Does deposit insurance retard the development of non-bank financial markets? ☆

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ABSTRACT

Whether, and how, the introduction of deposit insurance affects non-bank financial market development depends on whether banks and non-bank financial markets are substitutes or complements and theory has conflicting views. Using data on 134 countries over a 28-year period and several identification strategies we find that the *introduction* of deposit insurance retards the equity market, the non-bank depositaries sector, and the banking sector when law and order is weak. While strong law and order mitigates this effect, it does not lead to a positive outcome for all markets. For non-bank financial markets, the effect is greater in the long run so that while deposit insurance increases banking sector development in the long run, it retards non-bank financial markets regardless of the level of law and order. Finally, several design features exacerbate the negative outcomes. Our results have important policy implications for implementing or altering deposit insurance schemes.

1. Introduction

Over the last 40 years, there has been a tenfold increase in the number of deposit insurance schemes worldwide. Currently, more than 113 countries have deposit insurance schemes and another 40 are contemplating its adoption.[4] The main reason for the popularity

of deposit insurance is the view among policymakers that it is an effective mechanism in regard to the primary objective of preventing bank runs (Martin, 2006).[5] However, despite this popularity among policymakers, there is currently a debate about the potential for negative externalities related to the introduction of deposit insurance. In particular, there is concern that deposit insurance retards financial development of the banking sector because extant cross-country studies find that deposit insurance is strongly associated with lower levels of banking sector development (Cull et al., 2002).

If deposit insurance retards the development of the banking sector, then that would be of substantially greater concern if it also retards non-bank financial markets. This is because equity markets and non-bank financial intermediaries are an important component of the financial system of many countries and empirical evidence suggests that well-developed financial markets play a key role in economic growth.[6] Arguably, it is the development of the overall financial system that matters and not the development of

any one financial market (Demirgüç-Kunt and Levine, 2001; Levine, 2002).

Whether, and how, deposit insurance affects non-bank financial market development cannot be inferred from existing cross-sectional evidence that suggests that it has a negative effect on *banking sector* development. This is because the predicted effect on *non-bank* financial markets depends on whether they are regarded as substitutes or complements to banks. Theory has mixed views and there is an ongoing debate on this issue (Boyd and Smith, 1998; Arestis et al., 2001; Beck and Levine, 2001, 2002; Baumann et al., 2005; Gopalan and Gormley, 2013).

If banks and non-bank financial markets are complements then, given existing empirical evidence suggesting that deposit insurance retards banking sector development, we expect that the introduction of deposit insurance also retards non-bank financial markets. For instance, a banking sector that is retarded by the introduction of deposit insurance will nurture fewer firms to the point where they are able to access the public capital markets, thus also retarding these markets. As is well known, private credit markets are typically the main source of capital for firms in their nascent stages of development, before being able to raise capital in public markets (Peterson and Rajan, 1995; Cetorelli and Gambera, 2001). In addition, theoretical work by Cecchetti and Krause (2005) predicts that because the introduction of deposit insurance lowers the probability of loss on deposits and, as such, makes deposits more attractive than risky equities, firms are forced to increase the yield on equities, which reduces the issuance of equity by individual firms and retards the equity market.

In contrast, if banks and non-bank financial markets are substitutes, then a decline in banking sector development due to the introduction of deposit insurance could actually enhance the development of non-bank financial markets. For instance, risk-shifting activities that retard the banking sector after the introduction of deposit insurance may enhance non-bank financial market development.[7] Empirical evidence indicates that deposit insurance induced U.S. savings and loans banks to increase their investment in junk bonds in the 1980 s, aiding the development of the junk bond market. Hovakimian et al. (2003) find evidence of risk-shifting in a large number of countries as a consequence of deposit insurance and John et al. (2000) note that the extent of risk-shifting depends on banks' investment opportunity set. The latter is quite broad because approximately 70% of countries do not prohibit banks from owning corporate securities or engaging in insurance and securities business (World Bank, 2008).[8] Furthermore, deposit insurance can lead to higher participation rates by individuals in, and consequently greater development of, the capital markets, especially in countries where a risk-free asset is not widely accessible. This is because deposit insurance alters investors' investment opportunity set as the virtually risk-free insured deposit lowers the risk of a portfolio containing the deposit and risky securities, akin to the role of the risk-free asset in Tobin's separation theorem. In order to take advantage of the resulting higher Sharpe ratio, investors are likely to allocate a greater proportion of their future investments to risky securities.

Finally, the theoretical model by Cecchetti and Krause (2005) also predicts that with the introduction of deposit insurance banks offer less credit to private firms because deposit insurance results in a less efficient intermediation process and higher intermediation costs (e.g., insurance premiums). If non-bank financial markets are substitutes to banks, then under this scenario firms may seek more capital in non-bank markets, which should enhance their development.

In this paper we employ a panel model approach to assess whether the introduction of deposit insurance retards the banking sector, the non-bank depositaries sector, and the equity market. Using a sample of 134 countries, 62 (91) of which implemented (had) deposit insurance during our 28-year sample period, we find that when the rule of law in a country is relatively weak deposit insurance is associated with an economically meaningful and statistically significant decline in the *financial market activity* of all the above financial markets.[9] In addition, given weak rule of law, deposit insurance is also associated with an economically meaningful decline in the *size* of the banking sector and the non-bank depositaries sector, but not with the size of the equity market. When the rule of law is strong, deposit insurance is sometimes associated with a positive outcome, but it depends on the particular financial market. Cull et al. (2005) and others also find that law and order mitigates the negative effects of deposit insurance on different aspects of the financial markets. Collectively, these results imply that, in the absence of a strong law and order tradition, deposit insurance retards the development of the overall financial market.

We also document that, when the rule of law is weak, deposit insurance is associated with a decline in banking sector development in both the short term and the long term. However, when the rule of law is strong there are significant differences between the short- and long-term effects of deposit insurance. We find that even at high levels, law and order is not associated with an economically important increase in banking sector activity in the short term. In sharp contrast, the evidence suggests that deposit insurance has a positive effect on banking sector development in the long run. If law and order is at the level equivalent to our sample average there would be an increase in banking sector activity of approximately 15% of GDP. This is an important finding in that while previous papers (Cecchetti and Krause, 2005; Cull et al., 2002) find that law and order mitigates the negative effect of deposit insurance, they do not document whether this occurs in the short or the long term as their cross-sectional tests cannot capture the time dynamics of the effect of the introduction of deposit insurance.

The evidence further indicates that deposit insurance is negatively and significantly related to the financial development of equity market in the long run, even when the rule of law is strong. Taken together with our result suggesting that deposit insurance retards banking sector activity in the short run, the above supports the view that deposit insurance first retards banking sector development before it also constrains the development of the stock market.[10]

The results also reveal that the relation between deposit insurance and the development of the non-bank depositaries sector is generally negative, both in the short run and the long run, but

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[7] The negative effect of deposit insurance (or other deposit guarantees) on banks has been attributed primarily to the tendency of banks to increase risk after the introduction of deposit insurance (e.g., Brewer, 1995; Brewer and Mondschean, 1994; Demirgüç-Kunt and Huizinga, 2004; Ioannidou and Penas, 2010; Chernykh and Cole, 2011; Gropp et al., 2014; Anginer et al., 2014) given that depositors have less incentive to monitor banks (see, e.g., Demirgüç-Kunt and Huizinga, 2004; Karas, Pyle, and Schoors, 2013). Additionally, if the deposit insurance has already set aside funds to protect depositors, other bank creditors and shareholders have less incentive to monitor banks because it is easier to pressure the government into covering their claims if banks fail (Demirgüç-Kunt and Detragiache, 2002).

[8] That non-bank markets may develop in the presence of a relatively retarded banking sector is supported by the dominance of a market-based financial system in some countries (Demirgüç-Kunt and Levine, 2001; Levine, 2002).

[9] We regard weak (strong) law and order as a score of 2 (6) on a 6-point scale on which a higher number reflects greater rule of law. See data in Appendix A for countries' average law and order score over our ample period.

[10] Banks typically fund the nascent stages of firm development before firms are able to access the stock market and so a decline in bank funding and, hence, the rate at which firms enter the stock market would not be immediately observed. Chinn and Ito (2006) note that banking sector development is a prerequisite for stock market development.

the magnitude is larger in the long term. Finally, we find that the negative association between deposit insurance and non-bank financial market development is influenced by the scheme's design features that potentially provide an advantage to the banking sector and bank depositors.

Using several identification strategies to account for possible endogeneity, our results remain qualitatively unchanged. The results, therefore, are consistent with the view that the introduction of deposit insurance *causes* the aforementioned changes in financial market development.

This paper makes three main contributions. First, it contributes to the literature that documents the effect of deposit insurance on different aspects of financial markets (Cull et al., 2002, 2005; Demirgüç-Kunt and Detragiache, 2002; Cecchetti and Krause, 2005). Relative to these cross-sectional studies, we use a panel model with fixed effects and identify the causal effect of the *introduction* of deposit insurance by comparing the level of financial development for a country before deposit insurance with the same country after deposit insurance. Hence, we confirm the qualitative results of Cull et al. (2002, 2005) and Cecchetti and Krause (2005) of a negative association between deposit insurance and banking sector development, but overcome the concern of inferring causality from cross-sectional models. Moreover, we simultaneously discern the differential short- and long-term effects of the introduction of deposit insurance on both bank and non-bank financial markets.

Second, our paper contributes to the broader literature on the determinants of financial market development (e.g., La Porta et al., 1997, 1998; Beck et al., 2003; Rajan and Zingales, 2003; Stulz and Williamson, 2003, and others). In particular, while it is well known that institutional and financial development are positively correlated (Coffee, 2000; Mayer and Sussman, 2001; Beck et al., 2003; Chinn and Ito, 2006; see Huang, 2010 for an overview) our results suggest that deposit insurance as an institution introduces externalities that can retard the development of non-bank financial markets. Third, by analyzing the effect of deposit insurance on both bank and non-bank financial markets we add to the evidence of the important developmental link between the bank and equity markets (Rajan and Zingales, 2003; Chinn and Ito, 2006). Specifically, our main finding that deposit insurance retards both bank and non-bank financial markets suggests that, in general, these markets have a complementary relation (Boyd and Smith, 1998). As such, we contribute to the ongoing debate regarding whether bank and non-bank financial markets are substitutes or complements.

Our findings have practical policy implications. For instance, they could influence the decision of the 40 countries currently contemplating the adoption of deposit insurance. Our results should not be interpreted as implying that deposit insurance is ineffective in preventing bank runs and, therefore, should not be implemented. Recent evidence by Anginer et al. (2014) find that systemic stability was greater during the 2008 crisis in countries with deposit insurance schemes. Likewise, temporary schemes, such as those announced by Australia and New Zealand in response to the recent crisis, with specific short-term lifespan, might be very useful in the presence of crises. However, our results highlight that it is important for policymakers to consider potential negative externalities before implementing deposit insurance schemes. Further, our results could also influence the review that is currently underway in countries that have already adopted deposit insurance (Financial Stability Board (2011)). Given our finding that the features of the scheme influence its impact on financial development, the authorities may consider altering the scheme's design after its introduction as this may be more politically palatable than eliminating the scheme.

The remainder of the paper is as follows. Section 2 briefly describes the data, which are detailed in Appendix B. Section 3 describes the results and Section 4 concludes.

2. Data

In this section we briefly describe the data used in the paper. A detailed description of the data and their sources are in Appendix B. We use annual data on 134 countries (see Appendix A) spanning the 28-year period from 1984 to 2011. Although our sample spans 1984 to 2011, data for some countries are available only after 1984 (see Appendix A for start dates for each country). In addition, some countries have gaps in the data availability throughout the sample. Unfortunately, this is a consequence of including many developing countries in the sample. Our final sample contains all country/ years with data available on *all* of our controls as well as *any* of our dependent variables. Hence, models using different dependent variables can have different number of observations. The fact that the panel is unbalanced does not cause any issues in the estimation. Of the 134 sample countries, 91 had deposit insurance at some point during our sample period, while 62 countries implemented new schemes during our sample period.

2.1. Dependent variables

Ideally, we require a measure of financial development that reflects the ease with which entities that require capital can access same (Rajan and Zingales, 2003). Although size-based measures, such as market capitalization/GDP, have been used to represent financial development, larger capitalization does not necessarily translate to easier access to capital (Demirgüç-Kunt and Maksimovic, 1998; Levine and Zervos, 1998). As Cull et al. (2005) point out, proxies for financial development should be justified by the consideration that one of the primary goals of banks and other financial institutions is to provide capital to private investors. However, as we explain below for the equity market, the 'provision of capital' should be broadly construed in the context of the measurement of financial development. A preferred alternative to size-based proxies are activity-based proxies, now common in the deposit insurance, growth, finance, and international trade literatures (Levine and Zervos, 1998; Demirgüç-Kunt and Levine, 2001; Arestis et al., 2001; Cecchetti and Krause, 2005; Manova, 2008, 2013; Arellano et al., 2012). Given the above, our primary dependent variables are:

1. *Banking sector* development: credit extended by deposit money banks to the private sector/GDP for country i in year t.
2. *Non-bank depositaries* development: private credit extended by non-bank financial intermediaries/GDP for country i in year t.
3. *Equity market* development: total value traded on domestic exchanges/GDP for country i in year t. Total value traded reflects firms' access to capital through initial public and seasoned equity offers, and also includes secondary market transactions. Although this definition is commonly used in the literature, at first glance it may appear to be inconsistent with the above credit market definitions of financial development, which focus on the provision of new capital. However, it is regarded as an appropriate measure of financial development because secondary market transactions create liquidity and, thus, facilitate the trading of investors' ownership in the country's shares. The disposal of said shares provides capital for the investor. Furthermore, the secondary market facilitates the execution of transactions such as mergers and acquisitions, carve-outs, spinoffs, and split-offs. Existing shares serve as "currency" and, therefore, provide capital for many of these transactions. As such, these secondary market transactions both actively promote financial developmental and are reflective of the level of financial development. The data for equity market development is not available until 1989, so models using this dependent variable have a shortened sample covering the years 1989–2011.

Given that the numerator of the proxies for banking sector and the non-bank depositaries sector is similarly defined, we can combine these into a financial intermediaries sector. We do not, however, combine these financial markets, singly or jointly, with the equity market due to differences in the proxies.

