Economics Honours Dissertation 2024-2025

Productivity Effects of Foreign Ownership: Micro-Level Evidence from a Frontier Economy

University of Edinburgh

Supervisor: Dr. Nida Jamil

EXAM NO.: B202054

WORD COUNT: 9807

Abstract: This dissertation investigates the impact of foreign ownership on firm-level productivity in Laos, a lower-middle-income country with increasing exposure to foreign direct investment (FDI). Using data from 1,206 firms collected across four waves of the World Bank Enterprise Survey (2009–2018), the research applies fixed-effects OLS, instrumental variables (IV), and propensity score matching (PSM) to estimate impacts on total factor productivity (TFP). Findings show that foreign-owned firms tend to be more productive than purely domestic firms. The baseline fixed-effects regression suggests an average productivity gain of 0.696 log-points, while the IV approach estimates a larger effect of 5.88 log-points. These outcomes remain directionally consistent across different model specifications, although not all are statistically significant under alternative instruments and productivity definitions. While data limitations and identification assumptions constrain causal interpretation, the evidence supports the idea that foreign investment—when present—can lead to meaningful productivity improvements in developing economies such as Laos.

Table of Contents

Introduction

Foreign Direct Investment (FDI) is recognised as a catalyst for economic development, especially in developing countries in the African and East Asian regions. Among the various methods of FDI, foreign ownership in domestic firms is a significant channel through which international investors influence the firm performance of host-country enterprises.

Since its opening its borders in 1989, Laos has pursued economic liberalisation and integration into global markets. To attract FDI, the government has introduced policy reforms like the Special Economic Zones (SEZs), tax incentives and bilateral investment treaties—especially with China and Thailand, two largely different economies, that hold significant power in the region. Despite these efforts, FDI inflows remain modest compared to regional pairs (The World Bank, 2021), and empirical research on the efficacy of foreign ownership in enhancing productivity is currently limited.

While macroeconomic studies link FDI to economic growth (Emako et al., 2022), firm-level effects--particularly productivity gains--remain underexplored in Laos. Factors like institutional quality (e.g. financial and educational institutions), firm size, and cultural landscape may contribute to the effectiveness of foreign ownership, making it imperative to conduct localised empirical analysis. To answer these gaps in the literature, research objectives were formulated to provide clear direction in the research of this dissertation.

The dissertation assesses whether foreign ownership enhances firm productivity in Laos. Understanding the causal relationship foreign ownership has on productivity is the foundation of this dissertation. Answering such question will enable institutional stakeholders to evaluate the effectiveness of FDI-oriented policies. **Furthermore, the research explores whether the effect of foreign ownership on productivity varies by conventional firm characteristics, such as firm size, institutional facility, or other cultural factors.** The business landscape in Laos may shape how foreign ownership translates into elevated productivity.

Taking these objectives into account, the dissertation will be guide using the following research question as point of reference: **How and to what extent does foreign ownership affect firm productivity in Laos?** This research question can thus be translated into hypotheses that the dissertation will aim to test for through its econometric model. The hypotheses are as follows

- **Hypothesis 1: All other factors equal, foreign ownership does not lead to a statistically significant increase in Firm Productivity**
- **Hypothesis 2: All factors equal, foreign ownership leads to an increase in Firm Productivity**

We choose not to include an alternative hypothesis that takes on the stance that foreign ownership leads to a negative effect, as literature finds this highly improbable, regardless of the context or institutional environment.

By estimating the causal impact of foreign ownership on firm productivity, the dissertation aims to use econometric methods to provide empirical insights for policymakers and institutional stakeholders in Laos. These may guide future policy initiatives around FDI, including the design of incentives, institutional reforms, and strategic alliances. Furthermore, the dissertation also seeks to contribute to the broader literature on FDI, particularly by offering empirical findings from an under-research and geopolitically unique economy that is Laos.

Literature

FDI is a cornerstone of global economic integration. While its macroeconomic benefits are well-supported in the existing academic literature, the micro-level consequences of foreign ownership, particularly in smaller economies like Laos, are less well-documented. This chapter critically examines the existing literature on the dynamics between foreign ownership and firm productivity, with a specific on Laos and the broader category of smaller, transition economies in the global context.

2.1 Laos as a Case Study

Laos is a resource-rich country whose GDP relies heavily on natural capital, particularly hydropower and mining. Hydroelectric energy has become its primary export (With the main exporters being China and Thailand), raising its profile in the ASEAN region (Sanchez-Triana, 2021)

The Lao economy also benefits from massive infrastructural overhauls under China's Belt and Road Initiative (BRI). While the implementation of highway and railway networks has allowed Laotian cities to be interconnected with each other, the substantial consequence from high fiscal deficits remains a critical downfall of its economy (Peter, 2024; Mahtani & Huiying, 2023). To counteract this, the Laotian government has implemented several initiatives to encourage further FDI in the economy, notably the SEZs and various kinds of incentives like the reduction of the VAT rate.

2.2 Ownership Advantages and Selection Effects

The literature widely recognises two main theoretical frameworks for why foreign-owned firms might be more productive. Firstly, multinational corporations (MNCs) possess firm-specific resources and advantages that can enhance productivity. **Ownership Advantages** theory establishes the existence of proprietary technology, managerial expertise, or other intangible assets that give them an advantage (Hymer, 1960; Dunning, 1988). In models of heterogeneous firms, more productive companies are those that often find it profitable to engage in FDI, due to the high fixed costs associated with operating abroad. (Bentivogli

& Mirenda, 2017) The knowledge from foreign ownership transfers to subsidiaries which leads to a **foreign ownership premium (FOP)** (Javorcik, 2004)**.**

Secondly, **Selection Effects** suggest that productivity differences may stem not from ownership per se, but from which firms are acquired. Manne's Classic Control Theory (1965) predicts that efficient firms may target *underperforming* companies for takeover to replace bad management and unlock the firm's true potential; This can be called 'negative selection'. On the other hand, foreign acquirers might also engage in 'positive selection', purchasing only the best-performing domestic firms, thereby inheriting a productivity advantage that exists pre-takeover. It is empirically difficult to isolate each one's effect using available data. These theories underscore the importance of empirical methods that distinguish causation from selection. Studies have employed panel data and firm fixed-effects (to control for time-invariant firm quality), as well as **difference-in-differences** (DID) around the time acquisitions were made, **propensity score matching** (PSM), and **instrumental variables** (IV) techniques to address endogeneity.

2.3 Foreign Ownership and Firm Productivity: Empirical findings

Foreign-owned firms tend to be more productive than domestic ones. While this has been documented in both developed and emerging economies, the often yields larger differences. Using firm-level data from 118 developing countries, Waldkirch (2015) finds that foreign firms are more productive than domestic firms *on average*. His research controls for firm characteristics and unobserved heterogeneity via a fixed-effects regression (Uses both year and location fixed effects). This productivity difference remains robust following diagnostics, albeit with a reduced magnitude, after accounting for observable factors. In addition, Xu et. al. (2022) analyses over 120,000 firms across 139 countries (using an extended version of the WBES) and similarly reports robust evidence that foreign ownership has a positive effect on firm productivity. These large-sample studies confirm that, *on average,* foreign-owned firms outperform local firms in terms of productivity, consistent with the hypothesis of a foreign ownership advantage.

Furthermore, in Indonesia, Arnold and Javorcik (2005) use PSM to show a causal relationship between foreign acquisition and enhanced performance. This remains true in the immediate term: Gains are already generated in the year the firms were acquired and continue to accumulate in subsequent years of ownership. The study estimates that firms' **Total Factor Productivity** (TFP) is about 34% higher after three years of foreign ownership, than that of dimensionally comparable domestic plants. These improvements take the form of massive scale restructuring: As a result of increased financial facility, the acquired plants increase investment, expand employment, and pay higher wages. These findings provide substantial evidence that foreign ownership can cause productivity in firms, rather than reflecting selection effects of *better* firms. Similarly, Maria et. al. (2012) find that foreign takeovers lead to increases in innovation outcomes in Spain, after controlling for selection effects. These findings are also aligned with those from studies on the Czech Republic and China (Sabirianova et al., 2005; Liu & Li, 2024; Xu & Sheng, 2012)

In developed economies, findings equally point toward a foreign ownership premium, though the increases are empirically smaller. Firm-level data shows that U.S-owned plants have a productivity advantage in the UK relative to both British-owned MNCs and other foreign-owned plants (Criscuolo & Martin, 2009). This suggests that there are certain foreign owners that produce higher productivity premiums than others. In Italy, a similar panel study compared foreign-owned and purely domestic firms using PSM to establish a control group, followed by a DID estimation (Bentivogli & Mirenda, 2017). They find there are multiple dimensions in which foreign-owned companies exhibit a performance advantage; Firms experience higher growth in size, they are more profitable, and less financially constrained than their domestic counterparts. This premium increases over time after acquisition, indicating persistent growth premiums, and is especially true for the services sector.

However, not all contexts yield significant gains. In Germany for example, Wagner & Weche (2015) find that foreign-owned manufacturing firms had a marginally higher occurrence of financing constraints than domestic firms, and once firm-specific variables are controlled for, the differences disappear. Furthermore, foreign investors in Germany often acquired firms with weaker credit ratings (a form of negative selection), and that after acquisition, there was no statistically significant easing of financing constraints. This suggests that in economies that have developed financing systems, foreign ownership does not materialise into enhanced financing facility or increased productivity like many of the findings discussed beforehand.

These studies confirm that while foreign ownership can enhance productivity, the magnitude and mechanism of impact are highly context-dependent.

2.4 Heterogeneity in the Foreign Ownership-Productivity Relationship

While this positive relationship between foreign ownership and productivity seems to be the case on average, the magnitude can vary across firm characteristics and economic environments. A growing amount of research has focused on the relevance of firm size, institutional quality, and additional cultural/structural factors.

