



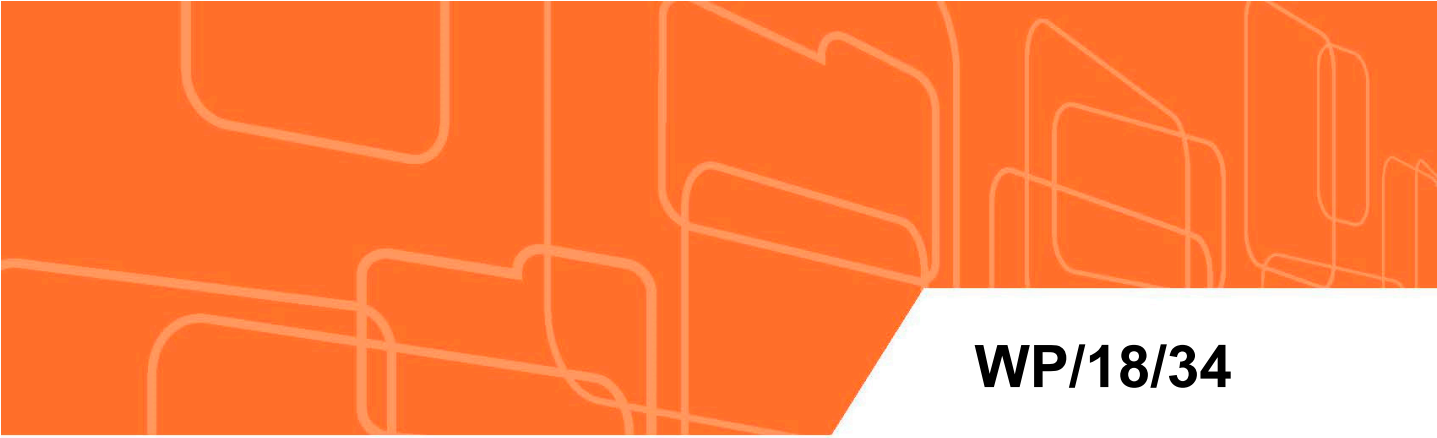
WP/18/34

IMF Working Paper

**Does Taxation Stifle Corporate Investment?
Firm-Level Evidence from ASEAN Countries**

by Serhan Cevik and Fedor Miryugin

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Fiscal Affairs Department

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Prepared by Serhan Cevik and Fedor Miryugin*

Authorized for distribution by Era Dabla-Norris

March 2018

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Abstract

This paper conducts a firm-level analysis of the effect of taxation on corporate investment patterns in member states of the Association of Southeast Asian Nations (ASEAN). Using large-scale panel data on nonfinancial firms over the period 1990–2014, and controlling for macro-structural differences among countries, we find a significant degree of persistence in firms' net fixed investments over time, which vary with firm characteristics, such as size, sales, profitability, leverage, and age. Our analysis brings up interesting empirical results, including nonlinear patterns of behavior in firms' capital investment decisions across ASEAN countries. Concerning the main variable of interest, we find that a moderate level of taxation does not hinder business investment, but this effect turns negative as higher tax burden raises the user cost of capital and distorts resource allocations.

JEL Classification Numbers: E22, E51

Keywords: Corporate income tax, investment, leverage, firm performance

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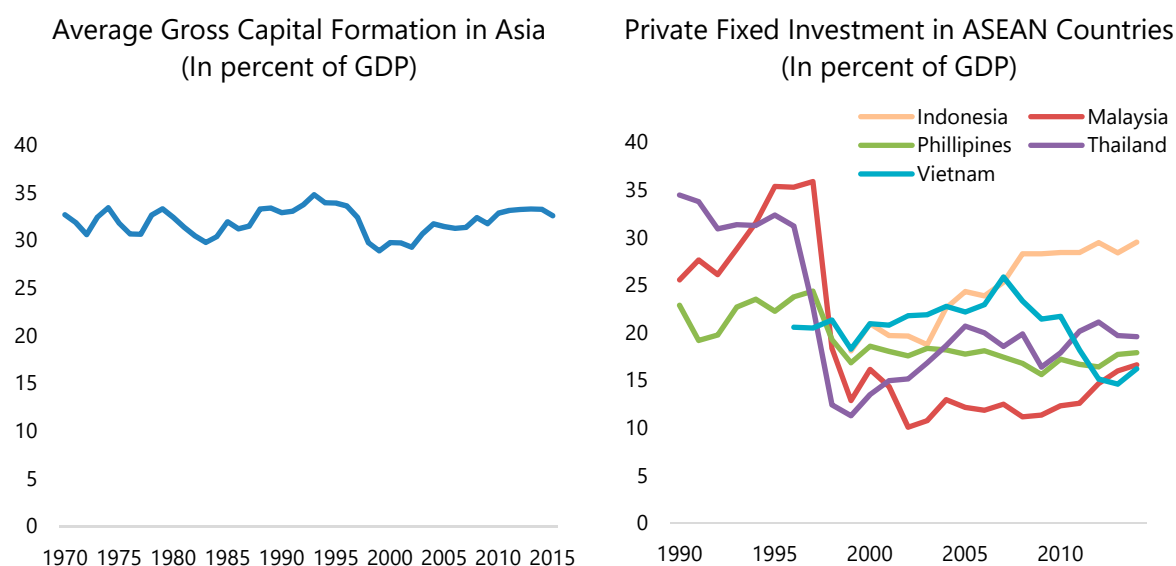
* The authors would like to thank Sophia Chen, Era Dabla-Norris, Souvik Gupta, Juan Jauregui, Kenneth Kang, Elena Loukoianova, Narine Nersesyan, Christine Richmond, Alexander Tieman and the participants of a presentation at the Bangko Sentral ng Pilipinas, and a joint seminar at the Asia Pacific and Fiscal Affairs Departments of the International Monetary Fund, for their comments and suggestions.

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I. INTRODUCTION

The interaction between taxation and economic activity pertains to the core of public policy. The global economy has recovered through its multiyear convalescence, but maintaining the momentum will require sustained investment growth. In fast-growing Asia, while gross capital formation remains high at an average of 33 percent of GDP during the period 2011–2015, there is still considerable variation across countries in private fixed investments (Figure 1). It is critical to macroeconomic performance to understand the dynamics of corporate fixed investment, which constitutes the lion's share of private investment. Empirical studies suggest that profitability, growth prospects and leverage are important in shaping firm-level investment behavior, while macrofinancial, regulatory, and institutional factors determine the conduciveness of the business climate. Using firm-level balance sheet data for a large sample of nonfinancial firms over the period 1990–2014, this paper investigates the determinants of business investment decisions with a particular focus on the role of corporate income tax (CIT) among member states of the Association of Southeast Asian Nations (ASEAN).

Figure 1. Fixed Investment Trends



Sources: IMF, World Bank.

There is extensive literature on the potential determinants of business investment dynamics, but taxation's impact remains elusive. One strand of the literature uses firm-level data and, consistent with standard models of factor demand, focuses on output and the cost of capital (Hall and Jorgenson, 1967; Auerbach, 1983; King and Fullerton, 1984; Auerbach and Hassett, 1992). In particular, according to the neoclassical model of investment, capital formation is a function of expected future profitability (i.e., Tobin's Q), leverage, and financing constraints

(Summers, 1981; Hayashi, 1982; Hubbard, 1998; Kalemli-Ozcan, Laeven, and Moreno, 2015).¹ While there are many empirical studies in this area of the literature, results differ substantially, especially in relation to the influence of the tax component of the user cost of capital on capital formation (Chirinko, Fazzari, and Meyer, 1999; Schaller, 2006; Gilchrist and Zakrajsek, 2007). The nature and size of this impact on the corporate sector's performance, however, is not straightforward. On the one hand, corporate income taxes are expected to lower firms' fixed investment spending (and total factor productivity) by raising the user cost of capital, distorting factor prices, and reducing after-tax return on investment. On the other hand, taxation provides resources for public infrastructure investments and the proper functioning of government institutions, which are key to a firm's success and investment appetite. As shown by Barro (1990) and, more recently, Aghion and others (2016), the overall impact of taxation on firm performance depends on the relative weight of these two opposing effects, which can vary depending on the size of the government and the composition and efficiency of taxation and spending.

The purpose of this paper is therefore to identify the firm-specific and macro-level determinants of corporate fixed investment. We contribute to the important debate on the role of fiscal policy in facilitating private sector development by investigating firm-level fixed investment behavior among nonfinancial firms in ASEAN countries.² Our dependent variable is the ratio of net fixed investment to total assets, and our main variable of interest is a firm-specific measure of the corporate tax burden as gauged by the ratio of CIT expense to profits before tax.³ To obtain consistent estimates, we adopt a model incorporating firm characteristics, and control for macroeconomic and structural differences across countries. We also include the square values of explanatory variables (and the lagged dependent variables in dynamic models) to capture nonlinear behavior (and persistence) in corporate investment decisions. We estimate both static and dynamic models of firm-level investment in physical capital, using an unbalanced panel of 799,328 companies during the period 1990–2014, and employ alternative methods to address estimation biases resulting from the inclusion of the lagged dependent variable, as well as the potential endogeneity of the explanatory variables.

