Size-dependent Subsidies and Financial Frictions: The Case of Vietnam's Lending-rate Cap for SMEs

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Abstract

Motivated by a policy in Vietnam that capped short-term lending rates for small and medium-sized enterprises (SMEs) in 2012, this paper develops a heterogeneous-agent general equilibrium model that integrates a size-dependent financial subsidy into a canonical framework of entrepreneurs with borrowing constraints. In the model, firms below an employment threshold rent capital at a discounted price, choosing production scale endogenously. I use micro-level data from Vietnam to document patterns in SME financing conditions around the policy and to calibrate the model. In the quantitative exercise, a 10% capital-price discount for eligible firms raises the equilibrium interest rate by 2.9% and the wage by 0.7%. The subsidy generates substantial firm-size bunching around the employment threshold, increases aggregate output and capital, and slightly reduces total factor productivity. Counterfactual experiments reveal a trade-off between scale and efficiency: higher subsidies expand capital and output and further compress capital distortions, but at the cost of higher overall misallocation. This paper connects the literature on size-dependent distortions and financial frictions by allowing the cost of capital to vary with firm size.

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1 Introduction

Small and medium enterprises (SMEs) account for the vast majority of firms and more than half of total employment worldwide. One of the main constraints facing SMEs is limited access to finance, which explains why government policies that support SME financing are widespread. This paper is motivated by an actual policy in Vietnam that capped short-term lending rates for SMEs. The cap was initially set at the maximum term-deposit rate plus 3 percentage points and was soon replaced by a fixed ceiling of 13% in June 2012, which was tightened further in subsequent years. The policy remains in place, although the State Bank of Vietnam (SBV) continues to adjust the ceiling in response to monetary conditions. Because such a cap matters only when it lies below the rate that lenders would otherwise charge, it can be interpreted as lowering the price of capital for eligible firms. This raises a central question: how does financial support that lowers the price of capital for firms below a size threshold affect firm behavior and aggregate outcomes?

Vietnam has received growing attention in the development literature following its transition from a centrally planned to a market-oriented economy and its sustained economic growth over the last two decades. Alongside the rapid growth of private firms, SMEs account for the dominant share of firms in Vietnam. The government defined SMEs and prioritized their development from the early 2000s, particularly through Decree 90/2001/ND-CP in 2001. In 2012, Circular 14/2012/TT-NHNN introduced direct monetary support by capping short-term lending rates for SMEs. The ceiling was initially linked to the maximum term-deposit rate and was subsequently replaced by a fixed lending-rate cap that tightened rapidly over the following years. Eligibility for the preferential rate was tied to SME status, making the policy a concrete example of financing support that varies with firm size.

This paper first documents patterns in SME financing conditions around the introduction of the policy using micro-level data from the Vietnam Enterprises Survey (VES). The analysis focuses on manufacturing firms, for which the SME classification is based on Vietnamese regulation. Median debt rel-

ative to net fixed assets rose sharply for SMEs around 2012 and remained above the corresponding non-SME median afterward. The same pattern appears when firms are assigned to a fixed 2011 SME cohort and when SME status is redefined annually. Pooled difference-in-differences regressions similarly show a relative post-2012 increase in SME credit intensity, measured by the debt-to-net-fixed-assets ratio, and, among firms with positive interest payments, a modest decline in interest expense per unit of debt relative to non-SMEs.

Motivated by these institutional and empirical patterns, in this paper, I develop a heterogeneous-agent general equilibrium model that incorporates a size-dependent financial subsidy into a canonical framework of entrepreneurs with borrowing constraints. While standard models of financial frictions typically assume a common capital rental price across firms, the policy generates variation in the price of capital according to firm size. In the model, firms below an employment threshold rent capital at a discounted price, whereas firms above the threshold pay the market rental price. Firms therefore choose their production scale endogenously, balancing the benefit of cheaper capital against the cost of foregoing the subsidy when they expand beyond the threshold. The model captures the interaction between a size-dependent subsidy and borrowing constraints that limit firms' access to capital. It provides a framework for quantifying the effects of size-dependent financing support on firm-level input choices, the firm-size distribution, capital accumulation, output, and productivity.

In the quantitative exercises, the benchmark model represents the Vietnamese economy prior to the policy launch and is calibrated to match key moments from Vietnamese micro-level data. I set the discount to 10%, which approximates the gap between the initial 13% cap and the typical short-term lending rate of about 14.5% before the policy. The results show that this discount on the capital rental price for eligible firms raises the equilibrium interest rate by 2.9% and the wage by 0.7%. The model also generates substantial bunching at the employment threshold: the mass of firms operating exactly at the cutoff increases sharply, while the share of firms above it declines. The subsidy encourages capital accumulation among eligible firms

but also changes firms' scale choices to preserve subsidy eligibility.

Compared with the benchmark, aggregate output increases by 3.6% and capital by 11.3%, while total factor productivity decreases slightly to 98.5% of the benchmark. In the post-policy equilibrium, the dispersion of the marginal product of capital (MPK) falls by 0.6%, but the overall level of misallocation increases by around 0.3%.[1] These two results are consistent. MPK dispersion captures only distortions in the use of capital, and it falls because the subsidy helps financially constrained small firms accumulate capital. Overall misallocation, by contrast, reflects the joint allocation of capital and labor across firms. Because eligibility depends on employment size rather than productivity, the subsidy creates its own distortion by shifting capital and labor toward less productive SMEs. Counterfactual experiments that vary the subsidy rate further illustrate a trade-off between economic scale and efficiency. A lower subsidy still helps constrained small firms grow, with minimal effects on aggregate productivity. Higher subsidies expand capital and output and reduce capital distortions relative to the benchmark, but at the cost of higher overall misallocation.[2]

This paper makes three contributions. First, it provides, to my knowledge, the first quantitative evaluation of Vietnam's SME lending-rate cap, interpreting the cap as a size-dependent subsidy on the price of capital in a heterogeneous-agent model with borrowing constraints. Second, it shows how a price-based subsidy tied to an employment threshold interacts with collateral constraints to shape firm behavior, the firm-size distribution, and aggregate outcomes. The subsidy expands aggregate output and capital and reduces capital distortions, but it also induces bunching at the threshold and raises overall misallocation, giving rise to a trade-off between economic scale and efficiency. Third, it links the model to an actual policy in Vietnam:

[1]MPK dispersion is the standard deviation of marginal product of capital across firms. Overall misallocation is measured as the gap between total factor productivity in the efficient allocation, obtained from the social planner's problem, and in the equilibrium allocation.

[2]Because labor supply is fixed in the model, percentage changes in aggregate output and capital equal percentage changes in output and capital per worker.

the institutional background and empirical patterns motivate the financing channel, and the model is calibrated to match moments from Vietnamese micro-level data.

This paper contributes to the literature on financial frictions and misallocation. Buera, Kaboski, and Shin (2011), Greenwood et al. (2013), Moll (2014), Midrigan and Xu (2014), Chen et al. (2023) and Vereshchagina (2022), among others, quantify the impact of borrowing constraints on aggregate output and productivity and highlight various amplification channels. Cavalcanti et al. (2024) argue that interest rate dispersion is itself an important financial friction, whereas the standard credit-constrained entrepreneur model typically assumes a single borrowing rate. This paper follows their direction by studying a policy that creates differences in the price of capital across firm sizes. It also relates to studies of policy in economies with financial frictions, such as Buera, Moll, et al. (2013) and Itskhoki and Moll (2019).