Firm Size: The productivity benefits of foreign ownership tend to be larger in medium and large firms. Xu et al. (2022) argue that this may be attributed to the superior ability for larger firms to absorb and utilise capital, technology, or skills transferred by foreign acquirers. Furthermore, larger firms often undergo significant corporate restructuring and can take advantage of economies of scale under new foreign management, increasing productivity. In contrast, smaller firms may face several constraints that reduce the effect of FDI. This may have implications for Laos, where small and micro firms dominate the business landscape

Industry/Sector: The foreign ownership gains often differ by industry. Bentivogli & Mirenda (2017) find that the performance premium was more concentrated in the service sector, with less significance in manufacturing. This may be because firms in the services industry involve more intangible assets and management practices where large corporation know-how becomes important. Manufacturing companies may already be closer to the technological frontier. For instance, in Italy, the government maintains strong ties with neighbouring, developed economies, enabling the manufacturing sector to benefit from managerial integration.

Institutional Environment: The target country's institutional landscape can influence the scale at which foreign ownership can enhance productivity performance. There is evidence that there exists a non-linear relationship with institutional development (Xu et al., 2022; Alfaro et al., 2004). Further, countries with *medium* levels of institutional development reap larger gains from foreign investments, whereas the effect is much smaller in countries with very low or very high development. This may be explained by increased constraints in implementing improvements in weaker institutional environment. In extremely strong institutional landscapes, domestic firms are already efficient and can access good resources, so the additional edge of foreign ownership is mitigated. The study finds that the biggest difference occurs in middle-income countries with decent yet imperfect institutions, where foreign owners can leverage their resources but also choose to invest in domestic firms that show potential.

Cultural and Structural Factors: Cultural conditions of societies and organisational expectations can also hinder FDI effects. The study reports that more collectivist countries (like Laos) see greater productivity gains than individualistic countries. One explanation for this is it may be easier for foreign owners to integrate with local workplaces or to implement worker education programs, whereas in individualistic countries (like Germany or the USA), there may be more resistance to external managerial practices. Further, cultural alignment between foreign owners and the host (e.g. language, managerial style, industrial connectedness) can affect how well productivity-enhancing practices come to fruition. Structural factors like firm age and pre-investment conditions should also factor into the relationship.

2.5 Channels through which Foreign Ownership affects Productivity

While channels are not investigated directly in this dissertation, understanding them can shed light on *how* foreign ownership leads to better performance in Laos. The literature identified the following mechanisms:

Technology Transfer and Innovation: Foreign ownership may enhance productivity through technology transfer and innovation. MNCs often have access to advanced technologies, proprietary know-how, and innovation management frameworks that are otherwise unattainable in the host country. These occur not

only through physical capital but via embedded knowledge in processes, systems, and human capital development. For instance, in Spain, foreign acquisitions resulted in a statistically significant increase in R&D investment, innovation output, and patent filings within the acquired firms. (Maria et al., 2012) In the context of developing countries, local firms often operate far from the technological frontier. Even basic technological upgrades can yield substantial productivity improvements (Venturini, 2015). In Laos, where domestic technological capabilities remain limited, the scope for such learning-driven productivity gains may be significant. However, the magnitude of the effectiveness depends on firm absorptive capacity, industry type, and other characteristics (Anabel, Narula & Marin, 2003)

Access to Global Markets and Inputs: Foreign-owned firms typically have exposure to international markets, both for exports and sourcing imports. Being part of a broader network, a foreign owner can facilitate transactions more easily into global supply chains. In Southeast Asia, foreign-owned firms sharply increased their export intensity post-takeover. (Albuquerque, 2005) They find that foreign-owned firms tend to import more from global sources, thus which could either take the form of higher quality or cheaper inputs into a production process, thus improving production efficiency. This is especially true in developing countries where firms may be concentrated on domestically produced goods; foreign ownership can expose firms to the global market, which in turn leads to higher volumes and learning from global competition.

Financial Resources and Credit Access: A critical channel is the financing capabilities of firms. The alleviation of financing constraints can motivate investors to bring capital into the targets' resources. Many firms in emerging markets are credit-constrained; Foreign firms were significantly less credit-constrained than domestic ones in the Ivory Coast, as borrowing by foreign firms tended to crowd out domestic firms from local credit markets (Ann et al., 2001). This is because banks find these foreign firms as 'safer bets' given their superior financial wealth. In addition, a study of African firms by Alby et al. (2020) finds 58% of foreign-owned firms have an overdraft facility or line of credit, in contrast to only 39% of domestic firms. This results in further investment into new technology, expanding scale of production, which lead to higher productivity gains. In emerging economies, empirical findings show that gaining a foreign parent can significantly ease a firm's financing constraints and enable new investments.

The existing literature consistently reports a positive relationship between foreign ownership and productivity. These gains, reflected through total factor productivity, profitability, labour productivity, and growth, can be attributed to factors like technology, innovation, financing facility, institutional environment, access to global markets, and more. However, the amplitude of these foreign ownership 'premia can vary depending on firm-specific characteristics and economic environments.

The literature informs the foundations of this dissertation, which turn to similar econometric methodologies to investigate the relationship between foreign ownership and productivity in Laos. Drawing

on this, we aim to identify whether similar foreign ownership premiums exist, and if so, what firm and country-level factors might impact these effects.

Data

To examine the relationship between foreign ownership and firm productivity in Laos, this study relies on firm-level data from the World Bank Enterprise Survey (WBES).

Laos's dataset includes detailed survey responses on firm characteristics, ownership structure, productivity inputs and outputs, financing, as well as responses on innovation, access to finance, labour force, and regulatory environment. The WBES is particularly suitable for this research for several reasons. Firstly, it offers panel data that allows for longitudinal analysis –tracking firm performance and characteristics across different years. This enables an improved understanding of how foreign ownership may influence productivity over time. Secondly, the survey captures both foreign-owned and domestic firms, providing the necessary variation to explore ownership-related heterogeneity. Third, the survey layout ensures comparability and isolation across regions and industries through stratified random sampling and standardised questionnaires.

The dataset was collected between 2009 and 2018 and includes 1,206 unique firms and 1,436 total observations over 4 sampling periods, with a subset re-interviewed in later rounds. Though the panel is unbalanced (i.e., not all firms appear in each wave), it still permits within-firm variation in key outcomes. We will choose to conduct a panel study accounting for the different time intervals, as it can shed light on intertemporal dynamics even if the resulting observations may be lower in quantity. The WBES presents an opportunity to analyse firm behaviour in a developing, landlocked economy with emerging exposure to global trade and FDI. Given Laos's limited availability of alternative firm-level data sources, the database stands out as the most comprehensive and accessible dataset to explore firm dynamics related to ownership and productivity for this economy. The following sections will describe the structure of the dataset, define the key variables used in the analysis, and explain how firm productivity will be measured.

3.1 Foreign Ownership

The key explanatory variable analysed in this study is foreign ownership. The foreign ownership variable is surveyed in all time periods the WBES was conducted in Laos. The variable is recorded as a percentage estimate owned by 'Private foreign individuals, companies, or organisations'. This will be named *Foreign_pct* in our model. From Fig. 1, we find that 1050 of the 1206 firms (87% of the sample) have 0% foreign ownership whereas 96 have foreign ownership greater than 75% (~7% of the sample). 36 of the firms remain in the 36-50% bracket (24 of which have written down 50%), 18 and 6 firms fall into the 51-75% and 1-25% brackets, respectively.

We find that only 12% of the sample have any level of foreign ownership; Most firms (1050 out of 1206) report no foreign ownership, whilst those that are foreign-owned are sparsely distributed across positive ownership shares. Taking this into consideration, the study adopts a binary indicator that takes the value of 1 if firms indicate any positive share of foreign ownership, and 0 otherwise, which was used in the study by Xu et al. (2022). This is motivated by both econometric intuition and theoretical relevance. Figure 2 shows the binary distribution of the new variable *Foreign_ownership.*

The use of this new variable is justified both theoretically and empirically. From an economic standpoint, even a minor foreign ownership level can introduce substantial changes in the operational routine of a firm. These benefits do not necessarily take on a linear relationship with ownership share, making a percentage-based variable approach potentially misleading. Furthermore, productivity gains often stem from the *existence* of foreign involvement, not the extent of it (Javorcik, 2004). This may be relevant to the Laotian economy, where ownership levels appear to be clustered at the extremes. A dummy variable therefore avoids imposing a linear structure, reduces susceptibility to measurement noise, and reflects the discrete institutional transformation that foreign investment can represent in emerging markets.

3.2 Productivity metrics

Like the investigated literature (Xu et al, 2022; Arnold & Javorcik, 2005), the key productivity metric calculated in this dissertation will be the **Total Factor Productivity** (TFP). The TFP which will be named *Tfp_resid* in this dissertation, is defined according to the Cobb-Douglas Production Function, shown below:

$$Y = AK^{\alpha}L^{\beta}M^{\gamma}$$

Where:

- Y is the firm output
- K represents the capital input
- L is the labour input; and
- M is the intermediate input

We use the firm's total annual sales, as a proxy for firm output (Y). The total labour cost, which includes wage, salaries, and bonuses, will be used as the labour input (L), and the capital input can be measured as a firm's cost to repurchase all its machinery (K). Finally, intermediate input will be measured as the firms' cost of raw materials and intermediate goods used (M). The TFP is calculated as the **residuals** from the production function found in the TFP Equation above, assigning the natural logarithm of firm output as the dependent variable, and the natural logarithm of capital, labour, and intermediate inputs as explanatory variables. Residuals capture unobserved factors like technological capability, managerial skill, organisational practices, or firm-specific innovations that influence output beyond the inputs. In this framework, TFP represents the "black box" of productivity that cannot be explained by traditional inputs alone. This

method follows the widely used approach introduced by Solow (1957) and remains a standard in productivity analysis, particularly when input price data are limited or unavailable.

