China Economic Review 77 (2023) 101895

Contents lists available at ScienceDirect

China Economic Review

journal homepage: www.elsevier.com/locate/chieco

Financial reforms and capital accumulation in developing economies: New data and evidence

Zidong An

School of Applied Economics, Renmin University of China, 59 Zhongguancun Street, Beijing 100872, China

ARTICLE INFO

JEL classification:
O11
O16
O43

Keywords:
Structural reform
Domestic finance
Capital account
Capital accumulation
Growth spell
Carbon inequality

ABSTRACT

This study uses newly constructed data on structural reforms and private and public capital stock to assess the effects of financial reforms on capital formation in developing economies. We find that while both domestic and external financial reforms are important determinants of capital formation, the former is more influential in middle-income countries (MICs) and the latter in low-income countries (LICs). For LICs, external financial reforms work mostly through attracting FDI. For MICs, within domestic financial reforms, what matters most are measures related to strengthening banking supervision and reducing credit controls. These results are driven by capital formation in the private sector. In addition, these effects are nonlinear, and it is important for a country's policy when it comes to the sequence of implementing domestic and external financial reforms. Given the importance of public investment in decarbonization, this study further discusses the potential impacts of financial reforms on climate change and carbon inequality.

1. Introduction

Economic theory suggests that structural reforms eliminate obstacles to a more efficient allocation of resources, thereby promoting economic growth. Recent thinking based on the past five decades of evidence suggests that in the early stages of development, the contribution of physical capital accumulation to GDP is at least as important as the contribution of total factor productivity, as summarized at one stage by Turnovsky (2009). Despite the large body of research on economic growth, much remains to be learned about the effects of structural reforms on capital accumulation. This study zooms in on the economic growth experience and focuses on how financial reforms affect capital accumulation in developing economies. What matters most—domestic reforms (e.g., banking and securities reforms) or external reforms (e.g., capital account liberalization to attract FDI and non-FDI flows)? Do different types of financial reforms matter at different stages of development, and if so, through which mechanisms?

This study attempts to answer these questions by matching two new datasets on financial reforms and private and public capital stock for a large panel of developing countries. The data on financial reforms by Alesina, Furceri, Ostry, Papageorgiou, and Quinn (2020) are comprehensive and cover six dimensions of domestic reforms (five on banking systems and one on securities) and external reforms (capital account liberalization). To preserve consistency with the measures obtained from the Penn World Table version 9.0 (PWT), the data on public and private capital stock by An, Kangur, and Papageorgiou (2019) are constructed so that the sum of the two types of capital stock match the total capital stock reported in the PWT.

We rely on two approaches to investigate the relationship between financial reforms and capital formation. First, we use graphic

E-mail address: zidong.an@ruc.edu.cn.

https://doi.org/10.1016/j.chieco.2022.101895
Received 28 July 2022; Received in revised form 10 November 2022; Accepted 22 November 2022
Available online 29 November 2022
1043-951X/© 2022 Elsevier Inc. All rights reserved.

analysis based on a structural break test to investigate the association between regime changes in capital growth and financial sector reforms. As Pritchett (2000) discusses, economic development should be considered as transitions between different regimes rather than a stable trend with modest cyclical deviations. Hausmann, Pritchett, and Rodrik (2005), Jerzmanowski (2006), Jones and Olken (2008), and Berg, Ostry, and Zettelmeyer (2012) adopt this approach to study growth patterns in different countries. Prati, Onorato, and Papageorgiou (2013) further use this approach to systematically investigate the association between growth breaks and structural reforms in different sectors. We rely on this approach to study the patterns of capital growth specifically. Our hypothesis is that financial reforms can trigger an acceleration in capital growth. Second, we use panel data analysis to quantify the association between financial reforms and the formation of physical capital, and to reveal the potential mechanisms through which financial reforms impact capital formation in middle-income countries (MICs) and low-income countries (LICs). As an extension of the baseline panel regression, we further use the local projection method to study the dynamic responses of capital accumulation to financial reforms.

We obtain three main findings. First, while both domestic and external financial reforms are shown to be important determinants of capital accumulation, the former is more influential in MICs, and the latter in LICs. For LICs, external financial reforms have worked mainly by attracting FDI. Second, our results are entirely driven by capital formation in the private sector but not in the public sector. Third, among domestic financial reforms found to be influential in MICs, the most important are measures related to the quality of banking supervision and the pervasiveness of credit controls. Taken together, these findings suggest that the main mechanism through which financial reforms work differs according to the development stage. In the early stages, external capital account liberalization seems to be the most important driver of investment, particularly by attracting inward FDI; in the later stages, domestic financial reforms that broaden and deepen the banking sector seem to be a more important driver of investment. These results hold important policy ramifications for the prioritization and timing of financial reforms. Given the importance of public investment in decarbonization, these results also call attention to the potential impacts of financial reforms on climate change and carbon inequality.

This study is related to the vast empirical literature on the macroeconomic effects of structural reforms (Ciminelli, Duval, & Furceri, 2020; Duval & Furceri, 2018; Levine, 2001; Nicoletti & Scarpetta, 2003; Ostry, Prati, & Spilimbergo, 2009; Prati et al., 2013). Within this field, our study is particularly related to studies that investigate the impact of financial liberalization on economic growth (Alesina, Ardagna, Nicoletti, & Schiantarelli, 2005; Bekaert, Harvey, & Lundblad, 2005; Laeven, 2003; Quinn & Toyoda, 2008), as summarized in a meta-analysis by Bumann, Hermes, and Lensink (2013). This study contributes to the literature by providing a comprehensive and direct analysis of the association between domestic and external financial reforms and capital accumulation in the private and public sectors, focusing on developing economies. The estimated positive association between financial reforms and capital accumulation is expected from the neoclassical perspective that financial liberalization decreases the cost of equity capital and consequently increases investment, as summarized by Obstfeld (1998). However, these results are somewhat surprising from the viewpoint of alternative theories that other barriers, such as informational asymmetries, prevent foreign capital from being efficiently invested (Stiglitz, 2000).

The remainder of this paper is organized as follows. Section 2 describes the financial reform indexes used in the empirical analysis, and summarizes how public and private capital are constructed. This section also presents basic stylized facts from both datasets. Section 3 presents the baseline results of the graphic and regression analyses. Section 4 conducts various robustness checks, including alternative regression specifications, estimation methodologies, data frequencies, and outcome variables. Section 5 discusses the potential impacts of financial reforms on climate change and carbon inequality. Section 6 concludes.

2. Data and facts

This section describes the financial reform indexes considered in the analysis and summarizes how the public and private capital stock series are constructed. This section also presents basic stylized facts from both datasets. The country sample used in the analysis consists of 62 developing economies (44 MICs and 18 LICs, detailed in Table A1), for which data are available in both databases.

2.1. Financial reforms

The indexes of domestic and external financial reforms are retrieved from the structural reform database of Alesina et al. (2020). The key advantage of this database over those used in previous works is that it has a longer time dimension (from 1974 to 2014) and comprises a larger number of developing economies (62 countries). The index of *domestic financial reform* is constructed following Abiad, Detragiache, and Tressel (2010), and it quantifies the effectiveness, restrictiveness, and pace of financial reform based on six dimensions of financial sector policies. Five dimensions are related to the *banking system*: (i) credit controls, such as subsidized lending and directed credit; (ii) interest rate controls, such as floors or ceilings; (iii) competition restrictions, such as entry barriers and limits on branches; (iv) the degree of state ownership; and (v) the quality of banking supervision and regulation. The sixth dimension is related to the *securities market*, and it captures the degree of legal restrictions on the development of domestic bond and equity markets, as well as the existence of independent regulators.

The identification of domestic financial policy reforms in these six dimensions is based mainly on available financial reports and relevant research articles produced by the International Monetary Fund (IMF). Relying on IMF reports not only provides the necessary country information on financial reforms but also implicitly provides a unified scoring standard across countries and over time. Furthermore, to ensure the accuracy of scoring each question and to utilize all available information, separate scores are assigned for

the same question based on the evidence provided by different document sources. Each dimension is evaluated based on three to four relevant questions, with the corresponding answers reflecting the different degrees of financial liberalization in the respective dimensions. The scores for each question are then aggregated into a final score following the coding rules proposed by Abiad et al. (2010). All indicators are scaled between zero (the highest degree of repression) and one (full liberalization).[1] When investigating the association between reforms in the domestic financial sector and capital accumulation, we use both the overall index and different subindexes.

The index of *external financial reform* is constructed following Quinn (1997), Quinn and Inclan (1997), and Quinn and Toyoda (2008), and it measures the international financial regulation for both residents and non-residents based on a broad set of restrictions on financial transactions. International financial regulations are identified based on the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions, ensuring comparability across countries and over time. Compared with other measures that focus only on restrictions on resident financial transactions, Quinn and Toyoda (2008) argue that this approach measures the effects of financial globalization more closely. The capital account reform index is also scaled between zero and one, with a higher value corresponding to greater liberalization.

Differences in the values of each indicator across countries and over time provide useful information on the variation in the absolute degree of financial liberalization within each sector. Additionally, differences in the value of the indexes across sectors provide a quantitative measure of whether one sector is more liberalized than another, given that the same methodology is used to construct each index. For instance, a positive difference between the Interest Rate Controls index and Credit Controls index indicates that the former is more liberalized than the latter.

As shown in Fig. 1, both domestic and external financial reforms trend upward over the period under consideration.[2] However, these indexes display significant differences between income groups, suggesting there may be a process of catching up. Fig. 2 shows the financial reforms in the selected MICs and LICs. Financial reforms in MICs started as early as the 1980s, and their implementation is gradual (e.g., China, Brazil, and South Africa). By comparison, financial reforms in LICs started in the late 1990s, and the pace is much faster (e.g., India, Vietnam, and Tanzania). For example, it took South Africa 25 years (1974–2001) to reach its current level of domestic financial openness, while Tanzania took only 12 years (1990–2002) to reach a similar level.

2.2. *Private and public capital stock*

Our data on total capital stock come from the PWT. PWT capital stock data have been widely used in empirical studies, not only because of their complete data coverage, but also because of their methodological advantages in using the perpetual inventory method (see Feenstra, Inklaar, & Timmer, 2015). In addition to aggregate stock data, we use the private and public capital stock series from An et al. (2019). These data are constructed using the same perpetual inventory method based on the total capital stock series from the PWT and the public–private investment ratio from the IMF's World Economic Outlook. A key advantage of these data is that the investment series, as an intermediate input, is backward calculated based on actual capital stock; hence, public and private capital are ex-ante consistent with the economy-wide aggregate stock at any point in time. With these data, we can investigate the impact of financial reforms on aggregate capital accumulation as well as capital accumulation in the private and public sectors.

The left and right panels of Table 1 provide summary statistics of the investment-to-GDP ratio and growth rate of capital stock, respectively. For the sample of 62 developing economies between 1974 and 2014, private investment contributes more than public investment, and this is mainly driven by MICs, especially during the second half of the period under consideration. In addition, both private and public investments account for a larger share of GDP in the second half of the sample period. The per capita capital growth in LICs is lower than that in MICs. In both MICs and LICs, there is evidence of acceleration of private capital growth and deceleration of public capital growth.

As shown in Fig. 3, both MICs and LICs experienced capital growth deceleration before the 1990s and acceleration afterward. This trend is consistent with that observed for financial reforms in Fig. 1. In China (Fig. 4), the capital growth rate remains at around 5% before the 1990s and accelerates to around 10% thereafter. It is mainly driven by private capital, in line with the domestic financial reforms that started in the 1990s. Capital growth acceleration in India is also driven by the private sector in line with domestic financial and capital account reforms. The other MICs and LICs show similar trends.[3]

3. Estimation and results

This section empirically investigates the impact of financial reforms on capital accumulation in the private and public sectors. The research hypothesis is based on the economic and political effects of financial reforms, which have been widely studied in the literature. We refer to Abiad and Mody (2005), Henry (2007), and Ostry et al. (2009) for extensive surveys.

3.1. *Financial reforms and capital growth spells*

First, we follow Prati et al. (2013) and conduct graphic analysis to study the association between financial reforms and growth

[1] One exception is the Banking Regulation dimension, in which a higher score means the banking sector is more regulated.
[2] Similar graphs for the six subindexes of domestic financial reforms are shown in Figure A1.
[3] See Table A2 for the simple correlation matrix between capital growth and financial reform indexes.