It is not clear that size-based measures are reasonable proxies for financial development. Nonetheless, we also examine the effect of deposit insurance on several size-based measures as the question of whether deposit insurance affects the size of financial markets is itself interesting and related to our main objective. They are: banking sector size (assets of deposit money banks/GDP for country i in year t), equity market size (stock market capitalization/GDP for country i in year t), and non-bank depositaries size (assets of non-bank depositaries/GDP for country i in year t). As for equity market activity, data on equity market size is available starting in 1989, leading to a shorter sample period for models using this dependent variable. The size-based measures allow for the combination of the above individual financial markets into various aggregates as described below.

To be consistent with the practice in the literature (see above), we scale each proxy for financial market development by the level of the country's GDP. Scaling by GDP has several advantages. For instance, it provides a better sense of the development of the financial market because even if an 'undeveloped' financial market (where the numerator of the proxy is low) is growing at a high rate in a particular period, relative to the size of the country's GDP it might not be providing substantial capital that has an important influence on overall economic activity. This approach also has the advantage that if in a growing economy the numerator of the scaled proxy does not change, rather than being recorded as stable, the scaled measure would correctly indicate a decline in financial development, since the financial market would be providing relatively less capital to the economy.[11]

2.2. Independent variables

The independent variable of primary interest is *DI*, which is defined as 1 for country i if it had deposit insurance in place in year t, and 0 otherwise. Also of high importance in our analysis is *law*, a measure of law and order for country i in year t. This variable reflects the quality of a country's legal system, specifically its strength and impartiality (law), and the extent to which the law is routinely upheld and, if not, whether sanctions are imposed (order). Important for our paper, it captures the extent to which a country's residents can and do use the existing legal system to enforce contracts and to settle disputes when they arise. The variable is measured on a scale of 0–6, with higher scores indicating that the country has a strong court system supported by functioning political institutions. This variable has been shown by several studies to have a positive effect on financial development (La Porta et al., 1997, 1998) and on the proportion of investment financed by external equity (Demirgüç-Kunt and Maksimovic, 1998).

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[11] One implication of the above is that if a country's GDP growth rate is greater than the growth rate of financial development for a particular segment of its financial system (the numerator of the scaled measure), then in a regression of the scaled proxy for financial development on the growth rate (or log) of GDP, the coefficient estimate could be negative. This does not imply that a faster growing economy or larger economic base retards financial development; instead, it is a mechanical reflection of the scaling. Note also that for a growing economy that is experiencing a transition in its financial system any one segment of the overall financial market (say the banking sector) may be contributing a relatively smaller amount of the overall capital needs of the economy compared to the contribution of other segments (say the equity market) if the financial system is evolving away from the former to the latter, again implying a negative correlation.

Law and order can also influence the effects of deposit insurance on financial development. This is because law and order is a good indicator of a country's institutional environment and, in particular, of the quality of bank regulation that helps to reduce moral hazard in the banking sector arising from generous deposit insurance (Barth et al., 2004) and of the institutional framework supporting long-term financial contracting (Demirgüç-Kunt and Maksimovic, 1998). As Kroszner and Strahan (2001) note, virtually all regulation has "distributional consequences" in the sense that new regulation could shift resources from one group to another. Accordingly, well-organized interest groups lobby legislators to ensure that new regulations allow them to capture rents at the expense of less organized groups. They find support for this (private interest) view in explaining the legislative reforms of the Federal Deposit Insurance Corporation (FDIC) in 1991. Likewise, Laeven (2004) find a similar explanation for the cross-country variation in deposit insurance coverage (generosity) around the globe. Demirgüç-Kunt, Karacaovali, Laeven (2005) find that more democratic countries are less likely to design adequate risk controls into their deposit insurance schemes, partly because of the ability of the banking lobby to pressure government. Hence, the extent to which public-interest legislation, such as that which, presumably, should govern the introduction of deposit insurance, is distorted to benefit private interests will depend significantly on the legal and institutional environment. In countries with a poor institutional setting the deposit insurance scheme might be too generous to the banking sector (and to riskier banks therein) and is likely to induce instability and impede the disciplining effect of the market (Demirgüç-Kunt et al., 2005).

However, strong law and order tradition strengthens market discipline (Demirgüç-Kunt and Huizinga, 2004), reduces moral hazard, provides the right incentives to bank regulators so that banks are optimally regulated (Cull et al., 2002), and offsets the ill effects of deposit insurance (Hovakimian et al., 2003). Moreover, bank risk-shifting that breaches the law is more likely to be sanctioned in countries with strong legal systems. Likewise, the impartiality of the legal system reduces the probability that the banking sector will be able to exploit the put option granted by deposit insurance to extract rents at the expense of depositors, bank creditors, and taxpayers. Supporting these arguments, previous studies, such as (Cull et al., 2002, 2005; Demirgüç-Kunt and Detragiache, 2002; Barth et al., 2004), and others, find that the law and order tradition of a country has a significant influence on how deposit insurance affects the financial development and stability of the banking sector. Similarly, Demirgüç-Kunt and Huizinga (2004) find that although market discipline is lower in countries with deposit insurance, it is higher where law and order is strong.

We expect that the impact of deposit insurance on *non-bank* financial markets will also be influenced by law and order. This is because law and order influences interindustry rivalry and reduces the rents that the banking sector can extract from, say, the insurance industry and non-bank financial intermediaries through the design of the deposit insurance scheme (Kroszner and Strahan, 2001). More broadly, a country's legal system influences the design of the deposit insurance scheme, which in turn determines the level of systemic risk introduced into the broad financial market by deposit insurance. We include the interaction between deposit insurance and law and order in our models to account for this potential moderating effect of law and order.

We use several control variables, most of which are motivated by their use in broadly similar contexts (see, for example, La Porta et al., 1997, 1998).

Finally, we follow the existing literature (see Demirgüç-Kunt and Detragiache, 2002; Barth et al., 2004; Cull et al., 2005) and create two indices of design features of the deposit insurance scheme. These are the credibility (*cred*) and generosity (*gen*) of the scheme,

which is the sum of the features that make the scheme more credible (generous). A scheme with more of these features is regarded as being more credible (generous). The simple index methodology used to create *cred* and *gen* has the distinct advantage that a change in the index is an indication of whether a country has an additional design feature.

Despite the benefit of simplicity, we acknowledge that it might be difficult to determine whether a particular feature adds to the generosity or to the credibility of a scheme. In addition, our construction implicitly assumes that each feature in a particular index has equal effect on our dependent variables. It should be noted that these drawbacks biases against us finding significant results. To address the above concern, we also estimate the effect of each design feature individually, which reduces potential biases due to misclassification.

3. Summary statistics and empirical results

3.1. Summary statistics

Table 1, Panel A, provides summary statistics on the activity-based proxies for financial market development as well as on the relative size of the various financial markets. For each variable of interest, in each year over the sample period we take the (cross-sectional) mean for the countries with and the mean for the countries without deposit insurance and then find the time series average of these cross-sectional means. We then test if there is a difference in the time series of cross-sectional means for the two groups. The mean level of banking sector activity is 55% of GDP in countries with deposit insurance and this is significantly greater than the mean banking sector activity for countries without deposit insurance (32% of GDP).[12] Although an interesting association, this could be because countries with a more developed banking sector are more likely to introduce deposit insurance, rather than a reflection of the effect of deposit insurance on banking sector development. There is no difference in the means of the financial activity of non-bank depositaries or equity markets across countries with and without deposit insurance. The preliminary analysis reveals roughly similar evidence for financial market size. Overall, though potentially interesting, these cross-country differences do not tell us about the effect of *introducing* deposit insurance. Since several variables that are likely to determine the level of financial development in a country are unobservable, we use a panel model with country fixed effects in order to examine the effect of the introduction of deposit insurance, to which we devote the next section.

Panel B of Table 1 reports the correlations between our variables. There is no evidence of high correlations, which could lead to multicollinearity in our multivariate regression models, between the independent variables.

Table 2 provides an overview of the main design features of the schemes in our sample. Panel A categorizes each feature according to the feature's contribution to the scheme's credibility or generosity. The data indicate that the most popular credibility features are compulsory membership (100%) and permanently funded schemes (88%).[13] The most popular generosity features are no coinsurance requirements (97%) and coverage per deposit being greater than 50% (95%). Panel B indicates that 89% of schemes have three or fewer of the design features that contribute to credibility. Further, 90% of schemes have three or fewer of the generosity features.

3.2. Empirical results

3.2.1. Impact of deposit insurance on financial market development

To examine the effect of the introduction of deposit insurance on financial market development we begin with the following panel model:

$$FinDev_{i,t} = \beta_1 DI_{i,t} + \beta_2 (DI \times law)_{i,t} + \beta_3 law_{i,t} + \sum_{p=4}^{p=9} \beta_p control_{pi,t}$$
$$+ \eta_i + \eta_t + \varepsilon_{i,t}, \qquad (1)$$

where $FinDev_{i,t}$ is the measure of financial market development of country i in year t. The independent variable of primary interest is DI, which is defined as 1 for country i if it had deposit insurance in place in (at any point during) year t, and 0 otherwise. The model includes country and year fixed effects, η_i and η_t. The country fixed effects account for time-invariant, unobserved country-specific characteristics that might affect financial market development. The time fixed effects control for worldwide changes over time that could potentially equally affect the financial development of all countries. Thus the impact of introducing deposit insurance is identified from the within-country variation over time; that is, the change in development for the same country before and after the introduction of deposit insurance. All standard errors are heteroskedasticity- and autocorrelation-consistent, with three lags. All dependent variables are winsorized at the 5% and 95% tails.

To allow for the possibility that the effect of the introduction of deposit insurance on financial development evolves differently in different countries we use the level of financial development (not changes) as dependent variable. For example, the effect could be discrete in some countries (perhaps occurring immediately upon the adoption of deposit insurance), while continually affecting development over several years in other countries. A large number of papers that examines the effect of different factors on financial development also specify the development variable in levels (La Porta et al., 1997; Levine and Zervos, 1998; Levine, 1999; Beck et al., 2003; Rajan and Zingales, 2003; Do and Levchenko, 2007; Baltagi et al., 2009; Roe and Siegel, 2011). For instance, Do and Levchenko (2007) use a similar panel model with country and time fixed effects to examine the impact of a country's external finance needs of its exports on its financial development, where the latter is the same as our banking sector development variable described above. Using a similar panel model, Glick and Rose (2002) examine the impact of leaving a currency union on the level of external trade.[14,15]

Previous, cross-sectional studies on financial development use *changes* in development as the dependent variable. For instance, Cull et al. (2002) utilize cross-sectional models and, as such, address the question 'Are there cross-country differences in the growth rate of financial development after adopting deposit insurance?'[16] Other than addressing the more interesting policy question (does deposit insurance impact the level of financial development?), our panel model has two advantages relative to the cross-sectional

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[12] In similar univariate tests, Cull et al. (2002) also find that countries that adopted deposit insurance had greater growth in their measure of financial development in the three years after adoption than countries that did not.

[13] Since there is no cross-country variation in compulsory membership we do not include it in the estimation below that utilizes the individual credibility measures (Table 8).

[14] In the spirit of Glick and Rose, the "within" estimator obtained from the panel fixed effects model addresses the policy question of interest, 'What is the impact on financial development of a country adopting deposit insurance?', by comparing the level of financial development for a country before deposit insurance with the same country after deposit insurance.

[15] Chinn and Ito (2006) use 5-year average of changes in financial development as the dependent variable in a panel setting. However, a multi-year measure would obscure any immediate effect of the introduction of deposit insurance and reduce precision in the estimation of the model parameters. More important, the use of the change in the dependent variable is necessitated by their need to address endogeneity due to, for instance, unobserved heterogeneity, but they are unable to use country fixed effects, which is standard in the literature, because their model includes time-invariant regressors. See Baltagi et al. (2009).

[16] Cull et al. (2005) use a Heckman two-step approach because they focus on the countries that have adopted deposit insurance to determine if features of the deposit insurance scheme affect financial development. See our Table 8.

Table 1

Summary statistics of financial market development and other variables.

	Complete sample		With DI		Without DI		
	Mean	Median	Mean	Median	Mean	Median	Difference
Panel A: Summary statistics							
Max number of years used	28		28		28		
Financial market activity – scaled by GDP							
Banking sector development	42.46	40.10	55.26	55.15	32.40	31.87	22.86**
Non-bank intermediaries development	13.14	13.50	13.22	13.14	13.40	13.49	−0.18
Bank & non-bank intermediaries development	55.54	55.78	61.00	61.05	52.18	51.69	8.82**
Equity market development	25.29	25.96	27.14	29.66	21.14	19.49	5.99
Financial market size – scaled by GDP							
Banking sector	51.97	49.85	66.94	68.21	40.30	40.01	26.64**
Non-bank depositaries	18.21	18.12	19.43	19.59	17.78	17.12	1.65*
Bank & non-bank intermediaries	72.49	72.66	80.11	78.78	68.66	68.74	11.46**
Equity market	44.86	44.79	46.56	47.65	41.50	41.51	5.06
Bank sector & equity market	113.99	110.13	120.58	115.05	102.02	104.61	18.56**
Overall financial market	137.55	140.61	134.97	137.35	145.70	148.54	−10.73
Law & order	3.76	3.80	4.45	4.43	3.35	3.41	1.09**
Creditor rights	5.33	5.32	6.11	6.11	4.69	4.77	1.43**
Shareholder rights	5.06	5.06	5.48	5.44	4.78	4.79	0.70**
Trade	77.50	76.62	73.18	66.88	78.34	79.97	−5.16
log(GDP)	24.46	24.40	25.72	25.71	23.57	23.58	2.15**
GDP growth	3.72	3.55	3.34	3.42	4.14	3.65	−0.80*
%Regadopt	0.35	0.34	0.47	0.47	0.22	0.24	0.25**