This approach follows Solow (1957) and is widely used in productivity analysis when input prices are unavailable (Xu et al., 2022). All monetary variables are kept in nominal Laotian Kip, given the focus on within-country comparisons. Looking at the summary statistics shown in Table 1, the TFP variable has a mean of 21.132, and a standard deviation of 1.917, suggesting that the spread of the variable is relatively small. The values for TFP do not have a particular reference metric and are only indicative of the relative levels in comparison to the dataset. The final sample for TFP estimation includes 560 observations, significantly fewer than the full sample due to missing or unreported values in the required input variables. This inconsistency introduces a **non-random missingness issue** that may bias the estimation sample. For instance, smaller and less formal firms will be less likely to report those variables needed as inputs, thus the calculated TFP outcomes may reflect a biased subsample of higher-performing or more transparent firms, undermining external validity and may lead to an overestimated relationship. Similar concerns have been raised in existing literature, which caution that missing productivity inputs in cross-country firm surveys often correlate with firm informality or lack of accounting capacity, especially in low-income contexts (Verbeek, 2008; Wooldridge, 2010). Mentioned studies also note that measurement error in the residuals may accumulate due to unbalanced or partially inputted panels, leading to efficiency bias or invalid standard errors if unaccounted for. This will be further discussed in the limitations chapter.

3.3 Control Variables

Productivity is shaped by a large range of firm-specific characteristics. Failing to control for these elements risks conflating the effect of foreign ownership with other productivity-relevant factors. Wooldridge (2010) notes that control variables serve as a statistical means to account for observable heterogeneity and allow the coefficient of interest (in this case, foreign ownership) to more closely approximate a **ceteris paribus** effect. To isolate the impact of foreign ownership on productivity, we include a broad set of control variables grounded in the empirical literature analysed in the previous chapter. These include:

- **Firm Size (*Firm_size*):** The number of Full-time employees
- **Firm Age (*Firm_age*):** The number of years since founding. There were anomalies in the dataset, with multiple firms claiming a higher-than-possible firm age (e.g. greater than 200 years). These were replaced with the mean of the observations (without the outliers)
- **Ownership Concentration (*Owner_pct*):** Maximum share held by a single owner
- **Manager Experience (*Manager_exp*):** Years of top manager's experience
- **Location Size (*Location_size*):** Categorical indicator of city population (1-5)
- **Industry Dummies (*Industry*):** Categorical indicator for Retail, manufacturing, and other sectors (1-3)

- **Certification Quality *(Certqual):*** Binary indicator for whether a quality certification is held
- **Obstacle for Electricity (*Elecobst):*** Perceived difficulty in obtaining reliable electricity (1-4, with 4 indicating very significant obstacle); A proxy for energy reliability
- **Main Product Share (*Mainprod_pct):*** Proportion of sales from the firm's primary product; Indicates how diverse the firm's product line is, which is a proxy to innovation.
- **Court System True (*Courtsyst):*** Perceived fairness of legal system. This is a proxy of the firm's confidence in the authoritative body in the country

Given we are using panel data, we will also control for time-invariant heterogeneity through dummy variables for each sample year. Table 1 shows the summary statistics of all the control variables that will be used in the productivity model. Approximately 16% of firms report any level of foreign ownership, a higher proportion than the one of the total dataset (~12%), which is advantageous as it provides a more balanced (although marginal) distinction in the dataset. The average firm in the subset employs 55 workers, is around 14 years old, and is heavily owner-concentrated, with the mean largest share being around 92-93%. Additionally, product diversification is observed to be low (main products take on 92% of total sales on average for firms in the sample).

Missing Values: For categorical or binary variables where firms answered, 'Don't Know' or 'Unclear' (coded as -9 in the dataset), we replaced the values with the sample mean to preserve the sample size. While this may be a channel for bias, alternative strategies (e.g. dummies for missingness) yielded similar results in robustness checks. However, because of the large proportion of firms not disclosing an answer, the categorical variable *Courtsyst* which indicates a firm's trust in the judicial system, will continue using -9, henceforth why it is cited as the minimum value in the Table

In addition to the summary statistics provided in Table 1, Table 2 shows the temporal distribution of observations. Most observations (58.6%) are from 2009, while subsequent years are considerably less represented: 8.0% in 2012, 19.5% in 2016, and 13.9% in 2018. This distribution contrasts with the more balanced full sample and reflects that many observations from later waves are excluded due to missing inputs required to compute TFP. This uneven distribution introduces two potential concerns. Firstly, the heavy proportion of the dataset being from 2009 may bias fixed-effects estimates if year-specific shocks or macroeconomic conditions disproportionately affect early survey rounds. Secondly, the smaller number of observations from 2012 and 2018 reduces the precision of year fixed effects and weakens the statistical power to detect intertemporal trends in productivity.

The inclusion of year fixed effects in all regressions is thus crucial to control for macroeconomic variation across waves. Nonetheless, this skew in year in distribution remains a limitation to the findings of this dissertation, particularly for any dynamic interpretation of productivity gains overtime. This should be kept

in mind when evaluating causal claims based on time-based variation, especially within fixed-effects or IV frameworks.

Methodology and Results

4.1 Model

To estimate the relationship between foreign ownership and TFP, the study employs a firm-level fixed effects model of the following form

$$TFP_{it} = \alpha + \beta_1 Foreign\_Ownership_{it} + \beta_x \mathbb{X}_{it} + \delta_t + \mu_i + \epsilon_{it}$$

Where:

- TFP_{ijt} is Total Factor Productivity for firm i at time t
- $Foreign\_Ownership_{it}$ is a dummy variable equal to 1 if the firm reports any positive share of foreign ownership
- $\mathbb{X}_{it}$ is a vector of control variables (firm size, age, ownership concentration, etc.)
- δ_t denotes year fixed effects
- μ_i captures firm-level time-invariant unobserved heterogeneity
- ϵ_{it} is the idiosyncratic error term

This specificized model allows for both observable firm characteristics and unobservable, time-invariant factor that can affect productivity. Year fixed effects capture macroeconomic shocks or policy changes common across firms. Robust standard errors are used throughout the entirety of the findings.

To rule out multicollinearity, we can use a Pearson Correlation matrix which reports all correlation coefficients of independent and dependent variables used in our baseline regression (Table 3). There are no coefficients that are above the absolute value threshold of 0.5, suggesting multicollinearity is unlikely to be an issue in this baseline regression (Xu et al., 2022).

Using the specifications above, we use the control variables outlined in the Data chapter and the fixed effects, to run a baseline Ordinary Least Squares (OLS) Regression. Table 4 presents the baseline results from the fixed-effects regression

The coefficient on the key variable *foreign_ownership,* is positive and statistically significant at the 1% level ($\beta_1 = 0.696$, p = 0.003) suggesting that foreign-owned firms exhibit 0.696 log-points higher TFP than their domestic counterparts, controlling for other factors. Among control variables, *Firm-size* has a positive and highly statistically significant coefficient ($\beta = .004$, p < .01). *Manager-exp* also boasts a positive coefficient that is less statistically significant than the variables, but still significant at the 5% level ($\beta = .021$, p < .05), indicating that firms with more experienced top managers tend to be more productive.

Comparatively, *Location-size* exhibits a negative and significant coefficient, suggesting that firms in larger cities experience lower productivity. One possible interpretation of this relation is that firms in larger cities may face greater competition or higher operational costs. Furthermore, obstacle to electricity *Elecobst* exhibits a positive coefficient statistically significant at the 5% level ($\beta = .104$, $p < 0.05$). This dynamic goes against empirical findings suggesting that, in this sample, firms that face more obstacles in obtaining electricity, appear to have higher productivity. Other controls like *Firm-age, Owner-pct, industry,* and *creditline* do not show statistically significant effects. Furthermore, year fixed effects for 2012 and 2016 show significant and positive coefficients. The overall model fit is strong, with an R-squared of 0.724, which indicates that approximately 72% of the variation in TFP is explained by the model. These results posit strong preliminary evidence of a positive association between foreign ownership and productivity; however, endogeneity concerns may necessitate further validation through other variations in estimation.

4.2 Instrumental Variable Regression

While the OLS model controls for observable and time-invariant firm heterogeneity, **endogeneity** remains a concern. In particular:

1) **Reverse Causality:** Highly productive firms are more likely to attract foreign investment (a concern that is also related to selection bias outlined in the literature section)

2) **Omitted Variable Bias:** Unobserved time-varying factors influence both ownership structure and productivity.

Studies have resorted to an instrumental variable (IV) strategy, which isolates the exogenous variation in foreign ownership that isn't correlated with the unobserved error term in the TFP equation.

The IV 2SLS strategy relies on two key assumptions:

1) **Relevance:** Satisfied if instrument used is significantly correlated with the explanatory variable of interest (which in this case is foreign ownership)

2) **Exclusion Restriction:** Requires that the instrument affects firm productivity only through its impact on foreign ownership, not through alternative channels

Following the intuition of credit constraints (Section 2.5), this dissertation will utilise a dummy variable for whether a firm has access to an overdraft facility as an instrument for foreign ownership. This variable is chosen based on both theoretical relevance and empirical precedence. Access to overdraft facility serves as a proxy for a firm's financial flexibility and relationship with the host banking system, which are considered by foreign investors when making investment decisions, thereby satisfying the **relevance condition** of a valid instrumental variable. In addition, after controlling for firm characteristics like firm size and firm age, overdraft access itself is unlikely to directly affect TFP beyond its effect through foreign ownership, which satisfies the **exclusion restriction** condition.

The IV 2-Stage Least Squares (2SLS) strategy will be employed in this study. In the first stage, the foreign ownership dummy is regressed on the instrument, along with relevant controls to isolate the exogenous variation in ownership. The second stage uses the predicted values of $Foreign\_Ownership_{it}$ to estimate its effect on TFP. The equations for both the first and second stage are as follows:

First Stage:
$$Foreign\_Ownership_{it} = \pi_0 + \pi_1 Overdraft_{it} + \Gamma X_{it} + \pi_2 Year\ FE_t + v_{it}$$

Second Stage:
$$TFP_{it} = \alpha + \beta_1 Foreign\_\widehat{Ownership}_{it} + \Gamma X_{it} + \beta_2 Year\ FE_t + \epsilon_{it}$$

To further isolate the exogenous variation in foreign ownership driven by overdraft access, the model includes *Finance_Access,* a categorical control variable capturing a firm's claimed access to credit or financial services (1-4, with 4 being severe obstacle). This allows us to differentiate the targeted liquidity channel (overdraft access) from broader credit facility. By controlling for finance access, the model cleanly identifies the variation in foreign ownership attributable to overdraft-specific conditions, thereby reinforcing the exclusion restriction.