Our estimations indicate that there are significant nonlinearities in the relationship between taxation and firms' investment behavior. Controlling for firm characteristics and macrostructural differences across countries, taxation does not appear to hinder business investment, but its effect turns negative as higher tax burden raises the user cost of capital and distorts resource allocations. Concerning firm size, the results show that large companies

¹ Tobin (1969) pioneered the ratio of the market value of a company's assets (as measured by the market value of its outstanding stock and debt) to the replacement cost of its capital stock as a measure of its incentive for additional fixed investment.

² The ASEAN countries include Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam. Owing to data limitations, however, the empirical analysis presented in this paper is based on a sample of firms located in Indonesia, Malaysia, the Philippines, Thailand, and Vietnam.

³ The marginal effective marginal tax rate is arguably a better measure of the firm-specific tax burden (Devereux and Griffith, 1998), but its calculation requires data on depreciation and amortization, among other pieces of information, which are not available for the great majority of the ASEAN firms covered in this study.

undertake significantly less fixed investment than others, but this is not a linear relationship, as very large firms tend to invest more than others. We observe similar nonlinear behavior with the impact of sales on investment, with a negative coefficient for its square term. This may reflect an increase in operating costs with higher sales, which partly depends on the ratio of fixed to variable costs and varies with company-specific and, sometimes, sector-specific factors. On the other hand, we find the opposite dynamics with profitability, but the estimated coefficients of profitability and its square term are not statistically significant in dynamic estimations. The results show an intricate pattern of nonlinear behavior in relation to leverage, as greater levels of indebtedness become increasingly detrimental to capital spending by nonfinancial firms. Finally, with regards to age, we find that younger firms have greater appetite for fixed investment than older companies, but the relationship between firm age and capital spending exhibits a nonlinear pattern, with more established firms undertaking a greater amount of investment.

A fair and efficient tax system is therefore key to promoting private investment and concurrently raising resources for public investment. A simpler CIT code with a lower tax burden can encourage entrepreneurial activity by new and existing firms, and reduce compliance costs across all segments of the corporate sector. This would, in turn, stimulate business investment and attract foreign direct investment. While there is room to reduce the statutory CIT rate in some ASEAN countries, like the Philippines, an alternative reform option is to limit the CIT on “excess returns” on equity, which would reduce tax-induced investment distortions and promote balanced investment growth. However, given the fact that ASEAN countries have relatively low tax-revenue-to-GDP ratios, it is necessary to develop a comprehensive strategy for corporate tax reform with the aim of strengthening tax compliance and broadening the tax base, while reducing the tax burden on the corporate sector.

The rest of this paper is structured as follows: Section II describes the data sources and presents descriptive statistics. Section III discusses our empirical methodology. Section IV presents the results and robustness checks, and Section V concludes.

II. DATA

The dataset consists of annual observations made on listed and unlisted nonfinancial companies in five ASEAN countries. We gather financial data from the Orbis database compiled by Bureau van Dijk Electronic Publishing, which requires careful management to ensure consistency and comparability across firms and countries, and over time.⁴ We pursue the data cleaning procedure suggested by Kalemli-Ozcan and others (2015) and filter out observations with negative values of investment, assets, sales, and debt and include only firms with at least three consecutive years of data. To minimize the effect of outliers, we exclude 1 percent of observations on both tails of the distribution of firm-specific variables. Accordingly, the final dataset used in this study has an unbalanced panel of 799,328 firms in five ASEAN countries, with 2,087,184 firm-year observations during the period spanning from 1990 to 2014.

⁴ All values reported in the Orbis database are in nominal US dollars.

Our data span a long period, covering economic booms, as well as the downturns caused by the Asian crisis and fallout from the global financial crisis. This coverage of different stages of the business cycle enriches the empirical analysis presented in this paper, but also necessitates the inclusion of country-specific information (log of real GDP per capita, real GDP growth, public investment as a share of GDP, trade openness measured by the sum of exports and imports in GDP, financial development measured by domestic credit to the private sector as a share of GDP, and measures of institutional development including tax administration) as control variables. We draw the macroeconomic series from the IMF's World Economic Outlook (WEO) and the World Bank's World Development Indicators (WDI) and Doing Business databases, and corruption and rule-of-law indices from the Political Risk Services (PRS) group's International Country Risk Guide (ICRG) database.

Table 1. Distribution of Firms Across Countries and Sectors

Sector	Country					Total	Percent of total
	Indonesia	Malaysia	Philippines	Thailand	Vietnam		
Agriculture	42	755	609	896	193	2,495	0.31
Mining	52	276	169	1,337	221	2,055	0.26
Manufacturing	302	7,332	5,726	30,534	3,365	47,259	5.91
Utilities	12	129	279	869	133	1,422	0.18
Construction	35	1,904	1,613	5,264	1,009	9,825	1.23
IT	41	556	1,258	1,949	98	3,902	0.49
Public services	19	487	1,559	2,667	103	4,835	0.60
Trade	80	5,855	12,246	26,899	1,480	46,560	5.82
Transportation	52	543	1,713	3,159	285	5,752	0.72
Real estate	44	1,286	2,596	9,289	132	13,347	1.67
Administrative	35	3,466	3,072	13,912	316	20,801	2.61
Unclassified	0	238,290	239	402,489	57	641,075	80.20
Total	714	260,879	31,079	499,264	7,392	799,328	100.0
<i>Percent of total</i>	<i>0.09</i>	<i>32.64</i>	<i>3.89</i>	<i>62.46</i>	<i>0.92</i>	<i>100.0</i>	

Source: Orbis, authors' calculations.

Table 1 presents the distribution of nonfinancial firms across 5 countries and 11 sectors over the period 1990–2014.⁵ The dataset has 714 firms in Indonesia; 260,879 in Malaysia; 31,079 in the Philippines; 499,257 in Thailand; and 7,392 in Vietnam. Accordingly, the substantial majority is concentrated in Thailand and Malaysia, accounting for 95 percent of the 799,328 firms

⁵ The sectors are based on the statistical classifications of economic activities according to the Nomenclature des Activités Économiques dans la Communauté Européenne (NACE), and include agriculture, construction, information technology, manufacturing, mining, professional and administrative services, real estate, transportation and storage, utilities, wholesale and retail trade, and a category referred to as "unclassified" (which covers firms that do not report a NACE code).

in the sample.⁶ It is important to note that the number of firms covered by Orbis varies from one year to another, increasing considerably after 2000. In terms of sectoral coverage, the dataset includes 11 NACE-classified nonfinancial sectors, excluding public services. Apart from the “unclassified” category, most of the firms operate in manufacturing and account for 30.8 percent of observations over the sample period, followed by the trade sector, with 30.3 percent of observations, and administrative services with 13.6 percent of observations. The “unclassified” category covers about 80 percent of the sample.

Table 2. Summary Statistics

	Unit	Observations	Min.	Max.	Average	Std. Dev.
<i>Dependent Variable</i>						
Net Fixed Investment	Ratio	588,004	0.0	7.6	0.1	0.3
<i>Firm Characteristics</i>						
Total Assets	Log	2,021,893	3.1	26.5	12.2	2.3
Sales	Log	1,480,511	0.0	25.4	12.6	2.4
Leverage	Ratio	2,004,211	0.0	54.6	0.1	1.1
Profitability	Ratio	1,956,119	-18.0	4.4	0.0	0.5
Age	Log	1,901,973	0.0	4.6	2.0	1.0
Taxes	Ratio	1,087,083	0.0	2.0	0.2	0.2
<i>Macroeconomic Factors</i>						
Real GDP Growth	Percent	109	-13.1	11.6	5.1	3.6
Real GDP per Capita	Log	109	6.8	9.3	8.0	0.6
Trade Openness	Ratio	109	0.5	2.2	1.1	0.5
Credit to Private Sector	Ratio	109	0.2	1.7	0.7	0.4
Public Investment	Percent	103	2.0	14.4	7.0	3.4
Statutory CIT Rate	Percent	109	20.0	35.0	29.5	3.5
<i>Institutional Factors</i>						
Corruption	Index	109	1.0	4.0	2.5	0.8
Rule of Law	Index	109	1.0	5.0	3.4	1.0
Time Spent in Paying Taxes	Log	45	4.9	6.9	5.7	0.7

Source: Orbis, ICRG, IMF, World Bank, authors' calculations.

Table 2 presents descriptive statistics for our full sample of firm-level, macroeconomic, and institutional variables. The dependent variable is net fixed investment (measured by the difference between tangible assets in the current period, and those in the previous period) scaled by total assets at the beginning of the year. Our main variable of interest is the firm-specific tax burden (measured by the ratio of CIT paid to profits before tax). To capture firm characteristics, we include size (measured as the log of total assets), growth prospects (measured as the log of sales), profitability (return on assets measured by the ratio of profits after tax to total assets),

⁶ The total number of firms included in the regression analysis is lower than the 799,328 firms in our panel, as we scale net investment with the lagged value of total assets.

leverage (defined as short-term and long-term debts over total assets) to measure a firm's overall indebtedness, and the age of the firm (measured as the log number of years since establishment). There are large variations in the investment ratio and firm characteristics, such as total assets, sales, profitability, and indebtedness. In terms of macroeconomic and institutional features, while five ASEAN countries included in our sample appear to present a similar picture, there are significant variations across these countries over the period 1990–2014.

