

# Credit to government and banking sector performance <sup>☆</sup>

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## Abstract

The impact of credit to government on three aspects of banking sector performance – its deepening over time, profitability, and efficiency – is examined for 142 countries. Country regressions suggest a sizeable negative effect of credit to government on bank deepening in developing countries, but no impact in advanced economies. Bank regressions find that credit to government raises the profitability but reduces the efficiency of banks in developing countries; in advanced economies, there appears to be no impact on profitability but a positive one on efficiency.

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## 1. Introduction

There is a large literature on the determinants of financial development and the link between financial development and growth.<sup>1</sup> Yet the potential effects of domestic bank credit to government on banking sector performance remain an unexamined aspect.<sup>2</sup> They are, however, a timely issue: since the mid-1990s, in many developing countries a decline in external debt has been offset by a rising share of bank credit being absorbed by governments. Possible implications of large credit to government for the banking sector are thus also a key missing piece in the debate on

optimal debt structures (Eichengreen and Hausmann, 2005).

This paper examines the impact of the share of lending to the government in total bank credit, henceforth referred to as credit to government, on three aspects of banking sector performance: (i) its deepening over time, measured alternatively by liquid liabilities of banks and bank credit relative to GDP; (ii) its profitability, measured by the return on assets; and (iii) its productive efficiency, measured alternatively by a score calculated with Data Envelopment Analysis relative to an empirical production possibilities frontier and the inverse of the overhead/assets ratio. Bank deepening is examined in country-level panel and cross-section regressions for 142 advanced and developing economies, while profitability and efficiency are studied for a cross-section of more than 5000 bank-year observations.

The country regressions suggest a sizeable negative effect of credit to government on bank deepening in developing countries, but no impact in advanced economies. The bank regressions find that credit to government raises the profitability but reduces the efficiency of banks in developing countries. These findings are consistent with those in the most closely related prior study (La Porta et al., 2002)

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<sup>1</sup> E.g., Beck et al. (2003), Boyd et al. (2001), Chinn and Ito (2006), Claessens and Laeven (2003), Detragiache et al., (2005), King and Levine (1993), Levine (1997), Levine et al. (2000) and Rajan and Zingales (1998).

<sup>2</sup> In contrast to macro channels through which government debt affects financial development indirectly, namely crowding out (e.g., Caballero and Krishnamurthy, 2004) and inflation (e.g., Catão and Terrones, 2005).

which finds that government bank ownership leads to slower banking sector deepening and less efficient banking sectors. In advanced economies, there appears to be no impact on profitability but a positive one on efficiency.

In the rest of the paper, Section 2 presents the data and preliminary evidence on the relationship between credit to government and country characteristics, particularly economic growth; Sections 3 and 4, respectively, examine the impact of credit to government on bank deepening and profitability and efficiency; and Section 5 concludes with policy implications.

## 2. Data and preliminary evidence

This section introduces the main variables used in the country regressions, and presents preliminary evidence on the relationship between credit to government and country characteristics, particularly economic growth. The data for the bank regressions are discussed later in Section 4. See Appendix Table 1 for additional details on the country variables.

The main independent variable is credit to government (*GOV*), defined as the ratio of bank credit to government to total bank credit.<sup>3</sup> As most of the other macro data, it is drawn from the IMF *International Financial Statistics* (IFS). The main dependent variables are two measures of banking sector depth: the ratio of liquid liabilities of banks to GDP (*LIQUID*) and the ratio of bank credit to GDP (*BANK*). While there are other indicators of financial depth, *LIQUID* and *BANK* are most relevant here given our interest in the effect of government borrowing on banking sector performance. Moreover, they were shown by King and Levine (1993), henceforth KL, to have a causal effect on economic growth.

By way of motivation, it is useful to examine the characteristics of countries that tend to have higher *GOV*. Table 1 shows univariate regressions for the 142 countries in our sample, with separate results for the 115 developing economies.<sup>4</sup> All regressions include a constant that is not shown to save space. The results overall suggest that *GOV* tends to be higher in countries that are poorer and have slower per capita growth and higher external debt. Moreover, higher *GOV* tends to be associated with more trade restrictions, a larger role of the public sector in the economy and in the banking sector, and a less favorable banking environment, although these relationships are not always statistically significant. Finally, *GOV* tends to be higher in the middle east, but lower in countries with Socialist legal origin.

While we are mainly interested in the effect of credit to government on banking sector performance, preliminary

results suggest that the negative univariate effect of *GOV* on economic growth remains robust when standard control variables are included, although only for the developing countries. This negative effect is unsurprising, given the close relationship between *GOV* and credit to private sector, for which KL found the same result. Table 2 replicates KLS pooled OLS cross-section regressions of five-year average per capita income growth on period dummies and the initial values of various independent variables, to which we add *GOV*. While results are not fully comparable given our larger sample<sup>5</sup>, for the developing economies the coefficients on *GOV* are found to be similar (albeit statistically different) to those on the financial depth measures in KL and have the opposite sign, as it could be expected. However, for the advanced economies we find a positive effect, indicative of a dichotomy we will incur also later in the paper. Including KLS indicators one by one in addition to *GOV* does not alter the results, as shown in the three columns to the right.

