



Convergence in Financial Development and Growth

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Abstract

We evaluate the cross-country convergence of financial development and its relationship with GDP growth. Financial inclusion variables have been widely converged across countries, and the catch-up effect of countries with poor financial coverage mainly drives the convergence. In contrast, financial development measures — including domestic credit, liability, mutual fund size, and stock market capitalization — have diverged since 1985 despite the absolute convergence in GDP and financial inclusion. The GDP growth rates strongly correlate with the change in financial development but not the improvement in financial inclusion.

Keywords Economic convergence · Financial inclusion · Divergence in finance

JEL Classification G20 · O11 · O43 · O47

1 Introduction

Kremer et al. (2022) documents the emergence of absolute convergence since 1985 and relates this new trend with the prevailing convergence of policy correlates. Countries are becoming more and more similar; thus, the rate of absolute convergence gradually converges to the rate of conditional convergence. Many policy-related financial variables have converged, such as financial freedom, inflation, central bank independence, etc. However, converging policies do not necessarily lead to financial development and market performance convergence. For example, in Kremer et al. (2022), credit to GDP diverged from 1985 to 2015. This paper examines the convergence of more financial outcomes.

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We collect a country-level panel data of 11 financial variables from the Global Financial Development database released by the World Bank and divide these variables into two groups, i.e., *inclusion* (of financial accesses) and *performance* (of financial activities), respectively. Four financial inclusion variables include physical banking infrastructures measured by the number of bank branches and ATMs, and financial accessibility measured by the number of listed companies and bank accounts normalized by the population size. These variables capture the availability of financial services in the nation. To some extent, these variables capture the extensive margin of the financial sector reaching the general public. The performance variables capture the scale of the country's financial activities by the following seven dimensions: deposit money banks' assets, liquid liabilities, mutual fund assets, financial system deposits, insurance company assets, domestic credit to private, and stock market capitalization as a percentage of GDP. These variables quantify the financial development level along the intensive margin.

Following Kremer et al. (2022), we first confirm that higher-income countries typically exhibit greater financial inclusion and better performance in the financial sector. Moreover, these variables' global averages moved toward higher-income countries. The number of bank accounts, bank branches, and ATMs has been rising since 2020, and we see no significant increase in the number of listed companies per capita. Also, not surprisingly, all metrics for financial sector performance rose from 1985 to 2020. On average, countries experience an expansion of the financial sector in terms of both inclusion and performance.

Next, we document our main finding about the convergence of financial variables: financial inclusion generally moves toward convergence. However, six of seven financial performance indicators show significant divergence trends over time. We document that financial inclusions have converged since 2000 in both cross-section and panel regressions. For example, a 1%-lower initial number of bank branches per capita is associated with 0.319%-higher ($s.e. = 0.034\%$) growth rate towards 2020. This convergence suggests a catch-up trend among lower-income countries in terms of financial inclusion. The cross-section convergence rate from 2000 to 2020 ranges from -0.32 ($s.e. = 0.034$) to -0.40 ($s.e. = 0.045$) for the three banking variables, and the number of public companies per capita converges at a rate of -0.17 ($s.e. = 0.069$). We further run panel regressions with 5-year and 10-year changes as the outcome variables, allowing both country and year-fixed effects. The convergence rates become even higher in panel regressions. In contrast, considering financial performance, the analysis of 136 countries shows that a one-percent-point higher initial ratio of private credit to GDP in 2000 correlates with a 0.140-percent-point ($s.e. = 0.078$) increase in the private credit growth rate over the next two decades. Similarly, liquid liabilities, stock market value, insurance company size, mutual fund assets, and deposits in the financial system also show widened gaps between financially developed and under-developed countries. The financial performance is highly path-dependent concerning its initial development level and exhibits no catch-up effects.

Lastly, we associate financial variables with economic growth. Observing absolute convergence over the past two decades, we find that four of seven financial performance metrics significantly and consistently explain GDP growth. For instance, among 105 applicable countries, after controlling the initial GDP, we observe that every one-percent increase in the ratio of private credit to GDP (e.g., from 10% to 11%) is associated with 0.548%-higher GDP growth (*s.e.* = 0.147%) over the same period. On the contrary, financial inclusion does not show any predictive power to GDP growth, at least within the recent two decades. We further estimate the conditional convergence speed with controls for the growth of financial inclusions and performance variables. For financial inclusion measures, the unconditional convergence rate is not statistically different from the conditional convergence rate. Meanwhile, the unconditional convergence rate is only half of the unconditional convergence rate after controlling the changes in liquid liability, financial system deposits, and credit to the private sector. The divergence of financial sector performance counteracts the unconditional convergence of GDP documented in Kremer et al. (2022).