This paper is also related to the literature on size-dependent distortions. Studies such as Restuccia and Rogerson (2008), Guner et al. (2008), Hsieh and Klenow (2014) and Brüggemann (2021) quantify the effects of size-dependent distortions on resource misallocation, and Garicano et al. (2016) show how a regulatory size threshold leads firms to bunch below it.

A smaller literature studies how size-dependent policies interact with financial frictions. Gopinath et al. (2017) and Zhu (2023) focus on differences in borrowing quantities or in the tightness of borrowing constraints across firm sizes, rather than differences in borrowing prices. Jo and Senga (2019) quantify the aggregate effects of credit subsidies targeted at small and young firms, and Qian and Vereshchagina (2024) show that output taxes rising with firm size can raise aggregate output and productivity when firms face financing constraints. This paper complements these studies by examining a subsidy on the price of capital that is tied to an employment threshold. In addition, this paper contributes to the use of quantitative heterogeneous-agent models disciplined by micro-level evidence to study a macroeconomic development policy, in the spirit of Buera, Kaboski, and Townsend (2023).

Finally, this paper relates to the literature on misallocation in Vietnam.

Existing studies document substantial misallocation in agriculture (Ayerst et al., 2020; K. Le, 2020) and in manufacturing (Doan and Kiyota, 2015; T. P. Nguyen and K. M. Nguyen, 2020), and link it to firm ownership (Zhou, 2015; Bach, 2019; P. Le, 2022). In recent work, Dao (2026) measures misallocation across industries and ownership structures and finds that it is substantial and increased over 2011–2020, and that labor-market distortions matter more for aggregate productivity than capital-market distortions. This paper complements these studies by examining a specific credit policy and how it reshapes the allocation of capital and labor within the economy.

The remainder of the paper is organized as follows. Section 2 briefly describes the institutional background. Section 3 presents the empirical motivation. Section 4 develops the theoretical framework. Section 5 describes the data and calibration strategy. Section 6 presents the quantitative results and counterfactual experiments. Section 7 concludes.

2 Institutional Background

The Vietnamese government has prioritized SME development since the early 2000s. Decree 90/2001/ND-CP, effective in December 2001, first defined SMEs as enterprises with either total capital of up to 10 billion VND or up to 300 employees, and it encouraged and created favorable conditions for their development. Decree 56/2009/ND-CP reclassified firm size by sector-specific. In particular, the upper bound for medium-sized enterprises remains 300 employees in agriculture and manufacturing industry but falls to 100 employees in trade and services. The total capital threshold for SMEs in the former industries rises up to 100 billion VND while up to 50 billion VND for the latter. However, neither the 2009 decree nor the earlier stimulus package (Resolution 30/2008/NQ-CP) provided any specific financial support for SMEs. The regulation of lending rates did not distinguish firms by size either. Until 2010, the State Bank of Vietnam (SBV) limited negotiable lending rates to 150% of a monthly base rate, and then allowed banks and borrowers to agree on rates in Circular 12/2010/TT-NHNN.

Direct financial support for SMEs was first introduced in 2012. In particular, Circular 14/2012/TT-NHNN, effective in May 2012, capped short-term lending rates in Vietnamese dong at the maximum term-deposit rate plus 3 percentage points. The cap applied to loans for agriculture and rural development, export production, SMEs under Decree 56/2009, and support industries. Within weeks, Circular 20/2012/TT-NHNN, effective in June 2012, replaced the formula with a fixed ceiling of 13%. From then on, the SBV adjusted the ceiling by announcing new numbers, and it tightened the ceiling further over the following years. The policy remains in place, although the SBV continues to change the level of the cap in response to monetary conditions.

This study is motivated by the policy and considers the lending cap rate a financial subsidy on the capital price due to the following reasons. First, a cap matters only when it lies below the rate that banks would otherwise charge. Second, when the cap is applied, eligible borrowers pay no more than the cap, and banks have little reason to lend at a lower rate. The cap therefore can be interpreted as a financial subsidy to eligible borrowers.

3 Empirical Motivation

This section documents how SMEs financing changed around the 2012 policy, providing descriptive and suggestive evidence motivating a study of the size-dependent financial subsidy channel in a quantitative model.

For empirical analysis, I use the Vietnam Enterprises Survey (VES), an annual administrative survey of formal firms collected by the General Statistics Office. The survey provides a rich set of information on firm-level characteristics including demographics, balance sheets, and income statements.

The interest rate cap policy applied to loans for four purposes: (i) agricultural and rural development, (ii) the production and sale of export goods, (iii) the production and business activities of small and medium-sized enterprises (SMEs), and (iv) the development of supporting industries. Loans under the first category primarily target the agricultural sector, while eligi-

bility for loans under the second and fourth categories is determined mainly by product lines. In contrast, eligibility for loans targeting SMEs depends on firm size, regardless of a firm's industry or products. To focus on the size-dependent component of the policy, I restrict the sample to manufacturing firms, which excludes the first group. The available firm-level data do not identify loans for the second and fourth groups. However, SMEs accounted for 93% of active firms in Vietnam in 2011, before the policy was implemented, so many loans in the second and fourth groups were probably granted to SMEs. Thus, the inability to identify these loans is unlikely to substantially affect the analysis of the size-dependent component of the policy.

The final sample is a balanced panel of manufacturing firms from 2006 to 2016, with over 50,000 firm-year observations. The variables are defined as follows. Debt is proxied by total liabilities reported on the balance sheet. Interest expense is reported in the income statement and is available from 2009. Assets are net fixed assets, measured net of depreciation. Employment is the number of workers. I use averages of beginning and end-of-year values for debt, net fixed assets, and employment. All monetary values are deflated by the World Bank linked GDP deflator. In addition, I further restrict the sample to firms with positive debt and positive net fixed assets for the debt-to-assets ratio, and to firms with positive debt and positive interest expense for the interest-to-debt ratio. Both ratios are winsorized at the 1st and 99th percentiles within year.

