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## By how much does conflict reduce financial development?

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**WIDER**

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Discussion Paper No. 2002/48

## **By How Much Does Conflict Reduce Financial Development?**

Tony Addison<sup>1</sup>, Abdur R. Chowdhury<sup>2</sup>  
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May 2002

### **Abstract**

Financial development is vulnerable to social conflict. Conflict reduces the demand for domestic currency as a medium of exchange and a store of value. Conflict also leads to poor quality governance, including weak regulation of the financial system, thereby undermining the sustainability of financial institutions. Conflict therefore reduces the social return to financial liberalization and other financial-sector reforms. This paper presents a theoretical model integrating the effects of conflict and financial liberalization, and then tests the model on data for 79 countries. Using an explanatory variable that measures the intensity of conflict (from low to high) the results show that conflict significantly reduces financial development, and that this negative effect increases as conflict intensifies. The paper concludes that conflict reduction is essential if financial reform is to have its full benefit for development.

Keywords: financial development, conflict, financial regulation

JEL classification: O16, O23

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## 1 Introduction

Financial development is often discussed as if it is merely a technical process that can be organized in a social vacuum. However, the increasing use of money in transactions and as a store of value, together with the creation of financial instruments that intermediate between lenders and borrowers, are all examples of institution-building. And building good institutions requires a measure of social stability. Unfortunately, violence is a fact of life for many people in the developing world: the last ten years or so have seen 56 major armed conflicts in 44 different locations (Sollenberg and Wallensteen 2001). Most of these are civil wars in low-income developing countries and countries in transition in Eastern Europe and the former Soviet Union.

Conflict has two major effects on the domestic financial system. First, it lowers confidence in the domestic currency: people fear the high inflation (often hyperinflation) that is frequently associated with conflict (as the authorities loosen fiscal and monetary policy to finance war, or lose control of the supply of currency). The currency also tends to depreciate in these circumstances (either through devaluation of the official exchange rate or, if the latter is inflexible, through a depreciation in the parallel-market rate). The demand for domestic currency therefore falls, and the demand for other stores of value (precious metals, foreign currency, and real assets) rises. Examples of the loss of confidence in the domestic-currency during civil war include the Confederacy in the American civil war and, more recently, Afghanistan, Angola, Zaire (now the Democratic Republic of the Congo), and the former Yugoslavia.

Second, conflict undermines governance, one dimension of which is the prudential regulation and supervision of the financial system (Addison 2002). Legislation to protect the public interest is either not forthcoming or it is not enforced. Unsound banks are licensed, and unsound lending practices are not restrained. The resulting financial crises undermine public confidence in the formal financial system, and the use (and availability) of formal financial-instruments contracts (savings accounts in particular).<sup>1</sup> While any society can suffer from a failure of financial regulation, conflict-affected countries are especially vulnerable because democratic oversight of public policy is often weak (Addison *et al.* 2001a, 2001b).

It is important to note that conflict takes many forms and that its *intensity* varies. This can range from infrequent guerrilla attacks that inflict relatively minor damage on a country's institutions and economy to a full-blown civil war involving protracted and extended fighting together with mass population displacement. We would therefore expect a conflict's negative effects on the financial system to vary with its intensity.

We can also expect conflict to influence the effectiveness of financial-sector reform, in particular reform's benefits will tend to fall as conflict intensifies. Any positive effect on savings and investment from the liberalization of ceilings on savings and loan rates

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<sup>1</sup> For example, as a result of conflict and financial repression in the 1970s and 1980s the ratio of M2/GDP in Uganda fell from about 25 per cent in the early 1970s to only 6 per cent in 1991, and the ratio of credit to GDP declined from 18 per cent to 4 per cent over the same period (Aleem and Kasekende 1999: 4).

will be weakened, and probably offset entirely in countries suffering a high intensity of conflict since the public's willingness to hold financial-instruments denominated in domestic currency will decline strongly. Conflict will also impede the enforcement of any new legislation or the use of any new institutional mechanisms to improve the prudential supervision of the financial system. In summary, the social returns to financial reform are likely to be lower in societies affected by conflict than in stable societies.

This paper addresses the issues beginning, in section 2, with a theoretical framework. Our framework uses Tobin's (1969) portfolio-balance model to analyse the choices that agents make in holding domestic currency versus alternative stores of value (such as precious metals, foreign currency, and other hedges) in conflict-affected countries. The model is also used to explore the impact of financial liberalization in a conflict context. Section 3 then explores the issue empirically, with a test of the model on data for 79 countries. Since the *intensity* of conflict is important (and not just whether the country is in conflict or not), our empirical model includes an explanatory variable which measures conflict intensity from high to low. We find that conflict significantly reduces financial development, and that this negative effect is increasing in conflict's intensity. The paper concludes, in section 4, that conflict resolution is essential if financial reform is to have its full benefit for development.