However, while these results provide suggestive evidence confirming the implications of KLS results for the impact of *GOV* on growth, the main contribution of this paper lies in the yet unexplored effects of *GOV* on banking sector performance, to which we turn now.

## 3. Bank deepening

We examine the effect of *GOV* on banking sector deepening with a two-pronged empirical strategy that combines those in Boyd et al. (2001) and Chinn and Ito (2006). First, we estimate the following fixed effects panel specification with OLS for 1960–2005:

$$\frac{BD_t^j}{BD_{t-5}^j} - 1 = \alpha^j + \beta_1 GOV_{t-5}^j + \beta_2 BD_{t-5}^j + \beta_3 INCOME_{t-5}^j + \beta_4 INFLATION_{t-5}^j + \beta_5 MARGIN_{t-5}^j + \varepsilon_t^j \quad (1)$$

where *j* stands for a country; *BD* is a measure of banking sector depth, alternatively *LIQUID* and *BANK*; *INCOME* is log per capita income; *INFLATION* is the CPI growth rate; and (interest) *MARGIN* controls for the degree of competition.<sup>6</sup> These controls are the most important determinants of financial development identified by the literature (e.g., Boyd et al., 2001; Claessens and Laeven, 2003). Unit root tests reject non-stationarity for all variables.

Second, we use OLS for a cross-section of the 1980–2006<sup>7</sup> change in financial depth:

<sup>5</sup> We use 142 countries and 5-year averages, while KL use 119 countries and 10-year averages.

<sup>6</sup> We also would have liked to include the real interest rate level to control for financial crowding out, but it is too highly correlated with *MARGIN*. However, including the former instead of *MARGIN* leaves results unaltered.

<sup>7</sup> Actually the change between the 1980–1982 and 2004–2006 averages. The data before 1980 has too many gaps.

<sup>3</sup> In all macro regressions, *GOV* is adjusted for negative observations that can arise in the IFS data when the government's deposits exceed its borrowing; I owe this point to an anonymous referee.

<sup>4</sup> The country classification follows the list in the Appendix of the semi-annual IMF *World Economic Outlook*.

Table 1  
Country characteristics

	Developing countries		All countries	
<i>a. Macroeconomy</i>				
Per capita income	-1.82	(3.50)	-5.27*	(2.86)
Per capita growth	-1.46***	(0.45)	-1.43***	(0.45)
Public external debt	0.09*	(0.05)	0.09*	(0.05)
Fiscal deficit	-0.39	(0.44)	0.02	(0.44)
<i>b. Government intervention</i>				
Overall government intervention	-1.57	(1.64)	-1.15	(1.59)
Trade restrictions	2.54*	(1.36)	3.19***	(1.21)
Relative size of public enterprises	0.16	(0.33)	0.20	(0.33)
Government ownership in banks	6.68	(5.82)	8.19	(5.33)
<i>c. Ease of banking</i>				
Banking sector freedom	-0.57	(0.56)	-0.84	(0.53)
Cost of enforcement	0.07	(0.06)	0.10*	(0.06)
Credit information	-0.96	(0.96)	-1.10	(0.89)
Deposit insurance	0.49***	(0.18)	0.15*	(0.15)
Incidence of banking crises	0.84**	(0.33)	0.99***	(0.31)
<i>d. Region and legal origin</i>				
Africa	0.35	(3.23)	1.97	(3.10)
Europe	-1.85	(4.29)	-0.40	(4.23)
Middle east	9.60*	(5.38)	10.80**	(5.34)
South America	-3.23	(4.36)	-1.72	(4.30)
English legal origin	3.55	(3.62)	1.59	(3.27)
French legal origin	3.26	(3.22)	5.04	(3.05)
Socialist legal origin	-7.78**	(3.32)	-5.88*	(3.23)

Notes: Robust standard errors in parentheses. Significance levels \*\*\*1%, \*\*5%, and \*10%.

$$BD_t^j - BD_0^j = \beta_1 \overline{GOV^j} + \beta_2 BD_0^j + \beta_3 INCOME_t^j + \beta_4 \overline{INFLATION^j} + \beta_5 \overline{MARGIN^j} + \beta_6 X^j + \varepsilon^j. \quad (2)$$

Here, *GOV*, *INFLATION*, and *MARGIN* are given by their long-term average, similar to the treatment of inflation in Boyd et al. (2001). *X* stands for one of 16 institutional controls which are included one at a time to save degrees of freedom.<sup>8</sup>

The panel and the cross-section complement each other: the cross-section focuses on the long-run relationships that we are specifically interested in. However, it does not exploit the time-series dimension and does not control for possible omitted variable bias, which the panel does through the fixed effects. Moreover, the panel deals better with potential endogeneity by using growth rates during non-overlapping five-year windows on the left side and initial values on the right side. A Hausman test suggests that this approach successfully deals with endogeneity. Moreover, an alternative estimation with system GMM confirms the OLS results. While we follow the bulk of the literature in pooling advanced and developing economies, we allow the slopes for the two groups to vary for our key variable

<sup>8</sup> While these characteristics are time-invariant due to data constraints, they tend to change very slowly anyway.