III. ESTIMATION STRATEGY

The empirical objective of this study is to analyze the impact of taxation on fixed investment spending at the firm level. In this context, our main variable of interest is the firm-specific tax burden as measured by the ratio of CIT paid to profits before tax, and we estimate its impact on the investment-to-assets ratio according to the following static specification:

$$\left(\frac{I}{K}\right)_{isct} = \beta_1 Tax_{isct} + \beta_2 Firm_{isct} + \eta_i + \eta_{sct} + \varepsilon_{isct} \quad (1)$$

in which the subscripts i , s , c , and t denote firm, sector, country, and time, respectively. The dependent variable, I/K , denotes the ratio of net fixed investment in a given year to total assets at the beginning of the year.⁷ Tax is our main variable of interest, standing for the firm-level tax burden as measured by the ratio of CIT expense to profits before tax. The term $Firm$ is a vector of company-specific control variables, including total assets, sales, profitability, leverage, and age. To explore nonlinear patterns in firms' investment decisions, we follow the specification used by Schwellnus and Arnold (2008) and include the squared values of explanatory variables, including the tax burden, in alternative specifications of the model. Furthermore, to capture persistence in fixed investment, we introduce the lagged dependent variable, and estimate the dynamic version of our model:

$$\left(\frac{I}{K}\right)_{isct} = \beta_1 \left(\frac{I}{K}\right)_{isct-1} + \beta_2 Tax_{isct} + \beta_3 Firm_{isct} + \eta_i + \eta_{sct} + \varepsilon_{isct} \quad (2)$$

The lagged dependent variable captures dynamic adjustments in firms' investment decisions to changes in the other variables included in the model. As in the static model, we include the squared values of explanatory variables, including lagged investment, taxation, and other firm characteristics. In both static and dynamic models, the η_i coefficient denotes the firm-specific fixed effects capturing time-invariant unobservable factors at the firm level. The η_{sct} coefficient denotes the set of sector-country-year fixed effects capturing unobserved time-invariant heterogeneity among firms across sectors and countries, and common shocks to firms belonging to the same sector in a country in a given year. This helps control for aggregate and sectoral demand or policy-induced shocks, as well as other macroeconomic and structural differences across countries and cross-sectional dependence among firms in our sample. ε_{isct} is an idiosyncratic error term that satisfies the standard assumptions of zero mean and constant

⁷ Capital spending can be measured on a net or gross basis. The net investment rate is a better indicator than gross investment, as it gauges the change in a firm's stock of physical capital, excluding the fraction of capital that depreciates each year.

variance. Robust standard errors are clustered, at the firm level to account for the fact that observations pertaining to a firm are correlated and thus do not contain as much information as unclustered errors.

We estimate both static and dynamic models, addressing firm heterogeneity and controlling for fixed effects. We present static specifications, estimated using both the fixed-effect and random-effect models to account for any time-invariant unobservable firm, sector, and country characteristics, and for unobserved time effects, controlling for common shocks. In addition, to take into account potential persistency in firm-level fixed investment behavior, we introduce the lagged dependent variable and estimate the augmented version of our model by applying the System Generalized Method of Moments (GMM) technique proposed by Arellano and Bover (1995) and Blundell and Bond (1998), which is appropriate given that our dataset covers a large number of firms within a short time dimension. This approach helps correct for estimation biases resulting from the inclusion of the lagged dependent variable, as well as the potential endogeneity of the explanatory variables. All specifications include firm, sector, country, and time fixed effects to capture common shocks and unobserved time-invariant heterogeneity among firms across sectors and countries. In some specifications, we replace country fixed effects with country-level control variables (per capita income, real GDP growth, public investment, trade openness, financial development, and measures of corruption and rule of law). This approach allows us to tease out additional information on how macroeconomic and institutional factors influence nonfinancial companies' capital spending decisions.

IV. EMPIRICAL RESULTS

We begin the analysis by first reporting the results of static estimations in Table 3 as a point of reference, but fixed investment is likely to exhibit persistence. We estimate the static specifications of our model linking business capital formation to firm characteristics, as well as macrostructural fundamentals, by using both the fixed effects and random effects approaches. All specifications include firm, sector, country, and time fixed effects to capture common shocks and unobserved time-invariant heterogeneity among firms across sectors and countries. In the specifications presented in columns (2) and (4), we replace country fixed effects with country-level control variables (per capita income, real GDP growth, public investment, trade openness, financial development, and measures of corruption, rule of law and effectiveness in tax administration). This approach allows us to tease out additional information on how macroeconomic and institutional factors influence firms' capital spending decisions.

Our estimations indicate that taxation has a significant impact on corporate investment with a nonlinear pattern. With regards to firm characteristics, we find that firm size has a statistically significant negative effect on capital spending. In other words, larger firms appear to invest less than others. The effect intensifies as the size of a firm increases, suggested by the significant negative coefficient of the squared term. Firms' growth prospects, on the other hand, have the expected positive effect on capital spending to a highly significant degree, with some

degree of nonlinearity being observed.⁸ As expected, leverage has a significant negative effect on corporate investment, while the coefficient of profitability is found to be positive, fueling firms' investment appetites. These effects remain robust when we include the squared values to capture nonlinear behavior, like higher profitability leads, to even more capital spending.

In columns (2) and (4) of Table 3, we present static specifications including macroeconomic and institutional variables, instead of country fixed effects. This allows us to enrich the analysis and tease out the impact of macrostructural differences among five ASEAN countries. The results obtained with this approach are broadly similar in terms of the direction, magnitude, and statistical significance of estimated coefficients of firm characteristics. With regard to macroeconomic and institutional variables, we find that per capita income, aggregate economic growth, and financial development have the expected effects with statistical significance on firm-level investment. The results show that the coefficient of real GDP per capita is negative and statistically significant, highlighting an income convergence effect on corporate investment across ASEAN countries. Real GDP growth, however, has a significant positive coefficient, implying that aggregate economic growth stimulates firm-level capital spending. Interestingly, the results indicate that public investment crowds out private capital spending. Financial development as proxied by domestic credit to the private sector is found to have a positive significant effect on firm-level capital spending. On the other hand, a country's trade openness has a negative effect, while both measures of institutional development—corruption and the rule of law—have negative effects on companies' investment decisions. While we present static specifications as a point of reference, we are hesitant about the validity of these estimation results since capital spending tends to be persistent over time.

In dynamic specifications, we introduce lagged capital spending to capture persistence over time in firms' investment decisions. However, including lagged dependent variables in standard estimation models commonly leads to inconsistent estimations, especially for panels with a large number of observations over a relatively short time period. Therefore, in the absence of an appropriate instrumental variable, we apply the System GMM estimator to deal with serial correlation and potential endogeneity among the explanatory variables, and obtain consistent and efficient estimates. Table 4 presents the results of our dynamic estimations via the two-step System GMM, including firm characteristics across all specifications, as well as macroeconomic and institutional controls in some specifications.⁹

⁸ The estimation results do not change when we use sales growth instead of sales.

⁹ The time dimension of our dataset is long—ranging from 1990 to 2014, but each firm in the sample has only a few observations on average. This could weaken the instrumentation in some specifications of the model.

Table 3. Firm-Level Investment—Static Estimations

Variables	Without nonlinear controls		With nonlinear controls	
	Dependent Variable: Fixed Investment Ratio			
<i>Firm characteristics</i>				
Total Assets, lag	-0.169*** [0.004]	-0.169*** [0.004]	-0.148*** [0.021]	-0.152*** [0.021]
Total Assets ² , lag			-0.001 [0.001]	-0.001 [0.001]
Sales, lag	0.018*** [0.002]	0.018*** [0.002]	-0.045*** [0.011]	-0.046*** [0.011]
Sales ² , lag			0.003*** [0.000]	0.003*** [0.000]
Leverage, lag	-0.017*** [0.004]	-0.015*** [0.004]	-0.021*** [0.007]	-0.018*** [0.006]
Leverage ² , lag			0.001 [0.001]	0.001 [0.001]
Profitability, lag	0.038*** [0.008]	0.038*** [0.008]	0.047*** [0.009]	0.047*** [0.009]
Profitability ² , lag			0.009** [0.004]	0.008** [0.004]
Age	0.015*** [0.006]	0.015*** [0.006]	-0.021 [0.013]	-0.022* [0.013]
Age ²			0.024*** [0.006]	0.024*** [0.006]
Taxes	0.038*** [0.005]	0.038*** [0.005]	0.076*** [0.010]	0.075*** [0.010]
Taxes ²			-0.027*** [0.007]	-0.027*** [0.007]
<i>Macroeconomic and institutional controls</i>				
Real GDP per Capita, lag		-0.976*** [0.111]		-1.029*** [0.114]
Real GDP Growth, lag		0.005*** [0.001]		0.005*** [0.001]
Credit to Private Sector, lag		0.530*** [0.035]		0.526*** [0.034]
Trade Openness, lag		-0.215*** [0.015]		-0.209*** [0.015]
Public Investment, lag		-0.025*** [0.003]		-0.025*** [0.003]
Rule of Law, lag		-0.030*** [0.006]		-0.031*** [0.006]
Corruption, lag		-0.049*** [0.004]		-0.047*** [0.005]
Number of observations	308,975	308,967	308,975	308,967
Number of firms	174,903	174,899	174,903	174,899
Adjusted R ²	0.080	0.075	0.081	0.076

Note: Standard errors clustered at the firm level are displayed in brackets. *** p<0.01, ** p<0.05, * p<0.1. A constant is included in each regression, but not shown in the table. The specifications reported in columns (1) and (3) include firm, country, sector, and time fixed effects, while those reported in columns (2) and (4) replace country fixed effects with country-specific macroeconomic and institutional variables.

