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Capital allocation, credit access, and firm growth in Vietnam

Christina Kinghan[1], Carol Newman[2], and Conor M. O'Toole[3]

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Abstract: In this paper, we explore the relationship between firm growth, access to finance, and the efficiency of capital allocation in Vietnam over the period 2005–2015. Using data from the UNU-WIDER Vietnam SME survey, we test whether firms with higher marginal returns to capital are more or less likely to get access to financing. This is a key test of how efficiently the financial system is functioning. We also test whether credit supply constraints are hindering capital allocation by limiting the investment and employment activities of firms with the highest marginal return on capital. A number of findings emerge. We find that high return investors, with the greatest marginal return on capital, have a lower likelihood of having formal finance (loans outstanding with formal credit institutions). We find evidence that rejected credit applications are limiting investment activity but not employment, particularly for firms with higher investment efficiency. This suggests a link between firm growth and a suboptimal allocation of credit.

Keywords: access to finance, SME, Vietnam
JEL classification: O12, O16, O17

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[1] Financial Stability Directorate, Central Bank of Ireland; [2] Department of Economics, Trinity College Dublin, Ireland; [3] Economic Analysis Division, Economic and Social Research Institute, Dublin, Ireland, corresponding author: conor.otoole@esri.ie.

1 Introduction

Since the original 'Doi Moi' economic reforms, Viet Nam has undergone considerable economic transformation. Living standards have risen and the economy has been reoriented away from central planning towards a more market-based economic structure. The development of private sector businesses, as well as foreign direct investment, have played an important role in this transformation. Understanding the catalysts for such rapid economic development can shed important light for policymakers and academics looking to decompose the sources of growth in a developing country context.

One sector of the Vietnamese economy that has experienced rapid reform is the financial sector. While initially Viet Nam was slow to embrace capital and banking market liberalization, a series of policy initiatives throughout the 1990s and into the 2000s laid the foundations for rapid change in financial markets. Kovsted et al. (2003) note that financial reform initially took place in two phases: 1) initial banking reforms between 1988–97 which split the commercial state lending from the Central Bank, State Bank of Viet Nam, as well as allowing joint stock commercial banks and foreign branches; 2) the banking law of 1998 which removed administrative control over interest rates and strengthened the independence of the Central Bank. These changes—along with a multitude of other reforms—led to a rapid financial deepening of the economy and high levels of credit growth. Private sector credit to GDP increased considerably between 1995 and 2015. Recent research has found that this process of financial development has led to a reduction in credit constraints and fostered higher investment amongst Vietnamese companies (O'Toole and Newman, 2017).

However, much of the existing research has focused on large companies or has been aggregate in nature. Fewer research papers have considered the role that financial reform has played in the development of small and medium sized companies, Rand (2007) being a notable exception. Indeed, where these issues have been considered, the efficiency of capital allocation has not been factored into the discussion. In an economy with perfect credit markets, we expect funds to flow to firms with the highest marginal revenue product of capital until marginal revenue equals the marginal cost on average. However, as many imperfections exist in credit markets, exploring their allocative efficiency in relation to their impact on firm growth is an important research area. A focus on the financing of SMEs is of particular importance given the extensive international evidence that these companies are most likely to suffer credit access difficulties due to informational asymmetries, a lack of collateral or other financial market failures (Berger and Udell, 2006; OECD, 2005).

To address this gap in the literature, we use a detailed panel dataset on a cohort of micro, small and medium-sized enterprises operating in Viet Nam to explore the relationship between capital allocation efficiency, credit access and firm growth. We approach our analysis in two steps. In the first step, using data on approximately 2,600 firms over the period 2005–15, we explore the relationship between credit access and capital efficiency for Vietnamese SMEs. More specifically, we examine the extent to which financing is allocative efficient by considering the relationship between credit constraints, credit demand and the marginal value of additional capital for firms. This sheds important light on whether the financial system is functioning in an efficient manner by allocating finance to those with the highest marginal returns. If credit is demanded by lower-productivity firms, this may suggest a selection effect which leads to an inefficient credit structure. If credit constraints are higher for more efficient firms, this may suggest that the financial system is not channeling funds to their most efficient use. As such, we also directly examine whether higher-efficiency firms have access to formal financing.

In the second step, we explore the impacts of misallocation on firm growth. If higher efficiency firms have restricted access to finance, we should find their investment and employment reduced to a greater extent by credit constraints. To explore this issue, we estimate investment and employment equations and explore whether these sources of firm growth are affected by credit constraints, a key channel through which financing impacts the real economy. We then identify the relationship between firm growth and the efficiency of capital allocation by considering whether credit constraints are limiting investment for those firms with the highest marginal returns. If we find evidence that high-return investors (with a high marginal revenue product of capital) are more likely to have their investment and employment impacted by credit constraints, then we can conclude that finance is not being allocated to its most beneficial use in the Vietnamese economy.

Our contributions to the literature are as follows. First, we extend the existing literature to explore how access to finance is linked to capital efficiency. By separately considering credit demand and credit supply indicators, we provide new insights into these channels. Second, we are the first paper to our knowledge to link credit constraints to investment and employment controlling for the efficiency of capital. Third, we provide new empirical evidence on the link between credit constraints and capital misallocation for a unique panel of micro, small and medium-size firms and in a developing country context, distinguishing between formal and informal credit channels. Finally, our paper provides new insights for Viet Nam on the potential role that easing credit access could have on firm growth through a discussion of capital allocation efficiency and its links to investment and employment.

A number of findings emerge from our analysis. First, we find that high-return investors, with the greatest marginal return on capital, have a lower likelihood of having formal finance (loans outstanding with formal credit institutions). In contrast, we find that informal finance is not related to returns to capital. We consider two possible underlying mechanisms. First, it could be that formal credit markets are not allocating finance to the highest-return firms and that informal credit markets are filling this gap. Second, it could also be the case that firms with formal credit have already successfully invested these funds reducing the marginal benefit of an additional unit of capital. The former is suggestive of inefficiencies in the financial market while the latter may simply reflect a dynamic adjustment process. Understanding which channel is in operation is important.