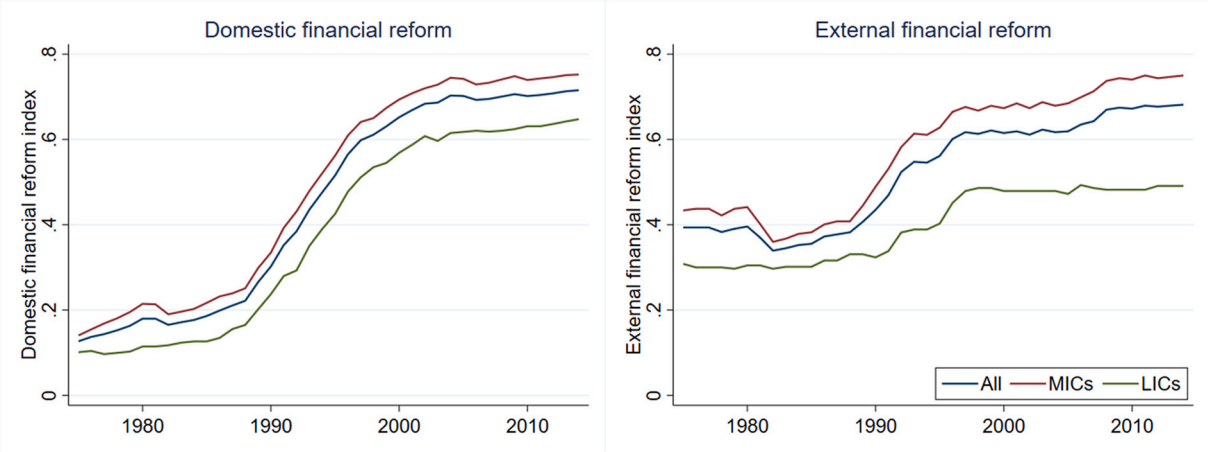

Fig. 1. Domestic and external financial reforms by income group.
Note: This figure plots the average domestic and external financial reforms by income group. The indicators range from zero to one, with higher levels denoting greater liberalization.

spells in capital stock. Pritchett (2000) argues that economic growth should be considered as transitions between different regimes rather than a stable trend with modest cyclical deviations. Hausmann et al. (2005) and Jerzmanowski (2006) find that regime changes in economic growth are common across different countries. Jones and Olken (2008) and Berg et al. (2012) investigate different growth experiences and find that regime changes tend to be more common and sharp in developing than developed countries. We identify growth spells in capital stock using the Berg et al. (2012) method, which modifies the test developed by Bai and Perron (1998, 2003) to identify the presence of multiple structural breaks in a time series when both the number and location of breaks are unknown. This method differs from Bai and Perron's approach in that it uses sample-specific critical values for the maximum number of spells, and such critical values are adjusted for the presence of heteroskedasticity and small sample size. This feature particularly suits our analysis, whose data span varies by country.

Fig. 5 plots the average residuals obtained by regressing the domestic and external financial reform indexes on a full set of country- and year-fixed effects for a six-year window before and after a structural break in total capital growth. The solid and dashed lines depict the dynamics of the average residuals in each index for countries that experience an upward and a downward structural break in capital growth, respectively. The graphic analysis for the two financial reforms is based on the same group of countries, where both indexes start four years before and end four years after a break. The country-fixed effects remove the country-specific average in each index; hence, a residual that moves from below to above the zero-reference line indicates a reform process from below to above the country average. Given that the year-fixed effects correct the global trend in the country-specific average, an upward dynamic indicates a more aggressive reform, while a downward dynamic indicates a reversal or lack of reform when many other countries are implementing reforms. Treating structural breaks as a set of events, the plotted average residuals around the structural breaks provide a graphic analysis of the association between financial reform and capital growth spells.

Domestic financial reforms (left panel of Fig. 5) are clearly associated with accelerations in capital growth, with the index improving four years before upward breaks and continuing for four years afterward. Similarly, reversals or a lack of domestic financial reforms are associated with deceleration in capital growth, with the index declining four years before the downward breaks and continuing for at least six years afterward. By contrast, although capital account reforms (right panel) are unrelated to acceleration in capital growth, reversals in capital account reform are associated with deceleration, as the index experiences a cliff-like decrease during downward breaks and continues increasing afterward.

We conduct the same analysis for private and public capital stock separately, and the results are shown in Fig. 6. The association between financial reforms and capital growth is driven mostly by the private sector. For private capital, we find similar results: domestic financial reforms and reversals are associated with upward and downward growth breaks, respectively. Furthermore, external financial reforms matter only when a reversal process occurs. As for public capital, we find little evidence except that reversals in external financial reforms lead to growth deceleration.

3.2. Financial reforms and capital growth: Panel analysis

For the second approach, we rely on panel analysis and estimate the following specification:

$$\left(lnK_{i,t} - lnK_{i,t-h}\right)/h = \beta_1 DF_{i,t-h} + \beta_2 CAP_{i,t-h} + \boldsymbol{\beta X_{i,t-h}} + \omega_i + \mu_t + \varepsilon_{i,t}, \tag{1}$$

where $lnK_{i,\ t}$ is the log of per capita capital stock (total, private, or public) in country i at period t. The dependent variable is the non-overlapping growth rate of per capita capital stock averaged over h years. In the baseline results, h is set to 3 years. The explanatory variables $DF_{i,\ t-h}$ and $CAP_{i,\ t-h}$ are the indexes of domestic financial and capital account reforms, respectively. $\boldsymbol{X_{i,t-h}}$ is a set of control

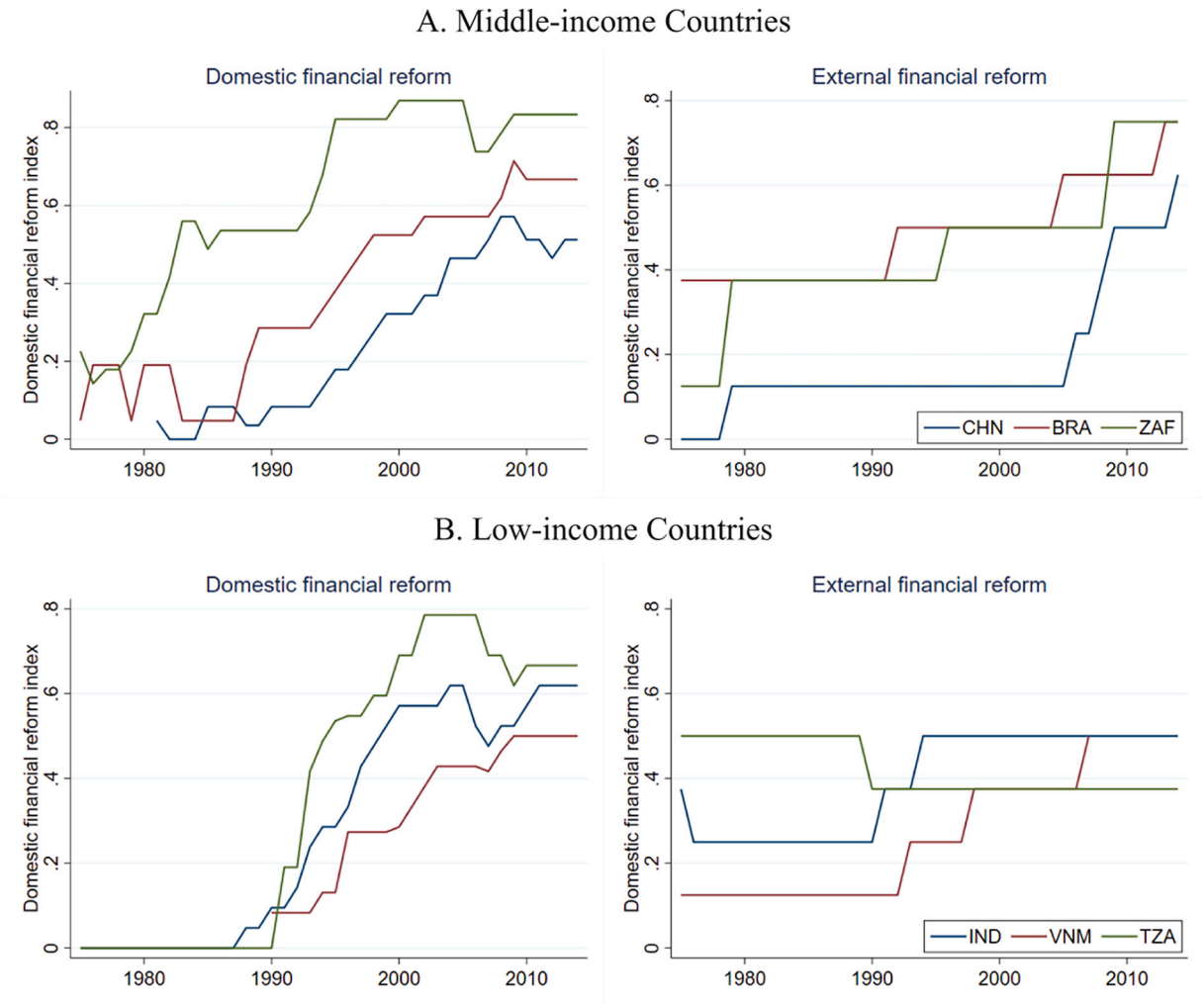

Fig. 2. Domestic and External Financial Reforms in Selected Countries.
Note: This figure plots the average domestic and external financial reforms in selected countries. The indicators range from zero to one, with higher levels denoting greater liberalization.

Table 1
Summary statistics.

	Investment (% of GDP)			Per capita capital growth (%)		
	1975–2014	1975–1995	1996–2014	1975–2014	1975–1995	1996–2014
All						
Total	24.5	23.6	25.4	2.59	2.18	3.04
Private	17.5	16.1	19.0	2.66	1.90	3.02
Public	7.0	7.5	6.4	3.01	2.99	3.48
MICs						
Total	25.0	24.7	25.2	2.93	2.78	3.10
Private	18.3	17.3	19.2	2.99	2.58	3.31
Public	6.7	7.4	6.0	3.44	3.56	3.43
LICs						
Total	23.5	21.5	25.9	1.86	0.91	2.90
Private	15.9	13.7	18.5	1.98	0.50	3.58
Public	7.6	7.8	7.4	2.08	1.86	2.32

Note: This table reports summary statistics of the investment-to-GDP ratio and capital growth by income groups and time periods.

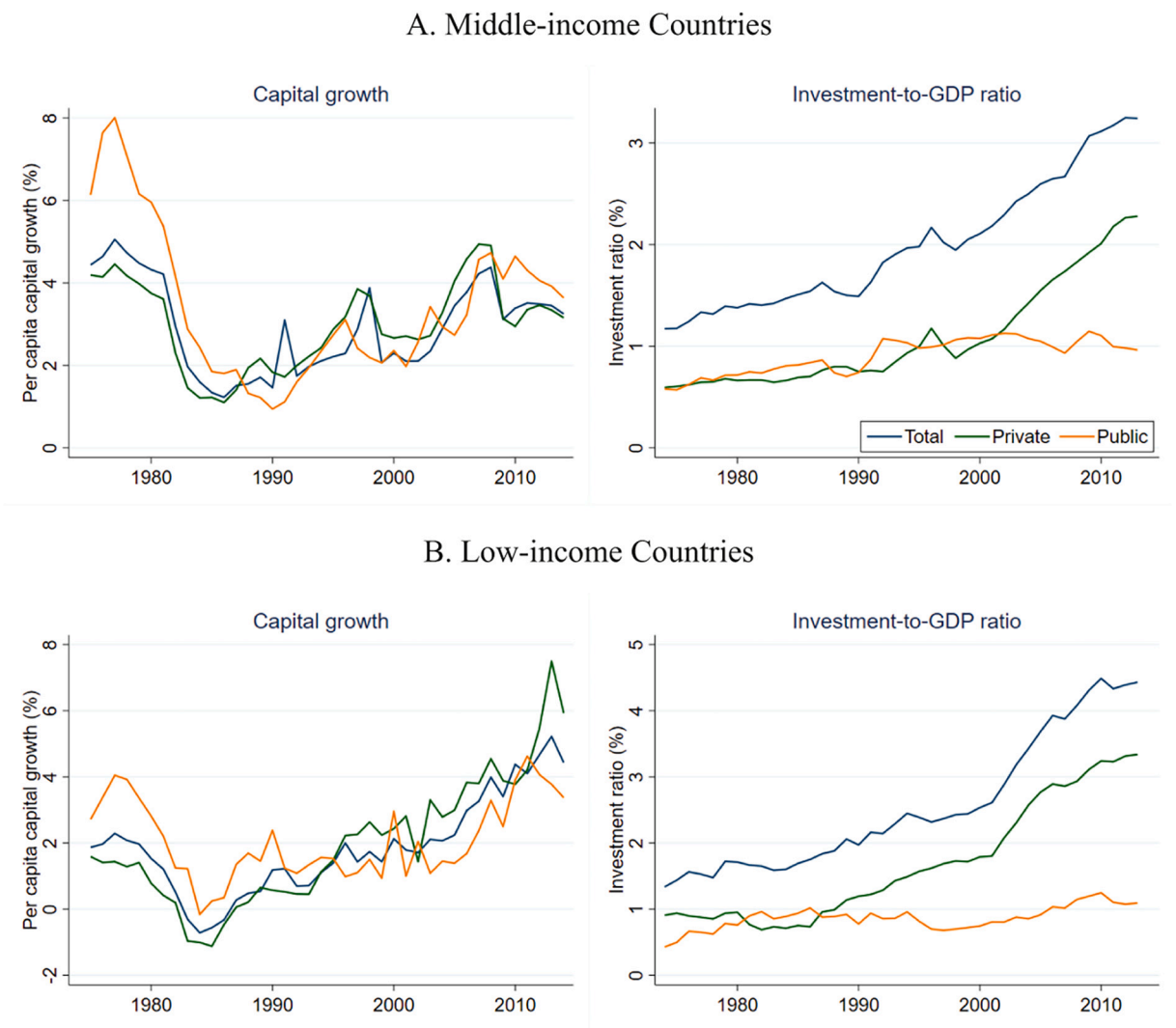

Fig. 3. Private and public capital by income group.
Note: This figure plots the average per capita capital growth and investment-to-GDP ratio by income groups.

variables, which includes a trade liberalization index, the inflation rate, and lagged per capita capital stock to control for convergence. We include a full set of country- and year-fixed effects denoted by the terms ω_i and μ_t, respectively, and $\varepsilon_{i,t}$ represents the error term. By including country- and year-fixed effects, any time-invariant characteristics that could affect capital growth and financial reforms, and the global trend in capital growth are controlled for.

