

Aspects of Financial Development and Manufacturing Growth and Size: Which Matter?

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- Renewed interest in the financial development-growth nexus in the wake of the global financial crisis
- Polarized theoretical arguments and empirical evidence
 - Positive link
 - Negative link

Positive Link

Financial intermediaries, in endogenous growth theory:

- Facilitate savings and capital mobilization towards the most productive activities (Bagehot, 1873; Schumpeter, 1912; Hicks, 1969; McKinnon, 1973; and Shaw, 1973)
- Help mitigate information asymmetry problems by
 - Achieving transactions cost-minimizing economies of scale
 - Diversifying and pooling of risks
 - Greenwood and Jovanovic (1990), Levine (1998), Levine (1999)
- That enable technological and process innovations and overall economic development
- Positive FD-growth link: King and Levine (1993a, 1993b), Rajan and Zingales, 1998; Beck, Levine and Loayza, 2000; Levine, Loayza and Beck, 2000; Beck and Levine (2004), Loayza and Ranciere (2006); Beck et al. (2007); Beck and Demirguc-Kunt (2008); and Saci et al. (2009)

Negative Link

- Credit surges often precede financial/banking crises (Beck and Levine, 2004)
 - Erosion of financial institutions, which in turn, raises the likelihood of growth-inhibiting financial crises (Rogoff, 2009).
 - Sample of economies with less developed financial sectors over the period 1960 to 2004 (Rousseau and Wachtel, 2011)
 - Sub-sample of 12 Latin American countries from 1960 to 1989 (De Gregorio and Guidotti, 1995)
 - Both using dynamic panel data estimators
- Lack of financial scale often attributable to the existence of weak institutions and market failures that are more pronounced in developing economies (Sutton and Jenkins, 2007).

Negative Link

- Financial repression, weak financial institutions and inefficiencies in credit allocation that predominantly favor public enterprises (Ben Naceur and Ghazaouani, 2007; Ayadi et al., 2013).
 - Negative short-run (annual) effect of private credit expansion on growth:
 - 30 developing economies over the period 1988-2001, using a two-step system general method of moments (SGMM) (Saci et al., 2009)
 - 11 southern and eastern mediteranean countries, using dynamic panel GMM methods (Ben Naceur and Ghazaouani, 2007)
 - Developed and developing Mediterranean countries over the period 1970-2009 (Ayadi et al., 2013)

Size Matters

- Existence of nonlinearities in the financial development-growth nexus
- For less developed financial systems: positive effect vanishes (Deida and Fattouh, 2002; and Rioja and Valev, 2004)
- For middle-income and high-income economies over the period 1960-2010 (Arcand et al., 2011)
- Existence of diminishing returns to financial expansion when private credit (as % of GDP) is higher than the 80-100% range
 - Consistent with Easterly, Islam and Stiglitz (2000): range where greater financial depth starts increasing volatility of growth
 - Robust to controls for macroeconomic instability, banking crises, and institutional quality.
 - A case of “too much finance”

Bank-Based vs. Market-Based FD

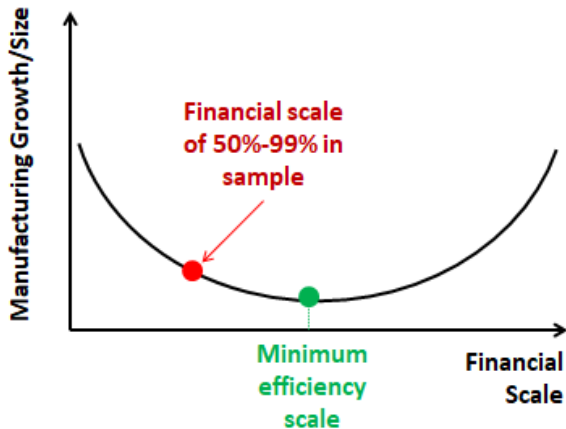
- Arguments for bank-based systems
 - In highly liquid systems, information asymmetry problems are exacerbated (due to lax accountability in corporate management), resulting in an inefficient allocation of savings
 - Banks mitigate market failures due to their long-term relationships with firms
- Arguments for market-based systems
 - Large banks encourage conservative investment projects, while extracting large rents from firms → low profitability → less incentive to invest in productivity-enhancing technologies and innovations
 - Financial markets provide a larger set of financial instruments, allowing better customization of risk management techniques, unlike in standardized bank-based systems
- Should develop both, since they provide complementary financial services to the economy (La Porta, et al., 1997; Levine (1998, 1999b); Khan and Senhadji, 2000)

