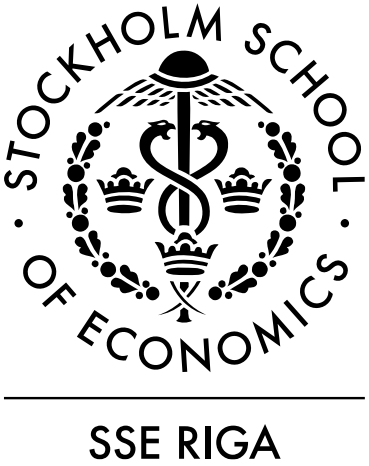

Bachelor Thesis

Financing Constraints and Productivity Growth in Central and Eastern Europe: Firm-level Evidence

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Abstract

The effect of financial frictions on productivity growth rates in Central and Eastern Europe (CEE) is not well studied, and particularly there is no evidence on the period after the Global Financial Crisis. This paper estimates the impact of various financial frictions on productivity growth rates in the 12 CEE region countries. I employed the Ackerberg, Caves, and Frazer (2015) Total Factor Productivity (TFP) estimation method for the base model specification; Wooldridge's (2009) TFP method, as well as Labour productivity measure for robustness to assess the productivity growth of the firms. To assess financial frictions' impact on productivity, I followed Levine and Warusawitharana's (2019) method. Overall, the findings suggest a negative effect coming from financial constraints on future productivity growth rates of the firms. The results bring valuable insights on the link between credit financing and productivity growth disturbed by financial frictions at different levels.

JEL classification: D24, G32, O16

Keywords: Total factor productivity (TFP), Financial frictions, Credit constraints, Finance and growth

1. Introduction

Productivity and technology have become indivisible concepts throughout history and might be perceived to be among the most important fields for economics research. The famous opinion written by Paul Krugman (1994) suggests that "productivity is not everything, but in the long run it is almost everything. A country's ability to improve its standard of living over time depends almost entirely on its ability to raise its output per worker" (p. 11). The growth in productivity was determined as the most valuable contributor to the expansion of the US economy through the decades, the critical force of the industrial revolution of the emerging Asian economies, and an essential source of the economic growth in European countries. Productivity growth might be substantially impacted by the developments in particular industries or even firms. For example, the booming ICT sector, and mainly the growth of proverbial giant Nokia in the late 1990s, played a considerable role in Finnish economy's productivity growth, which allowed manufacturing sector productivity to exceed the US level (Maliranta, 2009). According to Ali-Yrkkö (2010), Nokia's productivity acceleration (including spillover effects) has contributed 3 pp to the aggregate labour productivity growth in the Finnish manufacturing sector during 2001–2008.

The Global Financial Crisis (GFC) has dramatically weakened productivity growth, mainly by affecting access to financing (Bergeaud, Cette, and Lecat, 2018; Duval, Hong, and Timmer, 2020; Karpowicz and Suphaphiphat, 2020). The global financial recession has stimulated the academic world to research the finance-productivity nexus. Several papers explored the effect of financial frictions by using aggregate data (Cheng and Degryse, 2010; Christiano, Motto, and Rostagno, 2010; Decker, Haltiwanger, Jarmin and Miranda, 2017, López, 2017). Many other papers, which are primarily in my consideration, investigate the effect of credit constraints at the firm level (Andrews, Criscuolo, and Gal, 2016; Coricelli, Driffield, Pal, and Roland, 2012; Duval et al., 2020; Ferrando and Ruggieri, 2018). Financial frictions, brought by the GFC, are among the most important legacies of the global productivity growth deceleration at the firm level (Ferrando and Ruggieri, 2018; Jin, Zhao, and Kumbhakar, 2019; Levine and Warusawitharana, 2019; Midrigan and Xu, 2014; Wroński, 2019; and others). While at the country level, productivity is associated with living standards and wellbeing, on the micro- (company-) level, productivity is closely linked to companies' competitiveness and profitability. Midrigan and Xu (2014) argued for the link between aggregate Total Factor Productivity (TFP) and the productivity of individual producers. Notably, they explained that the presence of financial frictions is one of the most crucial

productivity impediments at the company[1] level, by (1) affecting producers' entry and technology adoption and (2) misallocation of the resources leading to efficiency losses. Thus, the inefficiencies at the firm level depress the productivity on the aggregate (country) level.

It is a widely studied fundamental mechanism that credit enhances TFP, which is backed up by the fact that financial markets increase productivity by reallocating the resources to their best use. When the financial frictions are brought to the table, the misallocation of the resources increases, which is predominantly in concern for the developing countries (Arizala, Cavallo, and Galindo, 2013; Restuccia and Rogerson, 2008). This means that the firms are unable to get financing for their operations and investments, consequently suffering from low productivity growth rates, which in turn depresses aggregate economic growth rates.

According to the economic theory, the less developed countries, or those "further from the global technological frontier" (p. 6) will enjoy a higher economic growth rate, higher return on investment, and enormous profits from the technological advancements (IMF, 2013). Central and Eastern European (CEE) countries are considered as less developed comparing to other European countries; thus, during the years before the GFC, the region has experienced rapid credit growth, which in turn led to large current account deficits and rapid capital accumulation (Coricelli et al., 2012; Levenko, Oja, and Staehr, 2019). Nevertheless, during the 2008/9 crisis, these countries have seen a sharp decline in credit demand and supply (Coricelli et al., 2012; Everaert, Che, Geng, Gruss, Impavido, Lu, Saborowski, Vandenbussche, and Zeng, 2015). This has negatively affected the productivity growth rates that have suffered the most in the CEE region than others in Europe (and have not yet recovered compared to the pre-crisis period). Particularly for Central Eastern and South-Eastern Europe (CESEE), productivity gains were the main driver of income convergence towards advanced European economies. In other words, the global financial downturn has distressed the CEE region financial system, resulting in restriction of firms' access to external (credit) financing and leading to low productivity rates.

The financial frictions and productivity in the CEE region are not well studied. Most of the existing papers cover the growth period until the financial crisis, use simple yet the most applicable methodology, and often have a unique dataset for one specific country and industry (Badia and Slootmaekers, 2009; Coricelli et al., 2012; Cuaresma, Oberhofer, and Vincelette, 2014; Gatti and Love, 2008), which shows a room for conducting a research and contributing to the post-crisis

[1] Throughout the paper the words *firm*, *company*, and *enterprise* would be used interchangeably.

literature on finance-productivity nexus. Furthermore, the scarce literature argues for the non-linear credit-productivity relationship, where under certain conditions, financial frictions can positively affect the productivity of the firms, yet the excessive levels start hindering the growth (Coricelli et al., 2012; Jin, Zhao, and Kumbhakar, 2019; Nunes, Sequeira, and Serrasqueiro, 2007). Therefore, my research question is the following:

RQ: **What is the effect of financial constraints on firms' productivity growth in the Central and Eastern European (CEE) region?**

I will use a recently developed methodology by Levine and Warusawitharana (2019) to assess the effect of present financial constraints on the firms' productivity growth in the CEE region on the post-crisis dataset covering 2011 – 2019 period. In the base model, productivity would be measured by *Ackerberg, Caves, and Frazer's (2015)* method to estimate TFP. *Wooldridge's (2009)* estimation, as well as *labour productivity*, would be used for robustness tests. Additionally, to shed some light on the non-linear relationship between financial frictions and productivity, the quadratic relationship will be used in the spirit of Levine and Warusawitharana (2019) and Jin, Zhao, and Kumbhakar (2019). The findings would enable policymakers to gather insights into the differences in effects coming from financial frictions within sectors and among peer countries and support in policy tools development that positively impact the economy's welfare.

The paper's findings reveal the negative impact of financial frictions on the firms' productivity growth rate. Economically: 1. 10% increase in book leverage leads to 0.2% drop in future TFP growth. 2. 10% increase in cash holdings gives from 0.02% to 0.6% increase in TFP in the next period. Additionally, firms with higher cash balances are by 0.15 pp more productive. 3. 10% increase in interest expense would result in 0.03% to 1% decline in future productivity growth. Firms with higher financial expenses would be by 0.03 to 0.25 pp less productive.

The structure of the rest of the paper is as follows. *Section 2* provides a brief overview of the literature on the finance-productivity nexus around the world and, in the CEE region in particular. *Section 3* describes the data obtained for the research. *Section 4* shows the construction of needed variables for the analysis and covers the chosen methods and their specifications. *Section 5* presents and discusses the results of the analysis addressing the RQ. Finally, *Section 6* summarises the whole study and presents the key takeaways and peculiar points.

2. Literature review

2.1. The Legacies of Global Financial Crisis

In most advanced and developing countries, productivity growth rates have not yet been recovered comparing with the pre-crisis period. Since the Global Financial Crisis (GFC), especially in the euro area, the considerable drop in the output was accompanied by the rather significant downturn in productivity growth rates compared to the pre-crisis rates (Schmoller and Spitzer, 2020). Wronski (2019) identified three major legacies of the Global Recession: lack of capital deepening, slowdown of international trade, and financial frictions, which were identified as one of the main concerns for developing countries.

ECB (2017) decomposed the slowdown in aggregate euro area labour productivity growth into two components: capital deepening and TFP. They also suggested that both the US and Europe saw a support to the capital deepening in the middle of the recession, however, this increase was artificial due to the decreasing employment, which mechanically improved capital deepening rates, while net investments remained low (ECB, 2017). During the post-crisis period (2013 – 2016), as one reason for miserable capital deepening rates and declining TFP in Europe, ECB (2017) defined another global financial downturn aftermath – credit constraints[2].

Long before the crisis, Kiyotaki and Moore (1997), together with Bernanke and Gertler (1989), while exploring the effect of the financial constraints, have revealed the negative relationship between the financial constraints and investments. According to Van Ark (2016), the main drivers of the GDP growth in the EU and the US were attributed to the investments in informational communication technologies, with an average of 0.6 pp of contribution to the growth (~ 2.5% of GDP growth). Moreover, the author states that firms might decrease their investments due to lower demand and return anticipation.

The productivity growth slowdown at the firm level was affected by several factors, which the academic world was focused on: stalling technological diffusion (Andrews et al., 2016), inefficient resource allocation, and declining business dynamism (Decker et al., 2017). Duval et al. (2020) also defined tightening of credit supply conditions as one of GFC features – it decreased intangible investment expenditure (or R&D), thus, also the productivity growth. According to

[2] Throughout the paper the words *financial frictions*, *financial constraints*, and *credit constraints* would be used interchangeably. I define them as companies' limitations to get the bank credit (e.g., mainly the cost of debt – if the costs are high then the frictions are high).

Schmoller and Spitzer (2020), the main contributor to the euro area productivity slowdown was a drop in efficiency of R&D projects due to the limited access to financing. The authors provide one of the potential explanations that GFC made companies anticipate the future downturns more rigorously. Eventually, it encouraged "safe asset holdings" (p. 31) rather than TFP-enhancing investments, which further depresses the implementation of new, more productive technologies within the company. In other words, it became harder for companies to finance their innovative projects.

Antoshin, Arena, Gueorguiev, Lybek, Ralyea, Yehoue (2017), and Everaert et al. (2015) stressed the bank's credit supply restrictions perspective. The latter examined the situation and provided evidence from the CESEE region. Initially, the region has experienced rapid credit growth because of the convergence and integration with advanced European countries. After the GFC, in response to the excessive credit expansion during the booming pre-crisis period, "banks tightened lending policies" (Everaert et al., 2015, p. 3). They provide several reasons for introducing credit constraints for firms and households. Firstly, there was a "sharp decline in global risk appetite", eventually resulting in capital outflows from the CESEE region. Secondly, due to capital requirements and liquidity formation demanded by the regulations, banks narrowed their capacity to lend. Thirdly, due to the uncertainty in firms' and households' economic prospects, credit supply was also hindered (Evaraet et al., 2015, p. 4). As an example, they state that Polish and Romanian enterprises, that are heavily dependent on credit from banks, have been affected differently: while there was an access to cheap funding in Poland due to the presence of parent banks, there was an opposite situation in Romania, accompanied by economic stagnation. While this research was covering CESEE countries specifically, Antoshin et al. (2017) concluded that in Europe, the banks' credit extension was slow to recover after the financial distress, so-called 'creditless recovery', which according to Abiad, Dell'Ariccia and Li (2011) is weaker than the normal recovery. According to the scholars' results, the banks' lending rates dropped significantly in the advanced European countries, however, the most significant gap comparing with the lending rates in the pre-crisis period was spotted in the CESEE region (Antoshin et al., 2017). Hence, building upon the distortions that happened in the market, most of the firms faced constraints in accessing the external funds to make productivity-boosting investments. This statement could be found in Fazzari, Hubbard, and Petersen's (1988) study, which proposed that in case a firm is financially constrained (firm possesses not only limited cash holdings (internal reserves) but also

is unable to get external financing (e.g., bank loan) on favourable conditions), its investment decision will depend on the availability of internal funds, rather than on the opportunity to invest into positive NPV projects. To get empirical evidence, academics from all around the world were trying to quantify the role of financial frictions in determining productivity level and growth.

2.2. The finance-productivity nexus evidence worldwide

To start building theoretical background, let me first make a brief overview of the recent literature exploring the finance-productivity relationship covering both developing and advanced economies from around the world, namely China, India, Canada, and sub-Sahara Africa. Jin, Zhao and Kumbhakar (2019) have investigated the role of external financial constraints in determining the firm-level productivity level and growth through the R&D investments in China. Like Schmoller and Spitzer (2020), the academics argue that the market imperfections and the limited access to the bank credit lead to lower productivity gains for both state-owned enterprises (SOE) and non-SOE through the R&D channel. The underlying idea is that firm's productivity rates will be directly affected by the limitation of the productivity-enhancing R&D activities due to credit less environment. During the period between 1998 and 2007, they found that almost 90% of the firms are subject to external financial constraints. Surprisingly, there were controversial results stating that the least constrained enterprises have lower productivity rates than those the most financially constrained. As was noticed, Chinese firms are not as severely affected by the negative impact of underdeveloped financial markets as it was expected (Jin, Zhao and Kumbhakar, 2019, p. 1150). They concluded that notwithstanding the state and foreign firms are less financially constrained, their performance rates are lower compared to the private firms. Moreover, they found evidence about the non-linear relationship between financing constraints and productivity, as was previously examined in Coricelli et al. (2012) and Nunes, Sequeira, and Serrasquero (2007). On the one hand, credit constraints imposed on the firms will not allow them to maintain appropriate R&D investments. On the other hand, those with no financial frictions may conduct "sub-optimal" investments that hinder the productivity rates (Jin, Zhao and Kumbhakar, 2019, p. 1140). Contributing to this finding, academics suggest that for China price distortion serves as one of the factors standing for non-linear connection. Finally, the authors summarised that specifically for the Chinese manufacturing sector for the investigated period, the productivity losses from the severe financial market conditions were outweighed by productivity gains from reducing the 'sub-optimal' investments.

While studying the same country, Li, Liao, and Zhao (2017) found a gap in the literature studying the effect of both internal and external constraints on productivity improvements. The main findings of the paper, while using different financial frictions measures, confirmed the significant increase in productivity level and growth rates if the firms possess both types of funds. Moreover, they showed the same difference in the productivity of state and private firms, arguing that it is the ownership factor that determines the access to bank credit rather than performance rates. Based on 600,000+ Chinese companies during 1998 – 2009, it was argued that, given the frictions in obtaining the external funds, which bring greater potential, the cash flows generated by the firm are crucial in determining future productivity. The additional results explored the substitution effect between internal and external financing and stated that firms possessing sufficient credit would obtain higher marginal productivity gains than from sufficient cash holdings. It is worth mentioning that the achievements of the entire economy could be partially attributed to the ability of the Chinese firms to generate profits and utilise the internal resources to remain productive and maintain gradual growth improvements (Li, Liao, and Zhao, 2017).

The previous two papers focused on the effects of financial frictions on the firms' productivity in China. Chen and Matousek (2019) addressed the phenomena from the perspective of the firms' ability to get external financing based on the firms' specifications (age, ownership, productivity, exporting status). In contrast to the previous two works, this paper, while possessing a significantly smaller dataset (panel of 1591 listed manufacturing firms), covers a later period of 2003 – 2016. Since the authors' dataset consists of listed firms, all the results were significant for companies' ability to raise equity financing rather than bank credit. The conclusions that could be drawn from Chen and Matousek's (2019) model depict the following: (1) the productivity level of the firms is an essential factor in determining the ability of the firm to access external financing (more evidence in favour of new equity, less for credit); (2) while external creditors will rather be focused on the ability of the firms to repay the debt and not on the efficiency of the firms, equity investors, on the contrary, are looking for long-term investment, since more productive firms can generate higher yields in the future; (3) old, large and exporting firms have better chances to raise external funds based on their productivity rates. In fact, it was claimed that the higher is the firms' productivity, the better are the chances to get external financing (Chen and Matousek, 2019).

Concluding the review of the finance-productivity literature in China, Feng, Lu, and Wang (2017) analysed the productivity and liquidity management under the costly financing for the firms.

The result of the paper, which is counter to economic intuition, suggests that there is an equilibrium for more productive firms, meaning that it could be more beneficial to maintain higher levels of liquidity inside the company rather than invest in the capital when being under or expecting for the financial pressure. Thus, Feng, Lu, and Wand (2017) proved that financial market reforms could lead to more efficient resource allocation, eventually, higher aggregate productivity gains.

Similar interest from the academic community could be traced from another part of the world, where Cao and Leung (2020) addressed the same topic. This time Canadian SMEs were in the focus of finance-productivity nexus research. The dataset consists of the Survey on Financing and Growth of Small and Medium Enterprises of 2011 and companies' financial information spanning from 2008 to 2013. The work presents a likelihood measure of being financially constrained depending on the firm's aspects, similar to Chen and Matousek (2019). While arguing that if small firms have limited access to external financing, they will not be able to develop, consequently leading to weakened aggregate productivity level, the strong negative relationship between financial constraints and slow productivity growth was not proven. The authors did not provide an extensive explanation on this fact; the potential argument could be that Canada is an advanced economy with a well-developed financial system that allows SMEs not to face as severe financing conditions as in emerging and developing countries. Therefore, the absence of solid evidence on the hindering effect of credit constraints on productivity should not be such a surprising outcome.

Analysis of the emerging economies India and sub-Sahara yields similar links between financial frictions and productivity. Girma and Vencappa (2014) presented that access to bank loans as a source of finance makes the most substantial impact on firm-level productivity growth among small Indian manufacturing companies. Contribution to the existing literature could be found even in African countries, where firms with limited access to external finance are 15% less productive compared to frictionless companies (Amos and Zanhouo, 2019).

2.3. Finance-productivity link in Europe

The recent financial crisis's impact on the real-world economy has refuelled interest in researching the spill-overs originating from the financial sector. As was described previously, one of the legacies of the GFC – financial frictions – may potentially bring distortions to firms' operations and restrain the productivity rates through drops in investments into productivity-enhancing projects, assets, capital, etc. For example, tighter credit conditions, while imposing the

increased liquidity risks, may lead the company to avoid long-term investments that improve productivity and instead engage management to pursue short-term investments (Aghion, Angeletos, Banerjee, and Manova, 2010).

Building upon that, Ferrando and Ruggieri (2018) aimed to bring new empirical insights and evidence on the productivity-finance relation in the euro area. Firstly, instead of using different proxies for financial frictions, they construct a synthetic indicator of financial frictions implying different scenarios. Based on the dataset consisting of 8 developed and developing European countries during the period 1995 – 2011, the authors found that a 1% decrease from the average indicator of financial frictions yields on average 0.185% increase in productivity. Additionally, private, small, and young firms are affected more by limited credit opportunities comparing to large and old corporations. Finally, Ferrando and Ruggieri (2018) estimated that the peripheral countries (Italy, Portugal, Spain) might see the most prominent benefits from frictionless access to finance, with productivity gains ranging from 19% to 22%, compared to the average companies in the Netherlands and Finland with 14% increase in TFP. Askenazy, Bellmann, Bryson, & Galbis (2016) reviewed the productivity slowdown in European countries and noticed that mainly for the Spanish companies the access to credit plays a vital role in determining current and future productivity growth rates since it allows to invest in technological and physical capital (p. 242).

The same question incentivised Levine and Warusawitharana (2019) to build their own predictive model and assess the effect of financial frictions on the firms' productivity growth and innovation activity. They devote more of their attention to a relatively slow recovery of the economy after the financial downturn. The main feature of the paper is different proxies for financial frictions that give insights into the different levels of financial constraints faced by the firms. During the period 2000 – 2011 for France, Italy, and Spain, there has been noticed that the link between financing usage and productivity growth becomes stronger when the financial pressure increase. Eventually, the study argues that financial frictions hinder the firms' investment activities, implying lower future productivity growth rates (Levine and Warusawitharana, 2019).

Inspired by the initially proposed model, Gomis and Khatiwada (2017) decided to do a similar research for a much larger sample of the countries (more than 100) and a wider period (1986 – 2014). The outcome that the firms' leverage has a positive effect on productivity rates was accompanied by the unobservable threshold after which leverage becomes excessive and negatively affects productivity. According to Gomis and Khatiwada (2017), the availability of

frictionless access to credit allows low-productivity firms to maintain excessive leverage, which depresses the aggregate performance of the economy. As for the empirical evidence, the authors concluded a 0.5% increase in TFP and labour productivity (value-added per worker), with a 10% increase in leverage.

However, there is a region in the world that is more interesting for researching the effect of financial frictions on productivity growth – Central and Eastern Europe. The legacies of the GFC are holding back the CEE region's catching-up process with developed economies in the EU (Levenko et al., 2019). As the authors have outlined, there is very little attention paid to the CEE region from the research community, and even those few studies mainly focused on the catching-up phase before GFC. The aggregate dataset for 11 CEE countries for the period 1996 – 2016 demonstrates that during the credit boom period and rapid economic growth (2002 – 2007), the growth in TFP stood for almost one third of the GDP growth. Yet, after the crisis, the absence of the TFP growth was the key factor restraining recovery of the hindered economic growth and the converging process of the CEE region (Levenko et al., 2019, p. 19 – 20).

Addressing the problem of slow firms' productivity growth, Moder and Bonifai (2017) performed an in-depth analysis of financing limitations effects in the Western Balkan countries based on the survey in 2012 – 2014. The research yields the probability of being financially constrained with respect to the size, location, and leverage of the firms. In conclusion, the limited access to finance was one of the key restraining factors for companies (Moder and Bonifai, 2017, p. 32).

On the other side, Cuaresma, Oberhofer, and Vincelette (2014) have used a unique sample of 153 firms from Belarus in the machine-building sector and found that non-SOE organisations are more productive. Notably, the authors claim that SOE firms tend to have higher SBCs (more accessible finance), which lead to unproductive investments, eventually affecting industry productivity rates. Coricelli et al. (2012) define SBCs as financial support from the government or financial institutions to firms with negative NPV projects (p. 1677).

Other authors tried to assess the financial frictions' impact on TFP growth in the context of Bulgaria. Gatti and Love (2008), using the IFC/World Bank survey in March – April 2004 on 548 Bulgarian companies, claimed a positive relationship between credit and productivity growth. According to the model specification, if a firm moves away from credit-less status, the consequent productivity increase ranges from 30 to 43% of a standard deviation in TFP (Gatti and Love, 2008,

p. 457). Thus, the results support previous works' theory that financial constraints lower productivity.

Moving towards another CEE region country, Badia and Slootmaekers (2009), by augmenting the approach implemented by Gatti and Love (2008), explored the effect of tighter credit conditions on productivity rates in Estonia. The results obtained by exploiting a unique firm-level dataset for the period between 1997 and 2005 lead to the following conclusions: (1) young and indebted firms are highly dependent on internal finance in their operations; (2) a significant part of the companies in Estonia experienced limited access to credit financing; (3) more importantly, they found that the presence of financial frictions markedly impacts the productivity rates of the high R&D and business services sectors, while having less impact on other industries. Finally, Badia and Slootmaekers (2009) argued that not necessarily firms with fewer limitations for financing will express higher productivity growth than those facing constraints, which even more contributes to the theory of the non-linear relationship between finance and productivity growth.

The non-monotonic link between leverage and productivity was also discovered in Coricelli et al.'s (2012) research on the CEE region. In the early 2000s, there was a rapid credit growth in CEE countries, particularly in the Baltic States, Southern Eastern Europe, and Ukraine. Bearing in mind the risks of the credit boom that the GFC has highlighted, the CEE region was affected the most in terms of tightening credit conditions for private and corporate clients (Everaert et al., 2015; Antoshin et al., 2017). Coricelli et al. (2012) defend their focus region by stating that transition economies (such as CEE countries) started their converging period from similar starting points, however, the different financial systems development and consequent series of reforms seemed to fail, and now holding back the region to catch-up with the previously seen growth rates. This argument is backed by the dominant share of zero-debt companies together with the firms with potentially excessive leverage in the dataset. The study proved the existence of the optimal leverage threshold for the firms in each country that maximises the productivity gains. In line with the previous papers, Coricelli et al. (2012) confirm the positive relation between leverage and productivity until a certain point and the negative connection of financial frictions with TFP growth. Another example of a non-linear relationship could also be found in Nunes, Sequeira, and Serrasqueiro (2007) for Portuguese firms. The authors found both positive and negative effects of leverage on productivity (depending on the productivity level). The negative link between debt

and productivity is backed by agency argument – where most banks available to lend money for tangible collateral, meaning a negative link between the level of debt and R&D activities. As most of the productivity-enhancing projects require R&D, there could be a negative link between leverage and productivity.

Financial frictions having a positive effect is also not unusual in the literature. For example, Nickell and Nicolitsas (1999) and Sena (2006) have found a positive impact of financial constraints on productivity and technical efficiency, respectively. Using a panel of UK and Italian firms, respectively, both papers argue that managers would have an incentive to work harder to increase a firm's performance, given a rise in financial pressure. Eventually, this implies an increase in productivity of the firm over the long run via efficient resource allocation and management.

Building upon that, Aghion, Bergeaud, Cette, Lecat, and Maghin (2019) argued for the vague impact (inverted-U) of financial constraints on productivity growth. On the one hand, the limited access to the credit adversely affects the productivity growth in the long run, via tightening opportunities for firms to invest in productivity-enhancing projects; on the other side of the spectrum, tighter credit conditions (e.g., larger financial frictions) make less productive firms (so-called zombie firms) to exit the market, thereby allowing new, potentially more efficient firms to enter. Evidence for the possible presence of a non-linear relationship will allow us to see which country would probably benefit from tightening the access to credit and for which the easing of the credit conditions might bring additional benefits in terms of productivity gains.

Based on the observed studies, the focus of my analysis is to assess financial frictions' effect on productivity growth in the CEE region by examining the following link:

Hypothesis: *Financial frictions negatively affect the productivity growth rates of the firms*.

2.4. Research gaps and contribution

As it was pointed out by Levenko et al. (2019), the CEE region is weakly researched, primarily referring to the link between finance and firms' productivity in the post-GFC era. Firstly, prior works covered precisely the converging period of the CEE countries from the late 1990s until the early 2000s (Badia and Slootmaekers, 2009; Coricelli et al., 2012; Gatti and Love, 2008).

Secondly, there are few papers (e.g., Cuaresma et al., 2014; Moder and Bonifai, 2017) that pursue the same goal by focusing on the later period until 2014, however, the datasets used are either unique or based on a survey that focused on specific countries, i.e., Belarus and Bulgaria. To the best of my knowledge, the only paper that tried to shed light on the finance-productivity

link for several countries of the CEE region is Coricelli et al. (2012). However, the period of consideration was 1999 – 2008, and the authors were mainly emphasizing the non-linear relationship of the leverage and productivity growth rather than assessing the impact of financial frictions on productivity. Therefore, there is currently a gap in the literature that explores the effect of financial frictions on productivity growth in the CEE region following the GFC.