Literature The paper revisits the economic convergence literature, which flowered in the 1990s, with major findings of nonexistence of absolute economic convergence (e.g., Barro 1991; Pritchett 1997), but convergence within countries (e.g., Barro and Sala-i-Martin 1992). Kremer et al. (2022) documents that although overall longer-period economic growth appeared to diverge, there is a trend toward unconditional convergence since 1990 and convergence since 2000. During this period, many correlates of growth, e.g., human capital, policies, and institutions, also converged and moved in the direction associated with higher income. Such absolute convergence is also documented by Roy et al. (2016) and Patel et al. (2021).

The paper adds to the literature discussing the relationship between financial development and economic growth. King and Levine (1993a, b) presents cross-country evidence consistent with Schumpeter's view that the financial system promotes economic growth using data in the 1960-1989 period. Fung (2009) finds that the mutually enhancing relationship between financial development and economic growth diminishes as sustained economic growth takes shape. As such, low-income countries with a relatively underdeveloped financial sector are more likely to be trapped in poverty. This view is also corroborated by meta-analysis across 67 studies (e.g., Valickova et al. 2015). The relationship is also discussed by a set of recent papers (e.g., Guru and Yadav 2019; Asteriou and Spanos 2019; Zhang and Naceur 2019; Shahbaz et al. 2022)¹ Some specific financial correlates also exhibit divergence among countries: Kiss et al. (2006) identify the growth of credit to the private sector (credit/GDP levels) across Central and Eastern Europe, disentangling the observed growth into an equilibrium trend and an excess (boom) component, which

¹ There is also a large strand of literature that focuses on specific financial correlates, including credit growth (e.g., Coeurdacier et al. 2015; Albanesi et al. 2022), liquid liabilities (e.g., McCaig and Stengos 2005; Loayza and Ranciere 2006), stock market capitalization (e.g., Harris 1997; Arestis et al. 2001), and financial system deposits (e.g., Bruno et al. 2012).

is also documented as an exception for convergence in Kremer et al. (2022). Recent literature is devoted to finding impediments of convergence, such as the presence of informal finance (e.g., Sever and Yücel 2023), demographic structure (e.g., Sever 2023), and cultural gaps (e.g., Kinnan and Townsend 2012).

The paper also relates to research on access to financial systems and financial inclusion, as comprehensively introduced by World Bank working series (e.g., Beck et al. 2009; Kendall et al. 2010; Demirgüç-Kunt and Klapper 2012). The development of access to finance can be treated as a growth constraint, reflected in firm financing (e.g., Beck and Demirguc-Kunt 2006), as well as the adoption of private financial activities. This suggests potential gaps between the development of access levels and real financial activities. On the other hand, Honohan (2008) examines the cross-country variation in household access to financial services. The within-country effects of financial access to economic growth are also widely discussed (e.g., Paramasivan and Ganeshkumar 2013; Demirgüç-Kunt 2013; Wang and Guan 2017). Together with these findings, we incorporate the development of financial accessibility and market performance, and further discuss how they affect economic growth differently.

The remainder of this paper is structured as follows. Section 2 introduces data, variables, and empirical specifications. Section 3 documents three main findings on convergence of financial variables. Section 4 discusses the interaction among the development of financial inclusion, financial performance, and economic growth. Section 5 concludes.

2 Empirical Setup

2.1 Data and Variables

We collect 11 country-level annual indicators from 1985 to 2020 from the Global Financial Development (GFD) database by the World Bank and divide them into two groups: *inclusion* of financial systems and *performance* of financial activities as shown in Table 1.² The inclusion indicators reflect the states of construction and popularization of the physical infrastructure related to access to the financial system, i.e., bank branches and ATMs, and the size of the participating entities, i.e., bank accounts and listed companies.³ The performance indicators capture the scales of major financial activities, especially those documented in literature as associated with economic

² Our database collects credible data from various resources. For inclusion indicators, I1-I3 are collected from the Financial Access Survey (FAS) by the International Monetary Fund (IMF). I4 is collected from the World Federation of Exchanges. For performance indicators, P1-P6 are from International Financial Statistics (IFS) by the International Monetary Fund (IMF). P7 is from the World Federation of Exchanges.

³ We logarithmize these financial variables to accommodate for the large cross-country variations. In the main analysis, we use $\log(X + 1)$ rather than $\log(X)$, ($X = 1, 2, 3, 4$) to avoid zero raw values. Potential quantitative biases arising from such an approach are not harmful or at least not crucial for our main focus.