Decomposing credit access into the demand for credit and the supply of credit, we find that firms with the highest return on capital are associated with lower demand for credit. We also find some evidence that efficient firms are more likely to be discouraged borrowers and are less likely to be credit-rationed, suggesting that credit supply constraints are affecting the choices of efficient enterprises in relation to accessing formal finance. In relation to firm growth, we find evidence that rejected credit applications are limiting investment activity, particularly for high-return firms, i.e. the firms with higher investment efficiency are more affected by credit constraints.

The rest of this paper is structured as follows. Section 2 discusses related literature. Section 3 describes the data and the empirical approach. Section 4 documents the empirical findings and section 5 concludes.

2   Related literature

Our research is related to four broad strands of existing empirical literature. First, this work is linked to the general literature on access to credit and firm performance. Second, our research is related to the broader literature on investment, employment, and credit access in the context of

financial sector development. Third, our paper speaks to the recent literature that attempts to identify distortions in the economy that prevent the efficient allocation of resources across firms. Fourth, our paper is closely linked to studies focusing on credit access, financial markets, and Vietnamese small firms. Understanding the specificities of the Vietnamese case is important to identify the role that changes to financial markets can play in the development of the SME sector in emerging economies.

The first strand of literature that we speak to explores the determinants and impacts of credit constraints in developed and developing economies. This is a vast literature and so here we provide a short description of the studies that are most closely related to ours to demonstrate the channels through which credit constraints can impact the real economy as a means of guiding our empirical analysis.

Financial market imperfections, which distort the efficient allocation of capital, arise for a number of reasons. In their seminal work, Stiglitz and Weiss (1981) define credit rationing as cases where either: a) identical firms receive different credit outcomes; or b) some firms cannot access financing at any interest rate. This can be due to a number of potential market imperfections such as: a) moral hazard and principal agency problems; b) adverse credit selection; c) monitoring difficulties; d) informational asymmetries; e) and legal enforcement (Lawless et al., 2017). A large number of papers have documented that small and young firms are more likely to be affected by such difficulties (Berger and Udell, 2006; Beck et al., 2006a) and as such credit market policies have been devised globally to address credit constraints particularly for small and medium-sized firms (OECD, 2005).

A large number of studies have focused on credit market constraints in developing country contexts and in particular the characteristics associated with constrained firms. Byiers et al. (2010) find that firm size, ownership and managerial capacity affect credit access using a manufacturing survey for Mozambique. Hansen and Rand (2014) explore differences in access to credit across gender for a sample of 16 sub-Saharan African economies. Beck et al. (2006b) find that institutional and financial development alleviates SME access to finance constraints and supports their contribution to economic growth. While these studies address a range of factors that influence SME access to finance, to our knowledge, ours is the first paper that addresses the relationship between credit access and the efficiency of capital for the SME sector (formal and informal) in a developing country context.

The second strand of relevant literature links investment financing, employment growth, and access to credit. This literature generally finds that financing constraints lower investment activity for enterprises thus preventing firms from growing (Chirinko, 1990; Bond and Söderbom, 2013; Fazzari et al., 1988; Campello et al., 2010). Such financing constraints—which come about due to market imperfections—therefore lead to a lower rate of economic growth as the capital stock is less than the optimal level.

A key focus of our paper is the relationship between credit access and firm growth. Two measures of firm growth often used in the literature are investment and employment. The relationship between investment and access to credit has been found to vary, depending on the degree of development of the financial system as well as the banking market structure and institutional set-up. This is an important consideration in the Vietnamese context, given how the economy has developed financially in terms of credit deepening in recent years. Ryan et al. (2014) find that banking competition increases SME financing constraints and the effects are greatest in countries with bank-dependent financial systems. Love (2003) and O'Toole and Newman (2017) find that credit constraints are lower where credit markets are deeper and more market-oriented. Beck et al. (2006b) note that institutional set-up and legal protections also matter for access to finance. In

terms of employment growth, a number of studies has also been found to reduce firm employment growth (Gerlach-Kristen et al., 2015; Spaliara, 2009). Chodorow-Reich (2014) also finds that credit market disruptions had a large impact on employment after the recent financial crisis in the US. However, these papers do not consider whether the effects of constraints differ depending on the efficiency of capital of the firm, which is what we explore directly in this paper.

Third, this paper examines credit constraints as a source of capital market inefficiency and so contributes to the emerging literature examining the link between credit market distortions and resource misallocation pioneered by Hsieh and Klenow (1999).[1] Examples in an Asian context include Brandt et al. (2013) who explore the extent to which TFP losses in China's non-agricultural sectors between 1985 and 2007 were associated with factor market distortions. They find evidence that the reversal in TFP growth can be attributed for the most part to capital misallocation due to capital market distortions that favoured investment in the state sector rather than more productive sectors of the economy. In the case of Japan, Caballero et al. (2008) find evidence for inefficient resource allocations resulting from the extension of credit to insolvent borrowers. Industries with greater numbers of insolvent borrowers had lower levels of job creation and lower levels of productivity.[2] There is a notable dearth in the literature of papers which examine the role of financial frictions and capital market misallocation in other developing country contexts such as Viet Nam. Moreover, to our knowledge there is no empirical evidence specifically focusing on micro, small and medium-sized firms which examines the interplay between formal and informal credit.