This Paper

- Seeks to answer the question, "Which aspects of financial development are beneficial to manufacturing growth and manufacturing size in developing economies?"
- Employs Blundell and Bond's (1998) and Windmeijer's (2005) two-step system GMM
- On an unbalanced panel dataset of 108-113 economies from the World Development Indicators
- Over six periods of five-year averages from 1997 to 2016
- Using the new IMF financial indicators dataset, which gives a broad-based measure of FD
- Focusing on the FD-manufacturing growth and size links in developing economies

- The usual indicators of financial development, i.e., private credit (% GDP) and bank credit (% GDP) do not have statistically significant effects on manufacturing growth and size.
- For about 50-99% of the economies in the sample, the financial scale levels are considerably below the minimum efficiency scales.
 - Size matters: the financial sector must attain a minimum efficiency scale before credit and liquidity expansion can benefit the economy, indicating a case of “too little” finance.

Preview of Results



Using the **IMF financial development indicators** (broad-based measure of financial development):

- **On manufacturing growth:** financial market and institutional depth, access, efficiency have positive and significant overall marginal effects
- **On manufacturing size:**
 - financial market and institutional depth and financial market access and efficiency have positive and significant marginal effects;
 - financial institutional access has a negative and significant marginal effect;
 - financial market efficiency has no significant effect
- How financial development is measured matters!

Using Blundell and Bond's (1998) and Windmeijer's (2005) **two-step system GMM (SGMM)**, we estimate:

$$y_{it} = \alpha FD_{it} + \beta FD_{it}^2 + FD_{it} DevEcon + \gamma X_{it} + \delta Z_{it} + \eta_i + \varepsilon_{it},$$

where

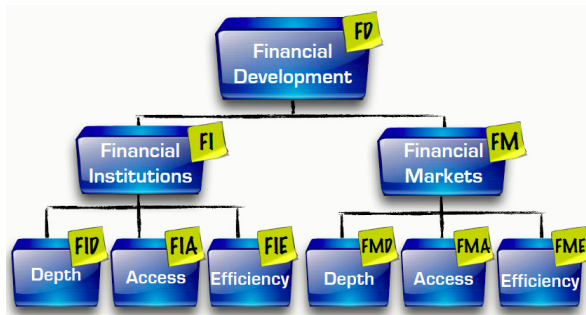
- y_{it} is the annual growth rate of manufacturing or manufacturing value added's share in GDP in country i in period t ;
- FD_{it} represents the financial development indicator;
- $DevEcon$ is a dummy variable that is equal to one if country i has a real GNI per capita of not more than \$10,000 in 1992;
- X_{it} is a vector containing predetermined and endogenous regressors, which include the lagged value(s) of the dependent variable;
- Z_{it} is a vector of strictly exogenous regressors;
- η_i is the unobserved fixed-individual effect; and
- ε_{it} is the error term.

Two-step SGMM has the following advantages:

- Allows the treatment of regressor endogeneity, using the lagged values of the dependent variable and the covariates as instruments
- Mitigates the Nickell bias: appropriate for big N small T datasets
- Generates more precise and more efficient estimates, mitigating the finite-sample bias
- Is more appropriate for dealing with variables that are or close to 'random walk'
- Information loss due to differencing in unbalanced datasets is less severe

- **Private credit** – credit extended to the private sector by the financial sector (% GDP); most common measure: used in Beck et al. (2000); Edison et al. (2002); Levine (2000); Favara (2003); Loayza and Ranciere (2006); Beck et al. (2007); Beck and Demirgüç-Kunt (2008); Saci et al. (2009)
- **Bank credit** – credit extended by banks to the private sector (% GDP); used in Beck and Levine (2004) and Levine and Zervos (2004)

IMF Financial Development Indicators



Source: Svirydzenka (2016)

● Financial institutions depth

- Private credit (% GDP)
- Pension fund assets (% GDP)
- Mutual fund assets (% GDP)
- Insurance premiums (% GDP)

● Financial markets depth

- Stock market capitalization (% GDP) – measures size of the stock market
- Stocks traded (% GDP) – measures how active the market is
- International debt securities of government (% GDP)
- Total debt securities of financial corporation (% GDP)
- Total debt securities of nonfinancial corporation (% GDP)