	Banking sector activity	Equity market activity	Non-bank depositaries activity	Banking sector size	Equity market size	Non-bank depositaries size	Law & order	Creditor rights	Shareholder rights	Trade	Log (GDP)	GDP growth	Crisis
Panel B: Correlations													
Equity market activity	0.46												
Non-bank depositaries activity	0.50	0.50											
Banking sector size	0.96	0.46	0.48										
Equity market size	0.49	0.73	0.51	0.47									
Non-bank depositaries size	0.47	0.55	0.95	0.45	0.53								
Law & order	0.54	0.37	0.41	0.51	0.28	0.31							
Creditor rights	0.31	0.31	0.36	0.24	0.38	0.33	0.20						
Shareholder rights	0.47	0.56	0.43	0.42	0.62	0.48	0.29	0.61					
Trade	0.36	0.25	−0.09	0.35	0.42	−0.14	0.23	0.36	0.32				
Log(GDP)	0.27	0.53	0.45	0.29	0.31	0.51	0.31	0.06	0.46	−0.31			
GDP growth	−0.01	0.07	−0.11	−0.02	0.09	−0.13	0.08	−0.01	0.03	0.20	−0.05		
Crisis	−0.04	−0.03	0.00	−0.05	−0.12	0.01	−0.01	−0.06	−0.06	−0.13	0.10	−0.24	
Deposit insurance dummy	−0.03	0.03	−0.06	−0.05	−0.07	0.01	−0.12	0.19	0.21	−0.21	0.30	−0.08	0.05

This table reports the mean and median values of financial market activity-based proxies for financial market development and measures of financial market size, both scaled by GDP, as well as various control variables over all available years in the period 1984–2011. There are 134 countries, 62 (91) of which implemented (had) deposit insurance at some point during our sample period. Activity-based proxies are: banking sector development – amount of private credit extended by deposit money banks/GDP, equity market development – total value traded/GDP, and non-bank depositaries development – private credit extended by non-bank financial institutions/GDP. Measures of financial market size are: banking sector size – assets of deposit money banks/GDP, equity market size – stock market capitalization/GDP, and non-bank depositaries size – assets of non-bank financial institutions/GDP. Size-based measures are aggregated at various levels, such as the overall market – the sum of banking sector, equity market, and non-bank depositaries. Law & order is a measure of the law and order tradition in a country and is an index ranging from 6, strong law and order tradition, to 0, weak law and order. Other variables are: creditor rights – a measure of the rights of creditors in the country and is an index ranging from 10, strong creditor protection to 0, weak creditor protection; shareholder rights – a measure of the rights of shareholders in the country and is an index ranging from 10, strong shareholder protection to 0, weak shareholder protection; trade – sum of imports and exports/GDP; log(GDP) – the natural log of GDP; GDP growth – the annual growth rate of GDP; and %regadopt – the percentage of countries in the region where country *i* is located that have adopted a deposit insurance scheme. The sample mean is obtained from the average of yearly values. A *t*-test is used to determine the significance of the difference in means between countries with and without deposit insurance. Significant differences are indicated by *, ** at the 5% and 1% level respectively. Panel B reports the Pearson correlation coefficients between the variables.

Table 2
Design features of deposit insurance schemes.

Credibility features			Generosity features		
Design feature	# of countries	Percent (%)	Design feature	# of countries	Percent (%)
Panel A: Makeup of the credibility and generosity of deposit insurance schemes					
Administration – private	11	12	Co-insurance not required	88	97
Government backstop	35	38	Coverage per deposit > 50%	86	95
Permanently funded	80	88	Interbank deposits covered	30	33
Risk-adjusted premiums	31	34	Foreign currency covered	56	62
Membership compulsory	91	100			
Credibility index			**Generosity index**		
Score	# of Countries	Percent (%)	Score	# of Countries	Percent (%)
Panel B: Distribution of credibility and generosity index scores					
0	0	0	0	0	0
1	3	3	1	3	3
2	29	32	2	15	16
3	49	54	3	65	71
4	10	11	4	8	9
5	0	0			
Total	91		Total	91	

Panel A of this table provides a breakdown of the individual design features of deposit insurance schemes for all countries in the sample which had adopted a deposit insurance scheme and for which information about the design feature is available. The features are categorized into those usually regarded as characteristic of the scheme's credibility and generosity, respectively. Panel B reports a summary of country-level credibility and generosity indices. To construct an index for a particular country a score of 1 is added if the country's deposit insurance scheme has a particular credibility or generosity feature. There are 134 countries in our sample, 62 (91) of which implemented (had) deposit insurance at some point during our sample period. The data cover the period 1984–2011.

approach. First, we control for unobserved heterogeneity (endogeneity), thus obviating concerns that it drives our results. Second, we can simultaneously incorporate both short- and long-term effects in our model, whereas these can only be examined separately (and less precisely) in cross-sectional models (cf. Cull et al., 2002, 2005).

Table 3 presents the results using the activity-based proxies for financial development.[17] The standalone *DI* dummy variable in Model 1 indicates that after the introduction of deposit insurance banking sector activity declines by approximately 20% of GDP, ignoring the moderating effect of law and order. This is consistent with previous cross-sectional evidence that deposit insurance is negatively related to banking sector depth, activity (Cull et al., 2005), and stability (Demirgüç-Kunt and Detragiache, 2002). However, the above interpretation is only correct if the country had a mean law and order score of zero.[18] Since the mean law and order is not zero for any country during our sample period, the effect of deposit insurance is conditional on the level of law and order and is given as: $\frac{\partial FinDev}{\partial DI} = \hat{\beta}_1 + \hat{\beta}_2 \times law$. The law and order variable increases in the rule of law from 0 to 6, where a score of 6 is found in countries such as Denmark, Iceland, and Sweden, which introduced deposit insurance during our sample period. The positive and statistically significant coefficient estimate on the interaction between law and order and deposit insurance implies that a law and order score of approximately 4 neutralizes the effect of deposit insurance on banking sector activity ($-19.8 + 5.1 \times 3.9 = 0$). The coefficient estimate on the interaction term implies that for every one unit of law and order above or below the "neutral" score of 4, banking sector development changes by about 5% of GDP following the introduction of deposit insurance. So, whereas for a country with the highest law and order score of 6 on average over the sample period deposit insurance has a large positive effect on its banking sector activity

(10% of GDP), a law and order score of around 2, similar to the score of Guatemala, Honduras, Nigeria, and the Republic of Congo, the effect of introducing deposit insurance is a net decline of approximately 10% of GDP in banking sector activity. The finding that law and order mitigates this negative effect of deposit insurance is similar to previous cross-sectional results (Demirgüç-Kunt and Detragiache, 2002; Barth et al., 2004; Cull et al., 2005).

Avoiding the need to assess the effect of deposit insurance at various levels of law and order and the large number of estimates that would be involved, we do not present statistical tests of whether the effect of deposit insurance is significantly different from zero at each given level of law and order (though the results are available on request). In general, we will refer to strong law and order as a score of 6 and weak law and order as a score of 2 and simply point out the potential economic impact.

The results indicate that equity market activity (column 2) also declines after the introduction of deposit insurance if law and order is weak (−10% of GDP). Likewise, there is an economically important decline in the financial activity of non-bank depositaries (column 3) when law and order is weak (−7% of GDP). Interestingly, while the highest possible law and order score of 6 is likely to lead to a net positive impact of deposit insurance on the equity market (5% of GDP), it would barely be enough to neutralize the negative impact on the non-bank depositaries sector (−1% of GDP).

One interpretation of the above results is that when a country introduces deposit insurance equity market development declines in sympathy with the retardation of banking sector development. Hence, in general, the decline in the development of the equity market is not due to benefits (e.g., implicit subsidies) obtained by the banking sector, since both the banking sector and the equity market are simultaneously retarded. Possibly, the introduction of deposit insurance reduces banking sector development, which supports fewer firms to the point where they are able to raise capital in the public capital markets, consequently retarding the development of these markets. This view is consistent with theoretical arguments in Cecchetti and Krause (2005) and with the finding by Chinn and Ito (2006) that banking sector development is a prerequisite for equity market development. If this view is correct, then we expect banking sector development to decrease first, followed by a decline in equity market development. Our panel approach allows us to assess this, which we do in the next section.

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[17] Our final sample contains all country-years with data available on all of our controls as well as any of our dependent variables. Hence, models using different dependent variables (e.g., banking sector activity vs. banking sector size) can have different number of observations. In Table 3, 5 and 7, the dependent variables are activity-based proxies for development, while in Tables 4 and 6, they are size-based proxies. In Table 8 dependent variables are also activity-based, but the modeling approach is different. Equity market data are available for a shorter sample period than for other financial markets.

[18] The lowest mean law and order score for any sample country with deposit insurance is 1 (Venezuela).

Table 3
Effect of deposit insurance on activity-based proxies for financial development.

	Banking sector	Equity market	Non-bank depositaries	Bank & non-bank intermediaries
DI dummy	−19.763**	−17.940*	−9.727**	−9.802
	(−6.249)	(−2.112)	(−2.678)	(−1.625)
DI × law & order	5.061**	3.849*	1.397	1.803
	(6.078)	(2.025)	(1.951)	(1.418)
Law & order	0.505	−1.640	−0.382	2.670
	(0.862)	(−0.968)	(−0.560)	(1.881)
Creditor rights	2.443*	2.595	1.219	−2.326*
	(1.963)	(1.187)	(1.169)	(−2.495)
Shareholder rights	1.214	0.768	−1.591	−3.508*
	(0.957)	(0.243)	(−1.350)	(−1.995)
Trade	0.034	0.054	−0.044	−0.136*
	(1.409)	(1.005)	(−1.327)	(−2.451)
Lagged_ln(GDP)	12.599**	−5.437	−15.525**	−0.628
	(4.057)	(−0.536)	(−3.073)	(−0.091)
GDP growth	−0.413**	0.320	−0.297**	−0.525**
	(−5.671)	(1.796)	(−3.656)	(−4.718)
Crisis	10.873**	1.254	0.731	5.927**
	(9.497)	(0.531)	(0.770)	(3.471)
Year dummy	yes	yes	yes	yes
R^2	0.360	0.349	0.108	0.287
N	2877	1735	852	844

This table reports the results of a panel regression of Eq. (1), with country fixed effects, for the sample of 134 countries, of which 62 (91) of which implemented (had) deposit insurance at some point during our sample period 1984–2011. The dependent variables are: banking sector development = sum of private credit extended by deposit money banks/GDP, equity market development = total value traded/GDP, non-bank depositaries development = private credit extended by non-bank financial institutions/GDP, and the combination of bank and non-bank intermediaries. DI is a dummy variable = 1 if the country had deposit insurance in year t and 0 otherwise and law & order = an index of law and order tradition ranging from 0 (low) to 6 (high). The control variables for country i for year t are: creditor rights = an index measuring the rights of creditors ranging from 0 (low protection) to 10 (high protection), shareholder rights = an index measuring the rights of shareholders ranging from 0 (low protection) to 10 (high protection), GDP growth = annual GDP growth; lagged_ln(GDP) = log of GDP for year $t − 1$; trade = (exports + imports)/GDP; crisis is a dummy variable = 1 if the country experienced a systemic banking crisis in year t and = 0 otherwise. t-Values with standard errors adjusted for heteroskedasticity and autocorrelation using three lags are in parenthesis.
*, ** indicate significance at the 5% and 1% levels, respectively.

The results further indicate that several control variables are significantly related to financial market development. Consistent with our expectations, we find that banking sector development is positively related to creditor rights and the size of the country's GDP. While larger economies are beneficial to banking sector development, the evidence indicates that, conditioning on the variables in the current specification, the development of non-bank depositaries declines with the size of the GDP. This may be a reflection of banking sector dominance in bank-centered economies. The evidence also indicates that the development of the banking sector and the non-bank depositaries sector declines with GDP growth. Bearing in mind that we scale the proxy for development by GDP, the most likely explanation for this is that the rate of growth of GDP is, on average, greater than the expansion of credit by these financial markets to the private sector. This is understandable given that the expansion of credit is in part influenced by monetary policy and central bankers are generally reluctant to allow too rapid an expansion in credit out of concern for inflation. Stock markets, in contrast, are likely to grow at a faster rate than the GDP given the forward-looking nature of the stock market. Consistent with this, we find that stock market development increases (marginally) with GDP growth rate.

The results also indicate that systemic banking crises are positively and significantly associated with banking sector activity.[19] At first glance this may appear counterintuitive. However, Cull and Martinez-Peria (2013) note that how bank activity behaves during crises is complex and, therefore, difficult to predict ex ante. For instance, the positive relation may be influenced by the intervention of the authorities. If intervention is on average successful, then this could lead to a positive relation between crisis and development. As an example consistent with this, 2007 to 2011 is characterized

as a banking crisis in the United States (Laeven and Valencia (2012)), yet banking sector activity and size grew in 2007 (at the onset of the crisis) as well as in 2008. In fact, banking sector activity increased from 57.47% of GDP in 2006 to 59.42% in 2007 and 62.99% in 2008. More generally, the positive relation may be related to several factors. Martinez-Peria and Schmuckler (2001) find that adequately capitalized banks in Argentina, Chile, and Mexico grew their deposits following crises. Greater deposit growth could result in increased financial activity. Ivashina and Scharfstein (2010) find that a subset of U.S. banks that had better access to deposit financing implemented less stringent cuts to their lending during the 2008 financial crisis. Gambacorta and Marques-Ibanez (2011), using a large sample of bank from 15 countries, find that banks which were well capitalized and relied more on deposit funding than on market-based funding tightened loan supply less during the 2008 crisis. Cull and Martinez-Peria (2013) find that in Central and Eastern Europe and Latin America bank lending during crises increases with foreign and government ownership of domestic banks, bank size, bank capitalization, and the funding structure (extent of funding by deposits). Further, bank activity also depends on geography (region of operations), liquidity of the bank's assets, and the particular point within the crisis cycle. Therefore, like Cull and Martinez-Peria (2013), we "caution against making sweeping generalizations" about how crises affect banking sector activity, especially when using such a large and diverse sample of countries as ours.

3.2.2. Deposit insurance and financial market size

The results for the effect of deposit insurance on the size of financial markets are reported in Table 4.[20] The evidence in Model

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[19] A systemic banking crisis is deemed to have occurred when a large part of the banking sector experiences insolvency or internal illiquidity such that the affected banks require the intervention of the banking authorities in order to be able to continue to carry out their regular functions.

[20] Given that the various measures of financial market size are amenable to various combinations, in addition to the financial intermediaries sector, we form a core financial market (banking sector and equity market) and an overall market (banking sector, equity market, and the non-bank depositaries). The activity-based proxies for development do not readily lend themselves to this type of aggregating, except for bank and non-bank financial intermediaries.

Table 4
Effect of deposit insurance on financial market size.