## 2 Theoretical framework

This section provides the *motivating* model for the econometric estimations below. It is based upon the classic Tobin (1969) multi-asset or portfolio-balance model. In this setting, various assets (stores of value) are gross substitutes for each other, provided there are three or more assets. The analysis in this section also draws on Taylor's (1983, chapter 5) extension of the Tobin model for developing countries.

Under the Tobin portfolio-balance approach, macroeconomic policy (monetary or fiscal) functions by altering the composition of the portfolios of wealth-holders. Policies are deemed successful, in terms of increasing investment demand and national income, if they induce a greater holding of real productive assets such as capital. In a setting of several assets much hinges on the relative substitutability among different assets that are gross substitutes.

Following Taylor (1983, chapter 5) total wealth ( $W$ ) is composed of three assets: physical capital ( $K$ ), domestic money ( $H$ ) and 'gold' ( $Z$ ) which is a *hybrid* asset (consisting of such items as precious metals and foreign currency):<sup>2</sup>

$$W = PK + H + P_z Z \tag{1}$$

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2 The hybrid asset 'gold' ( $Z$ ) includes items whose holding is motivated by the prospects of appreciation. It might also be extended to include investment in real estate, although this is less relevant in conflict zones.

$P$  and  $P_z$  represent the market prices of capital and ‘gold’ respectively. Equation (1) corresponds to the adding-up condition for total wealth.<sup>3</sup> The stock of capital ( $K$ ) is fixed during the period of analysis.

$H$  is high-powered money, equivalent to commercial bank reserves. For the sake of simplicity, commercial banks are assumed to lend only to firms to finance working capital ( $Q$ ). But the public deposit money with banks ( $D_p$ ), as do firms ( $D_f$ ). Thus deposits with banks’ are:

$$H = c(D_p + D_f), D_f = Q \quad (2)$$

$Q$  represents financing of working capital, the purchase of intermediate inputs and the payment of wages by firms’ in a cash-in-advance situation, and  $c$  represents the central bank imposed reserve requirements on bank deposits,  $c < 1$ . Bank loans take the form of advances to firms. Firms also borrow from the informal market, household wealth owners in our model.

A key assumption of the model is that the interest rate ( $r$ ) that clears the market for bank loans (made only to firms) is endogenous, whereas the interest rate on deposits in banks ( $r_d$ ) is an exogenous policy parameter. Raising the deposit rate is equivalent to financial liberalization, and may induce new commercial bank entry. There could, however, be a greater risk associated with a higher deposit rate ( $\rho$ ) accompanying financial liberalization due to the lack of appropriate prudential bank regulation (see Murshed and Subagjo 2002). The demand function for deposits made by the public may take the form:

$$D_p = h(r, r_d - \rho, \pi)W \quad (3)$$

The public holds a fraction of total wealth in bank deposits, whose real return is  $r_d - \pi_h$  (monetary inflation). The parameter  $\pi$  represents the relative appreciation of the value of ‘gold’,  $\pi_z$  relative to monetary inflation  $\pi_h$ :  $\pi = \pi_z - \pi_h$ . We postulate that  $h_1 < 0$ , the partial derivative of the demand for deposits is negatively related to loan market clearing rate, as household wealth holders lend directly to firms. The partial derivative with respect to the deposit rate is positive ( $h_2 > 0$ ), moderated by a risk factor. The demand for deposits with banks will be declining in the relative rate of ‘gold’ appreciation,  $h_3 < 0$ .

Equilibrium in the loan market (zero excess demand) takes the following form:

$$h(r, r_d - \rho, \pi)W + Q - \frac{H}{c} = 0 \quad (4)$$

The first term represents the public’s demand for deposits in the commercial banking sector, the second term firms’ working capital advances from banks that are re-deposited less supply (the last term). The loan market clears in the loan interest rate  $r$ .

In the ‘gold’ market equilibrium takes the following form:

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<sup>3</sup> The sum of the partial derivatives of the three assets with respect to wealth must equal unity.

$$g(r, r_d - \rho, \pi)W - P_z Z = 0 \quad (5)$$

The  $g(\cdot)$  function represents demand for ‘gold’. We would expect the demand for ‘gold’ to fall as the net bank deposit rate rises ( $g_2 < 0$ ), also for demand to rise as the asset is expected to appreciate ( $g_3 > 0$ ), but we postulate that  $g_1$  is ambiguous in sign.