Using this specification, we explore whether domestic and external financial reforms are associated with an acceleration in capital formation relative to the long-run rate. This section presents estimation results for total, private, and public capital for the entire sample of developing economies and separately for the MIC and LIC subsamples, in recognition of the heterogeneity across development stages (see, for example, Rioja & Valev, 2004). The relationship between different types of domestic financial reform and capital formation is also examined.

3.2.1. *Total capital*

Table 2 reports the estimates of total capital from the baseline specification 1. Column 1 reports the results for the complete sample of developing countries. The coefficient estimates for both domestic financial reforms and capital account reforms are positive; the former is highly statistically significant at the 1% level, whereas the latter is only marginally significant at the 10% level. As a country's domestic financial sector switches from the least to the most liberal, the yearly growth rate in total capital increases by 3.5% on average, holding the other conditions the same. For the external financial sector, this stimulating impact is 1.7%, on average.

When the country sample is split between MICs and LICs (Columns 2 and 3), it is shown that, for MICs, the coefficient estimate is positive (0.0413) and highly significant at the 1% level only for domestic financial reforms. The reverse is true for the LICs sample, where the coefficient for capital account reform is positive (0.0575) and highly significant, whereas that for domestic financial reforms

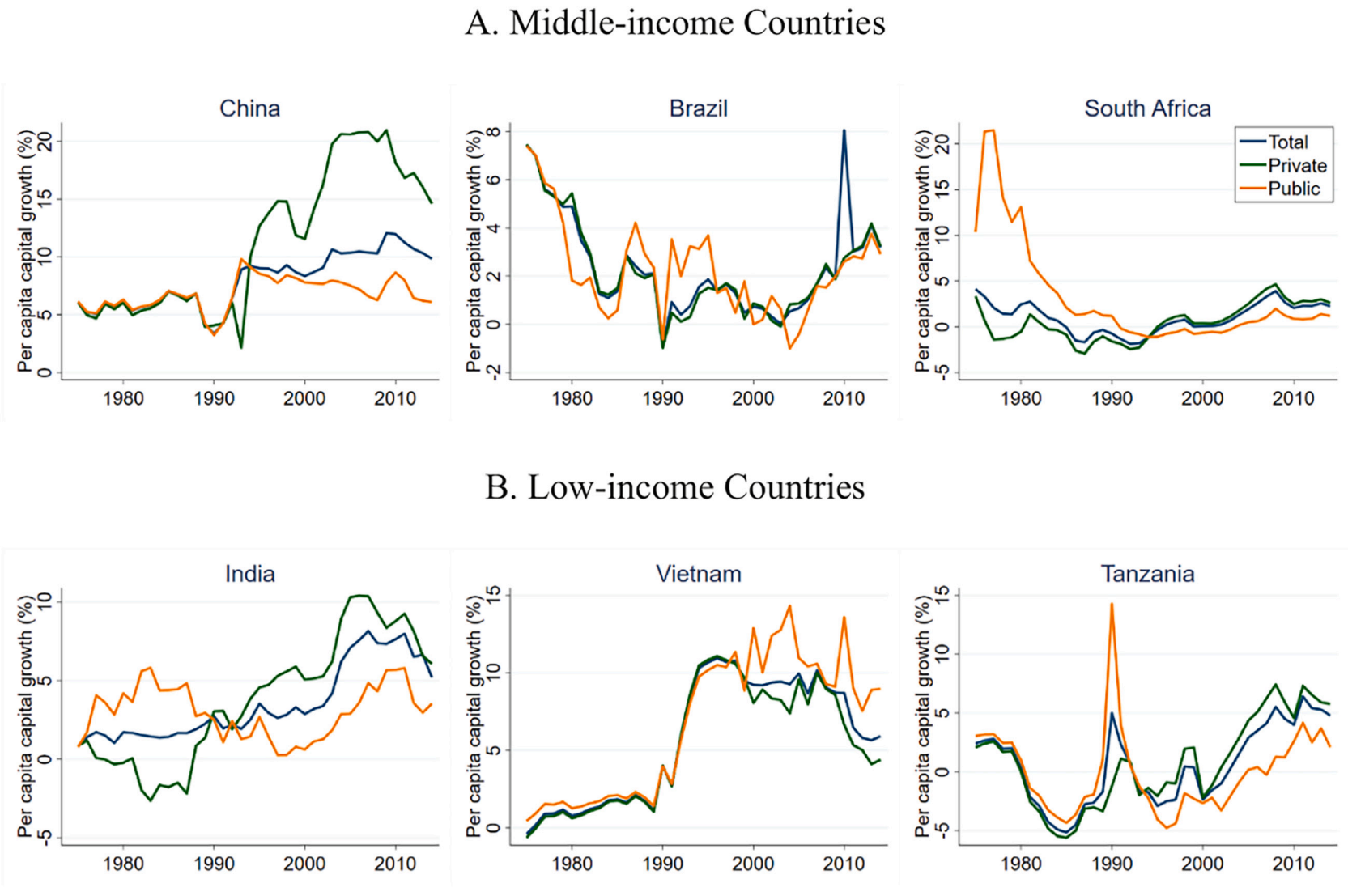

Fig. 4. Private and public capital in selected countries.
Note: This figure plots growth in total, private, and public capital in selected countries.

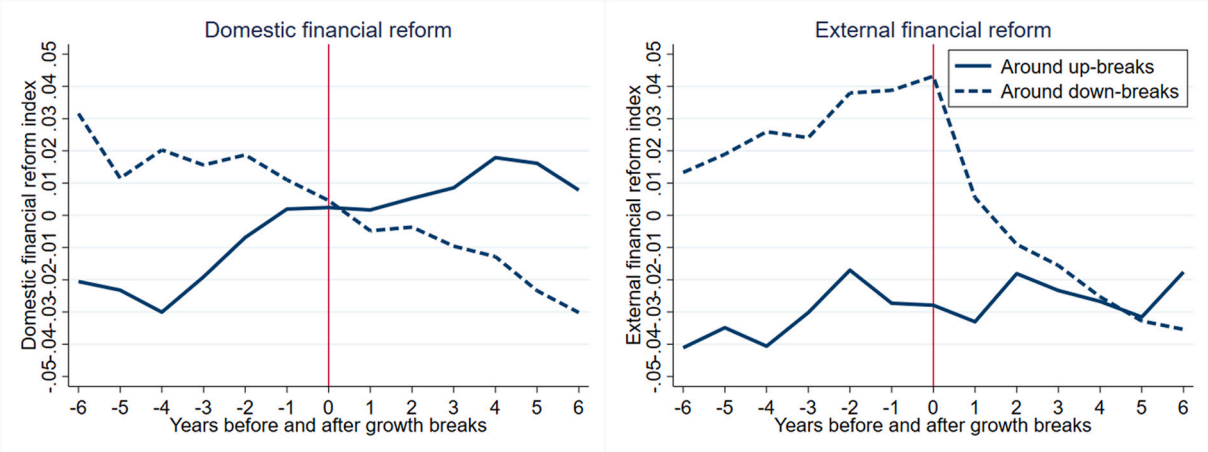

Fig. 5. Financial reforms and growth breaks in total capital.
Note: This figure plots the average residuals of the reform indicators for a six-year window before and after a structural break in total capital growth. See Table A3 for the list of breaks. Residuals are obtained by regressing each index on country- and year-fixed effects. The solid and dashed lines are for up- and down-breaks, respectively.

is only marginally significant at the 10% level. These results are somewhat consistent with the findings in the literature. Agell and Berg (1996) show that financial deregulation causes a boom in private consumption. Using a comparable measure, Prati et al. (2013) find that domestic and external financial liberalization stimulates economic growth by 6.4% and 2.1%, respectively. Christiansen, Schindler, and Tressel (2013) find that domestic financial liberalization boosts the investment-to-GDP ratio by 5.6 percentage points, but only in MICs. They find no significant impact for external financial liberalization. Using a newly constructed dataset, we can further investigate the impact of financial reforms on capital accumulation in the private and public sectors.

3.2.2. *Private and public capital*

Table 3 reports the results of decomposing total capital into private and public capital. Column 1 reports the estimates for private capital using a complete sample of developing countries. Consistent with the results in Table 2, the coefficient estimate for domestic financial reform is positive (0.0413) and highly significant, but that for capital account liberalization becomes insignificant. Columns 2 and 3 report the estimates for private capital by income group, respectively. The coefficient estimate of domestic financial reform is positive and statistically significant for both MICs and LICs. The coefficient estimate for capital account reform is significant only for LICs.

It is immediately striking that the results reported in Table 2 are driven predominantly by private capital formation, with financial reforms showing no significant effects on public capital accumulation (except for domestic financial reforms in MICs, and only with marginal significance). These findings contribute to the debate on the crowd-in or crowd-out relationship between private and public investment. This may be somewhat surprising, given that financial reforms resulting in private investment have often been thought to lead to complementarities (crowding-in effects) with public investments, particularly in infrastructure. Futagami, Morita, and Shibata (1993) theoretically derive a transitional path between private and public capital based on an endogenous growth model. An et al. (2019) find empirical evidence that public and private capital are highly substitutable in developing economies. The results above present an association only between financial reforms and private capital and indicate that the crowding-in effects are not statistically significant, at least not through the financial reforms in LICs.

3.2.3. *Different types of domestic financial reform*

As discussed in the data and facts section, the domestic financial reform index is an aggregation of six financial sector subindexes. To explore the impacts of different types of reforms on capital formation, we replace the overall index in the baseline specification with each of its components. Table 4 reports the estimation results for private and public capital. The upper, middle, and lower panels represent the full sample of developing countries, MICs, and LICs, respectively. The title of each column indicates the type of financial reform. Starting with the effects on private capital (left panel) for the complete sample of developing countries, reforms in Banking Supervision and Credit Controls have positive and statistically significant coefficients. The coefficient of Capital Control liberalization is not significant in any of the columns.

When splitting the sample into MICs and LICs, the coefficient estimates for Banking Supervision reforms continue to be positive and significant in MICs but not in LICs. In a theoretical analysis, Bolt and Tieman (2004) argue that risk-weighted regulation, reflected in the new Basel proposal, is effective and useful for controlling banking system vulnerability and increasing competition. For the latter, none of the domestic financial reforms is significant. However, the coefficient estimate for capital account reform is always positive and statistically significant, regardless of the type of domestic financial reform included in the regression, which is consistent with the results reported in Tables 2 and 3. Coefficient estimates for public capital continue to be mostly insignificant (exceptions are

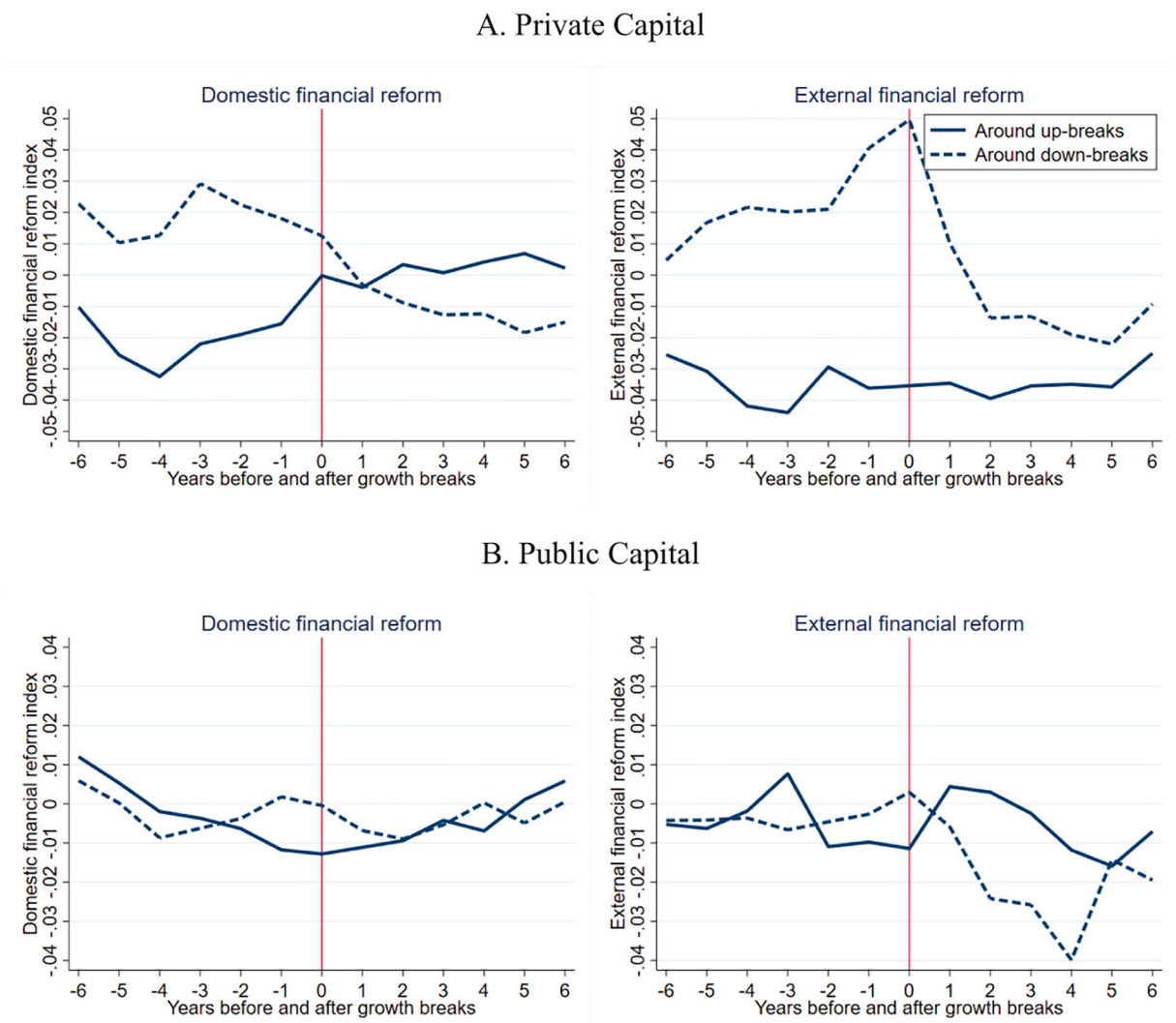

Fig. 6. Financial reforms and growth breaks in private and public capital.
Note: This figure plots the average residuals of the reform indicators for a six-year window before and after a structural break in private and public capital growth. See Table A3 for the list of breaks. Residuals are obtained by regressing each index on country- and year-fixed effects. The solid and dashed lines are for up- and down-breaks, respectively.

