

Firm Productivity, Exchange Rate Movements, Sources of Finance, and Export Orientation

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Summary. — We investigate the level and volatility effects of real exchange rates on productivity growth of manufacturing firms with heterogeneous access to debt, and domestic and foreign equity markets in Turkey. We find that while volatility affects productivity growth negatively, having access to foreign or domestic equity, or debt markets does not alleviate these effects. Furthermore, foreign or publicly traded companies do not appear to perform significantly better than the rest. We detect, however, that productivity is positively related to credit market access. Additionally, we find that while export-oriented firms react positively to currency appreciations, they are hurt more from volatility.

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Key words — productivity growth, exchange rate volatility, sources of finance, capital structure, export orientation

1. INTRODUCTION

Understanding the sources of exchange rate volatility and its impacts on the economy has been a pressing issue for researchers following the breakdown of the Bretton Woods system. As a result, the economic impacts of the level and volatility of exchange rate movements have been explored extensively using a variety of theoretical and empirical methods.¹ However, we know little about how changes in the level and volatility of exchange rates affect productivity. Despite a significant amount of research generated on the effects of exchange rate movements on investment, growth, and export performance of firms, research on firm level productivity has been limited. In fact, to our knowledge only [Aghion, Bacchetta, Ranciere, and Rogoff \(2009\)](#) provide empirical evidence that exchange rate uncertainty can negatively affect productivity growth. Furthermore, the productivity effects of heterogeneous access to external finance under exchange rate shocks also remain an unexplored field of research. The lack of research is quite surprising given that despite the substantial increases in financial openness and international capital flows across countries, firms' access to debt and equity markets, both foreign and domestic, is distributed quite unevenly, creating significant competitive asymmetries in those markets.

In this study, building on the heterogeneous firm literature, we empirically examine the impact of the level and the volatility of real exchange rate on firm level productivity growth, conditional on firms' access to domestic and foreign equity markets, debt finance, and foreign goods markets. To carry out our investigation we exclusively focus on firm level data collected from Turkey, an emerging economy, which went through two severe financial crises over the period of investigation yet still managed to grow faster than many other emerging as well as European economies. At a time when many developed and developing economies are grappling with the devastating goods

and asset market effects of the 2008–09 global financial crisis as well as the ongoing European sovereign debt crisis, we argue that we can gain valuable insights from the Turkish experience to understand the impacts of exchange rate shocks on productivity growth when firms have heterogeneous access to debt and equity markets as well as export markets.

To carry out our investigation, we utilize a unique panel dataset which includes the top 1,000 private manufacturing sector firms from Turkey. The data set covers the 1993–2005 period. Over the period of investigation, thanks to domestic and external financial liberalization that started in 1989, private firms' access to domestic and external equity markets as well as to bank finance increased substantially in Turkey. However, at the same time, this period is also characterized by high levels of economic risk, exchange rate uncertainty, and limited financial sector deepening. In particular, despite a substantial increase in FDI and portfolio inflows (reaching a total of \$96 and \$55 billion during 1990–2009, respectively) and foreign bank presence (which, in 2011, accounted for more than 40% of the sector), a major fault line that continues to limit firms' growth performance in Turkey is the lack of external finance. While private credit (from the banking sector

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and other financial institutions) to the private sector has increased substantially over the period of investigation (reaching 20% in 2005 and 33% in 2009 up from less than 17% of GDP in 1993), it is still significantly below the OECD average. As a result, private firms face strict credit constraints and are often forced to finance investments from internal sources or short-term borrowing. For example, the average share of short-term debt in total debt of the top 500 manufacturing firms was around 71% during 1992–2005 (the ratio stayed at around 69% during 2006–10). Consequently, more than half of manufacturing firms in Turkey report that they face external financing difficulties (ICI, 2011). Furthermore, Turkey is an emerging market with a long history of dollarization, which makes exchange rate volatility a significant source of risk for businesses.² In 2011, 60% (52%) of large (medium) size industrial firms depended on foreign currency credits for more than 70% of their external borrowing (ICI, 2011). On the other hand, the period under analysis was also a success story for export oriented manufacturing firms that succeeded in raising the share of manufactured goods in total exports from 84% in 1993 to 94% in 2005 (and 94% in 2011) (CBRT, 2012).

Our dataset has several unique features. To start with, all private firms in the dataset are among the top 1,000 manufacturing firms, generating approximately 28% of the total manufacturing value added in GDP and half of the total manufactured goods exports of Turkey over the period of investigation. Secondly, the dataset provides us with *time variant* information on firms' access to domestic and foreign equity, and to credit markets, with considerable variation across firms. For example, the share of firm level foreign equity participation ranges from zero to 100%, with an overall average of 15%. Likewise, the external debt to assets ratio (i.e., leverage) ranges between 8% and 68%, with an average of 44%. Last but not the least, 29% of the firms have access to the domestic equity market. The sample firms also display substantial heterogeneity in terms of their access to foreign goods markets with the share of exports in output ranging between 0% and 69.3% with an average of 23%. Therefore, we have the ability to control for firm heterogeneity based on access to domestic and foreign capital, and debt finance, as well as export orientation.