Table 2  
Growth regressions

	Baseline	<i>LIQUID</i>	<i>BANK</i>	<i>PRIVY</i>
<i>GOV</i> * <i>DEV</i>	-0.02** (0.01)	-0.02* (0.01)	-0.02** (0.01)	-0.02** (0.01)
<i>GOV</i> * <i>ADV</i>	0.05*** (0.01)	0.07*** (0.02)	0.05*** (0.01)	0.05*** (0.01)
<i>LIQUID/BANK/PRIVY</i>		-2.2E-03 (0.00)	1.9E-03 (0.00)	1.5E-03 (0.00)
<i>INCOME</i>	-4.28*** (0.52)	-4.39*** (0.54)	-4.36*** (0.56)	-4.33*** (0.57)
<i>INFLATION</i>	5.7E-05 (0.00)	4.1E-05 (0.00)	6.2E-05 (0.00)	6.0E-05 (0.00)
<i>SECONDARY</i>	2.67*** (0.29)	2.72*** (-0.30)	2.67*** (0.29)	2.67*** (0.29)
<i>GOVEXP</i>	-0.03*** (0.01)	-0.03** (0.01)	-0.03*** (0.01)	-0.03*** (0.01)
<i>TRADE</i>	0.01*** (0.00)	0.01*** (0.00)	0.01*** (0.00)	0.01*** (0.00)
<i>R</i> <sup>2</sup>	0.27	0.26	0.27	0.27
<i>n</i>	611	545	611	611

Notes: Robust standard errors in parentheses. Significance levels \*\*\*1%, \*\*5%, and \*10%.

*GOV*, because the dichotomy found in Section 2 suggests that the effects may differ between the two groups.

The panel results are presented in Table 3 and they provide consistent evidence of a negative impact of *GOV* on banking sector deepening for the developing countries, but no clear results for the advanced economies. The table shows five specifications: the baseline with and without controls; two regressions that, respectively, allow the coefficients on *GOV* to vary for very high and very low values; and a system GMM estimation to double-check robustness against endogeneity. In all ten regressions, for the developing economies the coefficient on credit to government (*GOV*\**DEV*) is highly significant with a negative sign. However, for the advanced economies (*GOV*\**ADV*) the evidence is weak, as the coefficient is insignificant in all OLS regressions, and has the opposite sign for *LIQUID* and *BANK* in the GMM regressions where it becomes significant. We thus focus the following discussion on the developing countries.

The negative effect of *GOV* on bank deepening in developing countries is also economically significant. The coefficients in the table's panel b imply that an increase in *GOV* by 1% point reduces the 5-year growth rate by 0.3% points for *LIQUID*, and by 0.9% points for *BANK*. *GOV* also explains a substantial part of the variation in bank deepening, with an *R*<sup>2</sup> of 0.18 for *LIQUID* and 0.28 for *BANK* in the univariate regressions. (Including the controls increases the *R*<sup>2</sup> to about 0.4–0.5.)

We check for possible non-linear effects by including dummies for extreme values of *GOV* (more than one standard deviation from the mean). The high *GOV* dummy (panel c) increases the size of the *GOV*\**DEV* coefficients, while the low *GOV* dummy (panel d) reduces it. This suggests a similar negative effect of *GOV* on bank deepening

Table 3  
Country panel

	LIQUID		BANK	
<i>a. Baseline without control variables</i>				
<i>C</i>	22.07***	(2.75)	40.72***	(6.18)
<i>GOV* DEV</i>	-0.43***	(0.16)	-1.03***	(0.35)
<i>GOV* ADV</i>	0.26	(0.65)	-0.15	(0.28)
<i>R<sup>2</sup>, n</i>	0.18	722	0.28	813
<i>b. Baseline with control variables</i>				
<i>C</i>	-63.15*	(36.81)	-12.32	(57.65)
<i>GOV* DEV</i>	-0.31**	(0.15)	-0.94***	(0.27)
<i>GOV* ADV</i>	0.61	(0.52)	0.34	(0.41)
<i>FD<sub>0</sub></i>	-1.46***	(0.29)	-1.07***	(0.28)
<i>INCOME</i>	42.23***	(11.61)	27.74	(17.66)
<i>INFLATION</i>	-5.3E-03	(0.00)	1.7E-03	(0.00)
<i>MARGIN</i>	-6.2E-03	(0.01)	0.03***	(0.01)
<i>R<sup>2</sup>, n</i>	0.49	389	0.41	444
<i>S.E., Hausman test</i>	0.30	0.41	0.73	0.59
<i>p-value</i>				
<i>c. Non-linearity (I): excluding high GOV</i>				
<i>C</i>	-60.92*	(32.14)	-11.23	(50.04)
<i>GOV* DEV</i>	-0.43***	(0.14)	-1.05***	(0.30)
<i>GOV* ADV</i>	0.50	(0.40)	0.24	(0.40)
<i>FD<sub>0</sub></i>	-1.45***	(0.25)	-1.07***	(0.24)
<i>INCOME</i>	41.74***	(10.12)	27.75*	(15.10)
<i>INFLATION</i>	-5.3E-03	(0.00)	1.7E-03	(0.00)
<i>MARGIN</i>	-6.1E-03	(0.01)	0.03***	(0.01)
<i>Dummy high GOV</i>	5.31*	(3.08)	5.24	(8.93)
<i>R<sup>2</sup>, n</i>	0.49	389	0.41	444
<i>d. Non-linearity (II): excluding low GOV</i>				
<i>C</i>	-3.66	(4.16)	-2.95	(1.81)
<i>GOV* DEV</i>	-0.26*	(0.15)	-0.69***	(0.22)
<i>GOV* ADV</i>	0.64	(0.53)	0.43	(0.40)
<i>FD<sub>0</sub></i>	-1.46***	(0.29)	-1.07***	(0.29)
<i>INCOME</i>	43.5***	(11.16)	29.27	(18.07)
<i>INFLATION</i>	-5.1E-03	(0.00)	2.8E-03	(0.00)
<i>MARGIN</i>	-4.6E-03	(0.01)	0.04***	(0.01)
<i>Dummy low GOV</i>	12.55**	(5.95)	53.74**	(25.79)
<i>R<sup>2</sup>, n</i>	0.49	389	0.42	444
<i>e. Endogeneity: system GMM estimation</i>				
Lagged dependent variable	-25.41***	(0.10)	-3.38***	(0.05)
<i>GOV* DEV</i>	-0.46***	(0.01)	-1.01***	(0.00)
<i>GOV* ADV</i>	0.97***	(0.01)	-0.24***	(0.01)
<i>INCOME</i>	-21.12***	(0.23)	-23.27***	(0.07)
<i>INFLATION</i>	-0.01***	(0.00)	3.6E-5***	(0.00)
<i>MARGIN</i>	-0.01***	(0.00)	0.03***	(0.00)
<i>S.E., n</i>	0.32	268	0.43	312
Sargan test, m2 test	0.55	0.72	0.53	0.89
<i>p-values</i>				