Privatization reform in the full sample, driven by MICs, and Securities reform in the LIC sample).

3.2.4. Foreign direct investment

The above results show that capital account liberalization is associated with acceleration in private capital formation, particularly in LICs, which is somewhat surprising. We seek to obtain a better understanding of this result by examining a potential channel for the impacts of capital account reforms on foreign direct investment (FDI). The channel is straightforward. On the one hand, developing countries account for a growing share of global FDI inflows and outflows (World Bank, 2017). On the other hand, foreign investment has been proven to be positively associated with levels of domestic investment (see, e.g., Desai, Foley, & Hines Jr, 2005).

Table 5 reports the results from a version of Eq. (1) that replaces the dependent variable with the per capita FDI stock, retrieved from the United Nations Conference of Trade and Development database. The coefficient estimate for capital account reform is positive and highly significant for the entire sample of developing countries. As shown in Columns 2 and 3, this coefficient is also positive and significant for MICs and LICs with the magnitude being much larger for the latter. Domestic financial reforms have no significant impact on FDI.[4] These results are consistent with the literature on capital flow threshold effects (see e.g., Kose, Prasad, & Taylor, 2011).

[4] When replacing the domestic financial reform index with each of its components, none shows significant impacts, while the coefficient of capital account reform stays positive and statistically significant.

Table 2
Panel regressions—total capital.

	(1) All	(2) MICs	(3) LICs
DF(t-3)	0.0351***	0.0413***	0.0425*
	(0.0121)	(0.0128)	(0.0238)
Cap(t-3)	0.0165*	0.0113	0.0575***
	(0.0088)	(0.0082)	(0.0142)
Trade(t-3)	0.0073	−0.0043	0.0047
	(0.0124)	(0.0141)	(0.0166)
LnK(t-3)	−0.0219***	−0.0153*	−0.0127
	(0.0067)	(0.0083)	(0.0109)
Infl(t-3)	0.0181**	0.0221**	0.0017
	(0.0085)	(0.0087)	(0.0173)
Obs.	659	459	200
R-sq	0.63	0.61	0.73

Note: The dependent variable is the non-overlapping three-year averaged growth rate in real capital stock per capita. All regressors indicate the initial value of the three-year period. Country- and year-fixed effects are included in all specifications. Robust standard errors are clustered at the country level in parentheses. Significant at *10%, **5%, and ***1%.

Table 3
Panel regressions—private and public capital.

	Private capital			Public capital		
	(1)	(2)	(3)	(4)	(5)	(6)
	All	MICs	LICs	All	MICs	LICs
DF(t-3)	0.0414***	0.0473***	0.0562**	0.0304	0.0445*	0.0457
	(0.0148)	(0.0151)	(0.0246)	(0.0205)	(0.0220)	(0.0600)
Cap(t-3)	0.0165	0.0106	0.0669***	−0.0058	−0.0187	0.0439
	(0.0130)	(0.0136)	(0.0168)	(0.0123)	(0.0123)	(0.0430)
Trade(t-3)	0.0115	0.0083	0.0000	0.0039	−0.0083	0.0179
	(0.0153)	(0.0200)	(0.0199)	(0.0186)	(0.0211)	(0.0303)
LnK(t-3)	−0.0128	0.0008	−0.0112	−0.0292**	−0.0239	−0.0361**
	(0.0111)	(0.0147)	(0.0088)	(0.0135)	(0.0180)	(0.0147)
Infl(t-3)	0.0298***	0.0377***	0.0122	0.0019	−0.0020	−0.0029
	(0.0106)	(0.0122)	(0.0228)	(0.0123)	(0.0119)	(0.0296)
Obs.	629	434	195	629	434	195
R-sq	0.58	0.62	0.64	0.58	0.64	0.49

Note: The dependent variable is the non-overlapping three-year averaged growth rate in real private and public capital stock per capita. All regressors indicate the initial value of the three-year period. Country- and year-fixed effects are included in all specifications. Robust standard errors are clustered at the country level in parentheses. Significant at *10%, **5%, and ***1%.

Developing economies, which are relatively capital scarce and labor rich, should benefit more from capital account liberalization. These studies show that threshold levels of certain variables, such as financial depth, institutional quality, and GDP per capita, are necessary before an economy can benefit from capital account liberalization.

3.2.5. On the sequence of implementing domestic and external financial reforms

On the direct effect of financial reforms, we find opposite results between MICs and LICs in terms that MICs are predominantly affected by domestic financial reforms, and LICs are affected by external financial reforms. However, these effects can be nonlinear, and it is also important for a country's policy when it comes to the sequence of implementing domestic and external financial reforms. For some countries, domestic financial reforms may not effectively promote capital accumulation when a country lacks internal funding. However, domestic financial reforms establish a "capable and friendly" financial environment that amplifies the effect of external financial reforms. For other countries, external financial reforms such as opening up accounts may increase both capital inflows and outflows, which offset each other when we focus on capital accumulation. However, external financial reforms also lead to a more competitive market, which in turn facilitates domestic financial developments.

We rely on two modified versions of the baseline specification. Eq. (2) investigates how domestic financial reforms alter the effect of external financial reforms on capital accumulation, and Eq. (3) tests for the opposite mechanism:

$$\left(lnK_{i,t} - lnK_{i,t-h}\right)/h = \gamma_1 DF_{i,t-h} + \gamma_2 DF_{i,t-h} \times CAP_{i,t-2h} + \boldsymbol{\gamma X_{i,t-h}} + \omega_i + \mu_t + \varepsilon_{i,t}, \tag{2}$$

$$\left(lnK_{i,t} - lnK_{i,t-h}\right)/h = \theta_1 CAP_{i,t-h} + \theta_2 CAP_{i,t-h} \times DF_{i,t-2h} + \boldsymbol{\theta X_{i,t-h}} + \omega_i + \mu_t + \varepsilon_{i,t}. \tag{3}$$

Ideally, domestic and external financial reforms and their interaction term are included in the empirical specification simultaneously. However, due to the high correlation between the interaction term and both reform indexes (0.89), we have to test the two

Table 4
Panel regressions with domestic finance subindexes—private and public capital.

	Private capital						Public capital					
	Banking super.	Int. rate controls	Credit controls	Privatiza-tion	Entry barriers	Securities	Banking super.	Int. rate controls	Credit controls	Privatiza-tion	Entry barriers	Securities
A. All	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
DF(t-3)	0.0220***	0.0152**	0.0060	0.0105	0.0026	0.0138	0.0166	0.0024	−0.0004	0.0173**	0.0081	0.0094
	(0.0075)	(0.0063)	(0.0079)	(0.0086)	(0.0076)	(0.0104)	(0.0131)	(0.0074)	(0.0067)	(0.0085)	(0.0119)	(0.0119)
Cap(t-3)	0.0206	0.0177	0.0204	0.0185	0.0213	0.0195	−0.0028	−0.0029	−0.0024	−0.0068	−0.0019	−0.0035
	(0.0135)	(0.0134)	(0.0139)	(0.0133)	(0.0139)	(0.0141)	(0.0121)	(0.0123)	(0.0125)	(0.0120)	(0.0123)	(0.0121)
Obs.	629	629	629	629	629	629	629	629	629	629	629	629
R-Sq	0.58	0.58	0.57	0.58	0.57	0.58	0.58	0.58	0.58	0.59	0.58	0.58
B. MICs	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
DF(t-3)	0.0238***	0.0104	0.0184**	0.0108	0.0043	0.0094	0.0221	0.0031	0.0129	0.0213**	0.0110	0.0006
	(0.0071)	(0.0072)	(0.0084)	(0.0070)	(0.0086)	(0.0072)	(0.0147)	(0.0079)	(0.0080)	(0.0086)	(0.0141)	(0.0147)
Cap(t-3)	0.0176	0.0149	0.0128	0.0147	0.0176	0.0160	−0.0126	−0.0132	−0.0154	−0.0175	−0.0119	−0.0125
	(0.0151)	(0.0151)	(0.0147)	(0.0144)	(0.0155)	(0.0152)	(0.0099)	(0.0108)	(0.0115)	(0.0108)	(0.0100)	(0.0105)
Obs.	434	434	434	434	434	434	434	434	434	434	434	434
R-Sq	0.61	0.61	0.62	0.61	0.60	0.60	0.64	0.63	0.64	0.64	0.63	0.63
C. LICs	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
DF(t-3)	0.0159	0.0186	−0.0064	0.0136	0.0158	0.0275	−0.0005	0.0089	−0.0197	0.0100	0.0260	0.0480**
	(0.0117)	(0.0132)	(0.0116)	(0.0177)	(0.0131)	(0.0226)	(0.0280)	(0.0186)	(0.0129)	(0.0217)	(0.0277)	(0.0213)
Cap(t-3)	0.0629**	0.0609**	0.0625**	0.0616**	0.0709***	0.0662***	0.0415	0.0398	0.0340	0.0392	0.0523	0.0446
	(0.0216)	(0.0215)	(0.0226)	(0.0248)	(0.0189)	(0.0204)	(0.0386)	(0.0396)	(0.0395)	(0.0385)	(0.0475)	(0.0391)
Obs.	195	195	195	195	195	195	195	195	195	195	195	195
R-Sq	0.63	0.64	0.63	0.63	0.64	0.64	0.48	0.48	0.48	0.48	0.49	0.50

Note: The dependent variable is the non-overlapping three-year averaged growth rate in real private and public capital stocks per capita. The title of each column indicates the financial sector sub-indexes included. All regressors indicate the initial value of the three-year period. Country- and year-fixed effects are included in all specifications. Robust standard errors are clustered at the country level in parentheses. Significant at *10%, **5%, and ***1%.

Table 5
Panel Regressions—Foreign Direct Investment.

	(1) All	(2) MICs	(3) LICs
DF(t-3)	−0.0593	−0.0557	0.0666
	(0.0661)	(0.0717)	(0.1509)
Cap(t-3)	0.1211***	0.1128***	0.3125**
	(0.0441)	(0.0395)	(0.1510)
Trade(t-3)	0.0172	−0.0418	0.0844
	(0.0700)	(0.0656)	(0.0969)
LnK(t-3)	−0.0850***	−0.1129***	−0.0751***
	(0.0182)	(0.0114)	(0.0218)
Infl(t-3)	0.0189	0.0378	−0.0669
	(0.0599)	(0.0690)	(0.1381)
Obs.	535	394	141
R-Sq	0.45	0.56	0.43

Note: The dependent variable is the non-overlapping three-year averaged growth rate in real FDI stock per capita. FDI data come from the United Nations Conference of Trade and Development database. All regressors indicate the initial value of the three-year period. Country- and year-fixed effects are included in all specifications. Robust standard errors are clustered at the country level in parentheses. Significant at *10%, **5%, and ***1%.

Table 6
Interactions between domestic and external financial reforms.

