financial systems and industrial growth. Concentrated banking markets, which provide the bulk of funding to firms, work better when economies are at an early stage of development and, more generally, with traditional industries whose characteristics are well known. In other words, more concentrated banking markets are more suitable for financing physical-asset-intensive industry rather than high-technology, R&D-based industries. When industries are intangible assets-based there is a need to improve transparency. Banking systems should become more competitive.

It is worthwhile noting that the positive impact of concentration reduces when countries move forward in the transition stage. In addition, it emerges the significant role of the institutional context - such as government's quality, property rights protection and corruption preventing policies - in removing potential obstacles to entrepreneurship growth. This



would suggests that the level of banking concentration but also these institutional variables and actions directed to strengthen them should be considered by policy makers in order to promote the entrepreneurial initiative in European transition countries and, thus, to sustain the long-run economic growth.

## References

- [1] Aghion, P., Fally, T., Scarpetta, S. "Credit Constraints as a Barrier to the Entry and Post-Entry Growth of Firms". *Economic Policy*, 22 (52), 2007, 731-779.
- [2] Ayyagari, M., Maksimovic, V., Demirgüç-Kunt, A. "How Important Are Financing Constraints? The Role of Finance in the Business Environment". *World Bank Economic Review*, 22 (3), 2008, 483-516.
- [3] Barth, J. R., Caprio, G., Levine, R. "The regulation and supervision of banks around the world - a new database". World Bank Policy Research Working Paper 2588, 2001.
- [4] Beck, T., Demirgüç-Kunt, A., Laeven, L., Levine, R. "Finance, Firm Size, and Growth". *Journal of Money, Credit and Banking*, 40 (7), 2008, 1379-1405.
- [5] Beck, T., Demirgüç-Kunt, A., Maksimovic, V. "Bank Competition and Access to Finance: International Evidence". *Journal of Money, Credit and Banking*, 36 (3), 2004, 627-48.
- [6] Beck, T., Demirgüç-Kunt, A., Martínez Pería, M.S. "Bank Financing for SMEs: Evidence Across Countries and Bank Ownership Types". *Journal of Financial Services Research*, 39 (1-2), 2011, 35-54.
- [7] Berger, A. N., Goldberg, L.G., White, L. J. "The Effects of Dynamic Changes in Bank Competition on the Supply of Small Business Credit". *European Finance Review*, 5(1-2), 2001, 115-139.
- [8] Bonaccorsi di Patti, E., dell’Ariccia, G. (2004). Bank Competition and Firm creation. *Journal of Money, Credit and Banking*, 36(2): 225-51.
- [9] Bonaccorsi di Patti, E. Gobbi, G. (2001). The Effects of Bank Consolidation and Market Entry on Small Business Lending. Banca d’Italia Temi di Discussione 01-404.

- [10] Bonin, J., Wachtel, P. (2003). Financial Sector Development in Transition Economies: Lessons from the First Decade. *Financial Markets, Institutions & Instruments*, 12(1): 1-66.
- [11] Brown, M. and M.C.R. Maurer. (2005). Bank Ownership, Bank Competition, and Credit Access: Firm-Level Evidence from Transition Countries. Mimeo, Swiss National Bank.
- [12] Cetorelli, N. (2001). Does Bank Concentration Lead to Concentration in Industrial Sectors? Federal Reserve Bank of Chicago Working Paper 01-01.
- [13] Cetorelli, N., Gambera, M. (2001). Banking Market Structure, Financial Dependence and Growth: International Evidence from Industry Data. *Journal of Finance*, 56(2): 617-48.
- [14] Cetorelli, N. Peretto, P.F. (2000). Oligopoly Banking and Capital Accumulation. Duke University, Department of Economics Working Paper 00-19.
- [15] Cetorelli, N. Strahan, P.E. (2006). Finance as a Barrier to Entry: Bank Competition and Industry Structure in Local U.S. Markets. *Journal of Finance*, 61(1): 437-61.
- [16] Chong, T.T., Lu, L., Ongena, S. "Does banking competition alleviate or worsen credit constraints faced by small- and medium-sized enterprises? Evidence from China". *Journal of Banking & Finance*, 37 (9), 2013, 3412-3424.
- [17] Claessens, S., Laeven, L. "Financial Dependence, Banking Sector Competition and Economic Growth". *Journal of the European Economic Association*, 3(1), 2005, 179-207.
- [18] Deidda L., Fattouh. B. "Banks, Financial Markets and Growth". *Journal of Financial Intermediation* 17(1), 2005, 6-36.
- [19] EBDR. (2010). Transition Report: Recovery and Reform. London, 2010.
- [20] Fernandez de Guevara, J., Maudos, J. "Regional Financial Development and Bank Competition: Effects on Firms' Growth". *Regional Studies*, 43(2), 2009, 211-228.

