

Governments, Trade, and Finance: 1980-2007

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ABSTRACT: We analyze country-level relationships between financial market volumes and indicators of financial market institutions, government activity, and openness to international trade, using interactions between global trends and country-specific characteristics to isolate an exogenous component of policy variation. Theoretically, finance is more useful and financial deregulation is more appealing if international trade makes it more important to match savings and investment and more difficult for national governments to fund and enforce policies that substitute private contractual arrangements. Empirically, we find that the direct effect of economic integration on financial development is small and insignificant, and that of financial market deregulation is hard to measure precisely. Along the path that led to the 2008-09 crisis, finance's growth was less obviously and more robustly driven by trade-related declines of government activity.

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1. Introduction

Between the 1980s and the 2000s, international trade and financial volumes both grew considerably, while deregulation and budget contractions tended to reduce the economic role of governments. These trends may have been driven by similar exogenous forces (such as technological progress in information and communication areas), or may have been directly linked to each other by such mechanisms as the additional financial contracting opportunities introduced by international turbulence, or the pressure towards financial deregulation induced by international competition (Rajan and Zingales, 2003). As we argue in this paper, more intense trade may foster also indirectly financial development if in more open economies it is more difficult to fund policies that substitute private financial transactions, as is the case for public investment in transportation, housing, and education, as well as for social and unemployment insurance schemes.

We focus on the indirect link between trade and finance that results from the combination of insights from hitherto separate strands of literature pointing out that trade openness may increase demand for public insurance (Rodrik, 1998), at the same time as it allows private agents to seek more lenient taxes and more generous subsidies across countries' borders (Sinn, 2003). Regardless of whether economic integration directly increases demand for external finance by firms or for consumption smoothing by households, it implies larger financial volumes through substitution of financial markets to government policies. This may be good or bad, depending on whether international competition decreases the lobbying power and rent-seeking activity of incumbents that undermines financial deregulation or instead it reduces governments' ability to design and enforce beneficial social insurance schemes. From both perspectives, however, economic integration reduces the ability of governments to suppress or substitute private finance.

We analyze country-specific trajectories along and around governments, trade, and finance broad worldwide trends in a standard OECD panel data set, seeking to disentangle policy reaction channels within the economic integration and financial development patterns observed over the past few decades. The task is demanding, but important: the 1980-2007 policy trends may wittingly or unwittingly have sown the seeds of the 2008-09 financial crisis, and exogenous factors and policy choices that shaped past experience may grind to a halt and possibly work in reverse when financial development proves to be a double-edged sword, as it spectacularly did in 2008-09.

To assess the role of national policies in fostering financial development, we formulate, discuss, and (to the extent possible) test assumptions that establish a cause-and-effect chain through the cross-sectional, time-series, and policy aspects of a standard country-level panel data set. Section 2 reviews previous contributions' efforts to detect empirically relevant theoretical linkages between government policies, economic integration, and finance, and introduces the empirical indicators analyzed in the rest of the paper. Section 3 outlines a theoretical framework where financial development reflects policy choices, driven in turn by underlying exogenous circumstances. Implementing the estimation and identification strategy presented in Section 4, Section 5 explores such relationships in empirical instrumental variable regressions. Section 6 concludes.

2. Issues and data

Various strands of the literature have explored possible theoretical linkages between trade and finance. Considering international economic integration, barriers to trade clog channels of adjustment to internal shocks at the same time as they protect domestic producers from external shocks which may be negatively correlated to those that originate in the domestic economy. To the extent that international markets offer new investment opportunities and increase income volatility, however, a positive association between trade and finance is not surprising, because financial markets are more useful when individual incomes and returns are more diverse and volatile. Rajan and Zingales (2003) focus particularly on the role of foreign competition in reducing domestic firms' rents and making it more necessary for them to draw on external finance. Beck (2002) explores the relationship between financial development and the composition (rather than the total amount) of trade, arguing that external funding is differently relevant across sectors, and finding that manufacturing production and exports are larger in more financially developed countries. Do and Levchenko (2007) show empirically that deeper trade integration has influenced production specialization, so as to imply faster development in countries where production is more dependent on external financing. Svaleryd and Vlachos (2002) use various trade measures to see whether higher exposure to external risk may increase the demand for finance. Huang and Temple (2005) document in panel data the character and intensity of dynamic impacts of trade on financial development.

The literature has also explored interactions between government policies and financial development. Obviously, governments may repress financial transactions, or foster them by making available a suitable legal and informational infrastructure. Like *de facto* financial development, *de jure* aspects of financial markets have evolved strongly over the last few decades: Tressel and Detragiache (2008) document that financial reform indicators are very significantly associated to *de facto* financial depth, controlling for various other country-level characteristics (including other liberalization indicators). Less obviously, financial development is also influenced by government policies that, just like financial contracts, reallocate resources over an individual's lifetime and across ex post income realizations. Unemployment insurance, public education, public housing, and many other government programs make it less necessary for economic agents to access private financial markets. This type of government activity crowds out private financial transactions, to an extent that depends on the substitutability of private markets and public programs, which is generally imperfect. While public policies and private contracts deliver similar services, they do so under different constraints and for different purposes (Chetty and Saez, 2010; Bertola and Koeniger, 2010). This has implications for the composition and intensity of public and private income- and consumption-smoothing mechanisms. Governments should intervene more extensively when poorly structured financial markets make it difficult to fund investments and smooth consumption privately (Bertola and Koeniger, 2007). For a given private contract structure, public policy should be more incisive when market incomes and investment opportunities are more heterogeneous and volatile, as may be the case in more open economies (Rodrik, 1998; Agell, 2002). While openness may through this channel call for more redistribution and regulation, it also weakens the economic power of national governments (e.g. Sinn, 2003). Empirically, the relationship between international trade and government is negative when country-specific characteristics are controlled for by fixed effects (Rodrik, 1997; Bertola and Lo Prete, 2009), indicating that race-to-the-bottom tensions may be operating along some dimensions of country-specific trajectories.

2.1. Data and correlations

We proceed to introduce the data we will be analyzing in the rest of the paper, and to inspect bivariate and multivariate relationships between empirical indicators of the phenomena of interest.

Our dataset, described in more detail in the Appendix, includes countries for which relevant trade, finance, and government policies' indicators are available for all or most of the 1980-2007 period.¹ To measure "Financial Development", we use the "Private Domestic Credit by Deposit Money Banks and Other Financial Institutions to GDP" volume (or *de facto*) variable drawn from the World Bank Financial Development and Structure Database (May 2009 revision, documented in Beck and Demirgüç-Kunt, 2009).² And, on the basis of the previous section's considerations, we proxy the factors that may determine Financial Development by three indicators: "Financial Structure," the summary of seven dimensions of the financial sector's institutional structure available in the IMF Financial Reform Database, documented in Abiad et al. (2008); "Trade" (the ratio of imports plus exports to GDP) and "Government" (the Government Share of GDP), both drawn from the Penn World Tables (version 6.3, compiled by Heston et al., 2009).³ Business cycles correlations between government's share of economic activity and financial depth may or may not be affected by the mechanisms we focus on (we do not consider government budget deficits, and ways in which trade may affect business cycles). In order to isolate structural relationships rather than cyclical fluctuations, we average available observations over six non-overlapping sub-periods, from 1980-1984 to 2005-07.

The top panels of Figure 1 illustrate the overall relationship between Financial Development and Trade indicators. There and in the following figures the left-hand side panel plots observations in levels, while the right-hand side panel displays deviations from country means, thus removing the influence on both variables of constant country characteristics, which turn out to be unsurprisingly important in the data: for example, the vertical cluster of points in the low-Trade, high-Financial Development of the top left panel plots observations from the US and Japan, countries that obviously differ from others in respects (such as high GDP per capita) that are removed by country effects in the top right panel, where the relationship between the within-country variation of Trade and Financial Development is much cleaner. The correlation between Trade and Financial Development is

¹ While microeconomic datasets may help assess the effects of supposedly exogenous policy changes, comparability problems make it difficult to do so on a cross-country comparative basis. Country-level information is necessary for the purpose of assessing and interpreting the causes and effects of policy changes, as we aim to do in this paper.

² We prefer to focus on credit rather than stock market indicators as the latter are more volatile, include international capital flows and foreign listings, and are less directly related to the policy indicators we analyze.

³ The government size variable, including public employment and purchases of goods and services, is suitable for our purposes to the extent that it captures the government's finance-substituting role in such fields as education and housing. The World Bank WDI dataset includes a "public transfers" variable that might offer a more direct gauge of governments' redistribution role. Those data are sparse and of dubious quality in developing countries, however, and prove uninformative when used in Epifani and Gancia's (2009) regressions for their purpose of testing the hypothesis that openness influences the size of government through its effect on tax policy's ability to change the terms of trade. We have explored the empirical relevance of the OECD Public Social Expenditure indicator, finding that its variation is largely related to demographic developments that lie outside this paper's scope.

mildly positive both in raw data (0.21) and in deviations from country means (0.26). While this could be attributed to the direct influence of international trade on consumption smoothing and investment funding needs, differences in the institutional structure of financial markets addressing those needs are also relevant. Indeed, as shown in the bottom panels of Figure 1, the Financial Structure index is positively related to credit volumes across the countries and periods in our sample (the correlation equals 0.57 in levels, 0.34 in deviations from country means).

