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# Financial Development and Employment

Evidence from Transition Countries

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#### IMPRESSUM

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# Financial Development and Employment – Evidence from Transition Countries\*

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## Abstract

This paper studies the association between a country's level of financial development and firms' employment growth. We employ an incomplete contract model for evaluating this association. The model proposes that a high level of financial development affects the employment of firms with low managerial capital negatively, while firms with high managerial capital benefit from a more developed financial system. We test this proposition with data from the Business Environment and Enterprise Performance Survey covering transition countries in Eastern Europe and Central Asia. We use firm size as a proxy for managerial capital. Our findings confirm a non-linear effect of financial development on firm employment. Specifically, the smallest firms' edge in employment growth over large firms is dampened when the level of financial development is higher, especially in countries at medium levels of financial development.

Keywords: Financial Development, Employment, Financial Constraints, Transition

JEL classification: G20, G28, G30, J30

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# 1 Introduction

The global financial crisis, starting in 2008, and the parallel job losses in many countries around the world have triggered broad interest in the link between finance and employment. The crucial question is whether bank lending is instrumental for firms' employment decisions. This question is related to the connections between finance and economic growth (e.g. King & Levine 1993*a*, King & Levine 1993*b*, Beck, Demirgüç-Kunt & Maksimovic 2004, Levine 2005, and Beck, Levine & Levkov 2010) but is much less studied. In this paper, we contribute to filling this gap. Specifically, we address the following two questions: Do firms in countries with a greater level of financial development experience higher employment growth than firms in countries with a lower level of financial development? Are different firm types affected differently?

We use a theoretical model of incomplete contracts that is closely related to Pagano & Pica (2012). Their model explains employment responses at the industry level to a country's level of financial development. We adjust this model to individual firms and introduce managerial capital of firms as an input factor in the production function. Managerial capital describes the ability of firm owners and managers to scale-up the firm's output by improving the marginal productivity of inputs such as labour and capital as well as by choosing the adequate amount and type of these inputs (Bruhn, Karlan & Schoar 2010). We propose that the effect of financial development on firms' employment depends on the firm's managerial capital: a high level of financial development affects the employment of firms with low managerial capital negatively, while firms with high managerial capital benefit from a more developed financial system. This is because all firms have better access to finance with a higher level of financial development and so want to expand their physical investment as well as employment. This increases the competitive pressure on the labour market. The resulting higher wages overcompensate the initial advantage from increased access to finance for firms with low managerial capital as they can no longer pay these high wages.

We test this proposition by using firm-level data from the Business Environment and Enterprise Performance Survey, which is jointly conducted by the European Bank for Reconstruction and Development and the World Bank. Controlling for the firm's age and economic sector, we use firm size as a proxy for managerial capital. This is in line with Lucas (1978), who proposes a theory of firm

size distributions based on the underlying distribution of managerial talent. He argues that the distribution of managerial talent in society is necessarily transformed into a corresponding distribution of firm sizes given that a manager's talent and ability are the limiting factors in production. Likewise, Aterido, Hallward-Driemeier & Pàges (2011) study the impact of access to finance measured at the local level on firms' employment growth. They find a positive effect of increased access to finance on employment growth for medium and large firms but no effect for micro and small firms. The authors propose that smaller firms may not necessarily be more credit constrained than larger firms. Owners of smaller firms may instead have lower talent or capabilities on average, which keeps them from growing their firms.<sup>1</sup>

We focus on the transition countries of Central and Eastern Europe, Southeastern Europe, and the Commonwealth of Independent States. The link between finance and employment is particularly interesting to study for these countries because they have experienced substantial market distortions with the transition from centrally planned to market economies. These distortions have had dramatic consequences for the labour market, and the need for more jobs is still evident. Financial systems had to be built from scratch, and the countries have done so at different speeds. As of 2014, the level of financial development ranges from not having changed much from a rigid centrally planned economy to being close to the standards of an industrialised market economy (EBRD 2012). On average, countries in Southeastern Europe and the Commonwealth of Independent States have less developed financial systems than do countries in Central and Eastern Europe. In our empirical analysis we exploit this cross-country variation in the level of financial development.

The data reveal considerable variation in the effect of financial development on employment growth across firm types. We find that while the small firms' percentage increase in employment is larger than large firms' increase, on average, their edge in employment growth over large firms is dampened when the level of financial development is higher. For example, micro firms increase their ratio of current over initial employment by 47 percent more than large firms on average. However, *ceteris paribus*, the difference in the employment growth ratio decreases to only 43 percent

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<sup>1</sup>An observation along these lines was made in an enterprise survey conducted by the EBRD in Bulgaria, Georgia, Russia, and Ukraine. It was found that smaller and younger firms were less able than larger and older firms to channel bank credit to productive uses. They were instead more likely to use the credit for personal purchases for the business owner (EBRD 2006).

if a country's share of private credit to GDP increases by 10 percentage points. These findings emerge with the complete sample as well as with the subgroups of Southeastern Europe and the Commonwealth of Independent States. Under the assumption that firm size is a good proxy for managerial capital, as suggested by Lucas (1978) and Aterido et al. (2011), our empirical results confirm the theoretical conjecture. They are also in line with recent experimental evidence (Karlan & Zinman 2011), which reveals a lower number of employees among micro-enterprises with access to credit compared to those without.

The paper contributes to the existing literature in a number of ways. First, we provide new evidence that financial development at the country level affects firm-level results. There are several studies showing such effects (Demirgüç-Kunt & Maksimovic 1998, Love 2003, Beck, Demirgüç-Kunt & Maksimovic 2005, Beck, Demirgüç-Kunt, Laeven & Levine 2008) but none analyze the influence of financial development on firm-level employment decisions. Pagano & Pica (2012) do focus on the relationship between financial development and employment but they study employment at the industry level, not the firm level. Second, our theoretical model provides the basis for questioning previous empirical findings, which suggest that small firms tend to gain more than large firms from financial development - in terms of growth in sales and value added (Beck et al. 2005; Beck et al. 2008). In line with Aterido et al. (2011), we show that large firms may instead be the ones that gain most from financial development. Third, to the best of our knowledge, this is the first study in this field of the literature that concentrates on transition countries.

The paper is organized as follows: Section 2 briefly describes the relevant literature. In Section 3, we develop the model. Section 4 sets out the econometric methodology, Section 5 explains the data, and Section 6 reports the results. Finally, Section 7 presents the conclusion.

## 2 Related literature

The financial turmoil in recent years and the subsequent deep cuts in employment in many firms have brought the issue of finance and employment to the forefront of the political and academic agenda. This has triggered much new research in the field because earlier contributions only dealt with the link between finance and employment occasionally (e.g. Sharpe 1994, Benito & Hernando

2003, Brown, Earle & Lup 2005, Musso & Schiavo 2007).

Several studies investigate the link between financial constraints (typically measured at the firm level) and employment decisions. Blalock, Gertler & Levine (2008) focus on the effect of financial constraints on firms' employment during times of large currency devaluations and banking sector failures. Specifically, the authors investigate how firm-level employment in Indonesia was affected by the Asian financial crisis. They use domestic ownership of exporters as an indicator for financial constraints and a limited ability to gain from better terms of trade. Their results show that domestically-owned exporters with presumably no access to foreign capital have more than 20 percent lower employment than foreign-owned exporters. Campello, Graham & Harvey (2009) reveal that US, European and Asian firms, which are constrained because of the financial turmoil in 2008, plan higher job cuts than non-constrained firms. Caggese & Cuñat (2008) show theoretically and empirically for Italy that financially constrained firms are more prone to use highly flexible employment contracts than non-constrained firms. The intensive usage of flexible employment helps companies to regain their capability to absorb demand volatility on the product side. This result implies that a lack of financial flexibility forces firms to use flexible labor contracts instead, provided that labor market regulation allows sufficient flexibility.

Benmelech, Bergman & Seru (2011) take a different path and relate their work to the finance and growth literature. They argue that there is an employment-to-cash flow sensitivity, similar to the investment-to-cash flow sensitivity (see e.g. Fazzari, Hubbard & Petersen 1988). Based on the results of three quasi-experiments, the authors claim that the availability of credit has a direct effect on firm employment, and subsequently, on economy-wide employment rates.

Pagano & Pica (2012) take this research a step further. They provide a theory of incomplete contracts to explain the impact of a country's financial development on employment. In their framework, a more developed financial system better restricts opportunistic behavior of borrowers. Increased repayment discipline enables banks to expand financial access. Their focus is on the heterogeneity of the effect of financial development on employment across industries. Those industries with the greatest need for external finance benefit the most from the development of the financial system. Therefore, employment gain is the highest in these industries. However, the effect of an

improvement is high only as long as financial development is low. It tapers off if the system is already highly developed. Pagano & Pica (2012) rely on international industry-level data for the period 1970-2003 to confirm this conjecture.

Aterido et al. (2011) explore the impact of a firm's business environment, including its financial environment, on employment growth. They depart from the finance and growth literature in three important ways. First, they measure the financial environment at the local level, rather than at the country level. Second, they focus on the question of whether firms of different sizes are differently affected by their financial environment. And third, they exploit data from a large number of countries, most of them developing countries. Large firms are found to have better access to finance than micro and small enterprises. The authors reveal strong non-linear effects: employment growth increases with better access to finance, but only for large and medium-sized firms.

