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What drives financial development? A Meta-regression analysis

By Chris Doucouliagos[a], Jakob de Haan[b,c], and Jan-Egbert Sturm[c,d]

[a]Deakin Business School, Deakin University, 221 Burwood Highway Burwood VIC 3125, Australia
[b]Faculty of Economics and Business, University of Groningen, PO BOX 800, 9700 AV Groningen The Netherlands; e-mail: jakob.de.haan@rug.nl
[c]CESIfo, Poschingerstr. 5, 81679, Munich, Germany
[d]KOF Swiss Economic Institute, Leonhardstrasse 21, ETH Zurich, LEE G 116, 8092 Zurich, Switzerland

Abstract

This article offers a meta-regression analysis of the literature on the drivers of financial development (FD). Our results based on 1,900 estimates suggest that institutional quality is positively correlated to both private sector credit and stock market capitalization (both as share of Gross Domestic Product). Domestic financial openness has a positive effect on both proxies for FD, while trade openness seems only important for stock market capitalization. Inflation has an adverse effect on FD, which is larger for stock market capitalization. Finally, we conclude that the literature has not yet robustly established that remittances matter for FD.

JEL classifications: G21, N20, O16, O43, P48

1. Introduction

There is a large literature showing that finance promotes economic development (at least up to a point). A well-developed financial system channels savings into value-creating investments, monitors borrowers to increase efficiency, facilitates to pool, share and diversify risk, and enables trade. King and Levine (1993a,b) and Rajan and Zingales (1998) were among the first to argue that financial development (FD) is related to economic development. Most studies in this line of research report evidence that FD stimulates economic growth (Levine, 2005), although some reach more ambivalent conclusions (e.g. Gries *et al.*, 2009).[1]

1 Some recent studies suggest that the relationship between financial and economic development may be non-linear (cf. Arcand *et al.*, 2015).

There is also a large literature on the relationship between FD and income inequality. FD can provide poor households with greater access to resources to meet their financial needs and may thereby lower income. Theory, however, suggests that FD could also benefit the rich (Greenwood and Jovanovic, 1990). Indeed, several recent studies have found that FD increases income inequality (de Haan and Sturm, 2017).

In view of the importance of FD for economic growth and income inequality, it is not surprising that the drivers of FD have been extensively researched. Determinants of FD that have been analyzed include trade and financial openness, legal rules and the quality of their enforcement, institutional quality, remittances, and inflation. Despite reporting close to two thousand estimates of the determinants of FD (discussed below), research has not resolved the issue of which factors are the most important. The reported findings are very diverse and often conflicting and fragile. What is missing from the literature is a systematic evaluation of these determinants.

This article offers the first quantitative review of the literature on the drivers of FD. For this purpose, we use meta-regression analysis (MRA), which is a set of statistical techniques that have been developed to identify and quantify associations drawn from an existing body of literature (Stanley and Doucouliagos, 2012; Schmidt and Hunter 2015). MRA has become increasingly popular, also in economics (Huang and Sim, 2018; Havránek and Sokolova, 2020; Heimberger, 2021). It is based on a focused examination of the role of methodological, specification, and data factors on, in our case, the reported effects of the drivers of FD. MRA can help to resolve divergent theoretical debates and conflicting empirical findings and draw robust inferences from the evidence base. Meta-analysis is particularly useful where there is disagreement over the qualitative (e.g. is there a negative or positive association) and/or quantitative inferences (the magnitude of the association). But, meta-analysis can also shed new light even on qualitatively well-established results in the literature. For example, many (but not all) economists would agree that institutions matter for FD and that inflation can be harmful. The evidence base includes qualitative divergent results ranging from institutions and inflation being good to being harmful to FD, thereby allowing to test whether the established view is really supported by available research. An additional benefit of meta-analysis is that it can be used to quantify the relative importance of institutions (or inflation) vis-à-vis other determinants, especially when the evidence base reports widely varying magnitudes of these key associations.

The aims of our meta-regression analysis are to: (i) provide a statistical synthesis of the existing research on the drivers of FD; (ii) assess the competing claims made about the impact of drivers of FD; (iii) explore the sensitivity of reported empirical results; and (iv) investigate and correct the evidence base for publication and misspecification biases. It is well known that methodological, specification, and data differences affect empirical estimates. These choices can create heterogeneity in reported estimates making it very difficult for conventional narrative reviews to make robust and valid inferences. Without some method of research synthesis, such as MRA, it becomes very difficult to draw robust inference of the effects of data, measurement, estimation, and empirical methodology on the reported results. Meta-regression analysis helps to explain why results systematically differ within and between studies; meta-regression analysis identifies and quantifies model misspecification and omitted variable biases.

MRA enables us to assess whether the evidence base is credible, strong, and decisive. An important dimension of research credibility is publication selection, where authors report results that are statistically significant, or consistent with some prior. Publication selection

bias is impossible to identify from individual empirical studies (Stanley and Doucouliagos, 2012). However, when the various studies and estimates are assessed through the lens of meta-analysis, publication and model misspecification bias can be identified and thereby the literature can be corrected for such biases, producing more credible and robust estimates of policy relevant parameters.

The article is structured as follows. Section 2 offers a summary of the main drivers of FD as identified in the literature and explains the reasons why these variables may affect FD. This section also describes the proxies used to test these main drivers of FD. Section 3 describes the data used in our analysis. Section 4 outlines the methodology and Section 5 presents our main results. Section 6 concludes.

2. Drivers of FD

2.1 Law and finance: creditor rights, investor protection, enforcement, information, and legal origin

In their seminal contributions, La Porta *et al.* (1997, 1998) argue that differences in financial systems around the world can be traced in part to the differences in the protection of shareholders and creditors, as reflected by *legal rules* and the *quality of their enforcement*. For instance, if lenders feel that regulations do not protect them and that their chance of taking control over the assets pledged as collateral is uncertain, they are likely not to extend credit since the implicit bankruptcy risk will severely reduce their expected earnings.

Furthermore, according to La Porta *et al.* (1997, 1998), protection of legal rights and contract enforcement vary systematically by *legal origin*, which is either English, French, German, or Scandinavian. La Porta *et al.* argue that the English common law tradition protects the rights of shareholders and creditors best, while the French civil code is associated with less efficient contract enforcement and weaker protection of shareholders and creditors. Countries with German or Scandinavian legal origins are said to have intermediate levels of protection, but the highest level of contract enforcement.

The law and finance theory can be tested by examining whether legal origin is related to a measure of FD, or by examining whether proxies for creditor and shareholder protection and contract enforcement are related to financial deepening, or both. Supplementary Appendix Table A1 summarizes the evidence in support of the law and finance view of FD.

La Porta *et al.* (1997) consider legal origin, contract enforcement (the 'law and order' index from ICRG; see below), and some proxies for investor protection in their cross-section model for stock market capitalization. They conclude that 'our shareholder rights variables account for some of the difference between relative market capitalizations of different legal families, but that the family effects are also significant.' (p. 1142). Levine et al. (2000) use differences in the legal rights of creditors, the efficiency of contract enforcement, and accounting system standards in a panel model to explain cross-country differences in the level of financial intermediary development, and find that countries with high scores on these variables tend to have better developed financial intermediaries.

However, some authors argue that other factors may trump legal origin. Four alternatives have been put forward: endowments; political factors; political instability; and culture (Beck *et al.*, 2003; Keefer, 2007; Roe and Siegel, 2011). For example, Roe and Siegel (2011) and Girma and Shortland (2008) point out that institutions of investor protection—

such as legal rules, courts, and regulators—cannot function well in an unstable political environment.

2.2 Institutional quality: political and financial risk, democracy, governance, and economic freedom

The law and finance theory points to the importance of the quality of legal institutions, notably when it comes to contract enforcement/rule of law. Other studies employ different indicators of *institutional quality*, which are argued to affect FD. The reasoning why institutional quality matters is very similar as under the law and finance theory.

Several studies employ International Country Risk Guide (*ICRG)* data (see Supplementary Appendix Table A1). ICRG classifies country risk into three different categories: political risk (including corruption, law and order, and bureaucratic quality), financial risk (including repudiation of contracts by the government, and risk of expropriation, as also used in the law and finance literature), and economic risk (including inflation).

Other authors focus on the extent to which *democratic institutions* are linked to FD. Pagano and Volpin (2001) argue that countries with closed and static political regimes tend to resist the availability of external financing, since the ensuing competition would threaten the entrenched powers of the political elite. Several studies report support for this view (see Supplementary Appendix Table A1), mostly using the Polity index.

A few studies consider *constraints on the power of the executive*, which also comes from the Polity database. This variable captures the official (de jure) discretionary leeway that the executive branch has in changing and implementing new policies. Acemoglu and Johnson (2005) report that constrains on the executive are significant in their estimates of FD.

Some studies focus on *governance*, using the average of the World Bank's Worldwide Governance indicators (Kaufmann *et al.*, 2009). These studies find evidence that better governance enhances FD. Finally, a few studies use (components of) some *economic freedom* measure to proxy institutional quality (see Supplementary Appendix Table A1).

There is strong support for the view that institutional quality fosters financial deepening (see Supplementary Appendix Table A1), although some studies report mixed or non-linear effects.

2.3 Trade and financial openness

Several papers examine whether trade and/or financial openness affect FD. Two reasons have been suggested why trade openness may matter. First, Svaleryd and Vlachos (2002) emphasize the role of risk diversification. As openness may be associated with greater risks, such as increased exposure to external demand shocks or foreign competition, it will create new demands for external finance. Firms will need credit to overcome short-term cash flow problems and adverse shocks.