First stage results (Table 5, Col. 1) show a negative and significant relationship at the 10% level between overdraft access and foreign ownership (β = -.0336, p < 0.1). While this contradicts prior findings, it may reflect context-specific dynamics or reverse causality, where firms with strong banking ties are also less reliant on foreign capital (e.g., more established companies have a sustained relationship with credit markets) The F-Statistic from the first stage regression is 15.09, well above the conventional threshold of 10, an indicator that the instrument is valid and that weak instrument bias in this case is unlikely. Other firm characteristics, like *firm_size, firm_age, owner_pct* and *courtsyst,* have statistically significant coefficients for foreign ownership in the first stage.

Second stage results (Table 5, Col. 2) show that foreign ownership has a statistically significant and substantially larger effect on productivity than in the OLS model (β = 5.88, p < 0.05). This suggests that OLS may underestimate the true effect of foreign ownership due to endogeneity bias. This large magnitude should be interpreted cautiously, as IV estimates reflect the **Local Average Treatment Effect (LATE)** for firms whose ownership status is influenced by overdraft access. As opposed to the Average Treatment Effect (ATE), this distinction is crucial because it implies that the estimated effect may not generalise to firms whose ownership decisions are driven by external factors. As such, while the IV result provides credible estimates under its assumptions, it should be interpreted as highly context-specific, and not necessarily representative.

4.3 Propensity Score Matching

While fixed-effects and instrumental variables address unobservable heterogeneity and endogeneity issues, there remains the possibility that firms in both foreign-owned and non-foreign-owned categories differ systematically on observed characteristics. Thus, we incorporate **Propensity Score Matching (PSM)** (Xu et al., 2022; Maria et al.., 2012; Sabirianova et al., 2005), a widely used non-parametric matching technique that involves two stages: (1) Estimating Propensity Scores through a logistic regression model where the dependent variable is the foreign ownership binary indicator, and the independent variables include pre-treatment firm characteristics. The resulting score reflects the conditional probability of receiving foreign ownership given the firm's observable attributes. (2) Matching and Outcome Comparisons: The treatment group (in this case, firms with any level of foreign ownership) are matched to the control group (firms with similar characteristics) based on propensity scores using nearest-neighbour matching within a caliper. The TFP outcomes between the matched samples are then compared to estimate the average treatment effect on the treated (ATT).

The PSM methodology provides another alley into empirically investigating the relationship between foreign ownership and productivity, by directly comparing foreign-owned and domestic firms that are observationally similar, thereby mimicking a randomized experimental setting on observables. This can reduce selection bias from observable firm characteristics. The PSM results are presented in Column 3 in Table 5.

The results from the PSM (Table 5, Col. 3) indicate that foreign ownership is associated with a statistically significant increase in productivity ($\beta = 0.913$), p < 0.01), consistent with the OLS and IV estimates, though smaller in magnitude than the coefficient of the IV regression. Control variables like firm size, manager experience, and location remain significant, further reinforcing the robustness of the findings. The Adjusted R-Squared is 0.7102, which, similarly to OLS, indicates that a large proportion of the variation can be explained by the model

Figure 4.a summarises the estimated impact of foreign ownership on TFP across the three econometric strategies: OLS, IV, and PSM. All models find a positive and statistically significant foreign ownership premium, though the magnitude of the effect varies by method used. The baseline OLS and PSM estimates indicate modest but significant increase in TFP. The IV specification yields a substantially larger estimate, consistent with potential downward bias in the OLS due to endogeneity or measurement error. The consistency in direction and statistical significance across all three methods reinforces the view that foreign ownership is associated with productivity-enhancing effects in Laos.

Robustness

Robustness tests are integral to ensure the positive association between foreign ownership and firm productivity is not an anomaly caused by model specification, instrument selection, or productivity measurement. This section explores three key dimensions of robustness: Ownership variable specification, alternative instruments, and alternative measures of productivity.

5.1 Foreign Ownership Specification

The model uses a binary indicator for foreign ownership. To test whether the magnitude of ownership matters to the relation, a re-estimate of the IV model using *Foreign_pct* as the new variable of interest was conducted and can be found in Table 6. Results show that the coefficient remains positive ($\beta = 0.107$) which suggests a similar directional relationship between foreign ownership and TFP. However, the effect is not statistically significant at conventional levels (p = .201). This suggests the existence of foreign ownership may matter more than the intensity, at least within the Laotian context where ownership levels are clustered at extremes.

This reinforces the theoretical premise that even minor foreign involvement can generate operational shifts. However, due to the skewness present in the *Foreign_pct* variable, a binary specification better captures the institutional relevance of foreign ownership in Laos.

5.2 Alternative Instrument

The main IV model uses overdraft facility access as an instrument, which is a proxy for financial constraints. To test the significance of this instrument, we explore two alternative instruments:

- **Finance Access:** A categorical variable measuring self-reported access to credit (1-4, 4 being severe obstacle). This serves as an alternative proxy for financial constraint
- **Location Size:** A proxy for urban density and infrastructural quality

In Table 7 columns 1 and 2, we find the alternative financial instrument *Finance_Access* has a positive effect ($\beta = 2.09$) on foreign ownership. However, the coefficient is not statistically significant. This may be due to overlap with existing controls or imprecise self-reporting. Furthermore, from the results shown in columns 3 and 4, the instrument *Location_Size* yields a positive and statistically significant (at the 10% level) second-stage coefficient ($\beta = 2.09$, p < 0.1), in line with the baseline IV result. First-stage results for this instrument confirm that firms in larger cities are more likely to attract foreign ownership.

These tests provide additional evidence that the causal relationship is not sensitive to the specific instrument chosen, as the directional relation remains consistent with alternative instruments. However, the statistical

insignificance relative to the results from the IV model may be a cause for concern, and thus we need to apply caution in the interpretation of the overdraft variable.

5.3 Productivity Specification

To assess the robustness of the main results, this section examines how findings may be impacted by the specification of Productivity. We utilise two additional productivity metrics: Labour Productivity and an adjusted form of TFP that incorporates energy costs. Labour productivity consists of a much simpler calculation: a measure of the natural logarithm of total annual sales per worker. Conversely, the extended TFP specification provides a broader measure of firm efficiency by accounting for energy usage, , which includes energy fuel and electricity combined as an input into the productivity metric. (Adjusted Cobb-Douglas Function: $Y = AK^{\alpha}L^{\beta}M^{\gamma}E^{\theta}$, we take the residuals) Given Laos's reliance on energy-intensive industries such s hydropower and mining, accounting for energy usage is relevant to the context.

Labour Productivity (Table 8 Column 1)**:** The IV regressions were re-estimated using labour productivity. The results show an equally positive correlation between foreign ownership and labour productivity, although the coefficient is much smaller ($\beta = .688$), and the finding is severely statistically insignificant. While the direction of the coefficient is consistent with the model for TFP, its statistical insignificance constrains the robustness of the productivity specification.

Adjusted TFP (Table 8 Column 2)**:** We run the IV regressions on the adjusted version of the TFP below shows the IV regression results, maintaining overdraft as the instrument of choice. While the coefficient of interest of foreign ownership is relatively substantial ($\beta = 2.086$), it is likewise not statistically significant, which adds onto similar findings from the labour productivity robustness check.

Although both alternative productivity metrics yield positive coefficients of interest, the results are not statistically significant, which could be attributed to several factors. Firstly, labour productivity is generally considered a noisier measure compared to TFP, as it only narrows down productivity to output per worker, without accounting for capital intensity, or other relevant factors. This can obscure true productivity dynamics across firms, leading to biased estimated effects. Additionally, the adjusted TFP metric may be affected by measurement error and sampling size (the inclusion of the energy variable has resulted in 40% less observations than in the original IV regression). This can inflate standard errors and reduce statistical significance even if the underlying relationship remains positive. Similar findings have been observed in previous empirical work, such as Arnold & Javorcik's (2009) analysis of Indonesian firms; They found that productivity gains were more pronounced when using multi-input TFP metrics as opposed to simpler ones like labour productivity.

Across all robustness tests, the direction of the foreign ownership effect remains positive. While some specifications lack statistical significance, particularly under alternative instruments (Finance Access) and productivity measures (Labour Productivity and Adjusted TFP), the consistency of directional results across methods and samples provides support for the reliability of the main findings. These robustness checks validate the conclusion that foreign ownership is positively associated with firm productivity in Laos but make be interpreted with caution given the statistical insignificance. These will be further analysed in the Limitations chapter.

Limitations

While this study uses firm-level panel data and robust econometric methods, there are several limitations that must be acknowledged. Both data-related issues and methodological assumptions could affect the interpretation and validity of the findings. Using existing literature similarly examining FDI and productivity, we will recognize these limitations, to place the findings in an appropriate context and to guide future research that seek to build on this dissertation's findings.

6.1 Measurement Error in TFP

Firm-level TFP is computed as a residual from the production function, making it prone to errors in measuring productivity. When surveying firms, inconsistencies in accounting practices, write-down errors, or informal record-keeping can all contribute towards noisy productivity measures. While the data is often cleaned like in this case, measurement error remains an importance concern in the productivity measure and other variables. Such errors can bias the results of the study. This has been noted in the broader literature, for instance, Wagner & Verardi (2010) notice substantial differences in productivity levels after removing outliers from the observations, underscoring how sensitive productivity can be to data quality.