Thirdly, due to the data availability issue, most previous studies were researching the CEE countries implemented methodologies that were the most applicable in those cases, yet not being the advanced ones.

Finally, by using the recently developed flexible methodology described in *Section 4.1*. and considered as the most sophisticated up-to-date approach to estimating productivity (*Section 4.2.*), this study will assess the impact of the tightened credit market conditions on productivity (*TFP* and *labour productivity*) by using the firm-level data in different sectors of the CEE countries. Additionally, my paper will bring preliminary empirical evidence for policymakers that prioritise "sustainable firm-level credit growth and developing appropriate policy tool" the most (Coricelli et al., 2012, p. 1677), as well as for entrepreneurs to maintain the profit-maximising strategies for the firms.

3. Data description

3.1. Dataset overview

The data I use for the study is obtained from the Orbis database provided by Bureau van Dijk (n.d.). The Orbis database consists of items from annual reports, and the coverage depends on the requirements and is country specific. The sample period that I am examining is between 2011 and 2019, which differs across countries. Bureau van Dijk covers only ten preceding years of annual reports of the companies. As of now, the only data that are publicly available is 2011 – 2020, but a large part of the firms has not yet reported the year 2020 data. The countries in the CEE region which I study are the following: Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Poland, Romania, Serbia, Slovakia, Slovenia, and Ukraine. Due to the data availability issue, I dropped Belarus, Bosnia and Herzegovina, Lithuania, Republic of Moldova, and Russian Federation companies with a miserable or absent number of firms reporting the data needed for analysis.

In order to construct the TFP, which is described in *Section 4.2*, I obtain *turnover*, *tangible fixed assets*, *labour*, and *materials costs* or *cost of goods sold*. Even though Orbis provides an item named *"Added value"*, I will manually calculate the value added per firm as *Value Added = Taxation + Net Income + Labour costs + Depreciation & Amortization + Interest paid*. However, since Orbis coverage is different among countries, for some of the companies *Value added* measure would be slightly overestimated (or underestimated in the case of Latvia) due to the absence of some variables included in the calculation. For the sake of one of the robustness checks, as another productivity measure, I use labour productivity, which is derived as *Labour productivity = Value added / Number of employees*.

The needed items for financial frictions will be described in *Section 4.3*. Same as Levine and Warusawitharana's (2019) method (reviewed in *Section 4.4*), I Winsorize (replace extreme values with less extreme) variables at the 97.5/2.5 percent levels to mitigate the impact coming from outliers. For each country, the sample was constructed as follows:

1. First, I rule out the companies with inputting mistakes (e.g., negative assets, sales, etc.). Second, filter companies with *Turnover*, *Value added*, *Labour*, *Materials* (or *COGS*), and *Tangible fixed assets* that are larger than zero to create the logarithmic form for the productivity estimations. Third, keep only companies that have at least three consecutive years of observations in order to mitigate the selection bias as well as to be able to construct the financial friction proxies. Fourth, delete companies operating in the Finance and insurance industry *(K)*. Finally, I rule out the companies having neither long- nor short-term debt outstanding.

2. As for another adjustment rules: First, I Winsorize the total sample at 97.5/2.5 percent levels. Second, after splitting the total sample into 8 subsamples divided by NACE main industry indicator: Accommodation and food *(I)*, Agriculture and mining *(A&B)*, Construction and real estate *(F&L)*, Information and professional, scientific activities *(J&M)*, Manufacturing *(C)*, Transport and storage *(H)*, Wholesale and retail trade *(G)*, Other services *(S)* (includes all other industries), I Winsorize them at 97.5/2.5 percent at each industry level.

3. My paper investigates real values rather than nominal ones. For all countries, except Ukraine, *Fixed assets* and *Tangible fixed assets* were deflated by *Gross fixed capital formation chain volumes*; *Value added* and *Turnover* were deflated by broad industries specific *Value added deflators*; other monetary variables (all monetary items in Ukraine) were adjusted by *GDP deflator*.

Finally, to have comparable results, monetary values of the countries are converted into current Int$ by using Implied PPP conversion rate.

By losing one year of observation to construct the variables such as sales growth, after all manipulations we are left out with 381,057 firms and 1,569,166 number of firms-year observations in total along 2012 – 2019. A brief summary of the dataset is presented in *Appendix A*.

4. Methodology

4.1. Arguments for the chosen methodology

Table 1 below summarises papers that proposed different methodologies yet studying the same topic.

By looking at the advantages of the two first studies exploring the relationship between financing and productivity, we can observe that both of them are using a rich and detailed dataset on firms in China. Li, Liao, and Zhao (2017) embedded data from banks on cities or province levels together with the firm-level dataset that allowed them to obtain the measures of financial frictions precisely. On the contrary, Jin, Zhao, and Kumbhakar (2019) used only detailed firm-level data that allowed them to construct the index of constraints under the methodologies of well-perceived authors. Furthermore, they obtained an exogenous productivity-finance link via the R&D channel that controls an investment decision. While Ferrando and Ruggieri (2018) are the ones of the few authors who were exploring the same relationship in Europe by using firm-level data, they focused on advanced EU countries. This factor allowed them to build financial friction indicator based on the SAFE-ECB survey, and put it into the TFP estimation, eventually arguing for the direct impact from the constraints. And the last methodology developed by Levine and Warusawitharana (2019) is using the rich dataset for only 3 EU countries. Orbis by Bureau van Dijk serves as the only source for firm-level data. Moreover, the financial frictions are built entirely from firms' balance sheets and income statements values (despite the country level measure based on the bond spread). Finally, the authors argue that their model does not suffer from endogeneity and multicollinearity, it reduces omitted variable bias, and the results are robust to implementing different measures of financing, hence financial constraints. This is extremely important in my case since I augment the model by recently developed financial frictions estimation methods. The chosen methodology of Levine and Warusawitharana (2019) will be described in the following *Section 4.4*.

To assess the productivity financial frictions relationship in the CEE countries empirically, I employ a quantitative research method – panel regression and cross-sectional design. Longitudinal design is the most appropriate because I am focused on the same sample of firms in the same countries at several points in time. Taking into consideration the data-availability issue, the cross-sectional design will also be employed. This approach will allow me to establish linkages between the firm-specific performance measures, companies' financing policies, and changes in productivity growth.

4.2. Measuring total factor productivity (TFP)

In this section I observe the main assumptions of the original method of TFP estimation proposed by Olley and Pakes (1996) (hereinafter OP). Then I briefly explain the methods of Levinsohn and Petrin (2003), Wooldridge (2009), and Ackerberg, Caves and Frazer (2015), (hereinafter, LP, WRDG, and ACF, respectively), that augmented the authentic method developed by OP.

Let me start with introducing a company that produces a homogenous output by using a simple Cobb-Douglas (CD) production function:

$$Y_{i,t} = A_{i,t} L_{i,t} K_{i,t}, \qquad (1)$$

where $Y_{i,t}$ stands for the gross output or value added, $A_{i,t}$ is a technology or the efficiency coefficient (or TFP), and two other arguments are the inputs to the production: $L_{i,t}$ is an amount of labour utilised, and $K_{i,t}$ implies physical capital company i possesses at time t. Assume that by taking log from of the CD production function we arrive at the following equation:

$$y_{i,t} = \beta_0 + \beta_l l_{i,t} + \beta_k k_{i,t} + \omega_{i,t} + \varepsilon_{i,t}, \qquad (2)$$

where $y_{i,t}$, $l_{i,t}$, $k_{i,t}$ denote log output, log labour, and log capital, respectively. The firm specific productivity term in defined as $a_{i,t} \equiv \ln(A_{i,t}) = \beta_0 + u_{i,t}$, and $u_{i,t} = \omega_{i,t} + \varepsilon_{i,t}$, which in practice is obtained as the residual term from production function estimation. By this, we have two unobservable items: the firm's productivity in the logarithm form ($\omega_{i,t}$) and the residual ($\varepsilon_{i,t}$), that is assumed to be i.i.d.

Author (publication year)	Li, Liao, and Zhao (2017)	Jin, Zhao, and Kumbhakar (2019)	Ferrando & Ruggieri (2018)	Levine and Warusawitharana (2019)
Country(s)	China	China	Belgium, Germany, Spain, Finland, France, Italy, the Netherlands, Portugal	France, Italy, Spain
Objective	"Investigate the effects of credit constraints on firm productivity" (p. 6)	"Explore the role of financial constraints in determining firm productivity" (p. 1153) through R&D channel	"Study the relation between firms' financial structure, access to finance, and TFP" (p .1)	"Explore the effect of financial frictions on firm productivity growth" (p. 16)
TFP method(s)	1. OLS 2. Augmented OP	1. OP 2. LP 3. ACF	1. OP 2. LP	Wooldridge
Financial frictions	**Internal** finance access – internal cash flow. **External** finance – credit supply and demand proxied at geographical and industry level	**Index** of financial constraints based on Love (2003), Whited (1992), Whited & Wu (2006)	**Synthetic indicator** of financial constraints based on firms' characteristics	1. "firm-specific variation in financial frictions" (p. 2) 2. industry-level measure 3. macro-level measure
Method(s)	1. Fixed effects panel regressions 2. GMM dynamic panel estimator **Arellano & Bond (1991)** and **Blundell & Bond (1998)**	GMM	Augmented **Wooldridge** and **LP** methods	GMM dynamic panel estimator by **Holtz-Eakin et al. (1988)** and **Arellano & Bond (1991)**
Results/Findings	*1.* Both **internal** and **external** finance **improve** firm **productivity** level and growth. *2.* "**Substitution effect** between internal and external finance (with weaker marginal effect on productivity from internal finance)" (p. 13). *3.* "**Internal** finance access in **more important** for firms in **financially vulnerable industries**" (p. 13). *4.* **non-SOEs** have **stronger** marginal **effect** from financing on productivity than SOEs.	*1.* **State** firms are **less constrained** than **non-state firms**. *2.* The **least** and **most constrained** firms **invest much less** in R&D than the **moderately constrained**. *3.* For the **mildly constrained** firms, **productivity increases** with financial constraints due to **reduced** "sub-optimal" investments but **decreases** when financial pressure **exceeds** the threshold. *4.* **Access** to external finance was **not efficiently spread** in China.	*1.* "Estimate for the **elasticity** of TFP with financial constraints of -18%" (p. 1). *2.* "This effect **significantly amplifies small, young, and private**. companies, effect persist over time" (p. 1). *3.* "**Peripheral countries** may **gain** 19% – 22% of their average TFP from free access to finance" (p. 1).	*1.* "As **pressure** from financial frictions **increases**, the **link** between financing and productivity growth becomes **stronger**" (p. 16). *2.* "**Financial frictions lower** firms' **investments** in innovative projects, eventually **hindering** future **productivity growth**" (p. 16). This leads to potential reason for **low economic activity** following the financial crisis
Merits	*1.* Rich and detailed dataset, accompanied with data from banks, allowing for rigorous analysis. *2.* Focused on both demand and supply sides for external finance.	*1.* Rich and detailed dataset. *2.* Robust results regarding TFP measurement approaches. *3.* Explored the link through the R&D channel.	*1.* Rich and detailed dataset from Orbis, accompanied with SAFE-ECB dataset. *2.* Direct measure of financial frictions based on firms' characteristics. *3.* Embedding index of financial constraints in TFP estimation results in exploring the link directly.	*1.* Rich and detailed dataset from Orbis only. *2.* Financial frictions measures cover several levels of constraints. *3.* Model is robust for using different financial constraints measure (equity and debt). *4.* Up to date method of TFP estimation.
Disadvantages	*1.* Simple methods of TFP estimation.	*1.* Complicated measurement of index of financial frictions.	*1.* Sample may not represent the whole population. *2.* Survey data of financial constraints	

Table 1. Summary of the major papers discussed in the literature review together with merits and disadvantages of each paper outlined based on the author's opinion. Created by the author.

From the logical point of view the labour variable is more adjustable than the capital (e.g., fire/hire an employee takes less time than buy/sell an equipment). If a firm has a perception of an increased productivity, it most likely will adjust the demand for labour. Therefore, if the firm observes higher productivity, it will lead to higher demand for labour, thus introducing an upward bias in β_l coefficient. In turn, the TFP estimation will be downward-biased. According to Marschak and Andrews (1944) the OLS estimates of Equation *(2)* are biased and inconsistent, due to the correlation between labour and productivity.

For the sake of solving the problems mentioned above the approach of OP was developed. The proposition is a dynamic model in which each firm must make a decision based on the information available: to continue operating or to leave the market. Former decision implies that the firm has to decide on the number of investments which depends on both capital and productivity. To estimate the model OP made four main assumptions: (1) production function shock consists of $a_{i,t} = \omega_{i,t} + \varepsilon_{i,t}$, where the unobserved productivity assumed to evolve exogenously following the first-order Markov process ($\omega_{i,t} = E\left(\omega_{i,t}\middle|i_{i,t-1}\right) + \xi_{i,t} = E\left(\omega_{i,t}\middle|\omega_{i,t-1}\right) + \xi_{i,t}$); (2) depending on timing, firms choose $l_{i,t}$ inputs or free variables (e.g., labour, materials) at the same period as they are planned to be utilised; (3) $k_{i,t}$ inputs or state variables (e.g., quasi-fixed real capital) are determined before the planned date of utilisation; (4) investment ($i_{i,t}$), or proxy variable, depends strictly monotonically on capital and productivity shock, $i_{i,t} = f_t\left(\omega_{i,t}, k_{i,t}\right)$. By inverting the function f and substituting it into Equation *(2)* we are able to get:

$$\omega_{i,t} = f_t^{-1}(k_{i,t}, i_{i,t}), \qquad (3)$$

$$y_{i,t} = \beta_0 + \beta_l l_{i,t} + \beta_k k_{i,t} + f_t^{-1}\left(k_{i,t}, i_{i,t}\right) + \varepsilon_{i,t}, \qquad (4)$$

$$y_{i,t} = \beta_0 + \beta_l l_{i,t} + \Phi_t\left(k_{i,t}, i_{i,t}\right) + \varepsilon_{i,t}, \qquad (5)$$

The OP method consists of two stages: first aims at removing one unobservable factor $\varepsilon_{i,t}$ by OLS estimation, and second stands for obtaining the estimators by the Generalized Method of Moments (GMM).

In the first stage, the Equation *(5)*, by using OLS, allows to get consistent estimates of β_l and $\Phi_t\left(\mathrm{k_{i,t}}, \mathrm{i_{i,t}}\right)$, that is approximated by low degree polynomial. We obtain $\hat{\beta}_l$ and $\hat{\Phi}_{i,t} =$

$\beta_k k_{i,t} + f_t^{-1}(k_{i,t}, i_{i,t})$. But given the $\hat{\beta}_l$ we still do not know β_k and especially $\omega_{i,t}$ – they will be estimated in the second stage.

Based on the exogenous first-order Markov process assumption and $\widehat{\Phi}_{i,t}$, OP suggested that we can decompose productivity into conditional expectations at time $t-1$ and a deviation from that expectation results in:

$$\omega_{i,t} = E(\omega_{i,t}|\omega_{i,t-1}) + \xi_{i,t} = g(\omega_{i,t-1}) + \xi_{i,t} = g(\widehat{\Phi}_{i,t-1} - \beta_k k_{i,t}) + \xi_{i,t}, \quad (6)$$

As a result, we end up with estimation of the following equation:

$$\widehat{\Phi}_{i,t} = \beta_k k_{i,t} + g(\widehat{\Phi}_{i,t-1} - \beta_k k_{i,t-1}) + \xi_{i,t}, \quad (7)$$

Since we do not know what the functional form of $g(\cdot)$ is, OP decided to approximate it also by low degree polynomial. From that, the GMM technique and bootstrapping for the standard errors allow us to estimate β_k by minimising $E(\xi_{i,t}) = 0$, where we use $k_{i,t}$ as an instrument. Given β_k, we can get the unobserved productivity shock $\omega_{i,t}$ or the Total Factor Productivity.

Now, after the control function method for TFP estimation was established, we can observe another control function that uses better data. This particular concern was highlighted by LP in the attempt to increase efficiency of the OP method. The main authors' argument says that there are a lot of firms that either do not make investments or do not report the number of investments. Thus, it is possible to have a big share of observations with zero investments values in firm-level datasets (e.g., from emerging and developing economies). Eventually, LP proposed to use intermediate inputs as a proxy variable in order to control for the unobserved by econometrician productivity shock ($\omega_{i,t}$). Following the same approach as in OP, LP suggested to use lagged variable of variable inputs ($l_{i,t-1}$) in addition to $k_{i,t}$ instrument proposed by OP in the last step of discussed estimation.

On the contrary, ACF argued that the labour coefficient may not be properly identified in OP/LP methods. They assumed that labour could be state variable rather than floating (e.g., high hiring/firing costs, long-term working contracts). Hence, the previously established functions could be extended to:

$$\omega_{i,t} = f_t^{-1}\left(k_{i,t}, d_{i,t}, l_{i,t}\right), \quad (8)$$

and

$$\Phi_t\left(k_{i,t}, d_{i,t}, l_{i,t}\right), \quad (9)$$

where $d_{i,t}$ stands for proxy variable – either OP's investments or LP's intermediate inputs. By embedding labour into the functions, we prevent the β_l to be estimated in the first stage. However, the ACF approach demonstrates that the second stage estimation of $k_{i,t}$ and $\omega_{i,t}$ parameters, could be accompanied by β_l coefficient. We can briefly see the changes following the embedding labour into the functions. By plugging *(8)* into *(2)*, we get:

$$y_{i,t} = \beta_0 + \beta_l l_{i,t} + \beta_k k_{i,t} + f_t^{-1}\left(k_{i,t}, d_{i,t}, l_{i,t}\right) + \varepsilon_{i,t}, \quad (10)$$

Besides, we do not obtain any coefficients in the first stage, we still need first stage to get the $\widehat{\Phi}_{i,t-1}$ estimation. Hence, the authors use the first stage as follows:

$$y_{i,t} = \Phi_t\left(l_{i,t}, k_{i,t}, d_{i,t}\right) + \varepsilon_{i,t}, \quad (11)$$

The second stage, the estimate of expected output $\widehat{\Phi}_{i,t}$ yields all the parameters from the following equation:

$$y_{i,t} = \beta_0 + \beta_l l_{i,t} + \beta_k k_{i,t} + g\left(\widehat{\Phi}_{t-1} - \beta_l l_{i,t} - \beta_k k_{i,t}\right) + \xi_{i,t}, \quad (12)$$

Eventually, by using the same approach as in LP, we obtain TFP estimation.

Finally, WRDG's approach further simplifies the estimation of the unobserved productivity – he proposed to use the GMM to estimate the TFP in one stage. The main issue explained by the author is (1) "ignoring the contemporaneous correlation in the errors across two equations", and (2) "do not efficiently account for serial correlation or heteroskedasticity in the errors" (Wooldridge, 2009, p. 113). Hence, by using the lags of the inputs as instruments, we are able to obtain all the parameters.

It has to be mentioned that since the firm-level report requirements on Orbis are country specific, not each country in the chosen region declare all the needed variables for the mentioned

TFP construction methods. This leads to the significant drop in a number of observations for some countries (e.g., Latvia). Due to the miserable sample, the TFP measuring might not represent the real situation. Thus, to increase number of firms observed in Latvia, I will additionally implement the recent method developed by De Loecker, Eeckhout, and Unger (2020). Authors argued that due to the fact they cannot identify the labour and/or material costs needed for TFP construction, the main idea is to use the bundle of variable costs that could be combined in cost of goods sold (COGS) variable.

As of now, methods proposed by Ackerberg, Caves, and Frazer (2015) and Wooldridge (2009) are the most sophisticated approaches in obtaining the TFP measures out of firm-level datasets. Building upon that, I will use ACF method in the main specification model for TFP estimation, while WRDG method and Labour productivity measure for the robustness tests.

4.3. Financial frictions proxies construction

Schauer, Elsas, and Breitkopf (2019) argued that the financial constraints are not directly observable either on the firm level or the macro-level. Through time, academia has proposed several measures to proxy for financial frictions of the firms, yet the main issue of those is stability as well as applicability to different sets of the firms. Most of the indexes proposed were developed by using the US listed firms. This raises a question about the accuracy of these measures when using different countries, time periods and types of firms. Another reason for reliable proxy estimation is a vital role firms' investments play in country's economic activity. Understanding the impact of financial constraints on firms and countries is crucial (Schauer, Elsas, and Breitkopf, 2019).

This section reviews all the financial frictions proxies that will be used in the paper. A major part of them is taken from the methodology proposed by Levine and Warusawitharana (2019), which is described in the next section. The main reason for such a choice, in comparison with other papers described above, is that they could be obtained by using only the financials of the companies distributed from the Orbis database. As the data availability issue is the main concern of the chosen CEE countries, an ability to create several proxies of financial constraints by using only financial data played a vital role in the decision made. As Levine and Warusawitharana (2019) proposed, I will use three proxies at the firm-level financial frictions: "*book leverage*, *cash holdings*, and *interest expense ratio*. These are measured as *book debt divide by total assets*, *cash divided by total assets*, and the *interest expense divided by lagged book debt"*

(p. 9). Levine and Warusawitharana (2019) argued that these measures provide significant cross-sectional and firm-level variation for identification. Notwithstanding this variation, to mitigate the concern of endogenous choices of the firm, they proposed to take these measures relative to the industry median "which controls for heterogeneity in firms across industries" (Levine and Warusawitharana, 2019, p. 9). As to the industry measure of external finance dependency, I use a ratio of median fixed assets to median sales with respective US industries.

Augmenting Levine and Warusawitharana's (2019) proxies with a recent method for private firms proposed by Schauer, Elsas, and Breitkopf (2019), my main base empirical model includes "an index of financial constraints for private firms (FCP)" (p. 280). This measure includes lagged values of the *natural logarithm of total assets*, *EBIT over interest expense*, *net income over total assets*, *cash holdings over total assets.*

$$FCP_{i,t} = -0.123 \times Size_{i,t-1} - 0.024 \times Interest\ coverage_{i,t-1} - 4.404 \times ROA_{i,t-1} - 1.716 \times Cash\ holdings_{i,t-1}$$

The main arguments to include new measure was specified by the authors, which are: (1) index enables to identify truly constrained firms; (2) index was built based on private firms; (3) "index relies on variables less subject to potential problems of endogeneity" (p. 271); (4) the measure identifies firms as financially constrained considering "both internal and external financial constraints" (p. 271). To separate firms into the more or less financially constrained groups, the top and bottom tercile of FCP index distribution would be used, (e.g., firms in the bottom (top) tercile would be less (more) financially constrained) (Schauer, Elsas, and Breitkopf, 2019, p. 281). Dummy variable, based on this cut-off, would be created, equalling to 1 if FCP index of the firm is in the bottom tercile (less financially constraint), and 0 otherwise.

4.4. Main model specifications

As it was mentioned, this paper aims to quantify the impact from financial frictions on TFP growth among industries in different CEE countries. Taking the difference in obtained unobserved productivity term results in the growth rate of productivity in the logarithm form: $\Delta TFP_{i,t+1} \equiv TFP_{i,t+1} - TFP_{i,t}$. This is a dependent variable used in the base model in the following analysis, accompanied by the *Labour productivity growth*, measured by $\Delta LP_{i,t+1} \equiv LP_{i,t+1} - LP_{i,t}$

To test the proposed theory my empirical tests are performed by implementing the model proposed by Levine and Warusawitharana (2019):

$$\Delta TFP_{i,t+1} = \beta_0 + \beta_1 \Delta TFP_{i,t} + \beta_2 \Delta TFP_{i,t-1} + \beta_3 \Delta Debt_{i,t} + \beta_4 Financial\ friction_{i,t} + \beta_5 Financial\ friction_{i,t} \times \Delta Debt_{i,t} + \beta_6 X_{i,t} + a_i + b_t + \varepsilon_{i,t}, \quad (13)$$

Same as in authors' model: $\Delta\text{TFP}_{i,t+1}$ stands for the productivity growth from year t to $t+1$; $\Delta\text{Debt}_{i,t}$ denotes the log difference in the debt financing of the firms from $t-1$ to t; $\text{Financial friction}_{i,t}$ is a measure of financial friction; $X_{i,t}$ combines control variables such as: firm age, size (measured as the log assets of the firm), sales growth (change in sales from year $t-1$), physical investment during year t. Estimations are performed with heteroskedastic robust standard errors (Levine and Warusawitharana, 2019, p. 7). The main coefficient of interest is β_4, and the theory states that this coefficient is negative, implying the hindering effect of financial frictions on productivity growth rates.

According to Holtz-Eakin, Newey, and Rosen (1988), biased estimates from traditional panel regressions are obtained due to the lagged dependent variables. Hence, for the sake of ending up with unbiased and consistent estimates of coefficients, I will use the system Generalized Method of Moments (GMM) estimation proposed by Arellano and Bond (1991) and Blundell and Bond (1998), which is also used in Levine and Warusawitharana (2019), for assessing the effect of financial frictions on productivity growth. Dynamic panel GMM regression plays vital role in tackling endogeneity and simultaneity among the regressors in the model (Li, Liao, and Zhao, 2018). In short, both estimators use additional moments and treat the regressors as endogenous. They use lagged first differences as instruments in addition to lagged levels as instruments that lead to increased efficiency of the estimators (Arellano and Bond, 1991).

4.5. Nonlinear Financial frictions – Productivity growth relationship

As was previously outlined in the *Section 2.3.*, financial frictions might have two opposite effects on productivity growth rates – positive and negative. Particularly Aghion et al. (2019) pointed out that financial frictions could increase productivity growth by substituting less productive firms with potentially more productive new entrants. Other authors, Jin, Zhao, and Kumbhakar (2019), shed light on the non-linear link by studying Chinese manufacturing firms. The fundamental idea is rather simple – include high order (e.g., second order) polynomial of

financial constraint measure. By this they were able to capture the non-linear or inverted-U relationship.

In the same manner, to give a piece of additional evidence, I will add a squared term of several financial frictions into the main Levine and Warusawitharana's (2019) model *(13)*, to potentially control for non-linearity between firms' financial frictions and productivity growth:

$$\Delta TFP_{i,t+1} = \beta_0 + \beta_1 \Delta TFP_{i,t} + \beta_2 \Delta TFP_{i,t-1} + \beta_3 \Delta Debt_{i,t} + \beta_4 Financial\ friction_{i,t} + \beta_5 Financial\ friction_{i,t}^2 + \beta_6 Financial\ friction_{i,t} \times \Delta Debt_{i,t} + \beta_7 X_{i,t} + a_i + b_t + \varepsilon_{i,t}, \quad (14)$$

By adding the squared term into the model, we will be able to observe the potentially emerging non-monotonic impact of the financial frictions on productivity growth.

4.6. Research limitations

There are several limitations to the study that could affect the results of the paper. First, the source of the data used – Orbis. Even though the coverage is extensive, it could contain imprecise data, especially in the CEE region. As such, for Latvia, the *COGS* variable is used instead of *Labour* and *Materials* in the TFP estimation process, and for Romania, the companies' outstanding debt is calculated as the sum of *Non-current* and *Current liabilities* instead of interest-bearing debt (long- and short-term). Second, 12 countries included in the Central and Eastern European region differ between themselves in terms of companies' size, characteristics, etc. Therefore, different countries obviously could have rather deviating results, and while for some countries one model specification (e.g., number of lags included) works fine, for others same model might suffer from second order autocorrelation (too many instruments). Third, due to technical limitation of the R-package used, I was not able to obtain unanticipated TFP component (e.g., standard errors), hence it was not possible to test the model for reverse causality concern. Forth, Levine and Warusawitharana (2019) measured capital as the replacement value of capital, while I use *Tangible fixed assets*, hence the effects could be over- or underestimated. Fifth, financial frictions used in the paper are constructed from companies' financials solely. Even in Levine and Warusawitharana's (2019) research, there was a surprising result with one financial friction. And given the abovementioned facts about data quality and coverage, it would be rational to assume that the proposed proxies might not be as efficient and might not capture the frictions that the

companies actually face. Finally, all model specifications did not pass Sargan-Hansen J-Test for overidentification. Therefore, one could find evidence to reject the model specification (regardless of model specification, the test remained unchanged).

