The Politics of Last Resort Lending

Michael Gavin

PhD Candidate
University of Toronto
Department of Political Science

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Abstract

The political economy literature has long recognized the importance of central banks as key first responders to banking crises. This study offers a political economy explanation for variations in central bank lending following a banking crisis. Modelling central banks as providers of insurance against financial risk, this study offers a new mechanism through which to explain state-bank relations. This insurance constitutes a state's financial safety net and the structure of political institutions is shown to shape the size and scope of this safety net. Using an event study methodology on a large sample of banking crises, this study finds that credibly independent central banks lend enhance last resort lending while democratic pressures act as a constraint. Two other components of the financial safety net, deposit insurance and net foreign exchange reserves, were found to reduce and enhance liquidity provision respectively, but only in credibly independent central bank.

For all the diversity of arguments in the international political economy literature on the origins and management of banking crises, central bank decisions feature prominently as a first line of defence in the early stages of a banking crisis (Pauly, 2009; Donnelly, 2014; Nelson and Katzenstein, 2014). The power of central banks to manage banking crisis is derived from their monopoly on domestic money creation. Because of their unique ability to lend, in principle, unlimited quantities of domestic currency to banks in trouble, central banks have been dubbed the 'lender of last resort' (Goodhart, 1988; Kindleberger and Aliber, 2011). Although the importance of last resort lending has not gone unnoticed by scholars, there are comparatively few studies of the factors that explain last resort lending decisions.

What explains variation in last resort lending to banking systems in crisis? This study shows that variation in last resort lending is shaped to a surprising degree by the institutional context within which central banks operate. The theoretical underpinning of this result sees last resort lending as a form of liquidity insurance, which forms a key pillar of state-backed financial safety nets (Kane, 2001). Given the rapidity with which banking crises develop, the provision of liquidity insurance, and the size of a state's financial safety net, is conditioned by the institutional opportunities and constraints central banks operate in. As liquidity insurance is set in the pre-crisis period, its existence represents a transfer of liquidity risk onto the central bank. As with a standard insurance contract, actual last resort lending is understood, in part, as fulfilment of this implicit liquidity insurance.

Evidence for this theory is provided by an event study on last resort lending on a large sample of banking crises. The results suggest that institutions of democratic accountability restrain liquidity provision while the independence of a central bank enhances it. Moreover, the marginal effect of democracy is most influential when the central bank is comparatively non-independent while the marginal effect of central bank independence is most influential at comparatively high levels of democracy. Together these findings suggest that last resort lending is most forthcoming when the independence of a central bank is credibly maintained by robust democratic institutions.

The larger financial safety net provided by independent central banks has implications for non-crisis times. By providing larger and more credible liquidity insurance, independent central banks offer a more credible implicit guarantee of their banking system's stability. With its potential for moral hazard, the supply of a generous financial safety net is contrary to the stereotypical "tight money," conservative view of central bankers who prefer to let

market forces play out as they wish.[1]

Politics and Safety Nets

Central banks are unique public institutions that support domestic and international financial development and stability. Normally endowed with mandates to maintain currency and, more recently, financial stability, the decisions by its highest authorities penetrate the entire economy. Central bank's do this by expanding and contracting their balance sheet, most commonly through purchases and sales of securities on secondary financial markets in order to influence of economy-wide interest rates. However, if faced with a financial crisis, central banks have the power to lend directly to financial firms facing liquidity shortfalls in an effort to provide a degree of stability.[2] This type of balance sheet expansion is called liquidity provision and has given central banks the nickname of the lender of last resort.

Liquidity provision typically consists of very short-term loans from a central bank to financial firms, typically commercial banks on a daily or weekly basis.[3] As a crisis-mitigation strategy with a long pedigree, central bank liquidity provision can be a deciding factor in the breadth, depth, scope, and cost of financial crises (Thornton, 1802; Bagehot, 1873). For example, Friedman and Schwartz (1963) influentially argued that the failure by the Federal Reserve to supply adequate liquidity during the banking crises of the early 1930s significantly amplified existing economic weakness and arguably produced the Great Depression.[4] With this argument in mind, Bernanke (2013) has in part justified the lending decisions by the Federal Reserve during the recent global financial crisis as necessary to avoid a similar fate.

Last resort lending is an important component of a state's "financial safety net," an umbrella term that includes policies and interventions aimed at crisis containment, understood as reducing the probability of financial contagion after initial troubles have begun (Gelpern, 2009). Beyond liquidity provision, financial safety nets typically include the provision of deposit insurance, the holding of foreign exchange reserves, implicit and explicit bailout guarantees, sponsorship of payment systems and in particular the 'real time gross settlement payments

[1] On the desirability of a conservative central banker, see Rogoff (1985). A critique of the naïve assumption of the conservative central banker can be found in Adolph (2013).

[2] A market exhibits high liquidity when assets can be bought and sold quickly at no discount. Central bank liquidity provision therefore enhances the ability of banks to meet their liabilities, preventing their collapse

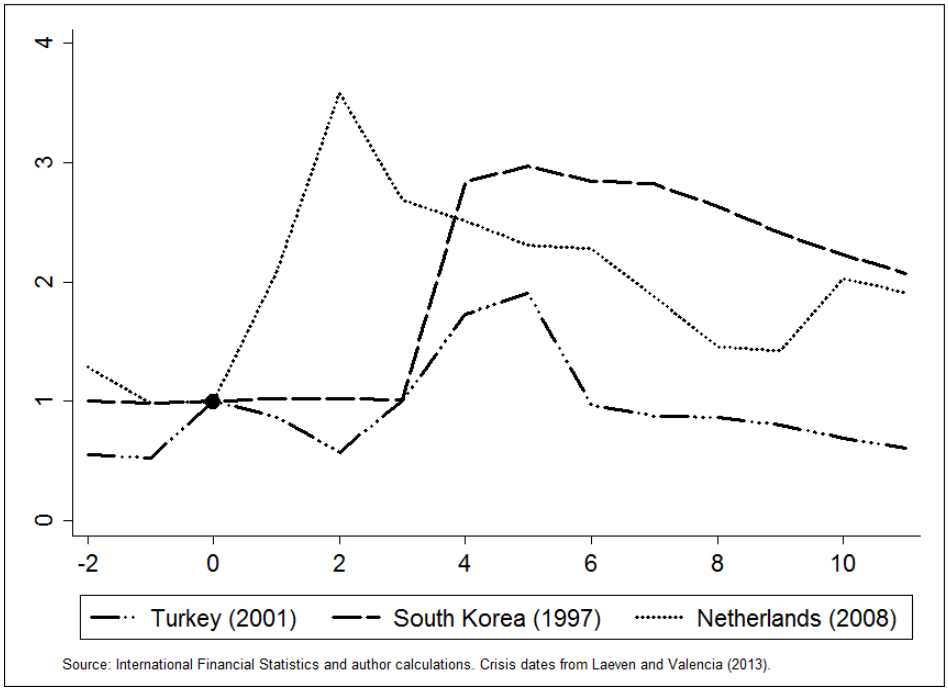
[3] In severe crises, central bank lending terms may extend to a few months.