6.2 Survey Data Representativeness

The panel data sourced from the WBES may not fully represent the business landscape in Laos. A downfall of the data used is that it only accounts for the formal, non-agricultural sectors of the economy; Informal and agricultural firms are excluded by design, which represent a large portion of the Laotian economy. This may result in the sample being skewed towards larger, formal businesses, which tend to be involved with more foreign activity. Furthermore, within the formal sector, the survey's stratified sampling (by region or by industry) ensures those dimensions are represented in the data, but there could still be a degree of biasedness present if certain types of firms are less likely to respond in the panel. Additionally, the highly cross-sectional nature of the data may weaken fixed effect accuracy – only a small portion of firms are re-interviewed, which results in a small and non-representative panel. This compromises the sample representativeness, since more dynamic, innovative or better-performing businesses might be those that remain in the panel longer (Waldkirch, 2015). Similar limitations have been addressed in other studies revolving around emerging market panel data, where these weaknesses make it complicated to fully address

selection issues. We thus must recognise the sample may not accurately represent the business landscape of Laos, and findings should be interpreted considering this caveat.

6.3 Definition and Reporting of Key Variables

The definition of foreign ownership can vary across existing literature, which may affect comparability with other findings. Studies stylistically define a foreign-owned firm as one with a least a certain threshold of foreign ownership, while others consider only a majority-foreign or 100% foreign. (Sadun et al, 2009) Furthermore, owners or managers might not know or be willing to disclose their ownership structure. Differences in interpretation can arise if, for instance, a domestically incorporated joint venture is seen by owners as domestic, despite significant foreign backing. This type of misclassification would add bias to the estimated productivity gap between foreign and domestic firms. (The magnitude of this is unclear and cannot be measured with the scale of this data)

Secondly, the 'overdraft access' instrument may suffer from variation in definition across time periods. Love et al. (2014) find that due to survey questionnaire differences, it can ultimately be impossible to identify overdrafts versus line of credits. In the Laotian context, all iterations of the WBES include the overdraft variable as a separate control to line of credit. However, the distinction between line of credit and overdraft in the context of Laotian financial markets may be more blurred, given the weaker institutional quality. This may lead to firms misreporting financial access: Some could confuse an overdraft facility with a standard credit line. Thus, the measure of overdraft might not be accurate, or consistent overtime. Any misreporting in the dummy variable will weaken the precision of the IV and could violate the exclusion restriction condition. In summary, this study's variables of interest (foreign ownership and the overdraft variable) can be subject to definition differences and reporting error. Considering this, it is imperative to apply careful interpretation of the results, and where possible, robustness checks using alternative definitions.

6.4 IV Validity

The validity of the instrumental variable is an integral concern to the IV 2SLS model. The study uses an overdraft facility as an instrument, with the intuition that it is correlated with being a foreign-owned firm (less financially constrained) but not directly with productivity. While the first-stage relevance condition is plausible according to the literature (MNCs or foreign-owned firms often have fewer financial constraints through larger parent networks), the exogeneity of this instrument may be harder to justify. The exclusion restriction condition requires having an overdraft facility affects TFP only through its impact on foreign ownership. This is more difficult to satisfy in a real setting: Access to credit could directly affect productivity by easing liquidity constraints on operations or enabling investment in technology and inputs. For instance, Beck et al. (2000) and others documented that credit availability facilitates capital accumulation and efficiency gains at the firm-level. If Lao firms with access to overdraft can purchase more capital or streamline production processes, they might achieve higher TFP irrespective of foreign ownership. In this

instance, the use of overdraft facility as the IV fails the exclusion restriction because it is endogenous and has a direct effect on productivity.

Additionally, the instrument may capture unobserved firm characteristics. If so, the instrument may be endogenous (i.e. correlated with the error term). Existing literature argue that overdrafts only provide immediate-term liquidity not used for productivity-enhancing projects, but this may be more difficult to address in our empirical results (Oudgou, 2021). Without a clearly exogenous source of variation, the IV estimates must be interpreted cautiously. In summary, the validity of the overdraft instrument is uncertain and depends solely on the inherent dynamics of the credit market in Laos. Even if the IV approach is intended to address endogeneity, any conclusions about causality rest on this strong (and possibly untestable) assumption.

6.5 Endogeneity Concerns

IV and the fixed effects strategy does not fully exclude the potential for endogeneity biases. FDI decisions are often non-random, and if any relevant factors are not accounted for by the controls, the estimated effect of foreign ownership could still reflect selection biases. If foreign investors in Laos choose to invest in firms with high growth potential (a characteristic that is difficult to control for in the WBES dataset) for instance, then foreign ownership would be correlated with future productivity gains for reasons other than the causal impact of foreign involvement.

Furthermore, the addressed limitations mean the concern endogeneity may not be fully eliminated. Results on FDI productivity impacts are highly sensitive to methodology and data choice (Gorg & Greenawa, 2004). There may also be missing time-varying factors, like changes in infrastructure or GDP levels, that may coincide with both rising FDI and productivity differences. These could confound the relationship. With a small and non-representative panel, it is challenging to address issues of self-selection or unobserved heterogeneity at the firm level via fixed effects (Waldkirch, 2015). Therefore, despite the use of an IV and controls, one cannot entirely exclude remaining endogeneity or omitted variable bias. The results should therefore be interpreted as an attempt at deducing causality, rather than definitive evidence of a causal relationship.

6.6 Short Panel and Fixed Effects Constraints

Using panel data in this study presents us with some advantages, but its short duration and year gaps in this instance imposes constraints on the econometric analysis. The firm panel only covers 4 time periods, strongly limiting variation in the data. Additionally, some categories surveyed for were not iterated over the entire sampling period and were only included in one or two time periods. A short panel means there are only a few observations per firm, reducing the estimation power of fixed effects. Foreign ownership may not change for many firms across the sampling period. Such occurrence in a business's life is infrequent, especially over a short horizon. Thus, with firm fixed effects in the model, identification of the foreign ownership effect comes from the within-firm chances, in other words, firms that switched ownership status.

If only a small portion of firms experience such chance, the fixed-effects estimates will only be driven by a small sample, decreasing its reliability.

6.7 Critical Evaluation

The overall research design of this dissertation demonstrates coherence between the research questions, theoretical framework, and empirical methods employed. The adoption of a multi-method econometric approach enhances the credibility of the analysis. The use of fixed effects, IVs, and PSM was not only methodologically valid but also allowed us to cultivate a triangulation of results through different identification strategies. The consistency in the direction of the effects reinforces the central claim of a positive association between foreign ownership and productivity, even as the magnitude and statistical significance were not consistently valid. This study's ability to integrate these findings into a coherent narrative reflects an adequate grasp of empirical reasoning and the conditional nature of inference in applied microeconomics.

Where the dissertation performs strongly is in combining empirical results with theory. The interpretation, and accountability of the model is grounded in the broader literature on FDI, and the discussion in the literature section connects empirical evidence to mechanisms outlined. While these channels are not directly tested, their relevance is clearly articulated and situated within the context of Laos.

The dissertation finally distinguishes itself in its analytical ambition. By extending the analysis through robustness checks, it validates, or adds caution to results, which is frequently appreciated in the broader literature. The decision to explore these extensions demonstrates intellectual eagerness and a willingness to acknowledge the downfalls of the empirical findings.

To summarise this chapter, while this study is bounded by data-specific constraints and assumptions, the adoption of multiple empirical strategies reduces reliance on any single identification technique. Though each component of the model has its limitations, the consistent directional findings support the robustness of the core claim: Foreign ownership is positively correlated with firm productivity in Laos.

Conclusion

To conclude, this dissertation aimed to examine whether foreign ownership leads to higher firm productivity in Laos. A small, landlocked economy with a unique dependence on extractive resources, and a multitude of institutional challenges, the Laotian economy has seen a gradual uptick in exposure to global capital via FDI. Informed by a rich body of existing empirical literature and frameworks, the study used the Laotian edition of the World Bank Enterprise Survey (WBES), which includes 1,206 unique firms surveyed

across four sampling periods from 2009 to 2018. The analysis evaluated not only the core relationship between foreign ownership and TFP, but also the robustness of the model being utilised across econometric specification, productivity definitions, and instrumental variable strategies.

The baseline fixed-effects OLS regression results indicate a strong positive association between foreign ownership and firm productivity. Table 4 indicates that, on average, firms with any level of foreign ownership have a TFP level 0.696 points higher than their domestic counterparts, all control covariates held constant. These findings aligned with the literature discussed in second section of this study, notably Arnold & Javorcik (2005) and Xu et al. (2022), which established the existence of 'foreign ownership premium' across a wide array of economies, both developed and transition states. In the context of Laos, the broader literature points towards better access to technology, managerial know-how, and integration into the global market, as channels for which foreign ownership enhances productivity.

In addition to the baseline OLS regression, it was critical to address endogeneity in the model, which may arise from selection effects or reverse causality in the variables of interest. To reinforce the model, the study employed a two-stage least squares (2SLS) instrumental variable (IV) approach using access to an overdraft facility as an instrument, shown in Table 5. The justification for this instrument was based on the notion that foreign investors are highly likely to engage with firms that have formal access to financial systems, which signals creditworthiness and operational transparency. The first stage of the IV regression confirmed the relevance of the instrument (F-Stat = 15.09), while the second stage revealed an even larger effect than the observed OLS model: Foreign Ownership raised firm TFP by approximately 5.88 points, suggesting that the OLS may have underestimated the true causal impact of foreign ownership due to downward bias from unaddressed endogeneity.

To triangulate the findings and mitigate concerns around model-specific bias, the study also utilised Propensity Score Matching (PSM), which is also shown in Table 5. This matching strategy compares firms with similar observable characteristics but differing ownership structures. The matched results reaffirmed the foreign ownership premium, with foreign-owned firms showing a statistically significant productivity advantage (Coeff. = 0.913, p < 0.01). The consistency across OLS, IV, and PSM approaches reinforces the argument that foreign ownership does enhance firm-level productivity in Laos. Referring back to the Hypotheses deduced in the introductory chapter, all 3 econometric methods used in this dissertation are broadly with consistent with **Hypothesis 2.** Adding caution to our interpretation of the results, this finding is thus rejecting **Hypothesis 1** in favour for the latter.