Second, an open economy may weaken the incentives and the political power of interest groups to resist financial deepening. Rajan and Zingales (2003) argue that in particular industrial and financial incumbents frequently stand to lose from FD as it creates opportunities for new firms to become established, which breeds competition and erodes incumbents' rents. Rajan and Zingales (2003) suggest that the simultaneous opening of trade and capital accounts holds the key to successful FD.

Others disagree. For instance, Chin and Ito (2006) stress the impact of capital account liberalization on FD through several channels. First, financial liberalization may mitigate financial repression in protected financial markets, allowing the (real) interest rate to rise to its competitive market equilibrium. Second, removing capital controls allows investors to engage in more portfolio diversification. Third, the liberalization process usually increases the efficiency level of the financial system by weeding out inefficient financial institutions and creating greater pressure for reform of the financial infrastructure.

The results of studies focusing on the impact of *trade openness* on FD are rather mixed (see Supplementary Appendix Table A1).[2]

Several studies have examined the impact of *capital account openness* on FD. Chin and Ito (2006) conclude that financial openness contributes to equity market development, but only when a threshold level of general development of legal systems and institutions has been attained. However, other studies do not (always) confirm the (conditional) positive effect of capital account openness on financial depth.

Apart from capital account openness, *other proxies for financial openness* have been used. Some studies use *capital flows* for this purpose, while others consider foreign direct investment (FDI), but results are mixed. Several studies employ the data of Lane and Milesi-Ferretti (2007) on *countries' foreign assets and liabilities* to proxy financial openness, while others use the database of Abiad et al. (2010) of *financial liberalization* to proxy financial openness.[3] Finally, the *presence of foreign banks* is sometimes used as proxy for financial openness (cf. Claessens and van Horen, 2014).

Some studies examine whether both *trade and financial openness* are *jointly* linked to FD as suggested by Rajan and Zingales (2003). The results are mixed (see Supplementary Appendix Table A1).

2.4 Remittances

Remittances, that is, funds received from migrants working abroad, have become the second largest source of external finance for developing countries after FDI. Furthermore, remittances are more stable than other international financial flows. Several studies examine whether remittances are related to FD. However, the theoretically expected effect is ambiguous.

On the one hand, remittances may have a positive impact on FD. Several reasons have been put forward to explain this. First, as remittances are typically lumpy, recipients might have a need for financial products that allow for the safe storage of these funds (i.e. bank deposits) even if most of these funds are not received through banks. Furthermore, to the extent that banks provide remittance transfer services, they may reach out to recipients with limited or no financial intermediation. Banks may also be more willing to extend credit to remittance-receiving households, given that remittances are often a significant and stable income source. Moreover, increased loanable funds created by banked remittance transfers can increase overall credit to other, non-remittance-receiving households (Aggarwal *et al.*, 2011).

2 As trade openness may be endogenous, some studies instrument trade openness with a measure of natural openness developed by Frankel and Romer (1999); see online Appendix Table A1.

3 The index of Abiad *et al.* (2010) summarizes de jure changes in credit controls, interest rate controls, entry barriers for banks, regulations, privatization, and restrictions on international financial transactions.

On the other hand, remittances may have a negative impact on FD. First, remittances might not increase bank deposits if they are immediately consumed or saved in other ways than via financial intermediaries. Furthermore, migrants tend to rely heavily on informal transfer channels rather than bank transfers for various reasons, like lower transaction costs and greater efficiency of informal transfer methods, and distrust of banks and financial authorities in the recipient countries. Because remittances can help relax individuals' financing constraints, they might lead to a lower demand for credit and have a dampening effect on credit market development. Remittance-receiving households might choose to rely on migrants abroad rather than on domestic banks for credit, in which case remittances become a substitute for credit. By becoming a substitute for inefficient or inexistent credit markets, remittances help alleviating credit constraints, thereby contributing to an improved allocation of capital and to higher economic growth.

Several studies report that remittances have a positive impact on FD. However, others find no support for this view (see Supplementary Appendix Table A1).[4]

2.5 Inflation

It is widely believed that inflation distorts the incentives for FD. In particular, moderate to high inflation may discourage financial intermediation, and encourage saving in real assets. An increase in the rate of inflation reduces the real return on assets. This reduction worsens existing credit market frictions, which results in less credit. The financial sector makes fewer loans; there is increased inefficiency in resource allocation, and a diminishing of intermediary activities (Boyd *et al.*, 2001). Likewise, lower inflation reduces the overall level of uncertainty about the ability of borrowers to meet their obligations, and the resulting less risky environment facilitates financial deepening.

As shown in Supplementary Appendix Table A1, some studies report evidence suggesting that inflation hampers financial depth. At the same time, the negative effects of inflation may be nonlinear. Some models suggest that only when inflation exceeds a certain critical level, will it have a negative effect on FD. Boyd *et al.* (2001) report that FD has a strong negative relationship with inflation, but only for countries with low-to-moderate rates of inflation. Khan *et al.* (2006) find that the threshold level of inflation after which it has a negative effect on FD is generally about 3%–6% per annum, depending on the specific measure of financial depth that is utilized.

4 These diverging outcomes are consistent with differences in country experiences. Martínez Pería *et al.* (2008) analyse for 25 Latin-American countries the association between remittances and financial development. For 18 of these countries, they observe that both remittances and financial tended to move together in an increasing fashion. However, in five countries—Belize, Dominica, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines—remittances and financial development appear to have moved in opposite directions, with financial development rising over the period and remittances falling consistently throughout the sample. Furthermore, for Argentina and Mexico it is hard to discern a clear pattern between financial development and remittances as periods of positive association between these variables have alternated with periods where remittances increase as financial development collapses. The latter periods seem to correspond to periods of financial banking crises in these countries. Remittances increased in response to these crises, producing the negative association.

3. Data

Our search strategy and reporting closely follows the guidelines provided by Havranek et al. (2020). The search for relevant studies involves several databases: Econlit, Web of Science, Repec/Ideas, and Google Scholar. We used combinations of the following broad keywords: 'FD', 'stock market capitalization', 'private credit', 'bank credit', 'inflation', 'institutions', 'creditor rights', 'civil law', 'rule of law', 'law and finance', 'governance', 'democracy', 'economic freedom', 'institutional quality', 'trade liberalization', 'trade openness', 'financial liberalization', 'capital account liberalization', 'financial openness', 'bank reform', 'remittances', and 'trust'. Once a study had been found, we used its references to search for more studies.

To be included in our meta-analysis, a study had to meet three criteria. First, we include only studies using data at the macro-level (thereby ignoring micro-based studies) and studies covering several countries (thereby ignoring single-country studies). The reason is that many of the drivers of FD as discussed in the previous section are based on cross-country differences, which, by definition cannot be included in micro- and single-country studies. Second, studies had to provide sufficient information from which we could quantify a comparable size effect. That is, studies had to report sample size, regression coefficients, and their standard errors or *p*-values or *t*-statistics. Studies that did not provide this information could not be included. Third, studies had to report the effect of one of the hypothesized determinants of FD, i.e. institutional quality, trade openness, financial openness, inflation, remittances, and trust. The search for studies was terminated November 2019. All coding was conducted and checked by three independent coders.

Following these criteria, we identified 80 studies with 1,413 estimates on private credit development, and 40 studies which report 487 estimates on stock market development; a total of 92 independent studies with 1,900 estimates for the meta-analysis.[5] All estimates included in our database were derived from econometric models that investigate the effect of at least one of the various determinants ($\boldsymbol{m}$) of FD, conditional on a vector of control variables, $\mathbf{z}$:

$$\mathrm{FD}_{\mathrm{ct}} = \alpha_0 + \alpha_m \boldsymbol{m}_{ct} + \alpha_z \boldsymbol{z}_{ct} + \varepsilon_{ct} \tag{1}$$

where c and t index the cth country in time period t when panel data are used (the time dimension is removed in cross-sectional studies), and FD is measured either as private credit or stock market capitalization. These are the most widely used indicators in research on the drivers of FD, as shown in Supplementary Appendix Table A1. Private credit is domestic credit to the private sector divided by GDP. Stock market capitalization equals the value of listed shares divided by GDP.

Even though it is widely used, the private-credit-to-GDP ratio does not capture several dimensions of FD, like access to credit and efficiency of the financial system.[6] The International Monetary Fund (IMF) provides data on these and other dimensions of FD

5 Many studies report estimates for both stock market development and private credit. However, 52 studies report only estimates for private credit and 9 studies report only estimates for stock market development.

6 Another concern is that a higher private-credit-to-GDP ratio may not only stimulate economic growth but that financial development is also often associated with more financial instability. Indeed, there is much evidence that financial crises are often preceded by credit booms (Schularick and Taylor, 2012).

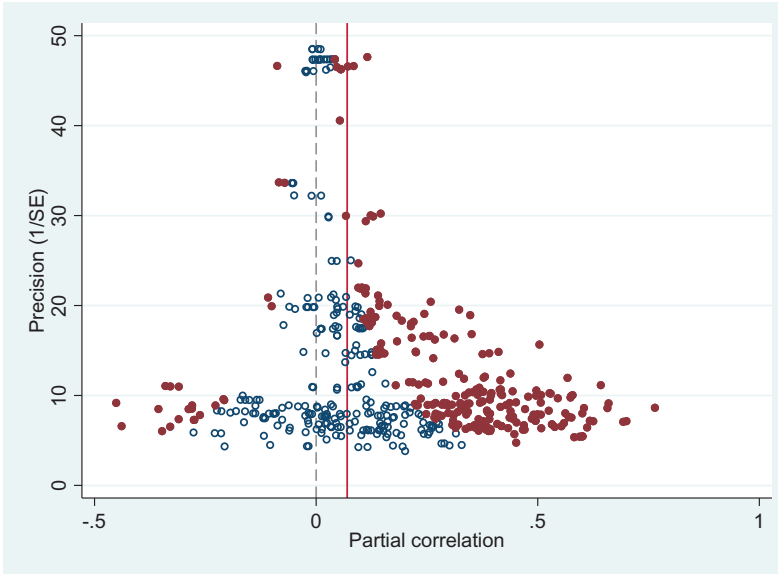

Fig. 1. Institutions and private credit
Source: Authors' calculations.
Notes: 503 estimates. Hollow circles are statistically insignificant correlations. Full circles are statistically significant. The solid line indicates the weighted average correlation ($r = 0.07$). The dotted line indicates a zero correlation.

and aggregates them into an index that summarizes how developed financial institutions and financial markets are in terms of their depth, access, and efficiency (see Svirydzenka, 2016 for further details).[7] Unfortunately, research on the drivers of FD has not or hardly used this and alternative indicators of (lack of) FD, such as dollarization. As a consequence, it is not possible to do a meaningful meta-regression analysis.