[4] See also Eichengreen (2014).

system', and orderly resolution in the event of a bank failure (White, 2004). While some components of a state's financial safety net remain opaque, such as the implicit guarantees at the heart of the 'too-big-to-fail' problem,[5] liquidity provision is an observable manifestation of the financial safety net in action and one that can be deployed quickly and decisively against financial instability.

Figure 1 shows what central bank liquidity provision following a banking crisis typically looks like in practice. In South Korea in 1997, Turkey in 2001, and the Netherlands in 2008 central bank claims on the banking sector were relatively stable in the pre-crisis period.[6] Once a crisis breaks out, which is typically a sudden although not always unexpected event, copious amounts liquidity were then "injected" into the banking system. After reaching a peak, central bank loans are rolled over in lesser and lesser quantities so that liquidity provision tapers off slowly before returning to pre-crisis levels.

Figure 1: Central Bank Liquidity Following a Banking Crisis



The literature on the politics of financial safety nets has been addressed in a number of ways, although it usually accompanies discussions of the politics of bank 'bailouts' and financial

[5] On too-big-to-fail, see Ueda and di Mauro (2013) and Moenninghoff et al. (2015).

[6] The horizontal axis represents the number of months since the onset of each banking crisis and the vertical axis measures liquidity provision relative to its level at the onset of a banking crisis. Crisis dates are provided by Laeven and Valencia (2013) and have been normalized to zero in Figure 1.

crisis management. Using case studies from the Asian financial crisis, MacIntyre (2001) argues that basic institutional structures mattered a great deal for how states managed their financial crisis. In particular, states with a mid-range number of veto players — to balance policy volatility and policy rigidity — were found to have fared better, as measured by levels of private investment, both during and following the crisis.[7] Others have found more worrying evidence in the distribution of financial sector bailouts. During the global financial crisis, Blau et al. (2013) find that funds distributed under the American Troubled Asset Relief Program were distributed faster and in greater quantities to banks with more extensive political connections and lobbying expenditures. Similarly, Grossman and Woll (2014) find that bailouts during the Eurozone crisis in Ireland, Denmark, Britain, and France were more generous and far reaching when governments negotiated one-on-one with banks instead of as a collective.

Using "large-n" quantitative methods, Keefer (2007) argues that the fiscal costs of financial sector bailouts are smaller and there is less regulatory forbearance in democracies because the effect of competitive elections constrains the capture of political authorities by powerful special interests. Similar results are found in Rosas (2006), who finds that democratic institutions impact a wide range of bailout policies following banking crises. In particular democratic institutions and central bank autonomy were found to reduce the probability of bailout policies such as public recapitalization, blanket deposit guarantees, and liquidity provision. Broz (2014) argues that the opening and expansion of currency "swap lines" by the Federal Reserve with foreign central banks, which has the rudimentary aspects of an international financial safety net, maintained an ample supply of global liquidity during the global financial crisis. The selection of partner central banks by the Federal Reserve, according to Broz, followed political and not merely economic criteria, since the Federal Reserve strongly preferred states that were hosts to significant American financial institutions.[8]

This study advances our understanding of the politics of bailouts and financial crisis management in two ways. First, large-n quantitative studies have largely focused on aggregate level indicators of policy by focusing on the existence of policy interventions or ex-post measures of fiscal costs. What these studies gain in cross-country applicability, they sacrifice in depth and nuance. On the other hand, the rich detail uncovered in case study research limits the

[7] Angkinand and Willett (2008) have tested and found support for MacIntyre's hypothesis in a "large-n" setting.

[8] See also McDowell (2012).

number of cases that any particular study can incorporate. This study takes a third approach by focusing in depth on liquidity provision in a large-n cross country setting. While this study incorporates other aspects of the financial safety net such as deposit insurance and foreign exchange reserves, it largely sacrifices a more complete view of banking crisis management in order to focus more deeply on the politics of liquidity provision.

The second contribution is an alternative mechanism through which to understand the politics of financial crises and financial safety nets. In particular, the existing literature frames the politics of bailouts and crisis management through the fiscal costs incurred by the state. This is problematic because interventions such as bank nationalizations, regulatory forbearance, payouts on deposit insurance, and liquidity provision have quite different expected fiscal costs. In particular, bailouts in the form of last resort lending are rarely defaulted on and are most often paid back with interest, rendering their fiscal costs moot. Indeed, former Treasury Secretary Timothy Geithner has repeated on numerous occasions that the actions by the Treasury earned a modest profit for American taxpayers, in sharp contrast to prevailing public opinion (Geithner, 2014). For this reason, the politics of the financial safety net, and in particular last resort lending, may be more about the politics of insurance provision than the politics of fiscal spending.

Financial Safety Nets as State-Sponsored Insurance

At its most basic, an insurance contract is an agreement between parties to exchange money for risk. Value for the customer is derived from their ability to transfer onto the insurance company future financial losses associated with an accident. This transfer of risk generates relief for the customer and a contingent liability for the insurer. The liability of the insurer is contingent because future payouts occur only if the insured event occurs and forms the basic mechanism behind concerns over insurance-induced moral hazard.

In general, insurance can incentivize both positive and negative behaviours, even if the insurable event never occurs. On the downside, insurance inevitably introduces moral hazard because the downside losses of the insured event no longer fall on the insured (Calomiris, 1997a). Increased risk taking, or at least less prudence on behalf of the insured, may result. On the other hand, insurance opens up possibilities for positive risk taking as well. For example, maritime insurance facilitates international trade by insulating shipping companies

from having to absorb the full costs associated with the loss of their ships (Bernstein, 1996). Similarly, unemployment insurance grants job seekers more time in their search for a job, potentially resulting in higher productivity and higher worker satisfaction in the long run (Centeno, 2004).