	Banking sector	Equity market	Non-bank depositaries	Banking sector & equity market	Bank & non-bank	Overall market
DI dummy	−18.958**	1.343	−24.453**	−22.441	−23.388**	−25.658
	(−6.023)	(0.181)	(−4.150)	(−1.771)	(−2.585)	(−0.917)
DI × law & order	4.968**	0.428	3.415**	6.338*	4.900**	3.738
	(6.017)	(0.277)	(3.108)	(2.413)	(2.663)	(0.680)
Law & order	0.271	−1.769	−1.541	−2.201	0.445	−5.041
	(0.404)	(−1.216)	(−1.574)	(−1.241)	(0.227)	(−1.510)
Creditor rights	3.001	5.465**	1.488	5.325*	−4.913**	0.937
	(1.937)	(5.704)	(0.748)	(2.453)	(−2.855)	(0.281)
Shareholder rights	−0.120	2.055	−1.527	−2.864	−2.395	1.734
	(−0.067)	(0.878)	(−0.710)	(−0.690)	(−0.800)	(0.316)
Trade	0.012	0.023	−0.059	−0.090	−0.113	0.077
	(0.444)	(0.612)	(−1.222)	(−1.531)	(−1.461)	(0.412)
Lagged_ln(GDP)	14.828**	14.724*	−33.532**	31.453**	−12.520	−46.713*
	(4.272)	(2.171)	(−3.980)	(3.160)	(−1.201)	(−1.998)
GDP growth	−0.479**	0.651**	−0.433**	−0.196	−0.559**	−1.512
	(−5.549)	(2.778)	(−3.045)	(−0.546)	(−2.692)	(−1.721)
Crisis	9.027**	−3.300	1.935	10.972**	7.226**	5.604
	(6.569)	(−1.635)	(1.176)	(3.485)	(2.632)	(0.896)
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.319	0.432	0.200	0.452	0.273	0.460
N	2913	1748	833	1720	831	552

This table reports the results of a panel regression of Eq. (1), with country fixed effects, for the sample of 134 countries, of which 62 (91) of which implemented (had) deposit insurance at some point during our sample period 1984–2011. The dependent variables are: banking sector size = assets of deposit money banks/GDP; equity market size = stock market capitalization/GDP; and non-bank depositaries size = assets of non-bank financial institutions/GDP, and combinations thereof. Overall market = size of (bank + stock market + non-bank depositaries). *DI* is a dummy variable = 1 if the country had deposit insurance in year *t* and 0 otherwise and law & order = an index of law and order tradition ranging from 0 (low) to 6 (high). The control variables for country *i* for year *t* are: creditor rights = an index measuring the rights of creditors ranging from 0 (low protection) to 10 (high protection), shareholder rights = an index measuring the rights of shareholders ranging from 0 (low protection) to 10 (high protection), GDP growth = annual GDP growth; lagged_ln(GDP) = log of GDP for year *t* − 1; trade = (exports + imports)/GDP; crisis is a dummy variable = 1 if the country experienced a systemic banking crisis in year *t* and = 0 otherwise. *t*-Values with standard errors adjusted for heteroskedasticity and autocorrelation using three lags are in parenthesis. *, ** indicate significance at the 5% and 1% levels, respectively.

1 indicates that the relation between deposit insurance and financial market size is very similar to that between deposit insurance and the activity-based proxies for financial market development. From the standalone *DI* variable the evidence is that the size of the banking sector declines by about 19% after the introduction of deposit insurance, ignoring law and order. As before, this negative effect is mitigated by law and order and a score of approximately 4 is required to neutralize this effect, which implies that deposit insurance has a positive impact on banking sector size when law and order is strong (approximately 11% of GDP).

For non-bank depositaries (column 3) the results are also qualitatively similar to those from the activity proxy. The introduction of deposit insurance is associated with a large and significant decline in size, and although law and order mitigates this effect even the highest law and order score does not lead to a positive outcome (−4% of GDP). The result is markedly different for the equity market (column 2) as deposit insurance has no significant effect on stock market size. Across various combinations of the financial markets containing the banking sector, the introduction of deposit insurance has a broadly similar impact on size to that for the banking sector, with the exception of the overall market, which also contains the equity market.

We check the robustness of the idea that the country's institutional environment has a moderating effect on the extent to which deposit insurance retards financial markets by using another proxy for the country's institutional development. Demirgüç-Kunt and Detragiache (2002) and Demirgüç-Kunt and Huizinga (2004) find that the quality of the country's bureaucracy is an important modifier of the effect of deposit insurance on banking sector stability. This is because bureaucratic quality also reduces moral hazard in the banking sector. During our sample, the correlation between bureaucratic quality and law and order is 0.67 (unreported). Replacing law and order with bureaucratic quality leads to the same qualitative results (see Appendix C).

In summary, we find that both the activity-based proxies for banking sector development and banking sector size decline after the introduction of deposit insurance when law and order is weak. For non-bank depositaries the effect is negative for both financial market activity and size, irrespective of the level of law and order. The results for the financial intermediaries are very similar to those of the banking sector. Similarly, we find a significant reduction in the activity-based proxy for equity market development, though not in equity market size, following the adoption of deposit insurance when law and order is weak. Collectively, these results suggest that, on its own, the introduction of deposit insurance significantly retards the development of a country's financial markets.

3.3. Dynamics of the impact of deposit insurance

In this subsection we examine the dynamics of the effects of deposit insurance on financial market development. Although it is generally the case that financial market development evolves over the long term, there are important reasons why the initiation of deposit insurance might have a different impact in the short and long run. For instance, if deposit insurance first has to affect banking sector development before it affects equity markets,[21] then the short-term effect on equity markets might be different from the long-term effect, as well as being different from the short-term effect on the banking sector. Cull et al. (2005) acknowledge that there could be different short- and long-term effects of adopting deposit insurance, but their years-in-place variable in the cross-sectional setting cannot adequately detect either a short- or a long-term effect of deposit insurance. More generally, previous papers using a cross-sectional approach are unable to simultaneously examine the short-term (Cull et al., 2002) and the long-term (Cull et al., 2005) effects of

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[21] This would be consistent with the finding that banking sector development is a precondition for equity market development (Chinn and Ito (2006)), as noted above.

deposit insurance and so they examine these separately. Karas et al. (2013), using a difference-in-differences approach for data on Russia, acknowledge that deposit insurance might have different effects on bank deposits and deposit interest rates over time and analyze event windows ranging from one to 13 quarters after adoption. Given that many schemes in our sample have been in place for several decades, we consider even 13 quarters to be short term.

One reason for the importance of this line of enquiry is that policy implications regarding the introduction of deposit insurance might depend on the short-term effect on market development, more so than its long-term effect. For example, if the short-term impact is positive, politicians might support its implementation because it fits with their election cycle, regardless of whether the long-term effect is negative. Moreover, if the short-term impact is positive, it would be easier to justify its, perhaps temporary, introduction in response to financial crises.

To examine this we define four dummy variables as: (1) one in years 0–4 and zero otherwise (*DI0*), where year 0 is the year of the introduction of deposit insurance; (2) one in years 5–9 and zero otherwise (*DI1*), (3) one in years 10–14 and zero otherwise (*DI2*), and (4) one in years 15 and after and zero otherwise (*DI3*). We then estimate a model in which we replace *DI* and the interaction between law and order and *DI* in Eq. (1) with dummies *DI0* to *DI3* simultaneously and the interaction terms between law and order and each of these dummies:

$$FinDev_{i,t} = \sum_{\ell=0}^{\ell=3} \beta_\ell DI\ell_{i,t} + \sum_{\ell=0}^{\ell=3} \delta_\ell (DI\ell \times law)_{i,t} + \beta_4 law_{i,t}$$
$$+ \sum_{p=5}^{p=10} \beta_p control_{pi,t} + \eta_i + \eta_t + \varepsilon_{i,t}. \qquad (2)$$

The coefficient estimate on the period dummy variables picks up the effect of deposit insurance on financial market development in the specific time periods after the introduction of deposit insurance as described above. For instance, *DI0* captures a short-term effect assuming that law and order is zero and $\hat{\beta}_0 + \hat{\delta}_0 \times law$ represents the short-term effect for a given law and order score. We include an interaction between each of these dummy variables and law and order to determine if and how law and order moderates the short- and long-term effects. Although 62 countries adopted deposit insurance during our sample period, only those that adopted it prior to 1998 will have 15 or more years of post-adoption data during our sample period. Hence, the coefficient estimate on the long-term effect is in some cases estimated using a smaller number of observations than the other period dummies. Inferences should, therefore, be made with this in mind.

Table 5 presents the results using the activity-based proxies for financial development. The results for the banking sector in column 1 indicate that, when law and order is weak, there is a decline in banking sector development in both the short term and the long term after the introduction of deposit insurance. However, at high levels of law and order banking sector development increases both in the short term and the long term after deposit insurance is adopted.

Turning to the evidence for the non-bank financial markets, we document that deposit insurance does not have a significant association with the development of the stock market (column 2) or the joint bank and non-bank financial intermediaries sector (column 4) in the short term, and is only marginally significantly (*t*-statistic = −1.95) associated with the development of the non-bank depositaries sector (column 3) in the short run.

Table 5
Short- & long-run effects of deposit insurance on financial market activity.

	Banking sector	Equity market	Non-bank depositaries	Bank & non-bank intermediaries
DI0 (years 0–4)	−9.877**	−10.806	−8.061	−4.568
	(−2.808)	(−1.223)	(−1.953)	(−0.724)
DI1 (years 5–9)	−8.348*	−16.011	−7.398	−7.396
	(−2.084)	(−1.654)	(−1.904)	(−1.117)
DI2 (years 10–14)	−14.318**	−33.033**	−6.516	−7.447
	(−3.046)	(−3.207)	(−1.405)	(−0.920)
DI3 (more than 14)	−24.718**	−45.397**	−14.381**	−22.287**
	(−5.292)	(−4.100)	(−2.873)	(−2.682)
DI0 × law & order	2.249*	2.160	1.287	0.489
	(2.295)	(1.086)	(1.430)	(0.336)
DI1 × law & order	3.302**	2.220	0.371	1.432
	(3.127)	(1.010)	(0.428)	(0.921)
DI2 × law & order	5.805**	3.800	−0.825	−0.476
	(4.708)	(1.584)	(−0.735)	(−0.216)
DI3 × law & order	10.464**	6.481**	2.205	3.335
	(8.509)	(2.628)	(1.588)	(1.375)
Law & order	0.706	−2.342	−0.351	2.443
	(1.221)	(−1.339)	(−0.511)	(1.686)
Creditor rights	1.799	3.424	1.125	−1.507
	(1.526)	(1.747)	(1.019)	(−1.220)
Shareholder rights	1.279	0.857	−2.088	−4.067*
	(1.142)	(0.282)	(−1.700)	(−2.104)
Trade	−0.009	0.062	−0.052	−0.143*
	(−0.361)	(1.150)	(−1.559)	(−2.463)
Lagged_ln(GDP)	15.507**	−5.786	−16.148**	−0.369
	(5.410)	(−0.597)	(−3.245)	(−0.052)
GDP growth	−0.362**	0.350*	−0.287**	−0.476**
	(−5.247)	(2.097)	(−3.578)	(−4.144)
Crisis	9.039**	0.111	0.404	5.479**
	(8.235)	(0.047)	(0.403)	(3.208)
R^2	0.428	0.370	0.133	0.320
N	2877	1735	852	844

This table reports results of a panel regression of Eq. (2), with country and year fixed effects over the period 1984–2011. The dependent variables are activity-based proxies for financial market development. DI0, DI1, DI2, and DI3 take the value 1 in years 0–4, 5–9, 10–14, and 15+ after the adoption of deposit insurance, respectively, and 0 otherwise. See Appendix B for variable description. Standard errors are adjusted for heteroskedasticity and autocorrelation using three lags. *, ** indicate significance at the 5% and 1% levels, respectively.

The evidence further indicates that when law and order is weak there is an economically large long-run decline in the development of the equity market, the non-bank depositaries sector, and the combined financial intermediaries sector. While law and order moderates the relation between deposit insurance and financial development, even the strongest law and order tradition does not appear to lead to an increase in long-run development for these non-bank financial markets after the adoption of deposit insurance. For instance, while countries with strong law and order (a score of 6) might expect an approximately 7% (relative to GDP) decline in equity market development in the long run, weak law and order (a score of 2) would be expected to be associated with a decline of approximately 32%. Collectively, the above evidence is consistent with the idea that the retardation of banking sector development takes some time before it begins to impede stock market development (Chinn and Ito, 2006). These results from the dynamics of the impact of deposit insurance suggest that the discussion regarding sources of capital as complements or substitutes might not be as clear as our initial results suggests (i.e., that they are complements). Even though they appear to be complements in the short run, the above is evidence suggests that they act as substitutes in the long run, in countries with high law and order. These results are new to the literature and could not be inferred from existing cross-sectional studies on the banking sector (Cull et al., 2002, 2005).

In Table 6 we report results based on financial market size. Qualitatively, the evidence is very similar to those using activity-based proxies for financial development, with the exception of the size of the equity market, which is mainly insignificantly related to the adoption of deposit insurance.

These inferences are qualitatively unchanged for several variations in the way we measure the short and long terms. For instance, they hold when we define the long term as greater than three, five, or seven years.

3.4. Accounting for possible endogeneity

The economically large and statistically significant decline in financial market development after the introduction of deposit insurance raises the question: does deposit insurance *cause* the decline in financial market development or are our results driven by endogeneity? Perhaps the main concern is the simultaneity bias that could arise if banking crises or other events affected financial market development and led policymakers to adopt deposit insurance. Demirgüç-Kunt and Detragiache (2002) document that deposit insurance increases the probability of banking crises and not the reverse, leading us to believe that this is not an issue. Furthermore, the (untabulated) correlation between our banking crisis dummy variable and a deposit insurance implementation dummy variable defined as 1 only in the year of implementation and 0 otherwise, is less than 0.01 and not significant (neither is the correlation between crisis and the usual *DI* based on all post-implementation years in Panel B of Table 1). Further, while several countries in our sample adopted deposit insurance after experiencing a banking crisis, there are several cases where the adoption of deposit insurance is unrelated to a crisis.

Nonetheless, we take several steps to address potential endogeneity. First, we include in our model specifications variables, such as a banking crisis dummy variable and GDP growth, that could simultaneously impact financial markets and the adoption

Table 6
Short- & long-run effects of deposit insurance on financial market size.