We collect estimates of α_m and transform these into a comparable measure. Unfortunately, descriptive statistics are frequently either poorly reported or not reported in studies, so that we have little confidence in extracting elasticities or percentage change from reported statistics and estimates.[8] Instead, we opt to use the partial correlation, which measures the strength of the association between a given variable and FD, holding constant all other factors.[9]

7 See: https://data.imf.org/?sk=f8032e80-b36c-43b1-ac26-493c5b1cd33b.

8 The main issue here is the scaling used. At times authors report descriptive statistics using one scale and use a different scale in the econometric analysis and it is difficult to identify the exact transformations involved. Using reported descriptive statistics often produces implausibly large elasticities.

9 Partial correlations, *r*, were calculated using the formula: $t/\sqrt{(t^2 + df)}$, where *t* is the *t*-statistic and *df* are the degrees of freedom. The standard error of the partial correlation is calculated as: $SE = \sqrt{(1 - r)^2/df}$. The partial correlations were also transformed into Fisher *z*-values. The meta-analysis results are essentially identical regardless of whether partial correlations or Fisher *z*-values are used; we report only results using partial correlations.

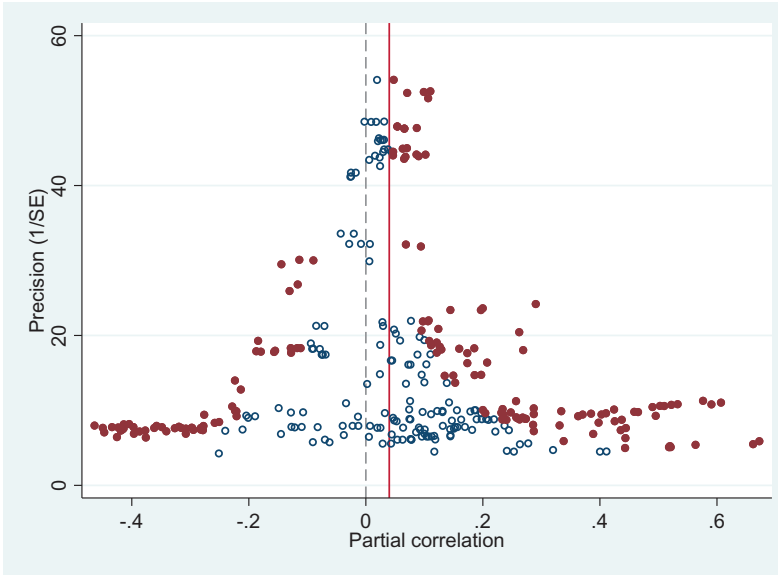

Fig. 2. Financial openness and private credit
Source: Authors' calculations.
Notes: See notes to Fig. 1 (305 estimates). The solid line indicates the weighted average correlation ($r = 0.04$).

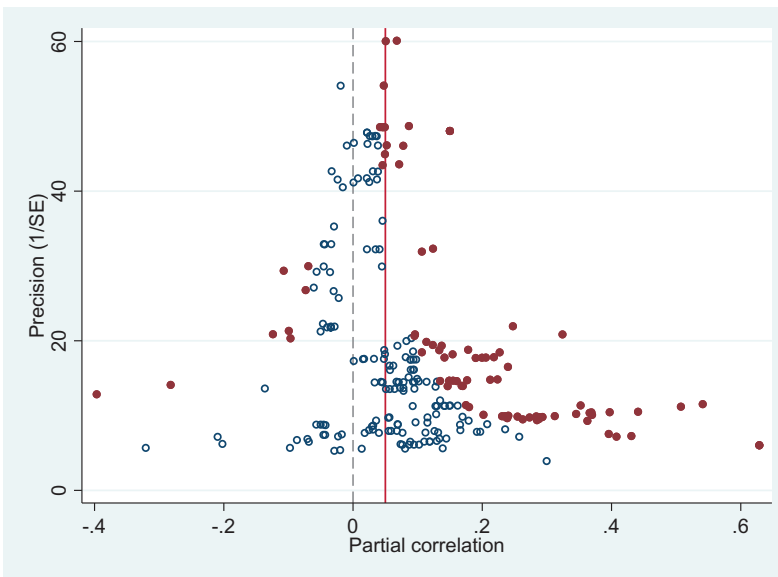

Fig. 3. Trade openness and private credit
Source: Authors' calculations.
Notes: See notes to Figure 1 (239 estimates). The solid line indicates the weighted average correlation ($r = 0.05$).

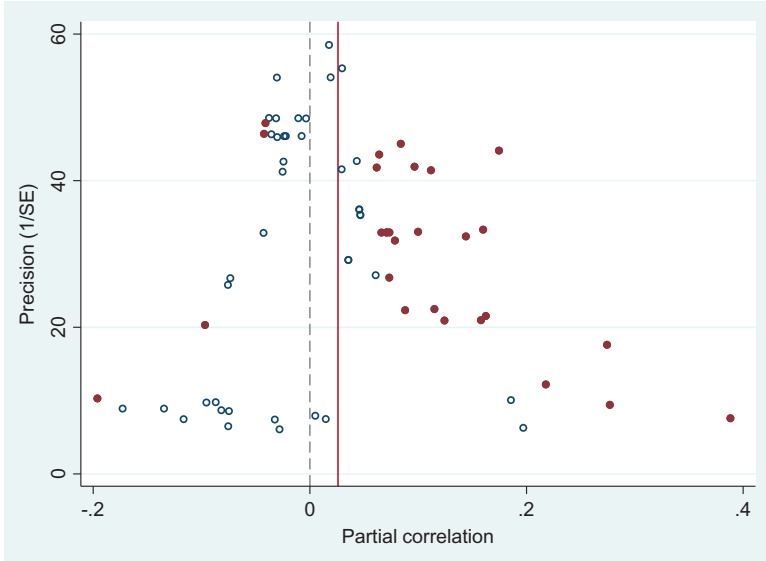

Fig. 4. Remittances and private credit
Source: Authors' calculations.
Notes: See notes to Figure 1 (69 estimates). The solid line indicates the weighted average correlation ($r = 0.03$).

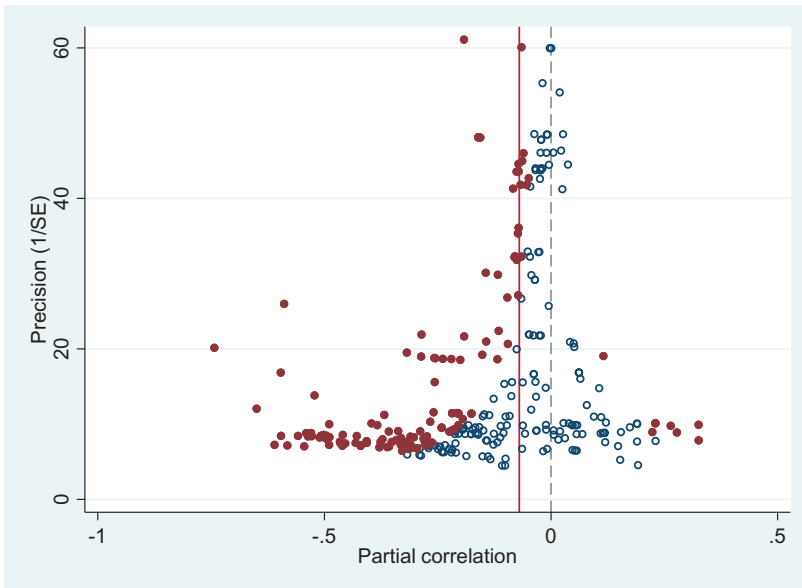

Fig. 5. Inflation and private credit
Source: Authors' calculations.
Notes: See notes to Figure 1 (288 estimates). The solid line indicates the weighted average correlation ($r = -0.07$).

The partial correlations for private credit are illustrated in Figures 1–5, in the form of funnel plots.[10] The funnel plots illustrate the distribution in reported estimates. There is significant heterogeneity in the evidence base, with both positive and negative effects reported for all hypothesized determinants. The studies offer independent replications of the various determinants of FD. Figures 1–5 suggest that many studies fail to replicate the findings of others. By applying meta-analysis, we are able to synthesize the evidence base and analyze these distributions and thereby assess what conclusions can be established from the literature.

The funnel plots become narrower for estimates reported with greater precision. Nevertheless, for all determinants, there is significant spread in the more precise estimates. For example, in the case of institutions, the estimates with precision >40 (6% of all estimates for institutions) range from −0.09 to +0.12. We use MRA to model the variation or heterogeneity in estimates (across all levels of precision). However, one factor that our MRA does not address is attenuation bias. Schmidt and Hunter (2015) point out that measurement error attenuates correlations. This could be a particularly important issue for the measurement of the key variables for developing countries. To the extent that this is an issue in this literature, our meta-averages are likely to provide *lower* bound estimates. We have no reason to suspect that attenuation bias is differentially larger for the more precise estimates nor differentially for the various determinants.