The final literature that complements our research addresses credit access and firms in Viet Nam. There are a number of papers of particular relevance. Rand (2007) uses a survey of SMEs in the manufacturing industry to explore the determinants of credit constraints, credit demand and the cost of capital for small firms in Viet Nam. Drawing on a cross-sectional study covering approximately 1,000 SMEs across four provinces (Ha Tay, Long An, Quang Nam, Phu Tho) and three of the largest cities (Ho Chi Minh, Ha Noi, and Hai Phong), the paper used direct indicators of credit rejections to explore which firms were constrained. The results indicate that between 14 and 25 per cent of SMEs were constrained and that these companies would increase their debt by between 40 and 115 per cent if constraints were loosened. The research also finds an important role for informal financing for those firms who are fast growing. Rand et al. (2008) also explore survey data on SME access to financing in Viet Nam. They find that the formal financial sector is just about keeping up with growth.

There has been a notable increase in the degree of financial development in Viet Nam since the mid-1990s as private sector credit has soared and reforms have been implemented in financial markets. To explore how this has impacted companies on the ground, O'Toole and Newman (2017) use the Vietnamese national enterprise survey to test the impact of financial development in Viet Nam on investment credit constraints for both large firms and SMEs. Using a standard Tobin's Q investment model, they separate financial development into three specific aspects: overall financial depth, the state-owned enterprise use of finance, and the degree of market-oriented bank lending. They develop indicators of financial development along these channels at the province level in Viet Nam. A number of findings emerge from their research. They find that financial development reduces external financing constraints for firms, thus facilitating higher

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[1] See Restuccia and Rogerson (2017) for an overview of the recent literature on this topic.

[2] See also Caggese and Cuñat (2013) for evidence from Italy that links credit constraints to misallocation through an exporting channel and Gopinath et al. (2015) for evidence of the link between size-dependent financial frictions and capital misallocation in an EU context.

investment activity. Financing constraints are decreasing in credit to the private sector, increasing in the use of finance by SOEs and decreasing in the degree to which finance is allocated on market-terms by commercial banks.

Thi Khanh (2016) explores the factors that determine access to formal credit in Viet Nam as well as considering whether firms are satisfied with the financing process. Using a survey of Vietnamese SMEs conducted from 2005 to 2013, the findings indicate that banking relationships and the business environment were important factors when applying for formal credit as well as in credit obtainment. However, positive measures of firms' performance, such as high return on assets scores and sales growth, did not have a significant influence on whether firms obtained credit. Furthermore, Vietnamese formal financial institutions were found to depend too much on collateral assets in assessing whether to supply credit.

A final study that provides important context for this paper is Kovsted et al. (2003) who document the financial development process in Viet Nam up to 2003. Their research provides insight into the overall process of financial reform that occurred in Viet Nam, the changing structure of the financial sector and its lending agents, an overview of the regulatory and central banking operations, and the many policy initiatives that were undertaken in the phase of reform up to 2003. Our study is complementary in that we review access to finance issues and developments in lending in the period following the initial reforms.

3   Data and empirical approach

3.1   Data overview

This paper uses a firm-level panel dataset, gathered using the Survey of Small and Medium Scale Manufacturing Enterprises (SMEs) in Viet Nam. The SME survey is conducted every two years on over 2,500 enterprises across ten provinces with a large proportion of the firms surveyed across all years of the survey. The population of non-state manufacturing enterprises in the ten selected provinces is based on two data sources from the General Statistics Office of Viet Nam. These are the Establishment Census and the Industrial Survey. This panel is compiled from surveys conducted in Viet Nam in 2005, 2007, 2009, 2011, 2013, and 2015. The provinces surveyed included the cities, Ha Noi, Ho Chi Minh City (HCMC) and Hai Phong, and the provinces of Ha Tay, Long An, Phu Tho, Quang Nam, Nghe An, Khanh Hoa and Lam Dong.

For the purposes of our analysis, the survey captures a range of questions on applications for finance, the types of credit the firms apply for as well the success of credit applications. Importantly, the data also captures the range of other balance-sheet and profit and loss controls that are needed to undertake standard assessment of investment as well as accurately control for credit risk and firm quality.

3.2   Empirical approach

Understanding the relationship between access to finance and capital efficiency

The first part of our empirical assessment links the marginal revenue product of capital (our proxy for firm capital efficiency) to broadly defined indicators of access to finance. We then separately focus on considering the association between credit demand and credit supply and capital allocation. It is important to split out supply and demand effects to understand whether capital efficiency in the economy is affected by the credit markets provision of financing or to selection

effects due to the type of enterprise that is seeking credit. Table 1 presents the main indicators that we use in our empirical methodology.

Table 1: Indicators of access to finance, credit demand and credit supply

Indicator	Definition
Formal Credit Access	Variable = 1 if firm has a formal loan or line of credit and 0 otherwise
Informal Credit Access	Variable = 1 if firm has an informal loan or line of credit and 0 otherwise
Credit Demand: Applied Loan	Variable = 1 if firm applied for a loan to a formal financial institution and 0 otherwise
Credit Demand: Requires Loan	Variable = 1 if the firm indicated it needs a loan to undertake its activities and 0 otherwise
Credit Supply: Credit rationed	Variable = 1 if firm has been rejected for a formal loan and 0 otherwise
Credit Supply: Discouraged Borrowers	Variable = 1 if firm did not apply for a loan due to a) possible rejection, b) the process was too difficult or c) the interest rates were too high and 0 otherwise
Credit Supply: Credit Constrained	This variable is a composite of credit rationed and discouraged borrowers.

Source: Authors' esimates.

We use the marginal revenue product of capital (MRPK) as our measure of capital efficiency and our measure is based on the underlying model of Hsieh and Klenow (2009) whose focus was on the extent of resource misallocation in both labour and capital markets. Our firm-specific measure of MRPK is given by

$$MRPK_{si} = \alpha_S \frac{\sigma - 1}{\sigma} \frac{P_{si} Y_{si}}{K_{si}}$$

1)

where α_S is the sector level (2-digit) elasticity of capital with respect to output and is computed as one minus the share of labour costs in total value added of the sector, sigma is the elasticity of substitution and is set conservatively at a value of 3, $P_{si} Y_{si}$ is nominal value added of the firm, and K_{si} is the capital stock of the firm measured as total assets.