	Banking sector	Equity market	Non-bank depositaries	Banking & equity	Bank & non-bank	Overall market
DI0 (years 0–4)	−11.724**	6.520	−24.834**	−9.035	−22.730*	11.301
	(−3.537)	(0.710)	(−3.962)	(−0.500)	(−2.261)	(0.242)
DI1 (years 5–9)	−8.100*	10.364	−24.741**	−1.717	−25.149*	−56.092**
	(−2.040)	(1.226)	(−4.172)	(−0.141)	(−2.452)	(−2.758)
DI2 (years 10–14)	−10.516*	−7.311	−21.770**	−19.663	−17.739	−46.966
	(−2.003)	(−0.864)	(−2.931)	(−1.537)	(−1.438)	(−1.784)
DI3 (more than 14)	−22.111**	−10.713	−32.092**	−43.610**	−35.401**	−90.117**
	(−4.158)	(−1.239)	(−3.815)	(−3.319)	(−2.703)	(−3.347)
DI0 × law & order	2.841**	−0.897	4.017**	2.894	4.840*	−5.771
	(3.091)	(−0.457)	(3.263)	(0.751)	(2.099)	(−0.557)
DI1 × law & order	3.381**	−1.443	2.577*	3.425	5.202*	8.315
	(3.180)	(−0.782)	(2.046)	(1.277)	(2.009)	(1.918)
DI2 × law & order	4.719**	2.271	−0.824	7.728**	−0.244	−2.500
	(3.512)	(1.230)	(−0.421)	(2.638)	(−0.085)	(−0.350)
DI3 × law & order	9.735**	3.905*	2.579	16.368**	4.328	7.772
	(6.719)	(2.097)	(1.245)	(5.274)	(1.354)	(1.144)
Law & order	0.494	−2.248	−1.523	−3.142	0.302	−7.667*
	(0.746)	(−1.493)	(−1.540)	(−1.757)	(0.150)	(−2.104)
Creditor rights	2.352	5.389**	1.966	4.686*	−3.717	5.100
	(1.452)	(5.606)	(1.023)	(2.145)	(−1.822)	(1.415)
Shareholder rights	−0.050	2.089	−2.770	−1.750	−3.434	−1.014
	(−0.027)	(0.900)	(−1.243)	(−0.378)	(−1.031)	(−0.183)
Trade	−0.030	−0.004	−0.072	−0.178**	−0.120	0.016
	(−1.217)	(−0.112)	(−1.416)	(−3.159)	(−1.472)	(0.085)
Lagged_ln(GDP)	18.035**	16.463*	−35.452**	39.798**	−13.862	−37.421
	(5.518)	(2.388)	(−4.341)	(4.125)	(−1.294)	(−1.504)
GDP growth	−0.427**	0.702**	−0.396**	−0.008	−0.489*	−1.008
	(−5.168)	(3.115)	(−2.873)	(−0.024)	(−2.337)	(−1.461)
Crisis	7.302**	−4.176*	1.035	9.165**	6.450*	0.591
	(5.472)	(−2.052)	(0.600)	(2.879)	(2.390)	(0.089)
R^2	0.370	0.441	0.234	0.482	0.288	0.506
N	2913	1748	833	1720	831	552

This table reports results of a panel regression of Eq. (2), with country and year fixed effects over the period 1984–2011. The dependent variables are measures of financial market size. *DI0*, *DI1*, *DI2*, and *DI3* take the value 1 in years 0–4, 5–9, 10–14, and 15+ after the adoption of deposit insurance, respectively, and 0 otherwise. See Appendix B for variable description. Standard errors are adjusted for heteroskedasticity and autocorrelation using three lags. *, ** indicate significance at the 5% and 1% levels, respectively.

of deposit insurance. For instance, countries with declining financial markets due to poor economic performance might adopt deposit insurance in an effort to bolster domestic savings in hopes of higher financial market development, which ultimately leads to economic growth (see, e.g., King and Levine (1993), Levine and Zervos, 1998). In this case, the adoption of deposit insurance could be the result, not the cause, of a decline in financial market development. By controlling for potential variables that could drive this relationship we reduce the probability that our results are merely a reflection of this phenomenon. Second, all our models are estimated with country fixed effects and, therefore, rule out the possibility that our results are driven by unobserved time-invariant heterogeneity.

In this section, we further address potential endogeneity by using an approach that more explicitly controls for the possibility that countries that adopt deposit insurance do so as a result of changes to their financial development. A similar approach is used by Servaes (1996) and Allayannis and Weston (2001) among others, and is detailed in Dougherty (2011, chapter 14). Specifically, we estimate the following augmented specification of the model in Eq. (1):

$$FinDev_{i,t} = \beta_1 SoontoAdoptDI_{i,t} + \beta_2 DI_{i,t} + \beta_3 law_{i,t}$$
$$+ \beta_4 (DI \times law)_{i,t} + \sum_{p=5}^{p=10} \beta_p control_{pi,t} + \eta_i + \eta_t + \varepsilon_{i,t}, \quad (3)$$

where *SoontoAdoptDI* is a dummy variable that takes a value of 1 in year *t* if a country does not have deposit insurance, but introduces one in the next one ($t + 1$), two ($t + 2$), or three ($t + 3$) years. As an example, if a country introduces deposit insurance in 1994, then the variable has a value of 1 in 1991, 1992, and 1993. In all other years, pre-1991 and 1994 and beyond, the variable takes a value of 0. We also include *DI* which, as described before, takes a value of 1 in period *t* if the country has deposit insurance, and zero otherwise. Given that the *SoontoAdoptDI* dummy variable is defined as 1 in the three years leading up to the introduction of deposit insurance it is designed to capture any decline in financial development in the years prior to the introduction of deposit insurance. If financial market development declined prior to the introduction of deposit insurance, and consequently caused the introduction of deposit insurance, then a necessary, but not a sufficient, condition is that there would be a negative and statistically significant coefficient estimate on *SoontoAdoptDI*.[22] However, if, in fact, it is solely the introduction of deposit insurance that retards financial development, then the coefficient estimate on *SoontoAdoptDI* should be insignificantly different from zero because the countries in this soon-to-adopt group did not have deposit insurance in that period. In addition, the coefficient estimate on the *DI* variable should be negative and significant, indicating that the decline in financial market development occurred at the point of, or after, the introduction of deposit insurance and is, therefore, caused by deposit insurance (we estimate a slight modification of the model in the empirical estimation below).

In the empirical estimation of the above model we let *SoontoAdoptDI* take a value of 1 not only in the 'soon-to-adopt' years preceding deposit insurance, but also in the years that the country has deposit insurance. The advantage of defining the dummy variable this way is the ease of interpretation. The fact that *SoontoAdoptDI* has a value of 1 over the entire period that *DI* also takes a value of 1 means that *DI* picks up only an incremental effect on financial market development over any effect of *SoontoAdoptDI*. That is, if deposit insurance causes the retardation of financial

markets, then *DI* should be negative and significantly different from zero. Because *SoontoAdoptDI* also takes the value of one after the adoption of deposit insurance we can interpret the coefficient on *DI* as the *incremental effect* of deposit insurance on financial market development relative to *SoontoAdoptDI*, and not the total effect (Servaes, 1996; Allayannis and Weston, 2001).[23] All standard errors are heteroskedasticity- and autocorrelation-consistent, with three lags.

The results are reported in Panel A of Table 7.[24] We find that the coefficient estimate on *DI* is negative, economically large (being in the range 9 to 17% of GDP), and statistically significant in all cases (marginally, in the case of the combined financial intermediaries sector). As before, the results suggest that when law and order is weak there is an economically important decline in financial development. The evidence further indicates that, with the exception of the banking sector, the *SoontoAdoptDI* variable is insignificant. The significant and negative coefficient estimate on *SoontoAdoptDI* for the banking sector (-5.58, *t*-statistic = 3.45) lends some support to the idea that at least some countries adopt deposit insurance after their banking sector has been in decline. Although we find that the introduction of deposit insurance causes a significant increment in the rate of decline, this leaves open the possibility that our finding that banking sector development declines in the short run after the adoption of deposit insurance is not due solely to the adoption of deposit insurance, but could be due in part to the retardation that started prior to its adoption. This is consistent with the result in Table 5 that suggests that, for a law and order score equivalent to that for the average country, the banking sector is only retarded in the short run, while for that same level of law and order deposit insurance is associated with a positive long-term effect on banking sector development. The remaining results, however, do not give rise to the possibility that declining development prior to the adoption of deposit insurance leads to the post-adoption decline in development of the non-bank financial markets. Instead, they are consistent with the hypothesis that deposit insurance causes the retardation of these markets.

Our final approach to addressing potential endogeneity is to use a two-stage least squares (2SLS) regression model. We follow Demirgüç-Kunt and Detragiache (2002) and instrument deposit insurance with a variable found to positively influence the decision to adopt deposit insurance, but is not likely to affect financial development, except through the deposit insurance channel. Demirgüç-Kunt and Detragiache (2002) argue that countries contemplating the adoption of deposit insurance are likely to be influenced by their regional counterparts that already have deposit insurance, as explicit schemes are viewed as the "best practice." Therefore, we instrument *DI* with *%regadopt*, defined as the percent of countries in the same region as country *i* that have adopted deposit insurance in year *t*. While we expect that a country might mimic the decision of its neighbors in adopting deposit insurance, there is no obvious reason to expect that the adoption of deposit insurance by the neighbors directly affects the financial development of the country. That is, any effect of the neighbors having adopted deposit insurance on the country's financial market development is through the country itself adopting deposit insurance. As such, an instrument based on neighboring countries' adoption of deposit insurance satisfies the exclusion restriction.[25]

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[22] The necessary *and* sufficient conditions are that the coefficient estimate on *DI* is insignificant and that on *SoontoAdoptDI* is negative and statistically significant.

[23] Setting the *SoontoAdoptDI* dummy to 1 only in the years prior to the introduction of deposit insurance and comparing the coefficient estimates on the *SoontoAdoptDI* dummy and the *DI* dummy ($\hat{\beta}_2 - \hat{\beta}_1 = 0$) yields identical results.

[24] The tests reported in this subsection use the activity-based proxies for financial development. Tests based on financial market size produce inferences similar to those previously obtained and reported in Table 4.

[25] Using similar logic and a panel model approach as ours, Baltagi et al. (2009) instrument a country's trade openness with the neighboring countries' trade openness in a study of the effect of trade openness on financial development.

Table 7
Accounting for possible endogeneity.

	Banking sector	Equity market	Non-bank depositaries	Bank & non-bank intermediaries
Panel A: Forward-looking (soon-to-adopt-DI) variable				
Soon to adopt DI	−5.578**	−2.278	−1.036	0.925
	(−3.447)	(−0.583)	(−0.624)	(0.317)
DI dummy	−16.107**	−17.126*	−9.218**	−10.248
	(−5.171)	(−1.988)	(−2.688)	(−1.819)
DI × law & order	4.914**	3.917*	1.411*	1.789
	(5.979)	(2.071)	(1.966)	(1.390)
Law & order	0.499	−1.721	−0.385	2.677
	(0.848)	(−1.022)	(−0.564)	(1.872)
Creditor rights	2.383	2.578	1.207	−2.316*
	(1.922)	(1.179)	(1.160)	(−2.489)
Shareholder rights	1.028	0.739	−1.612	−3.489*
	(0.800)	(0.234)	(−1.370)	(−1.984)
Trade	0.035	0.055	−0.042	−0.138*
	(1.460)	(1.022)	(−1.302)	(−2.530)
Lagged_ln(GDP)	12.918**	−5.195	−15.433**	−0.715
	(4.198)	(−0.512)	(−3.069)	(−0.105)
GDP growth	−0.412**	0.320	−0.301**	−0.522**
	(−5.662)	(1.788)	(−3.753)	(−4.675)
Crisis	10.848**	1.229	0.708	5.949**
	(9.595)	(0.520)	(0.743)	(3.503)
Year dummy	Yes	Yes	Yes	Yes
R^2	0.365	0.349	0.108	0.304
N	2877	1735	852	844
Panel B: Two-stage least squares (2SLS) model				
Predicted DI dummy	−55.202**	−89.386	−51.613*	−102.957*
	(−4.660)	(−1.767)	(−2.315)	(−2.560)
Predicted (DI × law & order)	29.626**	57.592**	6.468*	22.850**
	(6.730)	(2.682)	(2.152)	(3.963)
Law & order	−6.216**	−28.502*	−2.442*	−5.354*
	(−3.957)	(−2.460)	(−2.154)	(−2.250)
Creditor rights	4.613**	6.468	1.451	−1.591
	(2.869)	(1.502)	(1.309)	(−0.953)
Shareholder rights	0.592	0.652	−2.550	−3.694
	(0.343)	(0.103)	(−1.412)	(−1.253)
Trade	−0.056	−0.290	−0.046	−0.167*
	(−0.886)	(−1.317)	(−1.061)	(−2.261)
Lagged_ln(GDP)	4.535	5.117	−19.569**	−12.511
	(0.798)	(0.291)	(−3.356)	(−1.316)
GDPgrowth	−0.229	0.750	−0.389**	−0.612**
	(−1.932)	(1.597)	(−2.863)	(−2.783)
Crisis	12.782**	14.267	−1.544	3.894
	(6.210)	(1.518)	(−0.609)	(0.887)
Year dummy	Yes	Yes	Yes	Yes
N	2877	1735	852	844

The dependent variables are activity-based proxies for banking sector development, equity market development, non-bank intermediaries development, and the combination of bank and non-bank financial intermediaries. The independent variables of interest are *DI*, a dummy variable = 1 if the country had deposit insurance in year *t* and 0 otherwise and law & order, an index of law and order tradition ranging from 0 (low) to 6 (high). Panel A reports the results of panel regressions of Eq. (3), with country and year fixed effects. *Soon-to-adopt-DI* is a dummy variable = 1 if in year *t* a country does not have deposit insurance but adopts the scheme in the next one, two, or three years. In the estimation below we also allow the variable to take the value of 1 in the years after the adoption of deposit insurance. *t*-Values with standard errors adjusted for heteroskedasticity and autocorrelation using three lags are in parenthesis. Panel B reports the results of a 2SLS model. Deposit insurance (*DI*) is instrumented in the first-stage regression with *%regadopt*, the percent of countries in the same region as country *i* that have adopted deposit insurance in year *t*, and the exogenous variables reported below. Data are for the sample of 134 countries, 62 (91) of which implemented (had) deposit insurance at some point during our sample period 1984–2011. To account for heteroskedasticity and autocorrelation, we use robust standard errors clustered at the country level. All variables are described in detail in Appendix B. *, ** indicate significance at the 5% and 1% levels, respectively.