Correlations between Financial Development and Trade, and between Financial Development and Financial Structure, need not imply that one of the two variables drives the other. Hauner and Prati (2008) argue that international trade volumes increase in advance of a relaxation of the domestic financial market regulations, and national government policies are likely to be different in various related respects. We see in Figure 2 that in raw data, for our sample of countries and periods that excludes extreme outliers in terms of openness to trade and countries with missing information on financial volumes and institutions, the positive relationship between Trade and Government found by Rodrik (1998) in earlier periods and a larger sample is not apparent (correlation -0.07), and is actually even more negative (-0.14) in deviations from country means. The same is true if we lag trade openness (like Epifani and Gancia, 2009). This negative finding corroborates the relevance of our perspective focused on interaction not only between trade and government policies, but also between these phenomena and financial development. Indeed, the bottom panels of Figure 2 show that, whether or not country-specific unobservable features are controlled for, Government and Financial Development are negatively correlated (-0.27 and -0.26 respectively).

The negative correlation of Government and Financial Development is consistent with the idea that provision of e.g. public education services and public housing does crowd out private financial contracts. Of course, the relative importance of this channel needs to be assessed from a multivariate perspective, where other factors also influence Financial Development. Figure 3 displays the partial associations with Financial Development of the three characteristics of countries and periods on which we focus. Controlling for Trade and Government, Financial Structure is very significantly associated with Financial Development (top-left panel). Controlling for Financial Structure and Trade, Government is negatively and significantly associated with Financial Development (bottom-left panel). Conversely, there is no partial association of Trade and Financial Development after controlling for Financial Structure and Government (top-right panel). Figure 4 plots the same partial associations in terms of deviations of country means. Over time, the association of Financial Structure is still positive, but much weaker; that of Trade is mildly positive; the point estimate and statistical significance of Government correlations are remarkably robust to controlling for country characteristics.

In summary, we find that in our sample the positive correlation between Financial Development and Trade is almost completely accounted for by the correlations between Trade and Government and between Trade and Financial Structure. The latter empirical relationships may in turn be driven by the policy interactions reviewed at the beginning of this section. We proceed in what follows to outline structural theoretical relationships that may underlie these empirical associations.

3. Theoretical framework

In this section we outline how interactions between the theoretical mechanisms reviewed above may be combined so as to support the next section's structural regressions. We suppose that government policies may fill the gap left by financial market imperfections between individual income and desired consumption patterns, but that doing so is costly in ways that depend on potentially observable exogenous characteristics of the policymaking environment. If policies that leave less to be done by financial market transactions are optimally chosen in light of the costs and benefits of public and private income-smoothing channels, observed policy configurations and the resulting financial development will depend on those characteristics in ways amenable to empirical estimation.

Consistently with our empirical work on time-aggregated data, where cyclical developments are smoothed out, we discuss the role of financial markets and policies in mediating consumption smoothing across individuals in different contingencies or at different points in the lifecycle, rather than at the aggregate level in a dynamic economy. We illustrate the relevant mechanisms in the context of a simple formal model of the type reviewed in e.g. Bertola et al. (2007, Chapter 7). The relevant insights have already been highlighted in models of public redistribution and imperfect private insurance (Varian, 1980; Chetty and Saez, 2010; Bertola and Koeniger, 2010), and are more generally applicable to similarly motivated institutional constraints and policies, such as wage compression and public education programs.

Suppose that income and consumption take place in two periods and/or contingent realizations, in each of which income is high at y_H for half of the individuals, low at $y_L < y_H$ for the other half. Each individual experiences both realizations (in the two periods, or with equal probability), so it is in principle possible to smooth consumption completely: this would be optimal if each period's consumption yields utility according to a concave function $u(c)$ and, for simplicity, discount and return rates are both normalized to zero. In the absence of financial frictions, rational agents would share risk fully across income states or periods, so that $c_H = c_L = (y_L + y_H)/2$, where c_H and c_L denote the consumption levels corresponding to the respective income flows y_H and y_L .

To model financial market imperfections, let each purchase or sale of private financial securities entail a per-unit cost μ . Then, every individual's resource constraint reads

$$c_H + c_L = y_H + y_L - (y_H - c_H + c_L - y_L)\mu,$$

Consumption smoothing is costly if $\mu > 0$, but accessing the financial market is still worthwhile if income varies sufficiently strongly, so that

$$\frac{y_H}{y_L} > \frac{1 + \mu}{1 - \mu} \tag{1}$$

(otherwise, transaction costs are too large and/or financing needs too small for financial market activity, so that $c_H = y_H$ and $c_L = y_L$).

The optimal consumption pattern equates the ratio of marginal utilities, $u'(c_L)/u'(c_H)$, to the rate of transformation $(1 + \mu)/(1 - \mu)$ of resources transferred from the high to the low income situation. If utility is logarithmic, the ratio of marginal utilities is simply the inverse ratio of consumption levels,

and a closed-form solution is readily available: inserting $c_L = c_H(1 - \mu)/(1 + \mu)$ in the resource constraint yields

$$c_H = \frac{y_L + y_H - (y_H - y_L)\mu}{2(1 - \mu)}, c_L = \frac{y_L + y_H - (y_H - y_L)\mu}{2(1 + \mu)},$$

and each individual's welfare

$$\log(c_H) + \log(c_L) = \log\left(\frac{(y_H + y_L - (y_H - y_L)\mu)^2}{4(1 - \mu^2)}\right) \quad (2)$$

depends positively on average income and negatively, to the extent that they cannot be smoothed, on income fluctuations. These properties are qualitatively valid for more general concave utility specifications (see e.g. Andersen, 2010, for discussion and an application of indirect utility functions defined on income mean and dispersion parameters).

To model government activity, let it be possible, but costly, to implement public policies meant to transfer resources from the high to the low income states.⁴ Supposing for concreteness that transferring τ units of income entails a quadratic deadweight loss, $f(\tau) = \lambda\tau^2$, the government can increase the low income y_L by $\tau - \frac{1}{2}\lambda\tau^2$ and decrease the high income y_H by $\tau + \frac{1}{2}\lambda\tau^2$.

In an internal solution where both public transfers and private financial contracts are active, the tax rate should be set so that, at the margin, the welfare loss due to deadweight is offset by the savings on unit cost of intermediation in the financial market. The optimal $\tau = \mu/\lambda$ is larger when λ is small (deadweight losses are small and not very sensitive to taxation) and/or when μ is large (financial market access is more costly). These intuitive properties are qualitatively valid for more general specifications, including those where financial transaction costs are increasing in the amount transacted.

The typical individual's welfare is given by (2) evaluated at the income levels resulting from government policies. When $\tau = \mu/\lambda$ the sum of disposable incomes is

$$y_H - \tau - \frac{1}{2}\lambda\tau^2 + y_L + \tau - \frac{1}{2}\lambda\tau^2 = y_H + y_L - \lambda\tau^2 = y_H + y_L - \frac{\mu^2}{\lambda}$$

and their difference is

$$y_H - \tau - \frac{1}{2}\lambda\tau^2 - \left(y_L + \tau - \frac{1}{2}\lambda\tau^2\right) = y_H - y_L - 2\tau = y_H - y_L - 2\frac{\mu}{\lambda}.$$

The resulting expression neatly simplifies to read

$$U(\mu, \lambda, Y, \Delta) = \log\left(\left(Y + \frac{\mu^2}{\lambda} - \mu\Delta\right)^2 \frac{1}{4(1 - \mu^2)}\right)$$

where $Y \equiv (y_H + y_L)$ is the economy's total income, gross of the policy's deadweight loss, and $\Delta \equiv y_H - y_L$ is a measure of income dispersion.

⁴ In an imperfect-markets environment, policy may over some range increase rather than decrease aggregate resources. However, optimal policy choices always lie outside that range, and entail a trade-off between production incentives and consumption smoothing (Andersen, 2010).

Welfare is decreasing in λ , as well as in μ over the range of parameters where financial transactions are positive.⁵ Intuitively, both deadweight and transaction costs prevent policy and markets from smoothing consumption, and decrease welfare. Just as intuitively, a larger mean income Y increases welfare, while a larger income dispersion Δ reduces welfare as long as transaction costs prevent full smoothing of its consumption implications.

Individuals can smooth their consumption, over and beyond what is implied by optimal government policies, by accessing the financial market. The resulting consumption levels are

$$c_H = \frac{y_H + y_L - \lambda\tau^2 - (y_H - y_L - 2\tau)\mu}{2(1 - \mu)}, c_L = \frac{y_H + y_L - \lambda\tau^2 - (y_H - y_L - 2\tau)\mu}{2(1 + \mu)}.$$

The volume of financial market transactions can be gauged by the difference between net income and consumption at the times or in the contingencies when and where the latter is lower than the former.⁶

Using the $\tau = \mu / \lambda$ optimality condition to substitute lambda, we have

$$y_H - \tau - \frac{1}{2}\lambda\tau^2 - c_H = \frac{1}{2(1 - \mu)}(\Delta - \mu Y - (2 - \mu^2)\tau).$$

Normalizing this expression with aggregate income yields a *de facto* measure of financial development, akin to the Private Credit to GDP ratios examined above:

$$D\left(\frac{\Delta}{Y}, \frac{\tau}{Y}, \mu\right) = \frac{1}{2(1 - \mu)}\left(\frac{\Delta}{Y} - \mu - (2 - \mu^2)\frac{\tau}{Y}\right), \quad (3)$$

which depends on the underlying income dispersion, transaction cost, and public program determinants of demand and supply in the financial market.