Figure 1 presents the median debt-to-assets ratio by annual SME status, with the 25th–75th percentile band. SMEs classification is based on the average employment in each year. The figure shows that the median of SME debt-to-assets ratios distribution starts below in 2006–2007, are roughly equal during 2008–2011, relative to that of non-SMEs. In 2012 the SME median increased significantly, while the non-SME median rises more gradually, making the gap between them wider. SMEs remained having higher debt-to-assets ratios than non-SMEs through 2016, although the gap narrows in 2015. In addition, the 25th–75th percentile band shows that first quartile of the SME distribution started at lower level in 2006 then caught up and

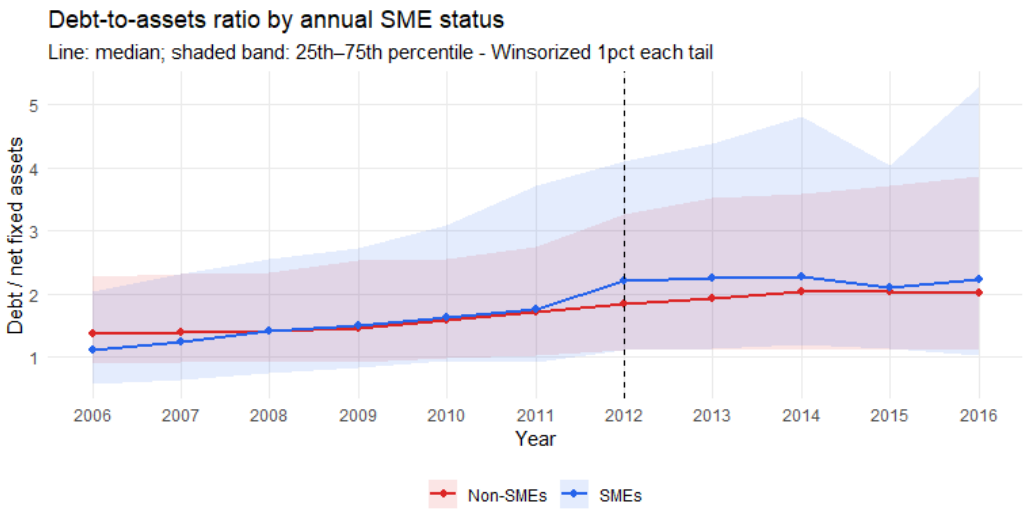


Figure 1: Debt-to-assets ratio by firm size.

stayed roughly at the same level of non-SMEs from 2012. Whereas, the SME third quartile increased more quickly, widening the gap to that of non-SMEs from 2010. In overall, the figure indicates SMEs attained more dept per unit of assets overtime and the median gap relative to non-SMEs was significantly higher from 2012. The same pattern appears when firms are assigned to the fixed 2011 SME status cohort (see Appendix A1).

To complement the figure, I estimate pooled difference-in-differences regressions:

$$y_{it} = \alpha_i + \lambda_t + \beta \left(\text{SME}_i^{2011} \times \text{Post}_t \right) + \varepsilon_{it}, \tag{1}$$

where: y_{it} is the interested outcome, SME_i^{2011} indicates the fixed 2011 SME cohort, $\text{Post}_t = \mathbf{1}\{t \geq 2012\}$, α_i and λ_t are the firm and year fixed effects, respectively. The coefficient β reflects the change in after 2012 difference in outcome between SMEs and non-SMEs relative to their gap pre-2012.

Table 1 reports the results for debt relative to net fixed assets. In the full 2006-2016 sample, the ratio of the 2011 SME cohort rises by 0.62 ratio points more than that of non-SMEs after 2012 (column 1). Columns 2 to 5 narrow the sample period to start in 2009, when interest expense data become available, and the last two columns further restrict the sample to firms with positive interest expense. Columns 3 and 5 use industry-by-year

effects instead of year effects, so that the comparison is made within an industry and year. The estimates differ in magnitude across specifications, ranging from 0.34 to 0.62, but all are positive and statistically significant. The results suggest that SMEs increased their credit intensity, defined as debt per unit of net fixed assets, by more than non-SMEs after 2012.

Table 1: Debt to assets ratio: pooled DID results

	(1)	(2)	(3)	(4)	(5)
$SME^{2011} \times Post$	0.616***	0.339*	0.601***	0.475**	0.550**
	(0.140)	(0.133)	(0.151)	(0.175)	(0.174)
Firm FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	No	Yes	No
Industry×year FE	No	No	Yes	No	Yes
Years	2006–16	2009–16	2009–16	2009–16	2009–16
Observations	49,432	36,223	36,223	18,474	18,474
Positive interest	No	No	No	Yes	Yes

Notes: The dependent variable is average debt divided by average net fixed assets, winsorized at the 1st and 99th percentiles within year. All columns include firms with positive debt and positive net fixed assets. Columns (4)–(5) further restrict the sample to firms with positive interest expense, available from 2009, which is the sample used in Table 2. SME^{2011} indicates firms with average employment of at most 300 in 2011. Post equals one from 2012. Standard errors clustered by firm are in parentheses. $^{*}\, p < 0.05$, $^{**}\, p < 0.01$, $^{***}\, p < 0.001$.

Table 2 reports the results for interest expense relative to debt, which I use as a proxy for the cost of borrowing. The sample covers 2009-2016 and includes firms with positive debt and positive interest expense. After 2012, the financing cost of the 2011 SME cohort falls by 0.31 percentage points relative to non-SMEs (column 1). With industry-by-year effects, the estimate is 0.29 percentage points (column 2). The estimates are negative and statistically significant in both specifications, suggesting that among firms paying interest, SMEs paid somewhat less interest per unit of debt after 2012.

Taken together, the evidence suggests that after 2012 SMEs became more

Table 2: Interest expense to debt ratio: pooled DID results

	(1)	(2)
$\text{SME}^{2011} \times \text{Post}$	-0.0031^{**}	-0.0029^{**}
	(0.0010)	(0.0010)
Firm FE	Yes	Yes
Year FE	Yes	No
Industry×year FE	No	Yes
Years	2009–16	2009–16
Observations	18,474	18,474

Notes: The dependent variable is interest expense divided by average debt, winsorized at the 1st and 99th percentiles within year. The sample includes firms with positive debt and positive interest expense. SME^{2011} indicates firms with average employment of at most 300 in 2011. Post equals one from 2012. Standard errors clustered by firm are in parentheses. $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$.

credit-intensive and, among firms paying interest, faced somewhat lower borrowing costs. These patterns are consistent with interpreting the lending cap as a financial subsidy that lowers the price of capital for eligible firms. This motivates the model, presented in the next section, which introduces the policy as a size-dependent financial subsidy.

4 Theoretical Framework

This section presents a heterogeneous-agent model that integrates the size-dependent financial subsidy into a canonical framework of entrepreneurs with borrowing constraints. Eligible firms, those with employment below a threshold, rent capital at a discounted price, so firms choose their scale endogenously. I use the model to quantitatively compare a benchmark economy without the subsidy with an otherwise identical economy with it.

4.1 Environment

In this study, the economy is endowed with two types of infinitely lived individuals: workers and entrepreneurs. The measures of workers and entrepreneurs are denoted by N_w and N_e, respectively. Workers supply labor used in production, do not save, and live hand-to-mouth. Entrepreneurs are heterogeneous in an exogenous entrepreneurial ability z. They operate firms to produce a single output good, which is the numeraire and can be used for consumption or capital formation.

Regarding the structure of the capital market, a representative financial intermediary owns capital and rents it to entrepreneurs at the rental rate R. The intermediary finances its capital stock by issuing a one-period risk-free bond a, which is held by entrepreneurs and serves as collateral. The interest rate on this bond is r. The intermediary earns zero profits; hence, in equilibrium $R = r + \delta$, where δ is the depreciation rate of capital. In the labor market, each worker has one unit of time supplied inelastically and earns a flat wage W.