Our research is closely related to both Pagano & Pica (2012) and Aterido et al. (2011). By adjusting the model of Pagano & Pica (2012) to the firm level and introducing managerial capital into this model, we are able to confirm the non-linear employment effect of financial development shown in Aterido et al. (2011) theoretically and, to the extent that firm size is a good proxy for managerial capital, also empirically.

### 3 Theoretical Background

We borrow the theoretical background from Pagano & Pica (2012). However, they concentrate on the impact of better access to finance on industry-specific employment, while we focus on employment in individual firms. Therefore, we adjust the framework of Pagano & Pica (2012) to the firm level and introduce firm-specific managerial capital as proposed by Bruhn et al. (2010). Specifically, we assume that there exists a continuum of firm types in the economy with managerial capital  $\gamma_i \in [\gamma_{min}, \gamma_{max}]$ .

#### 3.1 Managerial capital and employment

Consider a firm with a basic value of  $A$ . Imagine that the owner is self-employed in this firm. The owner considers expansion of the firm but this would require investing. The production function of



the firm  $i$  after investment is

$$Y(K, L, \gamma) = \gamma_i K^{1-\alpha} L^\alpha.$$

Production depends positively on the managerial capital  $\gamma_i$ , the capital  $K$  and employment  $L$ .  $K$  consists of the original firm  $A$  and capital that is borrowed from a bank.<sup>2</sup> Note that  $A$  is sunk if the owner decides to invest. The firm value after investment is  $P_i(\cdot) = Y - wL$  where  $w$  denotes the wage level. The bank can observe  $P_i(\cdot)$  but can enforce repayment of the loan only to the extent that the financial system's degree of sophistication  $\lambda$  allows.  $\lambda < 1$  defines the proportion of  $P_i(\cdot)$ , which the bank can seize for compensation of the original loan. Hence,  $\lambda$  determines repayment and, therefore, original loan size.

The following sequence of events is assumed given that the owner wants to expand. The firm owner receives in the first stage a take-it-or-leave-it offer from the bank about how much the firm can borrow. Given the value of the own asset  $A$  the owner then decides about the desired total investment  $K$ . In the second stage the firm owner chooses the employment level  $L$  given that investment  $K$  is already fixed in stage 1. With the bank's share  $\lambda$  of the firm value  $P_i(\cdot)$  the owner's problem of maximizing her own share  $S(\cdot)$  is

$$\begin{aligned} \max_L S(\cdot) &= (1 - \lambda) P_i(\cdot) \\ &= (1 - \lambda) (\gamma K^{1-\alpha} L^\alpha - wL) \end{aligned} \quad (1)$$

subject to the participation constraint  $(1 - \lambda) P_i(\hat{L}) \geq A$  where  $\hat{L}$  is the share-maximizing amount of labour. The owner raises external money if, and only if, her share of the firm value is equal to or exceeds  $A$ . The resulting optimal level of employment is

$$\hat{L} = \left( \frac{\alpha \gamma}{w} \right)^{\frac{1}{1-\alpha}} K.$$

Inserting  $\hat{L}$  into  $S(\cdot)$  yields  $\hat{S}(\cdot) = (1 - \lambda) [(1 - \alpha) \left( \frac{\alpha}{w} \right)^{\frac{\alpha}{1-\alpha}} \gamma_i^{\frac{1}{1-\alpha}}] K$  and therefore:

$$(1 - \lambda) (1 - \alpha) \left( \frac{\alpha}{w} \right)^{\frac{\alpha}{1-\alpha}} \gamma_i^{\frac{1}{1-\alpha}} K \geq A.$$

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<sup>2</sup>The interest rate is normalized to zero for simplicity of analysis.

The bank grants a loan of size  $F$  with  $F \leq \lambda P(\hat{L})$ . Own asset  $A$  and bank loan  $F$  determine the total amount available for investment  $A + \lambda(1 - \alpha)(\frac{\alpha}{w})^{\frac{\alpha}{1-\alpha}} \gamma_i^{\frac{1}{1-\alpha}} K \leq \hat{K}$ . Solving the equality for  $K$  yields an optimal total investment of

$$\hat{K} = \frac{A}{1 - \lambda(1 - \alpha)(\frac{\alpha}{w})^{\frac{\alpha}{1-\alpha}} \gamma_i^{\frac{1}{1-\alpha}}}.$$

$A + F \leq \hat{K}$  holds in general if

$$\lambda[(1 - \alpha)(\frac{\alpha}{w})^{\frac{\alpha}{1-\alpha}} \gamma_i^{\frac{1}{1-\alpha}}] \geq 1. \quad (2)$$

In this case, the owner will have enough liquidity to meet the desired investment level. No financial constraints exist. If expression (2) does not hold the owner is financially constrained in the sense that granted bank loan plus own asset  $A$  allows only an investment level  $K$  that is below the desired level. Solving expression (2) as equality yields the lower threshold

$$\underline{w}(\gamma_i) = \alpha[\lambda(1 - \alpha)]^{\frac{1-\alpha}{\alpha}} \gamma_i^{\frac{1}{\alpha}}. \quad (3)$$

Firm  $i$  is constrained for all wage levels  $w > \underline{w}$ . The threshold  $\underline{w}$  grows in the firm's managerial capital  $\gamma_i$ :

$$\frac{\delta \underline{w}}{\delta \gamma_i} = [\lambda(1 - \alpha)]^{\frac{1-\alpha}{\alpha}} \gamma_i^{\frac{1-\alpha}{\alpha}} > 0.$$

The owner's participation constraint requires

$$(1 - \lambda)[(1 - \alpha)(\frac{\alpha}{w})^{\frac{\alpha}{1-\alpha}} \gamma_i^{\frac{1}{1-\alpha}}] \hat{K} \geq A.$$

Equality defines an upper wage threshold

$$\bar{w}(\gamma_i) = \alpha(1 - \alpha)^{\frac{1-\alpha}{\alpha}} \gamma_i^{\frac{1}{\alpha}}. \quad (4)$$

If the wage level is above threshold  $\bar{w}$  the firm owner  $i$  is unwilling to invest because of the violation of the participation constraint. Note that  $\bar{w}$  is independent of the degree of financial development

but grows in the managerial capital  $\gamma_i$ :

$$\frac{\delta \bar{w}}{\delta \gamma_i} = (1 - \alpha)^{\frac{1-\alpha}{\alpha}} \gamma_i^{\frac{1-\alpha}{\alpha}} > 0.$$

In contrast, the lower threshold  $\underline{w}$  increases with  $\lambda$ :

$$\frac{\delta \underline{w}}{\delta \lambda} = \alpha \gamma_i^{\frac{1}{\alpha}} \frac{(1 - \alpha)^2}{\alpha} (\lambda(1 - \alpha))^{\frac{1-2\alpha}{\alpha}} > 0.$$

Figure 1 shows the prohibiting wage threshold  $\bar{w}(\gamma_i)$  and the lower threshold  $\underline{w}(\gamma_i, \lambda)$ . In the interval  $\underline{w}(\gamma_i, \lambda) < w < \bar{w}(\gamma_i)$  firms are financially constrained and the optimal labour demand of a firm with managerial capital  $\gamma_i$  is

$$L_D = \left( \frac{\alpha \gamma_i}{w} \right)^{\frac{1}{1-\alpha}} \frac{A}{1 - \lambda [(1 - \alpha) \left( \frac{\alpha}{w} \right)^{\frac{1-\alpha}{\alpha}} \gamma_i^{\frac{1}{1-\alpha}}]}.$$

The labour demand is decreasing in the wage level.<sup>3</sup> Demand for labour increases with managerial capital for any given wage level and any given state of financial development,  $\delta L_D / \delta \gamma_i > 0$ .<sup>4</sup> For a given level of managerial capital financial development expands the demand for labour,  $\delta L_D / \delta \lambda > 0$ .<sup>5</sup>

Assume for a moment that only one firm is active in the market. An equilibrium in the labour market exists if the labour supply curve,  $L_S(w)$ , is increasing in the wage level,  $\delta L_S / \delta w > 0$ . In this case  $L_S(w^*) = L_D(w^*)$  defines the equilibrium  $[L^*(\gamma_i, \lambda), w^*(\gamma_i, \lambda)]$ . Since higher managerial capital induces increased labour demand, the equilibrium wage level  $w^*(\gamma_i, \lambda)$  increases in  $\gamma_i$  (see Figure 1). It converges for high levels of  $\gamma_i$  against  $\underline{w}(\gamma_i, \lambda)$ .

In the realistic case of multiple firms with different managerial capital, an increase in the wage level  $w^*$  prevents some firms with lower managerial capital from investing. Figure 1 illustrates this. Let us assume for simplicity that the equilibrium wage level is determined by the firm with the highest managerial capital in the market. An increase of the highest managerial capital from  $\gamma_1$  to

<sup>3</sup>Note that  $\underline{w}(\gamma_i, \lambda) = 0$  for  $\lambda = 0$ . In this case each firm – independent of its managerial capital  $\gamma_i$  – is unable to invest.

<sup>4</sup>See Appendix A.

<sup>5</sup>See Appendix A.

