



The Uneven Effect of Financial Constraints: Size, Public Ownership, and Firm Investment in Ethiopia

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Summary. — This study investigates if financial constraints reduce investment among private and small firms using a rich, census-based dataset of manufacturing plants from Ethiopia. Impulse responses from a panel VAR estimation are used to compare the response of investment to changes in cash flow and the marginal product of capital among plants with different size and ownership status. The analysis reveals that cash flow has greater effect on investment among small plants, whereas the effect of the marginal product of capital is greater among large plants. This indicates that small plants are more financially constrained than large plants even though they have significantly higher marginal product of capital. Comparison between public and private firms is less conclusive, showing that size rather than ownership is strongly associated with financial constraints in Ethiopia. The results indicate that financial market imperfections could undermine industrial performance in Africa by limiting the growth of small firms.
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Key words — firm investment, financial constraints, capital misallocation, small firms, public firms

1. INTRODUCTION

Manufacturing industries in Africa and other developing regions are dominated by microenterprises and large firms, with a hollowed out center that reveals a “missing middle” (Sleuwaegen & Goedhuys, 2002; Tybout, 2000). More generally, average firm size tends to be much smaller (Hsieh & Olken, 2014) and the contribution of small and medium enterprises toward employment and GDP is significantly lower than in high-income countries (Ayyagari, Beck, & Demirguc-Kunt, 2007; Beck, Demirguc-Kunt, & Levine, 2005). This points to the presence of market and institutional failures that limit the growth of small firms, potentially lowering competitiveness and productivity (Bah & Fang, 2015; Bloom, Mahajan, McKenzie, & Roberts, 2010; Harrison, Lin, & Xu, 2014). A number of explanations have been suggested for this, including high cost of entry (Ayyagari, Beck, & Demirguc-Kunt, 2007; Klapper, Laeven, & Rajan, 2006), excessive taxation (Biggs, 2002), and regulatory burden that pushes firms into the informal economy (Tybout, 2000).

Developing countries are also characterized by underdeveloped financial markets that fail to identify and reward firms with growth potential (Beck & Demirguc-Kunt, 2006). Moreover, financial market imperfections could have unequal effect across firms for a number of reasons. Firstly, information asymmetry problems could have greater effect among small and young firms that lack established credit history and have limited net worth to use as collateral (Beck, Demirguc-Kunt, & Maksimovic, 2007; Carpenter & Petersen, 2002). Transaction costs such as costs of monitoring, screening, and contract enforcement per dollar borrowed can be higher for small firms, making external financing more expensive for them (Schiantarelli, 1995). Secondly, financial constraints could vary among firms due to unequal levels of political connections, especially in transition and developing economies where social networks and political ties substitute for poorly developed financial markets (Firth, Lin, Liu, & Wong, 2009; Lashitew, 2014). Studies show that public (state owned) firms tend to have lower financial constraints, possibly due to their informal ties with politicians than can influence

credit allocation (Guariglia, Liu, & Song, 2011; Harrison & McMillan, 2003). In countries like Ethiopia where public banks are dominant players, governments can also use directed credit to public firms as means of implementing industrial policy (IMF, 2014; Vaughan & Gebremichael, 2011).

This study analyzes how financial constraints could affect firm investment differently among firms of different size and ownership status. The analysis is based on a unique, census-based dataset of manufacturing establishments from Ethiopia, one of the largest economies in Africa. Ethiopia offers an interesting case for exploring the unequal effect of financial constraints because of its status as a formerly-socialist, transition economy with a poorly developed financial sector. Public banks constitute 70% of the asset value of all banks in the country, and the sector is closed off for foreign banks, creating a highly concentrated and uncompetitive banking sector (IMF, 2014). The country also lacks credit registries and other information sharing mechanisms, potentially exacerbating problems of information asymmetry and politically motivated lending.

The first contribution of this study to the literature on firm investment comes from the richness of our dataset, which covers the whole universe of plants in Ethiopia with at least 10 employees during the years 1996 to 2010. The vast majority of the existent literature on firm investment relies on data of mainly large firms that are not representative for small and medium enterprises (Beck *et al.*, 2007). More than 60% of establishments in our dataset are small firms with less than 50 workers, making it ideal for investigating the growth of small firms. Moreover, the census nature of the dataset enables

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us to generalize the results to the national formal sector in Ethiopia.

The standard approach for testing the presence of financial constraints involves estimating the Q-model or the Euler equation for investment that is augmented by cash flow and other measures of net worth (Fazzari, Hubbard, & Petersen, 1988; Hubbard, 1998; Schiantarelli, 1995). A significant effect of cash flow on investment is taken as evidence for financial constraints since only fundamentals should be sufficient to explain investment under perfect capital markets (Hayashi, 1982). However, these approaches neglect the complex and dynamic relationship between firm investment and its financial and fundamental determinants. The second contribution of the paper comes from the use a panel VAR methodology that captures the complex relationship between investment and its fundamental and financial determinants—i.e., the marginal product of capital and cash flow respectively (Gilchrist & Himmelberg, 1995, 1998; Love & Zicchino, 2006). In addition to providing a more complete representation of the data, a VAR approach leads to better identification of the effect of financial constraints on firm investment.