The size-dependent subsidy is introduced as a discount rate s on capital rental price, so that eligible SMEs pay $(1 - s)R$ instead of market rate R. Eligibility for the subsidy is determined by an exogenous threshold of labor $\underline{n}$ set by the government. The subsidies are financed by consumption tax.

4.2 Entrepreneurs

4.2.1 Entrepreneurs' preferences

The entrepreneurs' utility function is given by:

$$U(c) = \mathbb{E}_0 \left[\sum_{t=0}^{\infty} \beta^t u(c_t) \right] \quad \text{where} \quad u(c_t) = \frac{c_t^{1-\sigma} - 1}{1 - \sigma}$$

Here, β is the discount factor and σ is the coefficient of relative risk aversion. The expectation is taken over the realization of ability z, which varies over time according to a stochastic process known to entrepreneurs.

4.2.2 Entrepreneurs' production

An entrepreneur with ability z can operate a firm with productivity $A(z) = e^z$ and the production function is given by:

$$y = A(z)^{1-\gamma} \left(k^{\alpha} n^{(1-\alpha)}\right)^{\gamma}$$

where k and n are capital and production labor input, respectively, and α and γ determine the factor shares and the span of control. The entrepreneurial ability z has 2 components $z = \bar{z} + \tilde{z}$, in which:

- Permanent component $\bar{z}$ follows a Gaussian distribution with standard deviation σ_z.
- Transitory component $\tilde{z}$ follows an AR1 process with Gaussian disturbances: $\tilde{z}' = (1-\rho)\tilde{z} + \epsilon_{\tilde{z}}$.

4.2.3 Static profit maximization problem

The firm, operated by an entrepreneur with ability z and asset holdings a, has the following profit maximization problem:

$$\pi(a, z, \underline{n}, s) = \max_{k,n} \left\{ A(z)^{1-\gamma} \left(k^{\alpha} n^{1-\alpha}\right)^{\gamma} - \bar{R}(n)k - Wn \right\}$$
$$\text{s.t.} \quad k \leq \phi a$$

where:

$$\bar{R}(n) = \begin{cases} (1-s)R & \text{if } n \leq \underline{n} \\ R & \text{if } n > \underline{n} \end{cases}$$

Here the collateral constraint takes the form of $k \leq \phi a$ where a is the entrepreneur's asset holdings used as collateral, and parameter ϕ governs the stringency of the collateral constraint.

The entrepreneur will decide whether to operate the firm at a large scale with the standard market price or at a small scale to receive a financial subsidy.

4.2.4 Entrepreneurs' consumption saving problem

An entrepreneur begins a period with asset holdings a and ability z face the following consumption saving problem:

$$\max_{\{c_t, a_{t+1}\}_{t=0}^{\infty}} \left\{ \sum_{t=0}^{\infty} \beta^t \frac{c_t^{1-\sigma} - 1}{1-\sigma} \right\}$$
$$\text{s.t.} \quad (1+\tau_t)c_t + a_{t+1} \leq (1+r_t)a_t + \pi_t(a_t, z_t), \ \forall t.$$

In recursive form:

$$V(a,z) = \max_{a' \geq 0} \left\{ \frac{c^{1-\sigma}}{1-\sigma} + \beta \mathbb{E}_{z'}[V(a', z')|z] \right\}$$
$$\text{s.t.} \quad (1+\tau)c + a' \leq (1+r)a + \pi(a,z)$$

Denote the optimal decision rules as $c(a,z)$ and $a'(a,z)$.

4.3 Workers

Workers supply inelastically N_w labor. They consume all of their income with given consumption tax rate, i.e $N_w c_w = \frac{N_w W}{1+\tau}$.

4.4 Aggregation and Equilibrium

Let $G(a,z)$ be the joint distribution of entrepreneurs over the asset holdings and ability.

The aggregate demand for labor:

$$N^d = N_e \int_{a,z} n^d(a, z, \underline{n}, s) G(da, dz).$$

The aggregate supply for labor:

$$N^s = N_w.$$

The aggregate demand for capital:

$$K^d = N_e \int_{a,z} k^d(a, z, \underline{n}, s) G(da, dz).$$

The aggregate supply for capital:

$$K^s = N_e \int_{a,z} aG(da, dz).$$

The aggregate demand for output:

$$Y^d = N_e \int_{a,z} c(a, z)G(da, dz) + N_w c_w + \delta K^d.$$

The aggregate supply for output:

$$Y^s = N_e \int_{a,z} y(a, z, \underline{n}, s)G(da, dz).$$

The aggregate subsidies:

$$G_S = N_e \int_{a,z} \mathbb{1}\{n^d(a, z, \underline{n}, s) \leq \underline{n}\} sRk^d(a, z, \underline{n}, s)G(da, dz).$$

The tax revenue:

$$G_T = N_e \int_{a,z} \tau c(a, z)G(da, dz) + N_w \tau c_w.$$

A stationary competitive equilibrium consists of a set of functions, including prices w and r; tax τ; the entrepreneur's optimal savings function $a'(a, z)$, optimal factor demands $k^d(a, z, \underline{n}, s)$, $n^d(a, z, \underline{n}, s)$, output $y(a, z, \underline{n}, s)$, and profit $\pi(a, z, \underline{n}, s)$; and a stationary distribution $G(a, z)$ over entrepreneur assets and ability that satisfies the following conditions:

1. Given prices and borrowing limits, $k^d(a, z, \underline{n}, s)$, $n^d(a, z, \underline{n}, s)$, solve the firm's profit-maximization problem. The optimal output and profit are $y(a, z, \underline{n}, s)$, and $\pi(a, z, \underline{n}, s)$.

2. Given prices and tax, $a'(a, z)$ solves the entrepreneurs' consumption-savings problem.

3. The wage w and interest rate r, and tax τ clear the labor and capital markets and balance government budget respectively: $N_w = N^d$, $K^s = K^d$ and $G_S = G_T$.

4. The joint distribution of assets and productivity, $G(a, z)$, is stationary.

5 Data and Calibration Strategy

In this paper, I combine firm-level and household-level micro data with aggregate statistics to discipline my theoretical frameworks. The primary datasets are the firm-level VES and the household-level VHLSS. VES is an administrative dataset collected annual by the General Statistics Office of Vietnam, which widely used to study the Vietnamese formal sector. It reports detailed balance-sheet and income-statement items (e.g., revenue, employment, asset, interest expense, and liabilities), which allows construction of key financial and production moments. I use the 2011 cross-section to compute the aggregate debt-to-output ratio and a balanced manufacturing panel over 2006-2016 to discipline the stochastic process for entrepreneurial ability through moments of output dispersion and persistence.

The household-side information comes from the Vietnam Household Living Standards Survey (VHLSS), a nationally representative survey that provides detailed information on household demographics, labor-market activities, and living standards. I use the 2010 VHLSS to calculate the share of non-agriculture among self-employed workers. I complement with the aggregate self-employment, employers and own account workers from the 2011 Labor Force Survey report to calculate the entrepreneur shares in Vietnam.

In addition, I use the Penn World Table (Feenstra et al. (2015)) as another complementary data source, which provides internationally comparable national-accounts series used to discipline the depreciation rate and the aggregate capital-to-output ratio.

