Financial Development: Structure and Dynamics

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This paper analyzes the process of financial development over the last three to four decades from the perspective of the fundamental frictions (agency and collective) to which economic agents were exposed. A comprehensive statistical benchmarking analysis showed that financial development followed regular dynamics that can be largely explained by the underlying frictions. In particular, the sequencing, returns to scale, and shape of the developmental paths for various types of financial activities—including public debt, banking, insurance, asset management, and capital markets—broadly matched benchmark predictions. Reflecting financial innovation and the dynamic interaction between financial and economic development, financial development paths were also found to be strongly dependent on initial conditions. At the same time, policy differences, including the failure to improve the quality of the enabling environment and prevent financial crashes (the dark side of finance), were found to explain a sizable share of the deviations of individual country paths from the benchmarks.
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What has shaped the process of financial development (FD), and how regular has it been? Has this process followed a single or multiple paths? What were the sequences and shapes of the paths followed by different financial services and activities (as measured by FD indicators) as economies developed? How did policy—whether aimed at strengthening the enabling environment for financial contracting or ensuring the sustainability of FD—affect these paths?

Remarkably, the literature (particularly the empirical literature) that attempts to explain how economic development and financial sector policies jointly affect FD is still nascent.[2] The proposition that financial structure is shaped by the efforts of market participants to circumvent and reduce the

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2. See Huang (2005) for a comprehensive review of the literature on the determinants of FD.

frictions that hinder financial contracting is of course a familiar one.[3] However, few papers have attempted to analyze these frictions in terms of the way they interact and what this interaction may imply for the dynamics of FD.[4] At the same time, FD has typically been understood as a relatively smooth and predictable march from "relationship-based finance" to "arm's-length finance" involving a systematic process of market completion driven by a gradual reduction of agency frictions.[5] However, the global financial crisis showed that FD has a "dark side" associated with volatile boom-bust cycles. Thus, what may appear as progress in market completion can, in fact, exacerbate market failures, thereby undermining the sustainability of FD.

This paper begins by exploring and explaining the patterns of FD based on a simple typology of the frictions that hinder financial contracting. Following work by de la Torre and Ize (2010, 2011), the paper separates the frictions into agency frictions, which restrict the scope of bilateral contracting, and collective frictions, which restrict the scope of multilateral interaction and participation.[6] The structure of the financial system and its evolution over time (hence FD) reflect efforts to find the path of least resistance around these frictions. This hypothesis leads to broad predictions regarding the sequencing of financial activities, the shape of their development paths, the importance of scale effects, and the role of public policy. The hypothesis also suggests that the same easing of frictions that underlies the "bright side" of FD (innovation, market completion, improved allocation of funds and risks) can breed the tensions and fault lines of the "dark side" (systemic fragility, excessive fluctuations, crises).

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3. See, for example, Merton and Bodie (2004).

4. Interestingly, more work has been done on measuring the impact of FD on economic growth than on exploring how FD is affected by policy and economic growth (see, for example, Beck and Levine, 2004). When discussing the impact of financial structure on growth, the literature, at least until very recently, generally concluded that function matters more than form. See Demirgüç-Kunt and Levine (1999) or Allen and Gale (2000). More recent papers (such as Demirgüç-Kunt, Feyen, and Levine, 2011) have come closer to recognizing that there might be such a thing as an "optimal" financial structure, that is, that form might also matter.

5. An earlier strand of thought viewed FD as driven by the steady mitigation of asymmetric information failures, such as moral hazard and adverse selection (see, for instance, Akerlof [1970], Spence [1973], and Stiglitz and Weiss [1981]). A more recent strand has emphasized enforcement costs and lack of collateral leading to problems of limited pledgeability (see Holmstrom and Tirole [1996], and Geanakoplos, [2009]). Rajan and Zingales (2003) present a more complete narrative rooted in the same basic threads.

6. Failures to reduce agency frictions continue to dominate the FD literature. Such failures may occur at the level of the investor (reflecting an inability to monitor or a lack of interest in doing so), at the level of the borrower (reflecting problems of governance), or somewhere in between (reflecting problems of incentives and "skin in the game" at some level of the contractual chain or the monitoring pyramid). Failures to resolve multilateral-participation frictions, although less frequently discussed, are equally important. These failures are a routine occurrence in less-developed financial systems and justify much of the state's catalytic and financial infrastructure-building role. However, such failures may also occur in well-developed systems, particularly in the process of spreading risk (see Anginer, de la Torre, and Ize [2011]).

To explore such issues, we use a battery of 16 financial indicators that relate to different dimensions (depth-size or liquidity-efficiency) and channels (markets or institutions) of FD. To create a uniform set of dynamic benchmarks that facilitates comparisons across countries, we use a comprehensive set of country-level controls consisting of variables that reflect the stage of economic development (initial and current per capita income) as well as structural variables that are arguably exogenous to financial policy, including population size and density. We find that FD, as measured by the benchmarks, followed regular dynamics. However, development paths depended on the initial level of per capita income. Thus, the lower-income countries did not generally retrace the steps followed in the past by the current higher-income countries. This finding suggests that across-the-board innovations (that lift all boats at the same time) and path dependencies (that reflect dynamic interactions between financial and economic development) are both relevant for a country's FD trajectory. The fact that the data we use cover only a small slice of the world's FD history (35 years at most) compounds the importance of such initial income effects.

Reflecting the differential impact of frictions on different financial activities, paths differed widely across FD indicators. Indeed, the sequencing of financial services broadly conformed to what one would expect based on the gradual smoothing of the frictions along the paths of least resistance. For example, reflecting differences in the difficulty of coping with bilateral agency frictions (information or contract enforcement costs) across financial services, credit to governments developed before credit to private participants, bank deposits preceded bank credit, and the development of capital markets and associated institutions, such as mutual funds and other forms of asset managers, followed the development of bank credit. At the same time, reflecting collective frictions and network effects, external funding of the government preceded domestic funding, retail funding preceded wholesale funding, casualty insurance preceded life insurance, the development of capital markets lagged behind and was highly convex (a manifestation of large scale and network effects), and interconnectedness increased significantly as financial systems matured.

We further explore the dynamics of FD based on an analysis of how and why countries deviated from their benchmark paths. For this exploration, we use as additional controls a number of policy-related variables proxied by various enabling-environment indicators. We also include a financial crash variable to capture the dark side of FD. We find that enabling-environment factors, such as enforcement costs, creditor or property rights, and credit information, played an important role in promoting FD. However, we find that contractual frictions (rather than informational frictions) explained the bulk of policy-induced developmental differences across countries. Although informational frictions could be mostly overcome through technological innovations that could be more easily imported, contractual frictions mostly reflected weaknesses in local (nonimportable) institutions that were more difficult to resolve.

Regarding booms and busts, we find that financial crashes accounted for large and lasting lags in FD that cut across a surprisingly large number of indicators and dimensions of FD. The lasting impact of financial crashes clearly puts a premium on central bankers' and supervisors' capacity to anticipate and control unsustainable booms through monetary or macroprudential policies.

The rest of the paper is organized as follows. Section 2 briefly presents the conceptual framework for financial frictions that underpins FD (the bright side of finance) and links it with financial instability (the dark side of finance). Section 3 describes the data and procedures that are used to estimate the FD paths. Section 4 presents the dynamics of FD as given by the benchmark paths. Section 5 explores the role of policy in explaining deviations from the benchmarks. Section 6 concludes.

I. FINANCIAL FRICTIONS, FINANCIAL DEVELOPMENT, AND FINANCIAL STABILITY

The financial services industry emerges to help market participants find ways to reduce or circumvent the two classes of frictions that hinder financial contracting: bilateral agency frictions and multilateral collective frictions. Each class can be sub-divided into two categories: informational frictions (which relate to agents' limited and often asymmetric capacity to understand information and to the costs of obtaining information) and relational frictions (which hinder agents' capacity to agree, act upon, and enforce bilaterally or collectively beneficial financial contracts). This simple dichotomy underpins four paradigms, of which two (asymmetric information and costly enforcement) are associated with agency frictions and two (collective action and collective cognition) are associated with collective frictions.[7]

Asymmetric information frictions hinder FD because they lead to a misalignment of incentives between the principal and the agent. This misalignment, in turn, can trigger the commonly known market failures of adverse selection, risk shifting, shirking, and false reporting. Thus, information asymmetry frictions limit financial contracts to those contracts in which the agent has sufficient resources of its own at risk ("skin in the game") and/or where the principal can adequately screen and monitor the agent. Enforcement frictions also lead to a misalignment of incentives between the principal and the agent and, in this case, because of imperfect pledgeability, to a situation in which the agent is unable to credibly commit to honor the contract. Imperfect pledgeability thus restricts financial contracts to those contracts that can be effectively collateralized.