The outlined limitations could be mitigated in further research. Some suggestions for the next research are the following: 1. To use another data source, particularly, statistical bureaus of the countries; 2. As the results showed, such a study should examine either one country or a smaller region, as the model should be adjusted for the different specificities; 3. To get deeper insights on non-linear effect of financial frictions on productivity growth, another model specification should be tested.

5. Results and Discussion

The paper explores the effect of financial frictions on productivity growth rates within different industries as well as total economies of the CEE region countries. The results discussion will be accompanied with author's arguments and thoughts. Due to the limit in time and space, the results of the model with *adjusted book leverage* friction specification are reported at the industry and country level, while other proxies only at the country level. The same reason requires to report the robustness checks with *Labour productivity* measure only, however, the results for *Wooldridge's (2009) TFP* estimation will be outlined in the text. The structure of this section is as following: First, I will briefly summarise the TFP estimations. Second, summary statistics of the countries will be presented. Third, the results and discussion for different model specifications will be outlined. Lastly, I will swiftly touch upon the non-linear link in financial frictions – productivity relation.

5.1. TFP Estimations

To begin with, I summarise the obtained TFP coefficients for each industry separately, as well as for the total economies and the region. I compare my results expressed with those presented in Ferrando and Ruggieri (2018) for other European economies. *Appendix B* and *Appendix C* present TFP coefficients obtained by Ackerberg, Caves, and Frazer's (2015) method, as well as *Labour productivity* calculated as Value added per employees, respectively, both expressed in logs. Ferrando and Ruggieri's (2018) results suggest that peripheral countries, Spain, Portugal, and Italy, which are lagging behind more developed countries in the EU, possess TFP estimates of 3.66, 3.12, and 3.64, respectively. From the Appendices, we can see that Czech Republic, Estonia, Latvia, and

Slovak Republic are among the most productive countries in the region (5.08, 5.07, 4.77, 5.64, respectively). However, as other countries are lagging behind, the whole region is not as productive (3.79). Thus, the total results are comparable to those peripheral countries. This concludes the fact that the CEE region is less developed compared to other countries by having lower coefficients compared to rather developed European countries (e.g., Germany, Belgium, the Netherlands, etc.), which is in line with the previous statements.

5.2. Summary statistics

Appendix D reveals summary statistics for variables that are used in the main model to estimate the effect of financial frictions on productivity growth rates. In most of the countries, the productivity growth is consistent between 3 measures – Ackerberg, Caves, and Frazer's (2015) *(ACF)* TFP, Wooldridge's (2009) *(WRDG)* TFP, and Labour productivity *(LP)*. As for the ACF TFP, the weighted average growth is positive for all countries, except Bulgaria, Poland, Romania, and Slovak Republic, as well as the entire CEE region has a 1% decrease in growth rate. Two others productivity growth measures suggest positive TFP growth for the region ~0.9%, with negative trends observed in Poland, Romania, Slovak Republic, and Slovenia, as suggested by the estimations. For Latvia specifically, rather high growth in ACF TFP estimation could be explained by the different variables (e.g., COGS) that were used in TFP estimation.

It can be seen that the results might vary depending on the productivity growth proxy chosen. The debt growth or the log difference of debt financing from period t to t + 1 standardised by implied PPP conversion rate to the current international dollar, has similar characteristics for most of the presented countries suggesting negative debt growth, with the exception of Romania and Serbia, which showed positive rates on average (*NB:* for Romania, the debt outstanding was defined as a sum of *Non-current* and *Current liabilities*, due to the data availability issue). Same as in Levine and Warusawitharana (2019), summary statistics of the data depict deviations within some variables across the countries, however, since the estimation approach implies the within-firm variation analysis, these differences across countries values unlikely to disturb the results.

5.3. Financial frictions and productivity growth

5.3.1. Debt and productivity growth

Prior to delving into the impact of financial frictions on productivity growth, firstly, I examine the relationship between productivity growth rate and financing (debt) at the firm level.

This is done in order to assess the basic impact of debt growth on productivity growth rates. To estimate the link, I use the main model *(13)*, yet modifying it by excluding the financial frictions and its interaction term with debt growth (see *Appendix E(a)* and *E(b)*, where the base model specification is under *(a)*, and *(b)* reports Labour productivity robustness check). For all countries, as well as the region, the results show a negative statistically significant effect of debt financing on productivity growth rates. The results are robust for two other measures of firm's productivity. Following the logic of Levine and Warusawitharana (2019), it implies that one standard deviation increase in debt growth is associated with 0.019 to 0.059 standard deviations decrease in TFP over the next period, with the lowest effect in Bulgaria and Serbia, while the biggest drop is in Romania and Latvia (but this could be because of different debt definition and TFP method, respectively). The negative relationship between debt and TFP at the firm is not in line with the literature. One of the potential explanations could be found in Coricelli et al.'s (2012) paper. In line with their research, a major part of my sample also consisted of firms with zero debt outstanding before ruling them out. Yet those firms which possess the debt might be overleveraged. Hence, by facing a higher cost of debt, due to the default risk associated with excessive leverage, the growth in debt for such firms will hinder productivity rates, eventually affecting the results. Another argument is proposed by Legesse and Guo (2020), who show the negative link between long-term debt financing and firm efficiency, which was backed by pecking order theory. They argue that more efficient firms tend to generate higher cashflow, substituting long-term debt with internal funds.

Same as in Levine and Warusawitharana (2019), my results argue for the persistence of TFP. The coefficient before $\Delta TFP_{i,t}$ implies that a realised 10% increase in TFP in the current period, will be associated with a subsequent decline in TFP between 3.5% to 8.0% over the next period. Firms with higher sales would have higher productivity growth because most of the firms in the chosen countries are small, hence by growing their sales, they become more efficient in their operations (e.g., economies of scale), thus more productive. Larger firms tend to have lower productivity growth since, as they grow, agency costs start hindering the efficiency of the companies. Tangible investments for this *Labour productivity* measure have a positive effect (see *Appendix E (b)*). And the negative effect on TFP measures from investments is counterintuitive, but it mainly comes due to the TFP construction (*Tangible fixed asset* as state variable and change in those as investments), hence, mechanically, the effect might be negative. The results are robust for *WRDG TFP* measure (except Latvia, where due to data limitations, *WRDG TFP* is inconsistent).

5.3.2. Book leverage

As the first measure of financial friction at the firm level, the book leverage of the firm is taken relative to its industry median to mitigate the endogeneity in firms' choices. By choosing this measure, we argue that the companies with higher leverage would be associated with a higher risk of default, thus would face higher financial frictions in terms of the cost of additional borrowings. *Appendix F (a)* and *(b)* present both main and robustness results for industries and whole countries obtained from the estimation of the model *(13)* using the firm's lagged book leverage over its industry median. Based on the results, it can be stated that while growth in debt varies over industries, on average it has a positive impact on future productivity growth for the whole economy and the region. The main coefficient of interest before the financial friction has a minus sign , which is in line with the aforementioned literature, which showed that financial friction proxy has a negative effect on productivity growth rates (Ferrando and Ruggieri, 2018; Li, Liao, and Zhao, 2017, etc.). The firms with a higher book leverage will face higher risk of default, therefore higher cost of additional borrowings. In fact, given a 10% additional increase in company's book debt, the future TFP growth would drop by 0.2% in the entire region as well as in most of the countries separately. This could be explained by the existence of companies in different industries that already have high level of leverage, and each additional unit of debt would hinder firm productivity rates, as well as the growth of the entire industry (partially in line with Aghion et al. (2019)). From *Appendix F(a)*, we can observe the industries in which the book leverage financial friction has the most significant effect (except Romania, where the results could be exaggerated). As such, in Estonian Accommodation and food industry, the friction would decrease productivity growth by 0.3%, and in Construction and Real estate TFP would drop by 0.4%. For Czech and Hungarian Agriculture and mining, the drop is 0.3% and 0.4%, respectively. The drop of 0.5% in TFP growth due to high leverage in the Manufacturing industry would be in Slovak Republic. The results are robust and comparable for *WRDG TFP*, while for *Labour productivity*, the effect from financial friction is ambiguous. *Appendix F (b)* presents that financial friction, such as excessive leverage, could have a positive impact in Agriculture and mining, Manufacturing, Transport and storage, and Wholesale and retail trade industries in most of the countries. On the one hand, the results are deviating from those obtained for ACF TFP measure, however, on the other hand the industries with positive effects are capital intensive, which require a lot of *long-term* investments (e.g., factories, trucks, buildings, etc.). Therefore, large amounts of

debt could have a positive effect on such industries. Additionally, the evidence for such an argument could be found in Levine and Warusawitharana (2019). The authors tried to explain the positive effect as the fact that "past borrowing is also informative about future growth" (p. 11), meaning that the firms that had a large proportion of leverage before the period captured could now start or continue receiving benefits from projects financed with debt before. The control variables' behaviour, and explanation are similar to those described in *Section 5.3.1.*

Based on the facts, the *Hypothesis* cannot be rejected, meaning that the adjusted book leverage, at least for some industries and countries, indeed has a negative effect on firms' future productivity growth.

5.3.3. Cash holdings

The second measure of the financial friction is the industry adjusted lagged cash holdings of the firm. The underlying reason for choosing this proxy is that a firm possessing a higher cash balance could perhaps require less credit (external financing) for its productivity-innovative investments, or if there is a need for external credit, it would face a lower cost of borrowings due to lower risk of default. Therefore, one could expect the coefficient before adjusted cash holdings to be positive. Indeed, as we can see from *Appendix G (a)* and *(b)*, the positive coefficients before proxy are significant, while those with the negative sign are not. Only one country – Ukraine – reveals a negative and significant coefficient. One way to explain such an effect is that firms start saving more cash expecting other downturns and unpleasant environment, thus building up liquidity assets (cash) and not investing into the TFP enhancing projects. Nevertheless, the positive coefficients argue for firms having more cash would expect higher productivity growth, economically given a 10% increase in cash, firms in the CEE region could expect between 0.02% - 0.6% increase in future productivity growth (minimal in Czech Republic and Poland, maximum in Serbia). Moreover, in accordance with Levine and Warusawitharana (2019), I got a negative and significant coefficient on interaction term, saying that financial constraints decrease as cash balance rises. By using the authors' proposed differential effect (75^{th} (those with high financial constraints) – 25^{th} (those with low level) percentile of financial frictions × interaction coefficient) or marginal effect on productivity growth, we would get an economic interpretation of the coefficient. In economic sense – given one standard deviation growth in debt, the productivity growth for firms with high vs. low financial friction is between 0.02 and 0.36 percentage points, with the largest effect in Ukraine and the lowest in Latvia. The results suggest that those firms in

the CEE region with higher financial frictions (or in this case, with lower cash holdings) will be by 0.15 pp less productive than companies with high cash holdings. The results are robust for the *WRDG TFP* measure, but as for *Labour productivity*, the results suggest that debt growth starts hindering future productivity growth. This is in line with Legesse and Guo (2020) findings that productive firms tend to generate cash (e.g., higher cash holdings), thus for those debt becomes more as a burden due to interest payments. While investments and sales controls move in the same directions as in *Section 5.3.*1, the size of the companies has both positive and negative effects on productivity. Specifically, Bulgaria, Croatia, Czech Republic, Romania, Serbia, and Ukraine have small but positive and significant coefficients (see *Appendix G (a)* and *G (b)*). This could depend on the friction itself since smaller firms tend to have less cash.

Overall, we can see that the results vary over the chosen productivity measure; however, I can conclude positive and significant effect on future productivity growth coming from cash balance of the company. Therefore, since the firms with less cash (higher financial frictions) would face lower productivity growth rates – the *Hypothesis* cannot be rejected.

5.3.4. Interest expense ratio

Another model specification uses interest expense ratio, adjusted to the industry median to control for heterogeneity of companies' choices, as a third firm-level financial friction (Levine and Warusawitharana, 2019). The reason for choosing this proxy is backed by the fact that the interest expense ratio indicates the cost of the debt as well as the number of current firm's borrowings. As such, firms with larger interest expenses would face higher costs of debt (due to the default risk), and therefore, would not be able to get a large number of additional borrowings. *Appendix H (a)* and *(b)* show the results of the model with lagged adjusted interest expense ratio as a financial friction proxy. The base *ACF TFP* model indeed suggests the direct negative effect coming from the proxy on productivity growth (except Hungary, Latvia, and Ukraine with zero effect, while for Poland and Serbia small significant positive impact). The results show that those companies with higher interest expense ratio would face higher cost of debt, eventually having lower future productivity growth. Namely, by increasing interest expense by 10%, firms could expect from 0.03% (Croatia and Poland) to 1% (Czech Republic) decrease in future TFP growth. Based on this, we cannot reject the *Hypothesis*, arguing for the negative impact from financial frictions. Adding to this, we can again observe the debt growth negatively affecting future growth of productivity. The

reason for that has been already extensively outlined in the previous sections. The results are robust for both *WRDG TFP* and *Labour productivity*.

5.3.5. External finance dependency

Moving from financial frictions at the firm level, Levine and Warusawitharana (2019) proposed to use an industry proxy as well. In the same manner, as the authors proposed, I use external finance dependency of the firm's industry, measured as median ratio of fixed asset to sales over respective US industry. The underlying idea proposed by the authors say that firms that operate in the industries that are relying more on the external financing would face higher financial friction than those in less externally dependent industries (Levine and Warusawitharana, 2019). Put it differently, there are a large number of players operating in the industries that heavily rely on external financing, hence creditors would be selective. Same as in the authors' model specification, only interaction term is estimated (see *Appendix I (a)* and *I (b)*). By using the same differentiation effect of Levine and Warusawitharana (2019) explained in *Section 5.3.3*. I find that productivity growth for firms with high and low levels of financial friction is from 0.03 (Poland) to 0.25 (Croatia and Czech Republic) percentage points. Hence, firms in the CEE region with lower financial friction on average will be more productive by 0.06 percentage points. The results are robust for the *WRDG TFP* measure, while for *Labour productivity* specification, the interaction term has lost significance.

5.3.6. FCP index

Augmenting Levine and Warusawitharana's (2019) model by another financial friction measure, we might be able to see whether another financial friction proxy would be able to capture the impact of financial frictions on firm's future productivity growth. The index of financial constraints for private firms (FCP) was proposed by Schauer, Elsas, and Breitkopf (2019). Following the proposed construction method reviewed in *Section 4.3.*, the $FinCon_{i,t}$variable is created, and it takes value of 1 if the firm is located in the bottom tercile of the FCP index, and 0 otherwise. By this we are able to divide firms: bottom (top) tercile would be less (more) financially constrained ones. *Appendix J (a)* and *(b)* bring up the result for the model with the according specification. Interestingly enough, the coefficient before the index is positive for both TFP estimates – *ACF* and *WRDG*. It implies that those firms that are more financially constrained are more productive than those with lower constraints. The reason for such an outcome was already

outlined by Nickell and Nicolitsas (1999) and Sena (2006), advising for more efficient management when financial pressure increases. However, referring to the same specification but with *Labour productivity*, we see that the coefficient is negative and significant (except Serbia with positive and significant coefficient; see *Appendix J (b)*). Hence, for this financial friction proxy, I can only conclude the positive impact coming from the FCP index on TFP, while for the *Labour productivity* measure, the effect is negative. However, the overall effect is ambiguous based on the robustness test results.

5.4. Non-linear relationship

By looking at the results discussed in the previous sections, we are able to see the non-monotonic effect of financial constraint proxies on productivity growth rate. Therefore, it seems reasonable to check the relationship on the non-linear link. To do this, I add the squared term of the respective financial friction proxy used in the model, namely *industry-adjusted book leverage* and *cash holdings*. *Appendices K* and *L* present the results for each model specification, respectively. The result reveal that the non-linear link starts appearing at least at the country level for several countries.

As for the first tested proxy – adjusted book leverage – we can see that for Estonia, Hungary, Poland, Serbia, Slovak Republic, and Slovenia, the squared term has a positive and significant coefficient, while the coefficient before the proxy term is negative. Therefore, one could argue that there is a threshold after which the book leverage of the firm becomes excessive, and it leads to deceleration of the firms' TFP growth. The same evidence was provided by Coricelli et al. (2012), where authors argued for the optimal leverage ratio existing for the firms in the CEE region.

The adjusted cash holdings measure shows the negative and significant, yet rather small coefficients before the squared proxy for Croatia, Czech Republic, Serbia, Slovak Republic, and Slovenia. This might argue for the fact that firms, due to the external financial pressure, start building up liquidity reserves rather than undertaking productivity-increasing projects.

6. Conclusions

The CEE region, until the present time, remains poorly researched in terms of the finance-productivity link at the firm level. The goal of this paper was to investigate the effect of different firm and industry level financial frictions on firms' future productivity growth rates. To investigate the magnitude of the impact, I used Levine and Warusawitharana (2019) methodology, implying

several dynamic panel regressions for several countries in the CEE region. By doing this, I was able to answer the research question: **the effect of financial frictions on productivity growth rates for the firms in the Central and Eastern European region is *negative***. This statement does not imply that the financial frictions are the main driver of countries' TFP deceleration, but it rather argues for the hindering effect for the firms that are unable to access external credit financing.

I hope this study would assist policymakers in those countries to revise and implement more efficient conditions for the firms' crediting, as well as for companies in different industries to see the potential burden for their productivity growth.

In addition to answering the research question, I also shed light on the non-linear relationship between financial constraints and productivity growth at the country level. The results suggest that at least at the country level for two proxies of financial constraints there is a small effect standing for the non-linear impact of the chosen firm-level financial constraints on productivity growth rates. Nonetheless, those preliminary results should be investigated further.

This paper is one of the first to study the impact of financial friction on productivity growth in the CEE region during the post-crisis period. Therefore, this could be a good starting point for further studies in this region on the related topics. To improve the results, one could think about gathering the more precise firm-level data, either on a survey basis or requesting statistical bureaus of the countries. Finally, decreasing the number of countries in the sample would allow to dig deeper into each country-specific case and to bring up more valuable insights.

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8. Appendices

Appendix A. Dataset description

Country	Abbreviation	#Firms	#Observations	#Employees	Distribution
Bulgaria	BG	52,607	219,869	32	14.0%
Croatia	CR	36,314	161,408	27	10.3%
Czech Republic	CZ	34,819	123,411	61	7.9%
Estonia	EE	18,792	70,749	10	4.5%
Hungary	HU	7,899	35,432	143	2.3%
Latvia	LV	21,728	81,982	23	5.2%
Poland	PL	22,470	50,275	98	3.2%
Romania*	RO	63,394	310,964	66	19.8%
Serbia	SB	43,964	182,546	30	11.6%
Slovak Republic	SK	32,656	118,047	28	7.5%
Slovenia	SL	36,744	179,774	14	11.5%
Ukraine	UA	9,670	34,709	397	2.2%
Total	**Region**	**381,057**	**1,569,166**	**49**	**100%**

Notes: This table reports the description of the data sample. *Abbreviation:* substitutes for the names of the countries used. *#Firms:* number of firms. *#Observations:* number of firms-year observations. *#Employees:* average number of employees in the company. Distribution refers to the share of the firms in the dataset. *: for Romania, the dataset was filtered for firms having not less than 10 employees due to time and variable construction constraints. *Source:* Orbis by Bureau van Dijk. *Created by the author.*

Appendix B. TFP measure

	BG	CR	CZ	EE	HU	LV*	PL	RO	SB	SK	SL	UA	Region
Accommodation and food	2.23 [1.97] (0.60)	4.84 [3.97] (0.78)	1.59 [1.48] (0.55)	4.36 [3.66] (0.70)	3.08 [2.12] (0.93)	3.77 [3.09] (0.71)	2.54 [2.24] (0.59)	5.30 [4.29] (0.90)	4.96 [4.06] (0.84)	5.30 [4.45] (0.83)	4.24 [3.63] (0.64)	5.39 [4.38] (0.79)	4.45 [4.31] (1.57)
Agriculture and mining	3.25 [2.98] (0.77)	5.32 [4.02] (1.07)	3.71 [3.31] (0.64)	2.13 [1.86] (0.77)	2.21 [1.91] (0.77)	4.46 [3.56] (0.84)	3.21 [2.71] (0.90)	2.47 [2.17] (0.85)	3.45 [2.75] (1.25)	2.95 [2.47] (0.98)	1.54 [1.31] (0.67)	3.56 [2.93] (0.73)	3.25 [3.01] (1.14)
Construction and real estate	3.18 [2.46] (0.92)	1.40 [1.05] (0.74)	2.52 [2.10] (0.85)	4.91 [3.84] (0.90)	2.83 [2.09] (1.02)	4.36 [3.41] (0.87)	1.81 [1.47] (0.97)	2.46 [1.95] (0.89)	2.95 [2.38] (0.92)	2.70 [2.18] (0.98)	1.88 [1.52] (0.64)	7.11 [5.49] (1.27)	2.82 [2.04] (1.10)
Information and R&D	2.55 [2.03] (0.80)	1.48 [1.12] (0.72)	2.09 [1.61] (0.83)	5.22 [3.82] (0.99)	2.36 [1.64] (0.90)	5.47 [3.99] (1.09)	7.57 [5.92] (1.24)	2.67 [2.19] (0.87)	5.57 [4.03] (1.05)	6.20 [4.44] (1.14)	5.48 [3.98] (0.99)	3.66 [2.29] (0.91)	3.76 [2.93] (2.19)
Manufacturing	2.42 [1.99] (0.80)	2.20 [1.78] (0.67)	5.85 [4.66] (0.96)	5.42 [4.16] (1.01)	2.27 [1.85] (0.75)	5.33 [4.34] (1.01)	2.35 [2.01] (0.76)	6.91 [5.26] (1.27)	2.17 [1.82] (0.82)	5.97 [4.76] (1.03)	5.18 [3.80] (0.92)	1.46 [0.92] (0.90)	3.66 [4.02] (1.95)
Other services	2.53 [1.79] (0.84)	5.39 [3.75] (1.08)	2.21 [1.54] (0.80)	4.96 [3.68] (0.94)	2.80 [1.65] (1.03)	4.93 [3.63] (0.95)	7.48 [6.03] (1.12)	2.13 [1.54] (0.89)	3.07 [2.10] (0.84)	6.77 [4.49] (1.16)	1.33 [0.90] (0.71)	5.46 [3.23] (1.03)	4.23 [2.83] (1.95)
Transport and storage	3.59 [3.12] (0.77)	4.49 [3.50] (0.89)	2.53 [2.26] (0.73)	4.70 [3.55] (0.88)	2.96 [2.27] (0.80)	5.56 [4.42] (1.05)	4.14 [3.68] (0.83)	2.65 [2.25] (0.81)	2.25 [1.82] (0.82)	3.94 [3.27] (0.82)	1.92 [1.64] (0.66)	2.75 [1.80] (0.91)	2.91 [2.31] (1.10)
Wholesale and retail trade	3.47 [2.90] (0.95)	6.01 [4.58] (1.16)	6.47 [4.99] (1.22)	5.62 [4.29] (1.07)	4.45 [3.38] (1.08)	4.38 [3.54] (0.78)	3.80 [3.28] (0.91)	2.85 [2.28] (0.94)	6.28 [4.83] (1.17)	6.43 [4.94] (1.17)	5.73 [4.23] (1.11)	4.39 [3.68] (1.11)	4.59 [4.03] (2.15)
Total	**3.05** **[2.42]** **(1.47)**	**3.99** **[2.57]** **(1.70)**	**5.08** **[3.07]** **(1.71)**	**5.07** **[3.83]** **(1.09)**	**3.11** **[2.18]** **(1.13)**	**4.77** **[3.71]** **(0.99)**	**3.60** **[3.08]** **(1.87)**	**3.38** **[2.33]** **(1.47)**	**4.11** **[3.24]** **(1.63)**	**5.64** **[4.30]** **(1.45)**	**4.42** **[3.35]** **(1.55)**	**3.30** **[2.79]** **(1.63)**	**3.79** **[3.14]** **(2.02)**

Notes: This table reports weighted average, [median], and (standard deviation) of firm-level productivity measure – TFP – for each industry and country in total, expressed in logs. TFP is estimated by using Ackerberg, Caves, and Frazer's (2015) control function approach for the method initially proposed by Levinsohn and Petrin (2003). *: Due to data availability, for Latvia COGS were used as variables inputs and for control function instead of labour and materials, respectively. *Source:* Author's estimation.

Appendix C. Labour productivity measure

	BG	CR	CZ	EE	HU	LV	PL	RO	SB	SK	SL	UA	Region
Accommodation and food	2.78 [2.47] (0.84)	3.38 [3.25] (0.86)	3.10 [2.91] (0.91)	3.01 [2.89] (0.67)	3.51 [3.27] (0.78)	0.65 [0.78] (1.58)	3.77 [3.57] (1.04)	2.89 [2.80] (0.73)	2.90 [2.66] (0.70)	3.16 [3.09] (1.01)	3.50 [3.50] (0.62)	2.91 [2.51] (0.82)	2.86 [3.25] (1.63)
Agriculture and mining	3.92 [3.71] (0.96)	3.70 [3.67] (0.84)	4.02 [3.97] (0.67)	4.43 [4.13] (1.00)	4.15 [4.04] (0.76)	2.92 [3.00] (1.49)	4.25 [4.11] (1.00)	3.70 [3.52] (0.85)	3.75 [3.39] (0.92)	3.96 [3.80] (0.80)	3.71 [3.89] (0.81)	3.66 [3.39] (0.97)	3.74 [4.02] (1.85)
Construction and real estate	3.38 [2.96] (1.07)	3.55 [3.25] (0.86)	3.80 [3.48] (0.98)	3.78 [3.39] (0.95)	4.50 [4.02] (1.30)	2.40 [2.23] (1.85)	3.84 [3.79] (1.12)	3.42 [3.17] (0.83)	3.68 [3.19] (0.96)	3.84 [3.54] (1.07)	3.83 [3.65] (0.65)	3.70 [2.88] (1.29)	3.53 [3.68] (1.90)
Information and R&D	3.62 [3.17] (0.94)	3.74 [3.51] (1.06)	4.06 [3.62] (0.91)	3.88 [3.55] (0.88)	4.37 [4.07] (1.03)	2.15 [1.83] (1.69)	4.17 [3.79] (0.98)	3.51 [3.50] (0.85)	3.82 [3.16] (0.89)	4.18 [3.80] (1.00)	4.12 [3.87] (0.73)	3.63 [3.02] (1.20)	3.66 [3.94] (1.88)
Manufacturing	3.07 [2.78] (0.79)	3.35 [3.33] (0.72)	3.62 [3.58] (0.66)	3.50 [3.38] (0.74)	3.90 [3.78] (0.99)	1.58 [1.37] (1.51)	3.84 [3.68] (0.80)	2.96 [2.93] (0.74)	3.29 [3.02] (0.75)	3.58 [3.55] (0.85)	3.65 [3.80] (0.63)	3.37 [2.89] (0.89)	3.15 [3.78] (1.91)
Other services	2.25 [2.90] (1.16)	3.62 [3.34] (0.85)	3.78 [3.58] (1.04)	3.73 [3.33] (0.95)	4.27 [3.71] (1.20)	1.74 [1.48] (1.82)	3.83 [3.78] (0.98)	3.00 [2.88] (0.88)	3.33 [3.00] (0.88)	3.87 [3.73] (0.99)	3.79 [3.74] (0.73)	3.01 [2.61] (1.25)	3.16 [3.61] (1.91)
Transport and storage	3.26 [3.05] (0.76)	3.50 [3.55] (0.76)	3.53 [3.49] (0.75)	3.64 [3.40] (0.75)	3.77 [4.03] (0.78)	2.04 [1.91] (1.42)	3.64 [3.52] (0.91)	3.19 [3.19] (0.84)	3.54 [3.33] (0.78)	3.62 [3.66] (0.87)	3.92 [3.91] (0.56)	3.23 [2.74] (1.11)	3.23 [3.50] (1.86)
Wholesale and retail trade	3.43 [2.88] (0.90)	3.70 [3.40] (0.81)	3.91 [3.62] (0.89)	3.89 [3.33] (0.91)	4.22 [3.86] (0.96)	2.27 [1.65] (1.79)	3.99 [3.72] (0.89)	3.37 [3.14] (0.79)	3.58 [3.09] (0.85)	3.92 [3.66] (0.97)	4.08 [3.76] (0.73)	3.77 [3.03] (1.21)	3.55 [3.77] (2.01)
Total	**3.29** **[2.96]** **(0.95)**	**3.56** **[3.39]** **(0.85)**	**3.76** **[3.59]** **(0.87)**	**3.76** **[3.39]** **(0.91)**	**3.98** **[3.86]** **(1.04)**	**2.13** **[1.88]** **(1.77)**	**3.90** **[3.73]** **(0.95)**	**3.24** **[3.08]** **(0.83)**	**3.35** **[3.09]** **(0.84)**	**3.79** **[3.65]** **(0.97)**	**3.87** **[3.78]** **(0.68)**	**3.40** **[2.96]** **(1.07)**	**3.36** **[3.73]** **(1.92)**

Notes: This table reports weighted average, [median], and (standard deviation) of firm-level productivity measure – Labour productivity – for each industry and country in total. Labour productivity is defined as the ratio between Value added and number of employees. *Source:* Author's estimation.