In addition to the model, robustness checks further corroborated the findings. Firstly, alternative instruments were used for the IV strategy: 'Access to finance' and 'Location size'. While the former produced a consistent but insignificant result, the latter yielded a strong and significant coefficient in line

with the findings from the model. The 'access to finance' variable was an alternative metric for financial constraint whereas 'location size' builds on the intuition that larger urban areas attract more foreign investment due to better infrastructure, market access, and human capital pools. The idea that similar productivity differences were observed using a intuitively different instrument reinforces the robustness of the causal interpretation.

Secondly, productivity was redefined in two alternative ways, to test the sensitivity of the findings to the productivity metric being used. Both labour productivity and an adjusted measure of TFP including energy were used. While both specifications preserved the direction of the relationship, the coefficients were not statistically significant. This suggests that while the productivity effect is not unique to the specific metric chosen, data limitations such as measurement error and reduced sample size may reduce estimation precision. This is consistent with those findings in Arnold & Javorcik (2009), who noted that more complex TFP measures tend to yield stronger results than simpler proxies like labour productivity.

Despite the robustness of the results, the study is not without its limitations. The data, while rich and standardises, only accounts for the formal sector and is subject to standard issues like misreporting, missing data, and definitional ambiguity. Moreover, while the IV strategy addresses endogeneity, it relies on stronger, and perhaps unrealistic, assumptions. As discussed in the limitations chapter, access to overdrafts could potentially influence productivity through other channels beyond ownership status, thereby complicating causal claims.

In addition, the short and unbalanced distribution of foreign ownership reduces the capability to explore dynamic effects or conduct more sophisticated DID analyses. This also limits the identification power of the FE model, as only a small subset of firms changes ownership status over time. Consequently, while the causal claims are supported by multiple methodological approaches, the strength of these claims depends in part on the quality of the data and the instrument validity.

From a policy standpoint, the findings offer valuable guidance; It provides empirical evidence that promoting FDI, even in small levels, can lead to measurable gains firm productivity in Laos. Policymakers should thus continue efforts to make Laos a more attractive destination for foreign investors (E.g. VAT Reduction, lower visa restrictions, enhanced rail/aviation networks). Furthermore, the finding that firms in smaller locations performed better, once foreign owned, suggests that decentralising investment incentives could also yield economic benefits. Policymakers might also consider extending SEZ privileges (though societal impacts must be accounted) to mid-sized domestic firms seeking foreign partnership or extending tax incentives to employment or export benchmarks Drawing from Vietnam's success in attracting sector-specific FDI, Laos could similarly target value-added manufacturing or sustainable energy ot leverage its unique geographical stance.

The purpose of this dissertation is to add to the limited body of micro-level research on FDI in Laos. By applying rigorous econometric techniques and conducting extensive robustness tests, the study provides new evidence of a causal foreign-ownership productivity link in Laos. In addition, it also reinforces existing empirical findings mentioned in the literature chapter, suggesting that the productivity benefits of FDI are not exclusive to large emerging economies but may also be present in smaller, less-developed economies under the right conditions. While most firm-level studies focus on either large emerging markets, or a larger sample size spanning multiple countries, this research extends findings to a context where institutional quality, firm informality, and capital access differ substantially.

Future research could build on this study by incorporating longer panels with an extended time range within Laos, qualitative interviews with firm managers, or more granular data on foreign investor characteristics. Exploring whether different types of foreign investors have heterogeneous effects on productivity could also extend the literature to more nuanced insights. In addition, studying the channels of impact, like technology transfer, access to finance, and human capital development, would be valuable to better understand the mechanisms behind the productivity differences.

To conclude, this dissertation finds that foreign ownership exerts a significant and positive effect on firm productivity in Laos. This finding holds across multiple empirical strategies and is robust to alternative instruments, and productivity metrics. While data limitations and methodological constraints underscore the need for cautious interpretation, the findings provide compelling evidence that foreign ownership, a kind of FDI, when structured and absorbed effectively, can play a critical role in improving firm performance in Laos, and more broadly in developing economies globally.

Bibliography
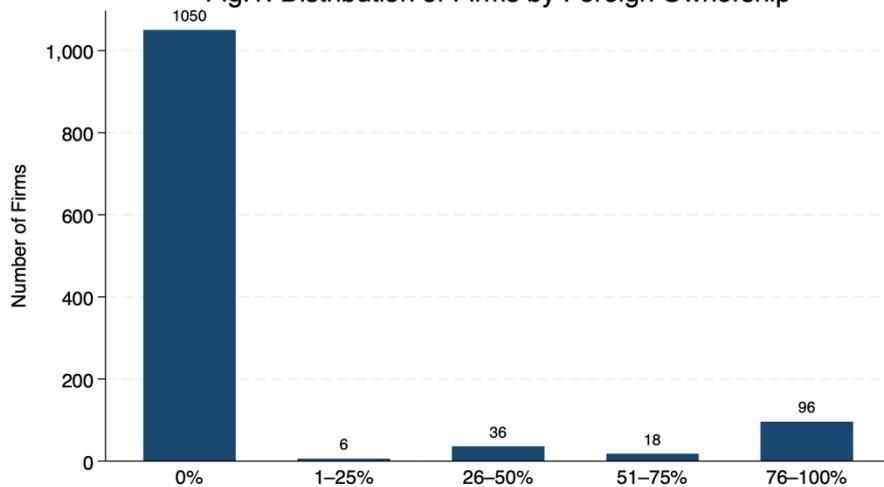
Albuquerque, R., Loayza, N. and Servén, L. (2005). World market integration through the lens of foreign direct investors. *Journal of International Economics*, 66(2), pp.267–295. doi:https://doi.org/10.1016/j.jinteco.2004.07.002.

Alby, P., Auriol, E. and Nguimkeu, P. (2019). Does Social Pressure Hinder Entrepreneurship in Africa? The Forced Mutual Help Hypothesis. *Economica*. doi:https://doi.org/10.1111/ecca.12330.

Alfaro, L., Chanda, A., Kalemli-Ozcan, S. and Sayek, S. (2004). FDI and economic growth: the role of local financial markets. *Journal of International Economics*, 64(1), pp.89–112.

Anabel, M., Narula, R. and Marin, A. (2025). *FDI spillovers, absorptive capacities and human capital development: evidence from Argentina.* [online] Repec.org. Available at: https://econpapers.repec.org/paper/unmumamer/2003018.htm [Accessed 18 Apr. 2025].

Ann, H., Harrison, A., Love, I. and McMillan, M. (2022). Global capital flows and financing constraints. *Journal of Development Economics*, [online] 75(1), pp.269–301. Available at: https://econpapers.repec.org/article/eeedeveco/v_3a75_3ay_3a2004_3ai_3a1_3ap_3a269-301.htm [Accessed 18 Apr. 2025].

Arnold, J. and Javorcik, B.S. (2005). *Gifted kids or pushy parents? Foreign acquisitions and plant performance in Indonesia.* [online] Policy Research Working Paper Series. Available at: https://ideas.repec.org/p/wbk/wbrwps/3597.html [Accessed 11 Apr. 2025].

Beck, T., Levine, R. and Loayza, N. (2020). Finance and the sources of growth. *Journal of Financial Economics*, [online] 58(1-2), pp.261–300. doi:https://doi.org/10.1016/s0304-405x(00)00072-6.

Bentivogli, C. and Mirenda, L. (2016). Foreign Ownership and Performance: Evidence from a Panel of Italian Firms. *SSRN Electronic Journal*. doi:https://doi.org/10.2139/ssrn.2914251.

Criscuolo, C. and Martin, R. (2009). MULTINATIONALS AND U.S. PRODUCTIVITY LEADERSHIP: EVIDENCE FROM GREAT BRITAIN. *The Review of Economics and Statistics*, [online] 91(2), pp.263–281. doi:https://doi.org/10.2307/25651337.

Do, T.K. (2024). Foreign ownership and green innovation. *Economics Letters*, [online] 237, p.111637. doi:https://doi.org/10.1016/j.econlet.2024.111637.

Dunning, J.H. (1988). The Eclectic Paradigm of International Production: A Restatement and Some Possible Extensions. *Journal of International Business Studies*, 19(1), pp.1–31. doi:https://doi.org/10.1057/palgrave.jibs.8490372.

Emako, E., Nuru, S. and Menza, M. (2022). The effect of foreign direct investment on economic growth in developing countries. *Transnational Corporations Review*, [online] 14(4), pp.1–20. doi:https://doi.org/10.1080/19186444.2022.2146967.

Hymer, S.H. (1960). The international operations of national firms, a study of direct foreign investment. *Mit.edu*. [online] doi:http://hdl.handle.net/1721.1/27375.

Javorcik, B.S. (2004). Does Foreign Direct Investment Increase the Productivity of Domestic Firms? In Search of Spillovers Through Backward Linkages. *American Economic Review*, [online] 94(3), pp.605–627. doi:https://doi.org/10.1257/0002828041464605.

Liu, T. and Li, K.-W. (2024). *Analyzing China's Productivity Growth: Evidence from Manufacturing Industries.* [online] Ssrn.com. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2185951 [Accessed 11 Apr. 2025].

Mahtani, S. and Huiying, O. (2023). *China's promise of prosperity brought Laos debt — and distress.* [online] Washington Post. Available at: https://www.washingtonpost.com/world/interactive/2023/laos-debt-china-belt-road/.

Manne, H.G. (1965). Mergers and the Market for Corporate Control. *Journal of Political Economy*, [online] 73(2), pp.110–120. Available at: https://www.jstor.org/stable/1829527.

Maria, G., Guadalupe, M., Kuzmina, O. and Thomas, C. (2012). Innovation and Foreign Ownership. *American Economic Review*, [online] 102(7), pp.3594–3627. Available at: https://econpapers.repec.org/article/aeaaecrev/v_3a102_3ay_3a2012_3ai_3a7_3ap_3a3594-3627.htm [Accessed 11 Apr. 2025].