Collective frictions hinder FD by constraining collective (rather than bilateral) participation. Much of the gains from financial activity relate to the reduction in transaction costs and the increase in liquidity and risk diversification benefits that result from multilateral arrangements in which many players

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7. For more details on the paradigms, see de la Torre and Ize (2010, 2011).

participate. Such arrangements can either take place in markets, where transactions can be conducted around a trading platform, or through financial institutions that offer services whose benefits are pooled across a large number of customers. The higher the number of participants is, the higher the benefits of participation will be. However, although participation creates positive externalities for society at large, it may be hindered by coordination failures. For example, because of first-mover disadvantages, an investor may abstain from buying a long-term security for which there is no secondary market and, hence, no liquidity. In this case, there is a multilateral (individual versus social) misalignment of incentives. Participation may also be hindered by collective (even symmetric) cognition frictions; one does not participate in an activity that is not well understood.

Therefore, market participants who wish to engage in financial contracting must find the path of least resistance around these frictions and the associated market failures. Once a decision is made to participate, private responses to coping with frictions can be divided into two subsets: responses aimed at lessening the frictions themselves (acquiring information, using collateral, delegating) and responses aimed at lessening the exposure to these frictions (diversifying and pooling risk, buying insurance and hedges, staying liquid). In turn, the state facilitates these private responses through a set of progressively more intrusive public interventions: (i) the provision of a basic contractual and informational infrastructure that facilitates contracting; (ii) coordination arrangements that facilitate participation (catalytic involvement to promote market development, systemic lending of last resort, government guarantees); (iii) the regulation and taxation needed to internalize externalities or protect consumers; and (iv) the direct provision by the state of financial services.

Financial structure is a snapshot, at a given point in time (hence, for a given technological and state of market development), of the composition of financial services aimed at coping with financial frictions. FD reflects the evolution of financial structure over time. At lower stages of FD, financial institutions resolve agency frictions by relying on nontradable and immovable collateral and relationship-based transactions. However, as the informational and contractual environment improves, private information becomes public, other types of collateral become available and tradable, and monitoring can increasingly rely on third parties, statistical methods, and accounting and disclosure standards.[8]

8. Different components of the financial system help address frictions in different ways. Consider information frictions: Capital markets provide price signals and motivate the supply of hard, public information by borrowing firms; banks generate proprietary information on clients; fund managers contribute to information gathering by monitoring marketable assets; and market facilitators (auditors, rating agencies, credit bureaus) contribute by selling specialized information and analysis. Consider risk management: Capital markets allow investors to diversify risk by buying assets with different risk profiles, and banks, insurance companies, and asset managers provide diversification through pooling. Finally, consider liquidity: Capital markets provide the liquidity that allows participants to unwind assets at limited cost, and banks offer deposits that can be redeemed on demand and at par.

The gradual easing of agency frictions thus helps boost participation, which unleashes positive network and scale externalities (e.g., liquidity, learning spillovers, efficiency) and sets in motion a virtuous development cycle. In turn, rising participation gradually increases the degree to which financial institutions and capital markets complement each other. The entire process is accelerated by financial innovation.[9]

The gradual easing of finance frictions provides a few predictable regularities that can be empirically verified. The first regularity concerns the sequence in which various financial activities are likely to develop, the second regularity concerns the shape of the paths they are likely to follow once they begin, and the third concerns the volatility of FD, reflecting the seeds of financial instability that germinate while FD takes place and that may eventually develop into a financial crisis.

The order of development of financial activities should reflect the intensity of the frictions to which they are exposed. The activities that are the least constrained should develop first. However, those financial services that are strongly inhibited by collective frictions should develop only after a critical mass of participation has been reached that is sufficient to trigger the positive network externalities needed to sustain their development. We would thus expect participation-intensive financial activities to be those that have the most rapid development paths (the most "buoyant" or convex) once they have passed this initial threshold. Because activities that exhibit the highest returns to scale are expected to be those exposed to the highest collective frictions, scale effects should correlate with the order in which financial activities develop and, subsequently, the buoyancy of their development.[10]

9. The history of FD is marked by major waves of innovation. Consider, for instance, the role in the exponential ascent of finance in the Western world stemming from the invention of Italian banking (based originally on trade-related bills of exchange) by the Medici in the late 14th century; the introduction of payment systems based on checking accounts, fractional reserve banking, and central banking during the 17th century; the development of the government bond market, its seeds already visible in the late middle ages; the invention of the joint-stock, limited liability company in the early 17th century and the associated mushrooming of stock exchanges; the emergence of marine insurance and life insurance in the second half of the 17th century; or, in the latter part of the 20th century, the development of securitization and derivative products. For an insightful and entertaining rendition of the history of finance in the Western world, see Ferguson (2008). For a recently updated review of the roots and dynamics of financial innovation, see Lerner and Tufano (2011). For the role of competition and deregulation in FD, see Rajan and Zingales (2003). Examples of theoretical and methodological breakthroughs that have dramatically influenced FD include double-entry bookkeeping, probability theory, life expectancy tables and actuarial science, and the Black-Scholes option theory.

10. The pattern can be broadly corroborated through comparative historical studies. The literature on the history of finance in the Western world is vast. See, for instance, Ferguson (2008) and Rajan and Zingales (2003).

However, the same frictions that underlie FD (the bright side of finance) are also likely to be at the root of its dark side (financial instability). We define the "dark side" as the type of financial malady in which the actual success in the process of smoothing frictions can endogenously lead to systemic instability.[11] This type of adverse dynamic may ensue if the easing of frictions boosts participation in such a way that it unleashes new and possibly more severe forms of frictions. FD may thus advance along a fragile or self-destructive trajectory that may lead to large and lasting reversals in developmental indices.

The dark side may arise at the interface between agency and collective action frictions. The smoothing of agency frictions facilitates a switch from private to public information, which, in turn, promotes participation but leads to a socially insufficient supply of screening and monitoring. Investors free ride on the increased availability of public information and choose to remain short and rely on market liquidity and public information to exit at the first sign of possible trouble.[12] The boost in participation can also promote risk origination without sufficient "skin in the game." As observed in the global crisis, this situation can give rise to a complex and opaque chain of transactions, which is ultimately unstable.[13]

This situation may also arise from dynamics associated with the intensification of collective action problems. The positive externalities of increased market participation in good times may turn into crippling negative externalities in bad times. Thus, market withdrawal in times of stress may be individually optimal but socially harmful because it can trigger self-fulfilling liquidity collapses.[14] Financial institutions may become too large (from a social point of view) because participants may not internalize the negative externalities (e.g., domino effects and contagion) associated with the failure of systemically important financial institutions and the too-big-to-fail or too-interconnected-to-fail syndromes that are associated with these failures.

The dark side may also be associated with the swelling of collective cognition problems. The successful easing of frictions (including through innovation) may lead to problems of collective cognition that, in a world of collective uncertainty, may result in wide mood swings. The bonanza associated with enhanced participation feeds a collective mood of optimism that unleashes bouts

11. There are other types of FD maladies. For instance, the lack of success in smoothing the frictions that make some forms of financial contracting impossible can itself be considered a malady. The success in smoothing frictions that leads to developmental inefficiencies can also be considered a malady. For example, financial innovations that are designed only to evade taxes or regulations may be beneficial to their creators and users, but not to society at large. Indeed, much of the increase in funds mobilization and allocation prior to the subprime crisis was arguably socially wasteful, even if it did not have adverse systemic stability consequences (Haldane, 2010). We are indebted to one of the referees for noting this point.