If all resources are allocated efficiently then the MRPK will be equalized across firms. Firms with higher than average MRPK face disincentives (such as credit constraints) for investing in capital, while those with below-average MRPK benefit from more favourable investment conditions (such as access to credit).

To measure formal credit access, we use an indicator which captures whether or not the firm has a formal loan or line of credit with a financial institution. This should give a broad indication of access to finance in the formal financial system. To measure informal access to credit, we use an indicator which captures whether the firm has an informal loan outstanding.

The above indicators measure usage of credit and do not disentangle credit demand and supply factors. To identify these two channels separately, we use two indicators for credit demand and two for credit supply. On the demand side, the indicators capture: a) whether the firm applied for formal credit; and b) whether the firm reports that it needs a loan. On the supply side, we use two traditional indicators of credit constraints to capture: a) rejection rates for loan applications (credit rationing); and b) discouraged borrowers. These are standard measures in the literature (See Casey and O'Toole (2015) for a discussion).

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Our main research objective is to empirically test for a relationship between credit access (as defined above) and capital efficiency. We therefore estimate the following equation which links each of the indicators above to a proxy for the firm's marginal revenue product of capital, controlling for firm profitability, size, age, and a range of fixed effects. Controlling for both firm profitability and marginal returns should ensure that credit market selection effects due to profitability are absorbed in the profit variable and that the capital efficiency measure captures allocation effects.

$$Pr(I = 1)_{it} = \beta_0 + \beta_1 lnMRPK_{it} + \beta_2 lnprofit_{it} + \beta_3 age_{it} + \beta_4 lnemp_{it}$$

$$+ \alpha_i + \tau_t + s_s + \pi_p + e_{it} \qquad (2)$$

I represents, in turn, each of the binary indicator variables noted above, ln*MRPK* is the log of the marginal revenue product of capital, *lnprofit* is the log of the profits of the firm, *age* is the age of the firm and *lnemp* is the number of employees, used to capture firm size. We saturate the model with fixed effects for sector, time, and province to ensure that time-invariant confounding factors are removed at these levels of variation. The model is estimated using a linear probability approach with and without a within-group transformation to remove firm-fixed effects. Standard errors are clustered at the sectoral level. Subscript i refers to firm i in the panel, a_i are firm-specific, time-invariant effects, π_p are province dummies, τ_t are year dummies, s_s are sector dummies and e_{it} is an *i.i.d.* error term. These notations are carried through equations (3) and (4).

Exploring the impacts on firm growth

First, we consider the association between access to finance and firm capital efficiency focusing on both credit supply and credit demand. This provides us with some tentative conclusions as to how high investment-return firms interact with the Vietnamese credit market.

Second, we focus on the credit supply side and test whether there is any evidence that credit supply constraints are limiting firm growth for high-return investors. If this is the case, it would provide evidence that capital allocation is not efficient and the policy conclusions can be directly linked to potential supply-side distortions. To measure firm growth, we focus on investment and employment which are two channels used extensively in the literature.

For many small firms, investment is often lumpy and infrequent. They may make a large investment in a specific year and then not invest again for a period of time. To capture these dynamics, we focus on both the extensive and the intensive margin of investment. We define a variable for whether or not firms invest in capital (measured as fixed or intangible assets) which is binary. To capture the intensive margin, we take the log of total expenditure on investment for investors only. To measure employment growth, we take the log of the total number of employees in the enterprise. To test for the impact of credit constraints, and their interaction with capital efficiency, we estimate the following investment equation:

$$\ln Inv_{it} = \beta_0 + \beta_1 rev\_gr_{it-1} + \beta_2 \ln profit_{it-1} + \beta_3 age_{it-1} + \beta_4 age^2_{it-1} + \beta_5 \ln emp_{it-1}$$

$$+ \theta_1 CC_{it-1} + \theta_2 \ln MRPK_{it-1} + \theta_3 CC_{it-1} \times \ln MRPK_{it-1} + \alpha_i + \tau_t + s_s + \pi_p + e_{it} \qquad (3)$$

The key variables of interest are *CC* which measures credit constraints and ln*MRPK*. As control variables, we include *rev_gr*, which is the growth in revenue between period t-1 and period t, and lagged profitability to capture firm fundamentals. We control for the age of the firm and its square. We also include the lagged number of employees as a control for firm size. Lags are included to

avoid simultaneity problems. As above, we saturate the model with fixed effects for sector, time, and province to ensure that time-invariant confounding factors are removed at these levels of variation. The model is estimated using a within-group transformation to remove firm-fixed effects. Standard errors are clustered at the sectoral level.

If credit constraints are limiting investment, then we expect $\theta_1 < 0$. If the credit market is not efficiently allocating capital, then we would expect $\theta_3 < 0$ indicating that the effect of credit constraints is greater for more efficient firms. For the extensive margin binary model, we estimate a linear probability model with the same set of covariates. For employment, we use a similar specification with the addition of a control to proxy for the marginal revenue product of labour.

3.3 Summary statistics

To motivate our empirical analysis, we present a number of summary charts which contextualize our research. Figure 1 presents trends in the credit supply and demand variables to gain insight into how firms' access to finance has evolved over the survey period. Both indicators of credit demand suggest that it has been in decline since 2007 suggesting firms are lowering their requirements for new credit over time in Viet Nam. In terms of credit supply, the share of discouraged borrowers appears to have risen over the period 2007–13 but has fallen back in 2015. The loan rejection rate (Credit Rationing) appears relatively steady over the period but has fallen somewhat between 2011 and 2015.