One possible concern with the use of this instrument is that the adoption of deposit insurance by many countries over time may be driven by unobserved common factors that make its adoption more beneficial to all countries as time passes. In the absence of such common factors we also include time fixed effects in the first stage of the 2SLS model to account for this possibility (Demirgüç-Kunt and Detragiache, 2002). In the first stage we obtain the predicted *DI* and *DI × law* using the above instrument and the exogenous variables reported below. In all specifications in this and the next section *%regadopt* is positively and highly significantly related to *DI*. These results are available on request. These predicted variables substitute for *DI* in the second stage, the results of which are reported below. To account for

heteroskedasticity and autocorrelation, we use robust standard errors clustered by country.

The results using the activity-based proxy for financial development in Panel B of Table 7 are highly consistent with the previous results as there is an economically large decline in the development of financial markets after the adoption of deposit insurance and, as before, law and order generally moderates this effect.

3.5. Robustness tests

Since our most important result in this paper is the negative effect of the introduction of deposit insurance on the development of non-bank financial markets, in particular that of the equity

Table 8
Design of deposit insurance scheme and financial market activity.

	Banking sector	Equity market	Non-bank depositaries	Bank & non-bank intermediaries
Panel A: Credibility and generosity indices				
Credible	−1.576	−9.491	−1.190	−9.713
	(−0.457)	(−1.673)	(−0.485)	(−1.659)
Generous	6.414	−3.232	−11.829**	−12.480
	(1.521)	(−0.465)	(−4.327)	(−1.887)
Credible × law & order	−1.841*	0.503	−1.202	−2.175
	(−2.565)	(0.438)	(−1.958)	(−1.486)
Generous × law & order	−3.504**	2.693	4.292**	0.992
	(−3.208)	(1.537)	(5.847)	(0.560)
Law & order	25.308**	−6.452	−4.059*	18.178**
	(7.685)	(−1.172)	(−2.124)	(3.941)
Creditor rights	0.262	3.474**	1.954**	5.483**
	(0.693)	(6.791)	(5.721)	(6.481)
Shareholder rights	1.412*	−2.248*	−0.223	4.077*
	(2.162)	(−2.530)	(−0.347)	(2.574)
Trade	0.197**	0.179**	−0.004	0.027
	(12.542)	(8.664)	(−0.276)	(0.746)
Lagged_ln(GDP)	5.377**	14.902**	3.641**	7.249**
	(9.002)	(17.968)	(6.050)	(4.844)
GDP growth	−1.503**	−0.028	−0.314	−0.935*
	(−7.223)	(−0.102)	(−1.904)	(−2.293)
Crisis	7.436**	−2.015	0.018	1.255
	(3.121)	(−0.689)	(0.010)	(0.271)
Lambda	−19.654**	0.800	−2.228	−18.253**
	(−9.356)	(0.297)	(−1.271)	(−4.227)
Constant	−148.069**	−353.386**	−68.970**	−155.874**
	(−7.006)	(−10.575)	(−3.721)	(−3.419)
N	2893	2682	2032	2032

	Coinsurance	Coverage	Interbank	For currency	Admin	Backstop	Permanent	Risk-adjust
Panel B: Impact of individual design features on financial activity (size) of various financial markets								
Banking sector activity								
Variable	−99.233	−8.810	24.475**	−16.880**	−0.212	0.518	10.791	8.335
	(−0.951)	(−0.452)	(5.138)	(−3.726)	(−0.027)	(0.106)	(0.968)	(1.891)
Interaction	19.397	3.888	−6.389**	2.286*	1.365	−1.723	−5.676**	−4.927**
	(0.930)	(0.824)	(−6.008)	(2.203)	(0.881)	(−1.584)	(−2.695)	(−4.963)
Lambda	−12.974**	−13.353**	−11.700**	−15.043**	−12.739**	−16.157**	−14.823**	−12.550**
	(−6.008)	(−6.308)	(−5.599)	(−6.996)	(−6.049)	(−7.293)	(−7.185)	(−6.179)
No. of obs.	2893	2893	2893	2893	2893	2893	2893	2893
Equity market activity								
Variable	−8.676	13.624	18.167**	−10.330	18.391	23.495**	−47.512**	−25.628**
	(−0.034)	(0.465)	(2.617)	(−1.514)	(1.732)	(3.261)	(−3.249)	(−3.832)
Interaction	0.906	−5.065	−1.117	1.105	−3.711	−8.445**	8.849**	5.956**
	(0.017)	(−0.734)	(−0.744)	(0.733)	(−1.806)	(−5.418)	(3.202)	(4.077)
Lambda	3.284	3.642	1.200	2.034	3.998	−2.716	4.288	3.254
	(1.234)	(1.373)	(0.455)	(0.754)	(1.499)	(−1.013)	(1.621)	(1.242)
No. of obs.	2682	2682	2682	2682	2682	2682	2682	2682
Non-bank depositaries activity								
Variable	27.414	−3.150	6.144	−18.093**	−1.099	−16.927**	8.928	−2.988
	(0.542)	(−0.309)	(1.767)	(−5.584)	(−0.239)	(−5.029)	(1.057)	(−0.922)
Interaction	−10.467	−0.304	0.207	5.186**	−2.283*	6.735**	−6.985**	−0.235
	(−1.029)	(−0.089)	(0.262)	(6.309)	(−2.199)	(7.580)	(−3.325)	(−0.291)
Lambda	−2.251	1.364	−0.024	1.761	−0.727	3.180*	−1.897	−0.176
	(−1.287)	(0.791)	(−0.014)	(1.035)	(−0.430)	(1.970)	(−1.103)	(−0.099)
No. of obs.	2032	2032	2032	2032	2032	2032	2032	2032
Bank & non-bank intermediaries activity								
Variable	−74.307	−6.607	21.484*	−17.052*	2.085	−9.789	0.486	3.082
	(−0.558)	(−0.256)	(2.422)	(−2.029)	(0.178)	(−1.062)	(0.022)	(0.428)
Interaction	8.941	−2.480	−7.138**	0.648	−6.991**	4.088	−6.263	−9.856**
	(0.334)	(−0.287)	(−3.539)	(0.304)	(−2.653)	(1.683)	(−1.127)	(−5.513)
Lambda	−6.455	−2.571	−0.309	−7.473	−8.056	−1.649	−6.340	−15.582**
	(−1.402)	(−0.588)	(−0.071)	(−1.690)	(−1.873)	(−0.375)	(−1.390)	(−3.858)
No. of obs.	2032	2032	2032	2032	2032	2032	2032	2032
Overall market size								
Variable	−33.703	48.529	124.866**	−58.834*	55.238	8.174	90.274	28.818
	(−0.058)	(0.486)	(5.078)	(−2.359)	(1.935)	(0.295)	(1.630)	(1.426)
Interaction	−18.542	−34.284	−31.584**	7.302	−28.280**	4.196	−44.753**	−28.324**
	(−0.157)	(−1.280)	(−5.776)	(1.189)	(−4.209)	(0.582)	(−3.071)	(−5.610)
Lambda	4.140	13.103	14.178	−0.281	−3.072	13.911	4.607	−21.642*
	(0.374)	(1.175)	(1.321)	(−0.024)	(−0.283)	(1.225)	(0.420)	(−2.098)
No. of obs.	1925	1925	1925	1925	1925	1925	1925	1925

The dependent variables in these models are activity-based proxies for financial development for various financial markets previously described. Panel A reports the second-step results of a pooled Heckman two-step model for the countries that had a deposit insurance scheme. Credible (*cred*) is the score on an index ranging from 0 to 5 measuring how credible the scheme is perceived to be by depositors of country *i*. Generous (*gen*) is the score on an index ranging from 0 to 4 measuring how generous the scheme is perceived to be by depositors of country *i*. Panel B reports the individual credibility and generosity features as independent variables in the second-step results of a pooled Heckman two-step model. See Appendix B for a detailed description of the variables. The data cover the period 1984–2011. *, ** indicate significance at the 5% and 1% levels, respectively.

market, we provide additional evidence on the effect of deposit insurance on equity market development using stock market turnover as an alternative proxy for stock market development. In untabulated tests we find that the introduction of deposit insurance leads to economically large and statistically significant decline in stock market turnover. This is consistent with the view that deposit insurance can also reduce participation in stock markets.

We also use an alternate proxy for banking sector activity-domestic credit provided to the private sector (as a% of GDP) by a larger set of credit intermediaries other than deposit money banks. We find qualitatively similar results (not tabulated) as our previous results.

We also examine if the negative effect of deposit insurance is restricted to low-income countries. Given that per capita income and institutional development are highly correlated, perhaps the legal framework in low-income countries is not sufficiently evolved to effectively stem the moral hazard that usually accompanies the introduction of deposit insurance. We exclude countries in the highest per capita income bracket from the sample (see Appendix A) and re-estimate Eq. (1) for the activity-based proxy of financial development.[26] The (untabulated) results indicate that there is a significant decline in the development of non-bank depositaries and the joint financial intermediaries sector and that it would require the highest level of law and order to neutralize this effect. However, there is no significant change in banking sector or equity market development after the introduction of deposit insurance. We would expect that there is substantially greater variation in financial market development among low-income countries relative to high-income countries, which could make the latter result a statistical issue – not an economic one – especially as the coefficient estimate on banking sector development is economically meaningful and has the expected negative sign. When we exclude low-income countries the results are qualitatively similar to the earlier full-sample results. The same holds when we assess the relation between deposit insurance and financial market size. Collectively, these results suggest that the impact of deposit insurance on financial market development is somewhat sensitive to the stage of economic development of the implementing country. However, it is interesting to note that the effect of deposit insurance on financial development is not a phenomenon found solely in low-income countries.

3.6. Effect of design features of deposit insurance

The use of the *DI* dummy variable in the previous analyses assumes that all deposit insurance schemes have the same effect on financial market development. However, previous research finds that the effect of deposit insurance on various aspects of the banking sector is influenced by the design of the scheme (Demirgüç-Kunt and Detragiache, 2002; Barth et al., 2004; Cull et al., 2005). Hence, we examine if and how the design of the scheme is associated with non-bank financial market development. In particular, we wish to examine if the negative association between non-bank development and deposit insurance is the result of specific scheme design features that provide banks and their depositors with some benefits that place non-bank financial markets at a disadvantage.

It is important to note that the scheme's design is fixed at the point of implementation and typically does not change thereafter. An empirical implication of this is that we cannot use a fixed

effects panel model to examine the effect of the scheme's design. Also, since we are examining only those countries that adopted deposit insurance, self-selection bias could overstate the significance of the impact of the scheme's design. Given the above, we estimate a pooled Heckman two-step model. In the first step, we use the instrument *%regadopt* and other exogenous variables to obtain the probability of adopting deposit insurance. In the second step we estimate:

$$FinDev_i = \beta_1 cred_i + \beta_2 gen_i + \beta_3 law_i + \beta_4 (cred \times law)_i$$
$$+ \beta_5 (gen \times law)_i + \sum_{p=6}^{p=11} \beta_p control_{p_i} + \varepsilon_i, \qquad (4)$$

where *cred* and *gen* are the credibility and generosity indices of the scheme for country *i* and the control variables include the inverse Mills ratio from the first step.

The results, using the activity-based proxies for financial development, from the second step of the Heckman model (Eq. (4)) are reported in Panel A of Table 8.[27] The evidence indicates that, for a given level of law and order, banking sector development is negatively associated with both the generosity and credibility indices. For the generosity index, this is not surprising as overly generous schemes induce less depositor monitoring and greater moral hazard in the banking sector. It also appears that features that are usually regarded as aiding credibility are also associated with lower financial development in the presence of the rule of law (see below). In general, credibility and generosity are negatively and marginally significantly related to non-bank financial development.

Concerns may be raised about whether deposit insurance schemes should cover interbank deposits, because even though this is considered a generosity feature its inclusion questions the credibility of the scheme. That is, Gropp and Vesala (2004) suggest that schemes should be judicious in their coverage because, as they show theoretically and empirically, deposit insurance reduces moral hazard when it credibly omits non-deposit creditors from coverage. Further, Imai (2006) find that reforms in Japan that limited coverage of time deposits increased depositor discipline on insured banks. Bearing this in mind we exclude the countries that covered interbank transactions from our sample and re-estimate the models based on Eq. (4). The untabulated results strengthen the above inferences in that, while more credible schemes are not significantly associated with banking sector development, credibility is significantly and negatively associated with non-bank financial development, although this is tempered by the rule of law. The evidence also indicates that, given the rule of law, generosity is negatively (marginally) associated with banking sector development. Notwithstanding, more generous schemes are also associated with lower non-bank development.

It should be noted that the inverse Mills ratio is statistically significant in some cases, indicating the presence of self-selection bias. That the coefficient estimate on the inverse Mills ratio is negative suggests that there are unobserved factors that induce countries to adopt deposit insurance and which also cause a decline in financial market development. The negative coefficient estimate also indicates that without accounting for self-selection the association between the scheme's design features and financial market activity would be understated.

In Panel B, we examine the association between individual features of deposit insurance schemes and the development of the banking sector as well as that of the non-bank financial markets.

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[26] Proceeding in this way allows us clearer insights into the issue because we do not make the assumption that the intercept or the effect of the control variables is the same for each group. Although this potentially lowers the power of the test compared to estimating a single model with a dummy variable for one of the groups, because we exclude only one of four income groups the reduction in sample size in these models is not likely to have a major effect.

[27] In the Heckman models, the number of observations is the number used in the first step. By default, the Heckman model includes observations in the first step that are missing data on the second-step dependent variable (financial development) if they will not be used in the second stage (e.g., when *DI* = 0). Hence, the number of observations in the Heckman model differs from those in the panel models.

The design feature of interest is listed at the top of each column and "variable" and "interaction" refer to the design feature at the top of the column and its interaction with law and order, respectively. The models are estimated with the full set of controls (not tabulated) as in previous panel models. We report results for activity-based proxies for financial development of banks, equities, non-bank depositaries, and the financial intermediaries sector and for the overall market size.