Table 1 Summary statistics of raw variables

Code	Variable	Detailed Description	Mean		S.D.	Min	25%	50%	75%	Max
			Pooled	t ₀ 2020*						
Inclusion										
	(Log) GDP per capita		8.23	7.35	1.66	3.13	6.89	8.19	9.62	12.36
I1	(Log) Bank accounts per 1,000 adults	Number of depositors with commercial banks per 1,000 adults.	5.87	4.99	1.53	0.00	5.00	6.16	6.88	12.52
I2	(Log) Bank branches per 100,000 adults	Number of commercial bank branches per 100,000 adults.	2.61	2.43	1.09	0.13	1.82	2.69	3.26	7.49
I3	(Log) ATMs per 100,000 adults	Number of ATMs per 100,000 adults.	3.27	2.69	1.44	0.00	2.25	3.58	4.17	9.65
I4	(Log) # listed companies per 1,000,000 people	Number of domestically incorporated companies listed on the country's stock exchanges at the end of the year per 1,000,000 people (does not include investment companies, mutual funds, or other collective investment vehicles).	2.54	2.62	1.24	0.00	1.53	2.47	3.50	6.84
Performance										
P1	Deposit money banks' assets (% of GDP)	Total assets held by deposit money banks as a share of GDP. Assets include claims on domestic real non-financial sector which includes central, state and local governments, non-financial public enterprises and private sector. Deposit money banks comprise commercial banks and other financial institutions that accept transferable deposits, such as demand deposits.	53.05	42.12	42.79	0.03	20.66	41.99	71.97	305.24
P2	Liquid liabilities (% of GDP)	Ratio of liquid liabilities to GDP. Liquid liabilities are also known as broad money, or M3. They are the sum of currency and deposits in the central bank (M0), plus transferable deposits and electronic currency (M1), plus time and savings deposits, foreign currency transferable deposits, certificates of deposit, and securities repurchase agreements (M2), plus traveler's checks, foreign currency time deposits, commercial paper, and shares of mutual funds or market funds held by residents.	57.90	45.69	59.66	0.06	26.39	45.19	71.36	927.43
P3	Mutual fund assets (% of GDP)	Ratio of assets of mutual funds to GDP. A mutual fund is a type of managed collective investment scheme that pools money from many investors to purchase securities.	41.93	29.97	107.30	0.01	3.22	11.82	33.22	998.32
P4	Financial system deposits (% of GDP)	Demand, time and saving deposits in deposit money banks and other financial institutions as a share of GDP.	48.25	36.64	44.50	0.02	19.49	38.62	62.77	462.13

Table 1 (continued)

Code	Variable	Detailed Description	Mean		S.D.	Min	25%	50%	75%	Max
			Pooled	t_0^* 2020*						
P5	Insurance company assets (% of GDP)	Ratio of assets of insurance companies to GDP.	18.21	24.47	26.93	0.10	2.07	5.58	22.75	198.68
P6	Domestic credit to private sector (% of GDP)	Private credit by deposit money banks and other financial institutions to GDP.	45.61	35.44	40.45	0.02	15.51	33.24	62.55	304.57
P7	Stock market capitalization (% of GDP)	Total value of all listed shares in a stock market as a percentage of GDP.	62.50	55.28	102.17	0.01	18.13	37.37	75.61	1777.54

The data coverage is from 1985 (or the earliest applicable year) to 2021 (or the latest applicable year, at least 2020)

growth, such as private sector credit growth. These performance indicators are already normalized with the country-level GDP. For the metric of economic growth, we use the GDP per capita, adjusted for Purchasing Power Parity (PPP), in our main specification.

Table 1 provides the indicator name, detailed description, and summary statistics for each indicator. All indicators exhibit large variations across countries. Take P6, domestic credit to the private sector, as an example. Its minimum value is only 0.02% (relative to GDP), implying that the country had almost no private credit supply then, while the maximum value reaches 304.57%. Notably, a more comprehensive examination of the distribution suggests that these maxima in Table 1 are not simply outliers or data errors but correspond to some extreme countries. Such large variations may reflect differences in economic activities across countries and are discussed further in subsequent analyses. Combining all variables together, we work with an unbalanced panel starting in different years upon data availability.

2.2 Specification

For the selected financial indicator X , denote the first applicable year as t_0 , and the corresponding value of country i in year t as $X_{i,t}$. We first assess the cross-sectional correlation between financial indicators and GDP, i.e.,

$$X_{i,t} = \alpha + \delta \log(GDP_{i,t}) + \epsilon_{i,t}. \tag{1}$$

Indicator X is defined as “high development favored” if the coefficient δ is significantly positive, i.e., higher-GDP countries are associated with higher values of X .

The next step is to measure the convergence of these financial indicators, that is, the β -convergence of policy correlates in Kremer et al. (2022). Formally, β -convergence of indicator X from year t_0 to year 2020 is the coefficient β in the following country-level cross-sectional regression:

$$\Delta_{t_0 \rightarrow 2020} X_i = \alpha + \beta X_{i,t_0} + \epsilon_i, \tag{2}$$

where $\Delta_{t_0 \rightarrow 2020} X_i = X_{i,2020} - X_{i,t_0}$ is the change of X during the sample period. A negative β indicates that higher initial values correspond to lower future growth; that is, the indicator X exhibits convergence across countries.

The third step is to estimate the convergence of economic growth with financial indicators as the control variable,

$$\Delta_{t_0 \rightarrow 2020} \log(GDP)_i = \alpha + \beta_G \log(GDP_{i,t_0}) + \gamma \Delta_{t_0 \rightarrow 2020} X_i + \epsilon_i, \tag{3}$$

where $\beta_G < 0$ implies the β -convergence of economic growth in general, and a significant positive estimated γ indicates that the growth of X contributes to economic growth. To further confirm that the inclusion of financial correlates generates a proper specification, we run the corresponding benchmark regression, i.e., equation (3) without $\Delta_{t_0 \rightarrow 2020} X_i$, on the same sample. Then, we also present the F-test

between the two regressions to examine how the GDP convergence rate changes with and without controlling for the change in financial inclusion or performance.