Appendix D. Descriptive statistics

	BG	CR	CZ	EE	HU	LV	PL	RO	SB	SK	SL	UA	Region
ΔTFP (ACF)	-0.016	0.037	0.002	0.010	0.003	0.033	-0.028	-0.048	0.013	-0.003	0.004	0.014	-0.010
	[-0.021]	[0.000]	[-0.011]	[-0.010]	[-0.006]	[0.012]	[-0.024]	[-0.018]	[-0.007]	[-0.011]	[-0.014]	[-0.005]	[-0.010]
	(0.367)	(0.295)	(0.248)	(0.311)	(0.268)	(0.269)	(0.253)	(0.315)	(0.353)	(0.322)	(0.271)	(0.332)	(0.278)
ΔTFP (WRDG)	0.006	0.034	0.008	0.023	0.019	N/A	0.003	-0.008	0.029	0.011	0.007	0.015	0.008
	[-0.008]	[0.000]	[-0.007]	[-0.004]	[0.000]		[-0.011]	[0.000]	[-0.001]	[-0.007]	[-0.012]	[-0.007]	[-0.002]
	(0.341)	(0.280)	(0.230)	(0.290)	(0.249)		(0.227)	(0.294)	(0.335)	(0.304)	(0.258)	(0.313)	(0.312)
ΔLP	0.019	0.019	0.031	0.014	0.015	0.002	-0.005	-0.005	0.002	-0.016	-0.006	0.034	0.010
	[0.005]	[0.009]	[0.015]	[0.005]	[0.014]	[-0.005]	[0.004]	[0.013]	[0.006]	[0.000]	[-0.007]	[0.005]	[0.004]
	(0.486)	(0.450)	(0.461)	(0.539)	(0.400)	(1.188)	(0.468)	(0.459)	(0.443)	(0.633)	(0.358)	(0.511)	(0.458)
Age	16.77	19.07	19.75	16.60	23.03	16.78	19.50	18.01	17.68	16.84	18.96	22.56	18.20
	[15.00]	[19.00]	[20.00]	[15.00]	[24.00]	[16.00]	[17.00]	[17.00]	[16.00]	[15.00]	[18.00]	[22.00]	[17.00]
	(8.70)	(10.22)	(7.37)	(7.98)	(10.27)	(7.45)	(15.34)	(8.04)	(8.58)	(7.40)	(8.83)	(12.23)	(9.00)
Assets, th. Int$	2490.69	2321.69	6644.80	1128.25	20447.40	1650.10	13839.31	3156.26	2771.50	2825.55	1516.47	33906.40	4236.80
	[854.20]	[658.47]	[1868.79]	[362.22]	[8971.53]	[473.52]	[4869.20]	[1608.37]	[658.18]	[793.39]	[456.85]	[10287.00]	[969.20]
	(3874.24)	(4101.18)	(11068.23)	(1890.07)	(34920.15)	(2735.92)	(21645.46)	(3493.91)	(5461.10)	(4699.33)	(2761.86)	(60965.35)	(13382.20)
Investment	0.156	0.235	0.141	0.139	0.062	0.358	0.104	0.281	0.188	0.200	0.198	0.006	0.144
	[-0.043]	[-0.061]	[-0.019]	[-0.076]	[-0.047]	[-0.019]	[-0.078]	[0.000]	[-0.070]	[-0.042]	[-0.057]	[-0.112]	[-0.042]
	(0.821)	(1.197)	(0.708)	(0.845)	(0.473)	(1.451)	(0.757)	(1.256)	(0.966)	(1.003)	(1.034)	(0.485)	(0.718)
Sales growth	0.090	0.106	0.054	0.069	0.062	0.150	0.093	0.114	0.100	0.086	0.076	0.024	0.079
	[0.000]	[0.019]	[0.005]	[0.001]	[0.015]	[0.022]	[0.031]	[0.002]	[0.010]	[0.016]	[0.010]	[-0.006]	[0.009]
	(0.434)	(0.400)	(0.283)	(0.360)	(0.304)	(0.484)	(0.304)	(0.421)	(0.452)	(0.364)	(0.338)	(0.363)	(0.326)
Book leverage	0.217	0.267	0.173	0.270	0.185	0.345	0.215	0.628	0.234	0.184	0.299	0.197	0.303
	[0.160]	[0.200]	[0.131]	[0.210]	[0.142]	[0.237]	[0.167]	[0.565]	[0.178]	[0.133]	[0.235]	[0.122]	[0.223]
	(0.191)	(0.249)	(0.149)	(0.223)	(0.169)	(0.430)	(0.190)	(0.514)	(0.221)	(0.169)	(0.264)	(0.224)	(0.268)
Cash	0.160	0.089	0.124	0.156	0.088	0.131	0.087	0.116	0.078	0.144	0.097	0.032	0.110
	[0.075]	[0.040]	[0.069]	[0.089]	[0.047]	[0.068]	[0.042]	[0.068]	[0.034]	[0.071]	[0.047]	[0.011]	[0.050]
	(0.200)	(0.120)	(0.147)	(0.178)	(0.107)	(0.163)	(0.114)	(0.147)	(0.108)	(0.177)	(0.125)	(0.050)	(0.136)
Interest expense	0.189	0.176	0.128	0.041	0.375	0.083	0.112	0.021	0.228	0.377	0.043	0.204	0.100
ratio	[0.106]	[0.067]	[0.062]	[0.020]	[0.041]	[0.036]	[0.054]	[0.012]	[0.053]	[0.077]	[0.008]	[0.112]	[0.040]
	(0.282)	(0.403)	(0.218)	(0.074)	(1.861)	(0.173)	(0.233)	(0.028)	(0.656)	(1.228)	(0.105)	(0.458)	(0.166)
Debt growth	-0.053	-0.026	-0.028	-0.044	-0.038	-0.059	-0.022	0.024	0.071	-0.001	-0.007	-0.104	-0.010
	[-0.075]	[-0.073]	[-0.057]	[-0.100]	[-0.055]	[-0.063]	[-0.052]	[0.000]	[-0.015]	[-0.023]	[-0.051]	[-0.143]	[-0.033]
	(0.699)	(0.811)	(0.744)	(0.774)	(0.858)	(0.795)	(0.713)	(0.427)	(0.940)	(0.884)	(0.833)	(0.894)	(0.688)
Ext. fin.	0.770	0.743	0.927	0.685	0.926	0.958	0.859	0.427	0.388	0.808	0.612	0.874	0.562
Dependency	[0.323]	[0.259]	[0.235]	[0.262]	[0.331]	[0.233]	[0.226]	[0.233]	[0.158]	[0.282]	[0.285]	[0.325]	[0.251]
	(1.390)	(1.595)	(2.721)	(1.259)	(2.119)	(2.136)	(1.836)	(0.672)	(0.730)	(1.574)	(1.036)	(3.041)	(0.844)

Notes: The table reports summary statistics for each country separately and for the entire region. It reports means, [medians], and (standard deviations). For ΔTFP (ACF), ΔTFP (WRDG), ΔLP – weighted averages are reported. Specifically, for Latvia Wooldridge's (2009) TFP methods yielded incomparable estimates, thus not reported. Sample period is from 2012 to 2019. Both ratios and estimates are Winsorized at the 97.5/2.5 percent levels, at industries and at the countries levels. *Source:* Author's estimations.

Appendix E. No financial friction specification

	BG	CR	CZ	EE	HU	LV	PL	RO	SB	SK	SL	UA	Region
ΔTFP ACF$_{i,t}$	-0.56***	-0.51***	-0.56***	-0.80***	-0.50***	-0.35***	-0.58***	-0.50***	-0.55***	-0.56***	-0.62***	-0.56***	-0.49***
	(-127.42)	(-94.62)	(-73.75)	(-54.29)	(-37.60)	(-45.74)	(-51.42)	(-126.22)	(-82.60)	(-82.65)	(-81.11)	(-46.65)	(-184.03)
ΔTFP ACF$_{i,t-1}$	-0.47***	-0.41***	-0.47***	-0.72***	-0.44***	-0.26***	-0.52***	-0.38***	-0.50***	-0.50***	-0.57***	-0.58***	-0.38***
	(-113.97)	(-80.36)	(-60.78)	(-54.54)	(-33.70)	(-35.57)	(-30.79)	(-113.84)	(-81.41)	(-75.09)	(-83.51)	(-51.72)	(-163.53)
Log assets$_{i,t}$	-0.02***	-0.006***	-0.006***	-0.01***	-0.004***	-0.002***	-0.01***	-0.01***	-0.002***	-0.02***	-0.01***	-0.004***	-0.01***
	(-92.55)	(-54.09)	(-60.61)	(-28.02)	(-29.42)	(-4.57)	(-58.97)	(-123.18)	(-3.74)	(-69.03)	(-76.35)	(-16.27)	(-42.70)
Sales growth$_{i,t}$	0.46***	0.44***	0.48***	0.43***	0.47***	0.40***	0.48***	0.38***	0.52***	0.58***	0.49***	0.55***	0.42***
	(147.81)	(124.67)	(99.11)	(50.65)	(50.01)	(135.59)	(73.13)	(127.55)	(125.77)	(140.26)	(108.43)	(70.34)	(217.72)
Investment$_{i,t}$	-0.07***	-0.03***	-0.06***	-0.04***	-0.15***	-0.05***	-0.08***	-0.06***	-0.05***	-0.06***	-0.03***	-0.11***	-0.06***
	(-59.86)	(-43.29)	(-34.98)	(-18.57)	(-25.24)	(-65.83)	(-35.89)	(-82.45)	(-52.46)	(-52.61)	(-38.36)	(-19.17)	(-117.44)
Debt growth$_{i,t}$	-0.01***	-0.01***	-0.01***	-0.01***	-0.01***	-0.02***	-0.01***	-0.04***	-0.007***	-0.009***	-0.008***	-0.01***	-0.02***
	(-10.45)	(-11.15)	(-8.18)	(-6.02)	(-4.45)	(-15.37)	(-7.62)	(-24.23)	(-9.24)	(-7.58)	(-10.38)	(-5.92)	(-35.45)
Obs.	280286	161408	123411	70749	35432	81982	50275	310964	182546	118047	179774	34709	1569166
Serial. corr. test, order 1 (p-val)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Serial. corr. test, order 2 (p-val)	0.998	0.058	0.004	0.593	0.148	<0.001	0.906	0.270	0.025	0.069	0.024	0.015	0.037

Notes: The table shows the results for model with no financial friction specification for each country separately as well as for the entire region. It reports coefficients, (t-stats) for a Blundell-Bond (1998) dynamic panel data estimation, by limiting the number of lags of the dependent variable used as instruments to two. The dependent variable is ΔTFP ACF$_{i,t+1}$. The last three lines report the number of observations used in estimation, and p-values of the first- and second order autocorrelation in the error term. Standard errors are heteroskedasticity robust. ***, **, *, and **.** denote statistical significance at 0-0.1%, 0.1-1%, 1-5%, and 5-10% levels, respectively. *Source:* Author estimation.

Appendix E (a). No financial friction specification robustness

	BG	CR	CZ	EE	HU	LV	PL	RO	SB	SK	SL	UA	Region
ΔLP$_{i,t}$	-0.81***	-0.84***	-0.97***	-0.91***	-0.83***	-0.95***	-0.99***	-0.73***	-0.85***	-0.91***	-0.81***	-0.78***	-0.84***
	(-187.33)	(-163.26)	(-144.19)	(-117.26)	(-67.21)	(-148.42)	(-92.60)	(-191.02)	(-97.94)	(-159.63)	(-180.08)	(-83.55)	(-222.24)
ΔLP$_{i,t-1}$	-0.61***	-0.63***	-0.76***	-0.68***	-0.63***	-0.74***	-0.76***	-0.49***	-0.67***	-0.78***	-0.61***	-0.66***	-0.62***
	(-145.22)	(-129.06)	(-104.34)	(-86.15)	(-53.05)	(-109.82)	(-44.56)	(-136.74)	(-79.17)	(-128.88)	(-147.53)	(-69.35)	(-166.16)
Log assets$_{i,t}$	0.00.	0.003***	0.007***	-0.001*	0.001***	-0.02***	-0.002***	0.003***	-0.01***	-0.004***	-0.008***	0.002***	-0.002**
	(1.66)	(11.36)	(29.91)	(-2.45)	(3.39)	(-17.65)	(-5.44)	(21.61)	(-8.17)	(-7.79)	(-34.55)	(6.37)	(0.92)
Sales growth$_{i,t}$	0.34***	0.33***	0.41***	0.43***	0.32***	0.55***	0.47***	0.36***	0.30***	0.36***	0.29***	0.43***	0.27***
	(77.37)	(65.05)	(44.56)	(45.58)	(23.09)	(37.00)	(34.16)	(88.24)	(44.06)	(41.93)	(64.66)	(36.15)	(66.64)
Investment$_{i,t}$	0.01***	0.002.	0.02***	0.03***	-0.005	0.06***	-0.003	0.01***	0.02***	0.02***	0.01***	0.06***	0.006***
	(6.73)	(1.77)	(4.49)	(6.65)	(-0.53)	(13.12)	(-0.54)	(10.88)	(8.36)	(7.11)	(9.96)	(7.72)	(4.42)
Debt growth$_{i,t}$	-0.01***	-0.02***	-0.01***	-0.03***	-0.02***	-0.09***	-0.03***	-0.14***	-0.009***	-0.03***	-0.02***	-0.02***	-0.03***
	(-5.96)	(-9.71)	(-3.65)	(-7.16)	(-5.53)	(-11.74)	(-7.38)	(-47.51)	(-515)	(-8.86)	(-12.36)	(-5.38)	(-25.16)
Obs.	208286	161408	123411	70749	35432	81982	50275	310964	182546	118047	179774	34709	1569166
Serial. corr. test, order 1 (p-val)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Serial. corr. test, order 2 (p-val)	0.771	0.887	0.828	0.339	0.950	0.023	<0.001	0.867	0.041	0.769	0.142	<0.001	0.110

Notes: The table shows the results for model with no financial friction specification for each country separately as well as for the entire region. It reports coefficients, (t-stats) for a Blundell-Bond (1998) dynamic panel data estimation, by limiting the number of lags of the dependent variable used as instruments to two. The dependent variable is ΔLP$_{i,t+1}$. The last three lines report the number of observations used in estimation, and p-values of the first- and second order autocorrelation in the error term. Standard errors are heteroskedasticity robust. ***, **, *, and **.** denote statistical significance at 0-0.1%, 0.1-1%, 1-5%, and 5-10% levels, respectively. *Source:* Author estimation.

Appendix F (a). Adjusted book leverage proxy and TFP growth

	BG	CR	CZ	EE	HU	LV	PL	RO*	SB	SK	SL	UA	Region
Accommodation and food													
ΔTFP ACF$_{i,t}$	-0.60***	-0.19***	-0.80***	-0.49***	-0.31***	-0.49***	-1.09***	-0.29***	-0.11***	-0.12***	-0.27***	-0.31***	-0.35***
	(-26.13)	(-7.10)	(-15.98)	(-12.07)	(-4.15)	(-6.20)	(-4.62)	(-15.11)	(-5.23)	(-4.28)	(-12.66)	(-4.29)	(-45.41)
ΔTFP ACF$_{i,t-1}$	-0.48***	-0.11***	-0.71***	-0.37***	-0.15*	-0.34***	-0.67***	-0.16***	-0.06**	-0.07**	-0.21***	-0.23***	-0.24***
	(-23.90)	(-6.22)	(-12.98)	(-9.77)	(-2.00)	(-4.28)	(-3.54)	(-12.13)	(-2.91)	(-2.71)	(-11.06)	(-3.84)	(-36.66)
Log assets$_{i,t}$	-0.003	-0.007***	-0.01***	-0.009***	-0.002**	0.001	-0.02***	-0.005***	-0.004***	-0.004***	0.01***	-0.002	-0.005***
	(-0.84)	(-15.69)	(-5.92)	(-5.13)	(-2.77)	(0.80)	(-3.77)	(-5.21)	(-12.32)	(-6.61)	(7.06)	(-0.72)	(-25.13)
Sales growth$_{i,t}$	0.38***	0.63***	0.24***	0.62***	0.60***	0.40***	-0.10	0.55***	0.71***	0.78***	0.62***	0.85***	0.58***
	(22.27)	(32.06)	(5.12)	(25.28)	(9.67)	(7.91)	(-0.62)	(53.09)	(45.42)	(47.83)	(48.21)	(10.11)	(120.13)
Investment$_{i,t}$	-0.04***	-0.04***	0.003	-0.06***	-0.27***	-0.03*	-0.06	-0.04***	-0.08***	-0.05***	-0.05***	-0.04	-0.05***
	(-5.01)	(-18.82)	(0.08)	(-5.39)	(-7.58)	(-2.37)	(-0.66)	(-8.31)	(-17.71)	(-11.42)	(-10.35)	(-0.55)	(-25.36)
Debt growth$_{i,t}$	**0.004**	**0.02****	**0.22*****	**0.14*****	**-0.08***	**0.09****	**0.24***	**0.34*****	**0.02**	**0.00**	**0.05*****	**0.09**	**0.10*****
	(0.31)	**(3.16)**	**(3.43)**	**(4.56)**	**(-2.35)**	**(2.75)**	**(2.49)**	**(7.33)**	**(1.55)**	**(0.00)**	**(4.14)**	**(1.41)**	**(15.08)**
Adj. book leverage$_{i,t-1}$	**0.008.**	**-0.001*****	**-0.02***	**-0.03****	**0.004**	**-0.03***	**0.05**	**-0.02****	**-0.005***	**-0.003.**	**-0.003**	**-0.03**	**-0.02*****
	(1.69)	**(-3.90)**	**(-2.18)**	**(-3.25)**	**(0.45)**	**(-2.39)**	**(1.59)**	**(-2.71)**	**(-2.49)**	**(-1.66)**	**(-0.97)**	**(-1.27)**	**(-12.46)**
Debt growth$_{i,t}$× Adj. book leverage$_{i,t-1}$	-0.03	-0.005***	-0.34***	-0.24***	0.09**.**	-0.17*	-0.32*	-0.44***	-0.04*	-0.009	-0.13***	-0.13	-0.16***
	(-1.61)	(-3.50)	(-3.39)	(-5.66)	(1.72)	(-2.42)	(-1.97)	(-7.81)	(-2.57)	(-1.25)	(-4.98)	(-1.67)	(-16.67)
Obs.	9928	11699	3685	3862	983	2052	1332	19759	5370	4383	12371	265	75689
Serial corr. test, order 1 (p-val)	<0.001	<0.001	0.003	<0.001	0.055	0.007	0.805	<0.001	<0.001	<0.001	<0.001	0.06	<0.001
Serial corr. test, order 2 (p-val)	0.649	0.044	0.662	0.527	0.161	0.979	0.846	0.637	0.304	0.803	0.606	0.990	0.496
Agriculture and mining													
ΔTFP ACF$_{i,t}$	-0.41***	-0.30***	-0.66***	-0.78***	-0.61***	-0.51***	-0.48***	-0.62***	-0.50***	-0.75***	-0.60***	-0.21***	-0.56***
	(-19.97)	(-7.55)	(-26.24)	(-28.20)	(-14.08)	(-23.45)	(-5.09)	(-38.66)	(-18.45)	(-12.07)	(-10.94)	(-15.44)	(-85.68)
ΔTFP ACF$_{i,t-1}$	-0.32***	-0.23***	-0.57***	-0.53***	-0.46***	-0.37***	-0.29**	-0.51***	-0.40***	-0.67***	-0.52***	-0.19***	-0.44***
	(-19.65)	(-7.37)	(-25.35)	(-21.00)	(-14.67)	(-20.52)	(-3.29)	(-42.75)	(-15.92)	(-14.83)	(-8.97)	(-16.63)	(-82.47)
Log assets$_{i,t}$	-0.001	-0.002**	-0.006***	0.002	-0.005***	-0.003***	0.00	-0.02***	-0.01***	-0.02**	0.01**.**	-0.005***	-0.009***
	(-0.35)	(-2.91)	(-15.03)	(0.69)	(-4.49)	(-3.57)	(0.15)	(-18.28)	(-12.59)	(-11.04)	(1.90)	(-14.66)	(-40.66)
Sales growth$_{i,t}$	0.52***	0.54***	0.31***	0.27***	0.34***	0.35***	0.52***	0.34***	0.61***	0.38***	0.41***	0.71***	0.45***
	(43.70)	(25.31)	(19.31)	(11.85)	(8.67)	(31.07)	(5.64)	(25.84)	(29.26)	(10.40)	(7.62)	(63.28)	(94.79)
Investment$_{i,t}$	-0.12***	-0.08***	-0.12***	0.05	-0.38***	-0.09***	-0.22*	-0.10***	-0.03*	0.01	-0.06.	-0.21***	-0.11***
	(-14.33)	(-8.31)	(-6.24)	(1.55)	(-7.63)	(-10.04)	(-2.23)	(-12.19)	(-2.31)	(0.49)	(-1.91)	(-21.10)	(-28.17)
Debt growth$_{i,t}$	**0.03.**	**0.01**	**0.11*****	**0.07.**	**0.32*****	**0.04****	**-0.07**	**0.10***	**0.006**	**0.009**	**-0.15****	**0.04*****	**0.04*****
	(1.85)	**(1.47)**	**(3.51)**	**(1.92)**	**(4.04)**	**(0.80)**	**(-0.51)**	**(2.22)**	**(0.33)**	**(0.46)**	**(-2.74)**	**(6.44)**	**(7.98)**
Adj. book leverage$_{i,t-1}$	**0.007**	**-0.002**	**-0.02*****	**0.03***	**-0.04****	**-0.00**	**-0.02**	**-0.02***	**-0.01**	**-0.03****	**0.03**	**-0.004.**	**-0.002**
	(1.55)	**(-0.74)**	**(-4.44)**	**(2.30)**	**(-2.87)**	**(-0.13)**	**(-1.18)**	**(-2.43)**	**(-1.29)**	**(-2.82)**	**(1.50)**	**(-1.70)**	**(-1.12)**