Central bankers keenly aware of the positive and negative incentives embedded in last resort lending have long sought to mitigate the latter by lending against good collateral at a high interest (Bagehot, 1873). More than this, banks incur significant reputational costs if they abuse their discount window privileges.[9] Irrespective of how successful discount window policies are in mitigating moral hazard, by acting as a reliable, deep-pocketed supplier of liquidity when private sources have gone dry central bank last resort lending forms an important source of liquidity insurance for banks.[10] While a bank's day to day liquidity management decisions are largely a function of regulatory requirements and its own risk tolerance, the central bank's provision of last resort lending is something banks no doubt value highly (Alessandri and Haldane, 2009). Therefore, analogous to a standard insurance contract, central bank liquidity provision necessarily entails the transfer bank-generated liquidity risk onto the central bank. This transfer of risk constitutes a contingent liability for central banks, a liability which exists even if central bank liquidity provision is never called upon (Brunnermeier and Sannikov, 2012). And banks pay no premium for this insurance coverage.[11]

The risk transfer mechanism that lies at the core of state sponsored liquidity insurance is the mechanism through which financial safety nets are effective in stabilizing financial markets under stress. Two further examples demonstrate the mechanism's generalizability beyond liquidity provision. On July 26, 2012, the President of the European Central Bank (ECB), Mario Draghi, famously declared that "within our mandate, the ECB is ready to do whatever it takes to preserve the Euro. And believe me, it will be enough," (The Financial Times, 2012). Draghi's famous words had the intended effect because they represented the construction of a credible contingent liability to supply troubled Eurozone banks with assistance if

[9]The discount window was the location where banks would go to borrow from a central bank. The importance of reputational costs was confirmed to me through interviews I conducted at the Central Bank of the Republic of Turkey in February 2016. For a theoretical discussion of reputational costs and discount window access see Waller (1990).

[10]On the risks, limits, and potential for unintended consequences of stabilizing state intervention in financial markets, see Congleton (2012) and Calomiris (1997b).

[11]Deposit insurance is the one aspect of the financial safety net that banks in many jurisdictions pay a premium for.

deemed necessary. While Eurozone economies continue to experience difficulties, many have pointed to Draghi's statement as the beginning of the end of the Eurozone crisis (Wolf, 2014). Secondly, the the relaxation of collateral requirements is a common policy response during a banking crisis (Chailloux et al., 2008). By accepting less secure collateral on last resort lending, central banks implicitly accept a larger contingent liability by opening themselves up to deeper losses should collateral values collapse and banks be unable to pay back their loans. Therefore, in the framework developed here it is the risk of financial losses, not the actual occurrence of losses, that makes the provision of financial safety nets, and last resort lending in particular, subject to political considerations.

Institutions and Liquidity Provision

Political pressure on central bank resources have traditionally been framed as a problem of policy time-inconsistency. An optimal monetary policy is time-inconsistent if the executive favours a loose monetary policy in the short-run, but a tight monetary policy in the long run. Even if the executive announces a tighter monetary policy, this commitment will generally lack credibility because the executive's preference for a short-term economic boost, especially in the run up to an election, contradicts the stated commitment of tighter monetary policy (Nordhaus, 1975; Dinç, 2005; Carvalho, 2014). The hangover that often follows from this form of politically motivated monetary policy is cited by economists and political scientists as a cost too large to justify political control over central bank policy (Rogoff, 1985). This argument also underlies the superior macroeconomic outcomes delivered by independent central banks (Cukierman et al., 1992; Maxfield, 1998; Bodea and Hicks, 2015a).

While influential, the time-inconsistency problem is not appropriate for explaining central bank behaviour during a crisis because for politicians the banking system switches from being an asset to a liability. Instead of the banking system being a channel through which central bank policy can distribute rents, a banking system in crisis becomes a source of excess risk to state revenues. Under the financial safety net framework developed here the transfer of liquidity risk, and its associated contingent liabilities, onto the state is a cost that politicians seek to reduce. These pressures are higher in democracies where politicians feel obliged to align their behaviour with the public anger that accompanies financial crises (Thirkell-White, 2009).

The constraints of democratic politics in the context of bank bailouts have been analyzed by

Levitin (2011). When bailout decisions are left in the hands of a legislature, Levitin (2011) argues that legislators opposed to the bailout may delay necessary legislation unless they are granted offsetting benefits. By increasing the probability of a hold up, democracies are more likely to produce "Type II" errors by falsely withhold state support when it is necessary. Similar effects are found in Rosas (2009). Using a formal model, Rosas argues that bailouts of banks facing financial difficulties are less likely under democratic regimes. The desire to avoid a tax-payer financed bailout in the event that an illiquid bank is in fact insolvent is the mechanism that connects democratic accountability with liquidity provision. Together these arguments lead to the first hypothesis.

> *H1 (Democracy):* Following a banking crisis, liquidity provision will be lower under high levels of democracy and higher under lower levels of democracy.

The degree of central bank independence is the second institutional structure hypothesized to shape last resort lending. As previously mentioned, a stereotypical conservative central banker has a preference for tighter monetary policy and is sensitive to any perceived loss in credibility (Franzese Jr, 1999; Lippi, 2000). Implicit in these conservative preferences is a belief that they will deliver superior economic outcomes, such as low inflation, stable financial markets, and stable economic growth. However, following a banking crisis, achieving such outcomes often requires a short-term liberal use of central bank resources to put a floor under a collapsing banking system (Cecchetti and Disyatat, 2010). Given that the provision of last resort lending represents a cost to the state politically, being shielded from political pressures allows an independent central bank to upload these costs onto the state. Moreover, the commitment to supply stabilizing last resort lending is credible with independent central bank since there is no time-inconsistency problem. These arguments lead to the second hypothesis.

> *H2 (Independence):* Following a banking crisis, liquidity provision will be higher under high levels of central bank independence and lower under low levels of central bank independence.

Empirical Design

In a banking crisis a significant fraction of a state's banking system experiences a rapid deterioration in its financial health. The suddenness of most banking crises leaves a clear demarcation between the pre-crisis period and the crisis proper that can be exploited in an event study to estimate the amount of central bank liquidity attributable to the crisis. An event study is a unique type of before-and-after research design that takes advantage of a sharp discontinuity in the data generating process[12] (Kothari and Warner, 2008).