Notes: Robust standard errors in parentheses. Significance levels \*\*\*1%, \*\*5%, and \*10%.

as the one of inflation found in Boyd et al. (2001): after the damage is done, additional increases in *GOV* above a critical threshold have a smaller marginal effect than below the threshold.

Although the Hausman test<sup>9</sup> (panel b) does not reject the null that *GOV* is exogenous, we double-check with

<sup>9</sup> The residuals from regressing *GOV* on the other independent variables are included as an additional regressor in the baseline specification. The Hausman *p*-value is the one on the *t*-statistic of these residuals.

Table 4  
Country cross-section

	LIQUID		BANK	
<i>a. Baseline without control variables</i>				
<i>C</i>	25.49***	(4.69)	39.71***	(10.60)
<i>GOV* DEV</i>	-0.42*	(0.24)	-0.81*	(0.41)
<i>GOV* ADV</i>	0.73*	(0.42)	1.66	(1.67)
<i>R<sup>2</sup>, n</i>	0.10	82	0.21	70
<i>b. Baseline with control variables</i>				
<i>GOV* DEV</i>	-0.46*	(0.23)	-0.88**	(0.41)
<i>GOV* ADV</i>	0.39	(0.46)	0.43	(1.98)
<i>BD<sub>0</sub></i>	0.21	(0.23)	0.19	(0.27)
<i>INCOME</i>	6.19**	(2.53)	11.65**	(4.42)
<i>INFLATION</i>	-4.8E-04	(0.01)	1.4E-02	(0.02)
<i>MARGIN</i>	-0.02	(0.02)	-0.21*	(0.12)
<i>R<sup>2</sup>, n</i>	0.16	77	0.29	66
Hausman test <i>p</i> -value	0.65		0.99	
<i>c. Non-linearity (I): dummy high GOV</i>				
<i>GOV* DEV</i>	-0.37	(0.43)	-0.42	(0.71)
<i>GOV* ADV</i>	0.49	(0.70)	0.96	(1.88)
<i>BD<sub>0</sub></i>	0.20	(0.23)	0.17	(0.25)
<i>INCOME</i>	5.97**	(2.39)	10.44**	(4.87)
<i>INFLATION</i>	1.8E-04	(0.01)	2.2E-02	(0.03)
<i>MARGIN</i>	-0.02	(0.02)	-0.25*	(0.14)
<i>Dummy high GOV</i>	-3.17	(14.75)	-16.81	(18.46)
<i>R<sup>2</sup>, n</i>	0.16	77	0.30	66
<i>d. Non-linearity (II): dummy low GOV</i>				
<i>GOV* DEV</i>	-0.59**	(0.29)	-0.92**	(0.35)
<i>GOV* ADV</i>	0.22	(0.45)	0.39	(1.99)
<i>BD<sub>0</sub></i>	0.19	(0.22)	0.18	(0.27)
<i>INCOME</i>	7.53**	(3.06)	12.12***	(3.95)
<i>INFLATION</i>	1.9E-03	(0.01)	1.5E-02	(0.03)
<i>MARGIN</i>	-0.03	(0.02)	-0.21	(0.14)
<i>Dummy low GOV</i>	-11.40	(7.76)	-3.39	(21.03)
<i>R<sup>2</sup>, n</i>	0.17	77	0.29	66

Notes: Robust standard errors in parentheses. Significance levels \*\*\*1%, \*\*5%, and \*10%.

the dynamic GMM estimator proposed by Arellano and Bover (1995) (panel e). The Sargan test of overidentifying restrictions and the m2 test of no second order serial correlation do not reject the null of consistency. The OLS results on *GOV\* DEV* remain virtually unchanged. This is also the case when the growth rates of *LIQUID* and *BANK* are replaced by the levels at the beginning of the next five-year window (not shown separately).