12. Huang and Ratnovski (2010) show that the dark side of bank wholesale funding dominates if bank assets are at arm's length and tradable.

13. See Ashcraft and Schuerman (2008) and Gorton and Metrick (2010).

14. See Shleifer and Vishny (2011).

of exuberance. The euphoric mood initially accentuates the upswing; however, once unexpected realities emerge, euphoria can easily turn into despair, worsening the collapse.[15]

II. Data and Estimation Procedures

In this section, we conduct a simple empirical analysis of FD indicators. Our aim is to illustrate the above conceptual framework by showing that the sequence of development of various financial activities and the shape of the path that they follow as they develop is consistent with (and thus validates, at least broadly) the broad footprints described above.

We measure domestic FD based on 14 depth-size indicators that include the following:[16]

- Key components of commercial banks' operations (retail and wholesale funding, credit to the private sector, credit to government, and claims on other domestic financial institutions)

- Insurance company premia (life and casualty)

- Mutual fund and pension fund assets

- Public and private debt securities (domestic and international capitalization)

- Equity (total stock market capitalization)

We complement these indicators with two indicators of efficiency-liquidity for which there is sufficient cross-country data:

- Banks' net interest margin

- Equity market turnover

To make the data as comparable as possible across countries, we create FD benchmark paths for each FD indicator by controlling for structural factors that can be considered policy exogenous (at least in the short term), including population (size and density) and three other country-specific characteristics that, for a given level of economic development, have a sizable impact (positive or negative) on FD (fuel exporter, offshore financial center, transition

15. The South Sea bubble and panic of 1720, which materialized in the wake of the financial revolution of the late 18th century, is an early example of bright side leading to dark side. The importance of mood swings for financial bubbles and panics has its roots in Keynes's animal spirits and Hyman Minsky's writings on financial crises (see Minsky 1975). More recently, the importance of mood swings was popularized by Kindleberger (1989) and Shiller (2006).

16. The data are from FinStats, a worldwide financial database compiled by the World Bank, which covers 40 key financial indicators for the 1980–2010 period (coverage quality varies between variables). The data come from a variety of sources, including the IMF's International Financial Statistics, BIS, WDI, S&P, Bankscope, Axco, and national sources.

country).[17] We also control for economic development, as proxied by per capita GDP. Although the latter is clearly not exogenous to FD, this fact is not a significant concern for what we want to achieve here.[18]

Reflecting that FD can be expected to be generally path dependent, we also include as controls the initial level of GDP per capita (as measured for the earliest date for which financial statistics are available) and its interaction with current GDP per capita. By introducing a level effect, including initial GDP per capita allows countries at different initial levels of economic development to follow their own dynamic FD path. The interaction term, for its part, allows the slope of this dynamic FD path to vary with the level of initial economic development.

As shown in the supplemental appendix S.II, this specification is key to properly representing the dynamics of FD, whether they reflect the impact of financial innovations or the interactions between economic and FD. Financial innovations are typically transferable across countries and thus tend to be introduced across the board (in low- as well as high-income countries)—that is, financial innovations can cause a boost in financial activity that "lifts all boats at the same time," with dynamic paths suddenly surging above the cross-section (benchmark) line at all per capita income levels in a parallel fashion.[19] In addition to allowing for such parallel surges, including the initial income level in the estimating regressions also helps to capture path dependence. Initial conditions matter because today's FD depends on today's output, which in turn depends on yesterday's FD. Path dependence thus implies that better initial institutions can become self-reinforcing.[20]

To facilitate the interpretation of the coefficients, we decompose the income effects into an initial income effect, y_0^i, and an income-growth effect, $y_t^i - y_0^i$ (all in logs). The estimating equation is as follows:[21]

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17. The controls were selected iteratively, based on individual statistical significance and collective explanatory power.

18. Detecting FD patterns does not require identifying and isolating the ways in which the dynamics of financial and economic development interact. In addition, as long as FD affects economic development with a longer lag than the other way around, financial sector policies will have at least a temporary impact on FD that is not fully captured by economic development. If so, generating a benchmark path for each FD indicator and comparing countries against the benchmark is informative in terms of the quality of FD policies. Thus, deviations from benchmarks can be at least partially interpreted as reflecting differences in policies and (policy-driven) institutions. See supplemental appendix S.I (available at http://wber.oxfordjournals.org/) for a formalization of this argument.

19. Consider, for example, the cases of credit card services and e-banking. These services are now found in most developing countries, and although they cover a smaller fraction of the adult population, they work with comparable functionality and quality as in rich countries. In both cases, developing countries have been able to leapfrog because the associated technology is relatively easy to import and adapt and the services do not depend significantly on local contractual institutions.

20. See North (1990).

21. To better capture the underlying FD patterns, we employ quantile (median) regressions, which are less influenced by outliers.

$$(1) \qquad FD_t^{i,j} = \alpha_0^j + \alpha_1^j y_0^i + \left(\alpha_2^j + \alpha_3^j y_0^i\right)\left(y_t^i - y_0^i\right) + \alpha_4^j s_t^i + \Omega_0^j X_t^i + \Omega_1^j Z_t^i + \varepsilon_t^j$$

where $FD_t^{i,j}$ is the (log of) the indicator j of FD for country i at time t, s_t^i is the (log of) the country's population size, X_t^i is a vector of other country-specific structural characteristics, and Z_t^i is a vector of policy variables.

The α_1 coefficient measures the elasticity of FD with respect to the country's initial per capita income. The higher this elasticity is, the more dependent the development of the financial indicator (or financial activity) is on the country's initial level of economic development (per capita income). Thus, this coefficient can be viewed as a proxy for sequencing: The activities that are more income elastic develop "later" than those activities that are less income elastic. Similarly, the $\alpha_2 + \alpha_3 y_0$ coefficient measures the elasticity of FD with respect to the country's per capita income growth.[22] The higher this elasticity is, the faster the activity develops with the country's economic development. Thus, growth elasticity characterizes the "buoyancy" of the financial-activity path. Finally, the α_4 coefficient measures returns to scale (elasticity relative to population size). Activities with higher returns to scale prosper in larger countries.

We run this regression in two stages. First, to fully capture the longer-run dynamics of FD and thus obtain a more meaningful benchmark, we estimate the regression over the whole panel but without policy and institutional variables. The results of this first stage are discussed in section 3. In the second stage, we reestimate the equation with policy-related institutional variables to capture their specific impact on FD. This second stage, whose results are examined in section 4, is conducted over a narrower sample because of limitations in the data on enabling-environment indicators.

III. FD Growth Patterns

Table 1 reports the results of the first-stage regressions over the full sample. Note first the impact of the structural controls. Reflecting returns to scale and network effects, FD tended to lag in countries with smaller or more dispersed populations. In contrast, reflecting uneven growth across sectors, FD in oil-exporting economies lagged behind FD in other economies at similar levels of income. Similarly, FD lagged behind in transition economies, in this case reflecting a pretransition economic system that did not favor FD. Inversely, and for obvious reasons, FD in offshore centers generally led FD in other countries.

Table 2 shows the variance decomposition of these estimates, expressed by groups of variables, in terms of simple averages (of absolute values) over all indicators as well as ranges (maxima and minima). The initial level of economic development (per capita income) accounts for the bulk (nearly half) of the

22. The coefficient is measured for, $y_0 = \bar{y}_0$ where $\bar{y}_0$ is the median initial income level for the entire country sample.