Debt growth$_{i,t}$× Adj. book leverage$_{i,t-1}$	-0.07** (-3.11)	-0.02. (-1.84)	-0.16*** (-3.45)	-0.22*** (-3.30)	-0.36*** (-3.53)	-0.09*** (-3.50)	0.04 (0.20)	-0.16* (-2.53)	-0.05* (-1.98)	-0.03 (-1.11)	0.24** (2.70)	-0.06*** (-7.82)	-0.08*** (-10.21)
Obs.	25797	6251	9858	5122	2894	11555	1713	17267	6257	7248	2022	11255	107509
Serial corr. test, order 1 (p-val)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.982	<0.001	<0.001	<0.001	0.010	<0.001	<0.001
Serial corr. test, order 2 (p-val)	0.613	0.101	0.218	0.002	0.090	<0.001	0.474	0.222	0.171	<0.001	0.977	0.385	<0.001
Construction and real estate													
ΔTFP ACF$_{i,t}$	-0.55*** (-40.63)	-0.61*** (-43.43)	-0.69*** (-34.92)	-0.79*** (-33.60)	-0.63*** (-13.38)	-0.62*** (-21.16)	-0.58*** (-7.52)	-0.65*** (-61.40)	-0.43*** (-22.46)	-0.50*** (-19.55)	-0.61*** (-34.74)	-0.24*** (-5.69)	-0.61*** (-124.90)
ΔTFP ACF$_{i,t-1}$	-0.43*** (-35.35)	-0.46*** (-39.06)	-0.54*** (-30.40)	-0.63*** (-31.32)	-0.51*** (-12.16)	-0.42*** (-16.15)	-0.51*** (-6.60)	-0.53*** (-54.98)	-0.32*** (-21.13)	-0.43*** (-20.35)	-0.48** (-32.50)	-0.22*** (-5.28)	-0.48*** (-115.48)
Log assets$_{i,t}$	-0.01*** (-15.33)	-0.01*** (-17.08)	-0.005*** (-8.73)	-0.01*** (-7.53)	-0.06*** (-5.77)	0.002* (2.03)	-0.01*** (-7.20)	-0.02*** (-23.44)	-0.02*** (-26.54)	-0.01*** (-10.76)	0.01*** (5.02)	-0.008*** (-5.68)	-0.01*** (-52.56)
Sales growth$_{i,t}$	0.42*** (50.11)	0.32*** (34.20)	0.40*** (28.28)	0.27*** (16.31)	0.35*** (11.39)	0.28*** (23.73)	0.44*** (8.55)	0.32*** (44.35)	0.44*** (43.57)	0.54*** (34.23)	0.39*** (31.60)	0.65*** (20.93)	0.38*** (117.20)
Investment$_{i,t}$	-0.06*** (-10.69)	-0.04*** (-12.81)	-0.03*** (-5.85)	-0.05*** (-6.65)	-0.14*** (-4.80)	-0.03*** (-13.35)	-0.10** (-2.74)	-0.07*** (-23.03)	-0.08*** (-13.23)	-0.05*** (-8.06)	-0.04*** (-8.72)	-0.18*** (-7.44)	-0.07*** (-43.26)
Debt growth$_{i,t}$	**0.03* (2.24)**	**0.03*** (3.87)**	**0.03. (1.69)**	**0.10*** (5.37)**	**0.15** (3.18)**	**0.10*** (5.56)**	**0.006 (0.15)**	**0.39*** (10.28)**	**0.04*** (3.84)**	**-0.02 (-1.62)**	**0.02. (1.83)**	**-0.02 (-0.61)**	**0.06*** (13.55)**
Adj. book leverage$_{i,t-1}$	**-0.02*** (-3.54)**	**-0.01*** (-3.68)**	**-0.007. (-1.86)**	**-0.04*** (-4.83)**	**-0.005 (-0.50)**	**-0.02*** (-3.85)**	**-0.02. (-1.68)**	**-0.004 (-0.61)**	**-0.01** (-3.12)**	**-0.02* (-2.49)**	**-0.003 (-0.56)**	**0.008 (0.79)**	**-0.02*** (-12.79)**
Debt growth$_{i,t}$× Adj. book leverage$_{i,t-1}$	-0.06*** (-2.98)	-0.10*** (-6.96)	-0.04* (-2.18)	-0.17*** (-6.26)	-0.21*** (-3.69)	-0.19*** (-5.68)	-0.05 (-0.87)	-0.45*** (-10.88)	-0.07*** (-5.31)	0.004 (0.17)	-0.05 (-2.83)	0.03 (0.86)	-0.10*** (-17.47)
Obs.	21997	19408	20508	12510	4220	13438	7219	40907	14746	15323	26903	2221	199400
Serial corr. test, order 1 (p-val)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.608	<0.001	<0.001	<0.001	<0.001	0.002	<0.001
Serial corr. test, order 2 (p-val)	0.405	0.668	0.070	0.843	0.444	0.284	0.553	0.004	0.648	0.958	0.010	0.786	0.149
Information and R&D													
ΔTFP ACF$_{i,t}$	-0.54*** (-33.04)	-0.65*** (-48.02)	-0.71*** (-23.11)	-0.34*** (-11.58)	-0.50*** (-9.96)	-0.28*** (-10.48)	-0.13** (-3.05)	-0.60*** (-39.15)	-0.14*** (-14.88)	-0.17*** (-8.58)	-0.28*** (-15.59)	-0.65*** (-7.67)	-0.46*** (-81.76)
ΔTFP ACF$_{i,t-1}$	-0.45*** (-31.49)	-0.53*** (-43.80)	-0.59*** (-20.76)	-0.30*** (-11.29)	-0.43*** (-9.77)	-0.20*** (-8.11)	-0.11** (-2.83)	-0.48*** (-33.86)	-0.11*** (-12.65)	-0.16*** (-9.75)	-0.22*** (-13.96)	-0.47*** (-6.30)	-0.38*** (-76.82)
Log assets$_{i,t}$	-0.02*** (-22.31)	-0.01*** (-17.72)	-0.01*** (-12.54)	-0.01*** (-9.96)	-0.01*** (-9.02)	0.002 (1.27)	-0.003*** (-3.34)	-0.02*** (-20.66)	-0.004*** (-14.36)	-0.01*** (-16.13)	0.01*** (5.90)	-0.003. (-1.88)	-0.009*** (-44.17)
Sales growth$_{i,t}$	0.50*** (41.94)	0.36*** (34.16)	0.40*** (20.01)	0.62*** (33.22)	0.45*** (9.85)	0.49*** (30.97)	0.64*** (25.54)	0.33*** (26.77)	0.71*** (107.29)	0.74*** (68.36)	0.65*** (60.92)	0.41*** (8.28)	0.53*** (132.07)
Investment$_{i,t}$	-0.05*** (-12.87)	-0.01*** (-5.13)	-0.04*** (-6.01)	-0.05*** (-11.01)	-0.10*** (-4.71)	-0.08*** (-17.11)	-0.07*** (-10.51)	-0.03*** (-14.68)	-0.09*** (-54.19)	-0.06*** (-28.74)	-0.06*** (-14.94)	-0.15*** (-3.65)	-0.05*** (-49.98)
Debt growth$_{i,t}$	**0.02 (1.18)**	**0.09*** (9.67)**	**0.11*** (3.63)**	**0.03*** (2.63)**	**0.06 (0.97)**	**0.10*** (5.18)**	**0.004 (0.24)**	**0.36*** (8.20)**	**-0.006. (-1.87)**	**0.00 (0.10)**	**0.04*** (5.98)**	**-0.03 (-1.15)**	**0.05*** (16.31)**

Adj. book leverage$_{i,t-1}$	**-0.02*** (-3.83)**	**-0.03*** (-7.73)**	**-0.04*** (-5.56)**	**-0.02*** (-5.17)**	**0.003 (0.26)**	**-0.05*** (-5.12)**	**-0.01* (-2.26)**	**-0.02** (-2.96)**	**0.004** (2.76)**	**-0.01*** (-3.83)**	**-0.07** (-2.58)**	**0.00 (0.03)**	**-0.02*** (-20.76)**
Debt growth$_{i,t}$× Adj. book leverage$_{i,t-1}$	-0.04* (-2.30)	-0.15*** (-11.51)	-0.14*** (-3.98)	-0.07*** (-3.97)	-0.11 (-1.26)	-0.17*** (-6.33)	-0.04 (-1.53)	-0.34*** (-8.67)	0.006 (1.44)	-0.01 (-0.98)	-0.08*** (-6.68)	0.01 (1.35)	-0.09*** (-19.72)
Obs.	16384	25243	11245	6680	2641	8126	4173	23803	21278	15334	29597	873	165377
Serial corr. test, order 1 (p-val)	<0.001	<0.001	<0.001	<0.001	0.038	<0.001	0.003	<0.001	<0.001	<0.001	<0.001	0.282	<0.001
Serial corr. test, order 2 (p-val)	0.114	0.202	0.343	0.666	0.774	0.350	0.267	0.090	0.303	0.434	0.206	0.004	0.013
Manufacturing													
ΔTFP ACF$_{i,t}$	-0.42*** (-25.90)	-0.20*** (-18.07)	-0.33*** (-28.95)	-0.34*** (-20.08)	-0.34*** (-17.82)	-0.22*** (-9.80)	-0.55*** (-14.58)	-0.20*** (-28.77)	-0.51*** (-48.96)	-0.52*** (-19.20)	-0.28*** (-27.11)	-0.32*** (-17.98)	-0.35*** (-105.60)
ΔTFP ACF$_{i,t-1}$	-0.36*** (-26.96)	-0.16*** (-17.85)	-0.26*** (-25.24)	-0.24*** (-16.61)	-0.29*** (-16.80)	-0.15*** (-7.62)	-0.43*** (-10.97)	-0.15*** (-26.61)	-0.40*** (-43.48)	-0.46*** (-20.37)	-0.22*** (-23.77)	-0.28*** (-16.92)	-0.28*** (-92.91)
Log assets$_{i,t}$	0.007*** (3.75)	-0.004*** (-20.43)	-0.003*** (-22.83)	-0.005*** (-11.03)	-0.002*** (-8.96)	0.00 (0.76)	0.01*** (3.41)	-0.004*** (-13.17)	-0.006*** (-20.89)	-0.02*** (-20.20)	0.01*** (12.23)	-0.007*** (-13.34)	-0.004*** (-50.37)
Sales growth$_{i,t}$	0.61*** (57.64)	0.65*** (90.34)	0.62*** (84.44)	0.64*** (63.21)	0.56*** (43.78)	0.52*** (44.53)	0.44*** (19.27)	0.66*** (146.61)	0.55*** (74.35)	0.51*** (25.61)	0.63*** (95.44)	0.55*** (35.35)	0.62*** (273.29)
Investment$_{i,t}$	-0.08*** (-19.29)	-0.05*** (-40.60)	-0.06*** (-15.18)	-0.06*** (-14.33)	-0.17*** (-16.79)	-0.10*** (-20.17)	-0.14*** (-8.77)	-0.07*** (-37.48)	-0.06*** (-17.46)	-0.07*** (-11.68)	-0.07*** (-20.48)	-0.15*** (-13.80)	-0.08*** (-80.43)
Debt growth$_{i,t}$	**0.005 (0.61)**	**0.004** (2.93)**	**0.08*** (9.52)**	**0.02** (2.85)**	**0.04* (2.53)**	**0.07*** (5.45)**	**-0.06** (-3.26)**	**0.28*** (17.28)**	**0.02*** (4.47)**	**0.03* (2.49)**	**0.03*** (5.35)**	**0.10*** (6.24)**	**0.04*** (20.00)**
Adj. book leverage$_{i,t-1}$	**-0.006* (-2.04)**	**-0.001** (-3.24)**	**-0.02*** (-13.07)**	**-0.01*** (-5.82)**	**-0.01*** (-4.30)**	**-0.02*** (-5.18)**	**-0.02** (-3.16)**	**0.005. (1.94)**	**-0.009*** (-3.74)**	**-0.05*** (-11.28)**	**-0.004* (-2.08)**	**-0.02*** (-4.60)**	**-0.02*** (-31.44)**
Debt growth$_{i,t}$× Adj. book leverage$_{i,t-1}$	-0.02* (-2.02)	-0.008*** (-4.83)	-0.12*** (-10.73)	-0.05*** (-4.42)	-0.07*** (-2.68)	-0.14*** (-6.42)	0.08* (2.39)	-0.35*** (-17.96)	-0.06*** (-7.88)	-0.07*** (-4.36)	-0.08*** (-6.77)	-0.15*** (-6.97)	-0.07*** (-24.69)
Obs.	39516	30475	31319	10200	10092	9849	12141	73900	44228	19671	35738	10006	327135
Serial corr. test, order 1 (p-val)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.007	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Serial corr. test, order 2 (p-val)	0.996	0.126	0.003	0.192	0.002	0.376	0.011	<0.001	0.084	0.832	0.037	<0.001	<0.001
Other services													
ΔTFP ACF$_{i,t}$	-0.57*** (-33.66)	-0.28*** (-21.83)	-0.30*** (-14.59)	-0.41*** (-14.84)	-0.39*** (-7.50)	-0.31*** (-11.13)	-0.26*** (-5.92)	-0.56*** (-32.18)	-0.40*** (-20.45)	-0.13*** (-8.41)	-0.65*** (-29.56)	-0.33*** (-9.36)	-0.49*** (-78.35)
ΔTFP ACF$_{i,t-1}$	-0.47*** (-29.92)	-0.18*** (-16.58)	-0.22*** (-12.21)	-0.27*** (-11.87)	-0.33*** (-6.55)	-0.24*** (-9.53)	-0.02 (-0.34)	-0.47*** (-31.00)	-0.33*** (-19.66)	-0.11*** (-7.97)	-0.55*** (-28.87)	-0.34*** (-7.56)	-0.40*** (-71.57)
Log assets$_{i,t}$	-0.01*** (-13.42)	-0.001*** (-4.48)	-0.002*** (-6.05)	-0.004*** (-4.63)	-0.003*** (-3.65)	0.002* (2.33)	0.01** (3.01)	-0.02*** (-19.27)	-0.002*** (-5.41)	-0.006*** (-15.41)	0.004 (1.16)	-0.004*** (-4.98)	-0.005*** (-25.41)
Sales growth$_{i,t}$	0.49*** (34.95)	0.56*** (64.45)	0.61*** (45.27)	0.64*** (42.06)	0.40*** (11.14)	0.46*** (38.97)	0.67*** (25.95)	0.29*** (24.96)	0.50*** (35.68)	0.78*** (76.25)	0.33*** (14.83)	0.57*** (13.82)	0.47*** (101.62)
Investment$_{i,t}$	-0.08*** (-15.57)	-0.05*** (-25.79)	-0.10*** (-20.57)	-0.06*** (-11.47)	-0.28*** (-10.20)	-0.07*** (-20.07)	-0.08*** (-7.18)	-0.04*** (-14.34)	-0.05*** (-11.65)	-0.06*** (-38.55)	-0.04*** (-5.51)	0.003 (0.10)	-0.06*** (-45.07)

Debt growth$_{i,t}$	**0.04***	**0.03*****	**0.06*****	**0.04*****	**0.01**	**0.03.**	**0.19*****	**0.29*****	**0.01***	**0.001**	**0.01**	**0.06****	**0.09*****
	(2.36)	**(4.50)**	**(3.88)**	**(3.75)**	**(0.37)**	**(1.83)**	**(4.16)**	**(8.21)**	**(1.98)**	**(0.26)**	**(0.67)**	**(2.68)**	**(16.10)**
Adj. book leverage$_{i,t-1}$	**-0.01****	**-0.002.**	**-0.009****	**-0.01****	**-0.02****	**-0.02*****	**-0.003****	**-0.01*****	**-0.00**	**0.00**	**0.00**	**-0.01***	**-0.02*****
	(-3.29)	**(-1.65)**	**(-2.68)**	**(-3.07)**	**(-2.62)**	**(-4.21)**	**(-2.61)**	**(-3.47)**	**(-0.14)**	**(0.15)**	**(0.12)**	**(-2.40)**	**(-15.32)**
Debt growth$_{i,t}$× Adj. book leverage$_{i,t-1}$	-0.05**	-0.05***	-0.09***	-0.07***	-0.03	-0.07**	-0.027***	-0.33***	-0.03**	-0.007	-0.05.	-0.04**	-0.14***
	(-2.64)	(-5.43)	(-4.51)	(-4.55)	(-0.74)	(-2.97)	(-4.15)	(-9.33)	(-3.02)	(-0.98)	(-1.74)	(-2.71)	(-18.37)
Obs.	16027	18051	11471	8118	2972	8651	6319	32180	12551	16560	15987	2263	151150
Serial corr. test, order 1 (p-val)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Serial corr. test, order 2 (p-val)	0.956	0.788	0.026	0.059	0.217	0.926	0.492	0.109	0.785	0.419	0.169	0.143	0.021
Transport and storage													
ΔTFP ACF$_{i,t}$	-0.41***	-0.62***	-0.51***	-0.34***	-0.36***	-0.16***	-0.52***	-0.47***	-0.59***	-0.54***	-0.71***	-0.45***	-0.52***
	(-37.70)	(-34.41)	(-14.49)	(-16.97)	(-7.00)	(-7.26)	(-6.03)	(-31.63)	(-27.30)	(-12.47)	(-33.68)	(-11.00)	(-89.58)
ΔTFP ACF$_{i,t-1}$	-0.33***	-0.48***	-0.48***	-0.27***	-0.33***	-0.14***	-0.42***	-0.38***	-0.44***	-0.47***	-0.64***	-0.34***	-0.42***
	(-33.22)	(-29.96)	(-15.54)	(-14.71)	(-5.95)	(-7.75)	(-6.35)	(-32.15)	(-25.78)	(-12.68)	(-30.91)	(-8.33)	(-82.44)
Log assets$_{i,t}$	-0.01***	-0.01***	-0.01***	-0.01***	-0.005***	-0.002***	-0.01***	-0.03***	-0.01***	-0.02**	0.006.	-0.005***	-0.01***
	(-20.44)	(-15.60)	(-14.99)	(-12.30)	(-6.83)	(-3.87)	(-7.00)	(-26.98)	(-14.90)	(-2.70)	(1.67)	(-3.72)	(-57.93)
Sales growth$_{i,t}$	0.49***	0.33***	0.30***	0.65***	0.43***	0.51***	0.45***	0.32***	0.42***	0.46***	0.27***	0.48***	0.42***
	(65.21)	(20.23)	(11.90)	(50.51)	(9.70)	(34.10)	(10.57)	(27.65)	(25.84)	(13.84)	(14.03)	(12.44)	(91.92)
Investment$_{i,t}$	-0.09***	-0.04***	-0.05***	-0.07***	-0.34***	-0.09***	-0.04**	-0.04***	-0.05***	-0.10***	-0.003	-0.05*	-0.08***
	(-31.90)	(-6.33)	(-6.58)	(-7.82)	(-7.61)	(-19.74)	(-3.13)	(-10.77)	(-6.36)	(-9.29)	(-0.33)	(-2.12)	(-37.85)
Debt growth$_{i,t}$	**-0.005**	**0.02.**	**0.08*****	**0.06*****	**-0.07**	**0.02.**	**0.008**	**0.32*****	**0.01**	**0.02**	**0.05****	**0.14*****	**0.05*****
	(-0.83)	**(1.88)**	**(3.69)**	**(5.69)**	**(-1.31)**	**(1.88)**	**(0.29)**	**(7.74)**	**(1.42)**	**(1.60)**	**(3.11)**	**(3.66)**	**(13.18)**
Adj. book leverage$_{i,t-1}$	**-0.006****	**-0.02*****	**-0.02*****	**-0.02*****	**-0.009**	**-0.008***	**-0.02***	**0.003**	**-0.01***	**-0.02****	**-0.00**	**-0.04*****	**-0.02*****
	(-2.61)	**(-4.05)**	**(-3.43)**	**(-4.73)**	**(-1.09)**	**(-2.09)**	**(-2.17)**	**(0.35)**	**(-2.11)**	**(-2.70)**	**(-0.00)**	**(-3.78)**	**(-14.31)**
Debt growth$_{i,t}$× Adj. book leverage$_{i,t-1}$	-0.001	-0.05**	-0.16***	-0.12***	0.10	-0.04*	0.005	-0.49***	-0.06**	-0.06*	-0.11***	-0.19***	-0.10***
	(-0.08)	(-2.85)	(-5.15)	(-6.84)	(1.20)	(-2.46)	(0.12)	(-8.75)	(-3.12)	(-2.15)	(-4.11)	(-3.39)	(-14.98)
Obs.	24354	10064	6376	8043	1991	7180	2750	23777	14325	7177	15978	2130	124145
Serial corr. test, order 1 (p-val)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.552	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Serial corr. test, order 2 (p-val)	0.374	0.434	0.346	0.746	0.871	0.364	0.441	0.528	0.094	0.393	0.082	0.094	0.105
Wholesale and retail trade													
ΔTFP ACF$_{i,t}$	-0.49***	-0.24***	-0.29***	-0.34***	-0.25***	-0.28***	-0.48***	-0.47***	-0.12***	-0.17***	-0.25***	-0.32***	-0.36***
	(-61.84)	(-31.04)	(-26.78)	(-22.80)	(-12.42)	(-14.71)	(-11.84)	(-56.79)	(-27.41)	(-14.14)	(-24.11)	(-12.68)	(-118.27)
ΔTFP ACF$_{i,t-1}$	-0.43***	-0.18***	-0.24***	-0.24***	-0.22***	-0.20***	-0.38***	-0.36***	-0.09***	-0.17***	-0.20***	-0.35***	-0.29***
	(-60.27)	(-26.45)	(-21.74)	(-18.53)	(-10.63)	(-13.70)	(-9.93)	(-56.92)	(-21.35)	(-15.14)	(-21.36)	(-13.84)	(-109.75)
Log assets$_{i,t}$	-0.01***	-0.005***	-0.004***	-0.006***	-0.003***	0.00	-0.01***	-0.02***	-0.005***	-0.005***	0.01***	-0.008***	-0.008***
	(-33.12)	(-31.56)	(-20.76)	(-15.67)	(-10.22)	(0.77)	(-11.81)	(-38.86)	(-46.82)	(-15.51)	(10.80)	(-9.12)	(-92.93)
Sales growth$_{i,t}$	0.58***	0.66***	0.69***	0.68***	0.73***	0.36***	0.51***	0.43***	0.79***	0.77***	0.71***	0.65***	0.62***
	(86.53)	(132.01)	(90.78)	(68.02)	(45.16)	(48.47)	(21.05)	(55.45)	(222.09)	(96.63)	(95.10)	(22.73)	(260.43)

Investment$_{i,t}$	-0.06***	-0.03***	-0.03***	-0.04***	-0.21***	-0.04***	-0.12***	-0.07***	-0.05***	-0.06***	-0.03***	-0.05***	-0.06***
	(-30.96)	(-33.55)	(-15.44)	(-19.93)	(-25.32)	(-34.22)	(-12.91)	(-42.46)	(-69.60)	(-34.77)	(-15.05)	(-7.30)	(-100.65)
Debt growth$_{i,t}$	**0.03*** **	**0.01*** **	**0.08*** **	**0.05*** **	**-0.01**	**0.05*** **	**0.05***	**0.39*** **	**0.009*** **	**0.01***	**0.02*** **	**0.04***	**0.03*** **
	(5.10)	**(3.46)**	**(10.05)**	**(7.92)**	**(-0.95)**	**(7.30)**	**(2.18)**	**(15.14)**	**(5.27)**	**(2.38)**	**(3.33)**	**(2.01)**	**(18.62)**
Adj. book leverage$_{i,t-1}$	**-0.01*** **	**-0.007*** **	**-0.02*** **	**-0.02*** **	**-0.005.**	**-0.02*** **	**-0.04*** **	**-0.03*** **	**-0.006*** **	**-0.007*** **	**-0.00**	**-0.02***	**-0.01*** **
	(-6.82)	**(-7.98)**	**(-11.03)**	**(-10.28)**	**(-1.82)**	**(-7.26)**	**(-5.10)**	**(-6.00)**	**(-9.49)**	**(-4.59)**	**(-0.06)**	**(-2.20)**	**(-23.08)**
Debt growth$_{i,t}$× Adj. book leverage$_{i,t-1}$	-0.06***	-0.03***	-0.12***	-0.09***	0.02	-0.10***	-0.11**	-0.61***	-0.02***	-0.03***	-0.04***	-0.06*	-0.06***
	(-7.83)	(-6.36)	(-11.20)	(-9.28)	(0.99)	(-8.86)	(-2.88)	(-17.16)	(-7.49)	(-3.31)	(-4.45)	(-2.19)	(-23.36)
Obs.	65866	40217	28949	1621	9639	21131	14628	79371	63521	32351	41178	5696	418761
Serial corr. test, order 1 (p-val)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.046	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Serial corr. test, order 2 (p-val)	0.229	0.001	0.003	0.657	0.367	0.415	0.441	<0.001	0.562	0.660	0.640	<0.001	0.027
Total													
ΔTFP ACF$_{i,t}$	-0.52***	-0.48***	-0.53***	-0.60***	-0.49***	-0.43***	-0.52***	-0.49***	-0.40***	-0.42***	-0.42***	-0.35***	-0.47***
	(-112.53)	(-84.87)	(-63.39)	(-53.60)	(-32.28)	(-36.26)	(-23.42)	(-104.92)	(-68.85)	(-56.10)	(-82.29)	(-33.18)	(-174.68)
ΔTFP ACF$_{i,t-1}$	-0.43***	-0.37***	-0.43***	-0.46***	-0.41***	-0.30***	-0.42***	-0.36***	-0.31***	-0.35***	-0.34***	-0.31***	-0.37***
	(-104.39)	(-73.96)	(-55.36)	(-47.14)	(-30.13)	(-30.12)	(-19.94)	(-91.28)	(-62.59)	(-50.61)	(-75.79)	(-31.38)	(-156.27)
Log assets$_{i,t}$	-0.01***	-0.006***	-0.004***	-0.006***	-0.004***	0.001***	-0.009***	-0.02***	-0.05***	-0.01***	-0.01***	-0.006***	-0.008***
	(-60.45)	(-34.46)	(-31.58)	(-15.83)	(-16.26)	(4.69)	(-23.26)	(-56.94)	(-45.83)	(-40.59)	(-58.22)	(-21.36)	(-91.89)
Sales growth$_{i,t}$	0.48***	0.46***	0.51***	0.47***	0.50***	0.39***	0.52***	0.40***	0.55***	0.60***	0.56***	0.62***	0.47***
	(137.95)	(115.09)	(90.92)	(62.58)	(45.78)	(72.53)	(40.87)	(107.68)	(123.04)	(114.40)	(150.84)	(70.30)	(248.72)
Investment$_{i,t}$	-0.07***	-0.03***	-0.05***	-0.05***	-0.15***	-0.05***	-0.08***	-0.05***	-0.05***	-0.05***	-0.03***	-0.10***	-0.07***
	(-52.02)	(-34.73)	(-27.26)	(-19.13)	(-22.67)	(-40.19)	(-17.37)	(-47.20)	(-45.83)	(-42.87)	(-42.18)	(-19.67)	(-95.11)
Debt growth$_{i,t}$	**0.03*** **	**0.04*** **	**0.04*** **	**0.07*** **	**0.05*** **	**0.07*** **	**-0.01**	**0.47*** **	**0.01*** **	**0.009** **	**0.02*** **	**0.06*** **	**0.03*** **
	(8.94)	**(16.25)**	**(11.00)**	**(10.82)**	**(8.68)**	**(12.87)**	**(-1.38)**	**(32.99)**	**(7.88)**	**(2.85)**	**(13.45)**	**(8.93)**	**(47.52)**
Adj. book leverage$_{i,t-1}$	**-0.02*** **	**-0.01*** **	**-0.02*** **	**-0.02*** **	**-0.02*** **	**-0.02*** **	**-0.02*** **	**-0.003**	**-0.006*** **	**-0.01*** **	**-0.03*** **	**-0.01*** **	**-0.02*** **
	(-14.18)	**(-12.67)**	**(-15.28)**	**(-12.78)**	**(-6.20)**	**(-13.04)**	**(-4.47)**	**(-1.19)**	**(-6.67)**	**(-11.05)**	**(-42.18)**	**(-5.57)**	**(-35.43)**
Debt growth$_{i,t}$× Adj. book leverage$_{i,t-1}$	-0.06***	-0.08***	-0.07***	-0.12***	-0.09***	-0.15***	-0.008	-0.58***	-0.04***	-0.02***	-0.06***	-0.08***	-0.13***
	(-12.67)	(-20.47)	(-14.07)	(-12.59)	(-10.25)	(-16.03)	(-0.47)	(-35.19)	(-12.84)	(-5.82)	(-19.17)	(-10.06)	(-51.42)
Obs.	219869	161408	123411	70749	35432	81982	50275	310964	182546	118047	179774	34709	1569166
Serial corr. test, order 1 (p-val)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.043	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Serial corr. test, order 2 (p-val)	0.256	0.303	0.003	<0.001	0.280	0.017	0.598	0.029	0.017	0.024	0.024	0.003	0.003

Notes: The table shows the results for the model with industry-adjusted book leverage as financial friction proxy for each country separately as well as for the entire region. It reports coefficients, (t-stats) for a Blundell-Bond (1998) dynamic panel data estimation, by limiting the number of lags of the dependent variable used as instruments to two. The dependent variable is $\Delta TFP\ ACF_{i,t+1}$. The last three lines report the number of observations used in estimation, and p-values of the first- and second order autocorrelation in the error term. Standard errors are heteroskedasticity robust. ***, **, *, and **.** denote statistical significance at 0-0.1%, 0.1-1%, 1-5%, and 5-10% levels, respectively. *Source:* Author estimation.