The results for the cross-section in (2) are shown in Table 4, and they confirm the panel results: the coefficient on *GOV\* DEV* is in most cases highly significant with a negative sign, while the one on *GOV\* ADV* is never significant. However, as the main deviation from the panel results, including the high *GOV* dummy (panel c) makes the *GOV\* DEV* coefficients insignificant, suggesting that only high levels of *GOV* have a statistically significant negative effect. There is tension between the cross-section and the panel on this point, but as the panel is more robust statistically, we regard its finding that increases in *GOV* beyond a certain threshold have a smaller marginal effect on bank deepening as more credible.

The coefficients in panel b imply that an increase in *GOV\* DEV* by 1% point reduces the 25-year bank deepening

Table 5  
Country cross-section with institutional controls

	<i>LIQUID</i>		<i>BANK</i>	
<i>Overall government intervention</i>	1.34	(2.41)	−6.85	(4.28)
<i>GOV*DEV</i>	−0.48*	(0.25)	−0.77**	(0.37)
<i>GOV*ADV</i>	0.45	(0.47)	0.28	(1.95)
<i>Trade restrictions</i>	3.60	(3.42)	−4.70	(3.14)
<i>GOV*DEV</i>	−0.61**	(0.28)	−0.65**	(0.32)
<i>GOV*ADV</i>	0.64	(0.43)	0.18	(1.98)
<i>Relative size of public enterprises</i>	−0.64**	(0.30)	−0.64**	(0.30)
<i>GOV*DEV</i>	0.01	(0.26)	0.04	(0.23)
<i>GOV*ADV</i>	−0.45	(0.49)	6.78***	(0.43)
<i>Government ownership in banks</i>	12.82	(21.13)	−18.69	(30.68)
<i>GOV*DEV</i>	−0.78*	(0.41)	−0.95	(0.72)
<i>GOV*ADV</i>	0.24	(0.48)	0.54	(1.91)
<i>Banking sector freedom</i>	−0.94	(1.11)	1.27	(2.01)
<i>GOV*DEV</i>	−0.46*	(0.24)	−0.84**	(0.38)
<i>GOV*ADV</i>	0.57	(0.45)	0.20	(2.13)
<i>Cost of enforcement</i>	−0.04	(0.09)	−0.20	(0.13)
<i>GOV*DEV</i>	−0.45*	(0.25)	−0.88**	(0.41)
<i>GOV*ADV</i>	0.40	(0.47)	0.46	(2.04)
<i>Credit information</i>	−3.15*	(1.67)	−5.05	(3.50)
<i>GOV*DEV</i>	−0.65***	(0.24)	−1.16**	(0.50)
<i>GOV*ADV</i>	0.23	(0.46)	0.09	(2.00)
<i>Deposit insurance</i>	−0.44	(0.34)	0.07	(0.54)
<i>GOV*DEV</i>	−0.48**	(0.23)	−0.88**	(0.43)
<i>GOV*ADV</i>	0.41	(0.45)	0.42	(2.01)
<i>Incidence of banking crises</i>	−0.02	(0.97)	−0.50	(0.83)
<i>GOV*DEV</i>	−0.47	(0.31)	−0.87**	(0.43)
<i>GOV*ADV</i>	0.38	(0.52)	0.45	(2.00)
<i>Africa</i>	−2.23	(5.94)	−0.63	(7.48)
<i>GOV*DEV</i>	−0.44*	(0.23)	−0.87**	(0.41)
<i>GOV*ADV</i>	0.38	(0.46)	0.43	(1.99)
<i>Europe</i>	−8.76	(16.67)	16.50	(11.14)
<i>GOV*DEV</i>	−0.46*	(0.24)	−0.88**	(0.41)
<i>GOV*ADV</i>	0.35	(0.47)	0.51	(2.01)
<i>Middle East</i>	−3.57	(10.52)	−4.10	(8.73)
<i>GOV*DEV</i>	−0.45*	(0.23)	−0.86**	(0.39)
<i>GOV*ADV</i>	0.36	(0.46)	0.39	(2.01)
<i>Latin America</i>	−10.26*	(5.81)	−24.59**	(10.50)
<i>GOV*DEV</i>	−0.56**	(0.26)	−1.10**	(0.47)
<i>GOV*ADV</i>	0.15	(0.47)	−0.07	(1.94)
<i>English legal origin</i>	6.76	(5.74)	−1.77	(8.74)
<i>GOV*DEV</i>	−0.49*	(0.26)	−0.87**	(0.40)
<i>GOV*ADV</i>	0.28	(0.44)	0.45	(1.97)
<i>French legal origin</i>	−4.59	(6.52)	−16.09*	(8.51)
<i>GOV*DEV</i>	−0.45*	(0.23)	−0.81**	(0.37)
<i>GOV*ADV</i>	0.24	(0.50)	0.02	(1.96)
<i>Socialist legal origin</i>	17.07	(36.77)	−5.80	(13.01)
<i>GOV*DEV</i>	−0.46*	(0.24)	−0.88**	(0.41)
<i>GOV*ADV</i>	0.44	(0.43)	0.43	(1.99)