The dependent variable is constructed in three steps. The first step is to estimate a linear trend in liquidity provision in state i using observations in the twelve month period prior to the crisis. The second steps is to project this trend into the "event window," which consists of the date of the banking crisis plus twelve months. This projection forms a counterfactual series of central bank liquidity assumed to approximate what central bank liquidity would have been were it not for the crisis. The final step is to subtract the projected series of liquidity provision from actual liquidity provision.[13] The result is a measure of the "abnormal" amount of liquidity supplied by a central bank due to the crisis.[14]

Multiple robustness checks are included. A placebo test is conducted using 1000 trials of the analysis with banking crisis dates chosen at random. This tests for the possibility that the estimated effect of political institutions on central bank liquidity is present more generally and therefore unrelated to a banking crisis. While Figure 1 shows that central bank liquidity provision is clearly related to the onset of a banking crisis, the effect of the institutional context on liquidity provision is not obviously different between times of crisis and times of stability. Systemic differences between the main event study and the placebo analysis support the hypotheses that the political institutional context within which central banks operate conditions their response to a banking crisis. Additional robustness checks include an analysis of coefficient stability, alternative econometric specifications, alternative measures

[12] Although event studies are relatively rare in political science, recent examples include Sattler (2013) and Guidolin and La Ferrara (2010).

[13] This step implies the dependent variable will be measured with error, imparting a well-known downward bias in the estimated regression coefficients (Green, 2003, p. 84).

[14] When the trend in central bank liquidity prior to a banking crisis predicts negative central bank liquidity in the event window, the projected series of claims is set to zero. Although the dataset contains twenty nine observations of negative central bank liquidity provision (i.e. banks were *net lenders* to central banks), this possibility is precluded in the analysis by restricting projected liquidity to be non-negative. This prevents situations where low levels of liquidity show as positive abnormal liquidity because projected liquidity is negative.

of various independent variables, and calibrating projected central bank liquidity using a six month pre-crisis trend instead of twelve.

Data and Methodology

Laeven and Valencia (2013) construct a dataset of systemic banking crisis for a large sample of countries spanning 1970-2011. An event is coded as a systemic banking crisis if the banking system is experiencing significant financial distress and states are responding with significant remedial policy intervention.[15] The database lists 147 banking crises, but the short-term nature of central bank liquidity provision requires a focus on the 39 crises whose dates include a month and where sufficient data on covariates can be obtained. A list of the banking crises included in the estimations is found in the online Appendix.

Central bank balance sheet variables are available from the International Monetary Fund's International Financial Statistics (IFS). Monthly observations span January 1970 until December 2012, although not all country series begin in 1970. The dependent variable measures abnormal liquidity provision as the abnormal share of the deposit base of the banking system claimed by the central bank. Normalizing liquidity provision by the deposit base of the banking system (a common measure of financial sector size) implicitly controls for the massive expansion in banking systems in the post-Bretton Woods era and allows meaningful comparisons of liquidity provision over time. It also measures the generosity of state support from the perspective of the banking system. Liquidity provision is defined as monthly observations of central bank claims on depository corporations (line 12e) normalized by the total deposit base of the banking system, defined as the sum of transferable deposits (line 24) and time, savings, and foreign currency deposits (line 25).[16]

The two main institutional variables are the unified democracy score from Pemstein et al. (2010) and a measure of central bank independence from Bodea and Hicks (2015b). These institutional variables are available at an annual frequency and have been linearly interpolated to produce monthly observations. A linear interpolation is justified because these variables

[15] See Laeven and Valencia (2013) for the detailed criteria use to determine whether a banking system is distressed and the list of remedial state interventions.

[16] Laeven and Valencia (2013) include liabilities to non-residents (line 26) in their definition of the deposit base of the financial system. Given that line 26 deposits are mostly non-banking system 'deposits' such as bonds, money market instruments, and various foreign liabilities, they have been excluded from the definition used here because my focus is on the deposits of the banking system.

change only gradually over time. Control variables include two indicators for the size and presence of a financial safety net. The first is a dummy variable indicating the presence of formal deposit insurance found in Laeven and Valencia (2013). The second is a measure of a state's level of foreign exchange reserves. Despite the wide range of country-specific motivations for accumulating foreign exchange reserves, the desire for self-insurance in a world of open global capital markets is widely acknowledged (Chin, 2010). Given that the accumulation of foreign currency reserves is costly, net foreign exchange reserves act as a proxy for the capacity of states to insulate their domestic banking systems from exchange rate and international capital flow volatility and constitute an important component of a state's financial safety net. Data on net foreign exchange reserves is available from the IFS at a monthly frequency and have been normalized by Gross Domestic Product (GDP). GDP was also available from the IFS, but at an annual frequency. GDP has been linearly interpolated in order to estimate monthly observations of Reserves/GDP.

Other control variables include the presence of a credit boom in the pre-crisis period, a measure of the exchange rate regime, and net capital inflows. Credit booms have been shown to reliably predict future financial crisis and therefore act as a proxy for financial system fragility at the onset of the crisis (Schularick and Taylor, 2012). Dummy variables indicating a pre-crisis credit boom are given in Laeven and Valencia (2013). The final two control variable are motivated by the Mundell-Fleming model. A dummy variable indicating whether a country has a floating exchange rate is constructed using the exchange rate indicators found in Reinhart and Rogoff (2004). The final control variable is net capital inflows. Following a banking crisis, the degree to which capital flows into or out of a state will shape the liquidity needs of the banking system and therefore the response by the central bank.[17] With these variables the empirical specification for the main event study is

$$AbnormalLiquidity_{i,t} = \beta_0 + \beta_1 Democracy_{i,t} + \beta_2 CBI_{i,t} + \beta_3 Democracy_{i,t} \times CBI_{i,t} +$$

$$\sum_{j=1}^{5} [\beta_{3j+1} Control_{j,it} + \beta_{3j+2} Democracy_{i,t} \times Control_{j,it} + \beta_{3j+3} CBI_{i,t} \times Control_{j,it}] + \epsilon_{i,t} \quad (1)$$

[17] In the immediate period following a banking crisis, actual capital outflows are a better indicator of the liquidity needs of a banking system than a measure of capital account openness. However, results substituting the capital account openness measure of Chinn and Ito (2008) for net capital inflows, available in the online appendix, are very similar.