TABLE 1. Basic Benchmark Regressions

	Bank Private Credit 1	Net Interest Margin 2	Bank Claims On Dom. Fin. Sector 3	Bank Credit To Government 4	Bank Domestic Deposits 5	Bank Non-Deposit Funding 6	Insurance Premiums (Life) 7	Insurance Premiums (Non-Life) 8
Panel A								
Log Initial GDPPC	0.372***	−0.261***	0.822***	0.285***	0.288***	0.380***	0.619***	0.267***
Log GDPPC minus Log Initial GDPPC	0.840***	0.120	−0.286	1.634***	1.535***	−0.271	0.745**	−0.155
Interaction	7.95^{e-05}	−0.0837***	0.223***	−0.183***	−0.0964***	0.146***	0.133***	0.0686***
Log Population	0.0721***	−0.0660***	0.243***	0.0940***	0.0367***	0.0717***	0.0424**	−0.0496***
Log Population density	0.0193***	−0.0293***	0.339***	0.200***	0.0870***	0.0452***	0.0999***	−0.0403***
Fuel dummy	−0.272***	0.00729	−0.256***	−0.262***	−0.163***	−0.0551	−0.687***	−0.202***
Offshore dummy	0.331***	0.105**	−0.634***	0.166***	0.333***	0.428***	−0.130	0.107**
Transition dummy	−0.0350	0.187***	−0.102	−0.0864	−0.170***	0.220***	−0.779***	−0.0863*
Constant	0.285***	3.709***	−8.413***	−1.285***	0.815***	−0.441***	−6.126***	−1.708***
Observations	4,075	1,785	1,643	4,003	4,097	3,983	2,138	2,308
Pseudo R^2	0.388	0.294	0.247	0.141	0.401	0.285	0.384	0.357
Panel B								
Log initial GDPPC	0.317***	0.734***	0.672***	0.415***	1.010***	0.159***	1.030***	−0.134***
Log GDPPC minus Log initial GDPPC	−3.501**	−1.423***	1.853***	0.253	2.332***	0.0639	−0.426	−2.144***
Interaction	0.566***	0.472***	−0.0452	0.0900	−0.0578	−0.0207	0.239***	0.167**
Log population	−0.0994	0.135***	0.462***	0.118***	0.112***	0.0973***	0.122***	−0.243***
Log population density	−0.152***	0.00934	0.0661***	0.0756***	−0.131***	0.0571***	−0.0115	−0.253***
Fuel dummy	0.360**	−0.224**	−0.0575	0.0716	−0.785***	−0.357***	0.0507	−0.00290
Offshore dummy	−0.278	0.960***	−0.592***	0.391***	−0.0158	−0.345***	0.150	−0.0280
Transition dummy	−1.834***	−1.421***	0.722***	−0.669***	−0.504**	−0.118	−0.499***	−0.474***
Constant	0.247	−5.554***	−4.359***	−0.975***	−6.488***	1.579***	−7.983***	4.601***
Observations	568	613	1,682	1,818	889	978	985	1,198
Pseudo R^2	0.169	0.383	0.375	0.274	0.353	0.0808	0.382	0.138

Notes: This table displays the median regression results of equation (1) using a panel of country-year data for the 1980–2010 period. GDPPC stands for gross domestic product per capita.

Source: Authors' analysis based on data described in the text.

TABLE 2. Variance Decomposition of the Benchmark Regressions

% of total variance	Log initial GDPPC	Current adjusted GDPPC	Population size	Other structural characteristics	Private credit crash	Strength of legal rights index	Credit information index	Strength of investor protection index	Enforcement costs	Residual
Without policy variables										
Average	22	15	4	7	..	..	..	..	..	52
Min.	1	4	0	1	..	..	..	..	..	32
Max.	44	33	24	17	..	..	..	..	..	80
With policy variables										
Average	18.4	17.9	4.1	6.8	4.4	3.3	2	1.7	1.3	40.2
Min.	0.5	5.5	0	1	0.5	0	0.1	0.4	0	23.5
Max.	42	32.8	25.7	21.2	18.7	18.2	4.3	4.8	3.3	63.9

Notes: This table provides a variance decomposition (using the regression coefficients from tables 1 and 4), calculated for indicator F as $VAR(F) = \Sigma\beta COV(F, X) + COV(F, \varepsilon)$. Other structural characteristics refer to the joint variance component of population density, fuel exporters, offshore centers, and the transition dummy. GDPPC stands for gross domestic product per capita.

*Source:* Authors' analysis based on data described in the text.

explained cross-country variations in FD, which, in turn, account for approximately half of the total variance. Thus, much of the cross-country FD pattern is simply explained by initial conditions, which, in an important sense, summarize the entire history of the economic and FD of a given country prior to the first observation in the sample period. However, countries' economic growth thereafter and over the sample period explains a substantial portion (approximately 30 percent) of the explained portion of FD paths, with population size and other structural controls accounting for the rest.

Figure 1 orders financial indicators in accordance with their elasticities with respect to initial per capita income and contrasts these elasticities with the growth and returns-to-scale elasticities. Panel C of figure 1 shows the matrix of cross-correlations across indicators. As a whole, figure 1 broadly validates one of the three main predictions of section 2: Sequencing, buoyancy, and returns to scale are all substantially correlated. The correlation between sequencing and buoyancy is particularly high; the later an activity develops, the faster it develops once it takes off. This result is expected once strong collective (participation) frictions are overcome. The positive correlation between sequencing and returns to scale also confirms that returns to scale relate to collective frictions. Larger returns to scale require higher critical mass for an activity to develop, and thus, it is more difficult for this activity to develop in the presence of substantial collective frictions.

To further test the hypothesis that sequencing, buoyancy, and returns to scale are interrelated, we group the indicators according to their initial income, income growth, and size elasticities (table 3). Regarding income, the high correlation between initial income and income growth elasticities simplifies this task because all FD indicators can be placed in three groups (column headings of table 3): early developers with low buoyancy ($\alpha_1 < 0; \alpha_2 + \alpha_3 \bar{y}_0 < -0.1$), middle developers with average buoyancy ($\alpha_1 \in [0, 0.5]; \alpha_2 + \alpha_3 \bar{y}_0 \in [-0.1, 1]$), and late developers with high buoyancy ($\alpha_1 > .5; \alpha_2 + \alpha_3 \bar{y}_0 > 1$). Financial indicators in the first group developed early but declined in importance as income grew. In contrast, the third group appeared late but grew very quickly. The middle group was somewhere in between.

Regarding size, we divide activities into those with negative returns to scale ($\alpha_4 < 0$), low returns to scale ($\alpha_4 \in [0, 0.1]$), and high returns to scale ($\alpha_4 > .1$) (row headings of table 3). Most financial activities (12 out of 16) cluster in the diagonal cells of the table, fully matching the predictions of section 3. That is, the later the initial level of economic development at which a financial activity developed is, the faster it developed as income grew and as it was increasingly subject to increasing returns to scale. The financial services above the diagonal or below the diagonal do not fully match the predictions of section 3. Above the diagonal are financial services that, given their low returns to scale,

FIGURE 1. Sequencing, Buoyancy, and Returns to Scale
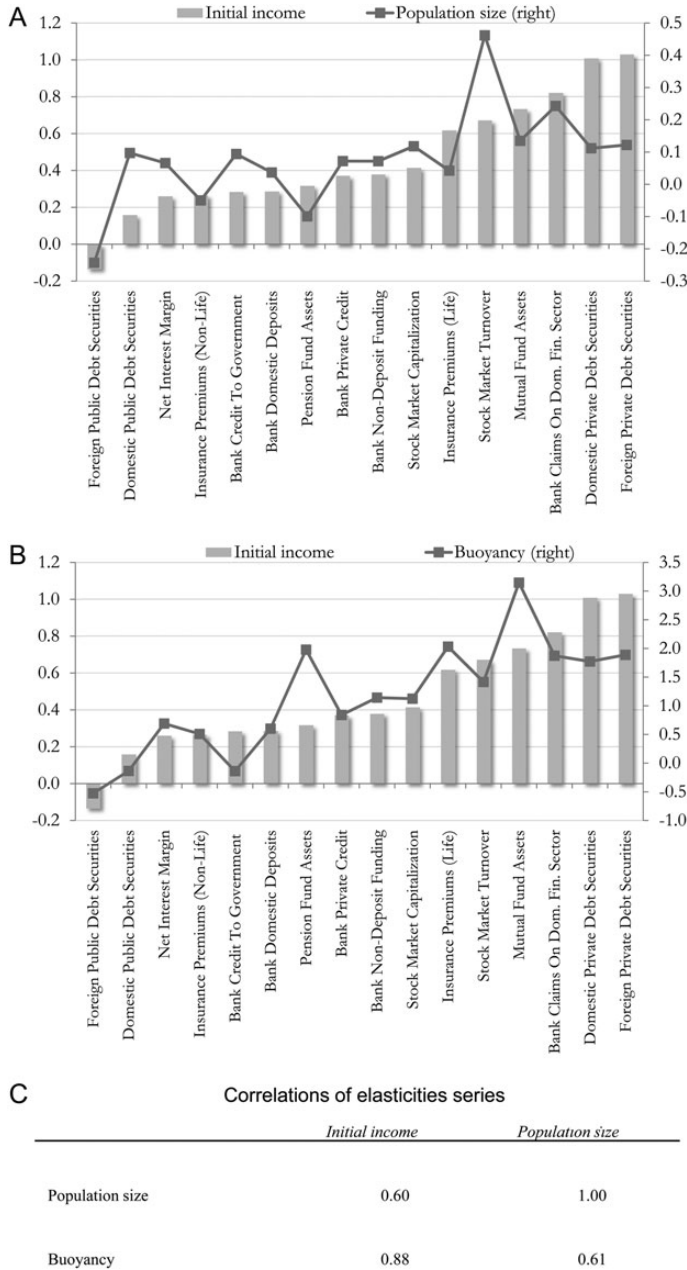
Notes: On the basis of equation (1), this figure present elasticities of initial income (α_1) and population size (α_4)–panel A-, and "buoyancy" ($\alpha_2 + \alpha_3 \bar{y}_0$), where $\bar{y}_0$ is the median of the initial income distribution–panel B-. The buoyancy elasticity, which depends on initial income, measures the financial development response to GDP per capita growth. Panel C contains the pairwise correlations between these three series.