3 Empirical Findings

3.1 Cross-sectional Relationship between Indicators and Economic Development

Table 2 reports how the indicators relate to economic development level and their general changes during the sample period. First, all inclusion indicators are “high development favored”: a high-income country tends to own more bank accounts, bank branches, ATMs, and listed companies per capita, respectively. On the other hand, the annual average increases from the first available year to 2020, indicating that worldwide countries have developed physical access to financial systems on average.⁴ Take indicator I2 as example. Among 157 countries in 2004, one country had 11.36 ($\approx e^{2.43}$ where 2.43 is the worldwide mean as shown in Table 1) bank branches per hundred thousand adults. The 1%-higher GDP per capita is associated with the 0.599%-higher number of branches per capita (significant at 1% level) — higher-income countries are associated with more bank branches. Over the past two decades, the global average has increased from 11.36 to 14.15. Although this does not imply economic growth, the availability of physical facilities creates the basic prerequisites for developing and expanding the scale of relevant financial services.

The performance indicators exhibit similar properties. Take indicator P6 as an example. Among 126 sample countries in 1985, the average scale (to GDP) of domestic credit to the private sector was 35.44%. A 1%-higher GDP per capita is associated with 0.11-points higher of the corresponding ratio (e.g., from 10% to 10.11%) on average. This is an echo with the findings in Kremer et al. (2022). These financial activities correspond to a high level of economic development, although they are also partly affected by specific economic structures of countries. During the sample period, the overall scale of credit supply has experienced rapid growth faster than global GDP growth, as the corresponding ratio has increased to 63.24% till 2020. Similar changes have also been seen in deposit money bank’s assets, liquid liabilities, mutual fund assets, financial system deposits, issuance company assets, and stock market capitalization. They imply that the roles of financial activities have been increasingly important with the rapid development of overall scales.

⁴ The number of observations of the first year and 2020 may differ. Since new entrants to the sample typically are small economies, the results in this table tend to underestimate the overall change. In addition, we repeat the same test on the balanced data. The results show the robustness of such implications.

Table 2 Correlation with GDP and changes of financial fundamentals

Variable	First Year	Dev. Favored	$\hat{\delta}_{t_0}$		$\hat{\delta}_{2020}$			
			Estimate	Std.Err	Estimate	Std.Err		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Inclusion								
I1	(Log) Bank accounts per 1,000 adults	High	0.884***	0.138	48	0.557***	0.094	79
I2	(Log) Bank branches per 100,000 adults	High	0.599***	0.041	157	0.387***	0.048	154
I3	(Log) ATMs per 100,000 adults	High	0.912***	0.054	122	0.612***	0.055	155
I4	(Log) # listed companies per 1,000,000 people	High	0.653***	0.071	82	0.783***	0.108	65
Performance								
P1	Deposit money banks' assets (% of GDP)	High	10.489***	1.894	127	23.095***	2.233	155
P2	Liquid liabilities (% of GDP)	High	9.290***	1.834	124	28.673***	4.063	153
P3	Mutual fund assets (% of GDP)	High	17.001***	5.564	40	57.194***	17.654	67
P4	Financial system deposits (% of GDP)	High	10.290***	1.549	126	24.652***	2.996	153
P5	Insurance company assets (% of GDP)	High	15.930***	2.538	50	16.804***	2.300	82
P6	Domestic credit to private sector (% of GDP)	High	11.087***	1.618	126	23.385***	2.190	154
P7	Stock market capitalization (% of GDP)	High	24.417***	4.746	68	35.480	24.647	64

Column (2) presents the first year, denoted as year t_0 in the following. Default is 1985. If fewer than 40 observations (countries) are applicable in 1985, then the earliest applicable year is used; (3) reports the development-favored correlates determined by their correlation with GDP per capita in t_0 . "High" refers to significant positive estimates of $\hat{\delta}$; (4), (5) and (6) report the corresponding estimations, standard errors and number of observations, respectively. (7)-(9) report the results in 2020

***, **, * indicate statistical significance at the 1%, 5% and 10% respectively

3.2 Different Convergence Patterns between Inclusion and Performance

We first examine the convergence of financial inclusion as Table 3 reports. Columns (1)-(4) document the results of equation (2), indicating that during the past two decades, the four inclusion indicators exhibit convergence across countries. The growth and change of such physical access and participating entities are relatively stable, allowing this finding of convergence to survive under tighter controls. As columns (5)-(12) show, we regress the change of $X_{i,t}$ in Δ_t years on its previous status with the panel data. The convergence is still robust after allowing for potential country-specific fundamentals and aggregate time fixed effects separately. Robust evidence shows low-income countries catch up with high-income in financial inclusion.