Appendix F (b). Adjusted book leverage proxy and Labour productivity growth (robustness)

	BG	CR	CZ	EE	HU	LV	PL	RO*	SB	SK	SL	UA	Region
Accommodation and food													
$\Delta LP_{i,t}$	-0.79***	-0.79***	-1.02***	-0.87***	-0.77***	-0.89***	-0.77***	-0.71***	-0.88***	-0.91***	-0.79***	-0.82***	-0.79***
	(-36.09)	(-37.68)	(-24.22)	(-18.19)	(-13.74)	(-14.76)	(-6.49)	(-23.93)	(-18.72)	(-21.92)	(-42.19)	(-5.74)	(-81.87)
$\Delta LP_{i,t-1}$	-0.55***	-0.55***	-0.74***	-0.69***	-0.48***	-0.68***	-0.44***	-0.36***	-0.60***	-0.67***	-0.54***	-0.72***	-0.53***
	(-28.21)	(-29.64)	(-15.26)	(-15.44)	(-8.16)	(-14.50)	(-5.08)	(-14.74)	(-13.85)	(-17.17)	(-32.86)	(-4.75)	(-59.06)
Log assets$_{i,t}$	-0.002	-0.007***	0.01***	-0.005	0.004.	-0.01	-0.009	0.005.	-0.006*	0.002	-0.01***	0.02*	0.001
	(-1.34)	(-6.31)	(3.82)	(-1.04)	(1.75)	(-0.92)	(-1.31)	(1.80)	(-2.57)	(0.48)	(-8.25)	(2.42)	(1.02)
Sales growth$_{i,t}$	0.33***	0.35***	0.62***	0.48***	0.15	0.96**	0.73***	0.45***	0.22***	0.39***	0.34***	0.39*	0.46***
	(12.13)	(12.31)	(6.48)	(7.02)	(1.41)	(3.02)	(4.95)	(14.33)	(4.10)	(4.41)	(13.02)	(2.29)	(35.00)
Investment$_{i,t}$	0.03*	0.01.	0.02	0.005	0.07	0.17.	-0.11	0.04**	0.09**	0.02	0.02**	0.32	0.04***
	(2.13)	(1.78)	(0.54)	(0.15)	(1.19)	(1.87)	(-1.33)	(2.98)	(3.24)	(0.45)	(2.86)	(1.49)	(7.96)
Debt growth$_{i,t}$	**-0.00**	**0.10*** **	**0.04**	**0.48*** **	**0.03**	**0.62** **	**-0.13**	**1.09*** **	**0.36** **	**0.15***	**0.06*** **	**0.12**	**0.33*** **
	(-0.07)	**(4.25)**	**(0.67)**	**(3.39)**	**(0.42)**	**(2.82)**	**(-0.79)**	**(8.45)**	**(6.28)**	**(2.56)**	**(4.46)**	**(0.50)**	**(16.29)**
Adj. book leverage$_{i,t-1}$	**0.02.**	**0.006**	**0.02**	**-0.03**	**-0.01**	**-0.17***	**0.05**	**-0.02**	**-0.02**	**-0.02**	**0.007**	**-0.05**	**-0.03*** **
	(1.91)	**(0.81)**	**(1.13)**	**(-1.07)**	**(-0.41)**	**(-2.30)**	**(1.22)**	**(-0.87)**	**(-0.78)**	**(-1.27)**	**(1.47)**	**(-0.43)**	**(-6.88)**
Debt growth$_{i,t}$×	-0.03	-0.22***	-0.09	-0.74***	-0.11	-1.00*	0.19	-1.50***	-0.64***	-0.23***	-0.15***	-0.16	-0.58***
Adj. book leverage$_{i,t-1}$	(-0.71)	(-5.46)	(-0.89)	(-3.98)	(-1.20)	(-2.44)	(0.64)	(-9.55)	(-6.19)	(-3.36)	(-5.27)	(-0.39)	(-18.36)
Obs.	9928	11699	3685	3862	983	2052	1332	19759	5370	4383	12371	265	75689
Serial corr. test, order 1 (p-val)	<0.001	<0.001	0.160	<0.001	0.068	<0.001	0.207	<0.001	<0.001	<0.001	<0.001	0.041	<0.001
Serial corr. test, order 2 (p-val)	0.181	0.874	0.790	0.363	0.997	0.879	0.130	0.634	0.287	0.205	0.454	0.215	0.041
Agriculture and mining													
$\Delta LP_{i,t}$	-0.83***	-0.87***	-0.94***	-0.88***	-0.89***	-0.89***	-0.95***	-0.80***	-0.88***	-0.80***	-0.79***	-0.63***	-0.84***
	(-72.71)	(-34.12)	(-48.91)	(-36.53)	(-25.58)	(-52.96)	(-9.07)	(-51.41)	(-33.13)	(-29.02)	(-19.97)	(-32.40)	(-136.44)
$\Delta LP_{i,t-1}$	-0.57***	-0.63***	-0.67***	-0.58***	-0.55***	-0.65***	-0.63***	-0.57***	-0.64***	-0.68***	-0.65***	-0.45***	-0.60***
	(-55.44)	(-27.94)	(-36.22)	(-25.49)	(-18.48)	(-41.66)	(-5.40)	(-41.45)	(-26.16)	(-29.22)	(-15.38)	(-25.49)	(-113.13)
Log assets$_{i,t}$	-0.01***	0.009***	0.005***	0.004	-0.002.	-0.03***	0.09*	-0.01***	-0.005***	-0.002	-0.006*	-0.008***	-0.003***
	(-9.32)	(5.17)	(5.38)	(1.07)	(-1.85)	(-7.99)	(2.39)	(-7.90)	(-3.38)	(-0.96)	(-2.18)	(-9.23)	(-7.81)
Sales growth$_{i,t}$	0.28***	0.20***	0.35***	0.32***	0.32***	0.56***	0.59***	0.29***	0.25***	0.15***	0.29***	0.50***	0.33***
	(22.65)	(7.01)	(10.49)	(10.79)	(6.21)	(16.18)	(3.42)	(14.35)	(9.49)	(4.33)	(6.46)	(21.50)	(42.42)
Investment$_{i,t}$	0.12***	0.04.	0.03	0.28***	-0.15*	0.27***	-0.07	0.09***	0.006	0.05	0.06*	0.19***	0.12***
	(10.31)	(1.69)	(0.96)	(6.44)	(-2.29)	(6.90)	(-0.43)	(6.09)	(0.33)	(1.31)	(2.10)	(8.58)	(15.92)
Debt growth$_{i,t}$	**0.14*** **	**-0.03**	**-0.002**	**-0.04**	**0.05**	**0.10**	**-0.47.**	**0.68*** **	**0.08** **	**-0.008**	**-0.008**	**0.04** **	**0.08*** **
	(7.10)	**(-0.83)**	**(-0.07)**	**(-0.59)**	**(0.91)**	**(1.57)**	**(-1.79)**	**(7.64)**	**(3.23)**	**(-0.28)**	**(-0.23)**	**(3.19)**	**(7.48)**
Adj. book leverage$_{i,t-1}$	**0.02** **	**0.02.**	**0.02***	**0.12*** **	**0.007**	**0.006**	**0.09**	**0.10*** **	**0.01**	**-0.006**	**0.01**	**0.01***	**0.009** **
	(2.73)	**(1.77)**	**(2.15)**	**(6.37)**	**(0.37)**	**(0.28)**	**(1.57)**	**(6.60)**	**(1.49)**	**(-0.62)**	**(0.96)**	**(2.06)**	**(2.86)**

Debt growth$_{i,t}$× Adj. book leverage$_{i,t-1}$	-0.23*** (-7.98)	-0.04 (-0.65)	0.002 (0.04)	-0.03 (-0.33)	-0.08 (-1.02)	-0.37** (-3.19)	0.80. (1.68)	-1.15*** (-8.88)	-0.10** (-2.58)	-0.02 (-0.68)	0.004 (0.07)	-0.09*** (-5.02)	-0.16*** (-10.65)
Obs.	25797	6251	9858	5122	2894	11555	1713	17267	6257	7248	2022	11255	107509
Serial corr. test, order 1 (p-val)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.093	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Serial corr. test, order 2 (p-val)	0.380	0.094	0.816	0.847	0.340	0.202	0.140	0.459	0.041	0.008	0.407	0.223	0.942
Construction and real estate													
$\Delta LP_{i,t}$	-0.80*** (-55.16)	-0.85*** (-57.04)	-0.95*** (-56.29)	-0.90*** (-43.93)	-0.83*** (-23.64)	-0.86*** (-36.30)	-0.95*** (-17.23)	-0.76*** (-62.03)	-0.82*** (-41.55)	-0.80*** (-47.84)	-0.84*** (-69.27)	-0.94*** (-12.43)	-0.83*** (-163.30)
$\Delta LP_{i,t-1}$	-0.59*** (-43.88)	-0.58*** (-44.56)	-0.71*** (-40.81)	-0.65*** (-36.51)	-0.62*** (-19.73)	-0.60*** (-26.75)	-0.69*** (-11.25)	-0.54*** (-47.75)	-0.58*** (-35.91)	-0.66*** (-40.12)	-0.61*** (-61.95)	-0.64*** (-9.23)	-0.61*** (-133.34)
Log assets$_{i,t}$	0.006*** (4.91)	0.003** (2.90)	0.01*** (10.20)	0.002 (1.02)	0.001 (0.65)	0.004 (0.96)	0.005. (1.76)	-0.01*** (-4.70)	-0.01*** (-12.50)	-0.002 (-0.94)	-0.002. (-1.85)	-0.008* (-2.05)	0.003*** (7.16)
Sales growth$_{i,t}$	0.21*** (20.29)	0.20*** (19.04)	0.29*** (15.20)	0.32*** (15.54)	0.19*** (5.97)	0.34*** (6.43)	0.39*** (5.84)	0.29*** (28.49)	0.17*** (16.85)	0.25*** (12.13)	0.19*** (20.69)	0.30*** (6.32)	0.27*** (61.35)
Investment$_{i,t}$	0.04*** (5.28)	0.01** (3.06)	0.04*** (4.22)	0.05*** (4.22)	0.10** (2.91)	0.01 (1.33)	0.02 (0.63)	0.02*** (4.62)	0.04*** (4.83)	0.02* (2.10)	0.02*** (6.25)	0.15** (2.65)	0.04*** (14.43)
Debt growth$_{i,t}$	**0.18*** (7.90)**	**0.07*** (6.41)**	**-0.03. (-1.74)**	**0.13*** (4.59)**	**0.07** (2.89)**	**0.67*** (7.29)**	**0.10. (1.78)**	**0.97*** (15.32)**	**0.07*** (6.86)**	**0.02 (0.77)**	**0.02** (2.68)**	**0.33*** (3.40)**	**0.13*** (18.05)**
Adj. book leverage$_{i,t-1}$	**-0.02** (-3.22)**	**0.01* (2.42)**	**0.01 (1.63)**	**-0.00 (-0.05)**	**0.006 (0.46)**	**-0.16*** (-5.34)**	**-0.03 (-1.16)**	**0.13*** (11.27)**	**0.004 (0.53)**	**0.03** (3.24)**	**0.008* (2.42)**	**-0.04 (-1.37)**	**0.00 (0.31)**
Debt growth$_{i,t}$× Adj. book leverage$_{i,t-1}$	-0.27*** (-8.48)	-0.13*** (-6.82)	0.02 (0.81)	-0.20*** (-5.09)	-0.15*** (-4.35)	-1.25*** (-7.84)	-0.21** (-2.76)	-1.09*** (-16.55)	-0.13*** (-8.22)	-0.03 (-1.04)	-0.05*** (-4.48)	-0.31** (-3.24)	-0.21*** (-21.17)
Obs.	21997	19408	20508	12510	4220	13438	7219	40907	14746	15323	26903	2221	199400
Serial corr. test, order 1 (p-val)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.593	<0.001	<0.001	<0.001	<0.001	0.010	<0.001
Serial corr. test, order 2 (p-val)	0.619	0.243	0.166	0.958	0.184	0.450	0.217	0.368	0.944	0.017	0.498	0.724	0.497
Information and R&D													
$\Delta LP_{i,t}$	-0.78*** (-47.40)	-0.77*** (-52.95)	-0.95*** (-36.50)	-0.82*** (-27.02)	-0.79*** (-15.30)	-0.87*** (-24.66)	-0.79*** (-14.21)	-0.73*** (-33.58)	-0.76*** (-49.93)	-0.90*** (-39.11)	-0.79*** (-61.34)	-0.62*** (-7.25)	-0.80*** (-137.30)
$\Delta LP_{i,t-1}$	-0.58*** (-38.93)	-0.55*** (-42.23)	-0.74*** (-27.56)	-0.63*** (-22.48)	-0.62*** (-13.59)	-0.64*** (-19.20)	-0.55*** (-11.19)	-0.54*** (-25.51)	-0.56*** (-41.28)	-0.70*** (-34.26)	-0.60*** (-52.26)	-0.47*** (-7.49)	-0.60*** (-112.67)
Log assets$_{i,t}$	-0.01*** (-8.36)	-0.005*** (-5.38)	-0.004** (-2.64)	-0.01*** (-4.38)	-0.007*** (-4.06)	0.002 (0.25)	-0.02*** (-3.96)	-0.03*** (-11.13)	-0.004*** (-6.23)	-0.02*** (-9.50)	-0.02*** (-16.26)	0.004 (1.47)	-0.008*** (-4.18)
Sales growth$_{i,t}$	0.39*** (23.90)	0.42*** (28.78)	0.31*** (10.80)	0.47*** (12.81)	0.22*** (4.71)	0.62*** (8.00)	0.38*** (5.79)	0.38*** (18.25)	0.29*** (23.74)	0.32*** (10.67)	0.30*** (25.48)	0.20** (2.65)	0.37*** (61.40)
Investment$_{i,t}$	0.004 (0.75)	0.006* (2.21)	0.01 (1.12)	0.04** (2.92)	-0.03 (-1.59)	0.04* (2.09)	-0.007 (-0.32)	0.01** (2.87)	0.02*** (5.35)	0.02** (3.20)	0.14*** (4.93)	0.08 (0.98)	0.01*** (8.51)
Debt growth$_{i,t}$	**-0.02 (-0.74)**	**0.12*** (8.92)**	**-0.05 (-1.56)**	**0.20*** (5.24)**	**0.05. (1.85)**	**0.54*** (6.45)**	**-0.24** (-2.91)**	**0.39*** (12.03)**	**0.03*** (4.27)**	**0.02 (0.99)**	**0.05*** (7.63)**	**0.07 (1.41)**	**0.10*** (16.21)**

Adj. book leverage$_{i,t-1}$	**0.01.**	**-0.004**	**0.04*** **	**-0.03***	**0.02**	**-0.21*** **	**0.06***	**0.05*** **	**0.008***	**0.007**	**0.00**	**-0.007**	**-0.008*** **
	(1.89)	**(-0.90)**	**(3.98)**	**(-2.33)**	**(1.29)**	**(-4.83)**	**(2.44)**	**(4.07)**	**(2.02)**	**(0.69)**	**(0.02)**	**(-0.74)**	**(-4.18)**
Debt growth$_{i,t}$× Adj. book leverage$_{i,t-1}$	0.007	-0.20***	0.07*	-0.30***	-0.05.	-0.83***	0.37**	-0.98***	-0.06***	-0.03	-0.12***	-0.09***	-0.16***
	(0.25)	(-10.06)	(2.07)	(-5.92)	(-1.94)	(-7.69)	(2.58)	(-12.60)	(-5.44)	(-0.98)	(-9.39)	(-3.46)	(-19.32)
Obs.	16384	25243	11245	6680	2641	8126	4173	23803	21278	15334	29597	873	165377
Serial corr. test, order 1 (p-val)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.021	<0.001	<0.001	<0.001	<0.001	0.007	<0.001
Serial corr. test, order 2 (p-val)	0.862	0.891	0.537	0.751	0.026	0.326	0.540	0.959	0.410	0.331	0.749	0.639	0.183
Manufacturing													
$\Delta LP_{i,t}$	-0.72***	-0.78***	-0.91***	-0.84***	-0.73***	-0.83***	-0.85***	-0.76***	-0.80***	-0.82***	-0.76***	-0.75***	-0.78***
	(-72.32)	(-66.31)	(-72.36)	(-40.14)	(-30.66)	(-34.44)	(-27.88)	(-67.70)	(-76.06)	(-44.64)	(-75.51)	(-27.69)	(-203.84)
$\Delta LP_{i,t-1}$	-0.53***	-0.56***	-0.73***	-0.61***	-0.57***	-0.61***	-0.53***	-0.52***	-0.57***	-0.64***	-0.55***	-0.55***	-0.58***
	(-60.54)	(-55.56)	(-61.02)	(-31.31)	(-27.80)	(-25.93)	(-15.87)	(-49.13)	(-63.51)	(-42.99)	(-66.79)	(-25.10)	(-172.40)
Log assets$_{i,t}$	-0.002***	-0.002**	0.002***	-0.008***	0.001.	-0.006	-0.006***	-0.006***	-0.001*	-0.01***	-0.01***	-0.002**	-0.001***
	(-3.36)	(-2.99)	(3.94)	(-6.31)	(1.76)	(-1.43)	(-3.72)	(-6.31)	(-2.49)	(-12.17)	(-19.73)	(-2.67)	(-4.64)
Sales growth$_{i,t}$	0.33***	0.30***	0.33***	0.42***	0.31***	0.76***	0.32***	0.36***	0.27***	0.32***	0.26***	0.34***	0.33***
	(33.00)	(25.09)	(18.78)	(17.45)	(11.14)	(11.16)	(6.56)	(29.68)	(28.68)	(13.12)	(26.72)	(12.57)	(78.60)
Investment$_{i,t}$	0.02***	0.009*	0.04***	0.03**	-0.002	0.15***	0.06*	0.06***	0.04***	0.02.	0.04***	0.12***	0.04***
	(3.45)	(2.24)	(5.20)	(3.22)	(-0.12)	(5.54)	(2.21)	(10.84)	(7.60)	(1.87)	(9.20)	(6.03)	(18.29)
Debt growth$_{i,t}$	**0.03** **	**0.006**	**0.04*** **	**0.03**	**0.03** **	**0.42*** **	**0.07.**	**0.89*** **	**0.03*** **	**0.05*** **	**0.03*** **	**0.17*** **	**0.07*** **
	(3.26)	**(0.77)**	**(3.49)**	**(1.33)**	**(2.92)**	**(5.67)**	**(1.80)**	**(20.17)**	**(5.14)**	**(3.30)**	**(5.75)**	**(6.00)**	**(18.54)**
Adj. book leverage$_{i,t-1}$	**0.02*** **	**0.02*** **	**0.007.**	**0.02***	**0.001**	**-0.14*** **	**-0.02**	**0.07*** **	**0.01*** **	**-0.01.**	**0.007***	**-0.00**	**0.006*** **
	(5.10)	**(6.20)**	**(1.74)**	**(2.51)**	**(0.20)**	**(-4.87)**	**(-1.61)**	**(9.23)**	**(5.14)**	**(-1.84)**	**(2.49)**	**(-0.06)**	**(4.21)**
Debt growth$_{i,t}$× Adj. book leverage$_{i,t-1}$	-0.04***	-0.03.	-0.09***	-0.08*	-0.09***	-0.91***	-0.21**	-1.24***	-0.07***	-0.12***	-0.10***	-0.25***	-0.15***
	(-3.52)	(-1.88)	(-5.43)	(-2.48)	(-4.18)	(-7.27)	(-2.92)	(-22.72)	(-6.78)	(-5.10)	(-8.09)	(-6.23)	(-24.47)
Obs.	39516	30475	31319	10200	10092	9849	12141	73900	44228	19671	35738	10006	327135
Serial corr. test, order 1 (p-val)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.329	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Serial corr. test, order 2 (p-val)	0.067	0.801	0.344	0.909	0.541	0.403	0.040	0.925	0.607	0.323	0.555	0.850	0.302
Other services													
$\Delta LP_{i,t}$	-0.76***	-0.78***	-0.98***	-0.87***	-0.83***	-0.87***	-0.85***	-0.76***	-0.83***	-0.81***	-0.79***	-0.81***	-0.80***
	(-41.32)	(-47.72)	(-41.97)	(-31.24)	(-17.45)	(-34.66)	(-15.79)	(-33.20)	(-40.66)	(-30.05)	(-46.66)	(-13.60)	(-118.87)
$\Delta LP_{i,t-1}$	-0.55***	-0.57***	-0.72***	-0.63***	-0.55***	-0.65***	-0.59***	-0.52***	-0.60***	-0.68***	-0.58***	-0.57***	-0.60***
	(-33.06)	(-40.63)	(-29.91)	(-23.55)	(-11.68)	(-27.31)	(-11.15)	(-26.83)	(-31.87)	(-37.87)	(-39.42)	(-11.61)	(-95.05)
Log assets$_{i,t}$	-0.002	-0.00	0.008***	-0.009***	-0.002.	-0.01**	-0.001	-0.005**	-0.00	-0.01***	-0.008***	-0.006**	0.00
	(-1.25)	(-0.08)	(7.33)	(-3.51)	(-1.86)	(-2.75)	(-0.30)	(-2.98)	(-0.65)	(-6.42)	(-7.96)	(-2.74)	(1.51)
Sales growth$_{i,t}$	0.38***	0.31***	0.36***	0.51***	0.30***	0.66***	0.47***	0.39***	0.29***	0.38***	0.31***	0.35***	0.41***
	(17.37)	(17.07)	(9.23)	(13.80)	(5.53)	(10.60)	(5.19)	(18.72)	(14.65)	(10.25)	(15.49)	(4.37)	(47.03)
Investment$_{i,t}$	0.008	0.008	0.01	0.06***	0.07**	0.11***	0.009	0.03***	0.03***	0.03***	0.02***	0.10	0.04***
	(1.14)	(1.61)	(1.23)	(4.28)	(2.88)	(5.34)	(0.26)	(4.84)	(3.99)	(4.58)	(4.21)	(1.47)	(13.12)

Debt growth$_{i,t}$	**0.03**	**0.12*** **	**0.10*** **	**0.18*** **	**0.04**	**0.09**	**0.05**	**0.66*** **	**0.04** **	**0.09*** **	**0.02.**	**0.14**	**0.24*** **
	(1.42)	**(8.34)**	**(4.06)**	**(5.01)**	**(1.31)**	**(0.97)**	**(0.60)**	**(9.73)**	**(3.27)**	**(3.75)**	**(1.93)**	**(1.60)**	**(19.61)**
Adj. book leverage$_{i,t-1}$	**0.02** **	**0.008.**	**0.01**	**0.01**	**-0.01**	**-0.06***	**-0.008**	**0.09*** **	**0.02*** **	**0.005**	**0.02*** **	**-0.007**	**-0.009*** **
	(2.95)	**(1.78)**	**(1.01)**	**(1.06)**	**(-1.27)**	**(-2.48)**	**(-0.30)**	**(7.63)**	**(4.31)**	**(0.65)**	**(5.10)**	**(-0.40)**	**(-3.43)**
Debt growth$_{i,t}$×	-0.05.	-0.20***	-0.15***	-0.31***	-0.12*	-0.30*	-0.08	-0.74***	-0.07***	-0.16***	-0.06***	-0.11	-0.37***
Adj. book leverage$_{i,t-1}$	(-1.76)	(-8.42)	(-4.06)	(-6.39)	(-2.57)	(-2.28)	(-0.67)	(-10.69)	(-3.59)	(-5.72)	(-3.35)	(-1.64)	(-21.85)
Obs.	16027	18051	11471	8118	2972	8651	6319	32180	12551	16560	15987	2263	151150
Serial corr. test, order 1 (p-val)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.288	<0.001	<0.001	<0.001	<0.001	0.042	<0.001
Serial corr. test, order 2 (p-val)	0.711	0.457	0.109	0.485	0.814	0.035	0.648	0.967	0.802	0.246	0.597	0.616	0.754
Transport and storage													
$\Delta LP_{i,t}$	-0.69***	-0.79***	-0.90***	-0.86***	-0.84***	-0.85***	-0.85***	-0.75***	-0.78***	-0.75***	-0.79***	-0.68***	-0.78***
	(-58.93)	(-43.79)	(-30.06)	(-35.08)	(-19.11)	(-34.13)	(-16.32)	(-46.67)	(-41.51)	(-22.85)	(-52.13)	(-9.08)	(-130.03)
$\Delta LP_{i,t-1}$	-0.48***	-0.52***	-0.71***	-0.61***	-0.61***	-0.64***	-0.57***	-0.45***	-0.54***	-0.64***	-0.55***	-0.47***	-0.56***
	(-44.05)	(-29.63)	(-23.76)	(-27.12)	(-13.25)	(-23.93)	(-10.42)	(-29.62)	(-32.80)	(-23.70)	(-46.53)	(-7.80)	(-101.33)
Log assets$_{i,t}$	-0.007***	-0.005***	0.003.	-0.02***	-0.002*	-0.04***	-0.01**	-0.02***	-0.007***	-0.004.	-0.02***	0.00	-0.007***
	(-7.33)	(-4.42)	(1.95)	(-7.74)	(-2.09)	(-7.73)	(-2.82)	(-9.56)	(-8.36)	(-1.75)	(-15.36)	(0.11)	(-19.82)
Sales growth$_{i,t}$	0.41***	0.35***	0.40***	0.56***	0.32***	0.69***	0.21.	0.34***	0.31***	0.33***	0.23***	0.31***	0.38***
	(32.21)	(14.95)	(7.90)	(16.79)	(5.20)	(8.76)	(1.85)	(15.07)	(15.57)	(6.73)	(14.19)	(5.24)	(48.59)
Investment$_{i,t}$	0.01*	0.03**	0.02.	0.21***	0.13***	0.13***	0.04	0.07***	0.11***	0.03.	0.06***	0.06.	0.05***
	(2.33)	(3.15)	(1.83)	(8.54)	(3.58)	(4.06)	(1.15)	(7.59)	(9.27)	(1.90)	(8.77)	(1.67)	(14.97)
Debt growth$_{i,t}$	**0.01**	**0.10*** **	**0.07** **	**0.17*** **	**0.02**	**0.26*** **	**0.12**	**0.85*** **	**0.10*** **	**0.06.**	**0.04*** **	**0.22*** **	**0.12*** **
	(0.94)	**(5.39)**	**(2.87)**	**(5.86)**	**(1.13)**	**(3.82)**	**(1.46)**	**(9.20)**	**(7.87)**	**(1.78)**	**(4.04)**	**(3.90)**	**(15.53)**
Adj. book leverage$_{i,t-1}$	**0.03*** **	**0.03** **	**0.03** **	**0.02**	**0.007**	**-0.07***	**-0.02**	**0.12*** **	**0.02** **	**-0.006**	**0.006**	**-0.03.**	**0.007***
	(6.13)	**(3.25)**	**(2.73)**	**(1.52)**	**(0.67)**	**(-2.54)**	**(-0.51)**	**(5.92)**	**(2.68)**	**(-0.41)**	**(1.17)**	**(-1.92)**	**(2.48)**
Debt growth$_{i,t}$×	-0.01	-0.20***	-0.14***	-0.42***	-0.07*	-0.55***	-0.20	-1.27***	-0.23***	-0.11*	-0.10***	-0.34***	-0.23***
Adj. book leverage$_{i,t-1}$	(-0.69)	(-6.46)	(-3.50)	(-7.86)	(-2.24)	(-4.21)	(-1.54)	(-10.54)	(-9.22)	(-2.28)	(-5.45)	(-4.08)	(-17.58)
Obs.	24354	10064	6376	8043	1991	7180	2750	23777	14325	7177	15978	2130	124145
Serial corr. test, order 1 (p-val)	<0.001	<0.001	<0.001	<0.001	0.023	<0.001	0.376	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Serial corr. test, order 2 (p-val)	0.542	0.034	0.828	0.755	0.623	0.438	0.957	0.104	0.669	0.974	0.591	0.473	0.118
Wholesale and retail trade													
$\Delta LP_{i,t}$	-0.78***	-0.81***	-0.91***	-0.88***	-0.82***	-0.88***	-0.86***	-0.46***	-0.78***	-0.82***	-0.77***	-0.71***	-0.79***
	(-96.11)	(-77.72)	(-64.59)	(-45.43)	(-32.62)	(-49.76)	(-34.26)	(-56.79)	(-89.56)	(-61.53)	(-76.04)	(-20.12)	(-231.69)
$\Delta LP_{i,t-1}$	-0.56***	-0.59***	-0.70***	-0.62***	-0.59***	-0.64***	-0.60***	-0.36***	-0.58***	-0.68***	-0.55***	-0.54***	-0.58***
	(-78.15)	(-65.67)	(-50.61)	(-35.06)	(-27.42)	(-39.16)	(-21.46)	(-56.92)	(-74.55)	(-56.69)	(-64.39)	(-18.67)	(-191.84)
Log assets$_{i,t}$	-0.001***	-0.002***	0.004***	-0.008***	-0.00	-0.01***	-0.01***	-0.02***	-0.005***	-0.001	-0.01***	-0.003.	-0.004***
	(-3.31)	(-3.71)	(5.07)	(-6.03)	(-1.25)	(-3.42)	(-5.75)	(-38.86)	(-12.66)	(-0.76)	(-19.12)	(-1.88)	(-21.74)
Sales growth$_{i,t}$	0.40***	0.37***	0.47***	0.48***	0.40***	0.86***	0.44***	0.43***	0.36***	0.40***	0.37***	0.39***	0.43***
	(39.58)	(29.93)	(20.86)	(18.87)	(12.39)	(15.98)	(8.55)	(55.45)	(38.91)	(19.16)	(30.46)	(8.17)	(93.65)