Its derivatives are

$$D_{\Delta/Y} \equiv \frac{\partial D\left(\frac{\Delta}{Y}, \frac{\tau}{Y}, \mu\right)}{\partial \frac{\Delta}{Y}} = \frac{1}{2(1 - \mu)} > 0,$$

⁵ Recalling condition (1), positive financial transactions are privately optimal if after-policy incomes satisfy $(y_H - \tau - \frac{1}{2}\lambda\tau^2)(1 - \mu) > (y_L + \tau - \frac{1}{2}\lambda\tau^2)(1 + \mu)$. When $\tau = \mu/\lambda$ this can be rearranged to $(y_L + y_H)\mu - (y_H - y_L) < \frac{\mu^3 - 2\mu}{\lambda}$ and coincides with the $Y\mu - \Delta < \frac{\mu^3 - 2\mu}{\lambda}$ condition for a negative partial derivative of $U(\mu, \lambda, Y, \Delta)$ with respect to its first argument.

⁶ A qualitatively similar gauge is provided by the difference between consumption and income in the specular cases where consumption is higher than disposable income. The two flows are not equal to each other, since transaction costs drive an asymmetric wedge between the two, but $c_L - \left(y_L + \tau - \frac{1}{2}\lambda\tau^2\right) = \frac{1}{2(1 + \mu)}(\Delta - \mu Y - 2 - \mu^2\tau)$ also depends positively on Δ , negatively on τ , and negatively on μ : the first two derivatives are obvious, and

$$\frac{\partial \xi(\Delta, \tau, \mu)}{\partial \mu} = -\frac{\xi(\Delta, \tau, \mu)}{(1 + \mu)^2} - \frac{Y - 2\mu\tau}{2(1 + \mu)}$$

is negative as long as financial transactions are positive, so that $\xi(\Delta, \tau, \mu) > 0$ and $y_H - \tau > y_L + \tau$: since the latter condition implies $2\tau < y_H - y_L$, we have $Y - 2\mu\tau > y_H + y_L - \mu y_H - \mu y_L = (1 - \mu)y_H + (1 + \mu)y_L > 0$.

$$D_{\tau/Y} \equiv \frac{\partial D\left(\frac{\Delta}{Y}, \frac{\tau}{Y}, \mu\right)}{\partial \frac{\tau}{Y}} = -\frac{2 - \mu^2}{2(1 - \mu)} < 0,$$

$$D_{\mu} \equiv \frac{\partial D\left(\frac{\Delta}{Y}, \frac{\tau}{Y}, \mu\right)}{\partial \mu} = \frac{1}{2(1 - \mu)^2} \left(\frac{\Delta}{Y} - 1 - (1 + (1 - \mu)^2) \frac{\tau}{Y} \right) < 0,$$

where the inequalities follow from $0 < \mu < 1$ and $\frac{\Delta}{Y} = \frac{y_H - y_L}{y_H + y_L} < 1$. Quite intuitively, in this and more general models the volume of financial market transactions is larger if incomes are more heterogeneous across market participants (i.e. $y_H - y_L$ is larger); if the government engages less in finance-substituting policies smaller (i.e. τ is smaller); and if private financial transactions are less costly (a smaller μ).

These simple expressions illustrate insights that are more general than the logarithmic and quadratic functional forms from which they are derived, and hold for more general concave utility specifications and income distributions. The resulting theoretical framework is suitable for our purpose of empirical analysis of policy impacts on financial development.

To model the effects and endogenous determination of openness to trade, denoted o , we let it affect average income Y , income dispersion Δ , and the intensity λ of deadweight losses, which all also depend on other characteristics of countries and period, denoted Z .

As more openness makes it possible to exploit comparative advantage, international trade should increase incomes (with positive welfare effects) and possibly their dispersion (with positive effects on the volume of financial transactions at given access cost), at the same time as it also makes it difficult for governments to design and enforce the tax, subsidy, and direct provision schemes that reduce individuals' need to access financial markets. We also let it be possible for governments to decrease financial transaction costs μ . The benefits of doing so are captured by the welfare function (2) of our simple consumption-smoothing model, and in more complicated models smaller financial frictions could also improve the quality of investment-savings matching.

To represent a meaningful policy tradeoff, the model also needs to feature costs of smoother private financial transactions, possibly in terms of instability and bail-outs if private financial costs are reduced by deregulation, or in terms of administration and supervision organization: the simplest way of accounting for such costs is to include μ among the determinants of the economy's average income Y .

The first order conditions for maximization of $U(\mu, \lambda(o, Z), Y(o, \mu, Z), \Delta(o, Z))$ are

$$U_{\mu}(\cdot) + U_Y(\cdot)Y_{\mu}(o, \mu, Z) = 0, \quad (4)$$

$$U_{\lambda}(\cdot)\lambda_o(o, Z) + U_Y(\cdot)Y_o(\lambda(o, Z)) + U_{\Delta}(\cdot)\Delta_o(o, Z) = 0, \quad (5)$$

where subscripts denote partial derivatives. Together with the condition

$$\tau = \frac{\mu}{\lambda(o, Z)} \quad (6)$$

for optimal choice of finance-substituting government activities, and provided that functional forms are such as to let first-order conditions identify a global optimum, these equations identify

$\mu^*(Z)$, $o^*(Z)$, and $\tau^*(Z)$ as the financial structure, openness to trade, and government programs resulting from the policy choices that turn out to be optimal in an environment characterized by Z .

Since $U_\mu(\cdot)$ is negative and $U_Y(\cdot)$ is positive, $Y_\mu(o, \mu, Z)$ is positive when condition (4) holds, and the concavity conditions that support optimality imply that the optimal μ is smaller if $Y_\mu(o, \mu, Z)$ is smaller. In words, governments should make it easier for private financial markets to operate only up to the point where the benefits of doing so begin to be offset by its costs, and the resulting transaction cost μ is smaller if the factors indexed by Z imply that those costs are small.

Condition (5) similarly illustrates the tradeoffs entailed by openness to trade: the first term is negative if more openness to trade makes it more difficult to operate, but the second is positive if international trade increases average income; the third term may also be negative if trade implies more heterogeneous incomes (as argued by contributions focused on the direct relationship between trade and finance or government programs): and the extent to which this is a problem is captured by the welfare derivative $U_\Delta(\mu, \lambda, Y, \Delta)$, which is all the more negative when it is more difficult for private finance and public policies to cope with income heterogeneity. The relative importance of the three effects again depends on the specific circumstances indexed by Z , as well as on functional forms: openness to trade is more attractive if it increases incomes more strongly, and if its implications for governments' ability to address income heterogeneity are less damaging.

Linearizing (3), the model economy's de facto financial development indicator is

$$FD(\tau^*(Z), o^*(Z), \mu^*(Z), Z) \approx D_{\Delta/Y} \frac{\Delta(o^*(Z), Z)}{Y(o^*(Z), \mu^*(Z), Z)} - D_{\tau/Y} \frac{\tau^*(Z)}{Y(o^*(Z), \mu^*(Z), Z)} + D_\mu \mu^*(Z), \quad (7)$$

plus a constant that depends on the linearization point, like the $D_{\Delta/Y}$, $D_{\tau/Y}$, and D_μ derivatives: while such nonlinearities and interactions depend on functional forms, and can hardly be assessed in limited data, the first-order effects in (7) are clear and intuitive. The effects of financial private transaction costs μ^* and of public policies τ^* are unambiguously negative; that of openness to trade, o^* , depends on trade's impact on demand for financial transactions. In turn, these policies (and financial volumes directly) depend on exogenous circumstances Z .

The panel-data evidence of Figure 4 can be interpreted in light of this model. The positive sign of the partial correlation between Financial Structure and Financial Development is consistent with the obvious theoretical prediction that smaller financial frictions should increase financial market volumes. The negative partial correlation between Government and Financial Development captures the less obvious, but theoretically unambiguous, substitution of private transactions for public policies. And the absence of a partial correlation between Trade and Financial Development indicates that the theoretically ambiguous impact of more international openness on income/consumption imbalances is estimated to be zero in the data. Partial correlations, however, could be spurious.

To estimate structural relationships, it is necessary to explain policy differences in terms of exogenous and observable sources of relevant variation. In the next section, we will seek to estimate the relationships between finance, trade, and government on the basis of semi-structural relationships resulting from linearization of (4), (5), (6) and (7).

4. Empirical implementation

From the previous section's theoretical perspective, the relationships between policies and financial development outcomes observed in Section 2 may be shaped by differences (across countries and over time) of economic integration's appeal; of the implications of economic integration for government policies' welfare effects; and of the ease with which financial markets may be structured so as to substitute government policies.

When and where trade is more beneficial and more difficult to restrain, then and there policymakers should be less inclined to erect barriers to international markets, more inclined to accept a reduction in their power to redistribute income, and more inclined to deregulate financial markets because inexpensive and easy-to-access finance is more useful in more open and competitive economies than in closed economies with powerful governments. The strength of each such inclination should also depend on the ease of substitution between private markets and public sector intervention.

These intuitive insights are superficially consistent with the broad global trends that motivate this paper. If technological and political factors made international trade more beneficial and harder to restrain, the resulting weakness of national tax and expenditure policies and the stronger appeal of financial market reforms may spur financial development. To assess the relevance across countries and over time of interrelated policy choices, however, it is necessary to go beyond common trends and identify in the data relevant differences in the causes and Financial Development effects of policy choices determinants.