TABLE 3. Typology of Financial Activities Based on Sequencing and Returns to Scale

	Early developers $\alpha_1 < 0; \alpha_2 + \alpha_3\bar{y}_0 < -0.1$	Middle developers $\alpha_1 \in [0, 0.5]; \alpha_2 + \alpha_3\bar{y}_0 \in [-0.1, 1]$	Late developers $\alpha_1 > 0.5; \alpha_2 + \alpha_3\bar{y}_0 > 1$
Negative returns to scale ($\alpha_4 < 0$)	Foreign public debt	Casualty insurance Pension fund assets*	
Low returns to scale ($\alpha_4 \in [0.0.1]$)		Domestic public debt Bank credit to government Bank private credit Bank retail funding Bank wholesale funding Net interest margins	Life insurance
High returns to scale ($\alpha_4 > 0.1$)		Stock market capitalization	Domestic private debt Stock market turnover Bank claims on financial sector Mutual fund assets Foreign private debt

Notes: This table presents a taxonomy of financial activities grouped along two dimensions: (1) sensitivity to population size (returns to scale) and (2) sensitivity to GDP per capita (both initial income and income growth effects). The returns to scale dimension is based on elasticity α_4 from equation (1). Sensitivity to GDP per capita is based on the initial income elasticity (α_1) and the buoyancy term ($\alpha_2 + \alpha_3\bar{y}_0$), where $\bar{y}_0$ is the median of the initial income distribution. The regression coefficients are taken from table 2. The Net interest margin coefficients were multiplied by -1 to ensure that an increasing value signifies a financial development improvement.

* indicates not significantly different from zero.

developed later than expected (casualty insurance) or more buoyantly than expected (life insurance).[23] Below the diagonal is one financial indicator (stock market capitalization) that, considering its high returns to scale, developed earlier than expected. However, these three FD indicators that deviate from predictions are only mildly deviant (there are no activities in the top-right cell or in the bottom-left cell of table 3), and the reasons underlying their deviancy can be easily identified, as discussed below.

To better comprehend the process of FD, we examine each financial activity by grouping them into four categories (government borrowing, banking services, capital markets, and institutional investors) that are broadly ordered according to the sequencing of their development. To illustrate the dynamics, we chart the predicted growth trajectories followed by some of the indicators for individual countries as their income grew over their initial income level (figures 2 and 3). We plot the initial and current income on the horizontal axis and the value of the indicator on the vertical axis. The continuous lines correspond to the initial cross-country benchmarks (i.e., the projected values of the indicators when initial income varies across countries while current income remains equal to initial income). The dotted lines correspond to the expected country-specific FD trajectories, given its initial income (i.e., the values of an FD indicator projected for a country as its per capita income grows above its initial income).[24]

Government Borrowing

Somewhat surprisingly, public-sector borrowing was the financial activity that developed the earliest. Furthermore, public-sector borrowing developed in international markets before it did at home (figure 1). These features are easy to explain based on frictions. Public-sector borrowing developed early because sovereigns are well known; hence, agency frictions were comparatively easier to overcome.[25] However, public-sector borrowing developed abroad first because well-established international markets, by definition, have overcome the relevant collective frictions. Hence, it is not surprising that government borrowing initially took place abroad and in foreign currency.[26] As frictions eroded and countries' FD deepened, governments were able to substitute external

23. The indicator for pension fund assets also appears above the diagonal; however, its size elasticity is not significantly different from zero.

24. In both cases, to better reveal the income dynamics, the values of all structural controls are kept equal to their median values over the whole sample.

25. Nonetheless, governments' capacity to issue debt may be subject to establishing minimum credibility as a debtor. See, for example, Dickson (1967) for a discussion of the measures taken by the English monarchy to bolster the credibility of its debt in the late 18th century.

26. This is, of course, the basic premise of the original sin literature, which focuses on the inability of emerging economy sovereigns and corporates to issue long-term debt denominated in local currency (Calvo and Reinhart [2002]; Eichengreen, Hausmann, and Panizza [2003]). The fact that a better foreign institutional framework facilitates enforcement (especially postdefault value recovery) is an important driver of the "original sin" story (De la Torre and Schmukler [2004]).

FIGURE 2. Estimated Development paths for Government Funding
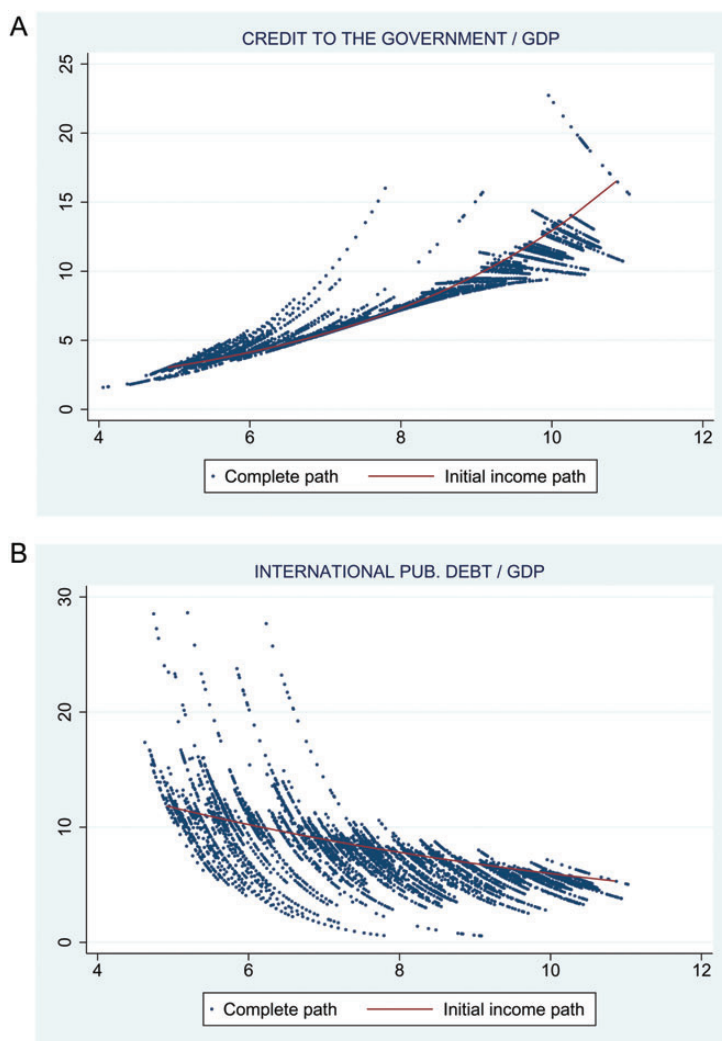
Notes: The figure presents the development paths of bank credit to government and state-owned entities (A) and international public debt (B) (both as a percentage of GDP), based on equation (1). The initial income path line is plotted against log initial income and is constructed by multiplying initial income by its estimated coefficient and adding a constant term to preserve scale. This constant is calculated as the sum of the sample median values of all right-hand variables in equation (1), with the exception of the estimated growth term, multiplied by the associated estimated coefficients and the estimated constant. The complete path is plotted against log GDP per capita and is composed of the predicted country-year values from equation (1).

borrowing with domestic borrowing. However, reflecting collective-participation frictions, governments typically started by borrowing from local banks instead of markets (figure 2). Thus, domestic public debt developed later than domestic bank credit to government or foreign public debt.