Equation (1) and various combinations of its components are estimated using OLS with errors clustered by country. A relatively 'simple' econometric strategy is suitable for event studies of this kind because of their built-in corrections for many of the standard econometric problems that arise in a cross-country regression analysis. For example, embedded within the projected counterfactual series of central bank liquidity are country-specific factors that may explain central bank liquidity provision. Analogous to the construction of the fixed-effects estimator, country-specific effects are controlled for with the subtraction of the counterfactual projection central bank liquidity from observed central bank liquidity. Furthermore, although the average state-level correlation between abnormal liquidity and its lag is a relatively high 0.64, the data generating process is inherently non-dynamic. Liquidity provision consists of very short term loans, rarely exceeding one week in maturity. The high correlation between abnormal liquidity and its lag therefore does not represent a dynamic process whereby observations in one month 'depend' on observations in the preceding month (see Achen, 2000). This non-dynamic understanding of the data generating process is reflected in the main estimation strategy.[18] Summary statistics for observations included in the estimations are shows in Table 1.

Table 1: Summary Statistics

	Observations	Mean	Standard Deviation	Min	Max
Democracy	530	0.671	0.788	-1.336	2.247
Central Bank Independence	530	0.532	0.215	0.173	0.869
Net Reserves (% GDP)	530	0.341	3.092	-10.601	17.133
Net Capital Inflows (% GDP)	530	2.462	5.599	-13.850	20.417
Deposit Insurance	530	0.636	0.482	0	1
Floating	530	0.432	0.496	0	1
Credit Boom	504	0.562	0.497	0	1

Results

The main results for the event study are listed in Table 3.[19] Ignoring the far right 'Democracy × CBI' column of Table 3 for the moment, which is analyzed separately below, the entire first

[18]Estimations accounting for serial correlation of the errors, a potential problem in dynamic settings, are very similar to the main results and are found in the online appendix.

[19]For convenience, the base results in Table 3 are repeated in Tables 4 and 5.

row of democracy coefficients have the expected sign and in four specifications are statistically significant at the 5% level and in the remaining two at the 10% level. Estimated democracy coefficients are relatively stable, falling in a relatively narrow range between -0.024 and -0.032. Together these results support H1, democracy has a restraining effect on abnormal liquidity provision during a banking crisis, all else equal. With an average democracy coefficient of -0.0275, this suggests that following a banking crisis liquidity provision will be lower by 2.75 percent of the deposit base of the banking system for a one unit increase in the unified democracy score.[20] Given that Laeven and Valencia (2013) report that median average liquidity support following a banking crisis was 9.6 percent of a state's deposit base, for a one unit increase in democracy to predict a reduction in 2.75 percent appears to be substantially significant.[21]

Looking across the second row of Table 3, again ignoring the far right 'Democracy × CBI' column, the central bank independence coefficients all have a positive sign and are statistically significant at the 5% level or higher in all cases but one. Central bank independence coefficients also fall in a relatively narrow range between 0.1 and 0.161 and average 0.136. Together these results support H2, more independent central banks supply more abnormal liquidity during a banking crisis, all else equal. Given that central bank independence is measured on a zero to one scale, a one unit increase in a central bank's independence score is too large to meaningfully interpret. Instead, given an increase in the central bank independence index of one standard deviation, equivalent to 0.215 units, abnormal liquidity is expected to be higher by 2.9 percent of the deposit base of the banking system.[22] Again, given the average median liquidity support observed following a banking crisis, this result appears to be substantially significant.

Turning now to the far right 'Democracy × CBI' column of Table 3, the signs and magnitude of the main coefficients are in line with the other columns of Table 3 but none of the coefficients are statistically significant at conventional levels.[23] However, as Brambor et al. (2006)

[20] A one unit increase in the unified democracy score is a little more than one standard deviation and is the approximate difference between Mexico (0.505) and Malta (1.545) in 2013.

[21] See Laeven and Valencia (2013), p. 244.

[22] 0.215 units on the central bank independence index is the approximate difference in scores between Costa Rica (0.678) and Chile (0.891) in 2010.

[23] This null result is almost surely due to the multicollinearity introduced by the interaction between democracy and central bank independence. Recall that the event study consists of observations only during the twelve month period following a banking crisis. Given that institutional variables tend to exhibit only moderate variation over time, 'within' variation over any twelve month period is even less. This general lack of

show, parameter estimates for interaction terms convey little important information on their own. Instead, it is the marginal effects of democracy and central bank independence on liquidity provision that are of primary interest. These marginal effects and their corresponding 95% confidence intervals are shown in Figures 2 and 3 and are estimated at the means of the other covariates. Figure 2 shows that the marginal effect of democracy on abnormal liquidity provision is negative and statistically significant at the 5% level only at low levels of central bank independence. With a sufficiently independent central bank, the restraining effect on the financial safety net from a marginal improvement in democracy disappears. Figure 3 shows the marginal effect of central bank independence at various levels of democracy, which is positive and statistically significant at the 5% level only for states with relativley high levels of democracy. This suggests that it is only when central bank independence is credibly sustained by the presence of robust democratic institutions that central banks will enhance the financial safety net[24]

Figure 2: Marginal Effect of Democracy at all Levels of Central Bank Independence

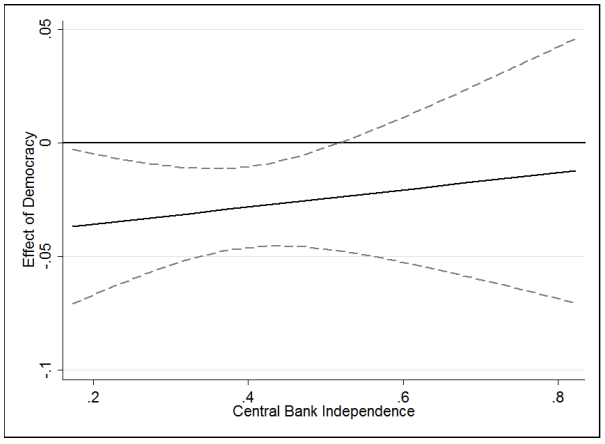


Figure 3: Marginal Effect of Central Bank Independence at all Levels of Democracy