4.1. Specification and identification

To implement this estimation strategy we run instrumental variables regressions on the empirical indicators introduced and inspected in Section 2. We suppose that Financial Development is influenced by Financial Structure, Trade, and Government, and that these policy indicators are in turn driven by exogenous variables that determine endogenous policy choices, rather than being determined by them. Regression specifications implement a semi-structural version of the theoretical relationships illustrated by the simple model of Section 3. Government, g , indexes the intensity of income-smoothing government activities represented by the tax parameter τ in the simple model; Financial Structure, r , relates to the ease of private consumption smoothing (a small bid-ask spread μ in the model); and openness to trade, o , is also policy-determined by choices that take into account its effect on the mean and dispersion of incomes (Y and Δ in the model where, as in reality, they also depend on other factors).

We suppose that observations of r_{it} , o_{it} , and g_{it} differ across countries i and periods t in ways that semi-structurally represent the solution with respect to the three policy choices of the system of equations resulting from linearization of the optimality conditions (4-6). Since the coefficients of that solution generally depend on exogenous conditions, we run regressions in the form

$$r_{it} = Z_{it} \beta_r + \varepsilon_{r,it} \quad (8)$$

$$o_{it} = Z_{it} \beta_o + \varepsilon_{o,it} \quad (9)$$

$$g_{it} = Z_{it} \beta_g + \varepsilon_{g,it} \quad (10)$$

where Z_{it} is a vector of time-and-period specific factors. The volume of financial transactions, f_{it} , is related to these variables by a linearized version of a structural relationship of the type exemplified by (7) in the model of Section 3,

$$f_{it} = X_{it} \delta + \rho r_{it} + \omega o_{it} + \gamma g_{it} + \eta_{it} \quad (11)$$

where the vector X_{it} includes variables that matter for financial transactions alongside the policy indicators of interest.

Unbiased estimates of the structural coefficients ρ , ω and γ cannot be obtained by ordinary least squares if the unobservable factors ε that also influence policies are correlated with the term η that policies do not explain in (11), as will be the case if observed policy indicators are endogenously chosen so to maximize an objective that depends on the ease and volume of financial transactions (Rodrik, 2005). Thus, regressing financial development on policies neither measure the all-else-equal effects of policies, nor tell us anything about the deeper determinants of policies and of financial development if the determinants of policies are correlated with those of financial development for given policies.⁷

To estimate the structural impact of policy on Financial Development by instrumental variable methods, sufficiently many relevant policy determinants of Z_{it} should be observable, not directly relevant to financial development (hence not included in X_{it}), and suitably informative about the policy variables of interest. Disentangling the effects of endogenous potential determinants of Financial Development would require at least as many independent sources of policy variation, but hardly any observable variation along each country's trajectory may be convincingly argued to be an exogenous driver of policy choices. For example, political sentiment could be driving policies, but it is not observable as such; actual election results are observable, but they are surely influenced by economic outcomes, and therefore not an exogenous determinant of policies.

To address this difficult issue, in what follows we examine the explanatory power for observed policies of interactions between common trends, which are suitably exogenous to policies if the global forces they represent are only weakly (if at all) influenced by country-level variables, and country-specific predetermined indicators of the intensity and shape of the relevant policy trade-offs.

The sources of policy variation we focus on are geographic characteristics and more or less remote historical events that may shape each country's policy response to new developments. As a gauge of the country-specific intensity of economic integration forces, we rely on the Frankel and Romer (1999) "Natural Openness" indicator, based on estimates on a 1985 sample of bilateral trade equations including only geographic characteristics. As a gauge of differences across countries in the ease of substituting private markets with public sector intervention, we rely on the La Porta et al. (1999) indicator of how each country's legal origin might shape its policies and markets. These indicators need not explain a very large portion of actual policies, which are certainly driven by a

⁷ For example, a market-oriented government might simultaneously deregulate financial markets and remove trade barriers and, independently of those and other policy choices, trigger financial development through investors' enthusiasm in a specific country and period. Other endogenous mechanisms could generate different biases: if Financial Structure responds to exogenous Financial Development variation (such as that generated by financial crises), the association between financial policy and financial development includes reverse causation channels that make it impossible to interpret it in structural terms.

large variety of unobservable exogenous factors and endogenous adjustment mechanisms. Just like small historically remote sources of policy variation (such as early settlers' health in new colonies) can usefully isolate and assess the structural role of subsequent policies (Rodrik et al., 2004), isolating exogenously different responses to exogenous developments can make it possible to identify the effects of policies. Natural openness and legal origin indicators fit our purposes in two key respects: they have been abundantly argued to be theoretically and empirically relevant to trade and finance policy and, since both are fixed for each country over time, they cannot be influenced by subsequent policy choices.⁸

The instrumental variables candidates are theoretically relevant and exogenous. Whether they are also relevant to policies and not to financial development directly is an empirical question that may be answered by the statistical evidence we report in the next section. As we seek to disentangle the separate effects on financial development of multiple endogenous variables, exogenous sources of country-and-time specific variation should push and pull different policies differently enough to detect their separate effects on financial development. Hence, the predicted policies should vary independently enough of each other to prevent multicollinearity problems in the second stage regression. This can be assessed by the Kleibergen-Paap Wald F test of the relevant covariance matrix's rank, which extends in heteroskedasticity-robust ways simpler tests applicable in asymptotically independently distributed settings (Kleibergen and Paap, 2006; Baum, Schaffer, and Stillman 2007a,b). Since the distribution of these statistics depends on details of the data generating process, and significance levels depend on the specific null hypothesis (in terms of relative bias) one wishes to test, the strength of the instruments is assessed informally. The Kleibergen-Paap statistic should not be too low and, to foster complete confidence in the instruments' strengths should be comparable to the critical values (in the order of 10) for the Cragg-Donald statistic it generalizes (see Baum et al., 2007a).

In general, policy determinants may influence financial development directly rather than only through the unavoidably imprecise policy indicators we include in our specification. The statistical plausibility of specification restrictions that exclude exogenous sources of policy variation from affecting Financial Development directly can be assessed empirically, if the variables that may influence Financial Development only indirectly through policy are more numerous than the policy indicators considered, by "over-identification" tests of whether the residuals of the second-stage equation (i.e., the deviations of actual financial development from what is predicted by the instrumented policy variables) are uncorrelated with exogenous sources of variation.

⁸ This makes them preferable to more sophisticated measures of the same country characteristics. As regards ease of trade, additional country-specific (and time-varying) information may be influenced by policy choices and outcomes. It would be similarly hard to disentangle structural relationships in the co-variation between Financial Development and time-varying features of legal systems (such as those documented in Armour et al., 2009), which is empirically strong but arguably less causal, and more difficult to interpret, than the influence exerted by the remote historical roots captured by the Legal Origin indicator.

5. Estimates

Since economic integration is more difficult and less beneficial for a large and remote island than for a small country surrounded by neighbors, we should expect the former to be less open than the latter. Less obviously, our theoretical perspective would lead us to expect that smaller values of the Natural Openness indicator should also be associated with more effective and intense Government activity, and with less developed financial markets.

Cross-country comparisons need not suffice to identify the relevant channels of policy interactions, however, because many other country-specific features influence each of these policies as well as financial development directly. Similarly, the relationship between differences in Legal Origin and various policy and outcome indicators studied by La Porta et al. (1999) and related contributions does not suffice to disentangle various Financial Development determinants. Even the least surprising and strongest empirical relationship, such as that between Financial Development and Financial Structure, could be spurious: countries with larger observed values of Financial Structure may be those where Financial Development is larger, and/or financial reforms appropriate, for a variety of reasons which also potentially influence other policy choices.

In light of the considerations above, it is not surprising to find that purely cross-sectional estimates provide limited and unreliable information. Table 1 reports (first-stage) OLS regressions, for separate cross-sections in the six available sub-periods, of the three policy indicators on Natural Openness and Legal Origin dummies (using French legal origin as reference group). While the regressions' overall explanatory power is significant, virtually the only individually significant coefficient estimate in all sub-period is that of Natural Openness as a determinant of Trade. With respect to the French legal origin group, Financial Structure is significantly more developed in countries with a Scandinavian legal system in the early sub-periods, and Government bigger since the 1990s in Socialist legal origin countries. In Table 2, the separate second-stage cross-sectional regressions based on Table 1's first stage estimates also deliver imprecise estimates: broadly, they confirm the findings of the OLS regressions reported in Section 2 (a positive impact on Financial Structure, no impact of Trade, and a negative - although here not precisely estimated - impact of Government), but the statistics indicate that the instruments are very weak, and that over-identifying restrictions are rejected at p-levels below 10% in the last two sub-periods.

Since the cross-sectional coefficient estimates are estimated so imprecisely as to fail to reject their equality across the periods, it is interesting to pool the observations, and include a time trend to assess the relevance of common influences on all countries' policies. Table 3 reports regressions, for a sample including all countries and periods, of the three endogenous determinants of Financial Development on a trend and either on Natural Openness and Legal Origin dummies (columns 1-3), and on interactions for Legal Origin with Natural Openness (thus allowing the relationships to differ in terms of Natural Openness slopes, as well as of levels, across subsamples of historically different groups of countries, in columns 4-6). The trend coefficient is negative and significant for Government, significantly positive for Financial Structure and Trade. All groups of Legal Origin level and slope effects are statistically significant, with the exception of slope effects for the Financial Structure indicator. Many of the main and interacted effects of Legal Origin and Natural Openness are individually significant, but they do not always conform with plausible theoretical priors that

would lead, for instance, one to expect English legal origin to be conducive to smaller Government, larger Financial Structure, and possibly more actual Trade for given Natural Openness.