The analysis is conducted by estimating a panel VAR model for different size and ownership subsamples, and then computing impulse responses that reflect the response of investment to cash flow and productivity shocks. In terms of size differences, the data offer *prima facie* evidence that small plants in Ethiopia are financially constrained since they have significantly lower investment rate than large firms (11% vs. 6%) in spite of having significantly higher marginal productivity. The impulse response analysis confirms this, since changes in cash flow induce a significant and relatively large investment response among small plants, whereas their effect is insignificant among large plants. This indicates that investment among small plants is contingent upon availability of internal cash flow. In contrast, changes in the marginal product of capital (MPK) induce significantly higher changes in investment among large plants, revealing that financial constraints do not limit them from responding to profitable opportunities. This shows that at least part of the large difference in investment rate between large and small plants is due to differences in financial constraints. These results are robust to different ways of classifying firm size, and when an investment model is separately estimated instead of the full VAR.

While the relationship between size and financial constraints has been previously explored in the investment literature (Carpenter & Petersen, 2002; Demir 2009; Haramillo, Schiantarelli, & Weiss, 1996), less attention has been paid to the role of state ownership. Considering the large role of public banks in Ethiopia and the presence of directed credit schemes that could benefit public firms (IMF, 2014), it becomes important to test if public firms are less financially constrained than private firms. The data seem to suggest this since public firms have significantly higher rate of investment. The impulse response analysis shows that the investment response for MPK is considerably higher among public firms than private firms, suggesting that public firms face lower financial constraints. However, public firms also show positive investment sensitivity to cash flow, a contradictory result which suggests that they are financially constrained. Taken together, these results indicate that firm size is strongly associated with financial constraints in Ethiopia, whereas the results are less conclusive with respect to public ownership.

The final contribution of this study is hence in showing that financial constraints that limit the growth of small firms could adversely affect competitiveness and productivity in developing countries. Importantly, our analysis reveals that small

firms are financially constrained in spite of having significantly higher marginal productivity of capital. This result adds to the rising evidence that attributes the low levels of productivity in developing countries to institutional factors that blunt competitive dynamics (Bah & Fang, 2015; Hsieh & Klenow, 2009).

The rest of the paper is organized as follows. Section 2 sets the stage by introducing the financing and manufacturing industries of Ethiopia. Section 3 reviews the related literature on firm growth, finance and firm investment and also sketches the VAR methodology. Section 4 describes the data and presents summary statistics. Section 5 presents the baseline results and a number of sensitivity tests and section 6 concludes the paper.

2. BACKGROUND ON THE ETHIOPIAN ECONOMY

Ethiopia's economy suffered from stifling government intervention during the era of socialist command economy from 1974 to 1991. Reforms that opened the market including steady liberalization led to slow recovery, which gained momentum recently through state-driven investments on infrastructure and other development projects. During 2006–15, Ethiopia's GDP grew at an average rate of 10% according to official data, making it one of the fastest growing in the African continent (Geiger & Moller, 2015). GDP expanded from a small base to become the fifth largest in Sub-Saharan Africa after Nigeria, South Africa, Angola, and Sudan. However, GDP per capital remains one of the lowest in Africa, standing at USD 590 or 1,530 in parity prices as of 2016 (IMF, 2016).

Economic growth in Ethiopia is mainly driven by agriculture and services, with the manufacturing sector playing less than proportionate role compared to the rest of Africa. Although the sector grew at a remarkable rate of around 10%, its share in total output remains very small.¹ The contribution of manufacturing to GDP remained at 4.3% from 2010 through 2015, whereas its contribution in Sub-Saharan Africa averaged 10% in the same time period (World Bank, 2016). Likewise, the share of manufactured goods in exports in Ethiopia remains below 10% during 2010–14, compared to about 25% in Sub-Saharan Africa (World Bank, 2016).

Manufacturing in Ethiopia is mainly composed of light and labor-intensive industries. The largest number of establishments in our census dataset operated in the food and beverages subsector (29%), followed by non-metallic mineral products (16%) and manufacture of furniture (15%). The next largest subsectors are manufacture of leather products, fabricated metal products, publishing and printing, and rubber and plastic products, each constituting about 6% of the sample. Geographically, the largest share of manufacturing plants are clustered around the capital city, Addis Ababa (40%), and in nearby towns in Oromia (20%), with Tigray, South Ethiopia and Amhara regions hosting the remaining 9.2%, 13.4% and 10.7% of the plants respectively. Although foreign plants make up only 4.3% of the observations in the dataset, foreign investment is picking up in recent years with the development of industrial parks.

Managerial surveys indicate that lack of access to external finance is consistently rated as the most important operational problem in Ethiopia, highlighting the low level of development in the financial sector (World Bank, 2015b). Although the banking sector registered significant progress recently, it remains highly underdeveloped and lacks supporting institutions such as credit bureaus and registries. Credit to the private sector as a share of GDP, a widely used proxy for financial sector development, stood at 14% in 2011, compared

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