$\gamma_2$  shifts the wage level  $w^*(.)$  by  $\Delta w$  upwards. This shift overcompensates the initial advantage from the better access to finance for firms with managerial capital in the range of  $\Delta \gamma$ . They can no longer compete on the labour market as the new wage level  $w^*(\gamma_1) + \Delta w$  is above their prohibiting threshold  $\bar{w}(\gamma_i)$ .

### 3.2 The effect of financial development

When the degree of financial development increases, e.g. from  $\lambda_{\text{low}}$  to  $\lambda_{\text{high}}$  in Figure 2, the threshold  $\underline{w}$  shifts upwards for any level of managerial capital. The debt capacity of any firm becomes larger. Consequently, any firm with managerial capital  $\gamma_i > \gamma_1$  would expand its labour demand if no change in the wage level occurred. However, the additional labour demand increases the equilibrium wage level and prevents firms with lower levels of managerial capital from applying for a loan. Figure 2 illustrates this. An increase in financial development by  $\Delta \lambda$  shifts the equilibrium wage level for a given managerial capital  $\gamma_3$  upwards from  $w_1^*$  to  $w_2^*$ . For firms with managerial capital  $\Delta \gamma = \gamma_2 - \gamma_1$ , this increase in wages,  $\Delta w^* = w_2^* - w_1^*$ , overcompensates the initial advantage from the higher degree of financial development. The firm owner would no longer be able to pay these wages without violating her participation constraint. A firm with managerial capital in the range of  $\Delta \gamma$  would increase employment if confronted with a financial system of development degree  $\lambda_{\text{low}}$  but refrain from increasing if the financial system is of degree  $\lambda_{\text{high}}$ . The higher  $\gamma_3$ , the further upward the equilibrium wage is shifted, resulting in more firm owners in the lower range of managerial capital becoming unable to meet their participation constraint and, thus, refraining from increasing employment in response to the higher degree of financial development.

In contrast, all firms with  $\gamma_i > \gamma_2$  can still afford the new equilibrium wage level and their labour demand and employment grows in response to the higher degree of financial development. The employment growth in response to a higher level of financial development is larger the higher  $\gamma_i$  is. To see this, consider the derivative<sup>6</sup>

$$\frac{\delta \frac{\delta L_D}{\delta \lambda}}{\delta \gamma_i} > 0.$$

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<sup>6</sup>See Appendix A.

The positive sign indicates that a firm's marginal demand for labour with respect to  $\lambda$  responds positively to an increase in managerial capital.<sup>7</sup> That is, when the degree of financial development increases, firms with lower managerial capital want to grow their labour force less in response than do firms with higher managerial capital.

So far, we have assumed that the firm with the highest managerial capital determines the wage level in the market. Now, we drop this simplifying assumption and explore whether the previous results hold in the equilibrium determined by the aggregate labour demand of all market firms. The aggregate demand is defined as

$$L_D^{total} = \sum_{\gamma_j}^{\gamma_z} L_D(\gamma_i, \lambda, w), i \in [j, z].$$

For any given maximum managerial capital  $\gamma_z$  the inequality

$$\sum_{\gamma_j}^{\gamma_z} L_D(\gamma_i, \lambda, w) > L_D(w^*(\gamma_z, \lambda)) \quad (5)$$

holds since  $L_D(w^*(\gamma_z, \lambda))$  is part of  $L_D^{total}$ . The equilibrium condition

$$\sum_{\gamma_j}^{\gamma_z} L_D(\gamma_i, \lambda, w^{**}) = L_S(w^{**})$$

defines the equilibrium market wage  $w^{**}$ . Inequality (5) ensures that  $w^{**}(\lambda) > w^*(\gamma_i, \lambda)$ . Therefore, an increase in the degree of financial development,  $\Delta \lambda$ , initiates additional labour demand by firms with larger managerial capital,  $\gamma_i > \gamma_i^{-1}(\bar{w} = w^{**})$ . However, labour demand decreases in response to higher financial developments for firms with fairly low managerial capital,  $\gamma_i < \gamma_i^{-1}(\bar{w} = w^{**})$ .

In sum, the model suggests that financial development increases the debt capacity of firms. Firms are, therefore, in principle able to borrow more from banks. However, the increased debt capacity triggers, at any wage level, higher demand for labour in the market. Given a labour supply curve that is rising in the wage level, the additional demand for labour from all firms shifts the equilibrium wage level in the labour market upwards. Firms with low managerial capital are

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<sup>7</sup>Given a labour supply curve that increases in the wage level, the positive sign also implies that the upward shift in the equilibrium wage caused by financial development is higher for larger levels of managerial capital.

less able to afford the higher wage level than firms with higher managerial capital. Consequently, firms benefit the less from a better developed financial system the lower their level of managerial capital is. Based on this theoretical result, we propose the following hypothesis to be tested with cross-country data:

### Hypothesis

*Firms with low managerial capital react to an increase in financial development with lower employment growth than firms with high managerial capital.*

## 4 Econometric specification

On the basis of our theoretical prediction, we use the following regression model to estimate the evolution of firm employment:

$$\ln\left(\frac{emp_{ijt}}{emp_{ijt-1}}\right) = \alpha + \beta type_{ijt-1} + \delta type_{ijt-1} findev_{jt-1} + \nu X + \tau Z + \varepsilon_{ijt} \quad (6)$$

where  $i$  represents the individual firm,  $j$  the country in which firm  $i$  is located, and  $t$  the current time period. The dependent variable is the logarithm of the firm's current employment (in period  $t$ ), normalized by its previous employment (in period  $t - 1$ ). This number is regressed on the firm's initial size  $type_{ijt-1}$ , which is a proxy for the firm's managerial capital, and an interaction of this variable with the initial level of financial development in a country  $findev_{jt-1}$ . Firm-specific controls  $X$  as well as country controls  $Z$  are included.  $\varepsilon$  is the idiosyncratic error term assumed to possess the usual desirable characteristics. The key coefficient of interest is  $\delta$ , which determines the impact of financial development on employment for firms with distinct levels of managerial capital. We estimate equation (6) with an OLS model.

Following Aterido et al. (2011), we include initial firm size instead of current firm size in order to correctly measure the relationship between employment growth and the level of financial development. Assume that the effect of financial development on employment growth differs for small

and large firms such that both firm types benefit from a higher level of financial development but large firms more so than small firms. At any level of financial development, there will be some small firms that grow and become large firms and some small firms that do not grow (depending on their respective managerial capital). If we counted the growing, initially small firms as large firms, we would underestimate the effect of financial development on employment growth for large firms. We consider the level of financial development that firms faced at  $t - 1$  to be relevant for the growth that they achieve between  $t - 1$  and  $t$ .

Pagano & Pica (2012) find that financial development affects employment growth of industries in non-OECD countries, while industries in OECD countries remain unaffected. This is explained by the fact that OECD countries have, on average, highly developed financial systems where further improvements in financial development are hardly possible. This is not the case in non-OECD countries. Given the sub-regional differences in our sample, we test how individual firms respond to changes in financial development across the entire set of transition countries but also across countries within their specific sub-region.

## 5 Data

The firm-level data for the implementation of the econometric model come from the Business Environment and Enterprise Performance Survey (BEEPS), a survey jointly conducted by the European Bank for Reconstruction and Development (EBRD) and the World Bank. The main objective of the BEEPS is to study the business environment, mostly in Central and Eastern Europe, Southeastern Europe and the Commonwealth of Independent States as well as in a number of additional countries (e.g. Turkey, Mongolia, Greece, and Spain). The survey data are collected through face-to-face interviews with firm representatives who provide information on ownership structure, competition, management, employment, finance, corruption, and other topics. The firms included are both from manufacturing and service sectors. As of 2014, five waves of the BEEPS have been conducted: 1999, 2002, 2005, 2009, and 2012.

The strengths of the survey are the use of a consistent survey instrument across a large number of countries, which facilitates cross-country analyses, and the inclusion of a large set of retrospec-

tive questions. We use data from the 2005 wave to avoid any interference from the later global financial crisis.<sup>8</sup> The 2005 wave contains about 10,800 observations. The sample firms have existed for at least four years and had more than one and less than 10,000 full-time employees at the time of the survey. We restrict the sample to the transition countries of Central and Eastern Europe, Southeastern Europe and the Commonwealth of Independent States. We lose all observations for Belarus, Bosnia and Herzegovina, Georgia, Tajikistan and Uzbekistan because we have no information on the country-level control variables ( $Z$ ) for these countries. The final sample consists of 7,400 observations. The number of firms per country varies widely. Table 1 provides a description of the sample composition. The sample was drawn in form of quota sampling on the basis of firm registries or similar lists.<sup>9</sup> In the below regressions, we adjust the standard errors for clustering at the country level.

Our main interest is the evolution of employment at the firm level and its dependence on financial development and firms' managerial capital. The 2005 BEEPS contains information about the number of full-time employees at the time of the survey  $t$  as well as 36 months ago at  $t - 1$ . We use these employment numbers to create our dependent variable ( $\ln(\frac{emp_{ijt}}{emp_{ijt-1}})$ ). The managerial capital of firms is proxied by dummy variables representing the firm size in  $t - 1$ . We distinguish between *micro* (2-10 full-time employees), *small* (11-49 full-time employees), *medium* (50-249 full-time employees) and *large* (250-9,999 full-time employees) firms. Note that the share of firms that have a loan at the time of the survey is considerably smaller among initially micro and small firms than among initially medium and large firms (Table 2).