4. Methods

One of the aims of meta-analysis is to summarize the evidence base. The simplest summary is a weighted average of all comparable estimates:

$$r_{ij} = \beta_0 + \upsilon_{ij} \tag{2}$$

where r_{ij} denotes the partial correlation between FD and the hypothesized determinants, i and j index the ith estimate from the jth study. Equation (2) is estimated by weighted least squares. The estimate's inverse variance provides optimal weights (Stanley and Doucouliagos, 2012). This produces an unconditional meta-average and assumes that among a comparable population of estimates, the only source of variation in reported results is random sampling errors.

Drawing credible inference from the evidence base is a major challenge when the evidence base consists of studies with low statistical power, when there is a high degree of heterogeneity in reported findings, and when some findings have been selectively reported e.g. on the basis of their statistical significance or because they match researchers' priors (Ioannidis *et al.*, 2017). Hence, Equation (2) will rarely adequately represent the evidence base.

Accommodating heterogeneity in the evidence base requires conditional meta-averages. This involves estimating a meta-regression model:

$$r_{ij} = \beta_0 + \beta_x \mathbf{x}_{ij} + \boldsymbol{\upsilon}_{ij} \tag{3}$$

where $\mathbf{x}$ is a vector of moderator variables that reflect genuine and artificial heterogeneity (described in Section 5.2 below). The coefficients on the $\mathbf{x}$ vector identify and quantify the magnitude of heterogeneity as illustrated in Figures 1–5. Heterogeneity can be genuine or

10 Funnel plots for stock market capitalization are available in online Appendix Figures A1 to A5.

an artifact of the way in which research is conducted. For example, the effect of institutional quality on FD may vary between developed and developing nations and it could vary over time. Moreover, reported estimates could differ because of model specification choices (potentially leading to omitted variable bias) and the choice of indicators of institutional quality. We explicitly model these various dimensions through meta-regression analysis.

In addition to heterogeneity, there is the issue of publication selection bias, whereby some researchers report only statistically significant results, or when some researchers report results that are consistent with their priors, e.g. an adverse effect of inflation or a positive effect of creditor protection on FD (see Ioannidis *et al.*, 2017; Christensen and Miguel, 2018). The impact of publication bias is to distort meta-averages, typically inflating them by a factor of 2 or more (Ioannidis *et al.*, 2017). Publication selection bias can be identified and corrected from the evidence base by including the standard error of estimated effects, SE_{ij}, in the meta-regression model:

$$r_{ij} = \beta_0 + \beta_{se} SE_{ij} + \beta_x \mathbf{x}_{ij} + \boldsymbol{\upsilon}_{ij} \tag{4}$$

If enough researchers select evidence on the basis of its statistical significance, then this will cause a correlation between SE_{ij} and r_{ij}.[11] The coefficient on SE_{ij} provides a test for the presence and magnitude of publication selection bias. Equation (4) then provides conditional estimates of the effects of the determinants of FD after correcting for publication selection bias (Stanley and Doucouliagos, 2012).[12]

Stanley and Doucouliagos (2014) propose a nonlinear meta-regression model for correcting the evidence base for publication selection bias:

$$r_{ij} = \beta_0 + \beta_{se} SE_{ij}^2 + \beta_x \mathbf{x}_{ij} + \boldsymbol{\upsilon}_{ij} \tag{5}$$

Equation (5) is known as the Precision Effect Test-Precision Effect Estimate with Standard Error (PET-PEESE) model and is the primary meta-regression model used in this article. PET-PEESE is one of several methods for identifying and correcting publication bias in an evidence base. Other notable methods include 'Trim-and-Fill' (Duval and Tweedie, 2000), selection models such as the three-parameter selection model (Hedges and Vevea, 1996) and the recent model proposed by Andrews and Kasy (2019), the *p*-curve and *p*-uniform methods (van Assen *et al.*, 2015), and the weighted average of the adequately powered studies (Ioannidis *et al.*, 2017). We here use PET-PEESE as this method has the lowest bias of all meta-analysis methods, the lowest rate of false positives, and the lowest mean squared error (Stanley and Doucouliagos, 2014; Kvarven *et al.*, 2019).[13]

11 If enough researchers are searching for a statistically significant effect, they will be estimating variants of models until they get a high enough *t*-statistic. This will then result in a correlation between the reported regression coefficients and their standard errors.

12 The constant in Equations (4) and (5) has no practical interpretation. Meta-averages need to be constructed using the constant and elements of the **x** vector.

13 Like all methods, PET-PEESE performs less well when there is high heterogeneity. This affects unconditional meta-averages. However, our approach in this article is to model heterogeneity in the evidence base through meta-regression. PET-PEESE also performs poorly when the sample size is low. See Stanley (2017) for details. For robustness, online Appendix Tables A13 and A14 compare the PET-PEESE non-linear publication bias correction results with an alternate linear publication bias correction model, FAT-PET results. Results are all similar.

Equation (5) is estimated by weighted least squares, using inverse variance weights. Inverse variance weights can be either fixed effects or random effects.[14] Fixed effects weights assume that there is a single underlying effect that all studies are estimating. Random effects weights allow for a distribution of effect sizes. We present the results for both sets of weights. However, random effects weights have been shown to produce more biased estimates when there is publication selection (Stanley and Doucouliagos, 2015). Further, Kvarven *et al.* (2019) show that random effects exaggerate meta-averages by nearly three-fold and have high rates of false positives; they find evidence of an empirical effect when there is none. Simulations show that unrestricted weighted least squares (UWLS) produce meta-averages with smaller bias and smaller Mean Squared Error, especially in cases where there is heterogeneity in the evidence base and some of the reported estimates have been preferentially chosen on the basis of their statistical significance (Stanley and Doucouliagos, 2015).[15]

5. Results

5.1 Unconditional meta-averages

The meta-analyses results are presented in Tables 1 and 2, for institutional quality and all other variables of interest, respectively. For both tables, Panel A reports the results for private credit and Panel B for stock market capitalization (but note that the evidence base for private credit is larger than that for stock market capitalization). As discussed in the methods section above, while we report random effects meta-averages, we rely on the UWLS results for inference as these are less biased (Stanley and Doucouliagos, 2014; Stanley et al., 2017; Kvarven *et al.*, 2019).[16]

Table 1 reports the meta-analyses for estimates relating to institutional quality. Column (1) combines all estimates of the effects of institutional quality using various measures for the quality of institutions. These results suggest a small positive effect of institutional quality on private credit ($r = 0.07$) and a slightly higher effect on stock market capitalization ($r = 0.08$).

Columns (2)–(8) present meta-analyses of the main specific measures for institutional quality. Columns (2) and (3) focus on measures relating to creditor protection and French civil law, respectively. Column (4) presents the results for estimates that use an 'aggregate' measure of institutional quality, i.e. one that combines several individual components such as control of corruption, government effectiveness, and rule of law (see Section 2). Columns (5) and (6) focus on two of these components: the rule of law and governance quality, respectively. Column (7) looks at democracy and column (8) at economic freedom. Except for French law, all the other dimensions of institutions have a positive effect on FD,

14 These terms refer to the weights used in meta-analysis and not to the panel structure of the data. Fixed effects weights $= 1/SE_{ij}^2$. Random effect weights $= 1/(SE_{ij}^2 + \tau^2)$, where τ^2 denotes the between-study heterogeneity variance.

15 Note that UWLS gives the exact same point estimates as fixed effects meta-analysis. The only difference is that UWLS has wider confidence intervals.

16 The appendix reports several robustness checks including: sample size weights (online Appendix Tables A2 and A3); the 'wild bootstrap' to correct standard errors (online Appendix Tables A15 and A16); instrumenting standard errors using the inverse of the square root of the number of degrees of freedom (online Appendix Table A17); and the WALS procedure of model averaging (online Appendix Table A18). Inferences are similar.

Table 1. Institutions and FD, unconditional meta-averages

	All estimates	Creditor protection	French law	Overall institutional quality	Rule of law	Governance	Democracy	Economic freedom
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				A. Private credit				
UWLS	0.071	0.126	−0.036	0.127	0.316	0.127	0.035	0.212
	(0.001)	(0.001)	(0.065)	(0.001)	(0.000)	(0.008)	(0.053)	(0.072)
RE	0.158	0.231	−0.069	0.186	0.356	0.200	0.092	0.208
	(0.000)	(0.000)	(0.073)	(0.000)	(0.000)	(0.001)	(0.022)	(0.080)
N [k]	503 [62]	95 [22]	82 [22]	94 [21]	34 [13]	54 [15]	78 [11]	20 [4]
I^2 (%)	82	75	67	83	66	77	73	55
				B. Stock market capitalization				
UWLS	0.079	0.085	−0.036	0.133	0.066	0.065	0.090	0.191
	(0.000)	(0.046)	(0.430)	(0.000)	(0.173)	(0.135)	(0.003)	(0.205)
RE	0.126	0.127	−0.156	0.152	0.278	0.101	0.130	0.225
	(0.000)	(0.027)	(0.089)	(0.001)	(0.131)	(0.115)	(0.044)	(0.182)
N [k]	195 [28]	16 [6]	24 [8]	49 [11]	24 [6]	27 (8)	38 (5)	5 [2]
I^2 (%)	78	67	72	73	80	68	79	37

Source: Authors' calculations.

Notes: Each cell reports a separate regression. The dependent variable is the partial correlation between FD and each of the measures of institutions proposed in the literature. Panels A and B present results for private credit and stock market capitalization, respectively. I^2 measures the percent of variation in reported estimated that can be attributed to heterogeneity. N and k denote the number of estimates and the number of studies, respectively. All models estimated with weighted least squares using inverse variance weights. *p*-values reported in parentheses using standard errors corrected for within-study clustering.