Investment$_{i,t}$	0.01***	0.009***	0.02***	0.04***	-0.003	0.07***	0.003	0.02***	0.02***	0.02***	0.01***	0.009	0.02***
	(4.34)	(3.81)	(3.32)	(5.07)	(-0.20)	(6.76)	(0.018)	(12.65)	(9.23)	(3.62)	(5.27)	(0.72)	(15.29)
Debt growth$_{i,t}$	**0.04*** **	**0.05*** **	**0.02**	**0.14*** **	**-0.003**	**0.51*** **	**0.13** **	**0.39*** **	**0.02*** **	**0.08*** **	**0.07*** **	**-0.03**	**0.07*** **
	(4.67)	**(5.87)**	**(1.54)**	**(6.50)**	**(-0.21)**	**(7.69)**	**(3.09)**	**(15.14)**	**(3.52)**	**(4.51)**	**(9.49)**	**(-0.85)**	**(17.15)**
Adj. book leverage$_{i,t-1}$	**0.01*** **	**0.01*** **	**0.007**	**0.004**	**0.008**	**-0.13*** **	**-0.006**	**-0.03*** **	**0.01*** **	**0.002**	**0.003**	**0.04** **	**0.007*** **
	(3.81)	**(4.25)**	**(1.35)**	**(0.74)**	**(1.21)**	**(-6.51)**	**(-0.41)**	**(-6.00)**	**(5.25)**	**(0.37)**	**(0.92)**	**(3.03)**	**(5.39)**
Debt growth$_{i,t}$×	-0.05***	-0.09***	-0.04.	-0.24***	-0.04.	-0.96***	-0.18**	-0.61***	-0.04***	-0.13***	-0.16***	0.04	-0.13***
Adj. book leverage$_{i,t-1}$	(-4.40)	(-7.69)	(-1.95)	(-8.09)	(-1.65)	(-9.03)	(-2.73)	(-17.16)	(-5.00)	(-5.28)	(-11.95)	(0.95)	(-22.45)
Obs.	65866	40217	28949	1621	9639	21131	14628	79371	63521	32351	41178	5696	418761
Serial corr. test, order 1 (p-val)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.587	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Serial corr. test, order 2 (p-val)	0.553	0.703	0.911	0.330	0.589	0.120	0.190	0.627	0.181	0.379	0.752	0.669	0.054
Total													
$\Delta LP_{i,t}$	-0.78***	-0.80***	-0.94***	-0.87***	-0.81***	-0.87***	-0.87***	-0.74***	-0.80***	-0.85***	-0.79***	-0.72***	-0.80***
	(-172.86)	(-148.22)	(-132.69)	(-97.29)	(-61.00)	(-103.13)	(-52.71)	(-125.88)	(-147.08)	(-113.97)	(-159.02)	(-54.69)	(-287.31)
$\Delta LP_{i,t-1}$	-0.56***	-0.57***	-0.72***	-0.63***	-0.59***	-0.63***	-0.59***	-0.48***	-0.59***	-0.67***	-0.57***	-0.52***	-0.58***
	(-138.32)	(-119.71)	(-100.70)	(-77.30)	(-50.18)	(-80.04)	(-34.36)	(-92.06)	(-122.97)	(-103.77)	(-135.98)	(-44.80)	(-216.15)
Log assets$_{i,t}$	-0.003***	-0.002***	0.004***	-0.005***	-0.00	-0.01***	-0.006***	-0.01***	-0.004***	-0.007***	-0.01***	-0.004***	-0.005***
	(-8.42)	(-5.24)	(13.18)	(-6.54)	(-0.92)	(-6.21)	(-6.97)	(-18.17)	(-18.35)	(-11.83)	(-34.18)	(-7.35)	(-31.73)
Sales growth$_{i,t}$	0.32***	0.31***	0.35***	0.41***	0.27***	0.63***	0.39***	0.37***	0.26***	0.31***	0.28***	0.39***	0.36***
	(67.81)	(56.51)	(36.19)	(38.52)	(17.97)	(29.51)	(15.10)	(60.64)	(52.63)	(29.49)	(57.16)	(26.70)	(112.23)
Investment$_{i,t}$	0.02***	0.01***	0.03***	0.05***	0.008	0.07***	0.009	0.03***	0.03***	0.02***	0.02***	0.08***	0.04***
	(11.23)	(6.94)	(6.91)	(10.96)	(0.89)	(10.86)	(0.88)	(15.02)	(16.24)	(7.38)	(13.89)	(8.24)	(25.17)
Debt growth$_{i,t}$	**0.06*** **	**0.07*** **	**0.02** **	**0.15*** **	**0.04*** **	**0.43*** **	**0.05.**	**1.05*** **	**0.05*** **	**0.06*** **	**0.04*** **	**0.10*** **	**0.06*** **
	(11.22)	**(16.63)**	**(2.82)**	**(12.10)**	**(4.96)**	**(13.75)**	**(1.89)**	**(38.84)**	**(14.17)**	**(-7.47)**	**(14.77)**	**(8.52)**	**(46.65)**
Adj. book leverage$_{i,t-1}$	**0.01*** **	**0.01*** **	**0.01*** **	**0.003**	**0.002**	**-0.12*** **	**-0.003**	**0.07*** **	**0.01*** **	**0.002**	**0.006*** **	**0.002**	**-0.00**
	(5.78)	**(5.50)**	**(4.95)**	**(0.94)**	**(0.48)**	**(-11.13)**	**(-0.30)**	**(15.71)**	**(7.76)**	**(0.51)**	**(4.22)**	**(0.51)**	**(-0.09)**
Debt growth$_{i,t}$×	-0.09***	-0.14***	-0.04***	-0.25***	-0.10***	-0.81***	-0.12**	-1.33***	-0.09***	-0.11***	-0.10***	-0.14***	-0.24***
Adj. book leverage$_{i,t-1}$	(-11.79)	(-19.20)	(-3.95)	(-14.16)	(-7.61)	(-15.88)	(-2.91)	(-42.49)	(-16.59)	(-9.88)	(-19.06)	(-9.74)	(-51.10)
Obs.	219869	161408	123411	70749	35432	81982	50275	310964	182546	118047	179774	34709	1569166
Serial corr. test, order 1 (p-val)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.013	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Serial corr. test, order 2 (p-val)	0.886	0.065	0.827	0.789	0.757	0.008	0.003	0.374	0.844	0.694	0.936	0.881	0.491

Notes: The table shows the results for the model with industry-adjusted book leverage as financial friction proxy for each country separately as well as for the entire region. It reports coefficients, (t-stats) for a Blundell-Bond (1998) dynamic panel data estimation, by limiting the number of lags of the dependent variable used as instruments to two. The dependent variable is $\Delta LP_{i,t+1}$. The last three lines report the number of observations used in estimation, and p-values of the first- and second order autocorrelation in the error term. Standard errors are heteroskedasticity robust. ***, **, *, and **.** denote statistical significance at 0-0.1%, 0.1-1%, 1-5%, and 5-10% levels, respectively. *Source:* Author estimation.

Appendix G (a). Adjusted cash holdings proxy and TFP growth

	BG	CR	CZ	EE	HU	LV	PL	RO	SB	SK	SL	UA	Region
ΔTFP ACF$_{i,t}$	-0.84***	-0.71***	-0.71***	-0.84***	-0.70***	-0.48***	-0.62***	-0.63***	-0.55***	-0.56***	-0.63***	-0.63***	-0.63***
	(-64.87)	(-81.78)	(-73.96)	(-64.87)	(-39.57)	(-45.33)	(-51.51)	(-92.30)	(-78.17)	(-78.43)	(-89.12)	(-35.65)	(-115.34)
ΔTFP ACF$_{i,t-1}$	-0.71***	-0.62***	-0.61***	-0.71***	-0.63***	-0.37***	-0.55***	-0.52***	-0.50***	-0.50***	-0.54***	-0.59***	-0.56***
	(-56.13)	(-79.44)	(-63.78)	(-56.13)	(-36.72)	(-36.23)	(-30.55)	(-91.68)	(-76.67)	(-70.70)	(-83.08)	(-30.46)	(-113.72)
Log assets$_{i,t}$	0.007***	0.01***	0.009***	0.007***	0.003**.**	-0.003***	-0.00	0.01***	-0.001*	-0.005***	0.008***	-0.003	0.006***
	(4.98)	(13.68)	(11.79)	(4.98)	(1.86)	(-4.08)	(-0.29)	(15.88)	(-2.18)	(-5.53)	(12.39)	(-1.39)	(18.61)
Sales growth$_{i,t}$	0.44***	0.41***	0.48***	0.44***	0.45***	0.40***	0.49***	0.41***	0.52***	0.58***	0.51***	0.50***	0.42***
	(59.03)	(92.54)	(83.56)	(59.03)	(39.35)	(102.50)	(69.04)	(98.86)	(124.74)	(156.13)	(122.39)	(42.74)	(101.68)
Investment$_{i,t}$	-0.04***	-0.02***	-0.04***	-0.04***	-0.15***	-0.05***	-0.08***	-0.05***	-0.05***	-0.05***	-0.03***	-0.09***	-0.06***
	(-9.36)	(-20.40)	(-10.82)	(-9.36)	(-17.72)	(-27.51)	(-29.23)	(-47.83)	(-47.94)	(-34.48)	(-20.67)	(-11.54)	(-34.72)
Debt growth$_{i,t}$	**0.27*** **	**0.12*** **	**0.15*** **	**0.27*** **	**0.15***	**0.21*** **	**-0.10**	**-0.002**	**0.08****	**0.09*** **	**0.16*** **	**0.32****	**0.13***
	(7.80)	**(6.87)**	**(5.72)**	**(7.80)**	**(2.24)**	**(5.00)**	**(-1.53)**	**(-0.11)**	**(3.05)**	**(4.59)**	**(8.89)**	**(2.79)**	**(2.36)**
Adj. cash holdings$_{i,t-1}$	**0.003.**	**0.005*** **	**0.002.**	**0.003.**	**-0.003**	**-0.002**	**0.002****	**0.008*** **	**0.06*** **	**-0.00**	**0.006*** **	**-0.01***	**0.003***
	(1.78)	**(9.17)**	**(1.82)**	**(1.78)**	**(-1.50)**	**(-1.47)**	**(2.71)**	**(8.63)**	**(5.01)**	**(-0.59)**	**(10.11)**	**(-2.54)**	**(2.23)**
Debt growth$_{i,t}$×	-0.15***	-0.05***	-0.08***	-0.15***	-0.07*	-0.10***	0.04	-0.02*	-0.03***	-0.05***	-0.07***	-0.10**	-0.07**
Adj. cash holdings$_{i,t-1}$	(-8.07)	(-7.41)	(-6.10)	(-8.07)	(2.39)	(-5.36)	(1.29)	(-2.02)	(-3.31)	(-5.06)	(-9.57)	(-2.79)	(-2.60)
Obs.	219869	161408	123411	70749	35432	81982	50275	310964	182546	156440	179774	34709	1569166
Serial. corr. test, order 1 (p-val)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.003	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Serial. corr. test, order 2 (p-val)	0.032	0.037	0.164	0.032	0.607	0.916	0.222	0.071	0.131	0.455	0.081	0.666	0.056

Notes: The table shows the results for the model with industry-adjusted cash holdings as financial friction proxy for each country separately as well as for the entire region. It reports coefficients, (t-stats) for a Blundell-Bond (1998) dynamic panel data estimation, by limiting the number of lags of the dependent variable used as instruments to two. The dependent variable is ΔTFP ACF$_{i,t+1}$. The last three lines report the number of observations used in estimation, and p-values of the first- and second order autocorrelation in the error term. Standard errors are heteroskedasticity robust. ***, **, *, and **.** denote statistical significance at 0-0.1%, 0.1-1%, 1-5%, and 5-10% levels, respectively. *Source:* Author estimation.

Appendix G (b). Adjusted cash holdings proxy and Labour productivity growth (robustness)

	BG	CR	CZ	EE	HU	LV	PL	RO	SB	SK	SL	UA	Region
$\Delta LP_{i,t}$	-0.82***	-0.84***	-0.96***	-0.92***	-0.82***	-0.95***	-0.99***	-0.69***	-0.81***	-0.92***	-0.82***	-0.79***	-0.81***
	(-169.55)	(-158.54)	(-129.21)	(-48.90)	(-17.96)	(-119.46)	(-23.04)	(-72.68)	(-93.18)	(-81.65)	(-169.26)	(-50.69)	(-29.43)
$\Delta LP_{i,t-1}$	-0.61***	-0.63***	-0.76***	-0.67***	-0.65***	-0.74***	-0.76***	-0.47***	-0.63***	-0.78***	-0.62***	-0.67***	-0.55***
	(-130.89)	(-124.32)	(-93.33)	(-36.98)	(-14.13)	(-87.34)	(-12.83)	(-58.17)	(-67.77)	(-69.76)	(-138.32)	(-40.51)	(-19.66)
Log $assets_{i,t}$	-0.006***	0.002***	0.006**	0.002	-0.006	0.01**	-0.008***	-0.03***	-0.01**	-0.03***	-0.005***	0.008***	-0.003***
	(-4.74)	(6.50)	(18.37)	(0.76)	(-0.87)	(2.73)	(-4.23)	(-19.70)	(-7.76)	(-10.25)	(-5.78)	(3.38)	(-4.54)
Sales $growth_{i,t}$	0.34***	0.34***	0.41***	0.44***	0.35***	0.56***	0.42***	0.38***	0.29***	0.36***	0.30***	0.39***	0.52***
	(73.16)	(63.62)	(41.59)	(24.82)	(6.83)	(32.42)	(9.42)	(43.40)	(48.39)	(26.81)	(63.50)	(16.95)	(15.67)
$Investment_{i,t}$	0.001	0.002	-0.01**.**	-0.03**	-0.05	0.05	-0.06*	0.007**	0.01***	-0.00	0.01***	0.06***	0.01***
	(0.44)	(1.32)	(-1.71)	(-2.73)	(-1.23)	(6.53)	(-2.04)	(2.86)	(4.29)	(-0.12)	(8.28)	(4.77)	(5.53)
Debt $growth_{i,t}$	**-0.19*** **	**0.003**	**-0.29*** **	**-0.95*** **	**-1.76*** **	**-0.98*** **	**-2.41*** **	**-1.30*** **	**-0.56*** **	**-0.26*** **	**-0.02**	**0.49***	**-0.60*** **
	(-7.29)	**(0.19)**	**(-5.79)**	**(-6.48)**	**(-6.60)**	**(-5.57)**	**(-3.75)**	**(-11.06)**	**(-6.80)**	**(-3.48)**	**(-1.06)**	**(2.51)**	**(-12.84)**
Adj. cash $holdings_{i,t-1}$	**0.004*** **	**0.004*** **	**0.01*** **	**0.03*** **	**0.04*** **	**0.04*** **	**0.02**	**-0.03*** **	**-0.02*** **	**-0.003**	**0.003*** **	**-0.02***	**0.15*** **
	(4.72)	**(6.55)**	**(6.96)**	**(4.47)**	**(2.78)**	**(7.20)**	**(1.60)**	**(-7.65)**	**(-5.14)**	**(-1.04)**	**(4.95)**	**(-2.32)**	**(6.65)**
Debt $growth_{i,t}$×	0.08***	-0.008	0.15***	0.48***	0.82***	0.39***	1.11***	0.65***	0.22***	0.12***	0.00	-0.16**	0.29***
Adj. $cash\ holdings_{i,t-1}$	(6.92)	(-1.22)	(5.53)	(6.21)	(6.41)	(5.00)	(3.69)	(9.89)	(6.60)	(3.22)	(0.11)	(-2.58)	(12.60)
Obs.	219869	161408	123411	70749	35432	81982	50275	310964	182546	118047	179774	34709	1569166
Serial. corr. test, order 1 (p-val)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Serial. corr. test, order 2 (p-val)	0.908	0.465	0.877	0.121	0.030	0.261	0.363	0.002	0.338	0.489	0.910	0.029	0.168

Notes: The table shows the results for the model with industry-adjusted cash holdings as financial friction proxy for each country separately as well as for the entire region. It reports coefficients, (t-stats) for a Blundell-Bond (1998) dynamic panel data estimation, by limiting the number of lags of the dependent variable used as instruments to two. The dependent variable is $\Delta LP_{i,t+1}$. The last three lines report the number of observations used in estimation, and p-values of the first- and second order autocorrelation in the error term. Standard errors are heteroskedasticity robust. ***, **, *, and **.** denote statistical significance at 0-0.1%, 0.1-1%, 1-5%, and 5-10% levels, respectively. *Source:* Author estimation.

Appendix H (a). Adjusted interest expense ratio proxy and TFP growth

	BG	CR	CZ	EE	HU	LV	PL	RO	SB	SK	SL	UA	Region
ΔTFP ACF$_{i,t}$	-0.52***	-0.50***	-0.57***	-0.61***	-0.65***	-0.52***	-0.61***	-0.41***	-0.55***	-0.56***	-0.45***	-0.44***	-0.69***
	(-54.29)	(-80.36)	(-71.17)	(-54.79)	(-28.46)	(-42.88)	(-52.04)	(-35.08)	(-82.30)	(-78.97)	(-70.24)	(-24.83)	(-130.03)
ΔTFP ACF$_{i,t-1}$	-0.43***	-0.40***	-0.47***	-0.48***	-0.61***	-0.39***	-0.54***	-0.34***	-0.50***	-0.49***	-0.38***	-0.39***	-0.60***
	(-49.35)	(-66.49)	(-58.28)	(-43.59)	(-26.57)	(-35.54)	(-30.78)	(-37.30)	(-81.42)	(-69.94)	(-60.42)	(-20.70)	(-113.54)
Log assets$_{i,t}$	0.003**	0.008***	0.007***	0.008***	0.003	-0.003***	-0.00	0.01***	-0.003***	-0.005***	0.004***	-0.004	0.007***
	(2.95)	(12.59)	(11.32)	(6.43)	(1.48)	(-3.76)	(-0.04)	(16.65)	(-3.85)	(-5.67)	(6.01)	(-1.53)	(18.21)
Sales growth$_{i,t}$	0.50***	0.45***	0.49***	0.46***	0.47***	0.40***	0.50***	0.48***	0.51***	0.58***	0.52***	0.60***	0.40***
	(87.79)	(114.01)	(99.28)	(67.23)	(29.13)	(100.50)	(72.59)	(93.77)	(124.62)	(137.59)	(126.08)	(40.92)	(110.17)
Investment$_{i,t}$	-0.06***	-0.03***	-0.05***	-0.06***	-0.15***	-0.05***	-0.08***	-0.06***	-0.05***	-0.05***	-0.03***	-0.11***	-0.11***
	(-21.07)	(-23.83)	(-24.12)	(-17.27)	(-11.95)	(-39.07)	(-32.21)	(-49.31)	(-51.10)	(-41.25)	(-19.16)	(-11.73)	(-20.52)
Debt growth$_{i,t}$	-0.45***	-0.14***	-0.06*	-0.18***	0.04*	-0.07***	-0.01	-0.20***	0.01	-0.05***	-0.15***	-0.23*	-0.61***
	(-9.92)	(-12.81)	(-2.13)	(-5.58)	(2.01)	(-4.25)	(-0.61)	(-4.34)	(1.29)	(-4.84)	(-9.92)	(-2.55)	(-10.74)
Adj. interest exp. ratio $_{i,t-1}$	**-0.01*** **	**-0.006*** **	**-0.002. **	**-0.003* **	**0.00. **	**-0.00 **	**0.001. **	**0.00*** **	**0.001*** **	**-0.001*** **	**-0.004*** **	**0.00 **	**-0.001*** **
	(-21.07)	**(-9.63)**	**(-1.65)**	**(-2.53)**	**(1.95)**	**(-1.58)**	**(1.88)**	**(3.55)**	**(3.42)**	**(-4.19)**	**(-7.76)**	**(0.06)**	**(-8.63)**
Debt growth$_{i,t}$ × Adj. interest exp. ratio $_{i,t-1}$	0.18***	0.03***	0.02**.**	0.06***	-0.002*	0.01**	-0.002	0.004***	-0.003*	0.006***	0.02***	0.08*	0.06***
	(9.18)	(11.38)	(1.70)	(5.10)	(-2.17)	(3.15)	(-0.29)	(3.33)	(-2.19)	(4.04)	(8.84)	(2.48)	(10.54)
Obs.	219869	161408	123411	70749	35432	81982	50275	310964	182546	118047	179774	34709	1569166
Serial. corr. test, order 1 (p-val)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Serial. corr. test, order 2 (p-val)	0.009	0.057	0.014	0.014	0.543	0.179	0.211	0.410	0.037	0.743	0.817	0.014	0.377

Notes: The table shows the results for the model with industry-adjusted interest expense ratio as financial friction proxy for each country separately as well as for the entire region. It reports coefficients, (t-stats) for a Blundell-Bond (1998) dynamic panel data estimation, by limiting the number of lags of the dependent variable used as instruments to two. The dependent variable is ΔTFP ACF$_{i,t+1}$. The last three lines report the number of observations used in estimation, and p-values of the first- and second order autocorrelation in the error term. Standard errors are heteroskedasticity robust. ***, **, *, and **.** denote statistical significance at 0-0.1%, 0.1-1%, 1-5%, and 5-10% levels, respectively. *Source:* Author estimation.

Appendix H (b). Adjusted interest expense ratio proxy and Labour productivity growth (robustness)

	BG	CR	CZ	EE	HU	LV	PL	RO	SB	SK	SL	UA	Region
$\Delta LP_{i,t}$	-0.80***	-0.84***	-0.97***	-0.90***	-0.80***	-0.89***	-0.98***	-0.71***	-0.85***	-0.93***	-0.81***	-0.79***	-0.81***
	(-91.81)	(-159.29)	(-109.20)	(-56.20)	(-30.94)	(-39.12)	(-85.44)	(-88.62)	(-96.66)	(-66.13)	(-70.16)	(-53.75)	(-97.73)
$\Delta LP_{i,t-1}$	-0.60***	-0.63***	-0.78***	-0.67***	-0.58***	-0.65***	-0.76***	-0.49***	-0.67***	-0.78***	-0.61***	-0.66***	-0.59***
	(-77.02)	(-125.47)	(-80.36)	(-44.46)	(-27.86)	(-23.26)	(-42.56)	(-75.31)	(-77.59)	(-47.57)	(-58.89)	(-39.05)	(-67.05)
Log assets$_{i,t}$	-0.007***	-0.007***	-0.01***	-0.007*	-0.006	0.05***	-0.002***	-0.03***	-0.01***	-0.02***	-0.007***	0.00	-0.003**
	(-4.61)	(-6.19)	(-5.79)	(-2.54)	(-1.38)	(4.24)	(-4.58)	(-21.22)	(-8.17)	(-5.29)	(-13.89)	(0.96)	(-3.17)
Sales growth$_{i,t}$	0.35***	0.33***	0.41***	0.43***	0.34***	0.61***	0.47***	0.31***	0.30***	0.36***	0.28***	0.47***	0.24***
	(47.67)	(64.32)	(37.68)	(28.84)	(14.46)	(17.07)	(33.05)	(49.06)	(43.97)	(20.95)	(34.66)	(20.55)	(38.14)
Investment$_{i,t}$	0.008**	0.003*	0.03***	0.02**	0.004	0.09***	0.00	0.005***	0.02***	0.05***	0.02***	0.08***	0.02***
	(2.84)	(2.27)	(4.37)	(3.08)	(0.31)	(5.46)	(0.13)	(3.58)	(8.32)	(5.14)	(6.74)	(5.67)	(5.43)
Debt growth$_{i,t}$	-0.08**	-0.08***	-0.32**	0.13*	-0.08	-2.56***	-0.12**	0.03***	-0.04*	-0.66***	-0.25***	-0.34**	-0.36***
	(-2.67)	(-6.83)	(-3.52)	(2.45)	(-1.57)	(-4.39)	(-2.64)	(3.18)	(-2.54)	(-6.83)	(-5.31)	(-2.63)	(-4.90)
Adj. interest exp. ratio $_{i,t-1}$	**0.00**	**-0.003***	**-0.1***	**-0.001**	**-0.001**	**-0.08***	**-0.003.**	**-0.00.**	**-0.001***	**-0.02***	**-0.006***	**0.00**	**-0.001***
	(0.61)	**(-6.03)**	**(-2.88)**	**(-0.45)**	**(-1.38)**	**(-3.76)**	**(-1.69)**	**(-1.68)**	**(-2.15)**	**(-7.11)**	**(-4.51)**	**(0.01)**	**(-4.27)**
Debt growth$_{i,t}$× Adj. interest exp. ratio $_{i,t-1}$	0.03*	0.02***	0.12***	-0.06**	0.003	0.66***	0.03*	-0.004***	0.005*	0.09***	0.03***	0.12*	0.10***
	(2.23)	(5.87)	(3.44)	(-2.89)	(1.36)	(4.03)	(2.00)	(-11.86)	(1.99)	(6.37)	(4.85)	(0.46)	(4.95)
Obs.	219869	161408	123411	70749	35432	81982	50275	310964	182546	118047	179774	34709	1569166
Serial. corr. test, order 1 (p-val)	<0.001	<0.001	<0.001	<0.001	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Serial. corr. test, order 2 (p-val)	0.478	0.973	0.247	0.997	0.124	0.363	0.001	0.075	0.021	0.005	0.409	0.002	0.394

Notes: The table shows the results for the model with industry-adjusted interest expense ratio as financial friction proxy for each country separately as well as for the entire region. It reports coefficients, (t-stats) for a Blundell-Bond (1998) dynamic panel data estimation, by limiting the number of lags of the dependent variable used as instruments to two. The dependent variable is $\Delta LP_{i,t+1}$. The last three lines report the number of observations used in estimation, and p-values of the first- and second order autocorrelation in the error term. Standard errors are heteroskedasticity robust. ***, **, *, and **.** denote statistical significance at 0-0.1%, 0.1-1%, 1-5%, and 5-10% levels, respectively. *Source:* Author estimation.