- [21] Fernandez, A.I., González, F., Suárez, N. "How do bank competition, regulation, and institutions shape the real effect of banking crises? International evidence" *Journal of International Money and Finance*, 33, 2013, 19-40.
- [22] Fischer, K. H. "Acquisition of Information in Loan Markets and Bank Market Power - An Empirical Investigation". EFA 0593, 2000.
- [23] Goldsmith, R.W. *Financial Structure and Development*. New Haven, CT: Yale University Press, 1969.
- [24] De Haas, R., van Lelyveld, I. "Foreign Bank Penetration and Private Sector Credit in Central and Eastern Europe." *Journal of Emerging Market Finance*, 3(2), 2004, 125-152.
- [25] Hainz, C. "Bank competition and credit markets in transition economies". *Journal of Comparative Economics*, 31(2), 2003, 223-45.
- [26] Hayashi, F. 2000. *Econometrics*. Princeton, NJ: Princeton University Press, 2000.
- [27] Kaufmann, D., Kraay, A., Mastruzzi, M. "The Worldwide Governance Indicators: Methodology and Analytical Issues". World Bank Policy Research Working Paper 5430, 2010.
- [28] King, R.G., Levine, R. "Finance and Growth: Schumpeter Might Be Right". *Quarterly Journal of Economics*, 108(3), 1993, 681-737.
- [29] Northcott, C.A. "Competition in Banking: A Review of the Literature". Bank of Canada Working Paper 04-24, 2004.
- [30] Petersen, M., Rajan, R.G. "The Effect of Credit Market Competition on Lending Relationships". *Quarterly Journal of Economics*, 110(12), 1995, 407-43.
- [31] Pellényi, G., Borkó, T. "Bank Competition and Firm Growth in the Enlarged European Union". Working Paper / FINES No 5.1, DIW Berlin, German Institute for Economic Research, 2009.

- [32] Rajan, R., Zingales, L. "Financial dependence and growth". *American Economic Review*, 88(3), 1998, 559-86.
- [33] Rajan, R., Zingales, L. "Financial system, industrial structure, and growth". *Oxford Review of Economic Policy*, 17(4), 2001, 467-82.
- [34] Ratti, R.A., Lee, S., Seol, Y. "Bank Concentration and Financial Constraints on Firm-level Investment in Europe". *Journal of Banking & Finance*, 32(12), 2008, 2684-94.
- [35] Schumpeter, J. A. *A Theory of Economic Development*. Cambridge, MA: Harvard University Press, 1911.
- [36] Schnitzer, M. "On the role of bank competition for corporate finance and corporate control in transition economies". *Journal of Institutional and Theoretical economics*, 155(1), 1999a, 23-50.
- [37] Schnitzer, M. "Enterprise restructuring and bank competition in transition economies". *Economics of Transition*, 7(1), 1999b, 133-55.
- [38] Scott, J. A., Dunkelberg, W.C. "Competition for small firm banking business: Bank actions versus market structure". *Journal of Banking & Finance*, 34 (11), 2010, 2788-2800.
- [39] Stock, J.H., Yogo, M. "Testing for Weak Instruments in IV Regression". *Identification and Inference for Econometric Models: A Festschrift in Honor of Thomas Rothenberg*, Donald W.K.A., Stock, J.H. eds. Cambridge University Press, 80-108, 2005.
- [40] World Bank. World Development Report: A Better Investment Climate – for Everyone, World Bank, Oxford University Press, 2005.
- [41] Yongjin, P. "Parsimonious Lenders: Bank Concentration and Credit Availability to Small Businesses". MPRA Paper No 9266, University Library of Munich, Germany, 2008.