As expected, there is a significant degree of persistence in firms' fixed investment spending over time. The coefficient of the lagged value of fixed investment is positive and highly significant across all specifications. Its square term turns out to be highly significant too, but with a negative sign. In other words, while a typical fixed investment cycle tends to last multiple years, firms with large investment projects are likely to invest less in the future. This may demonstrate the mean-reverting nature of capital spending, as well as the associated financial burden that drags down additional investment in the immediate future. The inclusion of lagged fixed investment and its square term does not alter the relationships, but leads to some changes in the magnitude of the other variables relative to the static model. For our main variable of interest, the System GMM results show that the linear impact of taxation on corporate fixed investment remains positive effect. Although we reach similar results with regards to other firm characteristics (such as size, profitability and leverage), these first-round effects may fail to capture nonlinear behavior in investment decisions.

Dynamic nonlinear modeling helps identify intricate patterns of investment behavior across our panel of nonfinancial firms in ASEAN countries. In columns (3) and (4) of Table 4, we present the estimates for the dynamic nonlinear model, including the square terms of all firm-level control variables. First, the squared value of corporate income taxes has a significant negative effect on a firm's capital spending. In other words, as the tax burden increases, it stifles private fixed investment. Second, lagged investment and its square term remain highly significant with similar signs and magnitudes. Third, we find that large firms undertake significantly fewer fixed investments than others, but this is not a linear relationship, and size does appear to matter. The square of assets has a statistically significant positive coefficient, indicating that very large firms tend to invest more than others. Fourth, we observe similar nonlinear behavior with the impact of sales—the magnitude of the coefficient increases substantially, but its square term has a negative effect on capital spending. This may reflect an increase in operating costs with higher sales, which partly depends on the ratio of fixed to variable costs and varies with company-specific and, sometimes, sector-specific factors. Fifth, we find opposite dynamics, as one would expect, with profitability, but the estimated coefficients of profitability and its square term are not statistically significant, but they draw attention to a nonlinear pattern with higher profitability leading to more fixed investment. Sixth, the inclusion of the squared term of leverage, however, helps capture an intricate pattern of nonlinear behavior. While the debt-to-asset ratio still has the same positive effect as it does in the linear model, the coefficient of its square term turns out to be negative and statistically significant at the 1 percent level. In other words, leverage may not be a burden up to a certain threshold, but higher levels of indebtedness become increasingly detrimental to new investment. Seventh, the age of the firm remains a significant factor in dynamic estimations with a negative effect on capital spending. The results indicate that younger firms have greater appetite for fixed investment than older companies, but the relationship between firm age and capital spending exhibits a nonlinear pattern, with more established firms undertaking a greater amount of investment.

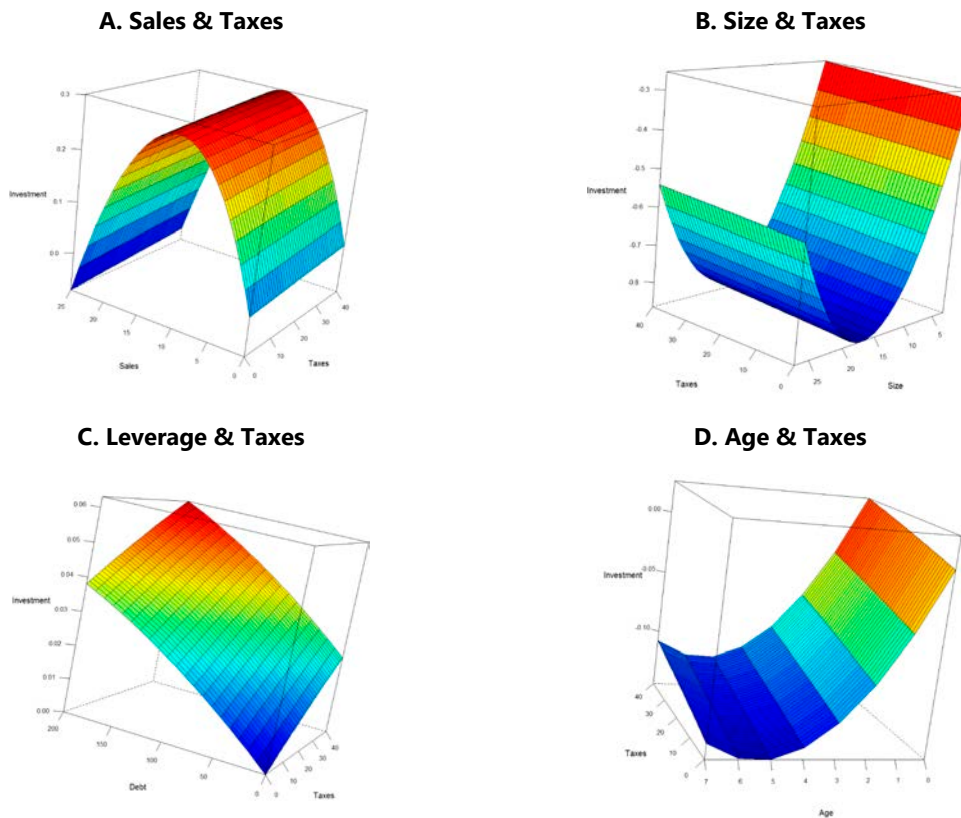
Table 4. Firm-Level Investment—Dynamic Estimations

Variables	Without nonlinear controls		With nonlinear controls	
	Dependent Variable: Fixed Investment Ratio			
<i>Firm characteristics</i>				
Fixed Investment, lag	0.070*** [0.013]	0.076*** [0.013]	0.067*** [0.013]	0.073*** [0.013]
Fixed Investment ² , lag	-0.012** [0.006]	-0.014** [0.006]	-0.012** [0.006]	-0.014** [0.006]
Total Assets, lag	-0.020*** [0.001]	-0.020*** [0.001]	-0.102*** [0.008]	-0.102*** [0.007]
Total Assets ² , lag			0.003*** [0.000]	0.003*** [0.000]
Sales, lag	0.010*** [0.001]	0.010*** [0.001]	0.047*** [0.004]	0.047*** [0.004]
Sales ² , lag			-0.002*** [0.000]	-0.002*** [0.000]
Leverage, lag	0.017*** [0.005]	0.017*** [0.005]	0.025*** [0.006]	0.025*** [0.006]
Leverage ² , lag			-0.003* [0.002]	-0.003* [0.002]
Profitability, lag	-0.008 [0.011]	-0.008 [0.011]	0.019* [0.010]	0.018* [0.010]
Profitability ² , lag			0.023*** [0.008]	0.022*** [0.008]
Age	-0.030*** [0.001]	-0.030*** [0.001]	-0.054*** [0.007]	-0.054*** [0.007]
Age ²			0.005*** [0.001]	0.005*** [0.001]
Taxes	0.040*** [0.005]	0.039*** [0.005]	0.072*** [0.010]	0.070*** [0.010]
Taxes ²			-0.020*** [0.007]	-0.019** [0.007]
<i>Macroeconomic and institutional controls</i>				
Real GDP per Capita, lag		0.014*** [0.003]		0.015*** [0.003]
Real GDP Growth, lag		-0.004*** [0.001]		-0.004*** [0.001]
Credit to Private Sector, lag		-0.059*** [0.018]		-0.031* [0.018]
Trade Openness, lag		-0.010 [0.009]		-0.005 [0.009]
Public Investment, lag		0.001 [0.002]		-0.000 [0.002]
Rule of Law, lag		0.021*** [0.005]		0.021*** [0.005]
Corruption, lag		0.014** [0.006]		0.013** [0.006]
Number of observations	120,610	120,607	120,610	120,607
Number of firms	69,506	69,503	69,506	69,503
AR1 p-val.	0.001	0.002	0.001	0.002
AR2 p-val.	0.702	0.784	0.678	0.758
# of instruments	695	383	701	389

Note: Standard errors clustered at the firm level are displayed in brackets. *** p<0.01, ** p<0.05, * p<0.1. A constant is included in each regression, but not shown in the table. The regressions presented in columns (1) and (3) include firm, country, sector, and time fixed effects, while in those presented in columns (2) and (4) country fixed effects are replaced with country-specific macroeconomic and institutional variables.