	(1) All	(2) MICs	(3) LICs	(4) All	(5) MICs	(6) LICs
DF(t-3)	0.0381**	0.0437**	0.0090			
	(0.0160)	(0.0164)	(0.0276)			
DF(t-3)*Cap(t-6)	0.0027	0.0028	0.0728**			
	(0.0148)	(0.0134)	(0.0265)			
Cap(t-3)				0.0203*	0.0058	0.0457*
				(0.0119)	(0.0082)	(0.0250)
Cap(t-3)*DF(t-6)				0.0005	0.0216**	0.0192
				(0.0156)	(0.0104)	(0.0366)
Trade(t-3)	0.0081	−0.0037	0.0083	0.0072	−0.0016	0.0026
	(0.0127)	(0.0137)	(0.0178)	(0.0120)	0.0079	(0.0163)
LnK(t-3)	−0.0211***	−0.0149*	−0.0139	−0.0218***	−0.0140***	−0.0109
	(0.0070)	(0.0084)	(0.0122)	(0.0069)	(0.0044)	(0.0133)
Infl(t-3)	0.0161*	0.0201**	0.0052	0.0197**	0.0218**	0.0030
	(0.0084)	(0.0087)	(0.0187)	(0.0084)	(0.0085)	(0.0183)
Obs	619	430	189	619	430	189
R-Sq	0.62	0.61	0.71	0.62	0.58	0.72

Note: The dependent variable is the non-overlapping three-year averaged growth rate in real capital stock per capita. All regressors indicate the initial value of the three-year period. Country- and year-fixed effects are included in all specifications. Robust standard errors are clustered at the country level in parentheses. Significant at *10%, **5%, and ***1%.

channels separately.

As shown in Table 6, with a repressed external financial market, the impact of domestic financial reforms on capital accumulation is consistent with the baseline results across different country groups (Columns 1 to 3); with a liberalized external financial market, the impact of domestic financial reform in LICs becomes positive and significant (Column 3, 0.0728). This indicates that with a more liberalized external financial market, capital formation in LICs benefits more from domestic financial reforms. On the opposite mechanism, with a more liberalized domestic financial market, external financial reforms become more effective in MICs (Column 5, 0.0216).

4. Sensitivity analysis

In this section, we perform several robustness checks. We examine whether the baseline results are robust to alternative data frequencies and use the generalized method of moment (GMM) estimator to control for potential endogeneity. The alternative specifications consider several financial reforms at a time, as well as private and public capital stock constructed using different depreciation rates. A local projection method is used to explore the dynamic effects of financial reforms. Finally, we check the robustness of our baseline results to different definitions of capital stock.

4.1. Alternative data frequencies

Next, we investigate whether our baseline results are robust to the use of alternative data frequencies. Table 7 reports estimates for

Table 7
Different data frequencies—private and public capital.

	Private capital					Public capital				
	1-Year	2-Year	3-Year	4-Year	5-Year	1-Year	2-Year	3-Year	4-Year	5-Year
(A) All	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
DF(t-h)	0.0383**	0.0353**	0.0414***	0.0347**	0.0327*	0.0256	0.0244	0.0304	0.0235	0.0204
	(0.0145)	(0.0141)	(0.0148)	(0.0171)	(0.0187)	(0.0211)	(0.0213)	(0.0205)	(0.0211)	(0.0229)
Cap(t-h)	0.0204	0.0199	0.0165	0.0177	0.0126	−0.0065	−0.0071	−0.0058	−0.0091	−0.0046
	(0.0131)	(0.0131)	(0.0130)	(0.0134)	(0.0134)	(0.0109)	(0.0113)	(0.0123)	(0.0126)	(0.0145)
Obs.	1948	968	629	481	378	1948	968	629	481	378
R-sq	0.50	0.54	0.58	0.59	0.62	0.48	0.52	0.58	0.62	0.66
(B) MICs	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
DF(t-h)	0.0524***	0.0508***	0.0473***	0.0434**	0.0369*	0.0392*	0.0336	0.0445*	0.0375	0.0304
	(0.0168)	(0.0160)	(0.0151)	(0.0180)	(0.0187)	(0.0220)	(0.0210)	(0.0220)	(0.0249)	(0.0268)
Cap(t-h)	0.0115	0.0090	0.0106	0.0112	0.0038	−0.0156	−0.0182	−0.0187	−0.0224*	−0.0176
	(0.0138)	(0.0137)	(0.0136)	(0.0136)	(0.0138)	(0.0107)	(0.0113)	(0.0123)	(0.0125)	(0.0152)
Obs.	1348	669	434	331	259	1348	669	434	331	259
R-sq	0.55	0.58	0.62	0.64	0.65	0.53	0.57	0.64	0.68	0.72
(C) LICs	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
DF(t-h)	0.0325	0.0324	0.0562**	0.0478*	0.0728*	0.0289	0.0410	0.0457	0.0443	0.0423
	(0.0220)	(0.0221)	(0.0246)	(0.0245)	(0.0347)	(0.0574)	(0.0568)	(0.0600)	(0.0559)	(0.0598)
Cap(t-h)	0.0704***	0.0757***	0.0669***	0.0704***	0.0711***	0.0318	0.0357	0.0439	0.0451	0.0442
	(0.0178)	(0.0178)	(0.0168)	(0.0169)	(0.0184)	(0.0433)	(0.0433)	(0.0430)	(0.0426)	(0.0444)
Obs.	600	299	195	150	119	600	299	195	150	119
R-sq	0.54	0.59	0.64	0.64	0.71	0.39	0.43	0.49	0.52	0.53

Note: The dependent variable is the non-overlapping h-year averaged growth rate in real private and public capital stock per capita. The title of each column indicates the data frequency. All regressors indicate the initial value of the h-year period. A full set of control variables are included in the estimation but not reported in the table. Country- and year-fixed effects are included in all specifications. Robust standard errors are clustered at the country level in parentheses. Significant at *10%, **5%, and ***1%.

private and public capital based on data with annual frequency and averaged over two- to five-year periods. Columns 1 to 5 report the estimates for private capital. With different data frequencies, the coefficient estimates for domestic financial reforms are positive and significant for the complete sample and MICs, while those for capital account reform are positive and significant for LICs. Columns 6 to 10 report the estimates for public capital and show no robust association between financial reforms and public capital growth.

4.2. Alternative depreciation rates

As discussed in the data and facts section, private capital stock and public capital stock are constructed following Kamps (2006). The ratio of the depreciation rate of public capital to that of private capital is assumed to vary between 0.45 and 0.60, across time and income groups. One concern with this assumption is that the ratio alters the growth rates of private and public capital stock, which can indirectly alter the estimated relationship between financial reforms and capital formation in the private and public sectors.

Table 8 reports the results under alternative assumptions for this ratio, including the lower band of 0.45, upper band of 0.60, and extreme case of 1.00. The baseline results are robust to alternate depreciation rate values. For private capital, the magnitude of the coefficients varies within a small range, and the significance level holds. For public capital, the coefficient estimates continue to be largely insignificant, with the exception of capital account reform for MICs. The same sensitivity analysis for the baseline results under different types of domestic financial reforms yields similar results.

4.3. Alternative specifications

In estimating specification 1, both in the baseline and robustness regressions, we include one index of financial reform at a time. A concern with this approach is that the process of domestic financial reform may involve several types of reforms that take place simultaneously. Table 9 reports the results for an alternative regression specification that includes a second domestic financial reform index, in addition to Banking Supervision.[5] The top cell of each column in each panel indicates the second type of domestic financial reform index. For private capital, the coefficient estimates of Banking Supervision for the complete sample and for MICs are positive and statistically significant. The coefficient estimates for capital account reform continue to be positive and significant only for LICs. For public capital, the coefficient estimates continue to be insignificant. We are reassured by the fact that the results obtained from the alternative specifications presented above are qualitatively very similar to the baseline results.

[5] The complete set of robustness exercises with two and three stacked indexes at a time are available upon request.

Table 8
Alternative depreciation rates—private and public capital.

	Private capital			Public capital		
	All	MICs	LICs	All	MICs	LICs
Ratio = 0.45	(1)	(2)	(3)	(4)	(5)	(6)
DF(t-3)	0.0427***	0.0478***	0.0592**	0.0292	0.0431*	0.0447
	(0.0153)	(0.0154)	(0.0253)	(0.0200)	(0.0216)	(0.0585)
Cap(t-3)	0.0163	0.0106	0.0677***	−0.0055	−0.0180	0.0441
	(0.0133)	(0.0137)	(0.0173)	(0.0121)	(0.0119)	(0.0419)
R-sq	0.58	0.62	0.63	0.59	0.65	0.50
Ratio = 0.60	(1)	(2)	(3)	(4)	(5)	(6)
DF(t-3)	0.0408***	0.0465***	0.0558**	0.0306	0.0456**	0.0447
	(0.0146)	(0.0148)	(0.0246)	(0.0207)	(0.0223)	(0.0597)
Cap(t-3)	0.0160	0.0100	0.0667***	−0.0064	−0.0193	0.0437
	(0.0128)	(0.0132)	(0.0167)	(0.0125)	(0.0125)	(0.0432)
R-sq	0.59	0.63	0.64	0.58	0.64	0.48
Ratio = 1.00	(1)	(2)	(3)	(4)	(5)	(6)
DF(t-3)	0.0379***	0.0444***	0.0509**	0.0339	0.0515**	0.0447
	(0.0136)	(0.0139)	(0.0235)	(0.0224)	(0.0243)	(0.0626)
Cap(t-3)	0.0154	0.0090	0.0653***	−0.0087	−0.0225	0.0424
	(0.0121)	(0.0124)	(0.0157)	(0.0135)	(0.0139)	(0.0461)
R-sq	0.60	0.63	0.66	0.55	0.61	0.45
Obs.	629	434	195	629	434	195

Note: The dependent variable is the non-overlapping three-year averaged growth rate in real private and public capital stock per capita. All regressors indicate the initial value of the three-year period. A full set of control variables is included in the estimation but not reported in the table. Country- and year-fixed effects are included in all specifications. Robust standard errors are clustered at the country level in parentheses. Significant at *10%, **5%, and ***1%.

4.4. Alternative definitions of capital

Thus far, the sensitivity analysis has been based on the same capital stock data constructed using PWT version 9.0. We also update the private and public capital data using the recently released PWT version 9.1. The major change is that the definition of capital, which was measured as capital stock, is now measured as "productive capital input" in the most current version.

Table 10 reports the estimates of the baseline specification 1 using the new definitions of total, private, and public capital. As shown in Columns 1 to 3, the coefficient estimates for domestic financial reform are positive and significant for the complete sample and MICs, and those for capital account reform are positive and significant only for LICs. Similar results are obtained for private capital, as shown in Columns 4 to 6. Public capital growth is positively associated with domestic financial reform only in MICs and is marginally significant. Overall, the results using the updated capital series are qualitatively consistent with the baseline estimates.

4.5. Alternative methodology

Thus far, the empirical analysis has been based on panel regressions with lagged reform indexes. In this subsection, we estimate the impulse response functions (IRFs) of private and public capital to financial reforms, using the local projection method developed by Jordà (2005). Specifically, for each horizon k, the following equation is estimated using annual data:

$$lnK_{i,t+k} - lnK_{i,t} = \rho_k^{DF} DF_{i,t} + \rho_k^{CAP} CAP_{i,t} + \boldsymbol{\rho_k}(\boldsymbol{L})\boldsymbol{X_{i,t}} + \omega_i + \mu_t + \varepsilon_{i,t}, \tag{4}$$

where $lnK_{i,\,t}$ is the log of per capita private or public capital of country i in year t; $DF_{i,\,t}$ and $CAP_{i,\,t}$ are the domestic financial and capital account reform indexes, respectively; $\boldsymbol{X_{i,t}}$ is a vector of control variables; and $\boldsymbol{\rho_k}(\boldsymbol{L})$ is a polynomial in the lag operator that controls for two lags. A full set of country- and year-fixed effects, denoted by ω_i and μ_t respectively, is included. $\varepsilon_{i,\,t}$ represents the error term.

This method has been used to assess the dynamic macroeconomic impacts of structural reforms. For example, Duval and Furceri (2018) use the method to investigate the effects of labor and product market reforms on output, employment, and productivity. This method provides a dynamic view of the relationship between financial reforms and capital formation. Eq. (4) is estimated for $k = 0, 1, \ldots, 10$, which is up to ten years after the implementation of financial reforms. IRFs are computed using the coefficient estimates ρ_k^{DF} and ρ_k^{CAP} and the confidence intervals using the estimated standard errors of these coefficients.

Fig. 7 shows the estimated IRFs of private and public capital, and the associated 90% error bands (dotted lines). Domestic financial reforms are associated with a long-lasting acceleration in private capital formation. Between the two income groups, MICs tend to have a faster response, whereas LICs start to show significant effects four years after the reform. However, the magnitude of the response tends to be larger for the LICs. Capital account reform leads to a lagged but long-lasting acceleration in private capital formation in LICs only. Regarding public capital, domestic financial reform shows a positive and persistent effect on private capital only in MICs. These findings are consistent with the baseline results and provide a dynamic view of the effects of financial reform on capital formation. Detailed coefficient estimates for each horizon are presented in Table A4.

Table 9
Stacked domestic finance subindexes—private and public capital.