## **A. Appendix tables**

### **A1. Data description and sources**

For the sake of convenience, in Table 1 we provide the NACE classification at 2-digit, although in the empirical analysis we mainly use more disaggregated data. This is intended to give an overview of the industrial sectors included in our analysis. Specifically, high-tech sectors are those identified by codes 24, 29, 30, 31, 32, 33, 34, 35 (excluding 35.1) 64, 72, and 73.

After, in Table 4 we provide the formal definition of all the variables included in the analysis together with the relative data source.

Table 1. List of industrial sectors.

<b>C Mining and quarrying</b>	
10	Mining of coal and lignite; extraction of peat
11	Extraction of crude petroleum and natural gas; service activities incidental to oil and gas extraction, excluding surveying
12	Mining of uranium and thorium ores
13	Mining of metal ores
14	Other mining and quarrying
<b>D Manufacturing</b>	
15	Manufacture of food products and beverages
16	Manufacture of tobacco products
17	Manufacture of textiles
18	Manufacture of wearing apparel; dressing and dyeing of fur
19	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear
20	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
21	Manufacture of pulp, paper and paper products
22	Publishing, printing and reproduction of recorded media
23	Manufacture of coke, refined petroleum products and nuclear fuel
24	Manufacture of chemicals and chemical products
25	Manufacture of rubber and plastic products
26	Manufacture of other non-metallic mineral products
27	Manufacture of basic metals
28	Manufacture of fabricated metal products, except machinery and equipment
29	Manufacture of machinery and equipment n.e.c.
30	Manufacture of office machinery and computers
31	Manufacture of electrical machinery and apparatus n.e.c.
32	Manufacture of radio, television and communication equipment and apparatus
33	Manufacture of medical, precision and optical instruments, watches and clocks
34	Manufacture of motor vehicles, trailers and semi-trailers
35	Manufacture of other transport equipment
36	Manufacture of furniture; manufacturing n.e.c.
37	Recycling
<b>E Electricity, gas and water supply</b>	
40	Electricity, gas, steam and hot water supply
41	Collection, purification and distribution of water
<b>F Construction</b>	
45	Construction
<b>G Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods</b>	
50	Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel
51	Wholesale trade and commission trade, except of motor vehicles and motorcycles
52	Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods
<b>H Hotels and restaurants</b>	
55	Hotels and restaurants
<b>I Transport, storage and communication</b>	
60	Land transport; transport via pipelines
61	Water transport
62	Air transport
63	Supporting and auxiliary transport activities; activities of travel agencies
64	Post and telecommunications
<b>K Real estate, renting and business activities</b>	
70	Real estate activities
71	Renting of machinery and equipment without operator and of personal and household goods
72	Computer and related activities
73	Research and development
74	Other business activities

Table 4. Variables' definition and sources.