Figure 1: Access to credit indicators
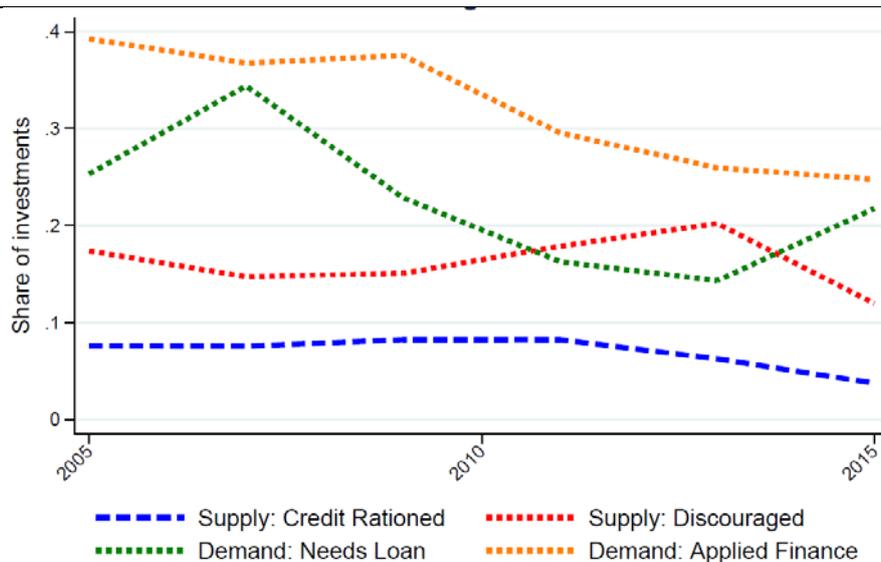
Source: Authors' calculations using Viet Nam SME survey.

Figure 2 illustrates how firms in our sample grow in terms of employment and investment over time. Employment growth has generally been falling over the sample period suggesting SME firms in Viet Nam are getting smaller. In more recent years, however, the rate of decline in employment has moderated somewhat. In terms of investment activity, also illustrated in Figure 2, we see that the proportion of firms investing every year has also fallen over the sample period, from over 60 per cent in 2005 to around 48 per cent in 2015. The biggest fall in investment rates was between 2005 and 2007 but it increased again between 2007 and 2009. A further decline in the number of firms investing occurred between 2009 and 2013, which is not surprising given the financial crisis, recovering marginally between 2013 and 2015.

The average marginal revenue product of capital is presented in Figure 3. The figure is an average across all firms in each survey wave. The data suggest that marginal returns increased during the early period, fell back coinciding with the global financial crisis, but rebounded in more recent times. Given that the Vietnamese economy has undergone a considerable transformation, including a broadening of the financial sector, it is surprising that the marginal product of capital has been very volatile. In an economy which is transitioning to a market-orientation, it is not unsurprising that during this transition, more efficient firms could be replaced by inefficient firms which raises overall marginal products. Indeed, O'Toole and Newman (2017) show that this market re-alignment coincided with a re-orientation of the financial sector away from the state-owned enterprises and towards an improved allocation of finance. This would suggest that the firms with higher levels of efficiency are not those to whom the credit market is channeling funds. Furthermore, it may be that lending institutions are focusing on informal signals for the allocation of formal finance rather than key firm performance indicators. Indeed, Malesky and Taussig (2008) found that banks in Viet Nam placed a greater emphasis on connections rather than performance indicators in the allocation of credit.

Figure 2: Illustrative measures of firm growth
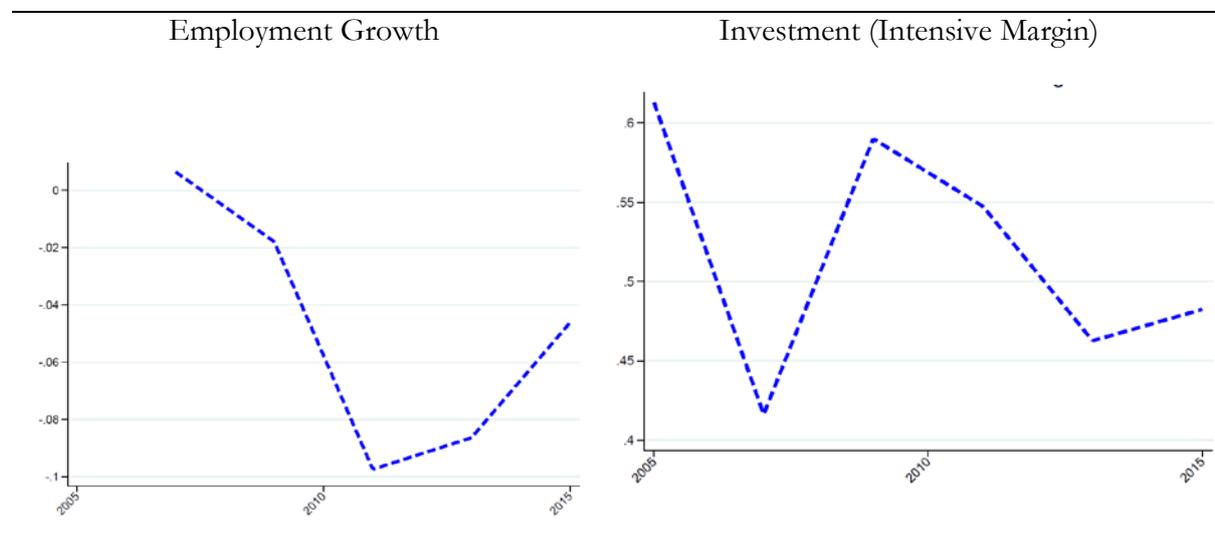
Source: Authors' calculations using Viet Nam SME survey.