The equilibrium condition for the third asset can be dropped by Walras’s law. Totally differentiating (4) and (5) and arranging the results in matrix form we obtain:

$$\begin{bmatrix} h_1 W & 0 \\ g_1 W & -1 \end{bmatrix} \begin{bmatrix} dr \\ dP_z \end{bmatrix} = \begin{bmatrix} -h_3 W & (1-h_2)W \\ -g_3 W & (1-g_2)W \end{bmatrix} \begin{bmatrix} d\pi \\ d(r_d - \rho) \end{bmatrix} \quad (6)$$

The trace of the Jacobian is  $-1 + h_1 W < 0$ , and the determinant ( $DET$ ) =  $-h_1 W > 0$ . Therefore, the model is stable.<sup>4</sup>

We are now in a position to carry out some comparative statics exercises. We consider two: an increase in conflict, and financial liberalization.

First of all, conflict, civil war, poor governance and political unrest raises the rate of appreciation of ‘gold’ ( $\pi$ ):

$$\frac{dr}{d\pi} = \frac{h_3 W}{DET} < 0 \quad (7)$$

and

$$\frac{dP_z}{d\pi} = \frac{[h_3 g_1 - h_1 g_3] W^2}{DET} > 0 \text{ if } g_1 < 0, \text{ when } g_1 > 0, h_1 g_3 > h_3 g_1 \quad (8)$$

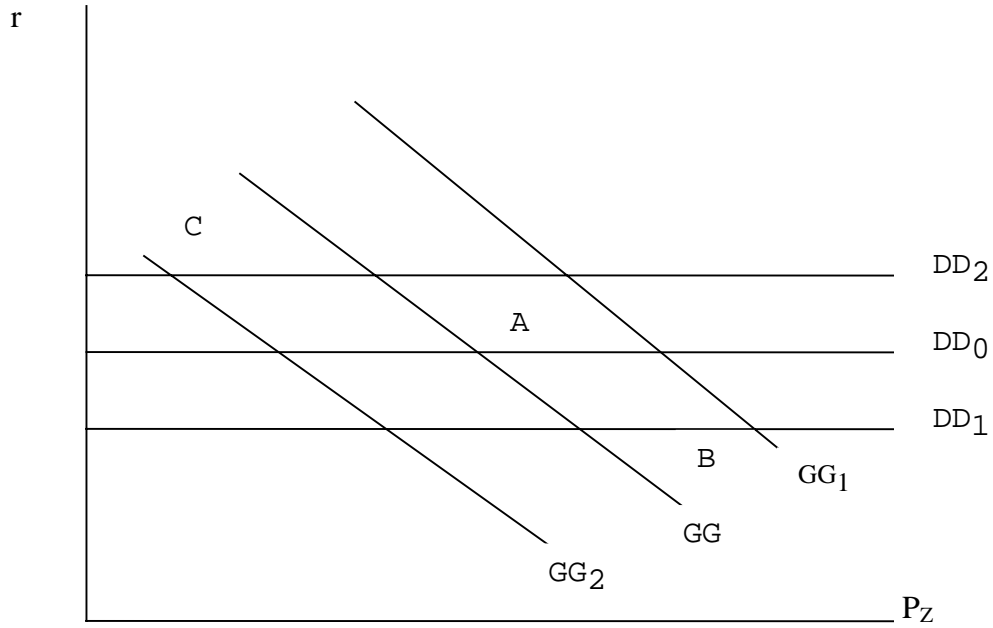
An increase in the relative attractiveness of ‘gold’ will lower the equilibrium loan rate in (7). This is because of a fall in the demand for bank deposits, as well as a decline in the demand for loans, or working capital, by firms. As far as the equilibrium price of ‘gold’ is concerned (8) we expect it to increase, if  $g_1 < 0$ . This means that as the loan rate increases, there is a movement away from both ‘gold’ and bank deposits so as to be able to lend directly (or informally) to firms. This represents normality, and is more likely to be the case in a more peaceful and stable society that is on a sustained high growth path. If, however,  $g_1 > 0$ , it implies that increases in loan rates encourage more ‘gold’ holding in addition to direct loans to firms. The decline in bank deposits, as a result of an appreciation in ‘gold’ values, is more dramatic in this case. This is more probable in unstable, badly managed and conflict-ridden nations. It might be argued that even in some countries with low-intensity conflict,  $g_1 < 0$ , especially during times of relative peace. We could refer to  $g_1 > 0$ , as a situation of severe or *intense* conflict. The equilibrium price of ‘gold’,  $P_z$  will also rise when  $g_1 > 0$ , as own price effects dominate cross price effects.