The weakness of cross-sectional evidence, in terms of both statistical tests and plausibility, indicates that countries differ in relevant respects over and beyond their measurable Natural Openness and Legal Origin characteristics. To elicit more relevant information, we note that such observable characteristics are potentially relevant to policy determination not only in terms of levels, but also in terms of responses to equally exogenous changes, such as those driven by changes in trade and communication costs, or global trade liberalization processes. Whether or not this is the case depends on functional forms. If the data respond affirmatively to that essentially empirical question then, under the debatable but unavoidable assumption that a common functional relationship generates the data across all observations, it is possible to specify and estimate models that identify the financial development implications of policies.

To capture the empirical relevance of theoretically plausible mechanisms, we identify a source of period-and-country specific variation in the interaction of Natural Openness, Legal Origin, and a trend. The results are virtually identical if the trend is replaced by indications of the intensity of world trade, or shipping costs, or financial globalization. All of these phenomena are arguably exogenous to country-specific policies, since individual countries are either too small or too closed to account for more than a small portion of global imports and exports; and all have followed tightly correlated trends over the sample period, so that their policy influence is summarized accurately by a simple trend. The trend coefficient is more readily interpretable than those of period dummies, which line up very well with the passage of time (and that we will cast in a similar role in the first stage of the next section's instrumental variable estimation).

Table 4 reports first stage regression results. The interactions between Natural Openness, Legal Origin, and the trend that capture the period-and-country specific variation of interest are strongly jointly significant. The trends in Financial Structure, Trade, and Government remain significant. In these regressions, however, the main effect of trends is much less interesting than their interaction with country-specific characteristics. The negative trend of Government in the previous tables might well reflect ideological trends that happen to coincide with those driving trade liberalization and financial reforms. Instead, it is harder to argue that interacted variables capture similarly spurious effects: the interaction of global trends with Natural Openness might conceivably pick up geographical channels of ideological transmissions, but may more intuitively capture the fact that more naturally open countries and their Government are disproportionately affected by the trade-relevant portion of global technological and political trends.

Many of the interaction coefficients are significantly different from each other, and appear to capture plausible effects. Comparing the English to the French or German Legal Origin groups, for example, the results suggest that in the former more Natural Openness implies a stronger inclination, when global trends exert pressure in such directions, to choose smaller Government and more Financial Structure. The small role of trends and Natural Openness as a determinant of Trade in countries of Scandinavian legal origin might also pick up an interpretable effect, reflecting some of

these countries' choices regarding EU or EMU membership, explained in turn by historical features proxied by the Legal Origin indicator.⁹

Having established that when country dummies are included the remaining variation over time of the exogenous variables contributes significantly to explaining each policy variable, we turn to estimation of second-stage semi-structural coefficients of the policy variable as determinants of Financial Development. Two issues remain important and difficult to address. First, interaction effects, while significant, may not be different enough to disentangle the separate effects of policies that are allowed to depend unrestrictedly on the identity of each country. Second, the same country characteristics and common factors that drive policies over the time period we analyze may well have been directly relevant to financial development, for given policies. The seriousness of the two problems can be assessed by statistical tests of instrument weakness and over-identifying restrictions.

Table 5 reports instrumental variable estimates from specifications that allow endogenous variables to be explained by country and time effects, and by interactions of period effects with Legal Origin and Natural Openness. Thus, the first stage of these regressions uses period-specific cross-sectional specifications, where country effects absorb the main effects of Natural Openness and Legal Origin as well as any other country characteristic that does not vary between periods. This specification is more flexible, if less interpretable, than those reported in Table 4. Using a trend instead of time effects to construct the instruments yields very similar pattern of coefficient sizes and significance, and somewhat stronger statistical evidence of instrument relevance.

Column 1 of Table 5 assesses the role of predicted values of the three variables of interest as the only determinants of financial development: in this regression, the Z_{it} exogenous determinants in equations (8-10) include country and time effects, as well as interactions of time effects with Legal Origin and Natural Openness, and none of these variables is allowed to influence Financial Development directly as an element of X_{it} in equation (11). Since the number of instruments excluded from the second-stage specification, and hence the number of over-identifying restrictions, is big, it is not surprising to find that the test of over-identifying restrictions is rejected. On the other hand, the relevance of the instruments is very strong: despite the tendency of all variables to trend together over the sample period, interactions with exogenous country-specific characteristics are related to country-specific policy choices in sufficiently different and significant ways for the purpose of identifying their separate impact. When both country and time effects are treated as excluded instruments, the specification test does not reject the null hypothesis that both OLS and IV estimates are consistent, and the coefficient estimates are similar in signs and size to those of OLS regressions reported in Figure 1. The insignificant negative coefficient of Trade indicates that Financial Development is not driven directly by economic integration, through the demand-for-finance effects reviewed in Section 2 above: the observed bivariate association between observed Trade and Financial Development reflects their association with other policies, which have large and significant effects on Financial Development. The positive and strongly significant coefficient of Financial

⁹ Not all such high-order effects are easy to interpret: and since Scandinavian countries are very open along the cross-sectional dimension picked up by the main effect of their Legal Origin, the estimates may simply reflect nonlinearities other than those we model. For our purposes, however, the details of the relationship between exogenous factors and endogenous policies are not as important as their theoretical plausibility and statistical reliability.

Structure intuitively confirms that deregulation of financial markets increases the volume of credit transactions by easing supply of financial services. Government is estimated to have a negative effect on Financial Development, consistently with substitution of private financial transactions to public policy in such fields as housing, education, and utilities.

Regressing financial development on just the policy variables of interest disregards the possible omitted variable bias caused by non-policy factors that influence the level of financial development and are correlated with policy choices. To assess the relevance of this problem, in columns 2-4 of Table 5 country and/or time fixed effects are included among the elements of the X_{it} variables that in equation (11) influence Financial Development for given policy indicators. Focusing on the “between” variation, by including period dummies in column 2, results in a regression that is still poorly specified and estimates very significant coefficients.

In columns 3 and 4, cross-country variation turns out to play a crucial role in identifying the effect of Financial Structure: when it is removed by inclusion of country dummies, the point estimate of that variable’s coefficient is much smaller; it is negative, and insignificantly different from zero, when time effects are also included in column 4. The specification in column 3, where we allow Financial Development to depend on unobservable country characteristics and on exogenous policy variation, turns out to be statistically satisfactory in some key respects: instruments are strong and the specification test rejects the null, supporting the IV estimation strategy. In column 4, the instruments are rather weak instead, and the over-identifying restriction is much less strongly rejected.

Across all the various specifications reported in Table 5, conversely, the coefficient of Government variation is robustly significant, and negative. Since the endogenous policy variables are instrumented by interactions of Legal Origin, Natural Openness, and time effects, this result admits a causal interpretation: the Government indicator of public economic activity, driven by time-and-country-specific indicators of the costs and benefits of international economic integration and of ease of financial transactions, exerts a significant negative effect on Financial Development. This is consistent with substitution of private financial contracts to government programs weakened by international competition.

6. Summary and implications

As national governments are less powerful in internationally integrated countries, both their retreat from economic activities and financial deregulation should in theory foster financial development through stronger demand for, and easier supply of, private financial contracts. Since international openness to trade is itself at least partly driven by government choices, and the character of imperfect substitution between finance and government activities is likely to be heterogeneous across countries, we have proposed an interpretation of past experience in terms of different costs and benefits of policy choices in different countries and periods: when and where trade is easier and more difficult to restrict, economic integration is more appealing; the same circumstances that induce more openness to trade should also induce policymakers to deregulate financial markets and governments to retreat from economic activity, to an extent that depends on such country characteristics as may be captured by simple indicators of their historical heritage.

Empirically, we find support for these mechanisms in regressions that relate policy choices to measurable exogenous forcing processes, specified as interactions between global trends and country characteristics, in the subtle variation that remains in the data after removing country and time effects. Available data are silent as to the structural implications of financial-sector reforms: changes of Financial Structure are not very different across countries, and very weakly related to such observable country characteristics as Natural Openness and Legal Origin. It is instead possible to detect a sizeable role of Government's retreat from interference with economic activity as a factor of financial development, that was negatively and robustly related to concurrent trend and cross-country variation in international trade opportunities.

The paths analyzed in this paper came to an abrupt stop with the 2008-09 economic and financial crisis. While it remains to be seen whether in the future government will again substitute finance, possibly triggering a reversal of the globalization trends observed in the past, the results offer intriguing information as to the possible future evolution of the technological, cultural, and political forces that drove policies, finance, and economic integration since the end of the cold war. Should the exit route from the 2008-09 crisis feature larger governments, some degree of financial repression, and implicit or explicit trade protectionism, the mechanisms we identify in past experience might work in reverse. Since the direct financial development impact of international openness to trade is estimated to be small and negative, any protectionism would not directly reduce reliance on financial transactions. But it might enable governments to play a more important finance-substituting role. To the extent that the recent crisis has highlighted some fragility of finance-based systems, a "great reversal" may occur not only through protectionism and financial repression, but also because well-intentioned policymakers aim to strengthen the protection afforded by collective redistribution policies in the face of poorly functioning financial markets.