	Private capital						Public capital					
	Banking super.	Int. rate controls	Credit controls	Privatiza-tion	Entry barriers	Securities	Banking super.	Int. rate controls	Credit controls	Privatiza-tion	Entry barriers	Securities
A. All	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
BKSP(t-3)	0.0220***	0.0211***	0.0216***	0.0195**	0.0219***	0.0213***	0.0166	0.0165	0.0167	0.0115	0.0151	0.0162
	(0.0075)	(0.0076)	(0.0074)	(0.0081)	(0.0075)	(0.0078)	(0.0131)	(0.0131)	(0.0131)	(0.0124)	(0.0116)	(0.0133)
2nd DF(t-3)		0.0147**	0.0053	0.0078	0.0006	0.0129		0.0021	−0.0009	0.0157*	0.0067	0.0088
		(0.0062)	(0.0079)	(0.0088)	(0.0074)	(0.0106)		(0.0075)	(0.0066)	(0.0083)	(0.0113)	(0.0120)
Cap(t-3)	0.0206	0.0173	0.0200	0.0187	0.0207	0.0191	−0.0028	−0.0033	−0.0027	−0.0067	−0.0024	−0.0039
	(0.0135)	(0.0130)	(0.0134)	(0.0131)	(0.0135)	(0.0137)	(0.0121)	(0.0122)	(0.0124)	(0.0120)	(0.0123)	(0.0120)
Obs.	629	629	629	629	629	629	629	629	629	629	629	629
R-Sq	0.58	0.59	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.59	0.58	0.58
B. MICs	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
BKSP(t-3)	0.0238***	0.0229***	0.0226***	0.0209***	0.0234***	0.0231***	0.0221	0.0219	0.0213	0.0148	0.0200	0.0221
	(0.0071)	(0.0071)	(0.0066)	(0.0068)	(0.0071)	(0.0072)	(0.0147)	(0.0147)	(0.0144)	(0.0143)	(0.0129)	(0.0148)
2nd DF(t-3)		0.0097	0.0178**	0.0074	0.0019	0.0079		0.0024	0.0124	0.0190**	0.0089	−0.0006
		(0.0071)	(0.0086)	(0.0070)	(0.0086)	(0.0073)		(0.0080)	(0.0077)	(0.0088)	(0.0134)	(0.0146)
Cap(t-3)	0.0176	0.0152	0.0131	0.0157	0.0177	0.0163	−0.0126	−0.0132	−0.0155	−0.0170	−0.0122	−0.0125
	(0.0151)	(0.0148)	(0.0141)	(0.0142)	(0.0151)	(0.0148)	(0.0099)	(0.0106)	(0.0111)	(0.0106)	(0.0097)	(0.0102)
Obs.	434	434	434	434	434	434	434	434	434	434	434	434
R-Sq	0.61	0.61	0.62	0.61	0.61	0.61	0.64	0.64	0.64	0.64	0.64	0.64
C. LICs	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
BKSP(t-3)	0.0159	0.0148	0.0175	0.0128	0.0110	0.0152	−0.0005	−0.0011	0.0034	−0.0033	−0.0103	−0.0017
	(0.0117)	(0.0114)	(0.0112)	(0.0116)	(0.0122)	(0.0126)	(0.0280)	(0.0276)	(0.0276)	(0.0243)	(0.0214)	(0.0299)
2nd DF(t-3)		0.0183	−0.0080	0.0120	0.0141	0.0273		0.0090	−0.0200	0.0104	0.0276	0.0480**
		(0.0132)	(0.0105)	(0.0181)	(0.0138)	(0.0224)		(0.0185)	(0.0145)	(0.0201)	(0.0260)	(0.0212)
Cap(t-3)	0.0629**	0.0589**	0.0594**	0.0602**	0.0687***	0.0640***	0.0415	0.0400	0.0334	0.0395	0.0544	0.0449
	(0.0216)	(0.0215)	(0.0226)	(0.0244)	(0.0194)	(0.0201)	(0.0386)	(0.0376)	(0.0369)	(0.0372)	(0.0451)	(0.0364)
Obs.	195	195	195	195	195	195	195	195	195	195	195	195
R-Sq	0.63	0.64	0.63	0.63	0.64	0.64	0.48	0.48	0.48	0.48	0.49	0.50

Note: The dependent variable is the non-overlapping three-year averaged growth rate in real private and public capital stocks per capita. The title of each column indicates the financial sector sub-indexes included. All regressors indicate the initial value of the three-year period. Country- and year-fixed effects are included in all specifications. Robust standard errors are clustered at the country level in parentheses. Significant at *10%, **5%, and ***1%.

Table 10
Alternative definitions of capital (PWT 9.1).

	Total capital			Private capital			Public capital		
	All	MICs	LICs	All	MICs	LICs	All	MICs	LICs
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
DF(t-3)	0.0299**	0.0388**	0.0176	0.0294*	0.0376**	0.0308	0.0242	0.0377*	0.0084
	(0.0131)	(0.0149)	(0.0235)	(0.0167)	(0.0165)	(0.0310)	(0.0170)	(0.0222)	(0.0319)
Cap(t-3)	0.0074	0.0080	0.0356**	0.0107	0.0102	0.0510**	−0.0089	−0.0116	0.0088
	(0.0098)	(0.0087)	(0.0158)	(0.0131)	(0.0121)	(0.0214)	(0.0108)	(0.0128)	(0.0272)
TR(t-3)	0.0049	0.0018	−0.0143	0.0069	0.0110	−0.0235	0.0042	−0.0062	0.0001
	(0.0117)	(0.0138)	(0.0216)	(0.0150)	(0.0190)	(0.0233)	(0.0165)	(0.0204)	(0.0265)
LnK(t-3)	−0.0171***	−0.0162**	−0.0039	−0.0116	−0.0042	−0.0109	−0.0330***	−0.0364***	−0.0182
	(0.0057)	(0.0078)	(0.0119)	(0.0094)	(0.0113)	(0.0125)	(0.0092)	(0.0122)	(0.0108)
Infl(t-3)	0.0087	0.0055	0.0147	0.0135	0.0080	0.0243	0.0129	0.0084	0.0153
	(0.0067)	(0.0075)	(0.0134)	(0.0094)	(0.0091)	(0.0195)	(0.0099)	(0.0124)	(0.0152)
Obs.	662	468	194	662	468	194	662	468	194
R-Sq	0.59	0.62	0.66	0.50	0.60	0.52	0.51	0.55	0.54

Note: The dependent variable is the non-overlapping three-year averaged growth rate in real private and public capital stock per capita. Capital is measured as "productive capital input" in PWT 9.1. All regressors indicate the initial value of the three-year period. Country- and year-fixed effects are included in all specifications. Robust standard errors are clustered at the country level in parentheses. Significant at *10%, **5%, and ***1%.

4.6. GMM estimation

The fixed-effects results are potentially subject to the concern that coefficient estimates with panel regression might be biased due to endogeneity. To address this potential, we examine the robustness of our baseline results by using the dynamic panel GMM method developed by Arellano and Bond (1991). Through simple manipulation, Eq. (1) for per capita capital growth can be rearranged as a dynamic model in which the lagged dependent variable is included as a regressor:

$$lnK_{i,t} = \widehat{\beta}_1 DF_{i,t-h} + \widehat{\beta}_2 CAP_{i,t-h} + \widehat{\boldsymbol{\beta}} \boldsymbol{X}_{\boldsymbol{i,t-h}} + \widehat{\omega}_i + \widehat{\mu}_t + \widehat{\varepsilon}_{i,t}, \tag{5}$$

where $\widehat{\beta}_j = h\beta_j$ for all j. Then, we can rely on the GMM estimator, which takes the first difference of Eq. (5) and uses the lagged dependent variable as the instrument.

As shown in Table 11, the heterogeneous effects of domestic financial reforms on LICs and MICs become more pronounced under the GMM specification for total capital (Columns 1 to 3), with coefficient estimates larger and more significant for MICs and insignificant for LICs. Capital account liberalization shows significant coefficients for both MICs and LICs. The rest of the table reports the results for private and public capital separately. Specifically, the positive and significant coefficient for domestic financial reform holds only for MICs but not for LICs. The coefficient of capital account liberalization is positive and significant for both MICs and LICs. The association between domestic financial reforms and public capital accumulation is positive and significant for the MICs.

In summary, the main results of the analysis are robust to the use of data with different frequencies, alternative depreciation rates used to construct private and public capital stock, an alternative specification that includes multiple financial reform indexes, an alternate definition of capital, alternative regression methodologies, and a dynamic GMM estimation.

5. Discussion: Do financial reforms affect carbon inequality?

Designed to improve resource allocation efficiency and promote capital formation and economic growth, financial reforms may also affect climate change and carbon inequality. On the one hand, a growing body of studies discusses the essential role of public investment and public-private partnerships in achieving the zero-greenhouse gas emissions goal (Jenkins, Mayfield, Larson, Pacala, & Greig, 2021; Meckling et al., 2022). On the other hand, recent studies emphasize the tradeoff relationship between economic growth and carbon emissions (Cohen, Jalles, Loungani, & Marto, 2018; Song, Sun, Zhang, & Su, 2020). Given that financial reforms have different impacts on private and public investment, this paper further discusses the impacts of financial reforms on carbon emissions.

Table 12 reports the results from a version of Eq. (1) with per capita greenhouse gas (GHG) emissions, retrieved from the World Resources Institute database. We also include economic growth to control for the coupling relationship between carbon emission and economic development (Cohen et al., 2018). As shown in Column 1, domestic reform, which promotes the formation of private capital but not public capital, has a positive and significant impact on GHG emissions. Comparing two country groups, this relationship is driven by the MICs. These empirical findings point to the potential consequences that, since financial reforms have different impacts on private and public investment, they may distort resource allocation and affect the capital structure. The heterogeneous impacts also indicate that though aggressive financial reforms increase emissions and affect carbon inequalities across developing countries, this impact could further depend on a country's development stage and other policy factors.

6. Conclusion

This study uses two newly constructed datasets on financial reforms and private and public physical capital stock of a large panel of

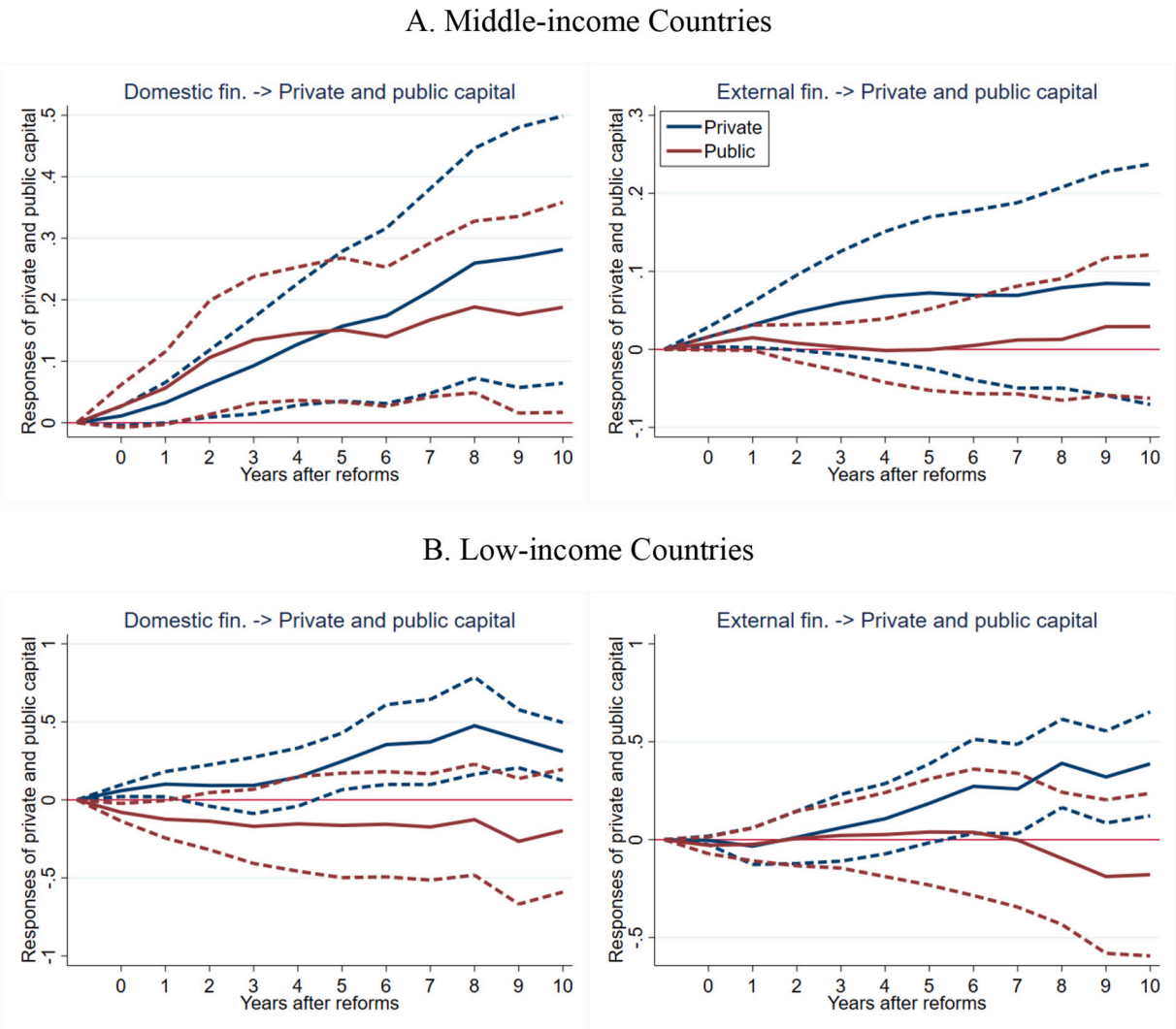

Fig. 7. Dynamic responses of capital growth to financial reforms.
Note: This figure plots the IRFs of private and public capital to domestic and external financial reforms.

developing economies to assess the potential effects of financial reforms on capital accumulation. We find that domestic financial reforms operate almost entirely through the private sector and are more important for MICs; whereas external financial reforms are more important for LICs. We also show that, for LICs, external financial reforms stimulate capital growth by attracting FDI. Within domestic financial reforms found to be influential for MICs, what matters most are the measures of banking supervision and credit controls. These findings suggest that the mechanism by which financial reforms work differs by the stage of development. In the early stages, the effect is primarily through capital account liberalization; in later stages, it is mainly through domestic financial reforms that broaden and deepen the banking sector, particularly by enhancing supervision and imposing credit controls. In addition, these effects are nonlinear, and it is also important for a country's policy when it comes to the sequence of implementing domestic and external financial reforms.