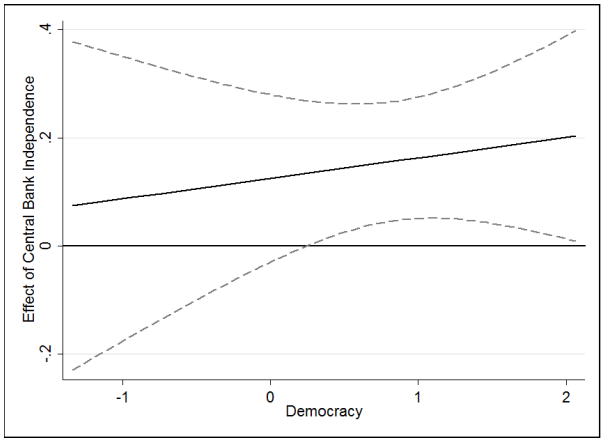


Table 4 includes interactions of the control variables with democracy and Table 5 includes interactions of the control variables with central bank independence. In neither case do the interaction variables substantively alter the results from Table 3.[25] In Table 4 the main effect of a central bank's net reserves, net capital inflows, and the existence of a pre-crisis

within variation for both indicies of democracy and central bank independence implies that their interaction will be highly collinear with the constituent variables. Indeed, the correlation between democracy and central bank independence with their interaction are 0.861 and 0.434 respectively. Multiple tests for multicollinearity also indicate that the introduction of the interaction term introduces multicollinearity. These tests and cross-correlations for all independent variables, including the interaction term, can be found in the online appendix.

[24]See also Bodea and Hicks (2015b), p. 42.

[25]The interpretations of the democracy and central bank independence coefficients in rows one and two

credit boom are statistically significant at least at the 10% level while all interactions are statistically insignificant. Interactions of control variables with central bank independence in Table 5 are largely statistically insignificant, with the exception of deposit insurance where the main effect is positive and the interaction is negative and statistically significant at the 10% level each.

Figures showing the marginal effects of each control variable across various levels of democracy and central bank independence are found in the online appendix. Most marginal effects are found to be not statistically significant. However, the marginal effects of the two alternative measures of the financial safety net, deposit insurance and net reserves, are statistically significant at the 5% level at high levels of central bank independence. Furthermore, the marginal effect for deposit insurance is negative which suggest that the presence of formal deposit insurance lowers abnormal liquidity provision, but only for comparatively high levels of central bank independence. This is consistent with the view that formal deposit insurance reduces the probability of bank runs (and hence the need for offsetting liquidity provision), but the credibility of this effect holds primarily in states that have comparably autonomous central banks. On the other hand, the marginal effects of net reserves are positive, suggesting that for a comparatively independent central bank, a marginal increase in net reserves provides more latitude for supplying domestic currency liquidity. The final control variable to have a statistically significant marginal effect is the positive effect of a credit boom in a comparatively non-democratic state, a result supporting the view that credit booms in non-democratic states are particularly fragile (Verdier and Quintyn, 2010).

Robustness Checks

Placebo Analysis

To test whether the effect of political institutions on central bank liquidity provision is systematically different following a banking crisis relative to times of stability, the event study is repeated on 1000 trials of the base model using 'crises' at randomly chosen dates.[26]

are nuanced with the addition of interaction terms because the main effect coefficients are conditional on the interacted control variables being zero.

[26]To ensure select dates did not fall around banking crises, the randomization process excluded dates twelve months before or after a banking crisis. To ensure the possibility of having twelve months prior to a 'crisis' and twelve months after, the randomization process also excluded the first and last twelve months in the dataset.

This 'placebo' analysis tests whether the effects of political institutions on abnormal liquidity provision found in Tables 3, 4 and 5 reflect the politics of banking crisis management or the politics of liquidity provision more generally. Additional support on the importance of banking crises for the politics of last resort lending will be confirmed if the results of the placebo analysis differ substantively from the main results.

Summary statistics comparing the main event study with results of the placebo analysis are listed in Table 2. The first two rows compare summary statistics on the dependent variable, the first row being from the actual event study and the second row being averages from the 1000 placebo trials. With a mean of 0.071, abnormal liquidity following a banking crisis averaged 7.1% of the deposit base of the banking system. In the placebo analysis, average abnormal liquidity is -0.005, or -0.5% of the deposit base of the banking system. The standard deviation and extreme values in the event study are also much lower than the corresponding average values from the placebo analysis. As expected, abnormal liquidity provision appears to be far more prevalent following a banking crisis compared to a sample of randomly chosen dates. In the middle two rows of Table 2 are summary statistics for the coefficient estimates for democracy and central bank independence. Average coefficient values are far lower than in the main event study, coming in at -0.01 and 0.023 respectively.

Table 2: Placebo Analysis - Summary Statistics

	Observations	Mean	Standard Deviation	Min	Max
Banking Crises	530	0.071	0.09	-0.19	0.035
Placebo	568	-0.005	0.158	-1.45	1.19
Democracy	568	-0.010	0.038	-0.194	0.1667
Central Bank Independence	568	0.023	0.074	-0.397	0.287
Observations		568	74.69	364	812
Clusters		34.9	3.77	22	47

The distribution of t-statistics over the 1000 trials, sorted from lowest to highest, for democracy and central bank independence are listed in Figures 4 and 5. The vast majority of t-statistics in both placebo trials fail to reach conventional levels of statistical significance. Indeed, in only 57 and 136 of the 1000 trials did the democracy coefficient achieve statistical significance at the 5% and 10% levels respectively. For central bank independence the

corresponding counts are 54 and 125. Overall the placebo analysis indicates that not only does liquidity provision differ markedly following a banking crisis, but that the influence of politics on abnormal liquidity provision differs substantially following a banking crisis relative to non-crisis times.