Notes: Robust standard errors in parentheses. Significance levels \*\*\*1%, \*\*5%, and \*10%.

which are 0.4% points for *LIQUID* and 1.3% points for *BANK* when based on the same time period as the cross-section.<sup>10</sup> They are sizeable, implying that an increase from the first to the third quartile of *GOV* (by 0.15) corresponds to a slowing of financial deepening over 25 years by about 6% points for *LIQUID* and 16% points for *BANK*. This is one third to half of the deepening achieved by the average country during 1980–2006.

We add controls for the degree of government intervention in the economy, ease of banking, region, and legal origin – the institutional aspects most consistently identified as significantly associated with financial development in the literature. As Table 5 shows<sup>11</sup>, only two controls materially reduce the significance of *GOV*: the relative size of public enterprises and government ownership in banks. To make sure that *GOV* still has an independent effect on financial depth, we include these two controls in the first-stage regression of the Hausman test. As shown in Table 4 (panel b), the test does not reject the null that *GOV* is exogenous.

In sum, the results for the developing countries consistently point to a statistically and economically significant negative effect of credit to government on bank deepening, while no significant effects in either direction are found for advanced economies. We now examine the potential effects of credit to government on individual banks' profitability and efficiency.

#### 4. Profitability and efficiency

To explore the effects of *GOV* on bank performance at the micro level, we add it to standard models<sup>12</sup> of profitability and (productive) efficiency. Profitability (*PROFIT*) is defined as the return on assets. Efficiency is alternatively measured by a Data Envelopment Analysis (DEA)<sup>13</sup> score (*EFF1*) and by the inverse overhead/assets ratio (*EFF2*); the former is better grounded in theory, while the latter is more intuitive. The zero/one-bounded DEA score is calculated relative to an empirical production possibilities frontier; our interest in productive efficiency suggests the value-added model (Berger et al., 1987) with interest and

<sup>10</sup> To make the panel effect (loss in five-year growth rate) comparable to the cross-section, it is compounded by five. The resulting 25-year loss in growth is multiplied with the average initial level of financial depth.

<sup>11</sup> The additional controls are added to the specification in Table 4b, but not all coefficients are shown.

<sup>12</sup> See, for example, Goddard et al. (2004) for profitability and Demirgüç-Kunt et al. (2004) for efficiency.

<sup>13</sup> DEA is a linear-programming method frequently used in bank efficiency measurement; see, e.g., Drake et al. (2006) and Sturm and Williams (2004). See Coelli (1996) for the specific model and computer program used. We calculate input technical efficiency under variable returns to scale using the multi-stage approach. The frontier is calculated for the pooled observations. It may have been preferable to calculate it separately by country, but it is well-known that DEA is sensitive to degrees of freedom, which precludes pooling DEA scores from frontiers calculated based on very different sample sizes. The DEA scores are available upon request.

ing by 0.5% points for *LIQUID* and by 0.9% points for *BANK*. These values are similar to those in the panel,

Table 6  
Bank cross-section

	<i>PROFIT</i>		<i>EFF1</i>		<i>EFF2</i>	
<i>C</i>	0.74*** (0.03)	−0.537*** (0.053)	0.11*** (1.3E-03)	0.119*** (0.002)	0.42*** (0.01)	0.573*** (0.022)
<i>GOV</i> * <i>DEV</i>	0.04*** (2.9E-03)	0.018*** (0.003)	−2.4E-03*** (1.2E-04)	−0.001*** (0.000)	−6.4E-03*** (1.1E-03)	−0.004*** (0.001)
<i>GOV</i> * <i>ADV</i>	−0.03*** (5.0E-03)	0.004 (0.005)	1.9E-03*** (2.1E-04)	0.001*** (0.000)	0.02*** (1.9E-03)	0.008*** (0.002)
<i>MARGIN</i>		0.178*** (0.008)		−0.004*** (0.000)		−0.041*** (0.003)
<i>CAPITAL</i>		0.033*** (0.004)		0.001*** (0.000)		−0.003** (0.001)
<i>LIQUIDITY</i>		−0.001 (0.002)		−2.0E-04*** (0.000)		0.006*** (0.001)
<i>OBS</i>		0.150*** (0.01)		−0.007*** (0.000)		−0.060*** (0.004)
<i>SIZE</i>		8.2E-09*** (0.000)		1.9E-09*** (0.000)		4.4E-09*** (0.000)
<i>R</i> <sup>2</sup>	0.05	0.26	0.11	0.36	0.04	0.16
<i>n</i>	5,389	5,389	5,389	5,389	5,389	5,389

Notes: Robust standard errors in parentheses. Significance levels \*\*\*1%, \*\*5%, and \*10%.