We use two alternative indicators for the level of financial development: (1) private credit by deposit money banks and other financial institutions as a share of GDP (*privcred*) and (2) the share of banks with assets of foreign ownership of at least 50 percent (*forshare*). These are derived from the Financial Development and Structure Dataset of the World Bank and the EBRD Banking

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<sup>8</sup>In addition, the 2009 wave contains less detailed information on physical investment than the 2005 wave. We use the data from 2009 for a robustness check. Note that the 2012 wave data is not yet available.

<sup>9</sup>This method means that the number of firms representing the manufacturing and service sectors in the sample were determined so as to reflect these sectors' contribution to GDP. Among the manufacturing and service firms in each country, a number of quotas with respect to firm size, ownership structure, export orientation and geographical location were fulfilled. For example, at least 10 percent of the sample are firms with 2-49 employees and at least 10 percent with 250-9999 employees. In this way, a self-weighted sample was constructed. More details on sampling can be found at <http://www.ebrd.com/pages/research/economics/data/beeps.shtml>.



Survey, respectively. We argue that these indicators are adequate measures of financial development, especially with regard to transition countries where the banking sector had to be transformed from one in which credit allocation was directed by the state to one which follows market considerations. Transformation essentially meant to liberalise interest rates, transfer commercial banking activities from the central bank to state banks, restructure and privatise state banks, allow entry of new private banks, including foreign banks, set up an appropriate legal framework, and initiate prudential regulation and supervision (Fries & Taci 2005). Measures of private credit and foreign ownership of bank assets in an economy are, therefore, proxies of the extent that such transformation has taken place. While total private credit to GDP is a commonly used measure for financial development, the foreign ownership of banks as an indicator for financial development may be controversial. Its usage is justified in the context of transition countries. Because foreign-owned banks use sophisticated credit technology, which tends to be adopted by domestic banks, they have positively influenced the efficiency of the banking sector in transition countries (Bonin, Hasan & Wachtel 2005, Fries & Taci 2005, EBRD 2006).

Figures 3 and 4 illustrate the evolution of these indicators of financial development in the period 1998-2010, which is the period for which we have consistent data for both indicators. These figures are based on simple averages (unweighted for population size) calculated for all countries in our sample, as well as the three sub-regions Central and Eastern Europe (CEE), Southeastern Europe (SEE), and the Commonwealth of Independent States (CIS).<sup>10</sup> Total private credit as a share of GDP (*privcred*) steadily increased in the transition region and in all three sub-regions separately until 2009, when the global crisis appears to have hit the region (Figure 3). However, the sub-regions differ strongly in the level of financial development. In the CEE countries, *privcred* stood at around 30 percent in 1998 and achieved the level of 80 percent in 2009. In the SEE countries, it increased from 17 percent to 48 percent over the same time period, and in the CIS countries, from 6 percent to 39 percent. Interestingly, the movement in the SEE countries mirrors the evolution of *privcred* in the complete sample.

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<sup>10</sup>In our dataset, Central and Eastern Europe is composed of Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovak Republic, and Slovenia; Southeastern Europe of Albania, Bulgaria, Croatia, Kosovo, FYR Macedonia, Montenegro, Romania, and Serbia; and the Commonwealth of Independent States of Armenia, Azerbaijan, Kazakhstan, Kyrgyz Republic, Moldova, Russia, and Ukraine.

The foreign ownership of banks (*forshare*) is less stable (Figure 4). There is a steady upward movement between 1999 and 2008 in the SEE countries. Starting from a low level (31 percent in 1998), this sub-region reached an average share of more than 85 percent in the second half of the following decade. It is fair to say that banking in SEE countries developed gradually into a foreign-dominated sector. In the CIS countries, *forshare* moved between slightly more than 20 percent to slightly more than 40 percent between 1998 and 2010. CEE countries show a more erratic movement, though at a higher level. After a period of stable growth, the foreign ownership of banks tends to decrease rather than increase since 2003. This may be an indication that the distribution of *forshare* is hump shaped. Starting at a low level of financial development, foreign ownership increases up to a certain point after which it decreases again - because domestic banks have now become sufficiently sophisticated. If so, *forshare* may not be a good indicator of financial development in countries where the transformation of the banking sector has been concluded. We take this into consideration by also running our regressions separately for the different sub-regions of CEE, SEE, and CIS countries.

In our regressions, we measure financial development at  $t - 1$ , which refers to the year 2002. Specifically, we calculate the means of *privcred* and *forshare* over the years 2001-2003 to even out extreme values. The firm-level control variables  $X$  are similar to those included by others in the literature (see, e.g. Aterido et al. 2011, Beck et al. 2005, Brown et al. 2005). Specifically, we apply the following indicators: *invest* controls for trends in physical investment over the last 3 years, *gov* for government influence and state ownership, *foreign* for access to foreign money, and *export* for geographical diversification. *city* is a control that proxies the local business environment, including the proximity of customers. Some recent contributions argue that a firm's employment growth depends more on age, rather than size (Haltiwanger, Jarmin & Miranda 2010, Earle & Telegdy 2011, and Lawless 2013). We therefore control for a firm's age (*age*) in our estimations below. The variable *age2* is included to account for a possible nonlinear effect of firm age. We also include dummies to control for the firms' economic sector, with firms in the mining, construction, manufacturing, transport, trade, real estate, hotels and restaurants, or other service sectors.

Given that financial development tends to increase with economic development, our measures

of financial development may capture something different than simply the evolution of the financial system.<sup>11</sup> Table 3 provides a detailed description of all variables as well as the respective data sources. Table 4 reports descriptive statistics.

As shown in Table 4, nearly 75 percent of the sample were micro or small firms three years before the survey took place, and the share of large firms is just above 10 percent. Table 5 illustrates that 27 percent of all firms decreased their full-time employment between 2002 and 2005; 44 percent increased their employment; and 29 percent did not have any changes in employment. Table 6 shows that all firms grew on average 29 percent in this time period; yet, average employment growth is the higher, the smaller the firm is.

## 6 Results

### 6.1 All countries

Table 7 reports the outcome of estimating Equation (6). Columns (1) and (2) display estimates with *privcred* as a measure of financial development, and Columns (3) and (4) with *forshare*. All columns confirm the relationship between firm size and employment growth observed in Table 6. The smaller the firm, the more increases employment. Specifically, the ratio of current over initial employment is on average larger by approximately 47 percent for micro firms compared with large firms (Column (2)). The coefficient of both financial development measures is negative in Columns (1) and (3). The measures interacted with *type* have a significantly negative coefficient for micro and small firms in Columns (2) and (4). This implies that micro and small firms in countries with a higher level of financial development experience relatively lower employment growth than micro and small firms in countries with a lower level of financial development. Everything else equal, an

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<sup>11</sup>Per capita Gross Domestic Product (GDP) is positively correlated with financial development for our sample of countries. The correlation is very high (0.82) for the case of *privcred* and lower (0.37) for the case of *forshare*. We therefore control for a number of country-level variables (6). Specifically, we control for GDP, GDP growth, inflation, and employment protection legislation. Data for GDP and GDP growth are taken from the World Development Indicators and for inflation from the International Financial Statistics. Employment protection legislation was obtained from the Institute for the Study of Labour (IZA) (Lehmann & Muravyev 2012). It is an indicator ranging from zero (least restrictions) to six (most restrictions), following the OECD methodology on employment protection. We again calculate average values of the first three variables over the years 2001-2003. For the last variable, we use the value for 2003 as the IZA dataset only contains values for 1995, 1999, 2003, and 2007.

increase in a country's level of private credit as a share of GDP by ten percentage points lowers the margin of micro firms' employment growth against large firms from 47 percent to 43 percent. Similarly, small firms have on average a higher ratio of 36 percent relative to large firms. Yet, a ten percentage points higher share of private credit results in an only 32 percent higher employment ratio of small firms relative to large firms. The magnitude of the effect is smaller for increases in the foreign ownership of banks (Column (4)). The coefficient of the interaction term with large firms is positive and marginally significant in Column (2). This means that a ten percentage point increase in the share of private credit leads to a 0.04 percentage points higher than average ratio of current over initial employment among large firms. Note that large firms experience low negative employment growth on average (Table 6). Hence, large firms in countries with a higher level of financial development move from negative to positive employment growth.

These results are in line with our hypothesis that small firms, i.e. firms with low managerial capital, are not able to compete when financial development pushes wages up. In contrast, the findings of Beck et al. (2005) and Beck et al. (2008) propose particular benefits (in terms of sales and value added) for small and opaque firms from a more developed financial system. Our evidence runs contrary to this literature to the extent that growth in sales and value added coincides with additional employment.

The coefficients of the control variables meet our expectations. Physical investment (*invest*) and access to foreign markets (*export*) display highly significant and positive coefficients in all specifications. The coefficients for government and foreign ownership (*gov* and *foreign*) as well as for being located in the middle of a large potential consumer base (*city*) are estimated to be significantly positive. The impact of age is estimated to be significantly negative and slightly convex. This indicates that employment growth is lower in older firms than in younger firms but the effect tapers off for higher ages. As seems plausible, GDP growth is positively and significantly related with employment growth at the firm level, as is employment protection.