There is a comparative limit to the need for both the expansion of physical access to financial systems and the growth of participating entities, and when the relevant indicators in developed countries reach a certain level, there is gradually no longer a room or a necessity for further growth. Therefore, developing countries generally tend to close the gap in these financial inclusion aspects gradually. Financial modernization benefits low-income countries more since the financial infrastructure is well-established in developed economies.

We then apply equation (2) to the performance indicators and report results in Table 4 Panel A. In contrast to inclusion indicators, all the performance indicators do not show significant convergence. Interestingly, six indicators show significant divergence. For example, column (6) documents that a one-percentage-point higher of domestic credit (to the private sector) to GDP in 1985 is associated with a 0.266-percentage point (*s.e.* = 0.155) higher growth of credit to GDP from 1985 to 2020. Recall the large variation across countries of domestic credit to GDP in 1985 with a standard deviation of 40.45%, and the above divergence can cause a quantitatively important widen gap of private credit. As such, we repeat the same specification with a shorter sample period starting in 2000 as an alternative robustness test, which is also more comparable to the access indicators, as Table 4 Panel B shows.⁵ The corresponding estimates show the same significant levels and signs. Moreover, the coefficients are relatively closer to zero. The process of divergence is generally persistent in the same direction so that longer time windows bring larger coefficients.

3.3 Financial Indicators and Economic Growth

The third specification relates financial indicators to economic growth. We treat the financial inclusion and performance indicators as correlates of economic growth, as equation (3) shows. We investigate the explanatory power of these financial developments in economic growth since 1985 and report results in Table 5.

⁵ Unlike inclusion indicators, although they are also technically feasible to test the convergence of performance on the panel data, the results are more affected by the selection of the sample interval and the time interval and, therefore, are less reliable. This is because the performance indicators are usually more sensitive to external shocks, e.g., financial crises, and the yearly values are always more volatile.

Table 3 Convergence of financial inclusion

Dependent	$\Delta_{t_0 \rightarrow 2020} \bar{X}_i$				$X_{i,t+\Delta} - X_{i,t}, \Delta t = 5$				$X_{i,t+\Delta} - X_{i,t}, \Delta t = 10$			
	I1	I2	I3	I4	I1	I2	I3	I4	I1	I2	I3	I4
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
<i>Variables</i>												
$I1_{i,t_0}$	-0.358*** (0.063)											
$I2_{i,t_0}$		-0.319*** (0.034)										
$I3_{i,t_0}$			-0.403*** (0.045)									
$I4_{i,t_0}$				-0.169** (0.069)								
$I1_{i,t}$					-0.860*** (0.090)				-1.03*** (0.100)			
$I2_{i,t}$						-0.572*** (0.067)				-0.893*** (0.064)		
$I3_{i,t}$							-0.634*** (0.044)				-0.917*** (0.030)	
$I4_{i,t}$								-0.534*** (0.042)				-0.839*** (0.068)
<i>Fixed-effects</i>												
Country					Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
year					Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Fit statistics</i>												
Observations	42	140	110	60	881	2,085	1,954	1,969	428	1,169	1,047	1,529

Table 3 (continued)

Dependent	$\Delta_{t_0 \rightarrow 2020} X_i$				$X_{i,t+\Delta_t} - X_{i,t}, \Delta t = 5$				$X_{i,t+\Delta_t} - X_{i,t}, \Delta t = 10$			
	I1	I2	I3	I4	I1	I2	I3	I4	I1	I2	I3	I4
X	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
R ²	0.445	0.388	0.431	0.094	0.807	0.756	0.830	0.588	0.955	0.936	0.953	0.829

Column (1)-(4) report country-level cross-sectional estimates. Variables I1-I4 are four fundamental indicators for inclusion of financial systems, i.e., bank accounts (logarithmic, same below) per 1,000 adults; bank branches per 100,000 adults; ATMs per 100,000 adults; and number of listed companies per 1,000,000 people, respectively. Standard errors in parentheses. Column (5)-(12) report panel-data analysis, where Δt equals 5 (10) years in the first (last) four columns. Country and time effects are fixed. Clustered (country & year) standard errors in parentheses

Signif. Codes: ***: 0.01, **: 0.05, *: 0.1

Table 4 Test of the convergence of financial performance indicators

Independent	P1	P2	P3	P4	P5	P6	P7	
X: (% of GDP)	Deposit money banks' assets	Liquid liabilities	Mutual fund assets	Financial system deposits	Insurance company assets	Domestic credit to private sector	Stock market cap	
Panel A								
Dependent Model	$\Delta_{t_0 \rightarrow 2020} X_t$	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Variables</i>								
X_{t-t_0}	-0.194 (0.144)	0.760*** (0.229)	3.690*** (0.368)	0.518*** (0.162)	0.395*** (0.098)	0.266* (0.155)	1.71*** (0.357)	
<i>Fit statistics</i>								
Observations	110	107	41	108	40	109	50	
R ²	0.016	0.095	0.721	0.088	0.299	0.027	0.323	
Panel B								
Dependent Model	$\Delta_{t_0 \rightarrow 2020} X_t, t_0 = 2000$	(1)	(2)	(3)*	(4)	(5)*	(6)	(7)*
<i>Variables</i>								
X_{t-t_0}	-0.099 (0.086)	0.346*** (0.107)	3.690*** (0.368)	0.306*** (0.081)	0.395*** (0.098)	0.140* (0.078)	1.71*** (0.357)	
<i>Fit statistics</i>								
Observations	137	132	41	134	40	136	50	
R ²	0.010	0.075	0.721	0.097	0.299	0.024	0.323	