- **Financial institutions access**

- Bank branches per 100,000 adults
- ATMs per 100,000 adults

- **Financial markets access**

- Percent of market capitalization outside of the top 10 largest companies (proxy of stock markets access)
- Total number of issuers of debt per 100,000 adults (proxy of bond market access)

● **Financial institutions efficiency**

- Efficiency in intermediating savings to investment – net interest margin (accounting value of bank's net interest revenue as a share of its average interest-bearing assets); lending-deposit spread
- Operational efficiency measures – non-interest income to total income; overhead costs to total assets
- Profitability measures – return on assets; return on equity

● **Financial markets efficiency**

- Stock market turnover ratio (value traded/stock market capitalization) – higher turnover indicates higher liquidity and greater market efficiency

X Vector

- Lagged values of the dependent and independent variables, also used as instruments
- Fixed capital formation (% GDP) – purported in theory as main driver of growth; used more intensively in manufacturing
- Log of real exchange rate – product of the ratio of LCU to USD and ratio of the US GDP deflator to the domestic economy's GDP deflator; an increase implies a real domestic currency appreciation, rendering exports cheaper relative to imports
- Real interest rate – measures the opportunity cost of borrowing incurred to expand the capital stock

X Vector

- Trade openness (% GDP) – sum of exports and imports as a percentage of GDP; captures the idea that more open economies have higher long-run manufacturing growth rates (Frankel and Romer, 1999; Chand and Sen, 2002); however, Rodriguez and Rodrik (2000) contend that there is much ambiguity regarding the effect of trade openness on growth;
- Average manufacturing tariff rate – as a proxy for distortions in the manufacturing sector; de jure measure of trade openness
- Services-manufacturing ratio – ratio of services value added to manufacturing value added as a percentage of GDP
- Lagged of services growth, instead of its contemporaneous value to mitigate endogeneity issues

Z Vector

- Tropical land area – in line with Sachs' (2001) “tropical underdevelopment”
 - Both history-dependent factors and the existence of ecological barriers to the diffusion of temperate-specific technologies in growth-critical areas such as health, agriculture, military, energy utilization and manufacturing in tropical areas
- Regional dummies
- Period dummies to control for common macroeconomic or trend shocks

Descriptive Statistics

Variable	Obs	Mean	Median	Std. Dev.	Min	Max
<i>Dependent variable</i>						
Manufacturing valued added (% GDP)	338	15.02	14.71	6.71	1.06	35.42
Manufacturing growth	337	3.44	3.10	3.77	-10.71	14.96
<i>Financial development indicators</i>						
Bank credit (% GDP)	337	46.59	34.42	39.08	2.79	219.64
Private credit (% GDP)	337	50.43	35.86	44.35	2.79	219.76
IMF Financial Development (FD) index	329	0.32	0.25	0.23	0.05	0.98
IMF Financial Institutions (FI) index	329	0.41	0.35	0.22	0.08	1.00
IMF Financial Markets (FM) index	329	0.23	0.10	0.25	0.00	0.99
IMF FI Depth index	329	0.28	0.18	0.26	0.01	1.00
IMF FM Depth index	329	0.22	0.11	0.26	0.00	0.98
IMF FI Efficiency index	329	0.57	0.57	0.13	0.22	0.79
IMF FM Efficiency index	329	0.24	0.06	0.31	0.00	1.00
IMF FI Access index	329	0.33	0.25	0.28	0.00	1.00
IMF FM Access index	329	0.22	0.06	0.28	0.00	1.00