Our estimation strategy aims at measuring sensible features of reality as regards the interplay of policy choices and financial development, but cannot tell us whether past policy changes were chosen by occasionally ill-advised politicians, or were suitable responses to new conditions. Like all things, finance has benefits as well as costs, that may or may not have been taken into account correctly at the time policy choices were made. Financial development is beneficial if it allows the economy to exploit productive investment opportunities. It can generate instability, however, through volatile expectations of future returns. In order to assess the relevance of policy choices along possible tradeoffs between the growth, equality, and instability of income and consumption, our approach would need to be extended beyond the interplay of policies and financial development. To draw normative implications, one would need to know whether the retreat of the state and the resulting expansion of private finance is a good or a bad thing. This depends in turn on whether government policies reflect rent-seeking motives (as in e.g. Rajan and Zingales, 2003) or well-intentioned attempts to remedy markets' shortcomings in addressing inequality and risk issues (as in e.g. Rodrik, 1998). In the absence of information about the costs of financial reforms and the benefits of international economic integration, views on this crucial issue unavoidably depend strongly on one's priors. Further work may try and characterize the sources and consequences of policy variation in terms of their implications for the growth, inequality, and instability of income and consumption.

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Appendix

Data definitions and sources

Financial Development. This is “Private Credit by Deposit Money Banks and Other Financial Institutions to GDP” from the World Bank “Financial Development and Structure Database,” as documented in Beck and Demirgüç-Kunt (2009). We rescale this variable to express it in percentage points.

Financial Structure. The IMF “Financial Reform Index” is available between 1973 and 2005 for 91 countries from the “Financial Reform Database” by the IMF (2008), as documented in Abiad et al. (2008). It considers seven dimensions of financial sector policy (credit controls and reserve requirements, interest rate controls, entry barriers, state ownership, policies on securities markets, banking regulations, and restrictions on the capital account). Along each dimension, a country is given a score on a graded scale from zero to three, with zero corresponding to the highest degree of repression and three indicating full liberalization. Liberalization scores for each category are then combined in a graded index that takes values between zero and 21.

Trade. This is “Openness in Current Prices”, drawn from the Penn World Tables, Version 6.3, compiled by Alan Heston et al. (2009). It is defined as the ratio of exports plus imports to GDP.

Government. The variable “Government share of Real GDP per capita,” drawn from the Penn World Tables, Version 6.3 (Heston et al., 2009).

Natural Openness. As measured by Frankel and Romer (1999) on the basis of bilateral gravity estimates including only geographic characteristics, aggregated to country-specific averages.

Legal Origin. Dummy variables equal to unity for countries in each of the La Porta et al. (1999) legal-origin groups: English Common Law; French Commercial Code; German Commercial Code; Scandinavian Commercial Code; Social/Communist Laws.

Sample

All the necessary data are available for all (or most of) the 1980-2007 period from the sources listed above for 72 countries:

- | | | |
|------------------------|----------------|------------------|
| 1. Algeria | 23. France | 45. Netherlands |
| 2. Argentina | 24. Germany | 46. New Zealand |
| 3. Australia | 25. Ghana | 47. Nigeria |
| 4. Austria | 26. Greece | 48. Norway |
| 5. Bangladesh | 27. Guatemala | 49. Pakistan |
| 6. Belgium | 28. Hong Kong | 50. Paraguay |
| 7. Bolivia | 29. Hungary | 51. Peru |
| 8. Brazil | 30. India | 52. Philippines |
| 9. Bulgaria | 31. Indonesia | 53. Poland |
| 10. Burkina Faso | 32. Ireland | 54. Portugal |
| 11. Cameroon | 33. Israel | 55. Romania |
| 12. Canada | 34. Italy | 56. Senegal |
| 13. Chile | 35. Jamaica | 57. Singapore |
| 14. Colombia | 36. Japan | 58. South Africa |
| 15. Costa Rica | 37. Jordan | 59. South Korea |
| 16. Denmark | 38. Kenya | 60. Spain |
| 17. Dominican Republic | 39. Madagascar | 61. Sri Lanka |
| 18. Ecuador | 40. Malaysia | 62. Sweden |
| 19. Egypt | 41. Mexico | 63. Switzerland |
| 20. El Salvador | 42. Morocco | 64. Tanzania |
| 21. Ethiopia | 43. Mozambique | 65. Thailand |
| 22. Finland | 44. Nepal | 66. Tunisia |

67. Turkey
68. Uganda

69. United Kingdom
70. United States

71. Uruguay
72. Venezuela

The results we report exclude countries with Trade larger than 200 percentage points (Singapore, Malaysia, Hong Kong); Jordan, an outlier in terms of Government's share of GDP (as high as 60%, and always larger than the 35% maximum of the other observations); Nigeria, where Government Size jumps from 10 to over 25% in the last period; and Switzerland and Denmark, which are outliers in terms of the level and dynamics of the Financial Development indicators. Excluding these outliers reduces the relevance of possible nonlinearities of the relevant relationships, as well as possibly spurious effects of international capital flows, and yields somewhat cleaner results. If all available countries are included, the instruments are stronger, over-identifying restrictions are always rejected, and the message of the data is broadly similar in most substantive respects (in particular, the negative effect of Government on Financial Development remains robustly significant across all specifications; Trade remains mildly and negatively related to Government, but attracts a moderately positive coefficient as a determinant of Financial Development when extreme outliers are included).

Observations of the resulting balanced sample, that includes 65 countries, are averaged for each country over six non-overlapping sub-periods of five years each (three years in the last one, 2005-2007). Annual data are interpolated when occasionally missing, and filled backwards and forward using, respectively, the first and last value available in the time series. Regression results are virtually identical if period averages are computed using only available observations. The only case where this is not possible is for Financial Structure for countries of former Socialist legal origin, as no data are available in the first and last period; excluding from the sample these countries and the other small group of Scandinavian legal origin countries weakens but does not substantially affect the results, which are also broadly robust to exclusion of the 2005-2007 period from the sample.

Table 1. First stage regressions, cross-sections

Dependent variable:						
Financial Structure	1980-84	1985-89	1990-94	1995-99	2000-04	2005-07
Natural Openness	0.06	0.05	0.06	0.05	0.05	0.06
	<i>0.05</i>	<i>0.06</i>	<i>0.06</i>	<i>0.05</i>	<i>0.04</i>	<i>0.04</i>
GermanLO	5.80	5.53	3.81	2.49	1.77	1.70
	<i>2.26</i>	<i>2.70</i>	<i>2.46</i>	<i>2.09</i>	<i>1.78</i>	<i>1.75</i>
EnglishLO	1.45	2.41	0.90	0.02	0.14	0.39
	<i>1.22</i>	<i>1.46</i>	<i>1.32</i>	<i>1.13</i>	<i>0.96</i>	<i>0.94</i>
ScandinavianLO	5.02	9.07	6.40	3.52	2.34	2.10
	<i>2.58</i>	<i>3.09</i>	<i>2.81</i>	<i>2.40</i>	<i>2.04</i>	<i>2.00</i>
SocialistLO	0.07	-1.05	-2.89	-1.20	1.53	2.22
	<i>2.28</i>	<i>2.73</i>	<i>2.49</i>	<i>2.12</i>	<i>1.80</i>	<i>1.77</i>
Number of observations	65	65	65	65	65	65
Dependent variable:						
Trade	1980-84	1985-89	1990-94	1995-99	2000-04	2005-07
Natural Openness	1.71	1.68	1.55	1.64	1.88	1.85
	<i>0.20</i>	<i>0.22</i>	<i>0.24</i>	<i>0.26</i>	<i>0.29</i>	<i>0.29</i>
GermanLO	-2.68	-5.34	-11.07	-10.33	-6.14	-1.12
	<i>8.76</i>	<i>9.37</i>	<i>10.34</i>	<i>11.42</i>	<i>12.46</i>	<i>12.69</i>
EnglishLO	-2.39	-1.12	0.76	3.12	3.82	0.15
	<i>4.72</i>	<i>5.05</i>	<i>5.57</i>	<i>6.15</i>	<i>6.71</i>	<i>6.84</i>
ScandinavianLO	7.56	2.29	-1.27	3.52	0.43	1.40
	<i>10.02</i>	<i>10.72</i>	<i>11.83</i>	<i>13.06</i>	<i>14.25</i>	<i>14.52</i>
SocialistLO	-5.06	-3.74	-5.81	8.22	20.12	27.53
	<i>8.86</i>	<i>9.48</i>	<i>10.46</i>	<i>11.55</i>	<i>12.60</i>	<i>12.84</i>
Number of observations	65	65	65	65	65	65
Dependent variable:						
Government	1980-84	1985-89	1990-94	1995-99	2000-04	2005-07
Natural Openness	0.08	0.06	0.03	0.01	-0.01	-0.02
	<i>0.07</i>	<i>0.07</i>	<i>0.07</i>	<i>0.06</i>	<i>0.06</i>	<i>0.06</i>
GermanLO	-3.27	-4.29	-4.72	-3.51	-3.47	-2.64
	<i>3.07</i>	<i>3.03</i>	<i>2.96</i>	<i>2.60</i>	<i>2.77</i>	<i>2.79</i>
EnglishLO	2.62	2.50	1.83	1.74	1.69	2.67
	<i>1.65</i>	<i>1.63</i>	<i>1.59</i>	<i>1.40</i>	<i>1.49</i>	<i>1.50</i>
ScandinavianLO	2.61	2.48	4.55	3.61	1.79	0.99
	<i>3.51</i>	<i>3.47</i>	<i>3.38</i>	<i>2.98</i>	<i>3.18</i>	<i>3.20</i>
SocialistLO	0.84	1.31	10.90	9.25	8.05	6.58
	<i>3.10</i>	<i>3.07</i>	<i>2.99</i>	<i>2.63</i>	<i>2.81</i>	<i>2.83</i>
Number of observations	65	65	65	65	65	65

Notes: OLS regressions, robust standard errors in italics. All regressions include a constant, not reported.