FIGURE 3. Estimated Development Paths for Bank Intermediation
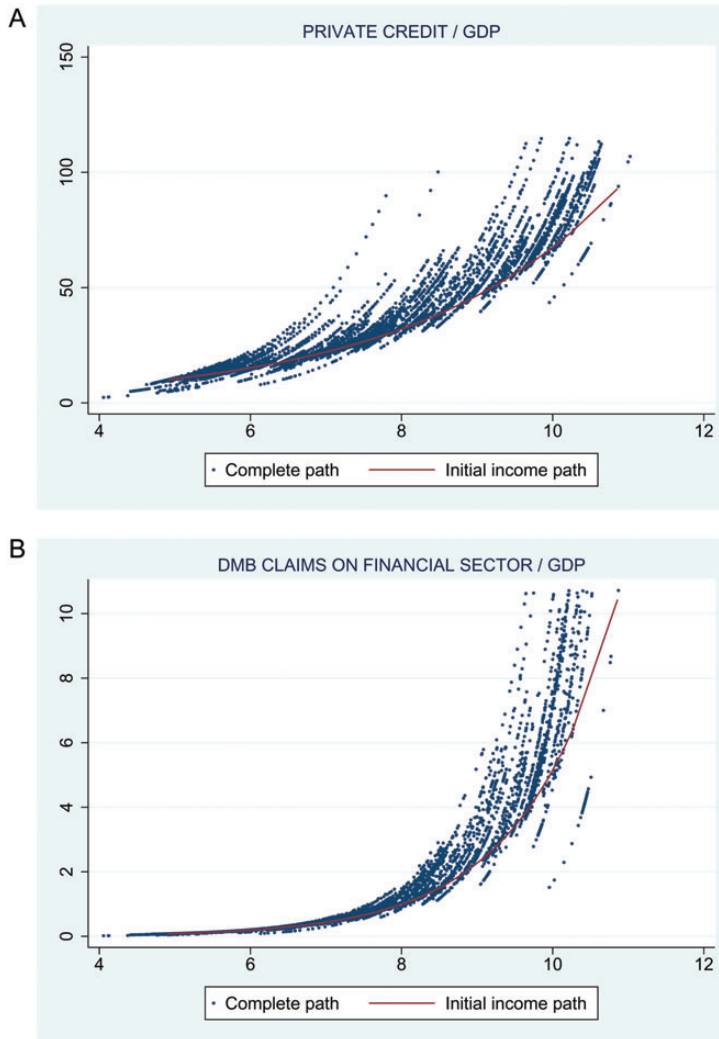
Note: This figure uses the same derivations as figure 2 as applied to bank credit to the private, nonfinancial sector (A) and bank claims on other financial institutions (B).

Banking Services

At the initial stages of FD, the lack of public information, a sound contractual framework, and tradable collateral restricts lending to mostly relationship lending based on private information rather than at arm's length (based on public information). Hence, banks would be expected to develop relatively

early, ahead of capital markets or asset managers such as mutual funds.[27] The fact that banks can also solve collective frictions efficiently through liquidity pooling and the provision of basic payment services further enhances their early attractiveness. Indeed, this early attractiveness is exactly what one observes. Banking services were the next financial activity to develop (figure 1). However, because attracting deposits is easier than overcoming agency frictions that limit lending, bank deposit taking should precede bank lending. Moreover, banks initially lent to governments rather than to private agents. Indeed, both features are corroborated by figure 1. At the same time, bank retail funding (deposits) took off before wholesale funding. As frictions eased, retail investors were increasingly able to shift into higher yielding, market-based instruments or to have their funds managed by asset managers or institutional investors rather than banks.[28] Reflecting participation frictions, bank claims on other financial institutions developed later but grew much faster once they developed (figure 3).[29] The gradual overcoming of collective frictions allowed banks to increasingly participate in an interinstitutional market that became denser as the number of players rose and the latter became more interconnected. Finally, note in figure 1 that improvements in bank efficiency (a reduction in net interest margins) began occurring very early, presumably as soon as banks started to operate.

Capital Markets

In view of the stronger agency frictions associated with arm's-length transactions, capital markets should only develop once public information has improved sufficiently. This hypothesis is largely consistent with the evidence. In view of high returns to scale, stock markets developed after banking (figure 1). Nonetheless, they developed ahead of prediction, which may be explained by the fact that equity issuance is an essential component of corporate finance (and governance) for larger firms. However, reflecting size thresholds and collective frictions that limit participation, the development of primary markets (market capitalization) should precede the development of secondary markets (market turnover), where trading liquidity is essential. As corroborated by figure 1, the secondary market developed after the primary market. At the same time, equity markets are likely to develop ahead of corporate bond markets because their

27. In particular, unlike markets, banks can develop even without a good legal framework (Rajan and Zingales [2001]).

28. Although our sample indicates that retail funding preceded wholesale funding, this sequence need not apply at all times and to all financial systems. For example, much of the precrisis banking growth in the Eastern European countries, which started from relatively limited levels of FD, originated from wholesale funding (mostly external) rather than domestic funding. Moreover, there appears to have been a shift (at least temporary) in many advanced economies back to retail funding following the global financial crisis.

29. The late but very rapid growth of interbank lending can be viewed as growth analogous to the rapid rise of bank interconnectedness that preceded the subprime crisis in the United States (Shin [2010]).

unlimited upsides can better compensate for the downsides associated with agency frictions. Again, figure 1 shows that this sequencing held: Private debt securities followed equity and developed abroad before developing at home.

Institutional Investors

The development of asset managers is likely to be constrained by the development of capital markets. In particular, the growth of mutual and pension funds should reflect the fact that marketable, liquid assets—which the funds need to invest in—appear relatively late. Furthermore, pension funds developed earlier than mutual funds (figure 1) because the collective frictions that needed to be overcome for their development were largely solved by an act of government (e.g., the creation of privately administered, fully funded, individual retirement savings accounts, often of a mandatory nature). In contrast, the frictions hampering the development of mutual funds (large returns to scale) had to be resolved by market forces. In both cases, however, their growth was extremely buoyant, reflecting the fact that marketable, liquid assets in which these funds invested grew very rapidly once they began to develop. Regarding insurance, life insurance companies are likely to develop relatively late because, in addition to being exposed to collective frictions (they also need to invest in market-based assets), they are exposed to larger agency frictions that reflect their longer investment horizons. This fact may explain why life insurance developed later than predicted. In contrast, casualty insurance is likely to develop earlier, both because it is partly influenced by policy (as in the case of mandatory insurance for motor vehicles) and because the risks it faces are normally distributed and can be more easily addressed through risk pooling. Furthermore, their negative returns to scale, which make this activity somewhat of an outlier, can be explained by the predominance of foreign trade insurance in smaller open economies.[30]

IV. The Role of Policy

In this section, we briefly explore the role of policy and institutions in explaining the deviations from benchmark paths. We use three variables (creditor rights, investor protection, and enforcement costs) that reflect the quality of the contractual environment and one variable (creditor information) that reflects the quality of the informational environment.[31] To measure the quality of

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30. The latter accounts for a disproportionally high share of total casualty insurance, reflecting the importance of foreign trade for the smaller economies (see Feyen, Lester and Rocha [2011]).