In the benchmark model without the size-dependent subsidy policy, there are 11 parameters, including Ne, N_w, σ, γ, δ, β, α, ϕ, ρ, $\sigma_{\bar{z}}$, and $\sigma_{\tilde{z}}$. I set the coefficient of relative risk aversion $\sigma = 2$ and the span-of-control parameter $\gamma = 0.8$, which are standard values from the literature. For the remaining parameters, I follow established strategies in the literature (e.g., Chen et al. (2023), for China) to calibrate. The calibration strategy is described below:

- Ne, N_w: Measures of entrepreneurs and workers. While the number of entrepreneurs N_e is normalized to 1, $N_w = 3.951$ is chosen to match the entrepreneurs share of 20.2% in the population.

- δ and β: The depreciation rate $\delta = 0.0579$ and discount factor $\beta = 0.915$ are chosen to match the depreciation rate and aggregate capital-to-output ratio (2.5) from the Penn World Table. [3]

- α: The capital technology parameter $\alpha = 0.447$ is calibrated to match a capital share of $\frac{1}{3}$, a standard value in the literature.

- ϕ: The collateral constraint parameter $\phi = 1.779$ matches the aggregate debt-to-output ratio of 0.615.

- ρ, $\sigma_{\bar{z}}$ and $\sigma_{\tilde{barz}}$: The parameter for autocorrelation of entrepreneurial ability $\rho = 0.505$, standard deviation of permanent productivity $\bar{\sigma}_z = 1.385$, and transitory productivity $\tilde{\sigma}_z = 0.645$ are jointly calibrated to match the one-year and five-year autocorrelations of log output, and the standard deviation of log output.

The post-policy model includes two additional parameters: the employment threshold $\underline{n}$ and subsidy rate s. The threshold $\underline{n}$ is set at the 93rd percentile of firm size in the benchmark equilibrium to match the share of SMEs in manufacturing in 2011. The subsidy rate s is set to 0.1, based on the interest-rate cap at the time the policy took effect. The first lending-rate cap for SMEs was 13% taking effect in June 2012, while the Bank for Investment and Development of Vietnam (BIDV), one of the largest banks in the country, announced a typical short-term lending rate of 14.5% before the cap became effective. The cap therefore lowers the borrowing rate of eligible firms by about $(14.5 - 13)/14.5 \approx 10\%$. Since banks have no incentive to lend below the cap, I interpret this reduction as a proportional discount of 10% on the capital rental price for eligible firms. For simplicity, I assume that this proportion is constant over time. Section 6 examines how aggregate outcomes vary with alternative subsidy rates.

Table 3 reports the targeted data moments and their model-implied counterparts. Overall, the calibrated economy matches the targeted moments closely, with an RMSE of 0.0077.

[3]The value of depreciation rate and capital-to-output ratio varies across the Penn World Table versions 9.0 to 11.0. I hence take the average value across versions.

Table 3: Data and Model-generated Moments

Moment	**Data**	**Model**
Capital share	0.3333	0.3333
Capital-to-output ratio	2.5031	2.5030
Debt-to-output ratio	0.6151	0.6151
SD of log output	1.5170	1.5176
Autocorrelation of log output (1-year)	0.9107	0.9127
Autocorrelation of log output (5-year)	0.8511	0.8322
RMSE across moments: 0.0077		

6 Quantitative Analysis

This section quantifies the equilibrium implications of the size-dependent subsidy by comparing the benchmark economy to the post-policy economy. In addition, I report how aggregate outcomes vary with alternative values of subsidy rates via counterfactual experiments.

6.1 Model Comparison

This section provides a comparison of equilibrium variables between the benchmark and the size-dependent subsidy models. Table 4 summarizes the equilibrium comparison with aggregate quantities normalized to 100 in the benchmark. The first two rows indicate that equilibrium prices increase under the policy: the interest rate rises 2.9% from 0.0753 to 0.0775, and the wage increases 0.7% from 0.6780 to 0.6825. Under the subsidy policy, aggregate output and capital increase by 3.6% and 11.3% respectively, while total factor productivity decreases to 98.5% of the benchmark. MPK dispersion declines slightly by 0.6% relative to the benchmark, suggesting that the size-dependent subsidy reduces financial distortions. However, overall misallocation increases slightly by 0.3%.

Table 5 reports the employment-size distribution in the simulated population of 1,000,000 firms under both models. The results indicate that the

Table 4: Compare equilibrium variables between models

Variable	**Benchmark**	**Post-policy**	**Change (%)**
Interest rate	0.0753	0.0775	+2.9
Wage	0.6780	0.6825	+0.7
Output	100.0	103.6	+3.6
Capital	100.0	111.3	+11.3
TFP	100.0	98.5	-1.5
MPK dispersion	100.0	99.4	-0.6
Overall misallocation	100.0	100.3	+0.3

Note: Aggregate variables normalized to 100 in the benchmark model.

Table 5: Firm size distribution across models

Firm type	**Benchmark**	**Post-policy**	**Change**
SMEs (emp $\leq$ threshold)	93.2%	97.6%	+4.4 p.p.
$emp < threshold$	91.4%	91.0%	-0.4 p.p.
$emp = threshold$	1.8%	6.6%	+4.8 p.p.
LEs (emp $>$ threshold)	6.8%	2.4%	-4.4 p.p.

Note: Shares of firms in the simulated population.

subsidy regime leads to a pronounced shift in the firm-size distribution toward SME status, together with substantial bunching at the eligibility threshold. While the SME share rises from 93.2% in the benchmark to 97.6% in the post-policy equilibrium, an increase of 4.4 percentage points, the share of large firms contracts from 6.8% to 2.4%. These changes suggest that a sizable fraction of firms selects into smaller-scale operations to qualify for the subsidy.

The most salient distributional change is the bunching at the threshold. The share of firms operating exactly at the employment cutoff increases from 1.8% to 6.6%. Most of this increase is consistent with large firms reducing employment to the cutoff, as the share of large firms falls by 4.4 percentage points. However, the share of firms strictly below the threshold also declines

slightly, by 0.4 percentage points. This pattern suggests that some SMEs, now facing a lower cost of capital, expand capital and labor demand until they reach the cutoff.