The impact of taxation on firm-level capital spending appears to vary with firm characteristics in nonlinear ways. Three-dimensional charts, presented in Figure 2, capture how fixed investments change in response to taxation at different levels of key firm characteristics, such as size, sales growth, and leverage, holding everything else constant. We plot net fixed investment along the Z-axis, and other firm characteristics on the XY-plane, with warmer colors indicating higher levels of investment. According to Panel A, corporate fixed investment increases along with sales, but this is not a linear relationship, and it appears to dissipate at extremely high levels of sales growth (which are not observed in our dataset). Panel B visualizes the opposite nonlinear relation between firm size and fixed investment, showing that smaller firms tend to invest more than larger enterprises at any given tax burden, except for very large firms that invest more than others. Panel C displays a positive effect of leverage on capital spending, but this also highlights a nonlinear pattern with high levels of indebtedness, resulting in lower levels of fixed investment in our sample of nonfinancial firms. Panel D demonstrates that younger enterprises tend to make higher fixed investment in order to expand and strengthen the business, whereas older ones are likely to invest more moderately.

Figure 2. Nonlinear Impact of Firm Characteristics on Fixed Investment



Source: Authors' calculations.

The interaction between the firm-level tax burden indicator and macro-structural variables helps focus on the potential channels of influence. The estimation results, summarized in

Table 5, show a significant degree of interaction between taxation and three main macro-structural factors (namely, economic openness, public investment, and the rule of law). Not only, higher levels of economic and institutional development enable firms to invest more, a country's macro-structural strength also lessens the impact of taxation on capital spending. The negative coefficient of these interaction terms indicate that the higher the level of trade openness (public investment, and the rule of law), the lower the effect of taxation on fixed investment spending at the firm level.

Table 5. Firm-Level Fixed Investment—Interaction Terms

Variables	Macro-Structural Variables						
	Real GDP per Capita	GDP Growth	Private Credit	Trade Openness	Public Invest.	Rule of Law	Corruption
	Dependent Variable: Fixed Investment Ratio						
Firm-Level Tax Burden	0.071 [0.099]	0.040*** [0.012]	0.059 [0.038]	0.103*** [0.027]	0.081*** [0.021]	0.080*** [0.021]	0.073*** [0.023]
Macro-Structural	0.015*** [0.004]	-0.004*** [0.001]	-0.055*** [0.019]	0.000 [0.010]	0.002 [0.002]	0.023*** [0.005]	0.015** [0.006]
Firm-Level Tax Burden x Macro-Structural	-0.003 [0.011]	-0.000 [0.002]	-0.018 [0.038]	-0.040** [0.017]	-0.005* [0.002]	-0.011* [0.006]	-0.014 [0.010]

Note: Standard errors clustered at the firm level are displayed in brackets. *** p<0.01, ** p<0.05, * p<0.1. The specifications are similar to that in the 2nd column of Table 4. Since the results are in line with the results of the baseline specification, only coefficients of interest are displayed. A constant is included in each regression, but not shown in the table. Sector-time fixed effects are used in all specifications.

V. ROBUSTNESS CHECKS

We carry out an extensive sensitivity analysis to confirm our econometric findings, and to attain a more nuanced picture of how taxation affects investment. First, we find that the estimation results for the dynamic model, via the System GMM methodology, remain robust to the inclusion of country-level macroeconomic and institutional variables instead of country fixed effects. Second, we estimate the dynamic model with firm characteristics and macrostructural control variables for each sector separately. Although the results, presented in Appendix Table 1, remain broadly consistent with our baseline findings, it should be noted that sector-specific estimations are sensitive to the limited number of observations.¹⁰ Third, to dig deeper into the relationship between firm size and capital spending, we classify firms with total assets in the lowest quartile in any given year as small, whereas firms with assets in the highest quartile are large. These results, presented in Appendix Table 3, show that fixed investment tends to be significantly more persistent in large firms. While firm size, sales, and leverage matter more among smaller firms, profitability is important for fixed investment appetite, regardless of the firm's size. With regards to taxation, however, we obtain mixed results that are not fully consistent with our baseline findings, due mainly to the limited number of observations.

¹⁰ Appendix Table 2 presents the results of a more detailed regression analysis of the manufacturing sector.

Country-specific estimations, albeit obtained with a limited number of observations, are broadly consistent with our cross-country panel estimations. Since the estimated parameters, based on a panel of ASEAN firms, represent an “average” effect of various firm characteristics and macrostructural factors, we also estimate the dynamic model of business capital formation using the panel of firms for individual countries. Although this exercise reduces the number of observations (especially in countries with limited coverage in the Orbis dataset), it provides a more granular analysis of the nonlinear dynamics of business fixed investment at a disaggregated level for each country.¹¹ These results, presented in Appendix Table 4, are broadly consistent with our cross-country panel estimations, but show variations among the four ASEAN countries included in the country-specific regression analysis. In particular, with regard to our main variable of interest, we observe a nonlinear pattern with the square term of taxation that has a negative impact on firm-level capital spending. The adverse effects of higher tax burden are particularly pronounced in the Philippines and Thailand, which may partly reflect the differences in the efficiency and quality of government spending in these countries. Lastly, we include time spent in paying taxes (hours per year) as an alternative control variable to capture the effect of administrative efficiency and find that it has a significant negative impact on fixed investment spending in our sample of ASEAN firms.¹²

VI. CONCLUSIONS AND POLICY OPTIONS

This paper examines the determinants of firm-level fixed investment in ASEAN countries over the period 1990–2014, using a large-scale panel of nonfinancial companies. To obtain consistent estimates, we adopt a model incorporating firm characteristics (size, sales, profitability, and leverage), and control for macroeconomic and structural differences across countries. We also include lagged investment and the square values of explanatory variables to capture persistency and nonlinear behavior in corporate investment decisions. We present the fixed-effects estimations as reference points, but our benchmark model is dynamic, estimated using the System GMM methodology.

Our analysis brings up interesting empirical results, including nonlinear patterns of behavior in firms’ capital investment decisions. We find that there is a significant degree of persistence in nonfinancial firms’ fixed investment spending over time. The nonlinear dynamic modeling indicates that a moderate level of taxation facilitates business investment (possibly by enabling public investment and proper functioning of government institutions), but this effect turns negative as the tax burden increases, stifling fixed investment growth among our sample of nonfinancial firms in ASEAN countries.¹³ With regard to the impact of size, the results show that large firms undertake significantly fewer investments than smaller enterprises, but this is not a

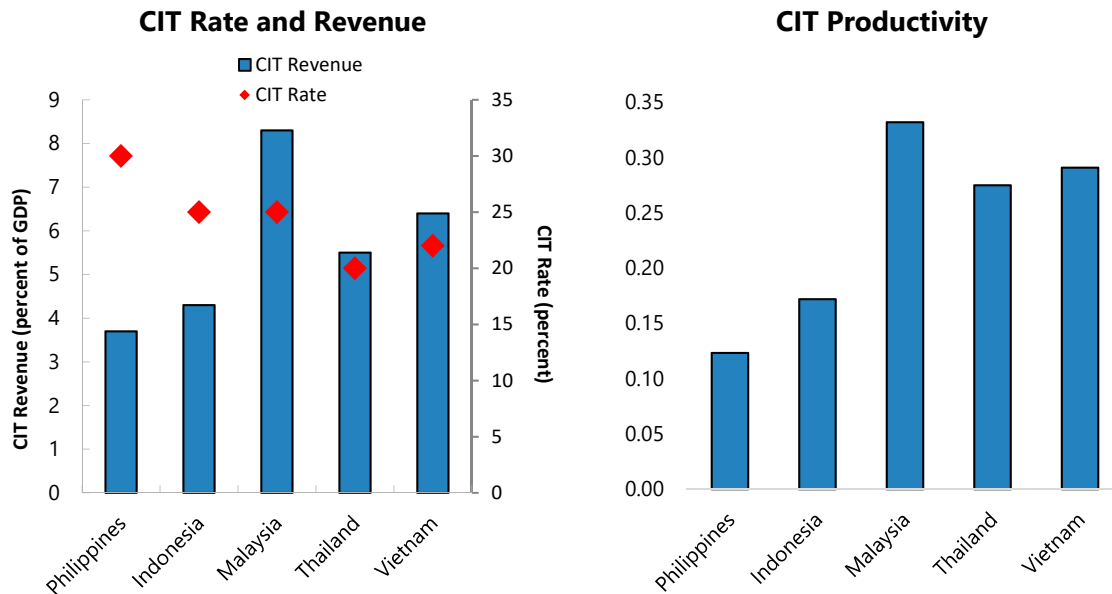
¹¹ Due to the lack of observations in the Orbis database, it is not possible to estimate the model for Indonesia.

¹² The tax administration variable from the World Bank’s Doing Business database is available only after 2006. The estimation results—based on data covering the period 2006–14—are presented in Appendix Table 5.

¹³ While this paper focuses on taxation, the empirical analysis also provides evidence of the importance of macroeconomic stability and governance reform in raising private investment growth sustainably.

linear relationship, as very large companies tend to invest more than others. We observe similar nonlinear behavior with the impact of sales on capital spending, with a negative coefficient for its square term. This may reflect an increase in operating costs with higher sales, which partly depends on the ratio of fixed to variable costs and varies with company-specific and, sometimes, sector-specific factors. On the other hand, we find the opposite dynamics with profitability, as higher profitability leads to more fixed investment. Finally, the results show an intricate pattern of nonlinear behavior in relation to leverage, as greater levels of indebtedness become increasingly detrimental for new fixed investments.