non-interest expense as two inputs, and net loans and deposits as two outputs.<sup>14</sup>

We add standard controls: (i) net interest *MARGIN* to proxy competition; (ii) *CAPITAL*, as higher capitalized banks need a higher return on assets and higher efficiency to reach a given return on capital; (iii) *LIQUIDITY*, as more liquid assets tend to yield a lower return, but also tend to require less non-interest inputs than loans; (iv) *OBS* for off-balance-sheet activities, which tend to be highly profitable, but also imply higher administrative costs; and (v) *SIZE*, which may affect profitability and efficiency through market power and economies of scale. See Appendix Table 2 for details on the variables. We estimate

$$\begin{aligned}
 \text{Performance}_i = & \alpha + \beta_1 \text{GOV}_i + \beta_2 \text{MARGIN}_i \\
 & + \beta_3 \text{CAPITAL}_i + \beta_4 \text{LIQUIDITY}_i \\
 & + \beta_5 \text{OBS}_i + \beta_6 \text{SIZE}_i + \varepsilon_i,
 \end{aligned} \quad (3)$$

jointly for the three performance measures as a SUR system, where *i* stands for a bank.<sup>15</sup>

We use 5389 bank-year observations from all banks available in Bankscope for 2001–2003.<sup>16</sup> As in the country regressions, *GOV* is interacted with dummies for developing and advanced economies which each account for about

<sup>14</sup> The two most frequently used alternatives are less adequate: the intermediation approach ignores costs; the operating approach uses income as output, mixing productive efficiency with other influences on profitability. Net loans (i.e., excluding loan loss provisions) are used to account for credit quality, in line with the literature.

<sup>15</sup> Truncated regressions, which are most suitable for the zero/one-bounded *EFF1*, yield very similar results.

<sup>16</sup> While Bankscope lists more banks, many do not report credit to government separately. Outliers for which the value of at least one variable is more than two standard deviations away from the median are excluded.

half of the banks. Table 6 shows for each dependent variable a regression that only includes the constant and *GOV*, plus the full specification. Almost all controls are highly statistically significant with the expected signs.

The regressions suggest that in developing countries banks that are lending more to the government tend to be more profitable but less efficient.<sup>17</sup> These effects are statistically highly significant and consistent across specifications. The coefficients in the regressions including controls imply that an increase in *GOV* by 1% point raises *PROFIT* by 1.8 basis points, while it reduces *EFF1* (the DEA score) by 0.1 basis points and *EFF2* by 4 basis points. Although not large, these effects make a notable difference when comparing banks with substantially different levels of credit to government: an increase in *GOV* from the first to the third quartile (by 14% points) implies an increase in *PROFIT* by 26 basis points, a decline in *EFF1* by 1.3 basis points, and a decline in *EFF2* by 6 basis points.

In contrast, for banks in advanced economies we do not find a statistically significant effect of *GOV* on *PROFIT*, but a positive effect on both efficiency measures. This contrast between developing and advanced economies echoes the one we found above for bank deepening. However, an examination of the underlying differences between developing and advanced economies that drive this dichotomy in the impact of credit to government on banking sector performance is beyond the scope of this paper and a task for future research.

<sup>17</sup> Because we look at productive efficiency here, a bank may well be less efficient but still be more profitable than another one: productive inefficiency that raises costs could be more than compensated by higher income.