Descriptive Statistics

Variable	Obs	Mean	Median	Std. Dev.	Min	Max
<i>X vector</i>						
Fixed k formation (% GDP)	337	22.93	22.18	6.78	5.59	63.56
Log of real exchange rate	337	3.41	3.10	2.67	-2.83	10.03
Trade openness	337	79.25	75.20	36.13	16.97	207.30
Manufacturing tariff rate	337	11.98	9.39	11.87	0.00	123.48
Services-manufacturing ratio	337	4.59	3.93	2.51	1.33	16.98
Services growth (-1)	337	4.62	4.38	3.32	-10.64	15.76
Real interest rate	337	7.79	5.91	14.20	-34.89	218.87
Developing economy dummy	337	0.82	1.00	0.18	0.00	1.00
<i>Z vector</i>						
<i>Regional dummies</i>						
Central Asia (CA)	337	0.03	0.00	0.18	0.00	1.00
East Asia and the Pacific (EAP)	337	0.15	0.00	0.36	0.00	1.00
Latin America and Carribean (LAC)	337	0.24	0.00	0.43	0.00	1.00
Middle East and North Africa (MENA)	337	0.05	0.00	0.23	0.00	1.00
South Asia (SA)	337	0.06	0.00	0.24	0.00	1.00
Sub-Saharan Africa	337	0.24	0.00	0.43	0.00	1.00
Tropical area	337	0.53	0.66	0.47	0.00	1.00
<i>Period dummies</i>						
1992-1996	337	0.06	0.00	0.24	0.00	1.00
1997-2001	337	0.17	0.00	0.38	0.00	1.00
2002-2006	337	0.25	0.00	0.43	0.00	1.00
2007-2011	337	0.27	0.00	0.44	0.00	1.00
2012-2016	337	0.25	0.00	0.43	0.00	1.00

Table of Cross Correlations

Table 2. Correlation Matrix of Financial Development Indicators

Financial development (FD) indicator	Bank Credit	Private Credit	IMF FD Index	IMF FI Index	IMF FM Index	IMF FI Depth Index	IMF FM Depth Index	IMF FI Efficiency Index	IMF FM Efficiency Index	IMF FI Access	IMF FM Access
Bank Credit	1.00										
Private Credit	0.96	1.00									
IMF FD Index	0.83	0.84	1.00								
IMF FI Index	0.84	0.84	0.94	1.00							
IMF FM Index	0.73	0.75	0.95	0.77	1.00						
IMF FI Depth	0.83	0.85	0.91	0.91	0.81	1.00					
IMF FM Depth	0.74	0.77	0.91	0.77	0.93	0.84	1.00				
IMF FI Efficiency	0.55	0.52	0.57	0.64	0.44	0.49	0.46	1.00			
IMF FM Efficiency	0.55	0.57	0.77	0.57	0.87	0.61	0.72	0.30	1.00		
IMF FI Access	0.71	0.71	0.82	0.92	0.64	0.72	0.60	0.46	0.47	1.00	
IMF FM Access	0.66	0.66	0.85	0.73	0.88	0.72	0.76	0.42	0.59	0.63	1.00

Results: Manufacturing growth and financial development

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Bank Credit	Private Credit	IMF FD Index	IMF FI Index	IMF FM Index	IMF FI Depth Index	IMF FM Depth Index	IMF FI Efficiency Index	IMF FM Efficiency Index	IMF FI Access	IMF FM Access
FD indicator											
Manufacturing growth (-1)	-0.14	-0.16	0.01	0.01	0.04	-0.05	0.02	-0.01	0.03	-0.05	0.05
Manufacturing growth (-2)	-0.16	-0.22	-0.06	-0.05	-0.07	-0.09	-0.08	-0.09	-0.06	-0.06	-0.09
FD indicator	-0.04	-0.05	30.68	16.14	11.34	19.31	13.28	7.02	-1.42	6.18	11.68
FD-squared	0.0001	0.0001	-21.24	-11.72	-9.36	-11.20	-8.06	-11.27	1.11	-9.13	-13.32
FD indicator*Dev. econ.	0.05	0.05	-13.82	-5.44	-4.34	-7.41	-7.34	9.82	2.66	-0.42	-5.81
Dev. Econ. dummy	-2.26	-2.79	11.46	7.69	6.25	9.25	7.00	-2.97	2.13	2.97	4.90
Log of RER	0.46	0.19	0.34	0.20	0.43	0.19	0.25	0.10	0.43	0.28	0.02
Fixed k formation (% GDP)	0.21	0.27	0.23	0.28	0.22	0.25	0.10	0.32	0.24	0.22	0.20
Trade openness	0.00	-0.01	-0.03	-0.04	-0.03	-0.02	0.00	-0.04	-0.03	-0.02	-0.03
Manuf. tariff rate (-1)	0.02	0.01	-0.05	-0.05	-0.03	0.00	-0.06	-0.03	-0.02	-0.01	-0.02
Tropical area	-0.06	0.54	1.92	1.37	0.25	2.11	0.33	2.72	0.94	0.08	0.67
Services-manuf. ratio	-0.16	-0.11	0.06	0.15	0.01	0.05	-0.04	0.10	0.04	0.01	0.18
Services growth (-1)	0.04	0.06	-0.18	-0.20	-0.12	-0.08	-0.08	-0.24	-0.13	-0.03	-0.20
Real interest rate	-0.04	-0.03	-0.06	-0.07	-0.09	-0.06	-0.08	-0.06	-0.06	-0.0001	-0.05
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Period dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	337	337	329	329	329	329	329	329	329	329	329
Number of countries	108	108	104	104	104	104	104	104	104	104	104
Number of instruments	104	87	92	93	92	92	92	92	92	103	92
Arellano-Bond AR(2)	0.64	0.53	0.66	0.63	0.96	0.85	0.96	0.84	0.70	0.74	0.94
Hansen test p-value	0.37	0.35	0.59	0.66	0.48	0.74	0.61	0.29	0.78	0.38	0.64