Table 2. Second stage regressions, cross-sections

Dependent variable:						
Financial Development	1980-84	1985-89	1990-94	1995-99	2000-04	2005-07
Financial Structure	7.47	7.05	12.05	18.28	18.36	22.25
	<i>2.17</i>	<i>1.90</i>	<i>2.83</i>	<i>7.31</i>	<i>10.03</i>	<i>12.28</i>
Trade	0.04	0.10	-0.34	-0.47	-0.30	-0.59
	<i>0.24</i>	<i>0.27</i>	<i>0.33</i>	<i>0.49</i>	<i>0.47</i>	<i>0.60</i>
Government	-3.22	-4.46	0.82	-0.97	-5.12	-2.08
	<i>2.28</i>	<i>2.64</i>	<i>1.69</i>	<i>3.18</i>	<i>3.15</i>	<i>3.62</i>
<i>Statistics:</i>						
Over-identifying restrictions	0.46	1.08	3.99	3.95	5.30	6.05
	[0.79]	[0.58]	[0.14]	[0.14]	[0.07]	[0.05]
Specification test	11.24	16.38	13.12	11.73	6.78	2.85
	[0.01]	[0.00]	[0.00]	[0.01]	[0.08]	[0.41]
Weak identification test	0.92	1.02	1.86	0.79	0.51	0.38
Number of observations	65	65	65	65	65	65

Notes: Instrumental variables regressions, robust standard errors in italics.

Excluded instruments: Natural Openness, Legal Origin dummies.

Statistics (P-values in square brackets) computed by the ivreg2 Stata module (Baum et al., 2007b), definitions:

Test of over-identifying restrictions, under the null: all the excluded instruments are exogenous.

Specification test, under the null: estimates from OLS and IV are both consistent.

Weak identification test: Kleibergen-Paap Wald rk F statistic, robust to non-i.i.d. errors.

Table 3. First stage regressions, panel (1980-2007)

Dependent variable:	Financial Structure	Trade	Governm.	Financial Structure	Trade	Governm.
Natural Openness	0.05 <i>0.02</i>	1.72 <i>0.16</i>	0.02 <i>0.03</i>	0.10 <i>0.03</i>	1.93 <i>0.14</i>	-0.05 <i>0.04</i>
GermanLO	3.52 <i>0.66</i>	-6.11 <i>3.31</i>	-3.65 <i>0.46</i>	5.70 <i>1.73</i>	-0.96 <i>8.32</i>	-4.76 <i>2.17</i>
EnglishLO	0.88 <i>0.56</i>	0.72 <i>2.80</i>	2.17 <i>0.70</i>	2.28 <i>0.81</i>	8.55 <i>3.87</i>	-0.05 <i>1.01</i>
ScandinavianLO	4.74 <i>0.68</i>	2.32 <i>2.88</i>	2.67 <i>0.94</i>	15.44 <i>9.56</i>	53.38 <i>45.83</i>	33.58 <i>11.95</i>
SocialistLO	-0.22 <i>0.64</i>	6.88 <i>4.46</i>	6.16 <i>1.18</i>	1.47 <i>3.05</i>	-23.01 <i>14.60</i>	1.12 <i>3.81</i>
NatOpen*GermanLO				-0.13 <i>0.08</i>	-0.32 <i>0.39</i>	0.07 <i>0.10</i>
NatOpen*EnglishLO				-0.10 <i>0.04</i>	-0.54 <i>0.21</i>	0.15 <i>0.06</i>
NatOpen*ScandinLO				-0.52 <i>0.45</i>	-2.48 <i>2.16</i>	-1.44 <i>0.56</i>
NatOpen*Soci alistLO				-0.09 <i>0.13</i>	1.25 <i>0.62</i>	0.25 <i>0.16</i>
Time trend	2.39 <i>0.12</i>	5.01 <i>0.61</i>	-0.34 <i>0.16</i>	2.39 <i>0.12</i>	5.01 <i>0.60</i>	-0.34 <i>0.16</i>
Nr. of observations	390	390	390	390	390	390

Notes: Fixed effects regressions, robust standard errors in italics. All regressions include a constant, not reported.

Table 4. First stage regressions, panel (1980-2007)

Dependent variable:	Financial Structure	Trade	Government
Time trend	2.57	4.32	-0.39
	<i>0.09</i>	<i>0.43</i>	<i>0.10</i>
Time*GeLO	-1.58	-3.48	0.51
	<i>0.36</i>	<i>1.73</i>	<i>0.27</i>
Time*EnLO	-0.57	0.39	0.61
	<i>0.22</i>	<i>1.15</i>	<i>0.21</i>
Time*ScLO	-0.34	22.21	-3.37
	<i>3.34</i>	<i>8.39</i>	<i>1.47</i>
Time*SoLO	1.29	-3.57	-0.53
	<i>0.84</i>	<i>3.79</i>	<i>1.55</i>
Time*NatOpen	-0.35	-10.83	1.39
	<i>1.53</i>	<i>3.90</i>	<i>0.73</i>
Time*NatOpen*GeLO	0.34	2.03	-0.20
	<i>0.15</i>	<i>0.74</i>	<i>0.09</i>
Time*NatOpen*EnLO	0.14	0.30	-0.46
	<i>0.09</i>	<i>0.65</i>	<i>0.11</i>
Time*NatOpen*ScLO	-0.35	-10.83	1.39
	<i>1.52</i>	<i>3.89</i>	<i>0.72</i>
Time*NatOpen*SoLO	-0.32	4.84	0.76
	<i>0.35</i>	<i>1.82</i>	<i>0.80</i>
Nr. of observations	390	390	390

Notes: OLS regressions, robust standard errors in italics. All regressions include a constant, not reported.

Table 5. Second stage regressions, panel

Dependent variable:				
Financial Development	1	2	3	4
Financial Structure	3.98 <i>0.35</i>	6.58 <i>0.45</i>	1.15 <i>0.35</i>	-1.79 <i>1.08</i>
Trade	-0.04 <i>0.08</i>	-0.06 <i>0.08</i>	0.12 <i>0.15</i>	-0.26 <i>0.19</i>
Government	-1.19 <i>0.30</i>	-1.04 <i>0.26</i>	-1.72 <i>0.76</i>	-1.36 <i>0.67</i>
<i>Included instruments</i>				
Country dummies	no	no	yes	yes
Period dummies	no	yes	no	yes
<i>Excluded instruments</i>				
Country dummies	yes	yes	no	no
Period dummies	yes	no	yes	no
<i>Statistics:</i>				
Over-identifying restrictions	217.52 [0.00]	195.44 [0.00]	93.22 [0.00]	67.94 [0.01]
Specification test	1.17 [0.76]	1.98 [0.58]	10.15 [0.02]	6.05 [0.11]
Weak identification test	41.63	58.58	15.63	4.93
Number of observations	390	390	390	390

Notes: Instrumental variables regressions, robust standard errors in italics.

Excluded instruments in all specifications: Interaction terms between Natural Openness and Time effects; interaction terms between Natural Openness, Time effects, and Legal Origin; interaction terms between Time effects and Legal Origin.

Country and period effects are treated as included or excluded instruments as indicated in the table.

Statistics (P-values in square brackets) computed by the ivreg2 Stata module (Baum et al., 2007b), definitions:

Test of over-identifying restrictions, under the null: all the excluded instruments are exogenous.

Specification test, under the null: estimates from OLS and IV are both consistent.

Weak identification test: Kleibergen-Paap Wald rk F statistic, robust to non-i.i.d. errors.

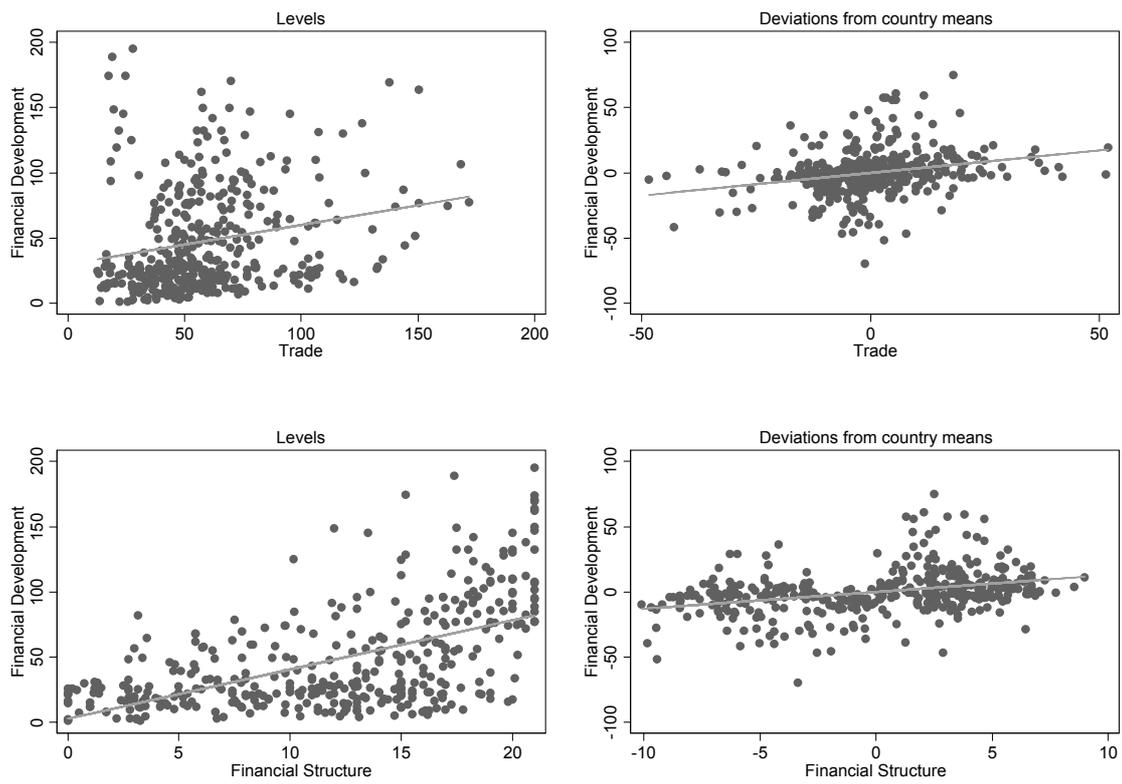


Figure 1. Bivariate relationships between Financial Development and Trade, and between Financial Development and Financial Structure.