<i>Variable</i>	<i>Description</i>	<i>Source</i>
Entrepreneurship	The gross flow of firms of industry $j$ in country $k$ , averaged by the period 2000-2007.	Structural Business Statistics, Eurostat
CR5	The sum of market shares measured in total assets of the five largest banks in each country, averaged by 2001-2007.	Banking Structure annual report, European Central Bank
HHI	The sum of square of market shares measured in total assets of all the banks in each country, averaged by 2001-2007.	Banking Structure annual report, European Central Bank
Activity Restriction	The degree to which the regulatory authorities allow banks to engage in activities different from the traditional spread-based interest in 2000. Range: 1 to 4, larger numbers indicates a greater restrictiveness.	Bank Regulation and Supervision, Barth et al. (2001)
Control of Corruption	The perceptions of the extent to which public power is not exercised for private gain. Range: -2.5 to 2.5, greater values indicates a stronger control.	Worldwide Governance Indicators, Kaufmann et al. (2010)
Financial Development	The sum of domestic credit to the private sector and stock market capitalization as a percent of GDP in 2000 (Rajan and Zingales, 1998).	World Development Indicator
Foreign Bank Ownership	The fraction of the banking system's assets that are 50 percent or more foreign owned, averaged by 2000-2003-2007.	Bank Regulation and Supervision, Barth et al. (2001)
Globalization	The level of globalization in each country from an economic perspective, averaged by 2000-2007. Range: 0 to 100, greater values indicates a higher level of globalization.	KOF Index of Globalization, Swiss Federal Institute of Technology, Zurich.
Government Effectiveness	The perception of the quality of public services and its independence from political pressures, averaged by 2000-2007. Range: -2.5 to 2.5, higher values indicates a greater quality government.	Worldwide Governance Indicator, Kaufmann et al. (2010)
Government-Owned Banks	The fraction of the banking system's assets that are 50 percent or more government owned, averaged by 2000-2003-2007.	Bank Regulation and Supervision, Barth et al. (2001)
Initial Share of Industry	Number of firms in industry $j$ in country $k$ over the total number of firms in country $k$ in 2000.	Structural Business Statistics, Eurostat
Log of GDP per capita	The logarithm of the GDP per capita at constant prices in 2000.	World Development Indicator
Privatization	The level of progress in transition reached by each country, averaged by 2000-2007. Range: 1 to 4, where 1 stands for little or no progress and 4 for major advances in transition.	European Bank for Reconstruction, EBRD (2010)
Property Rights	The degree to which a country's laws protect private property rights and the governmental enforcement of those laws, averaged by 2000-2007. Range: 0 to 100, greater values indicates a stronger protection.	Index of Economic Freedom, Heritage Foundation
Banking Application	The ratio of accepted applications to applications sent to the authorities to exercise banking activity in 2000.	Bank Regulation and Supervision, Barth et al. (2001)
Rule of Law	The perceptions of the extent to which agents have confidence in the rules of society, averaged by 2000-2007. Range: -2.5 to 2.5, greater values indicates a stronger confidence.	Worldwide Governance Indicator, Kaufmann et al. (2010)



## A2. OLS estimations

For transparency purpose we report the OLS estimations, although the results of the C Test lead to reject the null that regressors can be treated as exogenous and, thus, the instrumental variables approach is needed.

Table 10. Banking Concentration and Entrepreneurship: OLS estimations.

	5-Bank Concentration Ratio			Herfindahl–Hirschman Index				
	<i>All</i> (25)	<i>High-tech</i> (26)	<i>All</i> (27)	<i>High-tech</i> (28)	<i>All</i> (29)	<i>High-tech</i> (30)	<i>All</i> (31)	<i>High-tech</i> (32)
<i>Bank Concentration</i>	1.112 (1.466)	-0.603 (1.233)	15.782*** (2.433)	7.824*** (1.489)	-1.778 (1.354)	-1.049 (1.267)	9.180*** (1.492)	5.355*** (1.137)
<i>Bank Concentration</i> <sup>2</sup>	-1.815** (0.904)	-0.188 (0.752)	-11.825*** (1.856)	-5.955*** (1.148)	-0.560 (2.570)	-0.023 (2.467)	-28.007*** (4.692)	-16.338*** (3.334)
<i>Initial Share of Industry</i>	-0.470 (0.802)	-0.853 (0.917)	-0.380 (0.811)	-0.746 (0.929)	-0.419 (0.799)	-0.835 (0.940)	-0.586 (0.818)	-0.742 (0.905)
<i>Log(GDP)</i>	-0.786*** (0.134)	-0.467*** (0.091)	-1.173*** (0.207)	-0.665*** (0.140)	-0.709*** (0.130)	-0.443*** (0.092)	-1.321*** (0.247)	-0.807*** (0.171)
<i>Financial Development</i>	0.007 (0.190)	0.112 (0.178)			0.239 (0.256)	0.316 (0.239)		
<i>Government Effectiveness</i>	1.430*** (0.255)	0.818*** (0.200)			1.166*** (0.200)	0.646*** (0.162)		
<i>Control of Corruption</i>			0.017*** (0.004)	0.011*** (0.003)			0.019*** (0.004)	0.013*** (0.003)
<i>Property Rights</i>			1.484*** (0.280)	0.830*** (0.196)			1.725*** (0.338)	1.030*** (0.240)
Observations	1,439	355	1,439	355	1,439	355	1,439	355
R <sup>2</sup>	0.268	0.331	0.253	0.315	0.253	0.309	0.267	0.343

Note: Industry dummies are included but not reported. Cluster-robust standard errors in parentheses.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table 11. Banking Concentration and Entrepreneurship: OLS estimations.