The positive correlation of *invest* and employment growth is in line with the theory. It suggests that there is no substitution of physical investment for employment on average. Instead, employment tends to increase when there is growth in physical investment. To investigate potential heterogeneity,

we divide the sample into firms with positive investment growth and firms with no or negative investment growth (measured over the same period as employment growth). We find that the observed pattern of smaller firms being negatively affected and larger firms being positively (though not always significantly) affected by a higher level of financial development holds for both sub-samples and both indicators of financial development.<sup>12</sup>

## 6.2 Regional sub-samples

Exploration of the regional sub-groups may enable us to gain a more detailed picture of the link between financial development and firms' employment growth. Table 8 displays the outcomes of applying Equation (6) to CEE, SEE and CIS countries separately.

The findings confirm our predictions for SEE and CIS countries in Columns (2), (3) and (5). Financial development affects the relative employment growth of micro and small firms in the SEE and CIS countries negatively. Column (2) additionally suggests that large firms benefit from higher levels of financial development. Column (6) suggests no association between the level of financial development and employment growth of firms of all sizes in CIS countries. This finding signals the qualitative difference between *privcred* and *forshare* as measures of financial development. While a higher share of private credit in the economy affects smaller firms' relative employment growth in this region, a larger involvement of foreign banks does not make a difference.

The association between financial development and employment growth, for different firm sizes, is different for the CEE countries compared with the SEE and CIS countries. In the CEE countries, which are those with the most developed financial systems, a higher level of financial development affects the relative employment growth of either medium-sized firms (Column (1)) or large firms (Column (4)) negatively. Micro and small firms are unaffected. This finding is, to a certain extent, in line with Pagano & Pica (2012) in the sense that countries with more developed financial systems are different from countries with less developed financial systems. However, it also differs from Pagano & Pica (2012) because they find that there is no impact at all of financial development on employment growth in countries with highly developed financial systems (i.e. OECD countries).

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<sup>12</sup>The results are not reported here but are available from the authors on request.

### 6.3 Sensitivity analysis

In the following, we conduct a number of sensitivity checks to investigate whether our results are robust to different specifications (9). First, we exclude outliers in the dependent variable (Columns (1) and (4)). We define outliers as those values that deviate by more than three standard deviations from the mean, through which we lose 172 observations. None of the interaction terms remain significant when interacted with *forshare* (Column (4)). The results for the interaction with *privcred* reveal the familiar pattern of a negative impact for micro and small firms (Column (1)).

Second, we exclude all firms from sectors other than manufacturing (Columns (2) and (5)) because different sectors may have different employment patterns. In particular, substitution of physical investment for employment is particularly likely in manufacturing, compared with services. We find our basic results confirmed, namely that the smallest firms in countries with higher levels of financial development experience relatively lower employment growth relative to large firms than is the case for the smallest firms in countries with lower levels of financial development. However, the finding applies only to *privcred* as an indicator of financial development (Column (2)) but not to *forshare* (Column (5)). Foreign ownership of banks appears to be irrelevant for the employment growth. The coefficient for *invest* is always positive and highly significant, indicating that there is no substitutional effect between physical investment and labour.

Third, we repeat this sectoral perspective and only consider service firms (Columns (3) and (6)). These include firms in the transport, trade, real estate, hotel and restaurant, and other service sectors. Column (3) shows that, as above, micro and small firms in countries with higher shares of private credit experience relatively lower employment growth than large firms. Column (6), which measures financial development by the foreign ownership of bank assets, confirms this relationship. It additionally reveals that a higher level of financial development also reduces employment growth for large firms. As above, the coefficient for *invest* is positive and highly significant.

Fourth, we repeat our estimations with data from the 2009 BEEPS wave. This wave contains comparable information for all our variables, although with some minor deviations. As with the 2005 wave, it provides two numbers of full-time employees but  $t$  is here at the end of fiscal year 2007 and  $t - 1$  is at the end of fiscal year 2004. The fiscal year corresponds to the calendar year in all

transition countries. This implies that employment growth is measured for the period 2004-2007. Information on physical investment is limited to an indicator of whether or not a firm purchased any fixed assets in the previous year. We calculate *privcred* and *forshare* analogously to above. The regression results are reported in Table 10. We find in the total sample that employment growth of micro firms relative to large firms reduces with a higher share of private credit in GDP, and other firm types are unaffected (Column (1)). In contrast, a more pronounced foreign ownership of bank assets affects both micro and large firms negatively (Column (5)). Yet, these aggregated results of running the regression for all transition countries together hides important regional differences. While financial development is essentially unrelated with employment growth in CEE and CIS countries (Columns (2) and (6), and Columns (4) and (8), respectively), we observe the same pattern for SEE countries (Columns (3) and (7)) as above. Micro firms have relatively lower and large firms have higher employment growth with higher levels of financial development.

## 7 Conclusion

This paper studies the association between a country's level of financial development and firms' employment growth in transition countries. This is the first paper, to our knowledge, attempting to clarify theoretically and empirically whether financial development at the country level affects employment of individual firms in a non-monotonic way. We start with a theoretical model that captures the link between a firm's managerial capital and a country's financial development. The model proposes that financial development dampens the employment growth of firms with insufficient managerial capital. We use firm size as a proxy for managerial capital in the empirical analysis. We acknowledge that the model's proposition may not apply to ripe economies with highly sophisticated financial systems as the impact of financial development is likely to taper off at high levels. Our findings also do not provide direct evidence on the finance-growth nexus because we do not study growth at the country level and we do not focus on sales or profits. However, our results indirectly shed new light on this nexus to the extent that firm employment and growth in sales and profits are tightly connected.

We find that financial development has a significant effect on the employment growth of micro

and small firms, as well as, in some cases, of large firms. An increase in the share of private credit to GDP across countries significantly lowers the lead in employment growth that the smallest firms have on average over the large firms but increases the employment growth of large firms. This evidence is in line with our theoretical propositions. It also coincides with recent experimental evidence, which reveals fewer employees among microenterprises with access to credit compared to those without (Karlan & Zinman 2011). The interpretation provided there is that micro-entrepreneurs do not necessarily invest loan proceeds in growing their businesses but use them instead for managing their households' risks. In our sample, the described impact is particularly significant in Southeastern Europe. In addition, financial development measured by the asset share of foreign banks has a similar effect but this is less robust.

These results confirm the importance of financial development for the country's economic development but the findings also emphasize that the effect can be negative. This possible negative effect of financial development on employment growth has not been previously documented for transition countries. It has important implications for research and public policy. If financial development is dampening the employment growth margin of smaller firms relative to large firms, this raises questions about the strategy of many governments in transition countries to support economic development by allocating considerable public resources to bringing the country's financial system forward. The key insight from this paper is therefore that any empirical study on the finance and (firm-)growth nexus should consider different firm types. If access to finance heats up competition on the labour market and pushes wages upwards, smaller and opaque firms may be at risk of losing the battle. Financial development has distributional consequences which governments of transition countries need to be aware of.



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## A Appendix

1. Defining  $\phi(\gamma_i, w) = (1 - \alpha) \left(\frac{\alpha}{w}\right)^{\frac{\alpha}{1-\alpha}} \gamma_i^{\frac{1}{1-\alpha}}$  yields

$$\frac{\delta L_D}{\delta \gamma_i} = \frac{1}{(1 - \alpha)} \left(\frac{\alpha \gamma_i}{w}\right)^{\frac{\alpha}{(1-\alpha)}} \frac{\alpha}{w} \frac{A}{1 - \lambda \phi(\gamma_i)} + \left(\frac{\alpha \gamma_i}{w}\right) \frac{A}{(1 - \lambda \phi(\gamma_i))^2} \lambda \frac{\delta \phi}{\delta \gamma_i} > 0.$$

This expression is positive since  $\frac{\delta \phi}{\delta \gamma_i} > 0$ .