Oudgou, M. (2021). Financial and Non-Financial Obstacles to Innovation: Empirical Evidence at the Firm Level in the MENA Region. *Journal of Open Innovation: Technology, Market, and Complexity*, 7(1), p.28. doi:https://doi.org/10.3390/joitmc7010028.

Peter, Z. (2024). *Hefty debt to China stokes soaring inflation in Laos.* [online] Voice of America. Available at: https://www.voanews.com/a/hefty-debt-to-china-stokes-soaring-inflation-in-laos-/7885926.html.

Sabirianova, K., Svejnar, J. and Terrell, K. (2005). Distance to the Efficiency Frontier and Foreign Direct Investment Spillovers. *Journal of the European Economic Association*, [online] 3(2-3), pp.576–586. doi:https://doi.org/10.1162/1542476054472900.

Sadun, N., Bloom, N., Sadun, R. and Reenen, van (2009). *The Organization of Firms Across Countries.* [online] Repec.org. Available at: https://econpapers.repec.org/paper/cepcepdps/dp0937.htm [Accessed 18 Apr. 2025].

Sanchez-Triana, E. (2021). *Lao PDR: the Health, Environment, and Sustainable Economic Recovery Nexus.* [online] World Bank Blogs. Available at: https://blogs.worldbank.org/en/eastasiapacific/lao-pdr-health-environment-and-sustainable-economic-recovery-nexus?utm_source=chatgpt.com [Accessed 11 Apr. 2025].

Solow, R.M. (1957). Technical Change and the Aggregate Production Function. *The Review of Economics and Statistics*, 39(3), pp.312–320.

The World Bank (2021). *Foreign direct investment, net inflows (BoP, current US$) - Lao PDR | Data.* [online] data.worldbank.org. Available at: https://data.worldbank.org/indicator/BX.KLT.DINV.CD.WD?locations=LA.

Venturini, F. (2015). The modern drivers of productivity. *Research Policy*, 44(2), pp.357–369. doi:https://doi.org/10.1016/j.respol.2014.10.011.
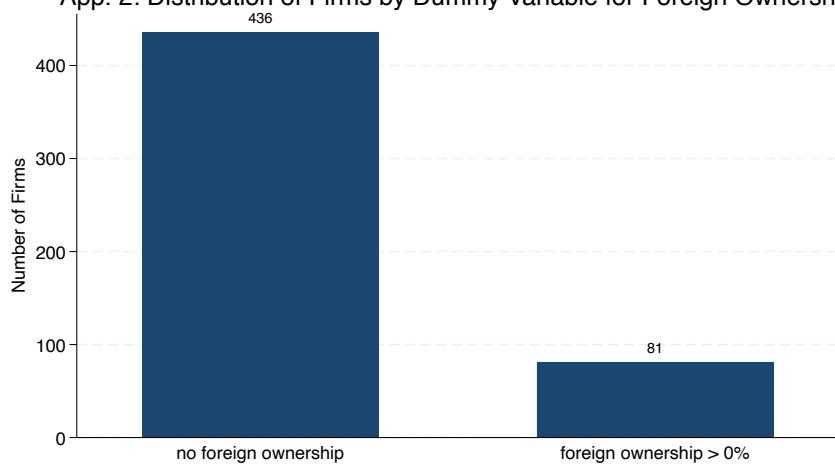
Verbeek, M. (2008). *A Guide to Modern Econometrics 2nd edition.* [online] Available at: https://thenigerianprofessionalaccountant.wordpress.com/wp-content/uploads/2013/04/modern-econometrics.pdf.

Wagner, J. and Weche Gelübcke, J.P. (2015). Access to finance, foreign ownership and foreign takeovers in Germany. *Applied Economics*, 47(29), pp.3092–3112. doi:https://doi.org/10.1080/00036846.2015.1011323.

Wagner, V., Verardi, V. and Wagner, J. (2010). *Productivity premia for German manufacturing firms exporting to the Euro-area and beyond: First evidence from robust fixed effects estimations.* [online] Repec.org. Available at: https://econpapers.repec.org/paper/luewpaper/172.htm [Accessed 18 Apr. 2025].

Waldkirch, A. (2015). *Foreign Ownership and Firm Productivity: Evidence from a Large Sample of Countries *.* [online] Available at: https://users.ssc.wisc.edu/~munia/467/Extra_Masters/ForeignFirmsProductivity_MWITFall2015-22.pdf [Accessed 11 Apr. 2025].

Wooldridge, J.M. (2010). *Econometric Analysis of Cross Section and Panel Data.* [online] *JSTOR*. The MIT Press. Available at: https://www.jstor.org/stable/j.ctt5hhcfr.

Xu, J., Liu, Y. and Abdoh, H. (2022). Foreign ownership and productivity. *International Review of Economics & Finance*, 80, pp.624–642. doi:https://doi.org/10.1016/j.iref.2022.02.079.

Xu, X. and Sheng, Y. (2012). Productivity Spillovers from Foreign Direct Investment: Firm-Level Evidence from China. *World Development*, 40(1), pp.62–74. doi:https://doi.org/10.1016/j.worlddev.2011.05.006.

Appendix

Fig.1: Distribution of Firms by Foreign Ownership

App. 2: Distribution of Firms by Dummy Variable for Foreign Ownership

This is referred to as Fig. 2 in the main body of the dissertation

Table 1: Summary of Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Variables of Interest					
tfp resid	560	21.132	1.917	16.867	28.631
foreign ownership	560	.159	.366	0	1
foreign pct	559	13.36	32.288	0	100
Control Variables					
firm size	560	76.798	184.353	0	1400
firm age	555	14.432	10.337	2	130
owner pct	254	92.516	18.765	0	100
manager exp	560	12.946	12.04	0	58
location size	560	2.604	1.27	1	5
industry	533	1.709	.816	1	3
creditline	560	1.686	1.002	1	2
certqual	560	1.509	1.824	1	2
elecobst	560	1.35	1.433	1	4
mainprod pct	560	93.914	16.237	1	100
courtsyst	560	-1.595	5.448	-9	4
Year (FE)	.	.	.	.	.
2009	560	.586	.493	0	1
2012	560	.08	.272	0	1
2016	560	.195	.396	0	1
2018	560	.139	.347	0	1

Note: Dummy and categorical variables start with 1, not 0. This is a recurring feature of WBES datasets, however, this is not the case for the Year dummy variables.

Table 2: Tabulation of year

Year of survey	Freq.	Percent	Cum.
2009	328	58.57	58.57
2012	45	8.04	66.61
2016	109	19.46	86.07
2018	78	13.93	100.00
Total	560	100.00	

Table 2 outlines a tabulation of the year variable post-treatment. In other words, only the observations that have all the variables available and treated are included.

Table 3: Pearson Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(
(1) foreign_owners~p	1.000										
(2) firm_size	0.309	1.000									
	(0.000)										
(3) firm_age	-0.032	0.043	1.000								
	(0.234)	(0.105)									
(4) location_size	-0.170	-0.157	0.023	1.000							
	(0.000)	(0.000)	(0.379)								
(5) industry	-0.041	-0.126	-0.108	0.090	1.000						
	(0.123)	(0.000)	(0.000)	(0.001)							
(6) manager_exp	-0.043	0.081	0.412	0.150	-0.049	1.000					
	(0.106)	(0.002)	(0.000)	(0.000)	(0.067)						
(7) finance_access	0.027	-0.027	-0.022	-0.018	0.002	0.012	1.000				
	(0.313)	(0.309)	(0.416)	(0.501)	(0.945)	(0.645)					
(8) creditline	0.031	0.066	0.032	-0.015	0.023	-0.040	0.213	1.000			
	(0.237)	(0.012)	(0.236)	(0.567)	(0.398)	(0.133)	(0.000)				
(9) certqual	0.061	0.150	0.045	-0.098	-0.004	0.000	0.007	0.076	1.000		
	(0.021)	(0.000)	(0.089)	(0.000)	(0.875)	(0.986)	(0.803)	(0.004)			
(10) elecobst	0.049	0.000	-0.054	-0.009	-0.066	-0.040	0.086	-0.033	-0.018	1.000	
	(0.062)	(0.999)	(0.041)	(0.746)	(0.014)	(0.135)	(0.001)	(0.216)	(0.487)		
(11) mainprod_pct	0.031	0.027	-0.014	-0.315	-0.030	-0.071	0.000	-0.076	0.037	0.008	1.(
	(0.245)	(0.304)	(0.589)	(0.000)	(0.266)	(0.007)	(0.985)	(0.004)	(0.164)	(0.753)	
(12) courtsyst	-0.012	-0.050	-0.075	0.319	0.074	-0.002	-0.118	-0.082	-0.044	0.012	-0.1
	(0.648)	(0.059)	(0.005)	(0.000)	(0.006)	(0.946)	(0.000)	(0.002)	(0.097)	(0.638)	(0.0

Values represent correlation coefficients between the variables on x and the y axis.