Table 2. Other determinants of FD, unconditional meta-averages

	Openness			
	Financial openness	Trade openness	Remittances	Inflation
	(1)	(2)	(3)	(4)
UWLS	0.042	0.050	0.026	−0.070
	(0.006)	(0.000)	(0.220)	(0.000)
RE	0.052	0.083	0.036	−0.139
	(0.236)	(0.000)	(0.088)	(0.000)
N [k]	305 [43]	239 [40]	69 [14]	288 [47]
I^2 (%)	81	73	80	84
UWLS	0.133	0.092	0.214	−0.068
	(0.000)	(0.039)	(0.121)	(0.000)
RE	0.154	0.106	0.214	−0.080
	(0.000)	(0.018)	(0.121)	(0.006)
N [k]	110 [19]	119 [22]	6 [2]	49 [16]
I^2 (%)	72	83	0	52

Source: Authors' calculations.

Notes: See notes to Table 1.

proxied by private credit. French law has a small negative effect, but this is only weakly statistically significant.

With regard to stock market capitalization, creditor protection, overall institutional quality, and democracy have positive and statistically significant correlations. The other dimensions also have positive correlations (except for French civil law), but they are estimated with low precision, most likely because of the thin evidence base.

Comparing the magnitude of the estimated partial correlations, the rule of law appears to be nearly five times more important, and governance twice as large, for private credit than for stock market capitalization. Creditor protection is also more important for private credit than it is for stock market capitalization. In contrast, democracy appears to be more important for stock market capitalization.

Table 2 suggests that both trade and financial openness have a positive effect on private credit and stock market development, whilst inflation has an adverse effect. Trade and financial openness appear to be more important for stock market development than for private credit. The effect of inflation on both measures for FD is about the same. The extant studies on remittances show a positive effect, but this is not statistically significant and this finding needs to be replicated by additional studies. We conclude that the literature has not yet established that remittances matter for FD.

5.2 Meta-regression analysis

Tables 1 and 2 also report I^2, a measure of between study heterogeneity. Simulations show that when I^2 exceeds 80% conventional meta-average methods reported in Tables 1 and 2 become less reliable at representing the evidence base (Stanley, 2017). In such cases, meta-regression analysis is recommended to accommodate the heterogeneity in estimates. That is, with large heterogeneity, there is a distribution of effects and an unconditional meta-average will not adequately represent the research record. However, as evidenced by Tables 1 and 2 the evidence base is thin (i.e. only a limited number of regressions) for several of the potential determinants. This poses a challenge, as regression-based tests will have low power to detect empirical effects for these thin-evidence-based dimensions. Hence, our meta-regressions focus on the areas where the evidence base is deepest. Thus, we do not attempt meta-regression for the effects of remittances and trust. The meta-regression results are presented in Tables 3–6, for institutions, trade openness, financial openness, and inflation, respectively.[17]

5.2.1 Institutions There are several measures used in the literature to investigate the impact of institutions on FD. Nevertheless, the literature considers the various estimates to be a pool of estimates from a common population that reflects the impact of institutions broadly. Hence, it is valid to combine the various estimates into one meta-regression model. This has the benefit of increasing sample size and statistical power for the meta-regressions. This also enables us to test whether the various measures and dimensions of institutions do make a difference to reported findings.

Table 3 presents the MRA results for institutions. Columns (1)–(4) refer to FD as measured by private credit, while columns (5)–(8) refer to stock market capitalization.

17 In their survey of 159 meta-analyses, Ioannidis *et al.* (2017) set a lower threshold of five estimates from which to calculate a meta-average.

Table 3. Institutions and FD, meta-regression analysis

	PC	PC	PC	PC Bayesian model averaging	SMC	SMC	SMC	SMC Bayesian model averaging
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SESQR	7.631***	7.975***	−3.869	−1.293	5.999***	6.954***	−0.689	5.452[a]
	(4.637)	(4.727)	(−1.181)	[−0.60]	(3.142)	(4.775)	(−0.163)	[2.36]
French legal	−0.166***	−0.151***	−0.152***	−0.157[a]	−0.159**	−0.233***	−0.237**	−0.135[a]
	(−3.912)	(−3.035)	(−2.828)	[−9.46]	(−2.523)	(−3.318)	(−2.597)	[−3.70]
Rule of law	0.117*	0.141**	0.163***	0.136[a]	−0.061	0.003	0.011	−0.001
	(1.947)	(2.233)	(2.863)	[3.33]	(−1.666)	(0.061)	(0.185)	[−0.11]
Creditor protection	−0.012	0.019	0.024	0.001	−0.032	−0.024	−0.024	0.001
	(−0.343)	(0.425)	(0.548)	[0.08]	(−0.835)	(−0.435)	(−0.337)	[0.08]
Democracy	−0.074**	−0.063	−0.065	−0.071[a]	−0.027	−0.110*	−0.083	−0.016
	(−2.295)	(−1.656)	(−1.551)	[−4.70]	(−0.975)	(−2.039)	(−1.272)	[−0.46]
Governance	−0.022	−0.004	0.017	−0.001	−0.063	−0.074	−0.061	−0.005
	(−0.543)	(−0.079)	(0.333)	[−0.10]	(−1.532)	(−1.606)	(−0.915)	[−0.26]
Economic freedom	0.019	0.029	0.081	0.013	0.058	0.048	0.040	0.023
	(0.259)	(0.448)	(1.627)	[0.37]	(1.514)	(0.744)	(0.511)	[0.45]
Legal formalism	−0.001	0.015	−0.036	−0.003	0.078	0.023	0.013	0.005
	(−0.011)	(0.236)	(−0.564)	[−0.15]	(0.929)	(0.217)	(0.135)	[0.19]
Creditor information	−0.003	0.033	0.057	0.004	−0.040	−0.029	−0.021	0.001
	(−0.062)	(0.682)	(1.189)	[0.26]	(−1.439)	(−0.462)	(−0.285)	[0.01]
Income		−0.012	−0.020	−0.001		−0.022	0.022	−0.001
		(−0.511)	(−0.931)	[−0.11]		(−0.533)	(0.420)	[−0.14]
Remittances/ trust		−0.062	−0.098**	−0.059[a]		0.019	0.069	0.004
		(−1.649)	(−2.336)	[−2.13]		(0.227)	(1.242)	[0.18]
Trade openness		0.043	0.037	0.039[a]		0.076	0.052	0.009
		(1.520)	(1.169)	[2.15]		(1.553)	(1.273)	[0.38]
Financial openness		0.007	0.043	0.006		−0.072	−0.111	−0.013
		(0.225)	(1.177)	[0.40]		(−1.489)	(−1.571)	[−0.50]
Inflation		0.018	0.040	0.011		−0.039	−0.017	−0.024
		(0.777)	(1.510)	[0.62]		(−1.046)	(−0.471)	[−0.71]
Developing			−0.049*	−0.005			0.083*	0.082[a]
			(−1.766)	[−0.39]			(1.705)	[1.85]
Non-OLS			0.011	0.001			0.024	0.001
			(0.783)	[0.22]			(0.530)	[0.02]
Focus of study			−0.015	−0.001			−0.069	−0.007
			(−0.677)	[−0.09]			(−1.291)	[−0.35]
Focus of study* SESQR			10.150***	8.831[a]			7.535**	0.689
			(3.340)	[5.01]			(2.448)	[0.31]
Panel			−0.095*	−0.061[a]			−0.015	−0.001
			(−1.867)	[−1.79]			(−0.181)	[−0.01]
Average year 1992			−0.000	−0.001			−0.003	−0.001
			(−0.194)	[−0.16]			(−0.950)	[−0.41]
Endogenous			−0.026	−0.003			0.095**	0.088[a]
			(−1.089)	[−0.28]			(2.506)	[2.70]
Constant	0.100***	0.062	0.175**	0.133[a]	0.104***	0.116**	0.151	0.071[a]
	(3.350)	(1.199)	(2.244)	[3.68]	(3.720)	(2.263)	(1.190)	[2.66]

(continued)

Table 3. Continued

	PC	PC	PC	PC Bayesian model averaging	SMC	SMC	SMC	SMC Bayesian model averaging
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Observations	503	503	503	503	195	195	195	195
Number of studies	62	62	62	62	28	28	28	28
Joint bias test			0.004				0.014	
Adjusted R^2	0.344	0.367	0.424	–	0.236	0.281	0.352	–

Source: Authors' calculations.

Notes: The dependent variable is the partial correlation between FD and a measure of institutions. SESQR is the standard error squared. PC and SMC denote private credit and stock market capitalization, respectively. Estimation using unrestricted weighted least squares, using inverse variance weights. *t*-statistics reported in parentheses using standard errors corrected for within-study clustering. *, **, *** denote statistical significance at the 10, 5, and 1%, levels, respectively. Columns (4) and (8) report the estimated coefficients and the posterior Mean/SD ratio in brackets from Bayesian model averaging. Joint bias test reports the *p*-value of the statistical significance of both *SESQR* and *Focus of study* SESQR*.

[a]Standard error band does not include zero.

The base is an 'aggregate' effect of the quality of institutions on FD. Here we use all estimates that use various measures ('aggregate' measures and measures of individual components, such as the rule of law), pool these and then test whether these alternate measures lead to quantitatively different results. The dependent variable is the partial correlation between FD (either private credit or stock market capitalization) and any measure of institutional quality.

Columns (1) and (5) include standard error squared, SESQR, to correct for publication bias, and eight variables that reflect the main differences in the way institutions are measured: French civil law, rule of law, creditor protection, democracy,[18] governance, economic freedom, contract enforcement or legal formalism, and credit information. Coefficients on these variables indicate how their inclusion in the model affects the positive partial correlation between FD and institutional quality. The coefficients on these variables quantify how different (larger or smaller) the effect of institutions is relative to the base (institutional quality).