To study firms' productivity growth, we implement a dynamic model adopted from the standard empirical growth literature as in Aghion *et al.* (2009) and Levine, Loayza, and Beck (2000), and use the GMM dynamic panel data estimator developed by Arellano and Bond (1991). The empirical results from our investigation show that real exchange rate volatility has a significantly negative effect on productivity growth. Yet, we do not find any evidence that having access to foreign or domestic equity markets, or to debt markets alleviates the adverse impact of exchange rate volatility on productivity at the margin. Having said this, however, we also find that the joint economic effect of exchange rate uncertainty is significantly lower for firms with access to foreign equity while being significantly higher for firms with access to domestic equity market. Interestingly, we observe that the negative productivity effect of exchange rate volatility is stronger for export-oriented firms. Furthermore, we report that the productivity of companies that are foreign owned or publicly traded is generally similar to that of the rest of the firms in our sample. On the other hand, supporting the findings of Aghion *et al.* (2009), we find that firm productivity improves with increasing external debt finance. When we scrutinize the level effects of exchange rate movements, we observe that a real exchange rate appreciation leads to improvements in productivity of export-oriented firms, while

the opposite is true for inward-oriented firms. The robustness of these findings is confirmed by a rich battery of sensitivity checks including those for measurement error, entry/exit bias, threshold effects, and firm tenure.

The rest of the paper is organized as follows. Section 2 briefly reviews the literature on the level and volatility effects of exchange rates on firm productivity. Section 3 introduces the empirical model, and describes the data. Section 4 presents the empirical results, and Section 5 concludes.

2. LITERATURE REVIEW

The theoretical research has shown that exchange rate uncertainty can work its effects on firms through multiple channels: (a) by changing the relative costs of production (and relative competitiveness) with both creative and destructive growth effects (Arize *et al.*, 2000; Burgess & Knetter, 1998; Gourinchas, 1999; Kandilov & Leblebicioglu, 2011; Klein, Schuh, & Triest, 2003; Sauer & Bohara, 2001); (b) by reducing the degree of credit availability from the banking system (Bernanke & Gertler, 1990);³ (c) by damaging firm balance sheets and net worth (Bernanke & Gertler, 1990; Braun & Larrain, 2005); and (d) through its interactions with other key variables, such as aggregate growth, causing uncertainty effects to magnify (Aghion *et al.*, 2009; Ramey & Ramey, 1995). The growth effects of exchange rate uncertainty, however, ultimately depend on firm characteristics. In view of the capital market imperfections and high exchange rate uncertainty faced by developing countries, having access to better internal and/or external finance through debt and equity markets can allow a significant competitive edge for private sector firms. For example, firms with access to foreign equity can deal with exchange rate shocks and market volatility more effectively than others due to having better access to international goods and capital markets, larger pool of internal finance through the parent company, and better risk management, know-how and experience, and higher labor and total factor productivity (Arnold & Javorcik, 2009; Demir, 2013; Desai, Foley, & Forbes, 2008; Mitton, 2006; Yasar & Paul, 2009). A similar argument can be made for firms with access to the domestic equity market and bank finance (Demir, 2013). Likewise, the levels of export orientation, import dependence, size, productivity, and profitability also determine the nature of firm response to exchange rate shocks (Arize *et al.*, 2000; Campa & Goldberg, 2001; Demir, 2010, 2013; Gourinchas, 1999; Klein *et al.*, 2003).

The idea that uncertainty can affect firm behavior indirectly through other variables has been considered by researchers that examine the fixed investment behavior of firms (Aizenman & Marion, 1999; Bloom, 2009; Bloom, Bond, & Van Reenen, 2007; Kandilov & Leblebicioglu, 2011; Leahy & Whited, 1996). Aghion *et al.* (2009), however, is the only study (we are aware of) that explored how exchange rate uncertainty affects productivity growth conditional on changes in credit depth. Using macro data from 83 countries, they show that exchange rate volatility reduces aggregate productivity growth more severely in countries with weaker financial sector development. The basic mechanism that leads to this result is that if borrowing is based on firms' current earnings, which deteriorate due to exchange rate shocks, the very same firms will not be able to invest in innovative technologies, leading to adverse productivity growth effects. However, the importance of firm heterogeneity generated by differential access to domestic or foreign financial markets (for debt and equity) has been left unexplored.

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