Table 4: Baseline OLS Linear regression

tfp_resid	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Foreign Ownership							
foreign_ownership	.696	.234	2.98	.003	.235	1.156	***
Controls							
firm_size	.004	.001	7.15	0	.003	.005	***
firm_age	-.006	.009	-0.66	.513	-.022	.011	
owner_pct	-.004	.005	-0.81	.421	-.014	.006	
manager_exp	.022	.009	2.32	.021	.003	.04	**
location_size	-.302	.125	-2.42	.016	-.548	-.056	**
industry	.304	.215	1.41	.16	-.12	.727	
creditline	-.081	.074	-1.09	.277	-.228	.066	
certqual	-.043	.019	-2.29	.023	-.079	-.006	**
elecobst	-.007	.058	-0.12	.901	-.121	.107	
mainprod_pct	-.003	.003	-0.96	.34	-.01	.003	
Courtsyst	.019	.016	1.16	.248	-.013	.051	
Year Fixed Effects							
2009b	0	.	.	.	.	.	
2012	4.17	.546	7.64	0	3.094	5.246	***
2016	.979	.455	2.15	.032	.083	1.876	**
2018	.459	.591	0.78	.438	-.706	1.625	
Industry Fixed Effects							
Industry Sampling ~	0	.	.	.	.	.	
Retail	-.431	.326	-1.32	.188	-1.075	.213	
3o	0	.	.	.	.	.	
Constant	21.252	.761	27.94	0	19.753	22.752	***

Mean dependent var	21.719	SD dependent var	2.021	
R-squared	0.724	Number of obs	223	
F-test	31.881	Prob > F	0.000	
Akaike crit. (AIC)	692.767	Bayesian crit. (BIC)	750.688	

*** p<.01, ** p<.05, * p<.1 → Levels of statistical significance referred to in the main body

Table 5: Instrumental variables 2SLS and Propensity-Score Matching

Variables	IV (Overdraft)		PSM
	First Stage Foreign_ownership (1)	**Second Stage** TFP_resid (2)	TFP_resid (3)
Foreign_ownership		5.881794**	.9137167***
		(2.21)	(3.25)
Overdraft	-.0335624*		
	(-1.89)		
Firm_size	.0003773**	.0015925	.003577***
	(2.28)	(1.06)	(7.38)
Firm_age	-.0037559**	.0180356	-.0042403
	(-2.20)	(1.27)	(-0.49)
Owner_pct	-.0055486**	.0280344	.0011124
	(-2.25)	(1.28)	(0.15)
Manager_exp	.004179*	.0084453	.0218865**
	(1.68)	(0.55)	(2.66)
Location_size	-.0671748	.0329648	-.3514836**
	(-1.65)	(0.11)	(-2.67)
Industry	-.0684332	.2375773	(Omitted)
	(-1.23)	(0.82)	
Creditline	.057726**	-.4334467**	-.5922885***
	(2.56)	(-2.05)	(-3.17)
Certqual	-.0095197	.0890193	-.4568791
	(-0.63)	(0.89)	(-1.52)
Elecobst	.0046791	.1122619	.095563
	(0.33)	(1.45)	(1.40)
Mainprod_pct	.0020936**	-.014893*	-.0023442
	(2.01)	(-1.87)	(-0.47)
Courtsyst	.0206336***	-.0692821	.0111738
	(3.22)	(-1.10)	(0.60)
Finance_access	-.0492803***	.2667637*	-.0663759
	(-2.86)	(1.71)	(-0.85)
Year			
2012	0	0	4.051141***
			(7.51)
2016	-.309565	2.239234**	1.043677*
	(-2.13)	(1.97)	(2.28)
2018	-.3227721	1.60827	.52265
	(-1.94)	(1.29)	(0.92)
Constant	1.125578***	15.94148***	22.74669***
	(4.49)	(4.70)	(23.25)
N	180	180	202
Adj. R-Squared	0.4318		0.7102
F-Test	15.09		29.97

Note: The Second Stage IV Regression did not yield an R-Squared or F-Test. This is also the case for future

IV regressions, notably in Table 6, 7 and 8.

Fig. 4.a: Effect of Foreign Ownership on TFP
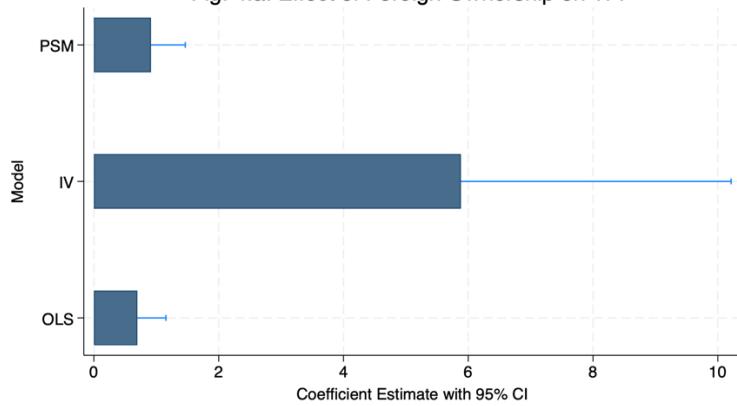
Table 6: Baseline OLS and IV Regression for alternative foreign ownership specification

Variables	OLS	IV (Overdraft)	
		First Stage	Second Stage
	TFP_resid	Foreign_pct	TFP_resid
	(1)	(2)	(3)
Foreign_pct	.0062137***		.1074455
	(2.64)		(1.28)
Overdraft		-1.837278	
		(-1.12)	
Firm_size	.0040124***	.0368315**	-.0001456
	(7.28)	(2.16)	(-0.04)
Firm_age	-.0061136	-.2851264**	.0265797
	(-0.71)	(-2.18)	(0.97)
Owner_pct	-.0067134*	-.1247614	.0088036
	(-1.71)	(-0.93)	(0.49)
Manager_exp	.021235**	.2887253	.0020033
	(2.35)	(1.46)	(0.07)
Location_size	-.3301918**	-6.067567*	.2897891
	(-2.56)	(-1.72)	(0.45)
Industry	.1870106	-3.569262	.2185686
	(0.88)	(-0.76)	(0.45)
Creditline	-.1409677	5.018797**	-.6331612
	(-1.25)	(2.47)	(-1.35)
Certqual	.0445445	-.927372	.1326684
	(1.33)	(-0.81)	(0.91)
Elecobst	.1011804**	.8182072	.0518706
	(2.12)	(0.68)	(0.40)
Mainprod_pct	-.0023535	.1799116**	-.0219098
	(-0.86)	(1.90)	(-1.26)
Courtsyst	.0204223	1.7254***	-.133306
	(1.24)	(3.02)	(-0.88)
Finance_access		-4.030273**	.4099415
		(-2.26)	(1.09)
Year			
2012	3.943938***	0	0
	(7.16)		
2016	.7874711**	-13.80537	1.90176
	(1.78)	(-1.16)	(1.19)
2018	.2486656	-18.16261	1.661281
	(0.42)	(-1.28)	(0.83)
Constant	21.67868***	47.14685**	17.49618***
	(28.77)	(2.38)	(4.03)
N	223	180	180
Adj. R-Squared	0.7235	0.2911	.
F-Test	31.21	7.18	.

Table 7: Instrumental variables 2SLS: Instrument Validity

Variables	IV (Finance Access)		IV (Location Size)	
	First Stage Foreign_ownership	**Second Stage** TFP_resid	**First Stage** Foreign_ownership	**Second Stage** TFP_resid
	(1)	**(2)**	**(3)**	**(4)**
Foreign_ownership		**2.09288**		**4.110201****
		(1.52)		**(2.13)**
Location_size			-.0948247**	
			(-2.43)	
Finance access	-.0281074*			
	(-1.88)			
Firm_size	.0005046***	.0034396***	.0004877**	.0023703*
	(2.67)	(3.48)	(2.56)	(1.91)
Firm_age	-.0044652**	.0007932	-.004437**	.0091344
	(-2.29)	(0.07)	(-2.21)	(-2.20)
Owner_pct	-.0057528**	.003903	-.0057413**	.0157613
	(-2.45)	(0.40)	(-2.42)	(1.02)
Manager_exp	.0022971	.0200009**	.0016244	.0158505
	(1.09)	(2.00)	(0.77)	(1.30)
Industry	-.0651477	.2504543	-.0544542	.3639791*
	(-1.61)	(1.47)	(-1.35)	(1.71)
Certqual	-.0069795	.0497171	-.0074972	.0615951
	(-0.53)	(1.27)	(-0.62)	(1.02)
Elecobst	-.00428	.1037741**	-.0068203	.1254276**
	(-0.33)	(2.32)	(-0.50)	(1.98)
Mainprod_pct	.000531	-.0022588	.0003606	-.0033011
	(0.42)	(-0.78)	(0.30)	(-0.76)
Courtsyst	.0122279**	.002536	.0113487**	-.0190367
	(2.29)	(0.12)	(2.20)	(-0.60)
Year				
2012	-.5276588***	4.137101***	-.2895436*	5.173997***
	(-4.39)	(5.43)	(-1.96)	(4.79)
2016	-.5276588***	1.07619	-.289393**	1.917213**
	(-3.46)	(1.62)	(-2.14)	(2.07)
2018	-.5293823***	.329166	-.2744623*	1.386998
	(-4.39)	(0.42)	(-1.75)	(1.24)
Constant	1.252344***	18.63422***	1.382862***	16.17475***
	(5.45)	(11.17)	(6.09)	(6.17)
N	223	223	223	223
Adj. R-Squared	0.3855	0.6761	0.3929	0.4609
F-Test	11.58		13.67	

*** p<.01, ** p<.05, * p<.1

Table 8: IV 2SLS, Alternative Productivity Metrics

Variables	IV Second Stage (using overdraft)	
	Labourprod (1)	Adj_TFP (2)
Foreign_ownership	**.6876782**	**2.085998**
	(0.23)	**(0.81)**
Firm_size	-.0006923	.0016375*
	(-0.38)	(1.81)
Firm_age	-.0019266	.0092817
	(-0.20)	(0.68)
Owner_pct	-.0030531	.0037103
	(-0.26)	(0.30)
Manager_exp	.0116978**	.0183129*
	(2.12)	(1.89)
Location size	-.1308272	.2306509
	(-0.82)	(0.72)
Industry	.1854214***	.1039647
	(3.19)	(0.47)
Creditline	-.0807496	-.6713142
	(-0.98)	(-1.32)
Certqual	.0422263	.0296538
	(0.59)	(0.48)
Elecobst	.059816	-.0046886
	(0.74)	(-0.07)
Mainprod_pct	.0002483	-.0052542
	(0.08)	(-0.96)
Courtsyst	-.0250169*	-.0189733
	(-1.68)	(-0.29)
Finance_access	.0229454	.0801782
	(0.30)	(0.53)
Year		
2012	0	0
2016	.2512364	.7037678
	(0.21)	(0.28)
2018	.8481611	0
	(0.81)	
Constant	17.66668***	2.887585***
	(6.09)	(7.07)
N	641	103
R-Squared	0.0519	0.0.0566
Chi2	46.12	53.41

*** p<.01, ** p<.05, * p<.1*