2.

$$\frac{\delta L_D}{\delta \lambda} = \left(\frac{\alpha \gamma_i}{w}\right)^{\frac{1}{1-\alpha}} \frac{A}{(1 - \lambda \phi(w, \gamma))^2} \phi(w, \gamma) > 0.$$

3.

$$\begin{aligned} \frac{\delta \frac{\delta L_D}{\delta \lambda}}{\delta \gamma} &= \left(\frac{\alpha}{1 - \alpha} \frac{\alpha \gamma_i}{w}\right)^{\frac{\alpha}{1-\alpha}} \frac{A}{(1 - \lambda \phi(w, \gamma))^2} \phi(w, \gamma) + \\ &\quad \left(\frac{\alpha \gamma_i}{w}\right)^{\frac{1}{1-\alpha}} \left[ \frac{-2A(1 - \lambda \phi(w, \gamma))}{(1 - \lambda \phi(w, \gamma))^4} \left(-\lambda \frac{\delta \phi(\cdot)}{\delta \gamma}\right) \phi(\cdot) \right] + \\ &\quad \left(\frac{\alpha \gamma_i}{w}\right)^{\frac{1}{1-\alpha}} \frac{A}{(1 - \lambda \phi(w, \gamma))^2} \frac{\delta \phi(\cdot)}{\delta \gamma} > 0. \end{aligned}$$

Table 1: Composition of sample

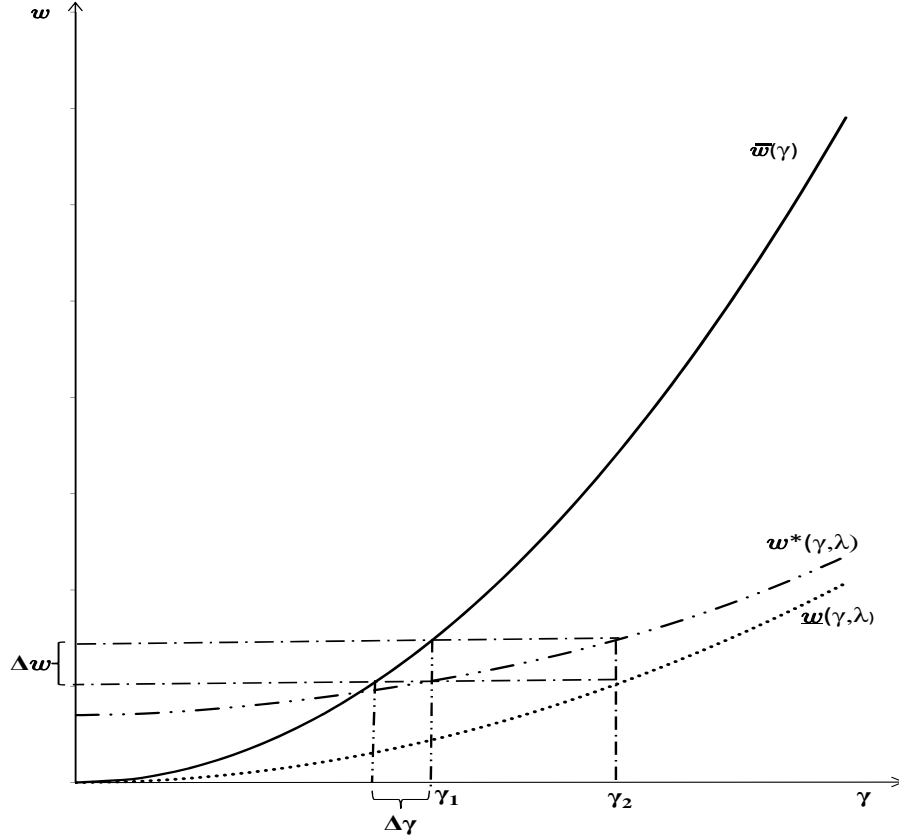
Country	Number of firms
Albania	193
Armenia	330
Azerbaijan	334
Bulgaria	274
Croatia	219
Czech Republic	312
Estonia	208
Hungary	575
Kazakhstan	557
Kyrgyz Republic	193
Latvia	192
Lithuania	186
FYR Macedonia	189
Moldova	323
Poland	953
Romania	551
Russian Federation	565
Serbia	272
Slovak Republic	199
Slovenia	219
Ukraine	556
Total	7,400

Table 2: Firm size and borrowing

Firm type	have a loan	total number
micro	937 (30.98)	3,025
small	1,102 (46.40)	2,375
medium	645 (53.57)	1,204
large	492 (61.81)	796

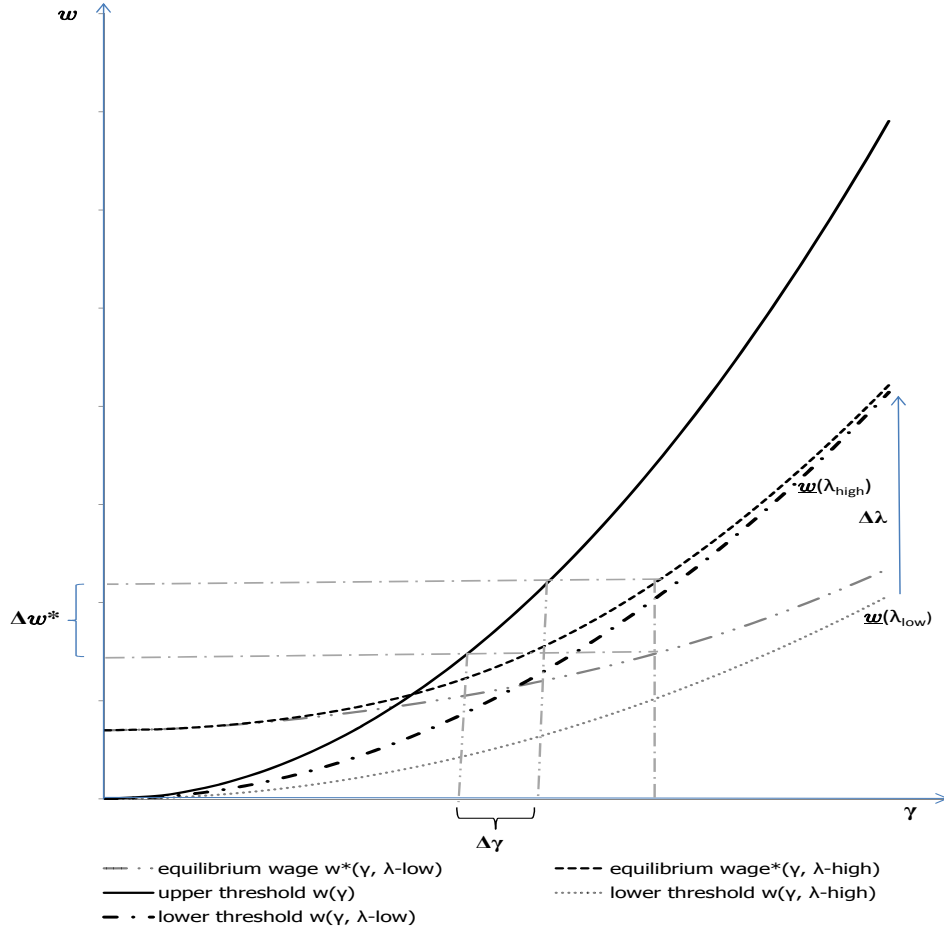
Note: Cell entries are numbers of firms. Numbers in parentheses are shares of the total numbers of firms (in percent).

Figure 1: Managerial capital and wage level



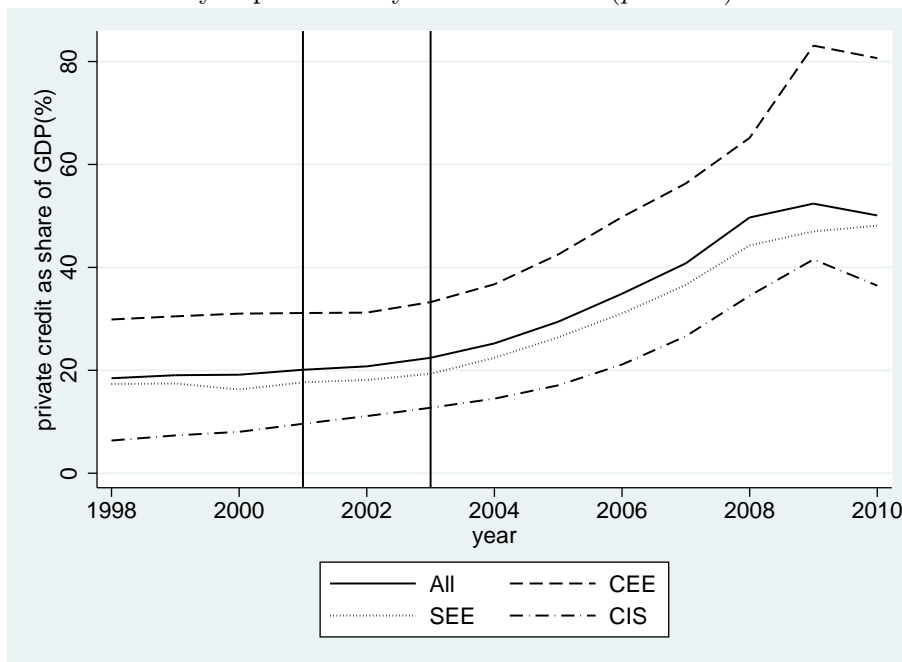
The figure is based on the following parameter values  $\alpha = 0.5$ ,  $A = 5$ ,  $\lambda = 0.3$ .  $\underline{w}(\gamma_i, \lambda)$  and  $\bar{w}(\gamma_i)$  correspond to expression (3) and (4) for  $\alpha = 0.5$  and  $\lambda = 0.3$ . The surplus maximizing labour demand for a firm with managerial capital  $\gamma_i$  is  $L_D(w, \gamma_i, \lambda = 0.3) = [5 \gamma_i^2] / [4 (1 - (3 \gamma_i^2) / (40 w)) w^2]$  with  $1 - (3 \gamma_i^2) / (40 w) > 0$ . Labour supply is assumed as  $L_S(w) = 8w - 11, 2$ .  $w^*(\gamma_i, \lambda = 0.3)$  is calculated by solving  $L_D(w, \gamma_i, \lambda = 0.3) = L_S(w)$ .