Figure 3: Marginal revenue product of capital
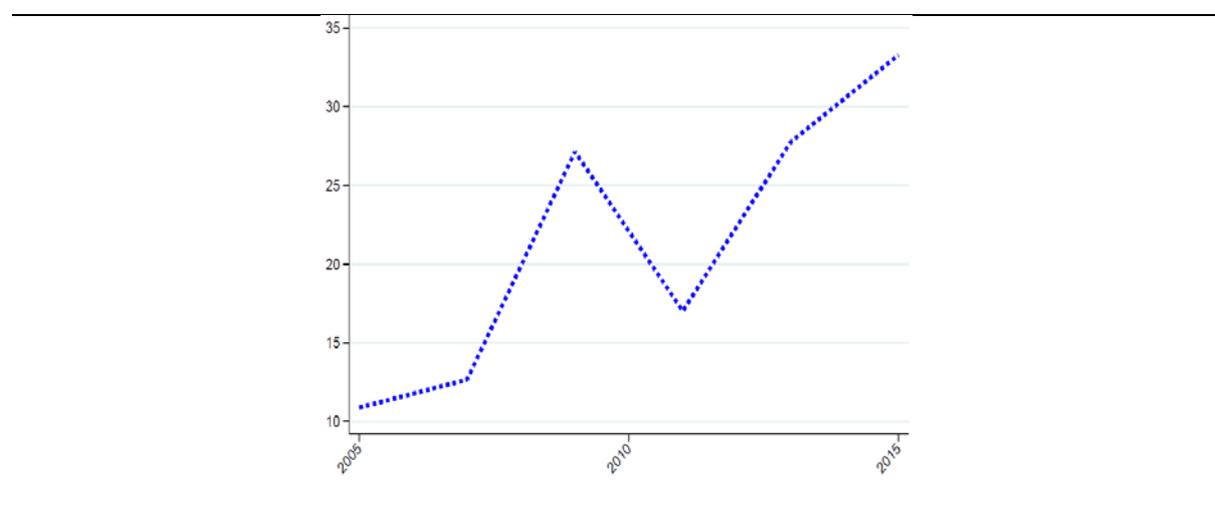
Source: Authors' calculations using Viet Nam SME survey.

Table 2 presents summary statistics on the key indicators of access to finance, credit demand and credit supply for each year of our analysis. Approximately 25 per cent of firms were constrained in each year of the survey; however, this figure declined to 16 per cent in 2015. Between 25 per cent and 40 per cent of firms obtained access to formal finance and over 60 per cent of firms accessed informal finance. Less than 10 per cent of firms in each survey year are considered to be credit rationed.

Table 3 presents summary statistics on the main continuous variables of interest in our analysis. The average age of firms in the dataset was 14 years and the average number of employees was 18. The average investment made by firms was approximately 820 Million VND and the average profit was 479 Million VND.

Table 2: Summary statistics on access to finance, credit demand and credit supply

Year	2005	2007	2009	2011	2013	2015
Sample size	2,823	2,635	2,657	2,537	2,575	2,648
Credit Constrained	25	22	23	26	26	16
Formal Credit Access	37	36	37	28	24	24
Informal Credit Access	71	61	70	64	63	65
Requires Loan	25	34	23	16	14	22
Discouraged Borrower	17	15	15	18	20	12
Credit Rationed	8	8	8	8	6	4
Applied Loan	39	37	38	29	26	25

Source: Authors calculation using Viet Nam SME Survey.

Table 3: Summary statistics on main continuous variables (millions VND)

Variable	Obs.	Mean	Std. Dev.	Min	Max
Total Investment	8,230	820	2,045	0	19,103
Revenue	15,494	3,534	8,174	27	75,179
Gross Profit	15,493	498	1,086	-14	10,500
Firm Age	15,775	14	10	2	77
Total Labour	15,811	18	50	1	2,561
Total Assets	15,494	3,920	7,533	24	68,244

Note: Outliers removed at 1st and 99th Percentile.

Source: Authors calculation using Viet Nam SME Survey.

4   Results

In this section, we present the main results of our empirical estimations. We first document the findings in relation to access to finance and capital efficiency, separating out supply and demand

side factors. Second, we explore the relationship between capital efficiency, credit constraints and investment. Finally, we examine the relationship between credit constraints, efficiency and employment.

4.1 Financing and capital efficiency

The use of financing and capital efficiency

Our empirical exploration begins by testing the relationship between access to formal and informal finance and capital efficiency. The regression results from the estimation of equation (2) using a linear probability models are presented in Table 4. We estimate each specification using both simple OLS techniques and a linear fixed-effects estimator (FE). As the fixed effects transformations remove firm-specific unobserved heterogeneity that could bias the estimates, our preferred specification is the FE. If there is a discrepancy between OLS and FE findings, the FE should take priority. Province, sector and time-fixed effects are included in all specifications and standard errors are clustered at the sector level.

Table 4: Relationship between capital efficiency, formal and informal credit

	(1) Formal finance OLS	(2) Formal finance FE	(3) Informal finance OLS	(4) Informal finance FE
Ln MRPK	-0.029***	-0.020***	0.006	0.007
	(0.004)	(0.005)	(0.003)	(0.006)
Constant	-0.390***	-0.214	0.650***	1.943***
	(0.049)	(0.132)	(0.027)	(0.123)
Province FE	Y	Y	Y	Y
Sector FE	Y	Y	Y	Y
Time FE	Y	Y	Y	Y
Other controls	Y	Y	Y	Y
Observations	15,062	15,062	15,072	15,072
R-squared	0.188	0.042	0.031	0.014
Number of Firm ID		5,012		5,014

Notes: Robust standard errors clustered at sector level are included in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note (1): OLS regression refers to pooled cross sectional estimation of the data. Fixed effect (FE) estimation uses a simple within-group mean removal technique.

Note (2): As specified in equation (2) other controls included are firm profitability, firm age and firm size. Results are not presented here but are available on request.

Source: Authors estimates using WIDER Viet Nam SME Survey data.