Table A1  
Macro variables

Variable	Description and sources	Mean, St. Dev.
Credit to government ( <i>GOV</i> )	Credit to government (IFS lines 22a – b + 42a – b) in percent of <i>BANK</i> : (1) 2003–2005 mean (2,3) Initial value of 5-year period (4,5) 1980–2006 mean	19.4, 16.2 16.2, 15.0 17.6, 12.8
Liquid liabilities of banks in percent of GDP ( <i>LIQUID</i> )	Currency + demand deposits + interest-bearing liabilities (IFS line 551 or IFS lines 34 + 35) in percent of GDP (WEO line NGDP): (2–4) Initial value (3) 5-year growth rate in percent (4,5) Change from 1980–82 average level to 2004–2006 average level	37.9, 30.8 16.9, 39.4 19.8, 27.1
Bank credit in percent of GDP ( <i>BANK</i> )	Bank credit (IFS lines 22 + 42), percent of GDP (WEO line NGDP): (2–4) Initial value (3) 5-year growth rate in percent (4,5) Change from 1980–1982 average level to 2004–2006 average level	42.1, 38.8 27.8, 75.9 31.8, 43.1
Per capita income ( <i>INCOME</i> )	Log of GNI per capita in US-dollars at PPP (WEO line PPPPC): (1) 2003–2005 mean (2–4) Initial value of 5-year period (5) Initial value	3.8, 0.50 3.5, 0.5 3.4, 0.5
Inflation rate ( <i>INFLATION</i> )	CPI growth rate in percent (WEO line PCPI): (2–4) Initial value of 5-year period (5) 1980–2006 mean	49.9, 472.9 72.9, 190.6
Interest margin ( <i>MARGIN</i> )	Mean spread between lending and deposit rates (IFS lines 60p, 60l): (3,4) Initial value of 5-year period (5) 1980–2006 mean	19.6, 191.1 18.9, 86.9
Per capita GDP growth ( <i>GROWTH</i> )	Annual percent change in <i>INCOME</i> : (1) 1995–2004 mean (2) 5-year mean	3.0, 3.7 2.0, 4.1
Bank credit to private sector in percent of GDP ( <i>PRIVY</i> )	Private sector credit (IFS lines 22d + 42d) in percent of GDP (WEO), initial value of 5-year period	35.1, 33.0
Secondary school enrolment ( <i>SECONDARY</i> )	Log of secondary school enrolment rate in percent (World Bank, World Development Indicators), initial value of 5-year period	59.1, 33.4
Government spending ( <i>GOVEXP</i> )	Government expenditure (WEO line GCENL) in percent of GDP (WEO line NGDP), initial value of 5-year period	26.5, 18.3
Openness ( <i>TRADE</i> )	Imports + exports (WEO lines NM + NX) in percent of GDP (WEO line NGDP), initial value of 5-year period	72.8, 63.2
Public external debt	Public external debt (WEO line D), percent of GDP, 2003–2005 mean	50.4, 37.3
Fiscal deficit	General government primary balance (WEO line GGBXI) in percent of GDP (WEO line NGDP), 1995–2004 mean	–0.6, 3.4
Overall government intervention	Index from 1 to 5, where higher values imply more intervention, 2003 (Heritage Foundation, 2005)	3.0, 1.0
Trade restrictions	Index from 1 to 5, where higher values imply more restrictions, 2003 (Heritage Foundation, 2005)	3.3, 1.2
Relative size of public enterprises	Value-added of state-owned enterprises in percent of GDP, average of 1978–1991 (World Bank, 1995)	3.2, 8.2
Government ownership in banks	Share of the assets of the top 10 banks in a given country owned by the government of that country, 1995 (La Porta et al., 2002)	0.4, 0.3
Banking sector freedom	Index from –5 to 5, where higher values imply less freedom, 2003 (Heritage Foundation, 2005)	–0.3, 3.0
Cost of enforcement	Cost of enforcing a contract in percent of debt, 2005 (World Bank, 2005)	25.3, 24.5
Credit information	Index from 0 to 6, where higher values imply better credit information, 2005 (World Bank, 2005)	3.0, 2.1
Deposit insurance	Number of years of existence of deposit insurance (Demirgüç-Kunt and Sobaci, 2001)	8.3, 12.0
Incidence of banking crises	Number of years from 1970 to 2002 during which the banking sector was in a systemic crisis, with small or borderline crises counted as half a year (Caprio and Klingebiel, 2003)	4.6, 4.4
Legal origin	Dummy (La Porta et al., 2002)	–

Notes: For variables that are appear in more than one table, the numbers (1–5) refer to the respective tables. IFS–IMF *International Financial Statistics*, WEO–IMF *World Economic Outlook Database*.

Table A2  
Micro variables

Variable	Description and source	Mean, St. Dev.
<i>PROFIT</i>	Return on average assets in percent (Bankscope)	0.7, 6.4
<i>EFF1</i>	Inverse of non-interest expense in percent of average assets (Bankscope)	5.3, 6.8
<i>EFF2</i>	Technical efficiency score calculated by DEA (see text)	0.1, 0.2
<i>GOV</i>	Sum of loans to municipalities and government, government securities, and treasury bills in percent of total assets (Bankscope)	11.0, 13.3
<i>MARGIN</i>	Net interest margin (Bankscope)	4.8, 6.7
<i>CAPITAL</i>	Equity in percent of total assets (Bankscope)	10.9, 16.0
<i>LIQUIDITY</i>	Liquid assets in percent of total assets (Bankscope)	32.3, 20.7
<i>OBS</i>	Other operating income in percent of total assets (Bankscope)	2.6, 6.6
<i>SIZE</i>	Total assets in billions of US-dollars (Bankscope)	15.0, 78.0

## 5. Conclusion

The paper examined the effects of credit to government on bank performance. Country regressions found a statistically and economically significant negative effect of credit to government on banking sector deepening in developing countries, but no impact in advanced economies. Bank regressions suggested that credit to government raises the profitability but reduces the efficiency of banks in developing countries, while in advanced economies there appeared to be no impact on profitability but a positive one on efficiency.

The findings have important policy implications, as they suggest underappreciated additional costs of large fiscal deficits in developing countries, working through the impact of government borrowing on the performance of the banking sector. The literature points to a number of such costs: first, lower financial depth tends to reduce economic growth; second, underdeveloped financial sectors can force financial openness upon an economy, raising the susceptibility to capital account crises (Aizenman and Noy, 2003); and, third, poor financial development tends to amplify financial crowding out (Caballero and Krishnamurthy, 2004). These effects need to be taken into consideration in determining the costs and benefits of running government deficits and of the domestic versus external financing of these deficits.

The effects of government borrowing on the financial sector are a fertile field for future research. Issues worth exploring but beyond the scope of this paper include the theoretical underpinnings of the effects of credit to government on banking sector performance; the reasons for the dichotomy between developing and advanced economies that was found here; and effects of government debt on the non-bank financial sector.

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## Appendix. Variables

See Tables A1 and A2.

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