This study offers three possible avenues for future research. The first is empirical analysis of the effect of large financial reforms (events) rather than financial reform indexes (trends), which are the primary focus of this study. Second, it would be worthwhile to investigate the mechanism of financial reforms in LICs more deeply, including the use of country case studies, to examine whether threshold effects on institutional capacity, financial dependence, and other structural variables affect the ability of capital account liberalization to raise private capital by attracting FDI. Third, it is also important to study the effects of financial reforms on both income and carbon inequality. Financial reforms have different effects on private and public capital. Given that private investment is mainly driven by profit, while public investment also considers public welfare, financial reforms could also affect both income and carbon inequality through the channel of capital investment.

Table 11
Dynamic panel GMM estimations.

	Total capital			Private capital			Public capital		
	All	MICs	LICs	All	MICs	LICs	All	MICs	LICs
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
DF(t-3)	0.0678***	0.0834***	0.0297	0.0374***	0.0411***	0.0163	0.0613***	0.0341***	0.0165
	(0.0220)	(0.0204)	(0.0210)	(0.0144)	(0.0089)	(0.0141)	(0.0129)	(0.0126)	(0.0131)
Cap(t-3)	0.0677***	0.0468***	0.0457***	0.0064	0.0245***	0.0160	−0.0199	−0.0060	−0.0042
	(0.0222)	(0.0146)	(0.0165)	(0.0137)	(0.0075)	(0.0097)	(0.0124)	(0.0087)	(0.0085)
Trade(t-3)	0.0444***	0.0062	0.0041	0.0150**	0.0091	0.0048	0.0003	−0.0230	0.0013
	(0.0128)	(0.0158)	(0.0136)	(0.0064)	(0.0073)	(0.0084)	(0.0065)	(0.0154)	(0.0066)
Infl(t-3)	0.0314*	−0.0030	0.0161	0.1291***	−0.0166	0.0689**	−0.0051	−0.0355	−0.0050
	(0.0174)	(0.0164)	(0.0183)	(0.0383)	(0.0236)	(0.0338)	(0.0307)	(0.0309)	(0.0315)
LnK(t-3)	0.8442***	0.8753***	0.9500***	0.8544***	0.9275***	0.8988***	0.9853***	1.0031***	0.9513***
	(0.0195)	(0.0221)	(0.0249)	(0.0241)	(0.0222)	(0.0439)	(0.0428)	(0.0452)	(0.0382)
Obs.	599	419	180	572	395	177	572	395	177
AR1	0.03	0.03	0.82	0.01	0.21	0.33	0.71	0.68	0.10
AR2	0.38	0.21	0.54	0.10	0.08	0.11	0.23	0.46	0.65
Sargan	0.79	0.55	0.27	0.61	0.16	0.00	0.39	0.97	0.10

Note: All specifications are estimated by the dynamic panel GMM method and include year-fixed effects. All regressors indicate the initial value of the three-year period. Robust standard errors are in parentheses. Significant at *10%, **5%, and ***1%.

Table 12
Panel regressions—greenhouse gas emissions.

	(1) All	(2) MICs	(3) LICs
DF(t-3)	0.0697**	0.0862**	0.0721
	(0.0283)	(0.0363)	(0.0469)
Cap(t-3)	−0.0012	−0.0132	0.0326
	(0.0176)	(0.0211)	(0.0359)
Trade(t-3)	0.0221	0.0052	0.0294
	(0.0276)	(0.0453)	(0.0338)
LnGHG(t-3)	−0.0770***	−0.0660***	−0.0833***
	(0.0122)	(0.0169)	(0.0173)
Infl(t-3)	0.0305	0.0318	−0.0053
	(0.0217)	(0.0265)	(0.0476)
Growth(t-3)	0.0639*	0.1025**	−0.0328
	(0.0370)	(0.0499)	(0.0641)
Obs.	453	317	132
R-Sq	0.35	0.33	0.47

Note: The dependent variable is the non-overlapping three-year averaged growth rate of per capita GHG emissions. Emissions data come from the World Resources Institute database. All regressors indicate the initial value of the three-year period. Country- and year-fixed effects are included in all specifications. Robust standard errors are clustered at the country level in parentheses. Significant at *10%, **5%, and ***1%.

Declaration of Competing Interest

None.

Data availability

The authors do not have permission to share data.

Appendix A. Appendix

Table A1
Country sample and income groups.

Middle-income countries		Low-income countries
Albania	Jordan	Bangladesh
Algeria	Kazakhstan	Burkina Faso

(*continued on next page*)

Table A1 (*continued*)

Middle-income countries		Low-income countries
Argentina	Latvia	Cote d'Ivoire
Azerbaijan	Lithuania	Ethiopia
Belarus	Malaysia	Ghana
Bolivia	Mexico	India
Brazil	Morocco	Kenya
Bulgaria	Nicaragua	Kyrgyzstan
Cameroon	Paraguay	Madagascar
Chile	Peru	Mozambique
China	Philippines	Nepal
Colombia	Poland	Nigeria
Costa Rica	Romania	Pakistan
Dominican Republic	Russia	Senegal
Ecuador	South Africa	Tanzania
Egypt	Sri Lanka	Uganda
El Salvador	Thailand	Vietnam
Georgia	Tunisia	Zimbabwe
Guatemala	Turkey	
Hungary	Ukraine	
Indonesia	Uruguay	
Jamaica	Venezuela	

Note: Income groups based on World Bank analytical classifications.

Table A2
Correlation matrix.

	Capital Growth	Priv. K Growth	Publ. K Growth	Capital Account	Domestic Finance	Banking Supervis.	Int. Rate Control	Credit Control	Privatiza-tion	Entry Barriers	Security Markets
Capital Growth	1.00										
Priv. K Growth	0.83***	1.00									
Publ. K Growth	0.62***	0.34***	1.00								
Capital Account	0.14***	0.15***	0.03**	1.00							
Domestic Finance	0.24***	0.25***	0.10***	0.51***	1.00						
Banking Supervision	0.28***	0.31***	0.16***	0.37***	0.78***	1.00					
Int. Rate Control	0.21***	0.25***	0.08***	0.49***	0.79***	0.54***	1.00				
Credit Control	0.13***	0.14***	0.05*	0.26***	0.61***	0.34***	0.43***	1.00			
Privatization	0.04	0.01	0.01	0.40***	0.73***	0.49***	0.47***	0.33***	1.00		
Entry Barriers	0.15***	0.15***	0.05**	0.38***	0.78***	0.54***	0.51***	0.36***	0.50***	1.00	
Security Markets	0.28***	0.27***	0.12***	0.35***	0.74***	0.61***	0.53***	0.27***	0.40***	0.53***	1.00

Note: This table reports the bivariate correlations based on annual data. Significant at *10%, **5%, and ***1%.

Table A3
List of structural breaks.

	Total capital		Private capital		Public capital	
Country	Up breaks	Down breaks	Up breaks	Down breaks	Up breaks	Down breaks
Albania					1991	
Algeria	2003	1986	2009	1986	2000	1986
Argentina				1980	2004	1980
Bangladesh	2001		1998		1997, 2009	1981
Bolivia	1990, 2009	1979		1979	1989, 2004	1979
Brazil		1980		1980	2006	1978, 1995
Bulgaria	1997	2009	2000	2009	1998	
Burkina Faso	2008	1987	2008	1992	2001, 2009	1985
Cameroon	1998, 2009	1986	2000	1988		1985
Chile	1988		1988		1992	
China	1992		1993, 2001	2009	1992	2004
Colombia	2005	1983, 1997	2005	1997	2009	1986, 1998
Costa Rica	1988	1980	1988	1980	1991	1980
Cote d'Ivoire		1980	1995	1979	2009	1982
Dom. Rep.			1995	1981	1987	1978, 2004
Ecuador	2004	1982	2001	1982	2001, 2009	1982
Egypt		1983				1986
El Salvador	1991	1979, 2008	1985	2008	1992	1979
Ethiopia	2000, 2009	1989	1997, 2009	1989	2005	
Ghana	1987, 1999	1979, 2008	1987, 1999	1979, 2008	1993	2001
Guatemala	1991	1981		1979	1991	1981, 2003
India	1994, 2003		1993		1976, 2005	1989
Indonesia	2006	1997	2005	1997		1997

(*continued on next page*)

Table A3 (*continued*)

	Total capital		Private capital		Public capital	
Country	Up breaks	Down breaks	Up breaks	Down breaks	Up breaks	Down breaks
Jordan		1982	1991	1981, 1999	1998	1982, 2006
Kenya	2004	1981	1994, 2004	1978	2009	1981
Madagascar	2003	1980	1986, 1999	2009		1980
Malaysia	2009	1997	1989, 2009	1981, 1997		1984
Mexico	1990	1982	1989	1981		1985
Morocco					2001, 2009	1982, 1990
Mozambique	2009		2009	1991	1991	1981
Nepal		1985			2009	1982, 2000
Nicaragua	1998		1997		2009	1987
Nigeria	2003	1982	2003	1982	2006	1982, 1998
Pakistan		1978	1989	2009	2005	1993
Paraguay		1982, 1997	2006	1983, 1997		1981, 1990
Peru	1993, 2006	1982	1993	1982	2007	1982
Philippines		1983		1983	1991, 2009	1983, 2000
Romania			1995		2006	
Senegal	1985, 1997		1985, 1997		1986, 1997	
South Africa	2003	1982	1995, 2003		2004	1980, 1996
Sri Lanka	1992, 2005	1983	2009		2007	1980
Tanzania	1989, 2002	1979	1989, 2001	1980		
Thailand	1988, 2004	1980, 1996	1988, 2004	1996		1997
Tunisia	1996	1984	1992	1984	1996	1984
Turkey	1986		1986		2009	1988
Uganda	1986, 1994		1993		1999, 2007	1991
Uruguay	1991	1982	1990		1991, 2007	1982
Venezuela		1982		1981		1982
Vietnam	1991	2009	1991	1999, 2009	1992	2007
Zimbabwe	1989		1989		2009	

Note: This table reports the list of upward and downward breaks in total, private, and public capital.

Table A4

Local projections – private and public capital.

	Private capital						Public capital					
	All		MICs		LICs		All		MICs		LICs	
Horizon (k)	DF	Cap	DF	Cap	DF	Cap	DF	Cap	DF	Cap	DF	Cap
0	0.0234**	0.0125*	0.0111	0.0160**	0.0545**	0.0023	0.1068	0.0881	0.0080	0.0098	0.0967	0.0679
	(0.0091)	(0.0068)	(0.0094)	(0.0076)	(0.0202)	(0.0131)	(0.1729)	(0.0682)	(0.1357)	(0.0787)	(0.2304)	(0.1630)
1	0.0494**	0.0232	0.0325	0.0315*	0.0874*	−0.0118	0.1819	0.0565	0.1205	−0.0163	−0.0259	0.0379
	(0.0188)	(0.0168)	(0.0199)	(0.0177)	(0.0453)	(0.0550)	(0.1902)	(0.0714)	(0.1496)	(0.0809)	(0.2437)	(0.1642)
2	0.0762**	0.0417	0.0635*	0.0472	0.0809	0.0433	0.3010	−0.0163	0.2120	−0.0259	0.0590	0.0253
	(0.0310)	(0.0266)	(0.0332)	(0.0292)	(0.0716)	(0.0806)	(0.2186)	(0.1143)	(0.1687)	(0.0897)	(0.3226)	(0.1784)
3	0.1103**	0.0536	0.0927*	0.0594	0.0824	0.0976	0.3666	−0.0370	0.2892	−0.0618	0.0265	−0.0161
	(0.0436)	(0.0364)	(0.0476)	(0.0404)	(0.0941)	(0.1009)	(0.2296)	(0.1189)	(0.1925)	(0.1073)	(0.3841)	(0.2065)
4	0.1431**	0.0679	0.1277**	0.0679	0.1215	0.1495	0.3200	−0.0801	0.3406	−0.1046	−0.3177	−0.0116
	(0.0546)	(0.0456)	(0.0602)	(0.0505)	(0.1014)	(0.1042)	(0.2593)	(0.1279)	(0.2216)	(0.1202)	(0.4342)	(0.2258)
5	0.1731**	0.0784	0.1569**	0.0723	0.2139*	0.2305*	0.4781	−0.1020	0.3389	−0.1267	−0.4584	−0.0116
	(0.0701)	(0.0546)	(0.0740)	(0.0591)	(0.1215)	(0.1115)	(0.3049)	(0.1374)	(0.2404)	(0.1359)	(0.5366)	(0.2451)
6	0.2172**	0.0826	0.1737*	0.0694	0.3150*	0.3269**	0.5428	−0.1729	0.4135	−0.1962	−0.0999	−0.0561
	(0.0948)	(0.0646)	(0.0866)	(0.0661)	(0.1768)	(0.1268)	(0.3382)	(0.1499)	(0.2822)	(0.1547)	(0.5361)	(0.2497)
7	0.2466**	0.0896	0.2144**	0.0692	0.3181	0.3446**	0.5411	−0.2121	0.4730	−0.2040	−0.0485	0.0294
	(0.1051)	(0.0727)	(0.1013)	(0.0722)	(0.1829)	(0.1318)	(0.3256)	(0.1734)	(0.2974)	(0.1737)	(0.5627)	(0.3523)
8	0.2859**	0.1158	0.2595**	0.0790	0.4063*	0.4970***	0.5747	−0.2083	0.4746	−0.2068	0.2325	−0.0719
	(0.1205)	(0.0816)	(0.1136)	(0.0782)	(0.1986)	(0.1334)	(0.3518)	(0.1800)	(0.3073)	(0.1834)	(0.6167)	(0.3773)
9	0.2522**	0.1053	0.2688**	0.0845	0.3175*	0.4787**	0.6813	−0.2284	0.4948	−0.2317	0.2017	−0.1511
	(0.1236)	(0.0892)	(0.1286)	(0.0872)	(0.1633)	(0.1704)	(0.4223)	(0.1926)	(0.3289)	(0.2043)	(0.6943)	(0.4015)
10	0.2233*	0.1124	0.2816**	0.0833	0.2304	0.5818**	0.7353*	−0.2139	0.5442	−0.2029	0.2703	−0.2964
	(0.1281)	(0.0967)	(0.1320)	(0.0936)	(0.1716)	(0.2007)	(0.4236)	(0.2001)	(0.3405)	(0.2165)	(0.7081)	(0.4403)