In columns (2) and (6), we add five variables that reflect econometric specification differences: control for per capita GDP, control for trade openness, control for financial openness, control for inflation, and control for remittances and trust.[19,20]

In columns (3) and (7), we add seven variables that reflect data and estimation differences: samples that include only developing nations, panel data, the average year of the

18 Where necessary, we changed the sign on the reported coefficient democracy so that all estimates are comparable and measuring the same directional move, i.e., a positive correlation denotes that democracy increases financial development.

19 We combined the latter two factors to conserve degrees of freedom. See the Appendix for a discussion on trust.

20 The inclusion of per capita GDP can create econometric problems. At one level, financial development will be influenced by per capita GDP. However, as discussed in the Introduction, there is an extensive literature showing reverse causality between financial development and economic growth.

Table 4. Financial openness and FD, meta-regression analysis

	PC	PC	PC	PC Bayesian model averaging	SMC	SMC	SMC	SMC Bayesian model averaging
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SESQR	2.198	5.466	19.180**	10.204[a]	4.292***	2.359	6.588	3.489
	(0.571)	(1.540)	(2.189)	[2.36]	(3.132)	(1.377)	(0.752)	[0.79]
Govt banks	−0.051	0.023	0.031	0.002	0.182***	0.192**	0.072	0.002
	(−0.787)	(0.427)	(0.573)	[0.15]	(4.174)	(2.351)	(0.545)	[0.04]
Capital account	−0.034	−0.141**	−0.123**	−0.133[a]	0.040	0.042	0.046	0.001
	(−0.890)	(−2.538)	(−2.491)	[−5.30]	(0.820)	(0.710)	(0.748)	[0.09]
FDI	−0.112**	−0.206***	−0.168***	−0.196[a]	0.063	0.028	0.052	0.005
	(−2.095)	(−3.730)	(−2.883)	[−7.81]	(1.486)	(0.363)	(0.732)	[0.31]
Income		−0.007	−0.025	−0.001		−0.125***	−0.121*	−0.005
		(−0.159)	(−0.504)	[−0.07]		(−3.006)	(−1.808)	[−0.16]
Trade openness		0.147***	0.139**	0.136[a]		0.038	0.074	0.006
		(2.979)	(2.694)	[5.47]		(0.984)	(1.416)	[0.30]
Institutions		−0.035	−0.032	−0.028[a]		−0.056	−0.018	−0.008
		(−1.342)	(−1.176)	[−1.36]		(−0.948)	(−0.251)	[−0.39]
Inflation		0.074*	0.078**	0.073[a]		−0.019	−0.011	0.002
		(1.723)	(2.085)	[3.37]		(−0.341)	(−0.238)	[0.15]
Remittances/ trust		−0.013	0.047	0.001		0.115**	0.074	0.033
		(−0.564)	(1.006)	[0.05]		(2.240)	(0.735)	[0.37]
Developing			−0.020	−0.001			−0.032	−0.002
			(−0.936)	[−0.17]			(−0.899)	[−0.25]
Non-OLS			−0.000	−0.001			0.018	−0.008
			(−0.012)	[−0.10]			(0.280)	[−0.40]
Endogenous			−0.035**	−0.005			0.018	0.005
			(−2.300)	[−0.42]			(0.698)	[0.31]
Average year 1992			−0.003	−0.001			0.003	−0.004
			(−0.906)	[−0.41]			(0.210)	[−0.68]
Panel			0.102	0.049			−0.246	−0.089
			(1.254)	[0.99]			(−1.031)	[−0.71]
Focus of study			0.077	0.013			0.310*	0.091
			(1.603)	[0.59]			(1.791)	(0.82)
Focus of study *SESQR			−11.934	−3.598			−6.462	−0.471
			(−1.528)	[−0.78]			(−1.070)	[−0.14]
Constant	0.082**	0.001	−0.161	−0.067[a]	0.072*	0.216**	0.101	0.110
	(2.382)	(0.018)	(−1.433)	[−1.07]	(1.778)	(2.543)	(0.464)	[0.89]
Observations	305	305	305	305	110	110	110	110
Number of studies	43	43	43	43	19	19	19	19
Joint bias test			0.057				0.569	
Adjusted R^2	0.105	0.235	0.283	–	0.053	0.056	0.118	–

Source: Authors' calculations.

Notes: See notes to Table 3. The dependent variable is the partial correlation between FD and a financial liberalization measure.

Table 5. Trade openness and FD, meta-regression analysis

	PC (1)	PC (2)	PC Bayesian model averaging (3)	SMC (4)	SMC (5)	SMC Bayesian model averaging (6)
SESQR	5.847**	−6.234*	−4.636[a]	−4.760	−12.029**	−3.738
	(2.102)	(−1.702)	[−1.79]	(−1.222)	(−2.207)	[−0.95]
Exports	0.005	−0.039	−0.033[a]	−0.063	0.006	−0.001
	(0.183)	(−1.324)	[−1.78]	(−0.951)	(0.073)	[−0.06]
Constructed trade	−0.007	−0.023	−0.008	−0.217***	−0.192**	−0.177[a]
	(−0.108)	(−0.437)	[−0.36]	(−3.667)	(−2.620)	[−4.28]
Income	0.060	0.059	0.050[a]	−0.038	0.000	−0.001
	(1.403)	(1.545)	[2.08]	(−1.114)	(0.003)	[−0.04]
Institutions	0.028	−0.004	0.001	0.005	0.120*	0.061[a]
	(1.169)	(−0.134)	[0.19]	(0.075)	(1.756)	[0.97]
Financial openness	−0.003	−0.005	0.001	0.045	0.057	0.003
	(−0.085)	(−0.261)	[0.03]	(0.655)	(0.944)	[0.18]
Inflation	0.007	−0.017	−0.002	−0.077	0.006	−0.042
	(0.164)	(−0.503)	[−0.30]	(−1.280)	(0.091)	[−0.76]
Remittances/trust	−0.051	−0.022	−0.013	0.006	0.071	0.003
	(−1.595)	(−0.852)	[−0.80]	(0.070)	(0.838)	[0.07]
Developing		0.005	0.001		0.054	0.024
		(0.220)	[0.06]		(1.224)	[0.60]
Non-OLS		−0.008	−0.001		0.059	0.079[a]
		(−0.532)	[−0.11]		(0.990)	[1.73]
Endogenous		−0.069**	−0.065[a]		−0.099	−0.025
		(−2.416)	[−5.00]		(−1.497)	[−0.54]
Average year 1992		0.001	0.001		−0.007**	−0.001
		(0.550)	[0.18]		(−2.182)	[−0.37]
Panel		−0.191***	−0.184[a]		−0.224	−0.047
		(−2.876)	[−5.95]		(−1.378)	[−0.54]
Focus of study		0.006	0.005		−0.040	0.001
		(0.173)	[0.44]		(−0.617)	[0.06]
Focus of study *SESQR		8.646**	8.381[a]		7.059	0.278
		(2.601)	[2.43]		(1.287)	[0.18]
Constant	−0.007	0.243***	0.212[a]	0.191*	0.227	0.118
	(−0.114)	(2.836)	[4.97]	(2.036)	(0.948)	[0.95]
Observations	239	239	239	119	119	119
Number of studies	40	40	40	22	22	22
Joint bias test		0.044			0.102	
Adjusted R^2	0.182	0.352	–	0.247	0.356	–

Source: Authors' calculations.
Notes: See notes to Table 3. The dependent variable is the partial correlation between FD and trade openness.

Table 6. Inflation and FD, meta-regression analysis

	PC (1)	PC (2)	PC Bayesian model averaging (3)	SMC (4)	SMC (5)	SMC Bayesian model averaging (6)
SESQR	−7.586**	−5.731	−7.135[a]	−6.781***	3.735	0.625
	(−2.439)	(−1.577)	[−3.72]	(−3.313)	(0.514)	[0.13]
Income	−0.022	−0.008	0.001	0.034	−0.074	−0.010
	(−0.741)	(−0.205)	[0.02]	(0.562)	(−1.375)	[−0.31]
Trade openness	−0.018	0.013	0.001	−0.076*	−0.061	−0.048[a]
	(−0.401)	(0.291)	[0.05]	(−1.917)	(−1.390)	[−1.44]
Institutions	0.037*	0.076	0.054[a]	−0.039	−0.004	−0.001
	(1.797)	(1.653)	[2.10]	(−1.226)	(−0.123)	[−0.14]
Financial openness	−0.027	−0.021	−0.001	−0.100	−0.182***	−0.132[a]
	(−0.616)	(−0.556)	[−0.21]	(−1.703)	(−6.605)	[−3.07]
Remittances/trust	0.093***	0.075***	0.071[a]	0.018	0.035	0.003
	(3.519)	(2.927)	[4.93]	(0.372)	(0.545)	[0.13]
Inflation change	0.099**	0.112	0.110[a]	−0.064	−0.024	−0.012
	(2.362)	(1.667)	[4.00]	(−1.217)	(−0.230)	[−0.42]
Above threshold	−0.112***	−0.094*	−0.077[a]	−0.080	−0.124***	−0.104[a]
	(−4.467)	(−1.972)	[−1.60]	(−1.501)	(−5.849)	[−3.17]
Developing only		−0.007	−0.001		0.121	0.108[a]
		(−0.375)	[−0.08]		(1.461)	[2.19]
Non-OLS		−0.048*	−0.047[a]		0.181**	0.127[a]
		(−1.929)	[−3.45]		(2.214)	[1.97]
Endogenous		−0.015	−0.001		0.175*	0.117[a]
		(−0.543)	[−0.18]		(1.969)	[1.69]
Average year 1992		−0.001	−0.001		−0.004	0.001
		(−0.350)	[−0.16]		(−0.875)	[0.10]
Panel		0.072	0.018		0.326**	0.029
		(0.920)	[0.52]		(2.710)	[0.37]
Focus of study		−0.055	−0.034[a]		−0.136	−0.047[a]
		(−1.146)	[−1.28]		(−1.441)	[−1.04]
Focus of study *SESQR		1.247	0.032		7.665	0.159
		(0.257)	[0.03]		(0.817)	[0.08]
Constant	−0.069	−0.148	−0.105[a]	0.077**	−0.279**	−0.044
	(−1.394)	(−1.467)	[−2.67]	(2.318)	(−2.319)	[−0.46]
Observations	288	288	288	49	49	49
Number of studies	47	47	47	16	16	16
Joint bias test		0.255			0.392	
Adjusted R^2	0.234	0.285	–	0.341	0.638	–

Source: Authors' calculations.