	5-Bank Concentration Ratio					Herfindahl-Hirschman Index						
	All (33)	High-tech (34)	All (35)	High-tech (36)	All (37)	High-tech (38)	All (39)	High-tech (40)	All (41)	High-tech (42)	All (43)	High-tech (44)
<i>Bank Concentration</i>	5.567*** (1.209)	2.768*** (0.946)	1.171 (1.403)	-0.565 (1.157)	4.642*** (1.123)	1.967** (0.845)	-2.321* (1.352)	-1.502 (1.202)	-1.614 (1.245)	-0.961 (1.182)	-3.264*** (1.376)	-2.148* (1.219)
<i>Bank Concentration<sup>2</sup></i>	-5.173*** (0.894)	-2.731*** (0.673)	-1.871** (0.860)	-0.226 (0.696)	-4.346*** (0.778)	-2.032*** (0.563)	-1.504 (2.403)	-0.683 (2.227)	-1.183 (2.301)	-0.383 (2.214)	1.433 (2.414)	1.448 (2.237)
<i>Initial Share of Industry</i>	-0.756 (0.814)	-1.054 (0.820)	-0.480 (0.806)	-0.827 (0.914)	-0.701 (0.775)	-0.971 (0.823)	-0.731 (0.812)	-1.087 (0.837)	-0.444 (0.809)	-0.787 (0.935)	-0.683 (0.779)	-1.013 (0.834)
<i>Log(GDP)</i>	-1.646*** (0.280)	-1.117*** (0.206)	-0.931*** (0.269)	-0.579*** (0.184)	-1.185*** (0.185)	-0.756*** (0.132)	-1.466*** (0.268)	-1.026*** (0.195)	-1.027*** (0.294)	-0.642*** (0.187)	-1.007*** (0.168)	-0.661*** (0.121)
<i>Financial Development</i>	0.218 (0.174)	0.268* (0.146)	0.146 (0.242)	0.220 (0.203)	0.017 (0.150)	0.114 (0.147)	0.261 (0.211)	0.324* (0.170)	0.556 (0.347)	0.515* (0.260)	-0.081 (0.172)	0.074 (0.168)
<i>Government Effectiveness</i>	3.053*** (0.532)	2.043*** (0.402)	1.573*** (0.382)	0.929*** (0.273)	2.634*** (0.426)	1.683*** (0.323)	2.767*** (0.504)	1.882*** (0.378)	1.474*** (0.355)	0.839*** (0.251)	2.457*** (0.404)	1.586*** (0.305)
<i>Government Owned-Bank</i>	2.641*** (0.520)	1.984*** (0.401)					2.581*** (0.565)	1.983*** (0.430)				
<i>Foreign Bank Ownership</i>			-0.155 (0.193)	-0.120 (0.141)					-0.326 (0.215)	-0.204 (0.147)		
<i>Activity Restriction</i>					0.881*** (0.155)	0.626*** (0.122)					0.898*** (0.173)	0.648*** (0.135)
Observations	1,439	355	1,439	355	1,439	355	1,439	355	1,439	355	1,439	355
R <sup>2</sup>	0.325	0.439	0.268	0.332	0.338	0.450	0.310	0.423	0.256	0.312	0.329	0.440

Note: Industry dummies are always included but not reported. Cluster-robust standard errors in parentheses. \*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1.

Table 12. Banking Concentration and Entrepreneurship: OLS estimations.