Country-level OLS estimates. The specification follows equation (2), where the independent variables are described in Table 1, respectively, e.g., X in column 2 refers to liquid liabilities to GDP (%). Columns (3), (5), and (7) in panel B are the same as in panel A since the corresponding ϕ_t s are originally 2000. Standard errors in parentheses Signif. Codes: ***: 0.01, **: 0.05, *: 0.1

Panel A shows the cross-sectional regression results of equation (3), and Panel B corresponds to the absolute convergence test on the same sample. Column (1) provides the benchmark result of growth convergence since 2000 without adding any potential correlates.⁶ The coefficients of $\log(GDP)_{i,t_0}$ are negative, implying that economic growth exhibits convergence in the sample period.

Regarding the estimates of the financial indicators, five performance indicators show significant and robust impacts according to the significant positive coefficients and the corresponding F tests.⁷ Take private credit as an example as panel A column (10) shows, a one-percentage-point increase in the private credit to GDP ratio (e.g., from 10% to 11%) is associated with 0.548%-higher GDP per capita growth on average after controlling initial GDP per capita (*s.e.* = 0.147%). In addition to private credit, higher deposit money bank assets, liquid liabilities, mutual fund assets, and financial system deposits also positively contribute to economic growth. The common feature is that they are related to borrowing and lending, albeit reflected in different sectors. They manifest investment and, therefore, are linked to economic growth.

Moreover, columns (5)-(8) and (10) of Table 5 reveal that the convergence coefficient becomes larger and more significant after including financial indicators as controls. Therefore, the development of financial performance acts as a counterforce of economic convergence.⁸ However, improvement in financial inclusion does not significantly impact economic growth, and the conditional convergence rate does not differ from the absolute convergence rate.

There are mainly two explanations. First, the initial state of GDP absorbs a large part of the effect of inclusion growth. As mentioned above, higher access growth is often born out of the catch-up effect in low-income countries. The catch-up effect is fully absorbed by the initial GDP level and does not predict additional GDP growth. Second, additional country-level factors affect the transmission from the inclusion facilities to the actual performance of financial activities; for example, entrepreneurs might not trust banks for loans but prefer to rely on local lending clubs despite more bank branches being available. The above two explanations are not mutually exclusive, but more likely, both make sense. While the first possibility is an econometric rationale, we are more interested in rationalizing the second logic, which will be discussed in the next section.

⁶ Though it is not directly comparable with the right columns due to missing data on covariates for some countries, the benchmark presents the overall converging trends in economic development of the world over the last 20 years across a larger data set.

⁷ We also examine their contribution to growth on the panel data set to account for potential differences in steady states, as discussed in Acemoglu and Molina (2022), while our focus is not on the convergence coefficient β , but the contribution of the correlates, γ . The panel suggests the robust contribution to economic growth of P1, P2, P4, and P6.

⁸ From the perspective of empirical specification, there are unobserved variables that relate to the initial $\log(GDP)_{i,t_0}$, the results of β_G -convergence in Panel B are more biased than Panel A (e.g., adding financial performance as correlates). Although this makes the estimated β_G less quantitatively meaningful, the comparison between Panel A and B is sufficient to qualitatively illustrate our main interest γ , i.e., the roles played by the financial correlates.