Notes: See notes to Table 3. The dependent variable is the partial correlation between inflation and FD.

data used,[21] whether the estimate was derived correcting for endogeneity, and whether a non-OLS (ordinary least squares) estimator was used (typically GMM (generalized method of moments)).[22] We also add the variable *Focus of study* to columns (3) and (7). This is a binary variable taking the value of 1 if the study focused on institutions and 0 if it is included institutions as a control.[23] With the inclusion of this variable in the MRA, we can test whether studies that are specifically interested in a particular variable produce different results. Arguably, these studies provide more accurate estimates of the underlying empirical effect on the grounds that the authors have thought deeper about the relevant modeling, measurement, and estimation issues. However, it is also possible that some authors that are interested in a particular variable might seek more actively to derive certain results. That is, it is possible that publication selection is more pronounced in areas where the authors are interested as opposed to mere controls. To allow for this possibility, we interact *Focus of study* with the SESQR.

Finally, to explore robustness and accommodate model uncertainty, in columns (4) and (8), we present results from Bayesian model averaging, reporting the estimated coefficients and the posterior mean to standard deviation ratio (in brackets).[24] Supplementary Appendix Table A8 reports results of a general-to-specific modelling strategy, as recommended by Stanley and Doucouliagos (2012).

For both private credit and stock market capitalization, French civil law has a negative coefficient, indicating that French civil law has significantly smaller correlations than institutional quality with both types of FD. For private credit, the rule of law has a stronger correlation than an overall index of institutional quality. Democracy has a negative coefficient in private credit meta-regressions, suggesting that democracy is not as important as overall institutional quality.

Samples that include only developing (and/or emerging) nations do make a difference. Specifically, larger correlations are presented for stock market capitalization. That is, institutions appear to be more important for the development of stock markets in developing nations. This is not surprising as the development of stock markets arguably depends more on having the proper institutions in place than the development of banking. However, it might also reflect a selection bias as many developing countries hardly have stock markets. Studies that control for trade openness report larger correlations between institutions and

21 For example, if a study used data from 1970 to 2000, the average year is 1985.

22 We code estimates as *Non-OLS* if they do not use OLS *and* do not accommodate endogeneity in the variable of interest. For example, a study may use GMM and treat one variable as endogenous but not treat the variable of interest (e.g. institutions) as endogenous.

23 We deemed a study to focus on institutions if institutions (or inflation, trade, and financial openness) was included in the title or if it was specifically mentioned in the abstract. This signals that the authors considered institutions to be an important focus of their inquiry.

24 A posterior mean/SD ratio greater than 1 suggests that a variable is robustly correlated with our dependent variable. A ratio of 1.3 is equivalent to a 90% confidence interval (see Masanjala and Papageorgiou, 2008). We include the constant and SESQR in all estimated models. We impose no other prior subjective information on the parameters of the various models. Hence, we use the *g*-priors recommended by Fernández *et al.* (2001): $g = 1/\max(n, k_2^2)$ for each estimated model, where n denotes the number of observations and k^2 are the regressors. These priors are the most commonly used in BMA studies (Steele, 2020). In addition, we also use the uniform model prior that treats all models equally. While other model priors can be used, the uniform prior is suitable for our primary task of exploring the robustness of our MRA results.

private credit. In contrast, controlling for remittances or trust results in smaller correlations for private credit.

Focus of study is not statistically significant, suggesting that studies that specifically focus on modeling the effects of institutions report similar correlations between institutional quality and FD as do studies that include institutions as a control variable. However, we find that two publication bias terms are jointly statistically significant, and the coefficient on *Focus of study* * SESQR has a positive sign suggesting that studies that specifically focus on the role of institutions are more likely to report larger statistically significant effects.[25] Finally, correcting for the endogeneity between institutions and FD appears to be important for stock market capitalization. We find that once all other study characteristics are controlled for, correcting for endogeneity produces larger correlations.

5.2.2 Financial openness The MRA for financial openness is presented in Table 4. The dependent variable is the partial correlation between FD and a financial openness measure. Columns (1) and (5) include variables that reflect differences in measurement of financial openness: the share of government-owned banks, capital-account based measures, and FDI-based measures. All other domestic financial openness measures are then the base. In columns (2) and (6), we add variables that reflect differences in econometric specification. Columns (3) and (7) report the general model with all potential moderator variables included. The Bayesian model averaging results are shown in columns (4) and (8).

Column (4) for private credit suggests that the inclusion of trade openness or inflation in the primary econometric model produces larger financial openness effects. The results also indicate that FDI and capital account-based measures of financial openness produce smaller effects than measures for domestic policy reform. We also find that there is a publication selection bias in this branch of the literature, with preferential reporting of larger effects from financial openness. For stock market capitalization (column 8), neither the alternate measures of financial openness nor other variables considered seem to moderate the reported results.

5.2.3 Trade openness Table 5 presents the MRA for trade openness. The dependent variable is the partial correlation between FD and trade openness. Different to financial openness, there is little difference in how trade openness is measured; it is mainly trade as share of GDP. Still, we control for alternative measures of trade openness (exports and constructed trade measure). Columns (1) and (4) include variables that reflect specification differences. Columns (2) and (5) present the general model with all potential moderators included, while columns (3) and (6) show results from Bayesian model averaging.

The results in column (3) for private credit suggest that using exports as proxy for trade openness results in smaller correlations. Furthermore, our findings indicate that controlling for income results in larger correlations and panel data and controlling for endogeneity gives smaller correlations. Finally, among studies that specifically focus on trade openness, there seems to be a publication bias in favor of reporting larger effects. For stock market capitalization, we find that controlling for institutions produces larger correlations between trade openness and FD.

25 When both *Focus of study* and *Focus of study * SESQR* are included in the MRA, the coefficient on *Focus of study* reflects the average value of these studies corrected for preferential reporting.

5.2.4 Inflation Table 6 offers the MRA results for inflation. The dependent variable is the partial correlation between inflation and FD. For stock market development, estimator matters; compared to OLS, treating inflation endogenous presents smaller adverse effects from inflation. There appears to be no change in the impact of inflation over time. Specification is also important. Controlling for trade and financial openness result in larger inflation effects (models without these variables result in smaller inflation effects, *ceteris paribus*). Samples that use only data from developing and emerging nations produce smaller inflation effects.

A couple of studies explore the impact of inflation thresholds. That is, they explore the impact of inflation on FD below a certain threshold and above that threshold. Allowing for threshold effects is important; the adverse effect of inflation is worse beyond a threshold rate of inflation. For private credit, we find that the way in which inflation is measured matters. In particular, threshold effects are also detected.

We note two qualifications to these findings. First, the threshold result is interesting. However, it comes from only two studies (Boyd *et al.*, 2001 and Khan *et al.*, 2006) and hence requires replication by other studies. Applying meta-analysis to the findings from these two studies suggests a threshold level of just over 6% (6.157). Second, the MRA for inflation and stock market capitalization is based on only 16 studies. As such, the results should also be interpreted with caution.

5.3 Conditional meta-averages

The MRA coefficients can be used to construct conditional meta-averages. The conditional meta-averages correct for publication selection and econometric misspecification bias, where these are detected as important. We form three sets of meta-averages. First, we construct conditional meta-averages using the Bayesian model averaging posterior means from Tables 3 to 6 above, for those variables with standard error bands that do not include zero. Second, we follow Havránek (2015), Zigraiova and Havránek (2016), and Havránek and Sokolova (2020), and use the same variables identified through Bayesian model averaging as robust moderator variables, to construct the WLS (weighted least squares) equivalent specification. We then use the estimated coefficients from these estimations to construct meta-averages.[26] Third, we use the coefficients from general-to-specific models, as is common practice in meta-regression analysis. In most cases, these approaches produce similar conditional averages. The Supplementary Appendix details the construction of these meta-averages and reports the general-to-specific MRA. Table 7 presents the conditional meta-averages. These estimates are our 'best practice' estimates of what this empirical literature has established. Columns (1) and (2) present the results for private credit and columns (3) and (4) for stock market capitalization. We report results for all countries combined in columns (1) and (3), and for samples that include only developing or emerging nations in columns (2) and (4). Table 7 thus provides a summary of what the literature has established with regard to these determinants of FD.

Institutional quality and the rule of law in particular have a robust positive effect on FD. When samples with all countries are considered, overall institutional quality appears to be more important to stock markets than to private credit, with partial correlations of

26 Havránek (2015) and Zigraiova and Havránek (2016) use the WLS specification to *approximate* confidence intervals around the point estimate derived from posterior means. Our approach centres confidence intervals around the equivalent WLS conditional estimates.