The evidence indicates that the generosity features coinsurance and coverage are not significantly correlated with financial development. On the other hand, coverage of interbank deposits is positively correlated with the development of all markets (with the exception of the non-bank depositaries where it is insignificant), in the absence of law and order. Similarly, foreign currency coverage is associated with lower development for all markets (with the exception of the equity market, where it is insignificant), in the absence of law and order. Law and order generally reduces the magnitude of the (positive or negative) association between these features and financial development.

In interpreting the results for the credibility features (below) it should be borne in mind that Cull et al. (2005) note that the mechanism by which these features affect financial development is less clear relative to the generosity features.[28] Further, Cull et al. (2002), in their theoretical exposition on the potential negative effect of deposit insurance on financial development, show that when banks have access to a large investment set of risky financial assets risk-adjusted premium is insufficient to stop banks from choosing a risk level that is higher than the overall bank-value maximizing risk level for a given proportion of bank capital. This is made worse by the fact that in many countries deposit insurance is obtained at less than the fair price (Laeven, 2002). Cull et al. (2005) find empirical evidence of a negative association between risk-adjusted premium and financial development. Specifically, they find some evidence consistent with the view that risk-adjusted premium can retard development and argue that law and order has limited ability to change that.[29]

We find that several credibility attributes have a different relation with banking sector development relative to that with non-bank financial market development. For instance, while government backstop is not significantly associated with banking sector development regardless of the level of law and order, it has a positive and significant equity market development and is negatively related to non-bank depositaries development, in the absence of law and order. Consistent with the results of Cull et al. (2005), the evidence further indicates that for a given level of law and order permanent funding and risk-adjusted premiums are negatively related to the development of the banking sector. The results for the non-bank financial markets are highly similar, although in the case of the equity market law and order has a moderating effect.

Overall, these results suggest that the design of deposit insurance schemes has important implications for the development of both the banking sector and non-bank financial markets. While the general evidence that the introduction of deposit insurance retards both banks and non-bank financial markets, especially when the rule of law is weak, suggests that these financial markets are complements, the evidence from the design features is less clear. This is because some design features have a similar impact on banking sector development and non-bank financial market development (generosity features), but others have the opposite impact (credibility features). Hence, any country that is contemplating implementing a deposit insurance scheme should be cognizant of the potential impact of individual features on the development of their markets.

4. Discussion and conclusions

Previous research raises the concern that deposit insurance retards banking sector development. Given the close developmental link between the banking sector and non-bank financial markets, the introduction of deposit insurance might retard not only the banking sector, but also the non-bank financial markets and, hence, the overall financial market. However, the answer to this question cannot be inferred from extant studies based only on the cross-sectional evidence from the banking sector. This is because the inference depends on whether non-bank financial markets are substitutes for or complements to the banking sector and theory has contradicting views and there is an ongoing debate on the matter.

Using a panel of 134 countries over 28 years, during which 62 of the countries introduced deposit insurance, we examine the effect of the introduction of deposit insurance on the development of the banking sector and non-bank financial markets. The general finding from a number of proxies for financial market development and several identification strategies is that, when law and order is weak, deposit insurance retards the development of the banking sector, the non-bank depositaries sector, the equity market, and the combined bank and non-bank financial intermediaries sector. Interestingly, the negative effect of deposit insurance on financial development is greater in the long run even when there is a strong law and order tradition, with the exception of the banking sector whose development is positively impacted by deposit insurance in the long run in countries with strong rule of law. Finally, we also find evidence that the effect of deposit insurance on non-bank financial markets is related to design features of the scheme in that some features that benefit the banking sector and bank depositors retard financial market development, while others aid their development.

So what should policymakers do? Should they advocate for the adoption of deposit insurance despite the result that, under some circumstance, it has a negative effect on financial market development? Our results do not imply that policymakers should abandon existing deposit insurance schemes or even refrain from implementing them if that is being contemplated. Our results suggest that the ultimate impact of deposit insurance on financial market development depends largely on the country's law and order tradition as well as on the specific design features of the scheme. Furthermore, it is important to consider the impact on the financial market as a whole, and not solely on the banking sector, as the potential negative effects are more persistent for the equity market than they are for the banking sector.

As noted previously, we are not advocating that our results imply that deposit insurance is not effective in meeting the specific objective for which it was implemented – preventing bank runs. Moreover, temporary schemes, such as those announced by Australia and New Zealand in response to the recent crisis, with specific short-term lifespan might be very useful in the presence of crises.

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[28] They view credibility features as "entry hurdles" to deposit insurance schemes and point out, for instance, that risk-adjusted premium may prevent some banks from opting into the insurance scheme if their asset portfolio is too risky. They further note that once the bank pays the risk-adjusted premium there is no incentive to subsequently reduce the risk of its portfolio (the time-inconsistency problem). We argue that it is even possible that higher (risk-adjusted) premiums could lead banks to increase risk in order to recover the cost of the premium.

[29] Note that Cull et al. (2005) invert their entry hurdle index to be consistent with the generosity index whereby an increase represents a 'bad' thing and so there should be a positive association between it and the volatility measure used as their dependent variable and a negative coefficient estimate on the interaction between the entry hurdle and law and order. For the relatively few cases where they find significant coefficient estimates the signs are opposite to expectations.

We leave it for future research to analyze the financial development impact of those short-term schemes. For the long term, the solution seems to lie primarily in the regulatory environment. Countries should be cautious in implementing this policy when the legal and contracting environment is weak. Finally, the scheme's design can provide some scope to moderate the potential negative effect of deposit insurance on financial market development.

Appendix A. List of countries in the sample

The appendix provides information on the sample period, date of introduction of deposit insurance, average law & order score, and income group of the countries in our sample. There are 134 countries, 62 (91) of which implemented (had) deposit insurance at some point during our sample period 1984–2011.

Country	Beginning	End	DI	DI introduced	Law & order	Income group
Albania	1995	2011	1	2002	2.68	Upper middle income
Algeria	1984	2011	1	1997	2.46	Upper middle income
Angola	1996	2011	0		2.84	Lower middle income
Argentina	1984	2011	1	1995	3.32	Upper middle income
Armenia	1999	2011	1	2005	3.00	Lower middle income
Australia	1984	2011	1	2008	5.88	High income
Austria	1984	2011	1	1979	6.00	High income
Azerbaijan	1999	2011	1	2007	3.73	Upper middle income
Bahamas, The	1985	2011	1	1999	4.15	High income
Bahrain	1985	2010	1	1993	4.73	High income
Bangladesh	1994	2011	1	1984	2.36	Low income
Belarus	1999	2011	1	1996	4.00	Upper middle income
Belgium	1984	2011	1	1974	5.50	High income
Bolivia	1984	2011	0		2.23	Lower middle income
Botswana	1985	2011	0		4.30	Upper middle income
Brazil	1984	2011	1	1995	2.84	Upper middle income
Brunei Darussalam	2001	2011	1	2011	5.36	High income
Bulgaria	1992	2011	1	1999	3.85	Upper middle income
Burkina Faso	1986	2011	0		3.48	Low income
Cameroon	1984	2011	1	2011	2.48	Lower middle income
Canada	1984	2011	1	1967	5.95	High income
Chile	2010	2011	1	1986	4.50	Upper middle income
China	1987	2011	0		4.18	Upper middle income
Colombia	1984	2011	1	1985	1.38	Upper middle income
Congo, Dem. Rep.	1992	2008	0		0.91	Low income
Congo, Rep.	1991	2011	1	2011	2.05	Lower middle income
Costa Rica	1984	2011	0		3.91	Upper middle income
Croatia	1999	2011	1	1997	4.85	High income
Cyprus	1985	2011	1	2000	4.37	High income
Czech Republic	1994	2011	1	1994	5.17	High income
Côte d'Ivoire	1984	2011	0		3.02	Lower middle income
Denmark	1984	2011	1	1987	6.00	High income
Dominican Republic	1984	2011	0		2.96	Upper middle income
Ecuador	1984	2011	1	1998	3.41	Upper middle income
Egypt, Arab Rep.	1984	2011	0		3.29	Lower middle income
El Salvador	1984	2011	1	1999	2.05	Lower middle income
Estonia	1999	2011	1	1998	4.00	High income
Ethiopia	1985	2008	0		3.79	Low income
Finland	1984	2011	1	1969	6.00	High income
France	1984	2011	1	1980	5.11	High income
Gabon	1984	2011	1	2011	2.75	Upper middle income
Gambia, The	1986	2011	0		4.00	Low income
Germany	1992	2011	1	1998	5.30	High income
Ghana	1984	2011	0		2.27	Lower middle income
Greece	1984	2011	1	1995	4.04	High income
Guatemala	1984	2011	1	1999	1.66	Lower middle income
Guinea	2005	2011	0		2.50	Low income
Guinea-Bissau	1991	2011	0		1.67	Low income
Guyana	1995	2005	0		3.32	Lower middle income
Haiti	1999	2011	0		1.85	Low income
Honduras	1984	2011	1	1999	1.95	Lower middle income

Appendix A (*continued*)

Country	Beginning	End	DI	DI introduced	Law & order	Income group
Hong Kong (China)	1989	2011	1	2004	4.85	High income
Hungary	1992	2011	1	1993	4.60	High income
Iceland	1984	2011	1	1985	6.00	High income
India	1984	2011	1	1961	3.36	Lower middle income
Indonesia	1984	2011	1	2004	2.75	Lower middle income
Iran, Islamic Rep.	1984	2007	0		3.57	Upper middle income
Iraq	2008	2010	0		1.50	Lower middle income
Ireland	1984	2011	1	1989	5.36	High income
Israel	1984	2011	0		4.14	High income
Italy	1984	2011	1	1987	4.80	High income
Japan	1984	2011	1	1971	5.25	High income
Jordan	1984	2011	1	2000	3.54	Upper middle income
Kazakhstan	1999	2011	1	1999	3.96	Upper middle income
Kenya	1984	2011	1	1988	2.84	Low income
Korea, Rep.	1984	2011	1	1996	4.00	High income
Kuwait	1993	2011	0		5.00	High income
Latvia	1999	2011	1	1998	5.00	Upper middle income
Lebanon	2009	2011	1	1967	4.00	Upper middle income
Liberia	2002	2011	0		2.30	Low income
Libya	2002	2009	1	2010	4.00	Upper middle income
Lithuania	2006	2011	1	1996	4.00	Upper middle income
Luxembourg	1985	2011	1	1989	6.00	High income
Madagascar	1985	2011	0		2.96	Low income
Malawi	1984	2011	0		2.84	Low income
Malaysia	1984	2011	1	2005	3.96	Upper middle income
Mali	1988	2011	0		2.79	Low income
Malta	1987	2011	1	2003	4.60	High income
Mexico	1984	2011	1	1986	2.77	Upper middle income
Moldova	1999	2011	1	2004	4.88	Lower middle income
Mongolia	1992	2011	1	2013	3.90	Lower middle income
Morocco	1984	2011	1	1996	4.32	Lower middle income
Mozambique	1993	2011	0		2.79	Low income
Namibia	2002	2011	0		5.20	Upper middle income
Netherlands	1984	2011	1	1978	6.00	High income
New Zealand	1984	2010	0		5.89	High income
Nicaragua	2000	2011	1	2001	3.92	Lower middle income
Niger	1986	2011	0		2.38	Low income
Nigeria	1984	2011	1	1988	1.98	Lower middle income
Norway	1984	2011	1	1961	6.00	High income
Oman	2002	2011	1	1995	5.00	High income
Pakistan	1984	2011	0		2.61	Lower middle income
Panama	1984	2011	0		2.64	Upper middle income
Papua New Guinea	1985	2004	0		3.05	Lower middle income
Paraguay	1991	2011	1	2003	2.81	Lower middle income
Peru	1984	2011	1	1991	2.36	Upper middle income
Philippines	1984	2011	1	1963	2.27	Lower middle income
Poland	1991	2011	1	1995	4.64	High income
Portugal	1984	2011	1	1992	5.11	High income
Qatar	2003	2011	0		5.00	High income
Romania	1991	2011	1	1996	4.14	Upper middle income
Russian Federation	1993	2011	1	2003	3.68	Upper middle income
Saudi Arabia	1984	2011	0		4.61	High income
Senegal	1984	2011	0		2.57	Lower middle income
Serbia	2006	2011	1	1989	3.50	Upper middle income
Sierra Leone	2007	2011	0		3.50	Low income
Singapore	1984	2011	1	2006	5.25	High income
Slovak Republic	1994	2011	1	1996	4.50	High income
Slovenia	1999	2011	1	2001	4.62	High income
South Africa	1984	2011	0		2.43	Upper middle income
Spain	1984	2011	1	1977	4.75	High income
Sri Lanka	1984	2011	1	2012	2.18	Lower middle income

Appendix A (*continued*)

Country	Beginning	End	DI	DI introduced	Law & order	Income group
Sudan	1984	2010	1	1996	2.17	Lower middle income
Suriname	1986	2005	0		2.15	Upper middle income
Sweden	1984	2011	1	1996	6.00	High income
Switzerland	1984	2011	1	1984	5.61	High income
Syrian Arab Republic	1984	2007	0		3.75	Lower middle income
Tanzania	1990	2011	1	1994	4.73	Low income
Thailand	1984	2011	1	2008	3.70	Upper middle income
Togo	1984	2011	0		2.61	Low income
Trinidad & Tobago	1984	2011	1	1986	3.45	High income
Tunisia	1988	2011	0		4.33	Upper middle income
Turkey	1984	2011	1	1983	3.77	Upper middle income
Uganda	1984	2011	1	1994	2.88	Low income
Ukraine	1999	2011	1	1998	4.00	Lower middle income
United Arab Emirates	2008	2011	0		4.00	High income
United Kingdom	1989	2011	1	1982	5.63	High income
United States	1984	2011	1	1933	5.64	High income
Uruguay	1984	2011	1	2002	2.80	Upper middle income
Venezuela, RB	2009	2011	1	1985	1.00	Upper middle income
Vietnam	1996	2011	1	2000	4.31	Lower middle income
Yemen, Rep.	1998	2006	1	2008	2.17	Lower middle income
Zambia	1986	2011	0		3.35	Lower middle income
Zimbabwe	1984	2007	1	2003	2.52	Low income