significant at 10%

significant at 5%

significant at 1%

Manufacturing Growth and Financial Development

	(1)	(2)	(3)	(4)	(5)
FD indicator	Bank Credit	Private Credit	IMF FD Index	IMF FI Index	IMF FM Index
Coefficient					
FD indicator	-0.04***	-0.05**	30.68***	16.14*	11.34**
FD-squared	0.0001	0.0001*	-21.24***	-11.72*	-9.36**
FD indicator*Dev. econ.	0.05***	0.05***	-13.82***	-5.44	-4.34*
Total marginal effect	0.02	0.01	6.24	2.50	5.13**
% change in manuf. gr. from a 1% change in the FD indicator	0.66	0.32	1.42	0.56	1.30**

Manufacturing Growth and Financial Development

	(6)	(7)	(8)	(9)	(10)	(11)
	IMF FI	IMF FM	IMF FI	IMF FM	IMF FI	IMF FM
	Depth	Depth	Efficiency	Efficiency	IMF FI	IMF FM
FD indicator	Index	Index	Index	Index	Access	Access
Coefficient						
FD indicator	19.31***	13.28***	7.02	-1.42	6.18**	11.68***
FD-squared	-11.20***	-8.06***	-11.27	1.11	-9.13***	-13.32***
FD indicator*Dev. econ.	-7.41***	-7.34***	9.82**	2.66**	-0.42	-5.81***
Total marginal effect	7.87***	4.17***	3.99	1.37	1.20	4.27***
% change in manuf. gr. from a 1% change in the FD indicator	2.03***	1.07***	0.51	0.43	0.33	1.18***

Results: Manufacturing growth and financial development

- Bank credit (% of GDP) and private credit (% of GDP) do not only capture financial development:
 - In an emerging market with a fairly open capital account, lack of independent monetary policy and weak banking systems
 - Subject to a deluge of capital (mainly short-term) inflows, seeking high returns in low interest rate environments, such as in the US
 - Can give rise to the creation of credit and asset booms in recipient countries
 - Diverting funds from more productive sectors, such as manufacturing
 - Results also in line with Rioja and Valev (2004) and Rousseau and Wachtel (2010), Gochoco-Bautista (PCED WP 2017-2018)