Figure 2: Managerial capital and financial development



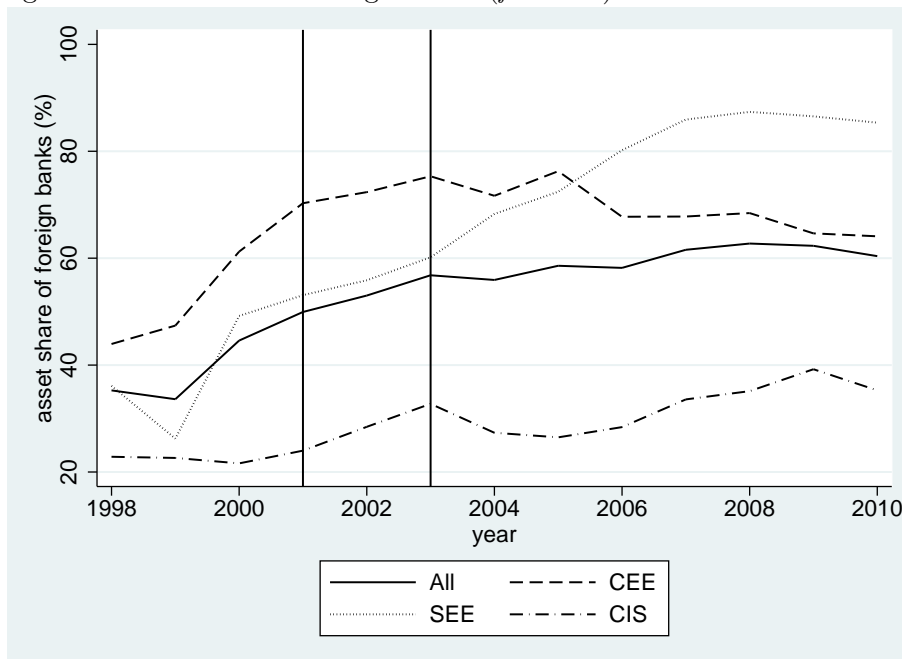
The figure is based on the following parameter values  $\alpha = 0.5$ ,  $A = 5$ ,  $\lambda_{low} = 0.3$ ,  $\lambda_{high} = 0.6$ .  $\underline{w}(\lambda_{low}), \underline{w}(\lambda_{high})$  and  $\bar{w}(\gamma_i)$  correspond to expression (3) and (4) for  $\alpha = 0.5$ ,  $\lambda = 0.3$  and  $\lambda = 0.6$ . The surplus maximizing labour demand for a firm with managerial capital  $\gamma_i$  is  $L_D(w, \gamma_i, \lambda) = [5\gamma_i^2]/[4(1 - (3\gamma_i^2)/(40w))w^2]$  with  $1 - (3\gamma_i^2)/(40w) > 0$ . Labour supply is assumed as  $L_S(w) = 8w - 11.2$ .  $w^*(\gamma_i, \lambda)$  is calculated by solving  $L_D(w, \gamma_i, \lambda) = L_S(w)$  for both values of  $\lambda$ .

Figure 3: Private credit by deposit money banks to GDP (*privcred*) between 1998 and 2010



Source: Authors' illustration; data from World Bank.

Figure 4: Asset share of foreign banks (*forshare*) between 1998 and 2010



Source: Authors' illustration; data from EBRD.



Table 3: Description of independent variables

Variable	Description	Data source
<b>Firm-level controls</b>		
invest	(100 + percent change in physical investment over the last 3 years)/100	2005 BEEPS
gov	Dummy = 1 if government owns at least 25 percent of the firm, 0 otherwise	2005 BEEPS
foreign	Dummy = 1 if private foreign company owns at least 25 percent of the firm, 0 otherwise	2005 BEEPS
export	Dummy = 1 if firm sells at least 25 percent abroad, 0 otherwise	2005 BEEPS
city	Dummy = 1 if firm is located in the capital or a city of more than one mio. inhabitants, 0 otherwise	2005 BEEPS
age	age of firm in years	2005 BEEPS
age2	age squared	2005 BEEPS
mining	Dummy = 1 if firm is in mining sector, 0 otherwise	2005 BEEPS
constr	Dummy = 1 if firm is in construction sector, 0 otherwise	2005 BEEPS
manufact	Dummy = 1 if firm is in manufacturing sector, 0 otherwise	2005 BEEPS
transport	Dummy = 1 if firm is in transport sector, 0 otherwise	2005 BEEPS
trade	Dummy = 1 if firm is in trade sector, 0 otherwise	2005 BEEPS
realest	Dummy = 1 if firm is in real estate sector, 0 otherwise	2005 BEEPS
hotel	Dummy = 1 if firm is in hotels and restaurants sector, 0 otherwise	2005 BEEPS
service	Dummy = 1 if firm is in other services sector, 0 otherwise	2005 BEEPS
<b>Firm size</b>		
micro	Dummy = 1 if firm had 2-9 full-time employees 3 years ago, 0 otherwise	2005 BEEPS
small	Dummy = 1 if firm had 10-49 full-time employees 3 years ago, 0 otherwise	2005 BEEPS
medium	Dummy = 1 if firm had 50-249 full-time employees 3 years ago, 0 otherwise	2005 BEEPS
large	Dummy = 1 if firm has 250 full-time employees or more, 0 otherwise	2005 BEEPS
<b>Country controls</b>		
gdp	GDP (in million current US Dollar), average for 2001-2003	World Development Indicators
gdpgrowth	GDP growth (in percent), average for 2001-2003	World Development Indicators
inflation	Inflation (in percent), average for 2001-2003	International Financial Statistics
epl	Indicator for employment protection legislation	IZA
<b>Financial development</b>		
privcred	Private credit of money deposit banks and other financial institutions as a share of GDP	Financial Development and Structure Dataset (World Bank)
forshare	Share of banks with assets of foreign ownership larger than 50 percent	EBRD Banking Survey

Table 4: Descriptive statistics

Variable	All countries	CEE	SEE	CIS
$\ln(emp_{2005}/emp_{2002})$	0.097 (0.522)	0.039 (0.489)	0.096 (0.502)	0.155 (0.557)
invest	1.119 (0.315)	1.108 (0.287)	1.149 (0.356)	1.111 (0.314)
gov	0.089 (0.285)	0.080 (0.271)	0.100 (0.300)	0.093 (0.290)
foreign	0.108 (0.310)	0.108 (0.310)	0.106 (0.308)	0.108 (0.311)
export	0.141 (0.348)	0.169 (0.375)	0.169 (0.375)	0.097 (0.296)
city	0.363 (0.481)	0.277 (0.448)	0.309 (0.462)	0.481 (0.500)
age	15.46 (17.11)	16.47 (17.33)	17.36 (17.74)	13.32 (14.85)
age2	531.8 (1655)	571.4 (1734)	690.7 (2114)	397.9 (1187)
mining	0.009 (0.097)	0.006 (0.077)	0.011 (0.102)	0.012 (0.110)
constr	0.091 (0.288)	0.098 (0.297)	0.072 (0.258)	0.097 (0.295)
manufact	0.422 (0.494)	0.399 (0.490)	0.404 (0.491)	0.454 (0.498)
transport	0.061 (0.239)	0.070 (0.254)	0.071 (0.256)	0.047 (0.211)
trade	0.228 (0.420)	0.222 (0.416)	0.255 (0.436)	0.219 (0.414)
realest	0.088 (0.283)	0.107 (0.309)	0.081 (0.271)	0.074 (0.261)
hotel	0.049 (0.217)	0.053 (0.224)	0.059 (0.235)	0.041 (0.197)
service	0.050 (0.218)	0.045 (0.208)	0.048 (0.214)	0.056 (0.230)
micro	0.409 (0.492)	0.469 (0.499)	0.411 (0.492)	0.347 (0.477)
small	0.321 (0.467)	0.274 (0.446)	0.303 (0.460)	0.378 (0.485)
medium	0.163 (0.369)	0.156 (0.363)	0.161 (0.367)	0.170 (0.376)
large	0.108 (0.310)	0.101 (0.301)	0.125 (0.331)	0.104 (0.306)
gdp	76,313 (102,245)	96,636 (78,034)	25,719 (17,249)	86,148 (137,144)
gdpgrowth	5.771 (3.034)	3.930 (1.899)	4.276 (1.694)	8.491 (2.538)
inflation	8.223 (8.979)	3.875 (2.077)	16.344 (14.290)	7.725 (4.994)
epl	2.224 (0.428)	2.118 (0.334)	2.482 (0.342)	2.176 (0.490)
privcred	20.64 (10.80)	31.07 (6.18)	16.76 (10.08)	12.57 (4.63)
forshare	50.66 (28.40)	73.32 (19.24)	55.78 (19.73)	25.07 (17.54)

Note: Reported are sample means. Standard deviation in parentheses.