Table 5 Growth predicted by financial inclusion and performance indicators

Dependent variable	$\Delta_{t_0 \rightarrow 2020} \log(GDP_t)$										
Panel A											
<i>X:</i>	Performance										
I1	I2	I3	I4	P1	P2	P3	P4	P5	P6	P7	
Bank accounts	Bank branches	ATMs	Listed companies	Deposit money banks' assets	Liquid liabilities	Mutual fund assets	Financial system deposits	Insurance company assets	Domestic credit to private sector	Stock market cap	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	
<i>Model</i>											
<i>Variables</i>											
$\frac{1}{100} \Delta_{t_0 \rightarrow 2020} X_i$	-5.73 (6.55)	5.92 (4.75)	10.7 (7.59)	0.239* (0.133)	0.340*** (0.093)	0.057* (0.030)	0.476*** (0.140)	-0.288 (0.341)	0.548*** (0.147)	-0.023 (0.025)	
$\log(GDP_{t_0})$	-0.156 (0.044)	-0.131*** (0.030)	-0.205*** (0.040)	-0.078* (0.044)	-0.107** (0.043)	-0.266*** (0.050)	-0.110** (0.044)	-0.164*** (0.054)	-0.117*** (0.043)	-0.206*** (0.037)	
<i>Fit statistics</i>											
Observations	41	107	56	106	103	39	104	38	105	47	
R ²	0.255	0.310	0.369	0.044	0.133	0.445	0.116	0.296	0.133	0.428	
Panel B											
<i>Variables</i>											
$\log(GDP_{t_0})$	-0.140*** (0.040)	-0.156*** (0.023)	-0.214*** (0.040)	-0.052 (0.042)	-0.055 (0.043)	-0.241*** (0.050)	-0.055 (0.043)	-0.183*** (0.049)	-0.054 (0.042)	-0.209*** (0.037)	
<i>Fit statistics</i>											
Observations	41	107	56	106	103	39	104	38	105	47	
R ²	0.240	0.307	0.345	0.014	0.016	0.388	0.016	0.282	0.015	0.417	

Table 5 (continued)

Dependent	$\Delta_{t-2020} \log(GDP)_t$										
F-test between Panel A & B. Null Hypothesis: The model in Panel A is better											
F	0.764	0.514	1.556	2.005	3.228*	13.532***	3.685*	11.515***	0.714	13.866***	0.843
p-value	0.388	0.475	0.215	0.163	0.075	0.000	0.063	0.001	0.404	0.000	0.364

Country-level OLS estimates. The specification of Panel A follows Eq. (3), where the independent variables are described in Table 1, respectively, e.g., X in column 6 refers to liquid liabilities to GDP (%). Standard-errors in parentheses

Signif. Codes: ***: 0.01, **: 0.05, *: 0.1

4 Combine Inclusion, Performance, and Economic Growth

This section further investigates how the changes in financial inclusion, financial performance, and economic growth interact. We pick two representative indicators of inclusion and performance, respectively, and explore their correlation. For inclusion, the data preprocessing suggests that they are positively related with high correlations. Therefore, we choose I2, bank branches per capita, with the maximum number of applicable observations. For the performance indicators, we choose I6, private credit, from the four significant and robust correlates of economic growth, as documented in Section 3.3.⁹ This proxy is also examined in Kremer et al. (2022), while its divergence property has not been widely discussed.

Figure 1 visualizes how private credit growth correlates to GDP growth. The x-axis represents the log growth of the financial performance proxy, private credit,¹⁰ from 1985 to 2020, and the y-axis is the log GDP per capita growth. The colors present the initial states of GDP per capita, and the larger scatter size indicates better inclusion of financial systems (the larger number of bank branches) in 2020. First, higher credit growth is associated with higher GDP per capita growth, as documented in Table 5. Second, the small points are dispersed throughout the graph, implying that it is not significantly correlated with credit growth, although positively correlated with credit scale in the cross-section. This makes it difficult for low-income countries to achieve faster growth in the quantity of financial services even if they have caught up in terms of financial inclusion.

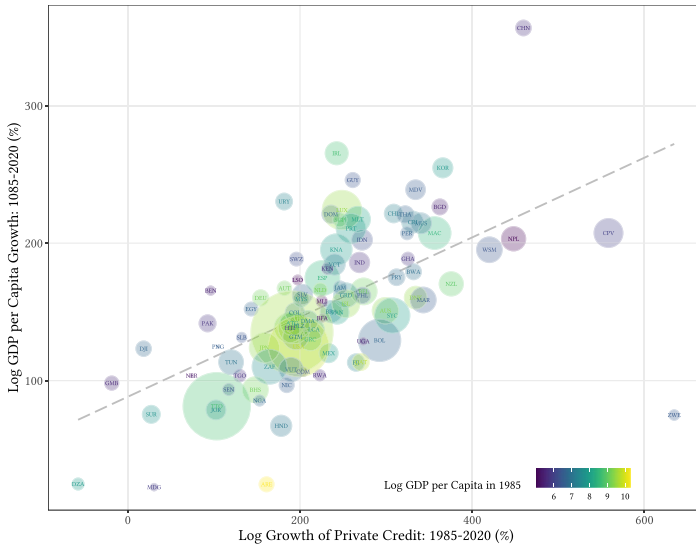
Figure 2 visualizes the second observation more clearly. The x-axis represents the log growth rate (%) of the financial inclusion proxy from 2004 to 2020,¹¹ and the y-axis is the growth spread — the growth rate of the financial performance (private credit growth) minus the growth rate of financial inclusion. The growth spread is expected to be uncorrelated with financial inclusion improvement if the development of inclusion explains the increase in the scale of financial activities. However, the linear fit is negatively sloped with a low R-squared. The scatter in the figure seems to be clustered into two categories: Low-level countries are located on the right side, experiencing higher rates of inclusion development; while high-income countries are located on the left side, experiencing faster credit growth but limited expansion in financial inclusion.