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4 The alert reader will have noticed that we do not allow total wealth,  $W$ , to alter in our analysis in (6). This is because we are interested in alterations to the *composition* of wealth, and not the level of wealth, induced by substitution effects.

These results are depicted in Figure 1 in  $r$  and  $P_z$  space. The horizontal DD schedule displays equilibrium in the bank deposit market. The GG schedule depicts equilibrium in the ‘gold’ market. It is downward sloping if  $g_1 < 0$  (less conflict), which is the stable case and depicted in Figure 1. The initial equilibrium is at point A. An increase in the relative return on ‘gold’, shifts the DD schedule downwards, and the GG rightwards with the new equilibrium at point B showing lower levels of  $r$  and  $P_z$ .

Figure 1  
Asset market responses to conflict and financial liberalization



We now turn to the second of our comparative statics exercises: financial liberalization: examples from conflict affected countries include Ethiopia and Mozambique. A key component of financial liberalization is the lifting of interest-rate ceilings on deposit accounts. This amounts to an increase in the bank deposit rate in our model:

$$\frac{dr}{dr_d} = \frac{(h_2 - 1)W}{DET} > 0 \text{ if } \frac{(h_2 - 1)}{(h_2 - 1)} > 0 \quad (9)$$

and

$$\frac{dP_z}{dr_d} = \frac{W^2[(h_2 - 1)g_1 + (1 - g_2)h_1]}{DET} < 0 \text{ if } (h_2 - 1) > 0, g_1 < 0 \quad (10)$$

$> 0 \text{ only if } (h_2 - 1) > 0, g_1 > 0$

Successful financial liberalization is meant to attract a greater volume of bank deposits, and eventually encourage greater lending by formal sector banks to firms. It should also induce a movement away from ‘gold’. The ultimate objective is to improve the process of financial intermediation. This in turn should push up the loan market rate,  $r$ , an effect that is reinforced if output and the demand for working capital by firms increases. There will be two effects in operation at this juncture. The first is to do with the rise in deposit rates ( $r$  in equation 9). The rise in the deposit rate will also raise the risk associated with



holding such an asset under conditions of conflict and poor prudential bank regulation. If the attractiveness of the return on bank deposits exceeds the increased risk associated with such an activity ( $h_2 - 1 > 0$ ), then there is successful financial liberalization,  $dr/dr_d > 0$  in (9). Secondly, the move away from ‘gold’ associated with  $P_z$  in equation (10). In addition to the condition just stated a movement away from ‘gold’ will be successful in (10) if  $g_1 < 0$ , as in less conflict ridden countries. Also, the reduction in ‘gold’ holdings is greater the closer ‘gold’ is a substitute for bank deposits. The effects of successive financial liberalization are illustrated in Figure 1 by a leftward shift in the GG schedule and an upward movement of the DD schedule. The new equilibrium is at point C associated with higher  $r$  and lower  $P_z$ .

### 3 Econometric investigation

#### 3.1 The choice of variables

We now proceed to test our model on a sample of 79 countries. The choice of countries is strictly determined by the availability of consistent data on all the variables. We consider five types of variables in the estimation process: the financial variable, conflict variable, control variables, governance indicators, and other explanatory variables. As we have no data for a cross-section of countries on the second hybrid asset ‘gold’ we focus on one asset, deposit money in banks. A fall in the demand for this asset, as a result of conflict along with poor governance, implies an increased demand for the other asset ‘gold’ (given our assumption that the third asset in our model, the physical capital stock, is constant during the period of analysis).

Two alternative measures of financial development are considered: BANK and DEPTH. The variable BANK emphasizes the risk sharing and information services that banks are most likely to provide. It is measured as deposit money bank domestic assets divided by deposit money bank domestic assets plus central bank deposit assets. An alternative variable, DEPTH, measured as the ratio of M2 to GDP, is also used as a proxy for the overall size of the formal financial intermediary sector.<sup>5</sup> The dependent financial variable will capture the effects of conflict on the demand for bank deposits as an asset, as well as the impact on this asset demand of liberalization via various governance variables.

The CONFLICT variable refers to the use of armed force between two parties, of which at least one is the government of a state, resulting in at least 25 battle-related deaths. Fifty-one countries in the sample are categorized as conflict countries. Depending on the intensity of the conflict, we allow for three conflict categories: Low, Medium, and High corresponding to the alpha-numeric ranking 1, 2, and 3, respectively. From our sample, 29 per cent of countries are high conflict nations, 22 per cent medium conflict, and 14 per cent low conflict countries. The remaining 35 per cent of the sample include countries with no conflict. These countries are assigned a rank of zero.