Table 5: Employment growth by country group

Employment growth	All countries	CEE	SEE	CIS
Negative growth	26.53	32.24	29.44	19.11
No change	29.00	30.06	27.86	28.62
Positive growth	44.47	37.70	42.70	52.27

Note: Cell entries are shares of the total numbers of firms (in percent) for each column

Table 6: Employment growth (in percent) by firm size

Firm size	Mean	25th percentile	75th percentile
micro	44.4	0	50
small	27.7	-7.1	38.5
medium	13.1	-14.4	18.2
large	-0.9	-17.3	8.3
total	29.0	-5.3	33.3

Table 7: Association between financial development and employment growth

The table reports estimated OLS coefficients and t-values (in parentheses). Standard errors are adjusted for clustering at the country level. The dependent variable is  $\ln(emp_{2005}/emp_{2002})$ . A constant and sector dummies are included but not reported. The omitted firm size category is *large*. The columns report results for different indicators of financial development: *privcred* = private credit by deposit money banks and other financial institutions as a share of GDP (columns (1) and (2)) and *forshare* = foreign ownership of bank assets (columns (3) and (4)). *privcred* and *inflation* are not identified for Uzbekistan and Bosnia and Herzegovina; *epl* for Belarus, Georgia, and Tajikistan. \*\*\*, \*\* and \* indicate significance at 0.01, 0.05 and 0.1 levels, respectively.

	(1)	(2)	(3)	(4)
invest	0.351*** (10.970)	0.351*** (10.984)	0.351*** (10.715)	0.351*** (10.741)
gov	0.039* (1.821)	0.041* (1.790)	0.040* (1.860)	0.042* (1.903)
foreign	0.079*** (3.553)	0.078*** (3.404)	0.080*** (3.654)	0.079*** (3.614)
export	0.075*** (3.033)	0.073*** (2.912)	0.071** (2.781)	0.070** (2.820)
city	0.048*** (3.206)	0.050*** (3.386)	0.044*** (3.050)	0.046*** (3.154)
age	-0.005*** (-5.007)	-0.005*** (-4.730)	-0.005*** (-5.105)	-0.005*** (-5.065)
age2	0.000*** (3.944)	0.000*** (3.400)	0.000*** (4.016)	0.000*** (3.774)
gdp	0.000 (0.284)	0.000 (0.289)	0.000 (0.061)	0.000 (0.094)
gdpgrowth	0.009*** (3.618)	0.009*** (3.645)	0.011*** (3.668)	0.011*** (3.602)
inflation	0.000 (0.268)	0.000 (0.301)	-0.000 (-0.076)	-0.000 (-0.035)
epl	0.023* (1.855)	0.021* (1.790)	0.041** (2.758)	0.041** (2.732)
micro	0.295*** (6.352)	0.469*** (6.906)	0.294*** (6.337)	0.405*** (5.305)
small	0.180*** (4.183)	0.356*** (5.159)	0.182*** (4.246)	0.295*** (3.544)
medium	0.088*** (2.922)	0.184*** (2.993)	0.089*** (2.974)	0.145** (2.354)
privcred	-0.003*** (-4.112)			
microXpriv		-0.004*** (-4.452)		
smallXpriv		-0.004*** (-5.630)		
medXpriv		-0.000 (-0.255)		
largeXpriv		0.004* (2.050)		
forshare			-0.001** (-2.178)	
microXfor				-0.001** (-2.501)
smallXfor				-0.001** (-2.300)
medXfor				-0.000 (-0.132)
largeXfor				0.001 (1.220)
Adj. R-Squared	0.108	0.111	0.107	0.109
Number of Obs.	7,400	7,400	7,400	7,400

Table 8: Association between financial development and employment growth, by sub-regions

This table reports estimated OLS coefficients and t-values (in parentheses). Standard errors are adjusted for clustering at the country level. The dependent variable is  $\ln(emp_{2005}/emp_{2002})$ . A constant, sector dummies and the same control variables as above are included but not reported. The columns report results for different indicators of financial development: *privcred* = private credit by deposit money banks and other financial institutions as a share of GDP (columns (1), (2) and (3)) and *forshare* = foreign ownership of bank assets (columns (4), (5) and (6)). The respective first set of these columns uses data from Central and Eastern Europe (columns (1) and (4)), the second set for Southeastern Europe (columns (2) and (5)) and the third set for the Commonwealth of Independent States (columns (3) and (6)). *privcred* and *inflation* are not identified for Uzbekistan and Bosnia and Herzegovina; *epl* for Belarus, Georgia, and Tajikistan. \*\*\*, \*\* and \* indicate significance at 0.01, 0.05 and 0.1 levels, respectively.

Variable	(1)	(2)	(3)	(4)	(5)	(6)
microXpriv	0.001 (0.804)	-0.006*** (-11.154)	-0.009*** (-5.236)			
smallXpriv	-0.001 (-0.530)	-0.000 (-0.189)	-0.012** (-3.183)			
medXpriv	-0.008** (-2.876)	0.001 (1.565)	-0.005 (-1.515)			
largeXpriv	-0.004 (-1.542)	0.004** (3.207)	0.010 (0.936)			
microXfor				-0.000 (-0.196)	-0.002* (-2.055)	-0.000 (-0.119)
smallXfor				-0.001 (-1.520)	-0.003*** (-4.745)	0.001 (0.803)
medXfor				-0.001 (-1.409)	-0.000 (-0.407)	-0.001 (-0.605)
largeXfor				-0.002*** (-4.300)	0.000 (0.108)	0.004 (1.605)
Adj. R-Squared	0.092	0.140	0.108	0.091	0.137	0.105
Number of Obs.	2844	1698	2858	2844	1698	2858

Table 9: Sensitivity tests

This table reports estimated OLS coefficients and t-values (in parentheses). Standard errors are adjusted for clustering at the country level. The dependent variable is  $\ln(emp_{2005}/emp_{2002})$ . A constant, sector dummies and the same control variables as above are included but not reported. The columns report results for different indicators of financial development: *privcred* = private credit by deposit money banks and other financial institutions as a share of GDP (columns (1), (2) and (3)) and *forshare* = foreign ownership of bank assets (columns (4), (5) and (6)). We exclude observations with outliers in the dependent variable in columns (1) and (4). We use only manufacturing firms in columns (2) and (5) and service firms in columns (3) and (6). *privcred* and *inflation* are not identified for Uzbekistan and Bosnia and Herzegovina; *epl* for Belarus, Georgia, and Tajikistan. \*\*\*, \*\* and \* indicate significance at 0.01, 0.05 and 0.1 levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
microXpriv	-0.003*** (-3.445)	-0.006*** (-3.113)	-0.003*** (-3.283)			
smallXpriv	-0.003*** (-6.175)	-0.002 (-1.525)	-0.003*** (-3.256)			
medXpriv	-0.001 (-1.322)	-0.002 (-1.568)	-0.001 (-0.923)			
largeXpriv	0.000 (0.284)	0.001 (0.596)	0.002 (0.593)			
microXfor				-0.001 (-1.486)	-0.001 (-1.215)	-0.001** (-2.127)
smallXfor				-0.001 (-1.635)	0.000 (0.322)	-0.001* (-2.027)
medXfor				-0.001 (-1.400)	-0.001 (-0.874)	-0.001 (-1.489)
largeXfor				-0.001 (-1.041)	0.000 (0.085)	-0.001* (-1.799)
Adj. R-Squared	0.104	0.114	0.101	0.102	0.111	0.100
Number of Obs.	7228	3042	3461	7228	3042	3461

Table 10: Sensitivity tests, 2009 data

This table reports estimated OLS coefficients and t-values (in parentheses). Standard errors are computed by taking survey settings into account. The dependent variable is  $\ln(emp_{2007}/emp_{2004})$ . A constant, sector dummies and the same control variables as above are included but not reported. The columns report results for different indicators of financial development: *privcred* = private credit by deposit money banks and other financial institutions as a share of GDP (columns (1)-(4)) and *forshare* = foreign ownership of bank assets (columns (5)-(8)). In columns (1) and (5), all transition countries are included, in columns (2) and (6), only CEE countries, in columns (3) and (7), only SEE countries, and in columns (4) and (8), only CIS countries. *privcred* is not identified for Uzbekistan and Bosnia and Herzegovina; *inflation* for Uzbekistan, Bosnia and Herzegovina and Kosovo; *epl* for Belarus, Georgia, and Tajikistan; and *forshare* for Kosovo. \*\*\*, \*\* and \* indicate significance at 0.01, 0.05 and 0.1 levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
microXpriv	-0.005*** (-3.038)	0.003 (0.768)	-0.012*** (-5.395)	0.008 (1.249)				
smallXpriv	-0.001 (-1.107)	-0.001 (-0.247)	-0.004* (-1.747)	0.003 (0.647)				
medXpriv	-0.000 (-0.176)	0.002 (0.677)	-0.003 (-1.060)	0.005 (0.762)				
largeXpriv	-0.004 (-0.690)	-0.011 (-1.017)	0.009** (2.373)	-0.001 (-0.116)				
microXfor					-0.001* (-1.811)	0.001 (0.427)	-0.009*** (-4.612)	0.003 (0.958)
smallXfor					-0.001 (-1.505)	0.001 (0.974)	-0.006*** (-2.601)	-0.003 (-1.253)
medXfor					-0.001 (-0.966)	-0.002 (-1.198)	-0.002 (-1.096)	-0.004 (-1.077)
largeXfor					-0.003*** (-2.591)	0.005 (1.063)	0.007*** (2.701)	-0.010** (-2.223)
Adj. R-Squared	0.133	0.137	0.171	0.181	0.131	0.138	0.168	0.184
Number of Obs.	6960	1972	1697	3291	6960	1972	1697	3291