Table 7. Conditional meta-averages

	Private credit, all countries	Private credit, developing countries	Stock market capitalization, all countries	Stock market capitalization, developing countries
	(1)	(2)	(3)	(4)
Institutions				
Overall	0.111; 0.118	0.111; 0.118	0.159; 0.155	0.242; 0.253
institutional	(0.09; 0.15)	(0.09; 0.15)	(0.13; 0.18)	(0.18; 0.32)
quality	0.118	0.118	0.162	0.237
	(0.09; 0.15)	(0.09; 0.15)	(0.09; 0.23)	(0.15; 0.32)
Rule of law	0.247; 0.255	0.247; 0.255	0.159; 0.155	0.242; 0.253
	(0.17; 0.33)	(0.17; 0.33)	(0.13; 0.18)	(0.18; 0.32)
	0.259	0.259	0.162	0.237
	(0.18; 0.34)	(0.18; 0.34)	(0.09; 0.23)	(0.15; 0.32)
French civil law	− 0.045; − 0.044	− 0.045; 0.044	0.024; 0.043	0.106; 0.141
	(− 0.09; − 0.01)	(− 0.09; − 0.01)	(− 0.08; 0.16)	(− 0.01; 0.29)
	− 0.042	− 0.042	− 0.026	0.049
	(− 0.08; − 0.01)	(− 0.08; − 0.01)	(− 0.15; 0.10)	(− 0.10; 0.19)
Financial openness				
Domestic	0.114; 0.171	0.114; 0.171	0.110; 0.133	0.110; 0.133
	(0.08; 0.27)	(0.08; 0.27)	(0.11; 0.16)	(0.11; 0.16)
	0.143	0.143	0.137	0.137
	(0.05; 0.24)	(0.05; 0.24)	(0.11; 0.16)	(0.11; 0.16)
Capital account	− 0.019; 0.032	− 0.019; 0.032	0.110; 0.133	0.110; 0.133
	(0.01; 0.06)	(0.01; 0.06)	(0.11; 0.16)	(0.11; 0.16)
	0.012	0.012	0.137	0.137
	(− 0.01; 0.03)	(− 0.01; 0.03)	(0.11; 0.16)	(0.11; 0.16)
Trade openness	0.013; 0.004	0.013; 0.004	0.179; 0.108	0.179; 0.108
	(− 0.02; 0.03)	(− 0.02; 0.03)	(0.05; 0.16)	(0.05; 0.16)
	0.004	0.004	0.108	0.108
	(− 0.02; 0.03)	(− 0.02; 0.03)	(0.05; 0.16)	(0.05; 0.16)
Inflation	− 0.086; − 0.070	− 0.086; − 0.070	− 0.154; − 0.144	− 0.046; − 0.026
	(− 0.12; − 0.02)	(− 0.12; − 0.02)	(− 0.20; − 0.09)	(− 0.12; 0.07)
	− 0.054	− 0.054	− 0.096	0.021
	(− 0.10; − 0.01)	(− 0.10; − 0.01)	(− 0.13; − 0.06)	(− 0.06; 0.10)
Inflation,	− 0.163; − 0.159	− 0.163; − 0.159	− 0.258; − 0.249	− 0.150; − 0.132
threshold	(− 0.24; − 0.08)	(− 0.24; − 0.08)	(− 0.31; − 0.18)	(− 0.24; − 0.02)
	− 0.163	− 0.163	− 0.207	− 0.09
	(− 0.22; − 0.11)	(− 0.22; − 0.11)	(− 0.25; − 0.17)	(− 0.17; − 0.01)

Source: Authors' calculations.

Notes: Table reports three sets of conditional meta-averages. The first row reports meta-averages using: (i) Bayesian model averaging posterior means for variables in Tables 3–6 with standard error bands that do not include zero and (ii) the coefficients from a WLS model that includes only those variables identified through Bayesian model averaging as robust moderator variables. The second row uses coefficients from general-to-specific MRA models. See the Supplementary Appendix for details on the construction of these conditional meta-averages. Figures in parentheses are 90% confidence intervals.

$r = 0.16$ and $r = 0.11$, respectively; though the confidence intervals overlap suggesting that institutional quality may be equally important. However, for samples with only developing and emerging economies, we find that institutional quality is more important for stock market development; $0.24 > 0.11$ and the 90% confidence intervals do not overlap. The rule of law is equally important to private credit and stock market development when analyzed samples relate to developing or emerging economies. However, when all countries are analyzed, rule of law is more important for private credit; $0.25 > 0.16$ and there is little overlap between the 90% confidence intervals. The positive effects of institutional quality are effectively neutralized in countries with French civil law. In nations with French civil law, the meta-averages suggest that institutional quality has an adverse effect on private credit and no effect on stock market development.

Financial openness has a positive effect on private credit, provided it is measured as domestic openness and not as capital account openness. The effect is much stronger with respect to the liberalization of domestic financial market, which is almost seven times more important to private credit than is capital account liberalization; $r = 0.11$ compared to $r = -0.02$, respectively. For stock market capitalization, capital account openness is equally important as domestic reform.

We find that the case for trade openness has not been established with respect to private credit. Indeed, the meta-average suggests a zero effect; $r = 0.01$. However, trade openness appears to be important for stock market capitalization; $r = 0.18$. There are 239 estimates relating to the effects of trade openness on private credit from 41 studies. Of these, 161 (65%) report statistically insignificant effects (in either direction); recall Figure 3. While the unconditional meta-average (Table 2) shows a small positive effect, we find, once publication and misspecification bias are considered, little evidence of a genuine empirical effect. To shed further light on this, we look at the interaction between trade openness and financial openness to test the Rajan and Zingales hypothesis that the combination of trade and financial openness drives FD. To do this, we conduct a meta-analysis on the interaction effect. The evidence base is also thin here, with only six studies and 29 comparable estimates. Conducting an UWLS meta-analysis on this, we find an interaction partial correlation of 0.040 with a p-value of 0.586. Hence, we conclude that the evidence does not support the Rajan and Zingales hypothesis.

Inflation has a negative effect on private credit development; $r = -0.09$. This adverse effect is larger for stock market capitalization, $r = -0.15$, but this is not confirmed for samples that use only data from developing or emerging economics; $r = -0.05$ but confidence intervals are wide and contain zero. Threshold effects appear to be important, with larger partial correlations.

Comparing across the various dimensions, and focusing on samples with all countries, the meta-analyses suggest that rule of law has the greatest positive impact on private credit development ($r = 0.25$), followed by domestic financial openness ($r = 0.11$) and overall institutional quality ($r = 0.11$). For stock market capitalization, trade openness ($r = 0.18$) has the largest effect, overall institutional quality has a similar effect to the rule of law ($r = 0.16$), followed by financial openness ($r = 0.11$).

6. Conclusions

Our results based on 1,900 estimates suggest that institutional quality is positively correlated to both private sector credit and stock market capitalization (both as share of GDP).

In nations with French civil law, institutional quality has no effect on FD. Domestic financial openness has a positive effect on private credit and stock market development, while trade openness appears only to be important for stock market development. Inflation has an adverse effect on both proxies for FD, but its effect is larger for stock market development. Finally, we conclude that the literature has not yet robustly established that remittances matter for FD.

Comparing across the various dimensions, and focusing on samples with all countries, the meta-analyses suggest that rule of law has the greatest positive impact on private credit development, followed by domestic financial openness, and overall institutional quality. For stock market capitalization, trade openness has the largest effect, followed by overall institutional quality and the rule of law, and financial openness.

There is some evidence of spatial differences, with the effects of institutions on stock market capitalization being larger in developing and emerging economies. Inflation has weaker effects on stock market capitalization in developing and emerging economies. Interestingly, we do not find evidence suggesting that the effects of the variables considered changes over time.

Are these correlations of practical as well as statistical significance? Doucouliagos (2011) presents guidelines for partial correlations: a partial correlation is small if less than 0.07, 0.17 is moderate, and 0.33 is large. This suggests that institutions have a moderate to large effect and inflation and financial openness have small to moderate effects.[27] A correlation of 0.25 for rule of law corresponds to the findings reported in Singh *et al.* (2009) and Adarov and Tchaidze (2011). Our findings for inflation ($r = 0.09$) correspond to studies such as Cull *et al.* (2005) and Hauner (2009). The results of Claessens and van Horen (2014) correspond to the findings for financial openness ($r = 0.11$).

We also detect evidence of publication selection bias. For stock market development, this is detected in the case of institutions, where there is preferential reporting of larger positive correlations. In the case of private credit, there is preference to report larger positive correlations for financial openness and larger negative inflation correlations. We also detect differences between studies that focus on these factors and all other studies. Authors focused on the effects of institutions or trade openness tend to preferentially report larger positive correlations.

Our analysis suggests that the evidence base for some of the hypothesized effects is rather thin. This holds, for instance, for remittances. Further analyses may increase the evidence base so that it becomes clear whether the limited number of studies examining the effect of these drivers or the absence of a genuine impact is causing our findings. Furthermore, there are some potential drivers that have been examined by a few studies only. This holds, for instance, for government debt. In view of the rising government indebtedness, further research on the role of government debt in FD is warranted. This also holds for the impact of dollarization on FD. As pointed out by Court *et al.* (2012), theoretically the impact of dollarization on FD is not clear. On the one hand, under inflationary circumstances dollarization may provide an alternative to saving in local currency, thereby promoting financial deepening. However, proponents of the currency mismatch theory argue that enabling foreign currency-denominated accounts in the banking system can increase the vulnerability of the banking system, which may hamper FD. So far, this issue has

27 Schmidt and Hunter (2015) demonstrate that even small correlations can signal large policy effects.

been investigated empirically by a limited number of studies only (De Nicolo et al., 2005; Court *et al.*, 2012; Bannister *et al.*, 2018; Ize, 2020) reporting mixed results.

Supplementary material

Supplementary material is available on the OUP website. These are a file explaining the material, the data, and the replication files, and the online appendix.

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