Appendix I (a). External finance dependency and TFP growth

	BG	CR	CZ	EE	HU	LV	PL	RO	SB	SK	SL	UA	Region
ΔTFP ACF$_{i,t}$	-0.51***	-0.39***	-0.70***	-0.76***	-0.68***	-0.48***	-0.46***	-0.43***	-0.55***	-0.56***	-0.61***	-0.37***	-0.64***
	(-66.87)	(-45.37)	(-63.90)	(-53.06)	(-42.55)	(-52.68)	(-26.47)	(-64.76)	(-82.52)	(-81.85)	(-79.66)	(-24.88)	(-141.94)
ΔTFP ACF$_{i,t-1}$	-0.41***	-0.30***	-0.64***	-0.69***	-0.61***	-0.37***	-0.42***	-0.30***	-0.50***	-0.49***	-0.56***	-0.33***	-0.51***
	(-59.28)	(-37.27)	(-61.08)	(-52.86)	(-39.23)	(-44.05)	(-15.91)	(-62.78)	(-81.25)	(-74.22)	(-81.78)	(-22.22)	(-125.79)
Log assets$_{i,t}$	-0.00	0.009***	0.008***	0.007***	0.003.	-0.003***	0.001	0.01***	-0.002***	-0.005***	0.007***	-0.004*	0.007***
	(-0.44)	(12.98)	(11.24)	(4.90)	(1.90)	(-5.55)	(0.96)	(16.41)	(-3.73)	(-6.29)	(10.78)	(-2.53)	(24.58)
Sales growth$_{i,t}$	0.52***	0.53***	0.46***	0.44***	0.46***	0.40***	0.54***	0.46***	0.52***	0.58***	0.50***	0.64***	0.40***
	(107.98)	(103.43)	(74.31)	(52.63)	(44.12)	(126.63)	(62.25)	(98.36)	(125.89)	(140.87)	(109.07)	(68.60)	(133.19)
Investment$_{i,t}$	-0.07***	-0.04***	-0.04***	-0.04***	-0.15***	-0.05***	-0.08***	-0.06***	-0.05***	-0.06***	-0.03***	-0.11***	-0.07***
	(-45.73)	(-37.46)	(26.47)	(-19.65)	(-21.69)	(-57.93)	(-27.73)	(-58.91)	(-52.44)	(-51.65)	(-38.55)	(-17.49)	(-67.81)
Debt growth$_{i,t}$	-0.03***	-0.02***	-0.02***	-0.02***	-0.01*	-0.006*	-0.01**	-0.10***	-0.01***	-0.02***	-0.01***	-0.008	0.33***
	(-7.52)	(-7.41)	(-6.33)	(-3.96)	(-2.28)	(-2.17)	(-2.67)	(-19.13)	(-4.74)	(-6.44)	(-7.81)	(-0.37)	(9.12)
Debt growth$_{i,t}$× Ext. fin. dependency	**0.02*** (3.33)**	**0.03*** (4.73)**	**0.02*** (3.95)**	**0.01 (0.89)**	**0.004 (0.35)**	**-0.04*** (-4.80)**	**0.004 (0.31)**	**0.19*** (14.61)**	**0.009 (1.32)**	**0.02** (3.03)**	**0.01** (3.20)**	**0.02 (0.22)**	**0.06*** (9.52)**
Obs.	280286	161408	123411	70749	35432	81982	50275	310964	182546	118047	179774	34709	1569166
Serial. corr. test, order 1 (p-val)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Serial. corr. test, order 2 (p-val)	0.131	0.039	0.529	0.187	0.026	0.737	0.437	0.105	0.023	0.064	0.080	0.149	<0.001

Notes: The table shows the results for the model with external finance dependency as financial friction proxy for each country separately as well as for the entire region. External finance dependency constructed as median ratio of fixed asset to sales over corresponding industry in the US. It reports coefficients, (t-stats) for a Blundell-Bond (1998) dynamic panel data estimation, by limiting the number of lags of the dependent variable used as instruments to two. The dependent variable is $\Delta\text{TFP ACF}_{i,t+1}$. The last three lines report the number of observations used in estimation, and p-values of the first- and second order autocorrelation in the error term. Standard errors are heteroskedasticity robust. ***, **, *, and **.** denote statistical significance at 0-0.1%, 0.1-1%, 1-5%, and 5-10% levels, respectively. *Source:* Author estimation.

Appendix I (b). External finance dependency and Labour productivity growth (robustness)

	BG	CR	CZ	EE	HU	LV	PL	RO	SB	SK	SL	UA	Region
$\Delta LP_{i,t}$	-0.81***	-0.83***	-0.97***	-0.91***	-0.81***	-0.95***	-0.96***	-0.74***	-0.85***	-0.92***	-0.81***	-0.78***	-0.83***
	(-186.37)	(-162.97)	(-144.13)	(-116.86)	(-35.73)	(-148.94)	(-51.68)	(-195.79)	(-187.45)	(-162.18)	(-91.41)	(-86.00)	(-177.98)
$\Delta LP_{i,t-1}$	-0.61***	-0.63***	-0.77***	-0.67***	-0.61***	-0.74***	-0.72***	-0.51***	-0.66***	-0.78***	-0.62***	-0.62***	-0.61***
	(-143.98)	(-128.73)	(-105.03)	(-85.62)	(-29.28)	(-110.73)	(-26.52)	(-142.47)	(-141.28)	(-128.44)	(-81.59)	(-57.50)	(-132.37)
Log $assets_{i,t}$	-0.005***	-0.007***	-0.01***	0.006	-0.007*	0.003	-0.002***	-0.03***	-0.008***	-0.03***	-0.008***	0.009***	0.00
	(-4.48)	(-6.28)	(-7.49)	(0.30)	(-2.19)	(0.82)	(-3.62)	(-28.84)	(-7.96)	(-4.24)	(-6.74)	(3.48)	(0.09)
Sales $growth_{i,t}$	0.34***	0.33***	0.41***	0.43***	0.34***	0.55**	0.47***	0.35***	0.29***	0.36***	0.28***	0.43***	0.30***
	(77.33)	(64.62)	(43.81)	(45.56)	(16.83)	(37.31)	(25.34)	(83.98)	(69.30)	(41.60)	(40.22)	(36.73)	(57.94)
$Investment_{i,t}$	0.01***	0.002	0.01***	0.03***	-0.004	0.07***	-0.007	0.009***	0.02***	0.01***	0.01***	0.06***	0.01***
	(6.42)	(1.14)	(3.50)	(6.65)	(-0.35)	(15.04)	(-1.14)	(8.03)	(13.95)	(4.49)	(6.14)	(7.93)	(7.05)
Debt $growth_{i,t}$	-0.02***	-0.02***	-0.01.	-0.03***	0.00	-0.12***	-0.02*	-0.13***	-0.02***	-0.03***	-0.01***	-0.03***	-0.10***
	(-3.55)	(-4.20)	(-1.75)	(-4.17)	(0.08)	(-7.84)	(-2.08)	(-23.86)	(-5.12)	(-4.24)	(-3.67)	(-4.16)	(-12.61)
Debt $growth_{i,t}$×	**0.01**	**0.00**	**0.01**	**0.02**	**-0.03**	**0.08**	**-0.01**	**0.03**	**0.02**	**0.003**	**0.004**	**0.05***	**0.03**
Ext. fin. dependency	**(1.45)**	**(0.06)**	**(0.66)**	**(0.65)**	**(-1.31)**	**(1.62)**	**(-0.47)**	**(1.61)**	**(1.49)**	**(0.24)**	**(0.61)**	**(2.06)**	**(12.16)**
Obs.	280286	161408	123411	70749	35432	81982	50275	310964	182546	118047	179774	34709	1569166
Serial. corr. test, order 1 (p-val)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Serial. corr. test, order 2 (p-val)	0.748	0.770	0.756	0.327	0.590	0.003	0.004	0.632	0.047	0.188	0.143	0.067	<0.001

Notes: The table shows the results for the model with external finance dependency as financial friction proxy for each country separately as well as for the entire region. External finance dependency constructed as median ratio of fixed asset to sales over corresponding industry in the US. It reports coefficients, (t-stats) for a Blundell-Bond (1998) dynamic panel data estimation, by limiting the number of lags of the dependent variable used as instruments to two. The dependent variable is $\Delta LP_{i,t+1}$. The last three lines report the number of observations used in estimation, and p-values of the first- and second order autocorrelation in the error term. Standard errors are heteroskedasticity robust. ***, **, *, and **.** denote statistical significance at 0-0.1%, 0.1-1%, 1-5%, and 5-10% levels, respectively. *Source:* Author estimation.

Appendix J (a). FCP index and TFP growth

	BG	CR	CZ	EE	HU	LV	PL	RO	SB	SK	SL	UA	Region
ΔTFP ACF$_{i,t}$	-0.50***	-0.50***	-0.70***	-0.85***	-0.66***	-0.51***	-0.62***	-0.42***	-0.56***	-0.53***	-0.59***	-0.62***	-0.62***
	(-61.63)	(-85.45)	(-62.95)	(-45.98)	(-31.55)	(-42.36)	(-39.89)	(-57.44)	(-73.29)	(-59.31)	(-69.08)	(-40.88)	(-109.70)
ΔTFP ACF$_{i,t-1}$	-0.42***	-0.39***	-0.64***	-0.75***	-0.62***	-0.39***	-0.60***	-0.29***	-0.50***	-0.50***	-0.54***	-0.59***	-0.55***
	(-58.73)	(-69.06)	(-60.29)	(-44.44)	(-31.43)	(-35.65)	(-28.43)	(-57.01)	(-70.93)	(-58.65)	(-69.96)	(-40.13)	(-109.09)
Log assets$_{i,t}$	0.001	0.008***	0.007***	0.01***	0.004*	-0.004***	0.002.	0.02***	-0.003***	-0.005***	0.008***	0.00	0.006***
	(1.57)	(13.32)	(9.54)	(6.11)	(2.11)	(-4.79)	(1.76)	(21.51)	(-3.89)	(-6.17)	(11.00)	(0.24)	(22.36)
Sales growth$_{i,t}$	0.52***	0.45***	0.46***	0.42***	0.45***	0.39***	0.48***	0.49***	0.52***	0.59***	0.51***	0.53***	0.44***
	(104.15)	(119.73)	(74.55)	(40.95)	(35.39)	(93.54)	(60.56)	(92.40)	(110.42)	(114.01)	(103.37)	(55.08)	(124.36)
Investment$_{i,t}$	-0.07***	-0.03***	-0.04***	-0.04***	-0.13***	-0.05***	-0.07***	-0.06***	-0.05***	-0.05***	-0.03***	-0.09***	-0.06***
	(-43.85)	(-38.79)	(-26.79)	(-14.08)	(-17.03)	(-42.07)	(-27.17)	(-52.31)	(-45.35)	(-52.01)	(-33.61)	(-15.74)	(-51.62)
Debt growth$_{i,t}$	-0.02***	-0.02***	-0.01***	-0.03***	-0.02***	-0.02***	-0.009*	-0.07***	-0.008***	-0.01***	-0.01***	-0.008.	-0.02***
	(-7.68)	(-7.07)	(-4.16)	(-5.33)	(-3.73)	(-6.35)	(-2.49)	(-11.71)	(-4.39)	(-4.69)	(-5.74)	(-1.85)	(-13.47)
FinCon$_{i,t-1}$	**-0.02*** **	**0.001**	**0.01*** **	**0.02*** **	**-0.004**	**0.004.**	**-0.01*** **	**-0.004***	**0.02*** **	**0.01*** **	**0.01*** **	**0.02*** **	**0.004*** **
	(-7.63)	**(0.56)**	**(5.15)**	**(4.62)**	**(-0.74)**	**(1.79)**	**(-3.79)**	**(-2.11)**	**(10.91)**	**(5.28)**	**(7.79)**	**(4.43)**	**(3.58)**
Debt growth$_{i,t}$× FinCon$_{i,t-1}$	0.01**	0.004.	0.001	0.02***	0.02***	0.004	-0.003	0.04***	0.00	0.001	0.002	0.001	0.009***
	(3.04)	(1.75)	(0.46)	(3.16)	(3.49)	(1.03)	(-0.73)	(6.47)	(0.41)	(0.45)	(0.98)	(0.33)	(6.43)
Obs.	280286	161408	123411	70749	35432	81982	50275	310964	182546	118047	179774	34709	1569166
Serial. corr. test, order 1 (p-val)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Serial. corr. test, order 2 (p-val)	0.991	0.977	0.684	0.448	0.464	0.505	0.955	0.132	0.003	0.060	0.528	0.084	<0.001

Notes: The table shows the results for the model with an index of financial constraints for private firms (FCP) as financial friction proxy for each country separately as well as for the entire region. FinCon$_{i,t-1}$ variable takes value of 1 if the firm is located in the bottom tercile of the FCP index, and 0 otherwise. It reports coefficients, (t-stats) for a Blundell-Bond (1998) dynamic panel data estimation, by limiting the number of lags of the dependent variable used as instruments to two. The dependent variable is ΔTFP ACF$_{i,t+1}$. The last three lines report the number of observations used in estimation, and p-values of the first- and second order autocorrelation in the error term. Standard errors are heteroskedasticity robust. ***, **, *, and . denote statistical significance at 0-0.1%, 0.1-1%, 1-5%, and 5-10% levels, respectively. *Source:* Author estimation.

Appendix J (b). FCP index and Labour productivity growth (robustness)

	BG	CR	CZ	EE	HU	LV	PL	RO	SB	SK	SL	UA	Region
$\Delta LP_{i,t}$	-0.79***	-0.82***	-0.98***	-0.91***	-0.83***	-0.91***	-0.97***	-0.69***	-0.86***	-0.92***	-0.83***	-0.76***	-0.87***
	(-85.54)	(-73.44)	(-137.95)	(-43.73)	(-62.67)	(-55.58)	(-83.87)	(-88.07)	(-85.10)	(-83.76)	(-78.21)	(-64.80)	(-109.56)
$\Delta LP_{i,t-1}$	-0.59***	-0.62***	-0.77***	-0.66***	-0.62***	-0.70***	-0.74***	-0.48***	-0.66***	-0.77***	-0.62***	-0.64***	-0.76***
	(-74.59)	(-66.26)	(-102.71)	(-36.32)	(-50.43)	(-46.46)	(-42.08)	(-77.32)	(-71.26)	(-73.29)	(-70.76)	(-56.09)	(-105.85)
Log assets$_{i,t}$	-0.006***	-0.008***	-0.01***	0.00	-0.007**	0.006	-0.009**	-0.03***	-0.01***	-0.03***	-0.008***	0.02***	0.01***
	(-3.81)	(-5.21)	(-8.07)	(0.24)	(-2.58)	(1.02)	(-3.23)	(-18.70)	(-7.24)	(-9.55)	(-6.01)	(3.50)	(20.15)
Sales growth$_{i,t}$	0.36***	0.32***	0.41***	0.42***	0.31***	0.57***	0.46***	0.33***	0.29***	0.35***	0.28***	0.44***	0.30***
	(47.68)	(37.01)	(43.76)	(24.45)	(22.10)	(21.69)	(31.80)	(49.36)	(38.57)	(27.78)	(36.46)	(31.22)	(33.43)
Investment$_{i,t}$	0.004**.**	-0.002	0.01***	0.02***	-0.004	0.05***	-0.002	0.005***	0.02***	0.01**	0.01***	0.06***	0.004***
	(1.90)	(-0.95)	(3.38)	(2.82)	(-0.38)	(6.94)	(-0.44)	(3.77)	(7.77)	(3.13)	(5.27)	(6.19)	(2.94)
Debt growth$_{i,t}$	-0.009	-0.01*	0.002	-0.04***	-0.02*	-0.09**	-0.03**	-0.11***	-0.009*	-0.02**	-0.02***	-0.001	-0.04***
	(-1.62)	(-2.27)	(0.35)	(-3.51)	(-2.22)	(-3.17)	(-2.92)	(-11.22)	(-2.26)	(-2.81)	(-3.77)	(-0.16)	(-11.06)
FinCon$_{i,t-1}$	**-0.02****	**-0.01.**	**0.02****	**-0.03***	**0.007**	**-0.06***	**-0.06*****	**-0.05*****	**0.01****	**-0.03*****	**-0.00**	**-0.05*****	**-0.01*****
	(-3.19)	**(-1.89)**	**(2.80)**	**(-2.51)**	**(0.84)**	**(-2.56)**	**(-7.16)**	**(-15.81)**	**(2.98)**	**(-3.83)**	**(-0.08)**	**(-5.02)**	**(-3.90)**
Debt growth$_{i,t}$× FinCon$_{i,t-1}$	-0.003	0.004	-0.01*	0.02**.**	0.00	0.01	-0.001	0.04***	-0.00	0.004	0.01*	-0.02*	0.02***
	(-0.46)	(0.69)	(-2.11)	(1.87)	(0.07)	(0.32)	(-0.11)	(4.12)	(-0.00)	(0.41)	(2.04)	(-2.11)	(5.90)
Obs.	280286	161408	123411	70749	35432	81982	50275	310964	182546	118047	179774	34709	1569166
Serial. corr. test, order 1 (p-val)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Serial. corr. test, order 2 (p-val)	0.918	0.611	0.681	0.595	0.879	0.114	<0.001	<0.001	0.140	0.040	0.853	0.001	<0.001

Notes: The table shows the results for the model with an index of financial constraints for private firms (FCP) as financial friction proxy for each country separately as well as for the entire region. FinCon$_{i,t-1}$ variable takes value of 1 if the firm is located in the bottom tercile of the FCP index, and 0 otherwise. It reports coefficients, (t-stats) for a Blundell-Bond (1998) dynamic panel data estimation, by limiting the number of lags of the dependent variable used as instruments to two. The dependent variable is $\Delta LP_{i,t+1}$. The last three lines report the number of observations used in estimation, and p-values of the first- and second order autocorrelation in the error term. Standard errors are heteroskedasticity robust. ***, **, *, and **.** denote statistical significance at 0-0.1%, 0.1-1%, 1-5%, and 5-10% levels, respectively. *Source:* Author estimation.

Appendix K. Non-linear adjusted book leverage proxy

	BG	CR	CZ	EE	HU	LV	PL	RO	SB	SK	SL	UA	Region
ΔTFP ACF$_{i,t}$	-0.50***	-0.50***	-0.56***	-0.80***	-0.68***	-0.48***	-0.57***	-0.63***	-0.55***	-0.56***	-0.44***	-0.43***	-0.50***
	(-64.18)	(-85.59)	(-70.62)	(-53.91)	(-32.75)	(-51.87)	(-44.96)	(-93.05)	(-83.96)	(-80.82)	(-86.72)	(-39.32)	(-119.03)
ΔTFP ACF$_{i,t-1}$	-0.41***	-0.40***	-0.46***	-0.72***	-0.64***	-0.38***	-0.50***	-0.52***	-0.50***	-0.50***	-0.36***	-0.37***	-0.42***
	(-56.35)	(-71.69)	(-57.07)	(-53.72)	(-32.93)	(-43.27)	(-26.65)	(-94.31)	(-82.34)	(-73.52)	(-73.05)	(-33.11)	(-103.23)
Log assets$_{i,t}$	0.006***	0.02***	0.01***	0.005***	0.003	-0.007***	0.002*	0.01***	-0.004***	-0.008***	0.01***	0.004**	0.003***
	(5.54)	(22.20)	(14.83)	(3.35)	(1.57)	(-8.34)	(2.15)	(14.15)	(-5.45)	(-9.46)	(17.86)	(2.83)	(2.89)
Sales growth$_{i,t}$	0.52***	0.45***	0.50***	0.43***	0.44***	0.40***	0.50***	0.40***	0.51***	0.58***	0.52***	0.58***	0.52***
	(104.97)	(119.01)	(97.83)	(50.27)	(34.79)	(123.69)	(66.67)	(96.39)	(127.60)	(139.28)	(144.23)	(77.00)	(107.52)
Investment$_{i,t}$	-0.06***	-0.03***	-0.04***	-0.04***	-0.12***	-0.05***	-0.08***	-0.05***	-0.05***	-0.06***	-0.03***	-0.11***	-0.05***
	(-31.02)	(-26.47)	(-23.48)	(-18.22)	(-16.79)	(-55.53)	(-26.22)	(-51.64)	(-51.03)	(-49.63)	(-29.31)	(-19.93)	(-35.26)
Debt growth$_{i,t}$	0.13***	0.13***	0.08***	-0.05***	-0.01	-0.06***	0.18***	-0.09***	-0.05***	-0.06***	0.11***	0.16***	0.10***
	(10.52)	(19.80)	(11.51)	(-5.06)	(-1.05)	(-8.70)	(8.52)	(-7.46)	(-12.16)	(-9.79)	(22.15)	(9.41)	(11.25)
Adj. book leverage$_{i,t-1}$	**0.005**	**0.008****	**0.004**	**-0.01***	**-0.01****	**-0.001**	**-0.02*****	**0.009*****	**-0.02*****	**-0.03*****	**-0.005.**	**-0.02*****	**-0.01*****
	(1.23)	**(2.92)**	**(1.16)**	**(-2.20)**	**(-2.78)**	**(-0.83)**	**(-4.99)**	**(3.66)**	**(-10.56)**	**(-8.53)**	**(-1.94)**	**(-4.21)**	**(-3.68)**
Adj. book leverage$^2_{i,t-1}$	**-0.005*****	**-0.002*****	**-0.003*****	**0.005***	**0.002***	**0.001***	**0.004****	**0.00**	**0.005*****	**0.005*****	**0.002****	**-0.00**	**0.001****
	(-4.24)	**(-3.59)**	**(-3.80)**	**(2.42)**	**(2.01)**	**(2.41)**	**(2.69)**	**(1.24)**	**(11.37)**	**(6.90)**	**(2.59)**	**(-1.06)**	**(2.86)**
Debt growth$_{i,t}$ × Adj. book leverage$_{i,t-1}$	-0.19***	-0.19***	-0.11***	0.05***	0.008	0.05***	-0.19***	0.06***	0.06***	0.05***	-0.18***	-0.15***	-0.18***
	(-12.43)	(-21.65)	(-13.18)	(3.79)	(0.52)	(6.02)	(-9.06)	(4.44)	(10.53)	(7.54)	(-24.49)	(-9.40)	(-14.23)
Obs.	219869	161408	123411	70749	35432	81982	50275	310964	182546	156440	179774	34709	1569166
Serial. corr. test, order 1 (p-val)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.003	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Serial. corr. test, order 2 (p-val)	0.403	0.021	0.042	0.571	0.452	0.773	0.432	0.001	0.018	0.018	0.002	0.885	<0.001

Notes: The table shows the results for the model with adjusted book leverage as financial friction proxy with addition of squared proxy term for each country separately as well as for the entire region. It reports coefficients, (t-stats) for a Blundell-Bond (1998) dynamic panel data estimation, by limiting the number of lags of the dependent variable used as instruments to two. The dependent variable is $\Delta TFP_{i,t+1}$. The last three lines report the number of observations used in estimation, and p-values of the first- and second order autocorrelation in the error term. Standard errors are heteroskedasticity robust. ***, **, *, and **.** denote statistical significance at 0-0.1%, 0.1-1%, 1-5%, and 5-10% levels, respectively. *Source:* Author estimation.

Appendix L. Non-linear adjusted cash holdings proxy

	BG	CR	CZ	EE	HU	LV	PL	RO	SB	SK	SL	UA	Region
ΔTFP ACF$_{i,t}$	-0.53***	-0.51***	-0.71***	-0.83***	-0.69***	-0.39***	-0.64***	-0.41***	-0.55***	-0.56***	-0.63***	-0.61***	-0.57***
	(-52.24)	(-90.39)	(-75.21)	(-51.44)	(-29.70)	(-24.32)	(-40.56)	(-45.96)	(-78.77)	(-80.87)	(-92.14)	(-34.58)	(-96.61)
ΔTFP ACF$_{i,t-1}$	-0.43***	-0.41***	-0.61***	-0.74***	-0.65***	-0.32***	-0.61***	-0.31***	-0.50***	-0.50***	-0.53***	-0.57***	-0.52***
	(-44.58)	(-76.72)	(-64.96)	(-50.07)	(-30.12)	(-25.14)	(-28.08)	(-44.48)	(-75.86)	(-73.25)	(-86.25)	(-27.81)	(-89.47)
Log assets$_{i,t}$	-0.003**	0.009***	0.009***	0.007***	0.004*	-0.003***	0.001	0.01***	-0.002*	-0.005***	0.008***	-0.002	-0.002*
	(-2.88)	(15.62)	(11.99)	(4.53)	(2.07)	(-4.21)	(1.11)	(10.81)	(-2.26)	(-5.74)	(12.83)	(-1.19)	(-4.59)
Sales growth$_{i,t}$	0.51***	0.44***	0.48***	0.42***	0.44***	0.42***	0.47***	0.47***	0.52***	0.58***	0.51***	0.53***	0.51***
	(87.57)	(124.51)	(84.92)	(48.49)	(32.15)	(86.31)	(57.47)	(81.76)	(123.94)	(139.29)	(126.82)	(40.16)	(156.27)
Investment$_{i,t}$	-0.10***	-0.03***	-0.04***	-0.03***	-0.12***	-0.05***	-0.07***	-0.06***	-0.05***	-0.05***	-0.03***	-0.11***	-0.06***
	(-23.02)	(-36.00)	(-11.86)	(-8.42)	(-15.29)	(-22.02)	(-13.15)	(-37.80)	(-45.67)	(-39.13)	(-23.52)	(-14.73)	(-34.29)
Debt growth$_{i,t}$	-0.41***	0.01.	0.13***	0.24***	0.12.	0.26***	-0.007	-0.92***	0.04	0.04*	0.12***	0.27*	0.02*
	(-8.09)	(1.65)	(5.15)	(5.42)	(1.94)	(4.29)	(-0.07)	(-12.64)	(1.57)	(2.24)	(7.32)	(2.38)	(4.56)
Adj. cash holdings$_{i,t-1}$	**0.005.**	**0.005*****	**0.006****	**-0.002**	**-0.003**	**-0.003**	**0.006.**	**-0.008***	**0.008*****	**0.004****	**0.009*****	**-0.01**	**0.003***
	(1.65)	**(7.00)**	**(2.85)**	**(-0.42)**	**(-0.85)**	**(-1.02)**	**(1.80)**	**(-2.41)**	**(7.21)**	**(2.80)**	**(7.01)**	**(-1.53)**	**(5.74)**
Adj. cash holdings$^2_{i,t-1}$	**-0.00**	**-0.0002****	**-0.001.**	**0.00**	**0.00**	**-0.00**	**-0.00**	**-0.001***	**-0.0004*****	**-0.001*****	**-0.004***	**-0.00**	**-0.01**
	(-0.32)	**(-2.72)**	**(-1.80)**	**(1.21)**	**(0.25)**	**(-0.89)**	**(-1.24)**	**(-2.37)**	**(-4.87)**	**(-3.40)**	**(-2.22)**	**(-0.03)**	**(-0.16)**
Debt growth$_{i,t}$ × Adj. cash holdings$_{i,t-1}$	0.19***	-0.01**	-0.07***	-0.13***	-0.06*	-0.12***	-0.003	0.47***	-0.02.	-0.02**	-0.06***	-0.09*	-0.10***
	(7.80)	(-3.08)	(-5.55)	(-5.82)	(-2.04)	(-4.54)	(-0.06)	(11.59)	(-1.85)	(-2.81)	(-8.05)	(-2.38)	(-4.12)
Obs.	219869	161408	123411	70749	35432	81982	50275	310964	182546	156440	179774	34709	1569166
Serial. corr. test, order 1 (p-val)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Serial. corr. test, order 2 (p-val)	0.372	0.078	0.087	0.330	0.964	0.119	0.659	0.017	0.064	0.095	0.003	0.845	<0.001

Notes: The table shows the results for the model with adjusted cash holdings as financial friction proxy with addition of squared proxy term for each country separately as well as for the entire region. It reports coefficients, (t-stats) for a Blundell-Bond (1998) dynamic panel data estimation, by limiting the number of lags of the dependent variable used as instruments to two. The dependent variable is $\Delta TFP_{i,t+1}$. The last three lines report the number of observations used in estimation, and p-values of the first- and second order autocorrelation in the error term. Standard errors are heteroskedasticity robust. ***, **, *, and **.** denote statistical significance at 0-0.1%, 0.1-1%, 1-5%, and 5-10% levels, respectively. *Source:* Author estimation.