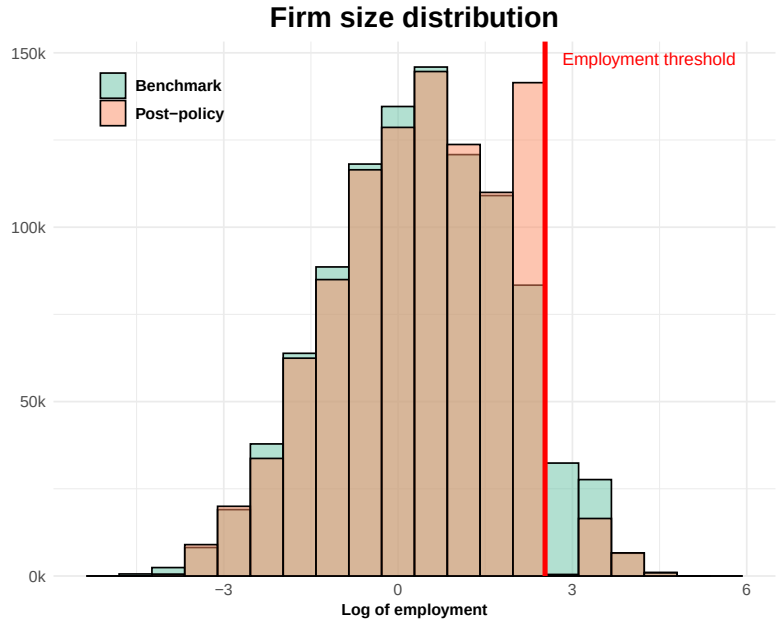


Figure 2: Firm size distribution in Benchmark and Post-policy equilibrium

Figures 2 and 3 illustrate how the size-dependent subsidy reshapes the simulated firm-size distribution relative to the benchmark. In the full distribution (Figure 2), the post-policy economy exhibits clear bunching at the employment threshold that determines subsidy eligibility, with a noticeably higher mass of firms accumulating at the cutoff than in the benchmark. The zoomed-in panel (Figure 3) highlights two additional features around the threshold. First, the post-policy distribution shows an absence of firms operating in the neighborhood just above the cutoff, reflecting firms' choice to remain eligible for the subsidy rather than expanding their scale beyond the threshold. Second, the mass of firms decreases in bins further below the threshold and increases in bins closer to the cutoff from the left, suggesting that part of the bunching reflects SME expansion toward the threshold.

Table 6 characterizes how the subsidy changes the intensive margin of input use—labor and capital—across employment-based firm types in the

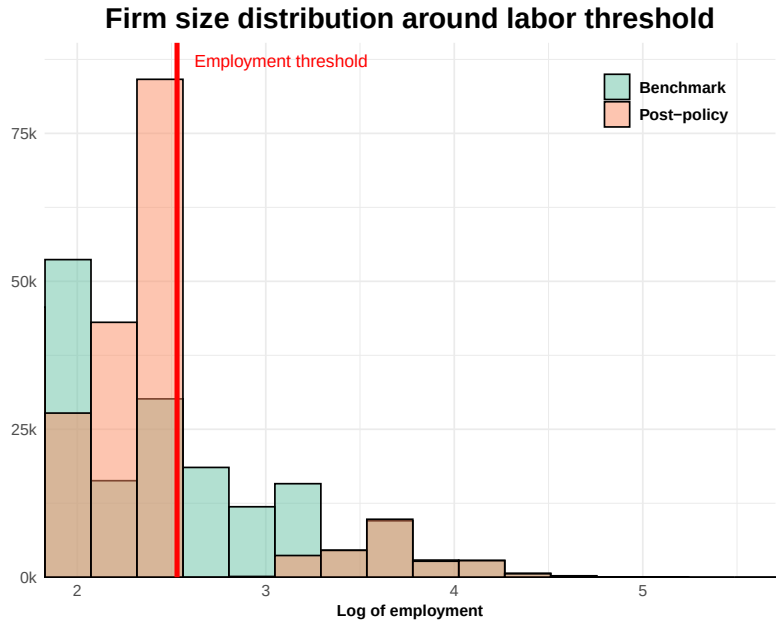


Figure 3: Firm size distribution around the employment threshold

post-policy equilibrium relative to the benchmark. Among SMEs, average employment rises by 31.70%, reflecting both expansion among firms strictly below the cutoff, where mean employment increases by 12.01%, and the large increase in the mass of firms located exactly at the threshold as shown in Table 5. Within-group extremes change little for SMEs: minimum employment is essentially unchanged (-1.18%), and the maximum is unchanged at the threshold. For large enterprises, mean employment also increases by 49.47%, even though the maximum employment level falls by 4.93%, indicating that the rise in the average is driven by changes in the composition of firms above the cutoff rather than growth of the very largest firms. In particular, the increase in the mean is consistent with the disappearance of firms operating just to the right of the threshold, as highlighted in Figure 3, which mechanically shifts left tail of the large-firm distribution toward higher employment levels.

The capital-usage panel shows a parallel but quantitatively stronger response for SMEs. Average SME capital increases by 50.66% relative to the benchmark, with higher capital intensity both among firms strictly below

the threshold, where mean capital rises by 23.41%, and among firms located at the cutoff, where mean capital rises by 20.71%. The range of capital within the threshold group also widens markedly: while the maximum rises by 46.54%, the minimum falls substantially by 56.25%, suggesting greater dispersion in capital choices among firms bunching at the cutoff. For large enterprises, average capital rises by 45.44%, and the minimum increases sharply by 91.20%, even as the maximum declines slightly by 5.86%. As with labor, this pattern indicates that the post-policy distribution thins out near the threshold from the right, leaving fewer relatively small "large" firms and raising average capital among those remaining above the cutoff, despite the higher equilibrium rental rate in the post-policy equilibrium.

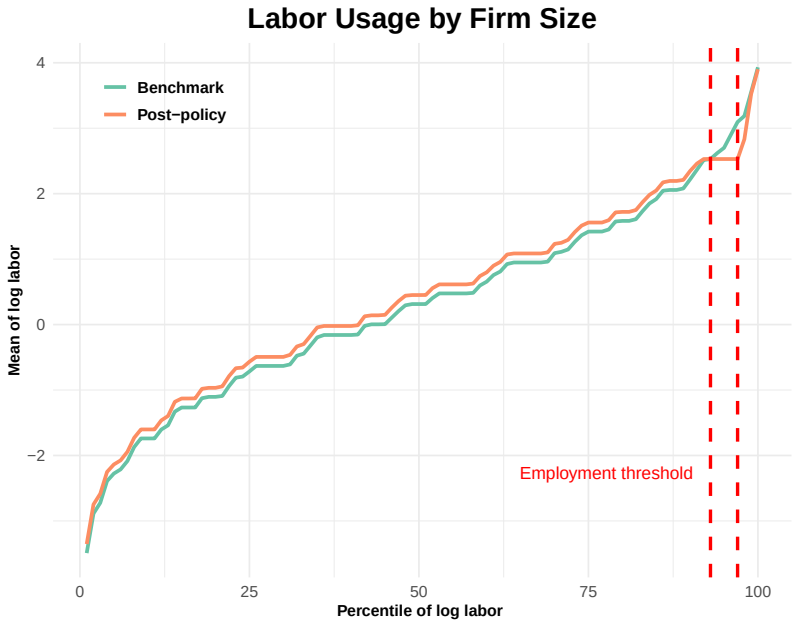


Figure 4: Labor usage by firm size percentile

Figures 4 and 5 plot average input usage—labor and capital, respectively—by employment percentiles in the benchmark and post-policy economies. These figures provide a distributional perspective that complements the information reported in Table 6. In both figures, the post-policy line lies above the benchmark line for percentiles below the employment threshold, indicating that SMEs benefit from the subsidy and expand their production scale.