It aligns with the intuition that high income is positively associated with high financial access and inclusion in a given initial cross-section. However, as low-income countries gradually catch up and compensate for the disadvantage of low initial levels of financial inclusion, they still fail to achieve a matching growth in the actual scale of financial activities. Our empirical results suggest a plausible

⁹ The main findings below are robust to different selection of indicators. We use these two indicators only for better-visualized exploration as examples.

¹⁰ In previous analysis, the indicator used is the private credit (relative) to GDP. Here, we focus on its absolute growth, so the absolute scale of private credit is used.

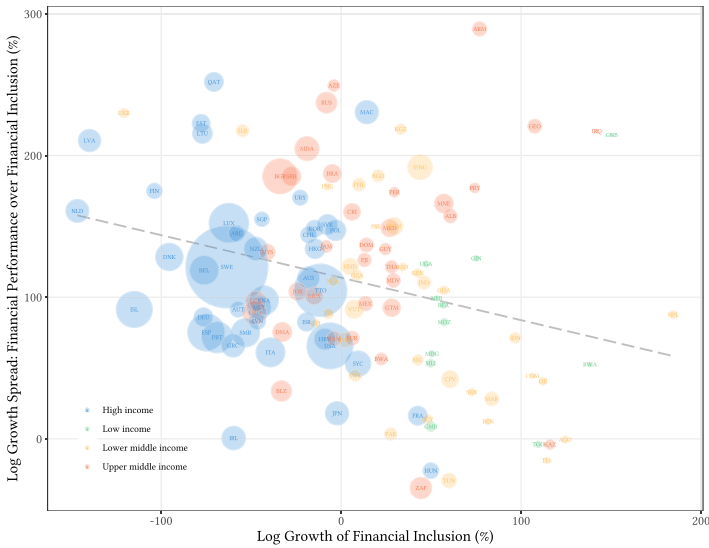
¹¹ Due to constraints on data availability, we have used the maximum possible time range in both plots without guaranteeing that the time ranges are equal. This is because it always makes more sense to include longer time ranges.



Notes: The x-axis represents the log growth rate (%) of the financial performance proxy, private credit, from 1985 to 2020. The y-axis is the log growth rate (%) of GDP per capita from 1985 to 2020. The colors present the initial states of GDP per capita, and the larger scatter size indicates better inclusion of financial systems (the larger number of bank branches) in 2020.

Fig. 1 Growth of private credit and GDP per capita

explanation for this phenomenon that the development of financial inclusion does not immediately expand the performance (market size) of financial activities. Some country-level omitted variables may disconnect the transmission from financial inclusion expansion to the size of financial activities. However, these omitted variables are more persistent and difficult to be affected by short-term financial infrastructure improvement. For example, the willingness to borrow might not increase as more bank branches in their neighborhood. Kinnan and Townsend (2012) leaves the potential for kinship to affect and facilitate participation in financial activities. Kremer et al. (2022) also sheds light on cultural factors persistently correlate with economic growth and policy changes cannot reshape culture easily. As a result, catching up on financial inclusion in low-income countries is not an exercise in futility. Yet, financial inclusion needs to be combined with additional factors to facilitate more financial activities and subsequent economic growth.



Notes: The x-axis represents the log growth rate (%) of the financial inclusion proxy, the number of bank branches per 100,000 adults, from 2004 to 2020. The y-axis is the growth spread (%) of the financial performance (private credit growth) over the financial inclusion. The colors present the income levels defined by the World Bank, and a larger scatter indicates better inclusion of financial systems (a larger number of bank branches) in the initial state (2004).

Fig. 2 Growth of financial inclusion and financial performance

5 Conclusion

In addition to financial policy convergence documented in Kremer et al. (2022), we further document that financial inclusion has converged across countries since 1985. This observation is consistent with the view of policy convergence — developing countries expand their financial service coverage to modernize the economy with capital. However, if we measure the actual size (a.k.a, quantity metrics) of the financial sector, we find six out of seven variables exhibit significant divergence over time: liquid liability, credit, issuance company assets, mutual fund assets, financial system deposits, and stock market capitalization. The widened gap in financial market development demonstrates strong path dependence — the countries with better financial performance tend to advance further despite convergence in GDP, policy correlates, and financial inclusion.

The remaining question is why financial sector development persists over time, given that policy and financial inclusion have become more and more similar across the country. Several forces can possibly explain the divergence. The nature of financial intermediaries can be a reason — if we consider the stock market, the leading equities market attracts global investors, and more capital further attracts more firms to issue their shares in the leading stock markets. Moreover, some social norms and cultures might also nurture different growth paths of financial development; for example, a lack of trust might make lenders set a higher bar for borrowers, and

simultaneously, a more restrictive lending rule further lowers the willingness to borrow from the formal financial institution. Future research could theoretically explain why countries segregate on high and low financial development levels, even without policy differences, and provide more empirical evidence.

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Data Availability The datasets are all publicly available, mainly compiled by World Bank and IMF. Researchers can obtain the same data following the data description in Section 2.1.

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