Figure 4: Democracy

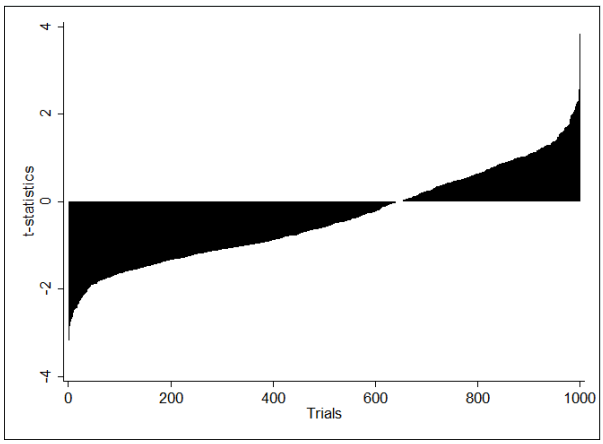
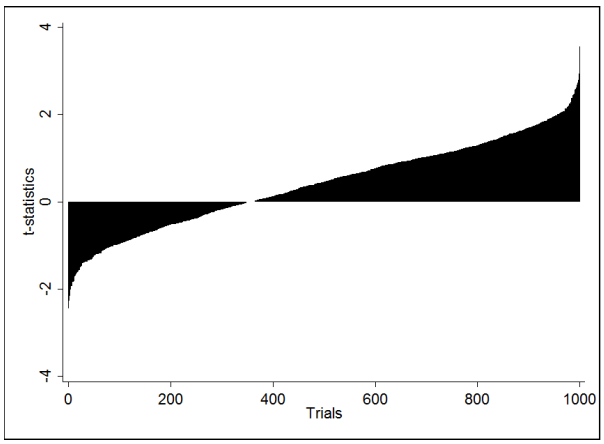


Figure 5: Central Bank Independence



Coefficient Stability

To analyze the stability and statistical significance of the democracy and central bank coefficients at different event windows, the analysis was run at event windows ranging from one to thirteen months. Using the full model Table 3 (i.e. the 'Boom' column) Figures 6 and 7 show the value of each coefficient as well as its corresponding p-value at each event window. The results indicate that coefficients for both democracy and central bank independence are quite stable at different event window lengths.[27] P-values for central bank independence become statistically significant at the 5% level at an event window of only four months, while p-values for democracy become statistically significant at the 10% level and only at the very end of the event window. However, after an initial upturn, p-values for democracy show a consistent downward trend after an event window length of three months.[28]

Other Robustness Checks

[27]The tendency for democracy coefficients to become more negative and central bank independence coefficients to become more positive as the event window lengthens results from average abnormal liquidity being higher at later event window dates. This is because not all central banks inject liquidity immediately after the beginning of a crisis. See the examples of South Korea and Turkey in Figure 1.

[28]Statistical significance is a function of the size and variation of a coefficient and the number observations. With stable coefficients and standard errors, p-values steadily decrease with longer event windows since the addition of one month to the event window adds approximately 40 observations to the sample (i.e. one observation for each crisis).

Figure 6: Democracy

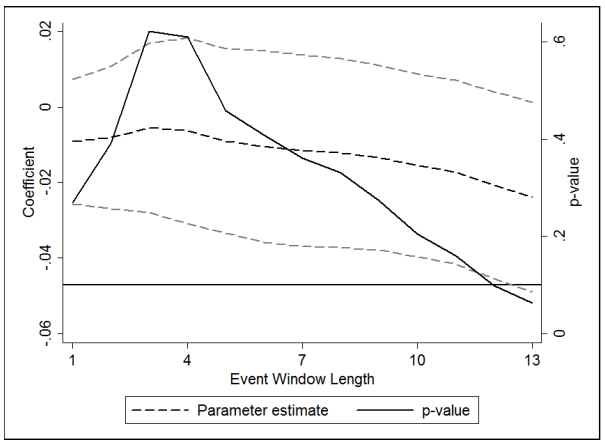
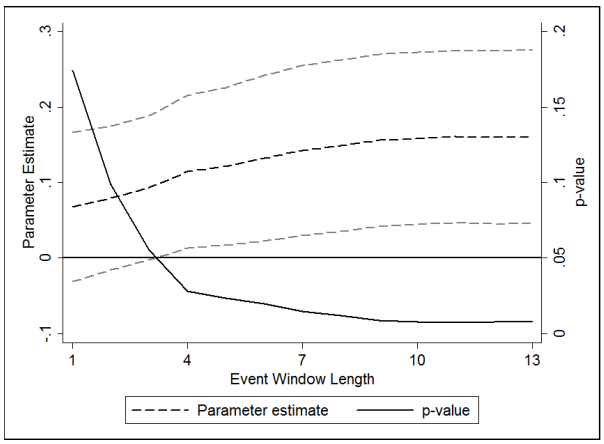


Figure 7: Central Bank Independence



The correlation between abnormal liquidity and its lag implies that serial correlation of the errors remains a possibility.[29] Although the short-term nature of last resort lending decisions plausibly renders this serial correlation spurious, multiple additional estimations were run that assume serially correlated errors. Tables 3, 4 and 5 were reestimated with Newey-West standard errors with an autocorrelation error structure up to a maximum lag of three (Newey and West, 1987). Results do not differ from the main event study.[30] A second method used to account for serial correlation of the errors is two-way clustering, by country and month (Cameron et al., 2012). Estimations using two-way clustering are also consistent with the main event study. All of these results are listed in the online appendix.

Alternative specifications of the main institutional variables were also checked. As an alternative specification for democracy, the polity2 variable from the Polity IV project was used in place of the unified democracy score (Marshall and Jaggers, 2002). As an alternative specification for central bank independence, a financial liberalization index by Abiad et al. (2008) is used and a capital account openness measure was also substituted for net capital flows. Lastly, a six month pre-crisis trend was used to estimate abnormal liquidity instead of the original twelve month pre-crisis trend. In all cases, the result are consistent with the main event study. These results are also published in the online appendix.

[29]Indeed, tests for serial correlation of the errors using the *xtserial* command in Stata 11 rejected the null hypothesis of no first order autocorrelation in all models.

[30]Multiple additional lag structures were tried, none producing substantially different results.

Conclusion

The commitment of public resources by central banks in the form of last resort lending to put a floor under financial markets under stress, even if temporarily, is a routine first response to a banking crisis. The goal of this paper has been to explore the political context that shapes this use of state power. By modelling financial safety nets, and last resort lending in particular, as the construction of contingent liabilities through the provision of insurance, central banks are able to implicitly transfer onto their balance sheets a portion of the risks assumed by banks. Following a banking crisis, last resort lending is therefore understood as the fulfilment of this implicit insurance arrangement.

In the empirical analysis, basic institutional structures were found to explain a surprising degree of variation in last resort lending. In particular, democratic accountability was found to restrain last resort lending while independent central banks were found to expand it. However, the restraining effect of democracy disappears at higher levels of central bank independence and the expansionary effect of central bank independence is strongest at the higher levels of democracy. Credible independence therefore is what allows a lender of last resort to live up to its name. These results add nuance to prevailing understandings of the politics of central banking. The conventional wisdom that sees central bankers as more consistent adherents to economic orthodoxy than politicians does not appear to hold during times of crises. Indeed, in a crisis environment, the politics of last resort lending suggests the opposite.