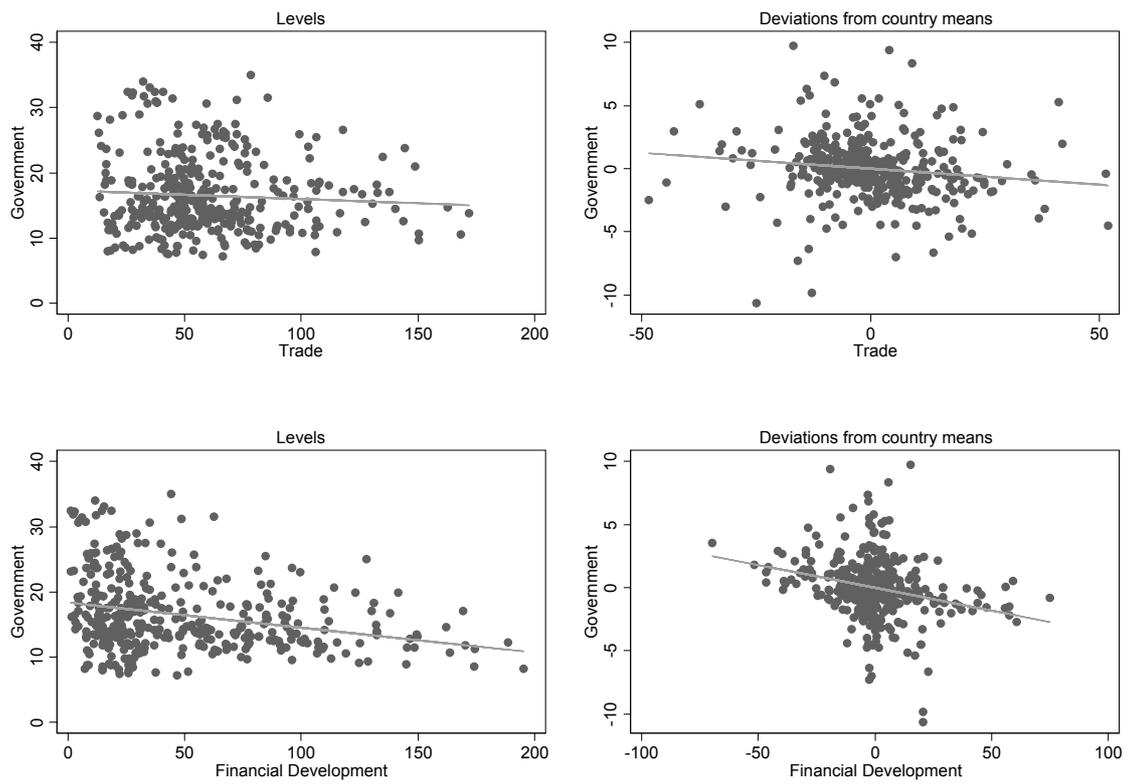


Figure 2. Bivariate relationships between Government and Trade, and between Government and Financial Development.

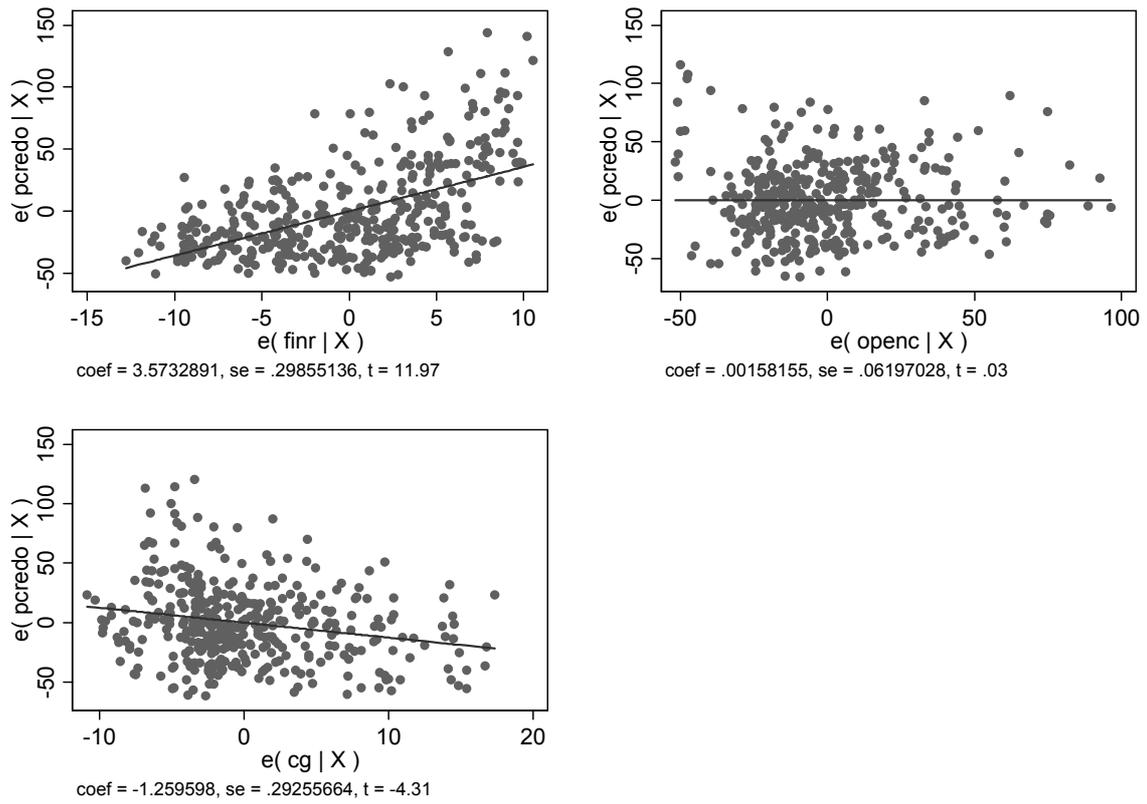


Figure 3. Partial correlations with Financial Development of Financial Structure, Trade, and Government.

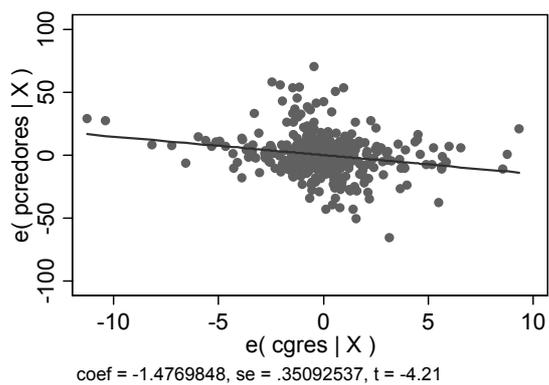
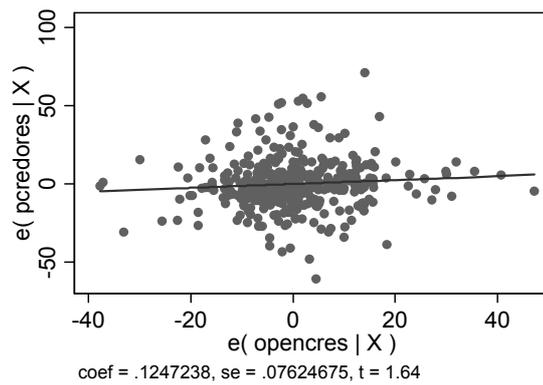
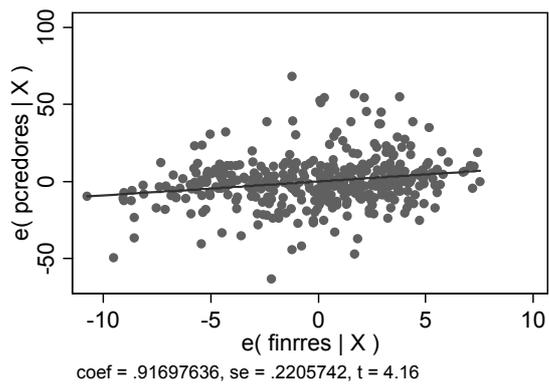


Figure 4. Partial correlations with Financial Development of Financial Structure, Trade, and Government, in deviations from country means.