As illustrated in columns (1) and (2), we find a negative correlation between the MRPK and the likelihood of having a formal loan. This suggests that firms with a higher marginal revenue product of capital have a lower likelihood of having formal finance. On face value, this result suggests that capital allocation is not efficient as the firms with higher returns on capital are not the ones to which the credit market is channeling funds. However, it could also be the case that the firms that have access to formal finance have already undertaken productive investments lowering their MRPK in which case the negative correlation here is simply picking up a dynamic adjustment process. We will explore this possibility when we consider the impact of access to credit on firm growth below.

In contrast to the results for formal financing, we find a positive correlation between MRPK and informal financing, in columns (3) and (4), although the magnitude is small and is not well-

determined. This suggests that the efficiency of capital is not an important consideration in the allocation of informal financing.

Identifying credit demand and supply effects

In the section above, we found some tentative evidence that the formal financing market is not allocating financing efficiently. We delve deeper into this issue by trying to understand whether this is coming through demand or supply effects in these markets. In this section, we test the relationship between formal credit demand, formal credit supply and capital efficiency.

The regressions exploring the relationship between credit demand and efficiency, estimated using a linear probability model and the same specification as for the regressions presented in Table 4 are presented in Table 5.

Table 5: Relationship between capital efficiency and credit demand

VARIABLES	(1) Applied loan OLS	(2) Applied loan FE	(3) Requires loan OLS	(4) Requires loan FE
Ln MRPK	-0.028***	-0.020***	-0.016***	-0.013***
	(0.004)	(0.005)	(0.002)	(0.003)
Constant	-0.379***	-0.302**	-0.213***	0.614***
	(0.052)	(0.125)	(0.022)	(0.143)
Province FE	Y	Y	Y	Y
Sector FE	Y	Y	Y	Y
Time FE	Y	Y	Y	Y
Other controls	Y	Y	Y	Y
Observations	15,071	15,071	15,075	15,075
R-squared	0.183	0.041	0.133	0.046
Number of Firm ID		5,013		5,014

Notes: Robust standard errors clustered at sector level are included in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note (1): OLS regression refers to pooled cross sectional estimation of the data. Fixed effect (FE) estimation uses a simple within-group mean removal technique.

Note (2): As specified in equation (2) other controls included are firm profitability, firm age and firm size. Results are not presented here but are available on request.

Source: Authors estimates using WIDER Viet Nam SME Survey data.

A number of findings emerge. Across all specifications, it appears that credit demand is negatively associated with the marginal revenue product of capital. As firms have a higher level of capital efficiency, their demand for credit falls. This is a surprising result as these firms are potentially the ones to gain most from taking on credit and increasing investment.

We also explore the relationship between credit supply and capital efficiency using the same specification. The results are presented in Table 6. We find that marginal returns to capital are negatively correlated with the probability of being credit-rationed and positively correlated with the probability of being a discouraged borrower, although in both cases the results are not well determined. It does provide, however, some suggestive evidence that being turned down for a loan (credit rationing) may well be justified on efficiency grounds as these firms have indeed lower returns to capital. On the other hand, firms who choose not to apply for a loan for fear of being rejected–the process being too difficult or the rate of interest being too high–are likely to be the ones that would yield high returns on that investment. Caution, however, should be exercised in this interpretation given that the results are not statistically well-determined.

Table 6: Relationship between capital efficiency and credit supply

	(1) Credit Rationed OLS	(2) Credit Rationed FE	(3) Discouraged OLS	(4) Discouraged FE
Ln MRPK	-0.002	-0.004*	0.024***	0.009
	(0.001)	(0.002)	(0.005)	(0.006)
Constant	0.029*	0.052	0.405***	0.693***
	(0.014)	(0.113)	(0.051)	(0.072)
Province FE	Y	Y	Y	Y
Sector FE	Y	Y	Y	Y
Time FE	Y	Y	Y	Y
Other controls	Y	Y	Y	Y
Observations	15,075	15,075	15,075	15,075
R-squared	0.034	0.011	0.036	0.014
Number of Firm ID		5,014		5,014

Notes: Robust standard errors clustered at sector level are included in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note (1): OLS regression refers to pooled cross sectional estimation of the data. Fixed effect (FE) estimation uses a simple within-group mean removal technique.

Note (2): As specified in equation (2) other controls included are firm profitability, firm age and firm size. Results are not presented here but are available on request.

Source: Authors estimates using WIDER Viet Nam SME Survey data.

4.2 Do financing constraints affect firm growth for efficient firms?

Financing and investment

To this point, we have explored the relationship between capital efficiency and access to finance. We find some tentative evidence that capital allocation may not be optimal as firms with higher marginal returns are less likely to have formal finance. In this section, we undertake a more direct test, which asks whether firm growth has been limited by credit allocation problems. To test this hypothesis, we explore whether credit constraints impact investment and employment and if the effect is larger for higher return firms. This is a more direct test of whether credit supply is limiting the efficient allocation of capital.

Table 7 presents the results for the specification exploring the relationship between credit constraints, the efficiency of capital and investment as given in equation (3). We present the results for both the intensive and extensive margin. All independent variables are lagged to avoid simultaneity issues and in each case the model is estimated including firm-fixed effects. We separately test the effects on all constrained firms and on credit-rationed firms and discouraged borrowers. In each case we interact MRPK and credit constraints to examine whether there is an impact on investment.