Results: Manufacturing size and financial development

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(9)	(8)	(10)	(11)
	Bank Credit	Private Credit	IMF FD Index	IMF FI Index	IMF FM Index	IMF FI Depth	IMF FM Depth	IMF FI Efficiency	IMF FM Efficiency	IMF FI Access	IMF FM Access
Financial development (FD)											
Manuf. output (% GDP) (-1)	0.81	0.82	0.79	0.85	0.81	0.85	0.84	0.83	0.83	0.86	0.85
	[0.04]***	[0.04]***	[0.04]***	[0.02]***	[0.03]***	[0.03]***	[0.02]***	[0.03]***	[0.02]***	[0.04]***	[0.03]***
Manuf. output (% GDP) (-2)	-0.08	-0.07	-0.09	-0.08	-0.12	-0.12	-0.12	-0.11	-0.12	-0.10	-0.12
FD indicator	-0.08	-0.05	-7.29	-6.80	-2.66	0.95	4.58	-8.63	-2.49	-9.15	1.29
FD-squared	0.0002	0.0001	1.83	3.62	-0.40	-5.54	-6.17	0.83	-0.32	4.05	-5.79
FD indicator*Dev. econ.	0.07	0.05	12.78	9.60	6.92	8.76	1.16	11.64	5.53	6.34	5.77
Dev. econ. dummy	-6.04	-4.53	-6.22	-4.99	-2.26	-4.95	-0.15	-6.80	-3.95	-2.65	-2.65
Log of RER	0.24	0.17	0.24	0.14	0.09	0.21	0.01	-0.11	0.04	0.02	0.03
Fixed k formation (% GDP)	0.13	0.13	0.08	0.09	0.05	0.10	0.03	0.05	0.08	0.06	0.09
Trade openness	-0.02	-0.02	0.00	0.00	0.01	0.00	0.01	0.00	0.02	0.004	0.00
Manuf. tariff rate (-1)	0.04	0.04	0.02	0.01	0.01	0.02	0.00	0.01	0.02	0.01	0.03
Tropical area	-0.99	-0.55	-1.33	-0.97	-0.41	-0.93	0.31	-0.24	-0.47	-2.07	-0.21
Services-manuf. ratio	-0.29	-0.28	-0.32	-0.22	-0.38	-0.24	-0.32	-0.31	-0.29	-0.22	-0.18
Real interest rate	0.02	0.01	-0.02	-0.03	-0.03	-0.03	-0.05	-0.04	-0.06	-0.04	-0.05
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Period dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	346	346	338	338	338	338	338	338	338	338	338
Number of countries	113	113	109	109	109	109	109	109	109	109	109
Number of instruments	87	87	92	92	92	92	92	92	92	92	92
Arellano-Bond AR(2)	0.20	0.21	0.26	0.19	0.28	0.36	0.16	0.18	0.49	0.20	0.28
Hansen test p-value	0.72	0.44	0.70	0.43	0.62	0.72	0.53	0.64	0.73	0.65	0.45

significant at 10%

significant at 5%

significant at 1%

Manufacturing Size and Financial Development

	(1)	(2)	(3)	(4)	(5)
FD indicator	Bank Credit	Private Credit	IMF FD Index	IMF FI Index	IMF FM Index
Coefficient					
FD indicator	-0.08***	-0.05***	-7.29*	-6.80	-2.66
FD-squared	0.0002***	0.0001***	1.83	3.62	-0.40
FD indicator*Dev. econ.	0.07***	0.05***	12.78***	9.60***	6.92***
Total marginal effect	0.004	0.007	6.40**	5.33	4.18**
%-point change in manuf. size due to a std. dev.'s increase in the FD indicator	0.15	0.32	1.46**	1.20	1.06**

Manufacturing Size and Financial Development

	(6)	(7)	(9)	(8)	(10)	(11)
	IMF FI	IMF FM	IMF FI	IMF FM	IMF FI	IMF FM
	Depth	Depth	Efficiency	Efficiency	IMF FI	IMF FM
FD indicator	Index	Index	Index	Index	Access	Access
Coefficient						
FD indicator	0.95	4.58*	-8.63*	-2.49**	-9.15***	1.29
FD-squared	-5.54**	-6.17***	0.83	-0.32	4.05*	-5.79***
FD indicator*Dev. econ.	8.76***	1.16	11.64***	5.53***	6.34***	5.77***
Total marginal effect	7.72***	4.38***	3.96	3.00***	-0.79**	6.37***
%-point change in manuf. size due to a std. dev.'s increase in the FD indicator	1.99***	1.13***	0.50	0.94***	-0.22**	1.76***

Results: Manufacturing Size and Financial Development

- Financial institutions access, measured in terms of banks per 100,000 adults and ATMs per 100,000 might be proxying for ease of liquidity access in consumer-dominated areas, e.g., shopping malls, which compete with manufacturing firms for financial resources.
- Financial institutions efficiency does not have a significant overall marginal effect on expanding manufacturing size, perhaps because it measures financial intermediaries' abilities to transform scarce resources efficiently into financial services and products or non-core liabilities, which most likely find their way into the sector real estate and housing sectors (Gochoco-Bautista, PCED WP 2017-2018)

This paper

- Contributes to the FD-growth literature by focusing on manufacturing growth and size, taking into account the different aspects of financial development
- Finds that it is the particular aspect of FD which matters
- **Some policy implications**
 - Importance of developing both bank-based and financial market institutions
 - Importance of developing and strengthening institutions and policies conducive to the better intermediation and use of capital inflows for growth and development objectives, such as supporting manufacturing growth without destabilizing the financial sector