Figure 3. Corporate Tax Landscape Across ASEAN



Source: IMF, Authors' calculations.

Fair and efficient taxation is pivotal in funding public investment in infrastructure and human capital and thereby stimulating private investment. Taken together, the empirical findings presented in this paper provide supportive evidence that tax systems can be designed better to promote capital formation in the private sector, and concurrently to raise additional revenue for much-needed government spending on physical and human capital in ASEAN countries. In particular, corporate taxes need to be integrated into a coherent tax structure designed to encourage entrepreneurial activity by new and existing firms, as well as tax compliance across all segments of the business sector. For example, Dabla-Norris and others (2017) find that tax compliance costs tend to be disproportionately higher for SMEs and young businesses. Therefore, tax administration reforms aimed at lowering compliance costs reduce the productivity gap of SMEs and new firms relative to larger and older firms. In this context, a simpler CIT code with lower tax burden can create a level playing field and reduce compliance costs for firms, which, in turn, promote fixed investment by existing and new firms, and attract foreign direct investment. Size-dependent and sector-specific preferential tax treatments

through exemptions, incentives, and other relief measures—a prevalent feature of tax regimes across all countries—distribute the burden of taxation disproportionately, reduce administrative and economic efficiency, and result in below-potential tax revenue generation.¹⁴

As ASEAN economies mature, the CIT regimes could be restructured to tax “excess returns” on equity instead of firms’ entire income streams. The empirical results show that an excessive level of taxation reduces incentive for private investment by raising the user cost of capital and distorting resource allocations. Some ASEAN countries, like the Philippines, have scope to cut the statutory CIT rate in a gradual manner, which could encourage domestic investment and attract foreign direct investment.¹⁵ But the extensive use of tax concessions and exemptions—estimated to amount 1.5 percent of GDP in 2014—results in distortions, and keeps CIT productivity at almost half the level of better performing peers (Figure 3), as is the case in the Philippines.¹⁶ An alternative reform option, however, is to limit the CIT on “excess returns” on equity (or economic rents). According to the allowance for corporate equity (ACE) scheme, investments earning a “normal” return on investments are exempt from the CIT through the deduction of an imputed return on equity.¹⁷ This allowance equals the product of a firm’s total equity capital, including taxable profits, net of corporate tax, and an appropriate rate of interest, such as the interest rate on long-term government bonds (Cnossen, 1996). The ACE allowance therefore approximates a firm’s normal profits, and the CIT is imposed only on profits in excess of the allowance. The ACE system would also address the discriminatory treatment of equity financing, eliminate the taxation of marginal investment, and provide opportunities for simplifying the corporate tax regime.¹⁸ While the ACE scheme would reduce investment distortions and promote long-term growth, it can also narrow the tax base and, consequently, lower revenue mobilization, especially in ASEAN countries with relatively low tax revenue-to-GDP ratios. Therefore, it is critical to develop a comprehensive approach to corporate tax reform aiming to reduce the tax burden while simultaneously strengthening tax compliance and introducing base-broadening measures, like phasing out tax incentives and preferential treatment, which complicate the system and erode the revenue base.

¹⁴ Using firm-level data from European countries, Benedek and others (2017) find evidence that size-related tax incentives can weigh on firm productivity and growth.

¹⁵ In the case of the Philippines, a one percentage point reduction in the statutory CIT rate would result in a revenue loss of about 0.1 percent of GDP.

¹⁶ The CIT productivity is measured as CIT revenue as a percentage of GDP, divided by the statutory CIT rate.

¹⁷ Klemm (2006) and De Mooji (2011) provide an overview of the ACE tax system and its applications around the world.

¹⁸ CIT regimes tend to cause a debt bias and an excessive leverage in the corporate sector by allowing for the deductibility interest payments but not for the return to equity.

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Appendix Table 1. Firm-Level Investment—System GMM Estimations by Sector

Variables	Agriculture	Mining	Manufacturing	Utilities	Construction	IT	Other	Trade	Transport	Real estate	Administrative	Unclassified
<i>Firm characteristics</i>												
Fixed Investment, lag	0.263* [0.135]	0.078 [0.074]	0.102*** [0.024]	0.015 [0.190]	-0.037 [0.057]	0.037 [0.146]	0.029 [0.117]	0.064** [0.031]	0.310** [0.127]	-0.057 [0.061]	0.139** [0.071]	0.049*** [0.017]
Fixed Investment ^2, lag	-0.088 [0.116]	-0.065 [0.048]	-0.021** [0.010]	-0.024 [0.164]	0.123*** [0.025]	-0.014 [0.136]	0.006 [0.095]	-0.018 [0.012]	-0.156 [0.114]	0.043* [0.022]	-0.044 [0.034]	-0.006 [0.007]
Total Assets, lag	0.074** [0.034]	-0.045* [0.027]	-0.035*** [0.012]	-0.106 [0.070]	-0.042* [0.025]	-0.055** [0.022]	0.025 [0.026]	-0.046*** [0.012]	-0.024 [0.035]	0.019 [0.022]	-0.051*** [0.019]	-0.162*** [0.017]
Total Assets^2, lag	-0.003** [0.001]	0.002** [0.001]	0.001*** [0.000]	0.004* [0.002]	0.001 [0.001]	0.001* [0.001]	-0.001 [0.001]	0.002*** [0.000]	0.001 [0.001]	-0.001 [0.001]	0.002*** [0.001]	0.005*** [0.001]
Sales, lag	-0.009 [0.016]	0.071*** [0.023]	0.051*** [0.009]	0.129** [0.053]	0.074*** [0.016]	0.052*** [0.019]	0.027 [0.017]	0.056*** [0.008]	0.085*** [0.025]	0.008 [0.012]	0.073*** [0.013]	0.053*** [0.010]
Sales^2, lag	0.000 [0.001]	-0.003*** [0.001]	-0.002*** [0.000]	-0.005** [0.002]	-0.002*** [0.001]	-0.001* [0.001]	-0.000 [0.001]	-0.002*** [0.000]	-0.003*** [0.001]	-0.000 [0.001]	-0.003*** [0.001]	-0.002*** [0.000]
Leverage, lag	-0.040 [0.039]	-0.005 [0.033]	-0.010 [0.009]	-0.091 [0.107]	-0.075** [0.035]	0.023 [0.050]	-0.027 [0.038]	-0.000 [0.010]	-0.012 [0.049]	0.013 [0.018]	0.015 [0.026]	0.023 [0.023]
Leverage^2, lag	0.009 [0.015]	0.004 [0.005]	0.002 [0.002]	0.042 [0.099]	0.056*** [0.019]	-0.005 [0.007]	0.003 [0.005]	0.002 [0.002]	-0.006 [0.020]	-0.001 [0.003]	0.003 [0.008]	-0.008* [0.005]
Profitability, lag	0.031 [0.036]	0.054 [0.052]	0.026 [0.019]	0.068 [0.066]	-0.081** [0.033]	0.010 [0.020]	0.025 [0.025]	-0.011 [0.020]	-0.031 [0.030]	-0.054 [0.051]	-0.020 [0.020]	0.045*** [0.017]
Profitability^2, lag	0.003 [0.020]	0.126* [0.075]	0.051** [0.025]	-0.038 [0.055]	0.052 [0.042]	0.006 [0.006]	0.004 [0.008]	0.011* [0.006]	-0.016* [0.009]	0.053 [0.060]	0.004 [0.008]	0.030*** [0.009]
Age	-0.072 [0.048]	-0.253*** [0.076]	-0.074*** [0.012]	-0.072 [0.067]	-0.020 [0.025]	-0.077* [0.046]	-0.066 [0.053]	-0.090*** [0.016]	-0.192** [0.086]	0.035 [0.022]	-0.127*** [0.031]	-0.019* [0.011]
Age^2	0.013 [0.009]	0.044*** [0.014]	0.009*** [0.002]	0.009 [0.014]	-0.001 [0.005]	0.015 [0.009]	0.006 [0.010]	0.012*** [0.003]	0.029* [0.016]	-0.011** [0.005]	0.020*** [0.006]	-0.002 [0.002]
Taxes	-0.109 [0.074]	-0.129** [0.060]	0.031* [0.016]	-0.084 [0.110]	-0.034 [0.057]	-0.021 [0.049]	0.048 [0.062]	0.042 [0.029]	0.040 [0.082]	0.049 [0.044]	0.020 [0.035]	0.081*** [0.014]
Taxes^2	0.066 [0.074]	0.067 [0.044]	-0.006 [0.013]	0.100 [0.087]	0.056 [0.057]	0.011 [0.033]	-0.041 [0.046]	-0.021 [0.026]	0.026 [0.067]	0.021 [0.044]	-0.003 [0.024]	-0.023** [0.010]
<i>Macroeconomic and institutional controls</i>												
Real GDP per Capita, lag	0.019 [0.014]	0.026* [0.015]	0.012*** [0.004]	-0.027 [0.019]	-0.000 [0.009]	0.041** [0.019]	0.006 [0.022]	0.009 [0.007]	-0.022 [0.014]	-0.013 [0.020]	0.011 [0.014]	-0.023 [0.033]
Real GDP Growth, lag	-0.010** [0.005]	0.001 [0.004]	-0.005*** [0.001]	-0.014** [0.007]	-0.000 [0.002]	-0.000 [0.007]	-0.004 [0.005]	-0.003 [0.002]	-0.010** [0.005]	-0.000 [0.006]	-0.004 [0.003]	0.002 [0.003]
Credit to Private Sector, lag	0.008 [0.095]	0.170 [0.160]	0.008 [0.024]	-0.244** [0.112]	0.006 [0.094]	0.054 [0.095]	-0.037 [0.083]	0.025 [0.039]	0.105 [0.094]	-0.321 [0.226]	0.060 [0.082]	-0.197 [0.150]
Trade Openness, lag	-0.088** [0.041]	-0.001 [0.089]	-0.014 [0.012]	0.122* [0.074]	0.017 [0.047]	-0.118** [0.059]	0.052 [0.069]	-0.034 [0.022]	-0.040 [0.062]	0.124 [0.098]	-0.014 [0.038]	-0.018 [0.056]
Public Investment, lag	0.004 [0.008]	-0.020 [0.016]	-0.002 [0.003]	0.023*** [0.009]	-0.002 [0.012]	-0.009 [0.014]	-0.004 [0.008]	-0.005 [0.005]	-0.012 [0.008]	0.043 [0.029]	-0.009 [0.008]	0.015 [0.018]
Rule of Law, lag	0.031** [0.016]	0.024 [0.056]	0.015** [0.006]	-0.021 [0.018]	-0.021 [0.032]	0.033 [0.028]	0.019 [0.016]	0.035*** [0.012]	0.001 [0.020]	-0.094 [0.091]	0.018 [0.022]	0.077 [0.073]
Corruption, lag	-0.016 [0.029]	0.049* [0.027]	0.006 [0.008]	-0.089*** [0.031]	0.048** [0.020]	0.069* [0.038]	-0.000 [0.036]	-0.006 [0.014]	-0.005 [0.032]	-0.012 [0.043]	0.068** [0.028]	-0.081* [0.045]
Number of observations	875	880	21,666	525	3,658	984	1,244	16,159	1,879	3,891	6,473	62,373
Number of firms	473	464	11,751	286	2,127	562	659	8,884	1,028	2,521	3,634	37,114
AR1 p-val.	0.001	0.001	0.001	0.002	0.001	0.002	0.001	0.001	0.001	0.001	0.002	0.001
AR2 p-val.	0.577	0.191	0.512	0.682	0.323	0.494	0.175	0.491	0.157	0.823	0.766	0.577
Hansen p-val.	0.261	0.153	0.014	0.015	0.026	0.037	0.053	0.167	0.007	0.012	0.018	0.013
Number of instruments	122	122	206	105	140	133	131	170	138	128	149	124