Appendix B. Data, definitions, and sources

Variable	Definition	Source
Banking sector activity	PRIVATE CREDIT BY DEPOSIT MONEY BANKS to GDP (%): private credit by deposit money banks to GDP, calculated using the following deflation method: $\{(0.5)*[F_t/P\_e_t + F_{t-1}/P\_e_{t-1}]\}/[GDP_t/P\_a_t]$ where F is credit to the private sector, P_e is end-of period CPI, and P_a is average annual CPI	Financial Development and Structure Dataset by Beck et al. (2013)
Non-bank depositaries activity	Bank & Non-bank Depositaries Activity *minus* Bank Activity. Set to missing if 0	Authors' calculations
Bank & non-bank financial intermediaries activity	PRIVATE CREDIT BY DEPOSIT MONEY BANKS AND OTHER FINANCIAL INSTITUTIONS to GDP (%): private credit by deposit money banks and other financial institutions to GDP, calculated using the following deflation method: $\{(0.5)*[F_t/P\_e_t + F_{t-1}/P\_e_{t-1}]\}/[GDP_t/P\_a_t]$ where F is credit to the private sector, P_e is end-of period CPI, and P_a is average annual CPI	Financial Development and Structure Dataset by Beck et al. (2013)
Domestic credit to private sector	Domestic credit to private sector refers to financial resources provided to the private sector by financial corporations, such as through loans, purchases of non-equity securities, and trade credits and other accounts receivable, that establish a claim for repayment. For some countries these claims include credit to public enterprises. The financial corporations include monetary authorities and deposit money banks, as well as other financial corporations where data are available (including corporations that do not accept transferable deposits but do incur such liabilities as time and savings deposits). Examples of other financial corporations are finance and leasing companies, money lenders, insurance corporations, pension funds, and foreign exchange companies	World Bank Item FS.AST.PRVT.GD.ZS
Market activity	STOCK MARKET TOTAL VALUE TRADED to GDP (%): total shares traded on the stock market exchange to GDP. Available starting in 1989	Financial Development and Structure Dataset by Beck et al. (2013)

Appendix B (*continued*)

Variable	Definition	Source
Bank size	DEPOSIT MONEY BANK ASSETS to GDP (%): claims on domestic real nonfinancial sector by deposit money banks as a share of GDP, calculated using the following deflation method: {(0.5)∗[Ft/P_et + Ft-1/P_et-1]}/[GDPt/P_at] where F is deposit money bank	Financial Development and Structure Dataset by Beck et al. (2013)
Market size	STOCK MARKET CAPITALIZATION to GDP (%): value of listed shares to GDP, calculated using the following deflation method: {(0.5)∗[Ft/P_et + Ft-1/P_et-1]}/[GDPt/P_at] where F is stock market capitalization, P_e is end-of period CPI, and P_a is average annual CPI. Available starting in 1989	Financial Development and Structure Dataset by Beck et al. (2013)
Stock market turnover	RATIO OF THE VALUE OF TOTAL SHARES TRADED TO AVERAGE REAL MARKET CAPITALIZATION. The denominator is deflated using the following method: Tt/P_at/{(0.5)∗[Mt/P_et + Mt-1/P_et-1] where T is total value traded, M is stock market capitalization, P_e is end-of period CPI P_a is average annual CPI	Financial Development and Structure Dataset by Beck et al. (2013)
Non-bank depositaries size	OTHER FINANCIAL INSTITUTIONS ASSETS to GDP (%): claims on domestic real nonfinancial sector by other financial institutions as a share of GDP, calculated using the following deflation method: {(0.5)∗[Ft/P_et + Ft-1/P_et-1]}/[GDPt/P_at] where F is other financial institutions' claims, P_e is end-of period CPI, and P_a is average annual CPI	Financial Development and Structure Dataset by Beck et al. (2013)
Type of scheme	(1 = explicit, 0 = implicit)	Demirgüç-Kunt et al. (2014)
Year enacted	Start year of deposit insurance scheme	Demirgüç-Kunt et al. (2014)
Foreign currency deposit insured	(1 = yes, 0 = no)	Demirgüç-Kunt et al. (2014)
Interbank deposits insured	(1 = yes, 0 = no)	Demirgüç-Kunt et al. (2014)
Coinsurance	(1 = yes, 0 = no)	Demirgüç-Kunt et al. (2014)
Permanent fund	(1 = funded, 0 = unfunded)	Demirgüç-Kunt et al. (2014)
Risk-adjusted premiums	(1 = yes, 0 = no)	Demirgüç-Kunt et al. (2014)
Government Backstop	(1 = yes, 0 = no)	Demirgüç-Kunt et al. (2014)
Administration	(1 = joint or private, 0 = official)	Demirgüç-Kunt et al. (2014)
Membership	(1 = compulsory, 0 = voluntary)	Demirgüç-Kunt et al. (2014)
Coverage to deposits ratio	(1 if coverage ratio > 1, 0 if coverage ratio < 1	Demirgüç-Kunt et al. (2014)
cred	This is a sum of the design features that contribute to the credibility of the scheme – (a) it is permanently funded because depositors may feel more confident if they know that funds are permanently earmarked to refund their deposits in the event of a crisis; (b) banks are required to pay risk-adjusted premiums to the deposit insurance agency given that risk-adjusted premiums may curb bank risk-taking activities; (c) there exists a government backstop, as depositors may feel more confident about a scheme backed by governments as they can more easily raise "unlimited funds" in the event of a crisis; (d) the scheme is privately administered because privately administered schemes should be less subject to political influences and may be perceived by depositors as less prone to corruption; and (e) membership is compulsory, since if all banks are forced to insure their deposits then it reduces depositors search cost for an insured bank. A scheme with more of these design features, a maximum of 5, would be perceived as being more credible	Authors' calculations
gen	This is the sum of the features of the scheme that contribute to its generosity based on the following design features – (a) foreign currency deposits are insured; (b) inter-bank deposits are insured; (c) no co-insurance is required by depositors; and (d) the amount of coverage provided per average deposit is greater than 50%. A scheme with more of these features, a maximum of 4, would be regarded as being more generous	Authors' calculations
GDP growth (annual %)	Annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 2005 U.S. dollars. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any	World Development Indicators Code: NY.GDP.MKTP.KD.ZG

Appendix B (*continued*)

Variable	Definition	Source
	subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources	
Income group	High, Upper Middle, Lower Middle, and Low Income	World Bank through Demirgüç-Kunt et al. (2014)
Region	Geographic Region of Country	IMF through Demirgüç-Kunt et al. (2014)
%regadopt	Percent of countries in the same region that had an explicit scheme in year *t*. Regions are based in IMF region data	Authors' calculations
Log GDP	Log of GDP (constant 2005 US$): GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in constant 2005 U.S. dollars. Dollar figures for GDP are converted from domestic currencies using 2000 official exchange rates. For a few countries where the official exchange rate does not reflect the rate effectively applied to actual foreign exchange transactions, an alternative conversion factor is used	World Development Indicators Database Code: NY.GDP.MKTP.KD
Trade (% of GDP)	Trade is the sum of exports and imports of goods and services measured as a share of gross domestic product.	World Development Indicators Database Code: NE.TRD.GNFS.ZS
Investor protection index (shareholder rights)	The strength of investor protection index is the average of the extent of disclosure index, the extent of director liability index and the ease of shareholder suits index. The index ranges from 0 to 10, with higher values indicating better investor protection. It is available from 2004 to 2014. In the event that several cities are covered within a given country, we use data for the city with the longest history of reported data. Since the rate of change in these legal variables is extremely low, we backfill missing country-years with the first available data. Details about the components that make up the index can be found here: http://www.doingbusiness.org/Methodology/protecting-minority-investors	Doing Business Survey – World Bank Database
Legal rights index (creditor rights)	This index, reflecting the legal rights of borrowers and lenders, measures the degree to which collateral and bankruptcy laws facilitate lending. It is based on data collected through study of collateral and insolvency laws, supported by the responses to the survey on secured transactions laws. The index includes 3 aspects related to legal rights in bankruptcy and 7 aspects found in collateral law. The index ranges from 0 to 10, with higher scores indicating that collateral and bankruptcy laws are better designed to expand access to credit. In the event that several cities are covered within a given country, we use data for the city with the longest history of reported data. Since the rate of change in these legal variables is extremely low, we backfill missing country-years with the first available data The initial methodology is developed in Djankov et al. (2007), and the World Bank has adopted it with minor changes. Details about the index can be found here[30]: http://www.doing-business.org/Methodology/getting-credit#legalRights	Doing Business Survey – World Bank Database
Law and order	This measure is also referred to as "rule of law." It measures the law and order tradition of a country. "Law" measures the strength and impartiality of the legal system and "Order" is an assessment of popular observance of the law. It ranges from 6, strong law and order tradition, to 0, weak law and order tradition	PRS Group International Country Risk Guide (ICRG)
Bureaucratic quality	This is a measure of the institutional strength and quality of a country's bureaucracy. It ranges from 6, highest quality, to 0, poor quality bureaucracy. A high value implies that the bureaucracy is partly autonomous from political pressure, has the strength and	PRS Group International Country Risk Guide (ICRG)

Appendix B (*continued*)

Variable	Definition	Source
	expertise to govern without drastic policy changes or interruptions in government services, and have an established mechanism for recruitment and training	
Crisis	A dummy variable = 1 for country *i*, if the country experienced a systemic banking or a borderline banking crisis in year *t*, and = 0 otherwise. We assume that all countries in the DI database would have been considered by Laeven and Valencia (2012) and so a country's absence from the database is assumed to mean no crisis occurred in the country.	Laeven and Valencia (2012)

[30]Starting in 2015, this index changed to include 12 components.

Appendix C. Table C1 Bureaucratic quality and the effect of deposit insurance

This table reports the results of a panel regression of Eq. (1), with country fixed effects, for the sample of 134 countries, 62 (91) of which implemented (had) deposit insurance at some point during our sample period 1984–2011. The dependent variables are measures of banking sector activity (Panel A) and banking sector size (Panel B), as defined in Tables 3 and 4 above. DI is a dummy variable = 1 if the country had deposit insurance in year *t* and 0 otherwise and bureaucratic quality = an index of bureaucratic quality ranging from 0 (poor) to 6 (high). The control variables for country *i* for year *t* are: creditor rights = an index measuring the rights of creditors ranging from 0 (low protection) to 10 (high protection), shareholder rights = an index measuring the rights of shareholders ranging from 0 (low protection) to 10 (high protection), GDP growth = annual GDP growth; lagged_ln(GDP) = log of GDP for year *t* − 1; trade = (exports + imports)/GDP; crisis is a dummy variable = 1 if the country experienced a systemic banking crisis in year *t* and = 0 otherwise. *T*-values with standard errors adjusted for heteroskedasticity and autocorrelation using three lags are in parenthesis. *, ** indicate significance at the 5% and 1% levels, respectively.

Panel A: Banking sector activity

	Banking sector	Equity market	Non-bank depositaries	Bank & non-bank intermediaries
DI dummy	−11.317**	−13.579*	−11.384**	−9.116
	(−4.091)	(−2.017)	(−2.801)	(−1.460)
DI × bureaucratic quality	4.463**	4.864	2.709*	2.358
	(3.606)	(1.916)	(2.102)	(1.072)
Bureaucratic quality	0.577	−5.564*	−2.111	−1.857
	(0.766)	(−2.243)	(−1.487)	(−0.816)
Creditor rights	2.440	2.793	1.494	−1.364
	(1.906)	(1.296)	(1.465)	(−1.516)
Shareholder rights	0.953	0.785	−1.470	−2.851
	(0.698)	(0.254)	(−1.237)	(−1.536)
Trade	0.016	0.049	−0.041	−0.131*
	(0.673)	(0.909)	(−1.248)	(−2.184)
Lagged_ln(GDP)	15.516**	−1.652	−15.549**	4.461
	(4.790)	(−0.168)	(−3.009)	(0.587)
GDP growth	−0.407**	0.359*	−0.301**	−0.509**
	(−5.480)	(2.025)	(−3.518)	(−4.187)
Crisis	11.018**	2.080	0.680	6.013**
	(9.217)	(0.868)	(0.716)	(3.412)
Year dummy	Yes	Yes	Yes	Yes
R^2	0.341	0.351	0.114	0.281
N	2877	1735	852	844

Panel B: Banking sector size

	Banking sector	Equity market	Non-bank depositaries	Banking sector & equity market	Bank & non-bank	Overall market
DI dummy	−9.498**	6.270	−25.956**	−4.591	−31.270**	−55.741**
	(−3.517)	(1.173)	(−4.432)	(−0.523)	(−3.101)	(−2.662)

Appendix C (*continued*)

	Banking sector	Equity market	Non-bank depositaries	Banking sector & equity market	Bank & non-bank	Overall market
DI × bureaucratic quality	4.048**	−1.179	5.717**	3.629	10.318**	16.190*
	(3.406)	(−0.686)	(3.282)	(1.190)	(2.899)	(2.554)
Bureaucratic quality	0.055	−0.170	−6.064**	−4.011	−11.234**	−23.540**
	(0.075)	(−0.117)	(−3.042)	(−1.477)	(−2.878)	(−3.781)
Creditor rights	3.094*	5.414**	2.148	5.668**	−3.013	1.868
	(2.001)	(5.684)	(1.105)	(2.674)	(−1.927)	(0.670)
Shareholder rights	−0.272	2.146	−1.388	−2.757	−1.777	1.450
	(−0.152)	(0.930)	(−0.634)	(−0.656)	(−0.582)	(0.278)
Trade	−0.003	0.035	−0.036	−0.085	−0.066	0.161
	(−0.110)	(0.902)	(−0.723)	(−1.404)	(−0.759)	(0.832)
Lagged_ln(GDP)	17.511**	13.201	−33.765**	35.185**	−10.089	−45.489*
	(5.003)	(1.938)	(−3.977)	(3.485)	(−0.930)	(−2.007)
GDP growth	−0.469**	0.642**	−0.436**	−0.159	−0.542*	−1.460
	(−5.431)	(2.691)	(−2.828)	(−0.448)	(−2.431)	(−1.558)
Crisis	9.224**	−3.515	1.901	11.712**	7.352**	6.594
	(6.596)	(−1.730)	(1.153)	(3.659)	(2.622)	(1.030)
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.302	0.431	0.215	0.448	0.293	0.482
N	2913	1748	833	1720	831	552

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