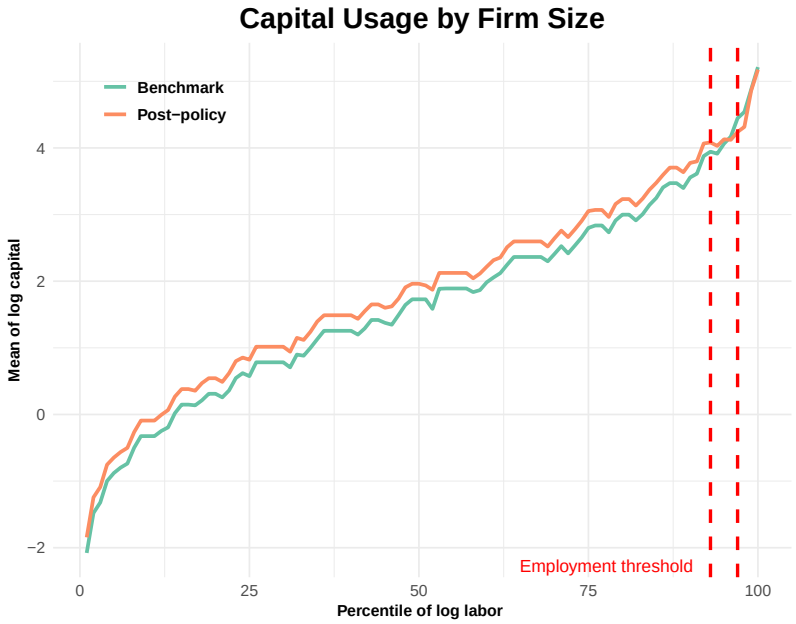


Figure 5: Capital usage by firm size percentile

By contrast, in the top three percentiles (beyond the SME cutoff in the post-policy economy), large firms use less labor and capital than in the benchmark, consistent with higher equilibrium wages and interest rates under the policy. This pattern helps interpret the last row of Table 6: in the subsidized economy, the largest firms operate at smaller scales even though average input usage can rise due to compositional changes and the absence of firms just above the threshold.

Table 6: Production factor usage between models

	Labor usage			**Capital usage**		
Firm type	**Mean**	**Min**	**Max**	**Mean**	**Min**	**Max**
SMEs (emp $\leq \underline{n}$)	+31.70%	-1.18%	unchanged	+50.66%	unchanged	+46.54%
emp $< \underline{n}$	+12.01%	-1.18%	+1.17%	+23.41%	unchanged	+11.83%
emp $= \underline{n}$	unchanged	unchanged	unchanged	+20.71%	-56.25%	+46.54%
LEs (emp $> \underline{n}$)	+49.47%	+52.45%	-4.93%	+45.44%	+91.20%	-5.86%

Note: Each entry reports (post-policy/benchmark - 1) $\times$ 100

6.2 Mechanism Discussion

Two mechanisms underlie these results. The first operates through factor prices. The subsidy lowers the capital rental price faced by eligible SMEs, so they demand more capital and, because capital and labor are complements in production, more labor. Labor supply is fixed and capital supply is limited by entrepreneurial savings, so the higher demand is absorbed through higher factor prices: the interest rate and the wage both rise in equilibrium. These higher prices fall on all firms, and large firms, which receive no subsidy, reduce their use of capital and labor.

The second mechanism operates through the allocation of capital. In the benchmark economy, the borrowing constraint limits capital to a multiple of entrepreneurial assets. As a result, productive entrepreneurs with little wealth are constrained, while less productive but wealthier entrepreneurs operate with more capital than is efficient. The subsidy partly offsets this friction: it lowers the cost of capital for small firms and raises their profits, which allows productive but small entrepreneurs to expand. This is reflected in the decline in MPK dispersion.

However, the subsidy also introduces distortions of its own. The eligibility threshold caps the size of productive firms that would otherwise grow beyond it, which lowers potential output and aggregate productivity. In addition, because eligibility depends only on size, cheaper capital also supports the expansion of unproductive SMEs, which raises their labor demand and may widen the dispersion of marginal products of labor. The subsidy therefore narrows the gap in financing conditions across firm sizes but creates financial distortions within the group of SMEs. Overall misallocation reflects both capital and labor distortions, so it can rise even though the dispersion of marginal products of capital falls.

6.3 Counterfactual Experiments

To evaluate how the economy response to the change in subsidy rate, I conduct several counterfactual experiments over alternative levels of the financial support. Figures 6 to 9 summarize how equilibrium prices, the firm

size distribution, aggregate quantities, and efficiency measures respond to the change in subsidy rates. Taken together, the figures show that higher subsidies strengthen the incentive to remain below the employment cutoff, amplify the shift in the firm-size distribution toward SMEs, and induce sizable general-equilibrium adjustments in factor prices and aggregates.

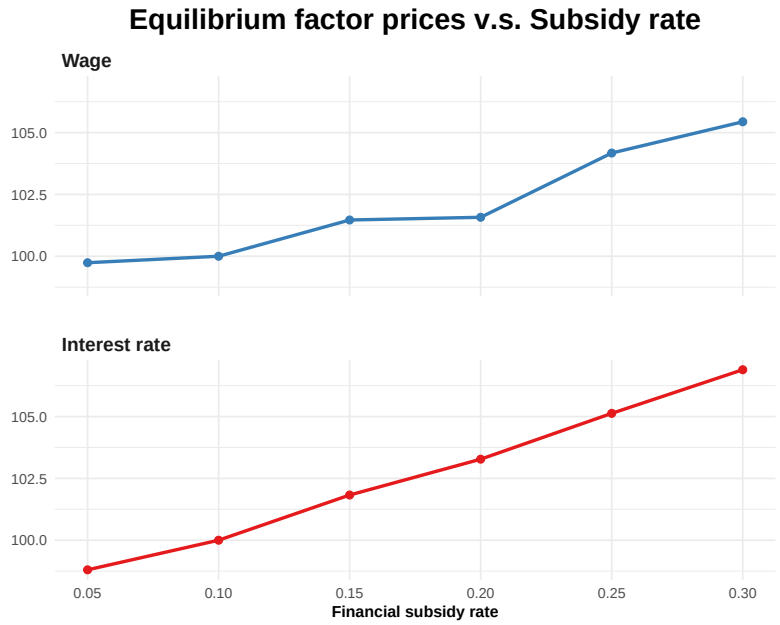


Figure 6: Equilibrium price across subsidy rates

Figure 6 reports equilibrium factor prices across the subsidy rates. As the subsidy rate rises, both wage and interest rate increase, indicating that stronger subsidies raise factor demand in general equilibrium. Figure 7 shows that the SME share increases monotonically with the financial subsidy, consistent with stronger selection incentives around the eligibility threshold as the subsidy becomes more generous.