Note: Standard errors clustered at the firm level are displayed in brackets. *** p<0.01, ** p<0.05, * p<0.1. A constant is included in each specification, but not shown in the table. Time fixed effects are included in all regressions.

Appendix Table 2. Firm-Level Investment—System GMM Estimations for the Manufacturing Sector

Variables	Without nonlinear controls		With nonlinear controls	
	Dependent Variable: Fixed Investment Ratio			
<i>Firm characteristics</i>				
Fixed Investment, lag	0.090*** [0.023]	0.106*** [0.024]	0.085*** [0.023]	0.102*** [0.024]
Fixed Investment ² , lag	-0.016* [0.009]	-0.022** [0.009]	-0.015* [0.009]	-0.021** [0.010]
Total Assets, lag	-0.010*** [0.003]	-0.011*** [0.003]	-0.034*** [0.012]	-0.035*** [0.012]
Total Assets ² , lag			0.001*** [0.000]	0.001*** [0.000]
Sales, lag	0.008*** [0.003]	0.009*** [0.003]	0.052*** [0.009]	0.051*** [0.009]
Sales ² , lag			-0.002*** [0.000]	-0.002*** [0.000]
Leverage, lag	-0.008 [0.008]	-0.008 [0.008]	-0.010 [0.009]	-0.010 [0.009]
Leverage ² , lag			0.002 [0.002]	0.002 [0.002]
Profitability, lag	-0.030 [0.053]	-0.030 [0.053]	0.026 [0.019]	0.026 [0.019]
Profitability ² , lag			0.051** [0.025]	0.051** [0.025]
Age	-0.035*** [0.003]	-0.034*** [0.003]	-0.075*** [0.012]	-0.074*** [0.012]
Age ²			0.009*** [0.002]	0.009*** [0.002]
Taxes	0.028*** [0.008]	0.025*** [0.008]	0.038** [0.016]	0.031* [0.016]
Taxes ²			-0.010 [0.013]	-0.006 [0.013]
Macroeconomic and institutional controls				
Real GDP per Capita, lag		0.014*** [0.004]		0.012*** [0.004]
Real GDP Growth, lag		-0.005*** [0.001]		-0.005*** [0.001]
Credit to Private Sector, lag		0.001 [0.024]		0.008 [0.024]
Trade Openness, lag		-0.015 [0.012]		-0.014 [0.012]
Public Investments, lag		-0.002 [0.003]		-0.002 [0.003]
Law and Order Index, lag		0.015** [0.006]		0.015** [0.006]
Corruption Index, lag		0.009 [0.008]		0.006 [0.008]
Number of observations	21,669	21,666	21,669	21,666
Number of firms	11,754	11,751	11,754	11,751
AR1 p-val.	0.001	0.002	0.001	0.002
AR2 p-val.	0.568	0.489	0.594	0.512
Number of instruments	233	200	239	206

Note: Standard errors clustered at the firm level are displayed in brackets. *** p<0.01, ** p<0.05, * p<0.1. A constant is included in each regression, but not shown in the table. The regressions presented in columns (1) and (3) include country-time fixed effects, while in those presented in columns (2) and (4) country fixed effects are replaced with country-specific macroeconomic and institutional variables.

Appendix Table 3. Firm-Level Investment— System GMM Estimations For Small and Large Firms

Variables	Dependent Variable: Fixed Investment Ratio			
	Small	Large	Small	Large
<i>Firm characteristics</i>				
Fixed Investment, lag	0.084 [0.065]	0.116* [0.059]	0.083 [0.064]	0.115** [0.058]
Fixed Investment ² , lag	-0.022 [0.021]	-0.000 [0.057]	-0.022 [0.021]	-0.000 [0.056]
Total Assets, lag	0.184** [0.091]	-0.088*** [0.023]	0.188** [0.092]	-0.086*** [0.022]
Total Assets ² , lag	-0.010** [0.004]	0.002*** [0.001]	-0.011*** [0.004]	0.002*** [0.001]
Sales, lag	0.035*** [0.011]	0.015 [0.012]	0.033*** [0.011]	0.021* [0.012]
Sales ² , lag	-0.001** [0.001]	-0.001 [0.000]	-0.001** [0.001]	-0.001* [0.000]
Leverage, lag	0.011 [0.020]	0.022 [0.026]	0.011 [0.020]	0.030 [0.026]
Leverage ² , lag	-0.003 [0.003]	-0.042 [0.043]	-0.003 [0.003]	-0.053 [0.042]
Profitability, lag	0.179*** [0.053]	0.065** [0.032]	0.176*** [0.052]	0.057* [0.031]
Profitability ² , lag	-0.069*** [0.016]	-0.117* [0.067]	-0.067*** [0.016]	-0.111* [0.064]
Age	-0.067** [0.029]	-0.035* [0.019]	-0.069** [0.029]	-0.033* [0.019]
Age ²	0.008 [0.006]	0.004 [0.003]	0.009 [0.006]	0.004 [0.003]
Taxes	0.157*** [0.034]	-0.077*** [0.019]	0.156*** [0.034]	-0.086*** [0.019]
Taxes ²	-0.051** [0.022]	0.054*** [0.014]	-0.050** [0.022]	0.061*** [0.016]
Macroeconomic and institutional controls				
Real GDP per Capita, lag			-0.887 [1.708]	-0.002 [0.004]
Real GDP Growth, lag			0.014 [0.020]	-0.004*** [0.001]
Credit to Private Sector, lag			0.325 [0.922]	0.035 [0.053]
Trade Openness, lag			0.028 [0.293]	-0.012 [0.028]
Public Investments, lag			0.041 [0.109]	-0.007 [0.006]
Law and Order Index, lag			0.187 [0.752]	0.017 [0.020]
Corruption Index, lag			0.087 [0.264]	0.013 [0.010]
Number of observations	8,765	11,576	8,765	11,576
Number of firms	5,371	6,522	5,371	6,522
AR1 p-val.	0.001	0.001	0.002	0.001
AR2 p-val.	0.516	0.428	0.512	0.641
Number of instruments	250	481	220	270

Note: Standard errors clustered at the firm level are displayed in brackets. *** p<0.01, ** p<0.05, * p<0.1. A constant is included in each regression, but not shown in the table. The regressions presented in columns (1) and (3) include country, sector, and time fixed effects, while in those presented in columns (2) and (4) country fixed effects are replaced with country-specific macroeconomic and institutional variables.