Note: This table reports the background coefficient estimates for Fig. 7. The dependent variable is the cumulative growth rate over the k-year horizon. All regressors indicate the initial value of the three-year period. Country and year fixed effects are included in all specifications. Robust standard errors clustered at the country level in parentheses. Significant at *10%, **5%, and ***1%.

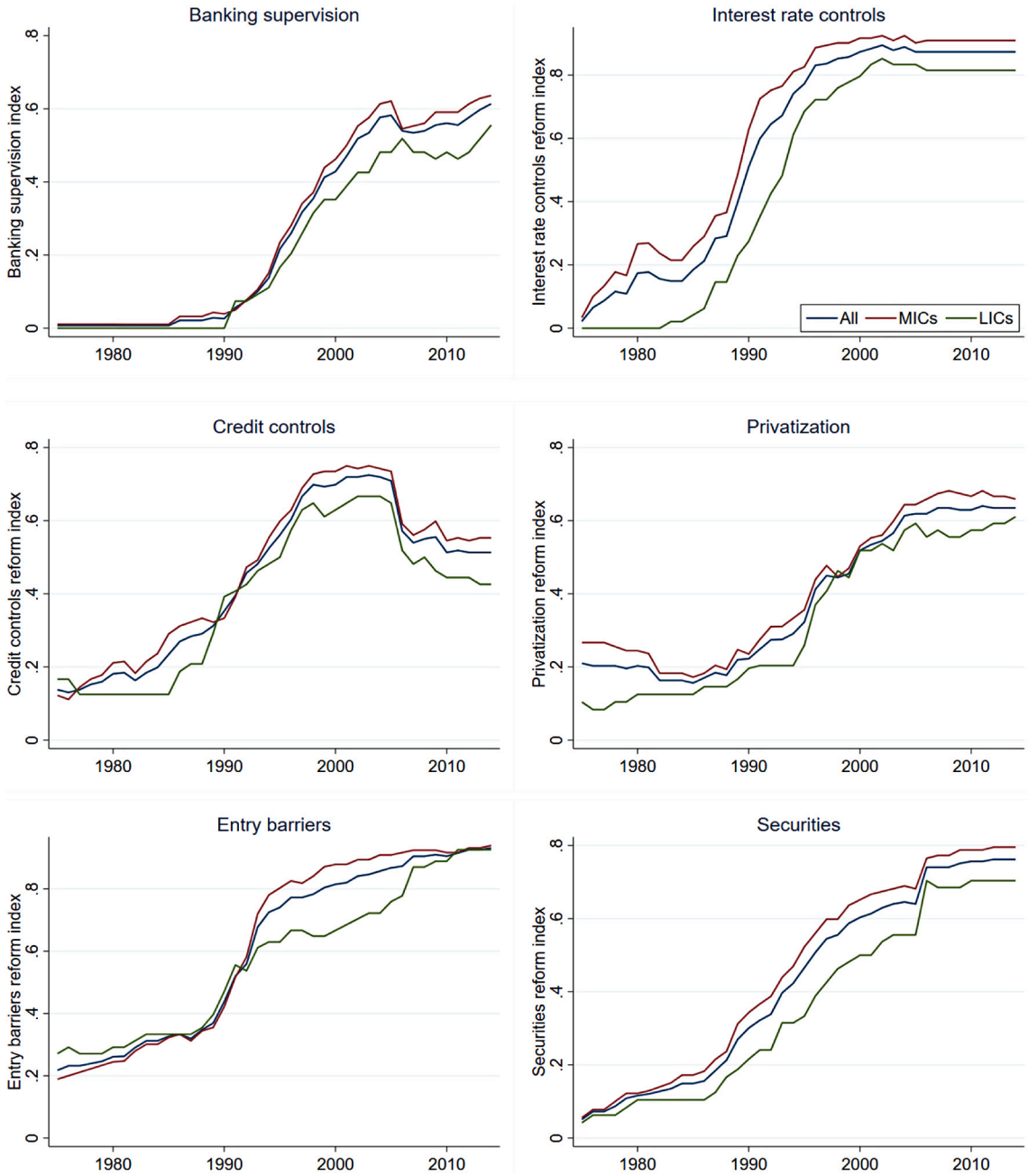

Fig. A1. Sub-indices of domestic financial reforms by income groups.

References

Abiad, A., Detragiache, E., & Tressel, T. (2010). A new database of financial reforms. *IMF Staff Papers, 57*(2), 281–302.

Abiad, A., & Mody, A. (2005). Financial reform: What shakes it? What shapes it? *American Economic Review, 95*(1), 66–88.

Agell, J., & Berg, L. (1996). Does financial deregulation cause a consumption boom? *Scandinavian Journal of Economics, 98*(4), 579–601.

Alesina, A., Ardagna, S., Nicoletti, G., & Schiantarelli, F. (2005). Regulation and investment. *Journal of the European Economic Association, 3*(4), 791–825.

Alesina, A., Furceri, D., Ostry, J. D., Papageorgiou, C., & Quinn, D. P. (2020). *Structural reforms and elections: Evidence from a world-wide new dataset.* National Bureau of Economic Research. Working Paper. 26720.

An, Z., Kangur, A., & Papageorgiou, C. (2019). On the substitution of private and public capital in production. *European Economic Review, 118*, 296–311.

Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *Review of Economic Studies, 58*(2), 277–297.

Bai, J., & Perron, P. (1998). Estimating and testing linear models with multiple structural changes. *Econometrica, 66*(1), 47–78.
Bai, J., & Perron, P. (2003). Computation and analysis of multiple structural change models. *Journal of Applied Econometrics, 18*(1), 1–22.
Bekaert, G., Harvey, C. R., & Lundblad, C. (2005). Does financial liberalization spur growth? *Journal of Financial Economics, 77*(1), 3–55.
Berg, A., Ostry, J. D., & Zettelmeyer, J. (2012). What makes growth sustained? *Journal of Development Economics, 98*(2), 149–166.
Bolt, W., & Tieman, A. F. (2004). Banking competition, risk and regulation. *Scandinavian Journal of Economics, 106*(4), 783–804.
Bumann, S., Hermes, N., & Lensink, R. (2013). Financial liberalization and economic growth: A meta-analysis. *Journal of International Money and Finance, 33*, 255–281.
Christiansen, L., Schindler, M., & Tressel, T. (2013). Growth and structural reforms: A new assessment. *Journal of International Economics, 89*(2), 347–356.
Ciminelli, G., Duval, R., & Furceri, D. (2020). Employment protection deregulation and labor shares in advanced economies. *Review of Economics and Statistics*, 1–44.
Cohen, G., Jalles, J. T., Loungani, P., & Marto, R. (2018). The long-run decoupling of emissions and output: Evidence from the largest emitters. *Energy Policy, 118*, 58–68.
Desai, M. A., Foley, C. F., & Hines, J. R., Jr. (2005). Foreign direct investment and the domestic capital stock. *American Economic Review, 95*(2), 33–38.
Duval, R., & Furceri, D. (2018). The effects of labor and product market reforms: The role of macroeconomic conditions and policies. *IMF Economic Review, 66*(1), 31–69.
Feenstra, R. C., Inklaar, R., & Timmer, M. P. (2015). The next generation of the Penn World Table. *American Economic Review, 105*(10), 3150–3182.
Futagami, K., Morita, Y., & Shibata, A. (1993). Dynamic analysis of an endogenous growth model with public capital. *Scandinavian Journal of Economics, 95*(4), 607–625.
Hausmann, R., Pritchett, L., & Rodrik, D. (2005). Growth accelerations. *Journal of Economic Growth, 10*(4), 303–329.
Henry, P. B. (2007). Capital account liberalization: Theory, evidence, and speculation. *Journal of Economic Literature, 45*(4), 887–935.
Jenkins, J. D., Mayfield, E. N., Larson, E. D., Pacala, S. W., & Greig, C. (2021). Mission net-zero America: The nation-building path to a prosperous, net-zero emissions economy. *Joule, 5*(11), 2755–2761.
Jerzmanowski, M. (2006). Empirics of hills, plateaus, mountains and plains: A Markov- switching approach to growth. *Journal of Development Economics, 81*(2), 357–385.
Jones, B. F., & Olken, B. A. (2008). The anatomy of start-stop growth. *Review of Economics and Statistics, 90*(3), 582–587.
Jordà, Ò. (2005). Estimation and inference of impulse responses by local projections. *American Economic Review, 95*(1), 161–182.
Kamps, C. (2006). New estimates of government net capital stocks for 22 OECD countries, 1960–2001. *IMF Staff Papers, 53*(1), 120–150.
Kose, M. A., Prasad, E. S., & Taylor, A. D. (2011). Thresholds in the process of international financial integration. *Journal of International Money and Finance, 30*(1), 147–179.
Laeven, L. (2003). Does financial liberalization reduce financing constraints? *Financial Management, 32*(1), 5–34.
Levine, R. (2001). International financial liberalization and economic growth. *Review of International Economics, 9*(4), 688–702.
Meckling, J., Aldy, J. E., Kotchen, M. J., Carley, S., Esty, D. C., Raymond, P. A., … Sweatman, J. (2022). Busting the myths around public investment in clean energy. *Nature Energy, 7*(7), 563–565.
Nicoletti, G., & Scarpetta, S. (2003). Regulation, productivity and growth: OECD evidence. *Economic Policy, 18*(36), 9–72.
Obstfeld, M. (1998). The global capital market: Benefactor or menace? *Journal of Economic Perspectives, 12*(4), 9–30.
Ostry, J. D., Prati, M. A., & Spilimbergo, M. A. (2009). *Structural reforms and economic performance in advanced and developing countries*. IMF Occasional Paper. *268*.
Prati, A., Onorato, M. G., & Papageorgiou, C. (2013). Which reforms work and under what institutional environment? Evidence from a new data set on structural reforms. *Review of Economics and Statistics, 95*(3), 946–968.
Pritchett, L. (2000). Understanding patterns of economic growth: Searching for hills among plateaus, mountains, and plains. *World Bank Economic Review, 14*(2), 221–250.
Quinn, D. P. (1997). The correlates of change in international financial regulation. *American Political Science Review, 91*(3), 531–551.
Quinn, D. P., & Inclan, C. (1997). The origins of financial openness: A study of current and capital account liberalization. *American Journal of Political Science, 41*(3), 771–813.
Quinn, D. P., & Toyoda, A. M. (2008). Does capital account liberalization lead to growth? *Review of Financial Studies, 21*(3), 1403–1449.
Rioja, F., & Valev, N. (2004). Does one size fit all?: A reexamination of the finance and growth relationship. *Journal of Development Economics, 74*(2), 429–447.
Song, Y., Sun, J., Zhang, M., & Su, B. (2020). Using the Tapio-Z decoupling model to evaluate the decoupling status of China's CO2 emissions at provincial level and its dynamic trend. *Structural Change and Economic Dynamics, 52*, 120–129.
Stiglitz, J. E. (2000). Capital market liberalization, economic growth, and instability. *World Development, 28*(6), 1075–1086.
Turnovsky, S. J. (2009). *Capital accumulation and economic growth in a small open economy*. Cambridge University Press.
World Bank. (2017). *Global investment competitiveness report*, 2017/2018.