Figure 8 plots aggregate outcomes (relative to the benchmark) across subsidy rates. While output and capital increase with the subsidies, with capital responding particularly strongly, TFP exhibits a gradual reduction over the same range. Figure 9 highlights the associated efficiency patterns: MPK dispersion declines as the subsidy rate increase, reflecting lower capital distortions. Whereas, the overall misallocation index increases as the

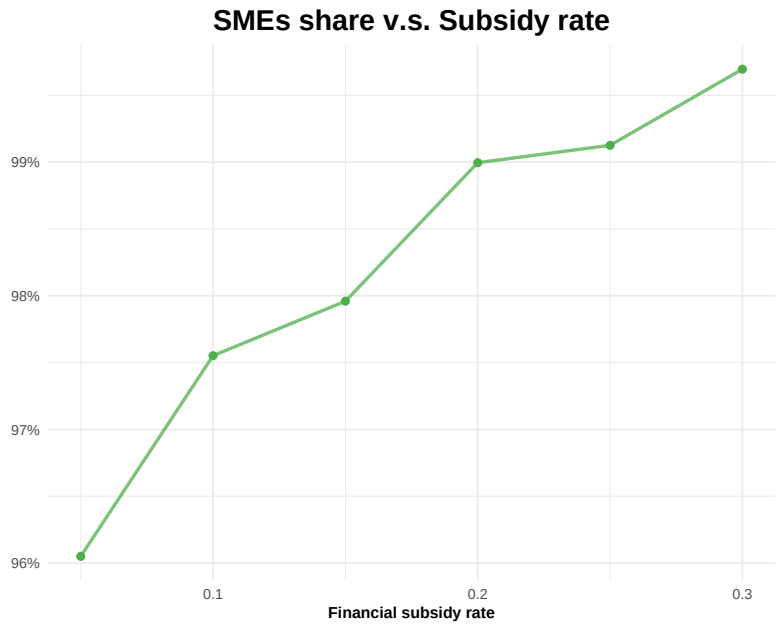


Figure 7: SME share across subsidy rates

size-dependent subsidy becomes more generous. This joint movement mirrors the mechanism emphasized in the baseline comparison—subsidies reduce price-driven wedges in capital allocation but simultaneously intensify size-dependent distortions.

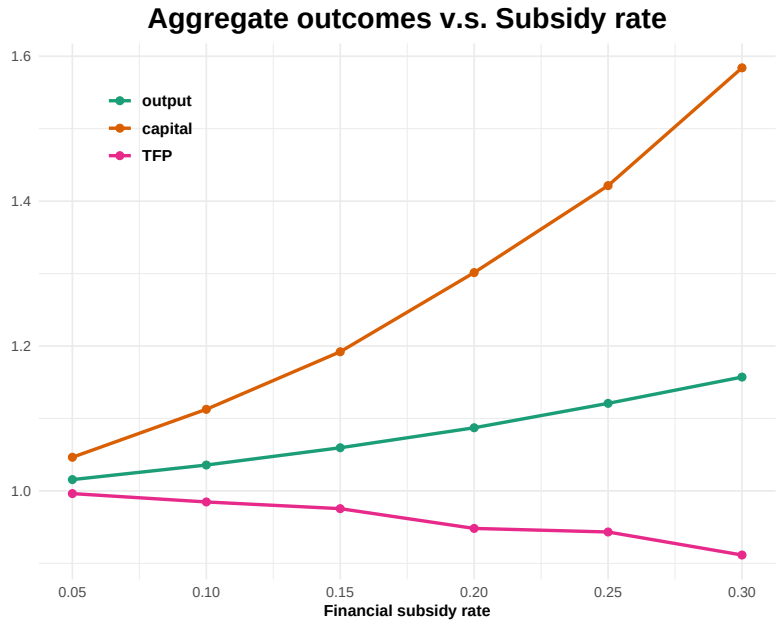


Figure 8: Aggregate outcomes across subsidy rates

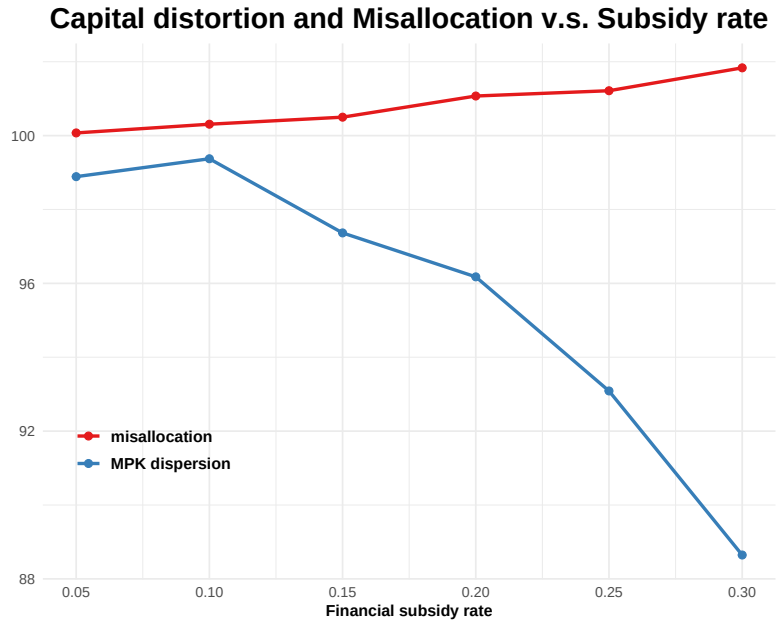


Figure 9: MPK dispersion and misallocation across subsidy rates

7 Conclusion

Motivated by the 2012 policy that capped lending rates for SMEs in Vietnam, this paper develops a heterogeneous-agent general equilibrium model that combines borrowing constraints with a size-dependent credit subsidy, and uses it to quantify the policy's aggregate effects. The model is disciplined by Vietnamese firm- and household-level data. In the baseline comparison, the subsidy increases aggregate capital and output and induces clear firm-size bunching at the employment threshold, while slightly reducing aggregate productivity. Counterfactual experiments show that a larger subsidy rate amplifies these responses: factor prices and aggregate activity rise, more firms select into the subsidized size range, and the dispersion of marginal products of capital falls further, but overall misallocation increases.

These findings highlight a central policy implication: size-dependent credit interventions can encourage production expansion among targeted enterprises, but they also create incentives for firms to adjust their scale to preserve eligibility. This response simultaneously introduces size-based distortions and reduces overall allocative efficiency. Designing SME credit policies therefore requires balancing the trade-off between economic scale and allocative efficiency. The framework in this paper provides a quantitative tool for evaluating such trade-offs and can be extended to analyze alternative policy designs.

This paper has two main limitations, each pointing to a direction for future work. First, the measures of workers and entrepreneurs are fixed, so there is no occupational choice and no firm entry or exit. The model therefore captures how existing firms adjust their size in response to the subsidy, but not how the policy changes who becomes an entrepreneur or how the firm population evolves over time. Introducing occupational choice would allow the subsidy to affect entry, firm dynamics, and the selection of entrepreneurs, and may alter the aggregate and productivity effects reported here. Second, the model treats the subsidy as a price discount that every eligible firm receives, and the financial intermediary lends to any eligible firm subject only to the collateral constraint. In practice, banks decide whether to lend,

and a binding rate cap may lead them to ration credit or screen borrowers more tightly. Incorporating bank lending decisions, for example through endogenous credit rationing or screening, would clarify how the policy reaches its target firms and how selective bank lending shapes aggregate outcomes.

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