Appendix Table 4. Firm-Level Investment by Country—System GMM Estimations

	Cross-Country	Malaysia	Philippines	Thailand	Vietnam
Variables	Dependent Variable: Fixed Investment Ratio				
<i>Firm characteristics</i>					
Fixed Investment, lag	0.073*** [0.013]	0.049*** [0.015]	0.387* [0.218]	0.123*** [0.032]	0.203*** [0.060]
Fixed Investment ² , lag	-0.014** [0.006]	-0.007 [0.006]	-0.485* [0.250]	-0.027 [0.022]	-0.076* [0.044]
Total Assets, lag	-0.102*** [0.007]	-0.167*** [0.014]	-0.079* [0.044]	-0.017*** [0.006]	-0.060 [0.053]
Total Assets ² , lag	0.003*** [0.000]	0.005*** [0.000]	0.002* [0.001]	0.000 [0.000]	0.002 [0.002]
Sales, lag	0.047*** [0.004]	0.054*** [0.008]	0.169*** [0.054]	0.038*** [0.003]	-0.152*** [0.046]
Sales ² , lag	-0.002*** [0.000]	-0.002*** [0.000]	-0.005*** [0.002]	-0.001*** [0.000]	0.004*** [0.001]
Leverage, lag	0.025*** [0.006]	-0.031 [0.174]	0.139 [0.090]	-0.009 [0.006]	0.073 [0.048]
Leverage ² , lag	-0.003* [0.002]	-0.012 [0.317]	-0.249* [0.150]	0.003 [0.002]	-0.111* [0.064]
Profitability, lag	0.018* [0.010]	0.045*** [0.016]	-0.087 [0.143]	-0.007 [0.009]	0.218* [0.118]
Profitability ² , lag	0.022*** [0.008]	0.026*** [0.008]	0.081 [0.279]	0.020 [0.014]	-0.473 [0.505]
Age	-0.054*** [0.007]	-0.028*** [0.010]	-0.043 [0.039]	-0.060*** [0.009]	-0.047* [0.024]
Age ²	0.005*** [0.001]	-0.000 [0.002]	0.006 [0.006]	0.006*** [0.002]	0.008* [0.005]
Taxes	0.070*** [0.010]	0.062*** [0.013]	0.052 [0.068]	0.044*** [0.012]	-0.022 [0.044]
Taxes ²	-0.019** [0.007]	-0.013 [0.009]	-0.025 [0.053]	-0.016 [0.011]	-0.062 [0.061]
<i>Macroeconomic and institutional controls</i>					
Real GDP per Capita, lag	0.015*** [0.003]	-0.129** [0.051]	0.492 [0.769]	-0.108*** [0.032]	-0.659** [0.294]
Real GDP Growth, lag	-0.004*** [0.001]	0.002** [0.001]	-0.013 [0.009]	-0.000 [0.000]	-0.048* [0.028]
Credit to Private Sector, lag	-0.031* [0.018]	-0.199*** [0.053]	0.200 [1.032]	0.009 [0.022]	0.200 [0.147]
Trade Openness, lag	-0.005 [0.009]	-0.099*** [0.016]	0.220 [0.387]	-0.021 [0.028]	0.335* [0.200]
Public Investments, lag	-0.000 [0.002]	0.024*** [0.004]	-0.002 [0.024]	-0.013** [0.007]	0.003 [0.009]
Law and Order Index, lag	0.021*** [0.005]	0.011 [0.013]	-0.100 [0.109]	-0.001 [0.006]	1.572*** [0.470]
Corruption Index, lag	0.013** [0.006]	0.041*** [0.009]	0.361** [0.162]	0.025** [0.010]	-0.017 [0.022]
Number of observations	120,607	74,042	676	42,738	3,117
Number of firms	69,503	44,059	391	23,089	1,936
AR1 p-val.	0.001	0.002	0.002	0.001	0.002
AR2 p-val.	0.758	0.619	0.091	0.475	0.067
Number of instruments	389	183	101	178	97

Note: Standard errors clustered at the firm level are displayed in brackets. *** p<0.01, ** p<0.05, * p<0.1. A constant is included in each regression, but not shown in the table. Sector-time fixed effects are included in regression (1), sector fixed effects – in regressions (2)-(5).

Appendix Table 5. Firm-Level Investment—System GMM with Tax Administration

Variables	Without nonlinear controls	With nonlinear controls
	Dependent Variable: Fixed Investment Ratio	
<i>Firm characteristics</i>		
Fixed Investment, lag	0.075*** [0.013]	0.072*** [0.013]
Fixed Investment^2, lag	-0.014** [0.006]	-0.013** [0.006]
Total Assets, lag	-0.020*** [0.001]	-0.104*** [0.008]
Total Assets^2, lag		0.003*** [0.000]
Sales, lag	0.010*** [0.001]	0.046*** [0.004]
Sales^2, lag		-0.001*** [0.000]
Leverage, lag	0.015*** [0.004]	0.028*** [0.005]
Leverage^2, lag		-0.006*** [0.001]
Profitability, lag	0.003 [0.010]	0.021** [0.010]
Profitability^2, lag		0.015*** [0.004]
Age	-0.030*** [0.001]	-0.050*** [0.007]
Age^2		0.004*** [0.001]
Taxes	0.040*** [0.005]	0.071*** [0.010]
Taxes^2		-0.019*** [0.007]
<i>Macroeconomic and institutional controls</i>		
Real GDP per Capita, lag	-0.078*** [0.015]	-0.076*** [0.014]
Real GDP Growth, lag	-0.001* [0.001]	-0.001 [0.001]
Credit to Private Sector, lag	0.040 [0.025]	0.065*** [0.025]
Trade Openness, lag	0.047*** [0.009]	0.052*** [0.009]
Public Investments, lag	-0.000 [0.001]	-0.001 [0.001]
Time Spent on Paying Taxes, lag	-0.546*** [0.079]	-0.546*** [0.078]
Corruption, lag	0.018*** [0.006]	0.018*** [0.006]
Number of observations	117,334	117,334
Number of firms	67,864	67,864
AR1 p-val.	0.001	0.001
AR2 p-val.	0.747	0.719
Number of instruments	218	224

Note: Standard errors clustered at the firm level are displayed in brackets. *** p<0.01, ** p<0.05, * p<0.1. A constant is included in each regression, but not shown in the table. The regressions include sector and time fixed effects.

Appendix Table 6. Firm-Level Investment—Dynamic Estimations (Classified Firms)

Variables	Without nonlinear controls		With nonlinear controls	
	Dependent Variable: Fixed Investment Ratio			
Firm characteristics				
Fixed Investment, lag	0.090*** [0.016]	0.105*** [0.016]	0.086*** [0.016]	0.102*** [0.016]
Fixed Investment ² , lag	-0.017** [0.007]	-0.022*** [0.007]	-0.016** [0.007]	-0.022*** [0.008]
Total Assets, lag	-0.009*** [0.001]	-0.009*** [0.001]	-0.027*** [0.006]	-0.026*** [0.006]
Total Assets ² , lag			0.001*** [0.000]	0.001*** [0.000]
Sales, lag	0.008*** [0.001]	0.008*** [0.001]	0.046*** [0.003]	0.045*** [0.003]
Sales ² , lag			-0.002*** [0.000]	-0.001*** [0.000]
Leverage, lag	0.006 [0.005]	0.005 [0.005]	-0.004 [0.006]	-0.004 [0.006]
Leverage ² , lag			0.003 [0.002]	0.003 [0.002]
Profitability, lag	-0.021 [0.017]	-0.021 [0.016]	-0.000 [0.009]	0.000 [0.009]
Profitability ² , lag			0.020 [0.013]	0.020 [0.013]
Age	-0.032*** [0.002]	-0.031*** [0.002]	-0.078*** [0.008]	-0.078*** [0.008]
Age ²			0.010*** [0.002]	0.010*** [0.001]
Taxes	0.028*** [0.006]	0.026*** [0.006]	0.029** [0.012]	0.022* [0.012]
Taxes ²			-0.003 [0.011]	0.002 [0.011]
Macroeconomic and institutional controls				
Real GDP per Capita, lag		0.013*** [0.003]		0.011*** [0.003]
Real GDP Growth, lag		-0.004*** [0.001]		-0.004*** [0.001]
Credit to Private Sector, lag		0.007 [0.017]		0.012 [0.017]
Trade Openness, lag		-0.016* [0.009]		-0.014 [0.009]
Public Investment, lag		-0.004* [0.002]		-0.003* [0.002]
Rule of Law, lag		0.018*** [0.005]		0.017*** [0.005]
Corruption, lag		0.013** [0.006]		0.011* [0.006]
Number of observations	58,237	58,234	58,237	58,234
Number of firms	32,392	32,389	32,392	32,389
AR1 p-val.	0.001	0.002	0.001	0.002
AR2 p-val.	0.862	0.637	0.913	0.69
# of instruments	667	369	673	375

Note: Standard errors clustered at the firm level are displayed in brackets. *** p<0.01, ** p<0.05, * p<0.1. A constant is included in each regression, but not shown in the table. The regressions presented in columns (1) and (3) include country, sector, and time fixed effects, while in those presented in columns (2) and (4) country fixed effects are replaced with country-specific macroeconomic and institutional variables.