Results also indicated that not all aspects of the financial safety net are used equally during a crisis. In states with comparatively independent central banks, it was found that the presence of deposit insurance lowered abnormal liquidity while higher foreign exchange reserves raised abnormal liquidity. This article has provided initial results on the connections between liquidity provision, deposit insurance, and foreign exchange reserves, but this only scratches the surface. Further investigating the interaction between various components of the financial safety net are a promising avenue for future research.

Table 3: Abnormal Central Bank Liquidity

	Base	Deposit Insurance	Reserves/GDP	Floating	Capital Inflows/GDP	Boom	Democracy × CBI
Democracy	-0.032**	-0.030**	-0.025*	-0.027**	-0.027**	-0.024*	-0.043
	(0.013)	(0.014)	(0.013)	(0.012)	(0.013)	(0.012)	(0.028)
Central Bank Independence	0.100**	0.115*	0.142**	0.143**	0.154***	0.161***	0.125
	(0.048)	(0.057)	(0.057)	(0.055)	(0.055)	(0.057)	(0.079)
Deposit Insurance		-0.017	-0.023	-0.023	-0.031	-0.029	-0.025
		(0.026)	(0.025)	(0.024)	(0.024)	(0.025)	(0.027)
Net Reserves (% GDP)			0.008**	0.007**	0.004	0.004	0.004
			(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Floating				0.025	0.011	0.016	0.012
				(0.023)	(0.024)	(0.024)	(0.024)
Net Capital Inflows (% GDP)					-0.004*	-0.004	-0.004
					(0.002)	(0.002)	(0.002)
Credit Boom						0.032	0.032
						(0.020)	(0.020)
Democracy × Central Bank Independence							0.038
							(0.067)
Constant	0.041	0.042	0.026	0.016	0.032	0.004	0.021
	(0.025)	(0.026)	(0.025)	(0.028)	(0.032)	(0.033)	(0.038)
F	6.13	4.17	4.19	4.09	3.48	3.91	8.65
$Prob > F$	0.005	0.013	0.008	0.005	0.009	0.003	0.000
R^2	0.11	0.12	0.19	0.20	0.24	0.26	0.27
N	530	530	530	530	530	504	504

Coefficients estimated with OLS. Errors clustered by country. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 4: Democracy & Abnormal Central Bank Liquidity

	Base	Deposit Insurance	Reserves/GDP	Floating	Capital Inflows/GDP	Boom	Full
Democracy	-0.032**	-0.040**	-0.028**	-0.038***	-0.036**	-0.023	-0.072**
	(0.013)	(0.019)	(0.012)	(0.011)	(0.014)	(0.020)	(0.032)
Central Bank Independence	0.100**	0.118**	0.120**	0.103**	0.113**	0.107**	0.139**
	(0.048)	(0.057)	(0.046)	(0.049)	(0.049)	(0.048)	(0.057)
Deposit Insurance		-0.024					-0.046
		(0.027)					(0.031)
Deposit Insurance × Democracy		0.013					0.034
		(0.024)					(0.031)
Net Reserves (% GDP)			0.011**				0.008
			(0.004)				(0.005)
Net Reserves × Democracy			-0.003				-0.000
			(0.003)				(0.004)
Floating				0.028			-0.023
				(0.025)			(0.031)
Floating × Democracy				0.009			0.044
				(0.023)			(0.030)
Net Capital Inflows (% GDP)					-0.006**		-0.007***
					(0.002)		(0.002)
Net Capital Inflows × Democracy					0.001		0.006**
					(0.002)		(0.003)
Credit Boom						0.042*	0.054**
						(0.024)	(0.023)
Credit Boom × Democracy						-0.011	-0.021
						(0.022)	(0.026)
Constant	0.041	0.045*	0.024	0.029	0.049*	0.011	0.035
	(0.025)	(0.024)	(0.025)	(0.028)	(0.027)	(0.034)	(0.037)
F	6.13	3.72	4.57	4.37	4.03	7.43	8.06
$Prob > F$	0.005	0.013	0.005	0.006	0.009	0.000	0.000
R^2	0.11	0.12	0.18	0.15	0.20	0.15	0.31
N	530	530	530	530	530	504	504

Coefficients estimated with OLS. Errors clustered by country. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 5: Central Bank Independence & Abnormal Central Bank Liquidity

	Base	Deposit Insurance	Reserves/GDP	Floating	Capital Inflows/GDP	Boom	Full
Democracy	-0.032**	-0.033**	-0.027**	-0.033***	-0.032**	-0.027**	-0.024**
	(0.013)	(0.014)	(0.012)	(0.012)	(0.013)	(0.013)	(0.011)
Central Bank Independence	0.100**	0.289***	0.120**	0.108**	0.124**	0.065	0.334***
	(0.048)	(0.104)	(0.046)	(0.051)	(0.053)	(0.075)	(0.119)
Deposit Insurance		0.100*					0.086*
		(0.053)					(0.050)
Deposit Insurance × Central Bank Independence		-0.245*					-0.237**
		(0.126)					(0.106)
Net Reserves (% GDP)			-0.000				-0.002
			(0.007)				(0.008)
Net Reserves × Central Bank Independence			0.014				0.008
			(0.011)				(0.013)
Floating				0.036			0.044
				(0.040)			(0.056)
Floating × Central Bank Independence				-0.005			-0.034
				(0.090)			(0.099)
Net Capital Inflows (% GDP)					-0.003		0.001
					(0.003)		(0.005)
Net Capital Inflows × Central Bank Independence					-0.004		-0.008
					(0.006)		(0.008)
Credit Boom						-0.007	0.017
						(0.051)	(0.056)
Credit Boom × Central Bank Independence						0.076	0.033
						(0.102)	(0.100)
Constant	0.041	-0.029	0.027	0.023	0.040	0.039	-0.074
	(0.025)	(0.034)	(0.025)	(0.026)	(0.026)	(0.042)	(0.062)
F	6.13	4.48	4.44	3.87	4.03	5.62	3.35
$Prob > F$	0.005	0.005	0.006	0.011	0.009	0.001	0.003
R^2	0.11	0.18	0.18	0.15	0.20	0.15	0.33
N	530	530	530	530	530	504	504

Coefficients estimated with OLS. Errors clustered by country. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

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