31. The investor protection index, creditor rights and creditor information indices are taken from the World Bank's Doing Business database. Although the creditor information quality variable only measures one dimension of the quality of the informational environment (namely, the quality and coverage of credit bureaus), we used only this variable because it had the best coverage and was generally highly correlated with other information indices. The contract enforcement index is the first principal component of the following indicators (also from Doing Business): contract enforcement costs, number of days to enforce a contract (in logs), and number of procedures to enforce a contract.

macroprudential management, we construct a credit crash dummy that measures severe annual drops in the ratio of private credit to GDP.[32] Table 4 presents the results of the regressions similar to table 1 but with the policy variables included, estimated over the more limited period for which the data are available. The variance decomposition for these new estimates, which is similar to the decomposition shown for the regressions without policy variables, appears in table 2.

Together, the enabling-environment indicators account for a significant (albeit limited) fraction of the total explained variance of the financial indicators, which rises from 48 to 60 percent when the policy variables are incorporated.[33] As expected, better creditor rights promoted banking activity (not only private credit but also, and apparently even more, bank claims on other financial institutions) as well as capital markets (stock market capitalization and, even more strongly, private bond market capitalization) and life insurance. Similarly, lower enforcement costs facilitated bank funding (both retail and wholesale) and bank private lending while contributing to lowering intermediation margins. Unsurprisingly, the quality of investor protection had a particularly large impact on stock market activity (both in the primary and secondary markets). Furthermore, as expected, the quality of the informational environment was important for bank private lending and, even more so, for private (corporate) debt capitalization (particularly at home).[34]

It is noteworthy, however, that the contractual variables (particularly creditor rights) accounted for the lion's share of the cross-country differences, with information accounting for only a relatively small fraction.[35] This result likely reflects the fact that improvements in the informational environment, which are more technology dependent, could be more simply introduced and imported from abroad.[36] In contrast, improvements in the contractual environment required a strengthening of local institutions that was harder to deliver. This

32. The "crash variable" for a particular country is the fraction of years of the entire period in which annual private credit dropped by 20 percent or more.

33. Many of the enabling-environment indicators face measurement problems and only cover limited dimensions of policy. Thus, the share of variation across countries explained by policy may be, in practice, substantially higher than identified here.

34. Somewhat surprisingly, however, the credit information variable appears to discourage bank funding and results in higher bank intermediation margins. The reduction in bank funding may reflect the emergence of alternative (market-based) channels of financial intermediation. Furthermore, as the more competitive segments of the borrowing market (particularly corporates) migrate to the capital markets, bank loans become increasingly concentrated in households and smaller enterprises, where margins are higher owing to lower competition and higher risk.

35. The importance of the legal and institutional environment for financial and economic development is consistent with the evidence discussed in Beck and Levine (2005).

36. This conclusion deserves an important qualification because of the already noted limitations of our index, which only measures one dimension of a broader, multifaceted reality. To the extent that informational frictions reflect both information gathering and information processing costs (i.e., problems of bounded understanding and rationality in an increasingly complex environment), it could be argued that such frictions are unlikely to vanish any time soon.

TABLE 4. Extended Benchmark Regressions

Panel A

	Bank Private Credit 1	Net Interest Margin 2	Bank Claims On Dom. Fin. Sector 3	Bank Credit To Government 4	Bank Domestic Deposits 5	Bank Non-Deposit Funding 6	Insurance Premiums (Life) 7	Insurance Premiums (Non-Life) 8
Log initial GDPPC	0.266***	−0.260***	0.664***	0.415***	0.269***	0.411***	0.508***	0.199***
Log GDPPC minus Log initial GDPPC	0.456***	0.524***	−0.817	2.065***	1.049***	−0.378*	0.391	−1.114***
Interaction	−0.00235	−0.134***	0.283***	−0.253***	−0.0817***	0.115***	0.0998**	0.187***
Log population	0.0406***	−0.112***	0.294***	0.204***	0.0576***	0.0754***	0.0626***	−0.0520***
Log population density	0.0465***	−0.0167	0.348***	0.175***	0.0623***	0.0152	0.139***	−0.0284***
Fuel dummy	−0.233***	−0.0135	0.289*	−0.464***	−0.227***	−0.145***	−0.519***	−0.183***
Offshore dummy	0.271***	0.00753	−0.767***	0.157*	0.362***	0.675***	−0.195*	0.0437
Transition dummy	−0.373***	0.152**	−1.572***	−0.146	−0.319***	−0.118	−1.645***	−0.272***
Private credit crash	−5.963***	2.945***	−3.188**	−1.724***	−3.329***	−5.281***	−1.782***	−0.409
Strength of legal rights index	0.0288***	−0.00336	0.242***	−0.0454***	0.00687	0.0178*	0.277***	0.0561***
Credit information index	0.0425***	0.0857***	−0.0264	−0.210***	−0.0449***	−0.0560***	0.0546***	0.0180**
Strength of investor protection index	0.0167	0.0103	−0.0933*	0.155***	0.0570***	−0.0390**	−0.0250	−0.0414***
Enforcement costs	−0.00326***	0.00178**	−0.00486*	−0.00268**	−0.00238***	−0.00378***	0.00668***	0.000972
Observations	2,148	1,731	1,056	2,140	2,160	2,094	1,805	1,857
R^2	0.710	0.479	0.395	0.317	0.662	0.604	0.633	0.537

(Continued)

TABLE 4. Continued

Panel B

	Pension Fund Assets	Mutual Fund Assets	Stock Market Turnover	Stock Market Capitalization	Domestic Private Debt Securities	Domestic Public Debt Securities	Foreign Private Debt Securities	Foreign Public Debt Securities
	1	2	3	4	5	6	7	8
Log initial GDPPC	−0.0629	0.713***	0.593***	0.481***	1.173***	0.346***	1.006***	−0.224***
Log GDPPC minusLog initial GDPPC	−2.166	−2.300***	1.268***	0.644*	5.861***	1.311**	−0.894	−1.431**
Interaction	0.285	0.476***	−0.0795	−0.000579	−0.487***	−0.224***	0.327***	0.133
Log population	−0.0525	0.287***	0.619***	0.155***	−0.0301	0.154***	0.123***	−0.467***
Log population density	−0.142***	−0.119***	0.00520	0.0397**	−0.0740*	0.129***	−0.0179	−0.184***
Fuel dummy	0.182	−0.335**	−0.183**	0.0137	−0.380***	−0.00603	0.0845	−0.0817
Offshore dummy	0.121	1.230***	−0.334***	0.0959	−0.567***	−0.509***	−0.243*	−0.478***
Transition dummy	−3.052***	−1.387***	0.635***	−0.926***	−0.744**	0.359*	−0.673***	−0.460***
Private credit crash	−5.985***	−7.414***	−6.495***	−4.187***	4.262**	−2.988**	−0.742	8.200***
Strength of legal rights index	0.189***	0.000925	0.00960	0.0372**	0.176***	−0.0530**	0.0421*	−0.0906***
Credit information index	0.275***	−0.324***	−0.0881***	−0.132***	0.181***	0.108***	−0.111***	0.115***
Strength of investor protection index	0.0476	0.0617	0.157***	0.121***	0.0480	0.0952***	−0.0470	−0.0532
Enforcement costs	−0.00971	−0.00576	−0.0127***	0.00268	0.00390	−0.00294	0.00623**	−0.00164
Observations	565	567	1,292	1,344	645	707	883	1,073
R^2	0.378	0.669	0.598	0.490	0.567	0.277	0.617	0.330

Notes: This table extends table 1 by adding the following additional policy variables: *Private credit crash* (which assumes a value of 1 if private credit to GDP drops by over 20 percent for a particular country-year) and a set of variables taken from the World Bank Doing Business Database, including the *Strength of legal rights index* (the extent to which creditors are legally protected), the *Credit information index* (the quality of credit information), the *Investor protection index* (the extent to which investors are protected by law), and *Enforcement costs* (the cost to enforce a contract). The contract enforcement index is the first principal component of the following indicators (also from Doing Business): contract enforcement costs, number of days to enforce a contract (in logs), and number of procedures to enforce a contract. GDPPC stands for gross domestic product per capita.