Table 7: Testing the effect of credit constraints and capital efficiency on investment

	(1) Extensive	(2) Intensive	(3) Extensive	(4) Intensive	(5) Extensive	(6) Intensive
Lag Ln MRPK* Lag Credit Constraints	-0.010	-0.086				
	(0.011)	(0.061)				
Lag Ln MRPK	-0.004	0.093*	-0.006	0.077*	-0.004	0.080*
	(0.007)	(0.047)	(0.005)	(0.038)	(0.006)	(0.044)
Lag Credit Constraints	-0.027	-0.230				
	(0.038)	(0.153)				
Lag Ln MRPK* Lag Credit Rationed			0.004	-0.093*		
			(0.019)	(0.050)		
Lag Credit Rationed			-0.031	-0.328***		
			(0.054)	(0.104)		
Lag Ln MRPK* Lag Discouraged Borrower					-0.014	-0.063
					(0.010)	(0.075)
Lag Discouraged Borrower					-0.019	-0.114
					(0.031)	(0.192)
Constant	-0.742***	2.923***	-0.381**	3.225***	-0.745***	3.245***
	(0.137)	(0.490)	(0.136)	(0.446)	(0.138)	(0.479)
Controls	Y	Y	Y	Y	Y	Y
Province FE	Y	Y	Y	Y	Y	Y
Sector FE	Y	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y
Observations	10,040	5,022	10,040	5,022	10,040	5,022
R-squared	0.037	0.061	0.037	0.061	0.037	0.061
Number of Firm ID	3,621	2,522	3,621	2,522	3,621	2,522

Notes: Robust standard errors clustered at sector level are included in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

Note (1): As specified in equation (3) other controls include revenue growth, firm age and age squared, lagged profitability in logs, and lagged number of employees in logs.

Source: Authors estimates using WIDER Viet Nam SME Survey data.

On the intensive margin, we find a negative interaction between the marginal product of capital and credit rejections (column 4). This suggests that as efficiency increases (higher marginal product firms), credit constraints lower the level of investment that firms undertake. That we find this channel specifically for the intensive margin and not the extensive margin, may reflect the fact that those firms with high marginal products may have internal resources that they will use to undertake *at least some* investment even if they are credit-constrained. They will not invest the optimal level but they will appear in the measure for the extensive margin as having some positive level of investment. More generally, this finding suggests that credit allocation may be the allocation of investment in the Vietnamese economy.

Financing and employment

The second measure of firm growth that we consider is employment. We test the relationship between employment, credit constraints and capital efficiency using the same specification as above. The channel through which access to finance impacts employment is not as direct as investment, as the latter requires potentially larger amounts of funds at a particular point in time while expanding the work force could be done incrementally. It may be the case, however, that employment growth is slowed if firms cannot access sufficient working capital to manage wage bills or—if firms forego investments—they may operate at a lower than optimal capital output ratio thus lowering employment growth.

The results using the same specification as for Table 7, with the addition of a control for the marginal revenue product of labour, are presented in Table 8. We do not find any statistically significant interactions between the marginal products and credit constraints in the employment specifications. This suggests that the negative effect of credit on capital efficiency and firm growth is running through the investment channel and not the employment channel.

Table 8: Testing the effect of credit constraints, credit allocation and employment

	(1)	(2)	(3)
Lag Ln MRPK* Lag Credit Constraints	0.005		
	(0.015)		
Lag Credit Constraints	0.018		
	(0.040)		
Lag Ln MRPK	-0.002	-0.003	0.000
	(0.011)	(0.009)	(0.011)
Lag Ln MRPL	-0.065**	-0.065**	-0.065**
	(0.026)	(0.026)	(0.026)
Lag Ln MRPK* Lag Credit Rationed		0.030	
		(0.037)	
Lag Credit Rationed		0.078	
		(0.087)	
Lag Ln MRPK * Lag Discouraged Borrower			-0.008
			(0.014)
Lag Discouraged Borrower			-0.015
			(0.043)
Constant	1.383***	1.379***	1.391***
	(0.284)	(0.280)	(0.285)
Controls	Y	Y	Y
Province FE	Y	Y	Y
Sector FE	Y	Y	Y
Time FE	Y	Y	Y
Firm FE	Y	Y	Y
Observations	8,145	8,145	8,145
R-squared	0.072	0.073	0.072
Number of Firm ID	3,152	3,152	3,152

Notes: Robust standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

Note (1): Controls include: revenue growth, firm age and age squared, lagged profitability in logs, lagged number of employees in logs and the lag of the log of the firm's marginal revenue product of labour.

Source: Authors estimates using WIDER Viet Nam SME Survey data.

5   Conclusions and policy implications

This paper explores the impact of credit access on firm growth by examining whether credit is flowing to firms with the highest return on capital. Standard neoclassical economic models would suggest that an efficient capital market should intermediate financing to firms with the highest returns on investment allowing them to invest and grow. For the case of Viet Nam—a country that is transitioning to a more market-oriented economy—we find evidence that financial markets are not necessarily intermediating finance to its highest return in the case of SMEs, and this is limiting investment at the firm level.

More specifically, we find that high-return investors, with the greatest marginal return on capital, have a lower likelihood of having formal finance (loans outstanding with formal credit institutions). Marginal returns on capital do not seem to impact on informal financing. This could be suggestive evidence that formal credit markets are not allocating finance to the highest return and that informal credit markets are filling a void to address this gap.

Directly testing whether credit supply is the limiting channel, we find evidence that rejected credit applications are limiting investment activity but not employment, particularly for firms with higher

investment efficiency. The effects are found to be running through the credit-rationing channel on the intensive margin of investment.

Our results provide a number of insights for policy. Having formal credit in Viet Nam is associated with lower marginal returns on capital. While this might be suggestive of good credit allocation (as firms with formal credit have been able to make investments), the fact that credit constraints are found to limit investment for high marginal return firms, would indicate otherwise. We find suggestive evidence that borrower discouragement may be an important credit constraint in Viet Nam. More efficient firms appear to be more discouraged. Since these borrowers often do not interface with a formal financial institution (as compared with rejected borrowers who make an application), targeted credit policies, such as guarantee schemes, for example, are less likely to be effective in addressing this market failure. Improving awareness amongst firms, and increasing information about the formal credit process, might prove to be the more effective policy response.

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