	5-Bank Conc. Ratio		Herf.-Hirsc. Index	
	(45)	(46)	(47)	(48)
<i>Bank Concentration</i>	3.397** (1.422)	1.271 (3.131)	5.585* (2.893)	2.615 (4.645)
<i>Globalization</i>	0.066*** (0.012)		0.036*** (0.006)	
<i>Bank Concentration*Globalization</i>	-0.057*** (0.017)		-0.085** (0.034)	
<i>Privatisation</i>		1.367*** (0.501)		0.889*** (0.163)
<i>Bank Concentration*Privatisation</i>		-0.604 (0.827)		-0.973 (1.205)
<i>Initial Share of Industry</i>	-0.497 (0.817)	-0.306 (0.730)	-0.430 (0.808)	-0.263 (0.744)
<i>Log(GDP)</i>	-0.065 (0.104)	0.802*** (0.172)	-0.154 (0.104)	0.517*** (0.138)
<i>Financial Development</i>	-0.433 (0.379)	-1.693*** (0.455)	-0.065 (0.343)	-1.015*** (0.382)
Observations	1,439	1,439	1,439	1,439
R <sup>2</sup>	0.255	0.255	0.238	0.235

Note: Industry dummies are always included but not reported. Cluster-robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

## A2. First stage regression

Table 13 shows first stage regression results for the two endogenous variables on the main specification. Actually instruments appear to be highly correlated with both endogenous variables.

Table 13: First stage regressions.

Dependent variable:	CR <sub>5</sub>			CR <sub>5</sub> <sup>2</sup>			HHI			HHI <sup>2</sup>		
	All (49)	High-tech (50)	All (51)	High-tech (52)	All (53)	High-tech (54)	All (55)	High-tech (56)	All (57)	High-tech (58)	All (59)	High-tech (60)
<i>Rule of Law</i>	-1.597*** (0.129)	-1.633*** (0.254)	-2.420*** (0.188)	-2.471*** (0.372)	-1.167*** (0.084)	-1.188*** (0.166)	-0.499*** (0.041)	-0.508*** (0.082)				
<i>Rule of Law</i> <sup>2</sup>	0.172*** (0.033)	0.181*** (0.062)	0.226*** (0.047)	0.238*** (0.089)	0.166*** (0.019)	0.171*** (0.036)	0.061*** (0.008)	0.063*** (0.015)				
<i>Banking Applications</i>	-35.138*** (2.492)	-35.570*** (4.860)	-56.780*** (3.692)	-57.432*** (7.198)	-28.465*** (1.707)	-28.781*** (3.325)	-13.186*** (0.854)	-13.348*** (1.662)				
<i>Banking Applications</i> <sup>2</sup>	19.984*** (1.456)	20.231*** (2.839)	32.501*** (2.156)	32.875*** (4.203)	16.407*** (0.995)	16.590*** (1.939)	7.652*** (0.497)	7.746*** (0.967)				
<i>Initial Share of Industry</i>	-0.142 (0.114)	-0.046 (0.172)	-0.214 (0.166)	-0.064 (0.245)	-0.104 (0.072)	-0.022 (0.097)	-0.053 (0.034)	-0.008 (0.042)				
<i>Log(GDP)</i>	-0.032 (0.031)	-0.031 (0.061)	-0.073 (0.045)	-0.072 (0.089)	-0.019 (0.019)	-0.019 (0.037)	-0.026*** (0.008)	-0.026 (0.017)				
<i>Financial Development</i>	-0.737*** (0.099)	-0.747*** (0.200)	-1.265*** (0.140)	-1.282*** (0.282)	-0.682*** (0.054)	-0.693*** (0.109)	-0.318*** (0.023)	-0.324*** (0.046)				
<i>Government Effectiveness</i>	1.965*** (0.124)	1.997*** (0.243)	3.027*** (0.182)	3.074*** (0.357)	1.371*** (0.082)	1.392*** (0.161)	0.611*** (0.041)	0.621*** (0.080)				
Observations	1,439	355	1,439	355	1,439	355	1,439	355				
R <sup>2</sup>	0.714	0.720	0.726	0.732	0.733	0.739	0.732	0.738				

Note: Industry dummies are always included but not reported. Cluster-Robust standard errors in parentheses.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1.