***, **, and * indicate $p < .01$, $p < .05$, and $p < .1$

Source: Authors' analysis based on data described in the text.

interpretation is bolstered by the results of a regression of creditor rights and credit information against country income (incorporated through both a linear term and a quadratic term). The creditor rights index is convex, whereas the credit information index is concave.[37] This result suggests that improvements in the informational environment are achieved early on, whereas improvements in creditor rights take much longer to materialize. Thus, one should observe fewer cross-country differences regarding the quality of information compared to the quality of contracts.

Remarkably, the credit crash dummy accounts for a sizable share of total explained variance, particularly in the case of private credit (where it accounts for nearly 30 percent) but also for other banking indicators, such as bank funding and bank margins, and even for financial activity outside banking. For example, the credit crash dummy had a sizable negative impact on stock trading. It is also remarkable that banking systems took such a long time to recover from such impacts. This finding can be inferred from the fact that the credit cash dummy, which is estimated over a 30-year time span, remains highly significant when regressed against the pure cross-section of last period indicators rather than the full panel.[38] This result is a noteworthy reminder that FD (the bright side) and financial instability (the dark side) strongly interact in lasting, complex ways.

The interaction between bright and dark sides is illustrated further in figure 4, which plots the predicted and actual dynamic paths of private bank credit for all countries in the database, separated into three groups according to their initial income levels. Even at such an aggregate level of analysis, a cursory inspection suggests that, in most cases, busts occurred following booms in which the actual development paths went over their predicted values. Thus, financial unsustainability (the dark side of FD) appears to be related to abnormal deviations from the regular development paths inferred from a cross-country benchmarking analysis (the bright side of FD). Of course, this hypothesis must be validated by a detailed statistical analysis at the country level, a topic left for further research.

V. Final Thoughts

The broad cross-country benchmarking approach we have developed here can help to measure the quality of policies at any point in time and to identify the forces and frictions shaping FD. This approach began from the premise that both the evolution of financial structure (FD) and its sustainability (financial stability) are shaped by four fundamental types of frictions and their associated market failures. Two such frictions restrict agents' capacity to establish and enforce bilateral contracts (agency frictions), and the other two frictions restrict

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37. The underlying regression is available from the authors upon request.
38. The underlying regression is available from the authors upon request.

FIGURE 4. Estimated Private Credit Development Paths by Region
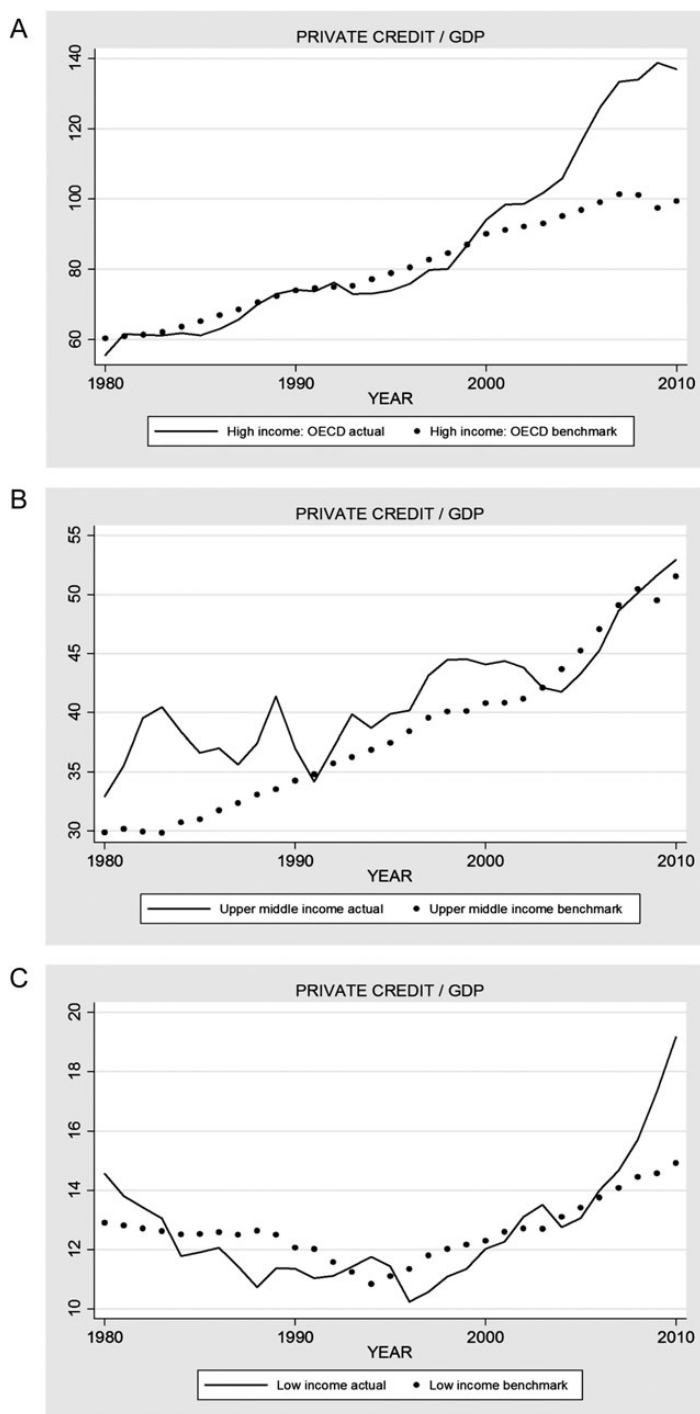
Notes: This figure presents the actual and predicted paths of bank credit to the private sector (as a percentage of GDP) for high-income (A), middle-income (B), and low-income (C) countries. Predicted paths are derived from equation (1) using group medians. The samples are restricted to the countries for which data are available back to 1980.

agents' capacity to participate and coordinate their financial activities in ways that are collectively desirable (collective frictions). The predictions derived from this approach regarding the order of development, returns to scale, and the shape of the developmental paths of various financial activities were broadly satisfied. In particular, where strong participation frictions were responsible for hindering the growth of financial activities, development only began after some threshold. However, once this threshold was passed, it was followed by buoyant dynamics because rising participation and interconnectedness generated positive externalities that promoted further participation and interconnectedness.

This paper has also argued that the same frictions that feed the development forces of the bright side feed the forces of instability from the dark side, making them interact in complex and unexpected ways and leading to booms followed by busts.[39] Indeed, the paper has shown that FD was substantially volatile and that countries paid a heavy and lasting price for financial collapses. Avoiding such collapses requires the early identification of the buildup of systemic stress. By inferring a predicted development path from a broad universe of observations, our benchmarking approach may help to discriminate between sustainable and unsustainable trajectories. A key topic for further research is to investigate whether deviations from benchmarks can help to predict crashes on a country-by-country basis.

An important caveat applies, however. Although our analysis suggests the presence of developmental regularities, it does not ensure predictability, particularly as one goes farther into the future. On the one hand, financial innovations may introduce inflexion points that are undetectable from the existing historical data. If so, apparent short-term upward deviations from the benchmark paths could, in fact, become sustainable because the benchmark paths themselves bend upward. On the other hand, it is possible for the benchmark paths to bend downward, at least in the longer term. For example, some of the indicators that have exhibited rapidly growing paths may eventually slow down, in accordance with logistic (S-shaped) trajectories.

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39. The evidence presented on our measure of "buoyancy" is arguably consistent with the empirical suggestion that there can be "too much finance" (see Arcand, Berkes and Panizza [2012]). In effect, high buoyancy implies a decreasing impact of FD on economic growth. In this sense, finance may resemble a luxury good; its use increases significantly as income rises, yet its benefits (whether in welfare or growth) exhibit falling marginal returns. To be sure, buoyancy by itself does not necessarily imply that there can be "too much finance." If one reasonably assumes nonsatiation, more finance should always be better. However, once the "dark side" is factored in, it is no longer clear that more finance is necessarily better because the marginal costs of financial instability may eventually come to dominate the marginal benefits of more FD. Ultimately, however, the balance between marginal costs and marginal benefits depends on the policy response, which puts a premium on keeping the forces of the dark side at bay as FD deepens.

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