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5 Estimation results using the DEPTH variable are similar to those derived from using the BANK variable. Since the BANK variable fits well with the theoretical model derived in the earlier section, only the estimation results using the BANK variable are reported. Results for the DEPTH variable are available from the authors.

Per capita GDP (PCGDP) is the control variable. The rationale for using per capita GDP as a control variable is straightforward: richer nations tend to have better scores in governance indicators, and to have more solid and mature financial institutions.

The indicators of governance capture the likely impact of financial liberalization in the context of risk and prudential regulation prevailing in that country ( $\rho$  in the theoretical section above). They not only show how governments are elected, monitored and replaced, but also their capacity to formulate and implement public policies effectively as well as the attitude of the electorate and their representatives toward the institutions that govern economic, political, and social interactions. Following Kaufmann *et al.* (1999a, 1999b), five categories of governance indicators are used in this study: graft, rule of law, government effectiveness, regulatory burden, and voice and accountability. Graft and rule of law represents the respect of citizens and the state for the institutions that govern their interactions. Government effectiveness and regulatory burden, on the other hand, represent the government's ability to formulate and implement sound policies; while voice and accountability measure the process by which those in authority are elected and replaced (see also de Mello and Barenstein 2001). The governance variables range from  $-2.5$  to  $2.5$ , where a positive number indicates good, or relatively good, governance.

The government budget deficit/surplus as a ratio of GDP (BUDGET) and the foreign exchange regime (EXCH) are also included as explanatory variables. A very large budget deficit can impede financial development by crowding out private demand for credit and, if monetized, the budget deficit is inflationary, which reduces the demand for domestic financial instruments. In the aftermath of a number of recent financial crises, the impact of the exchange rate regime on financial stability has become one of the central components of the debate on the appropriate exchange rate policies for countries to adopt.<sup>6</sup> Studies by Eichengreen and Hausmann (1999) and Hausmann *et al.* (1999) have begun to discuss—primarily at the theoretical level—the potential links between exchange rate regime and financial stability. With the exception of Eichengreen and Arteta (2000) and Domac and Peria (2000), this issue has remained largely unexplored at the empirical level. Hence we investigate this issue by allowing for three exchange rate categories: fixed, intermediate, and floating.<sup>7</sup>

Thirty three countries in the sample are from Africa. An African dummy variable is therefore used to capture adverse geographical, neighbourhood, and conflict effects.<sup>8</sup>

The governance indicators are for the 1997-98 period. The CONFLICT variable is for the 1989-97 period. The per-capita GDP is the average for the 1989-98 period, while the other

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6 For an overview of the competing arguments and literature linking exchange rate regimes and financial stability, see, among others, Domac and Peria (2000).

7 Fixed exchange rate regimes include pegs to individual currencies or to a basket. The intermediate regimes includes crawling pegs, managed floating, and regimes that allow limited flexibility with respect to a set of indicators. Estimations were also performed by distinguishing fixed exchange rate regimes vis-à-vis all other regimes. Initial results were similar to those reported here.

8 Estimations were also conducted using a battery of other explanatory variables, including the logarithm of population, the ratio of government expenditures to GDP, and the Gini coefficient. However, none of these variables were statistically significant. Moreover, the overall regression results were significantly worse than those reported here.

variables are averages for the 1980-2000 period. A detailed list of variables and sources are given in the data Appendix.

### 3.2 Estimation results

First, to set the stage, the 51 conflict-prone countries in the sample are ranked by the intensity of the CONFLICT variable. The financial variable, BANK, is inversely related to CONFLICT across the three groups shown in Table 1. The asterisk next to the average BANK variable in the countries with low intensity conflict, 0.398, indicates that this ratio is significantly larger than in the countries with medium conflict intensity (at the 0.05 level in a one-tailed, homoskedastic t-test, i.e., assuming equal variance), as indicated by the t-statistic within parentheses below. The critical t-value is 1.66. Likewise, the average BANK variable for the middle conflict intensity group, 0.253, is significantly larger than in the high conflict intensity countries. The F-value in the bottom line, 12.1, also exceeds the critical value, 2.89, indicating significant differences among the three average values of BANK reported (at the 0.05 level). Thus countries with high conflict intensity tend to be associated with lower average values for the financial variable, BANK. In fact, the figure for high conflict economies is nearly a quarter of that for low conflict countries, indicating a significantly lower demand for money as an asset in high conflict countries. The scatter plot and simple regression line shown in Figure 2 confirm this pattern.

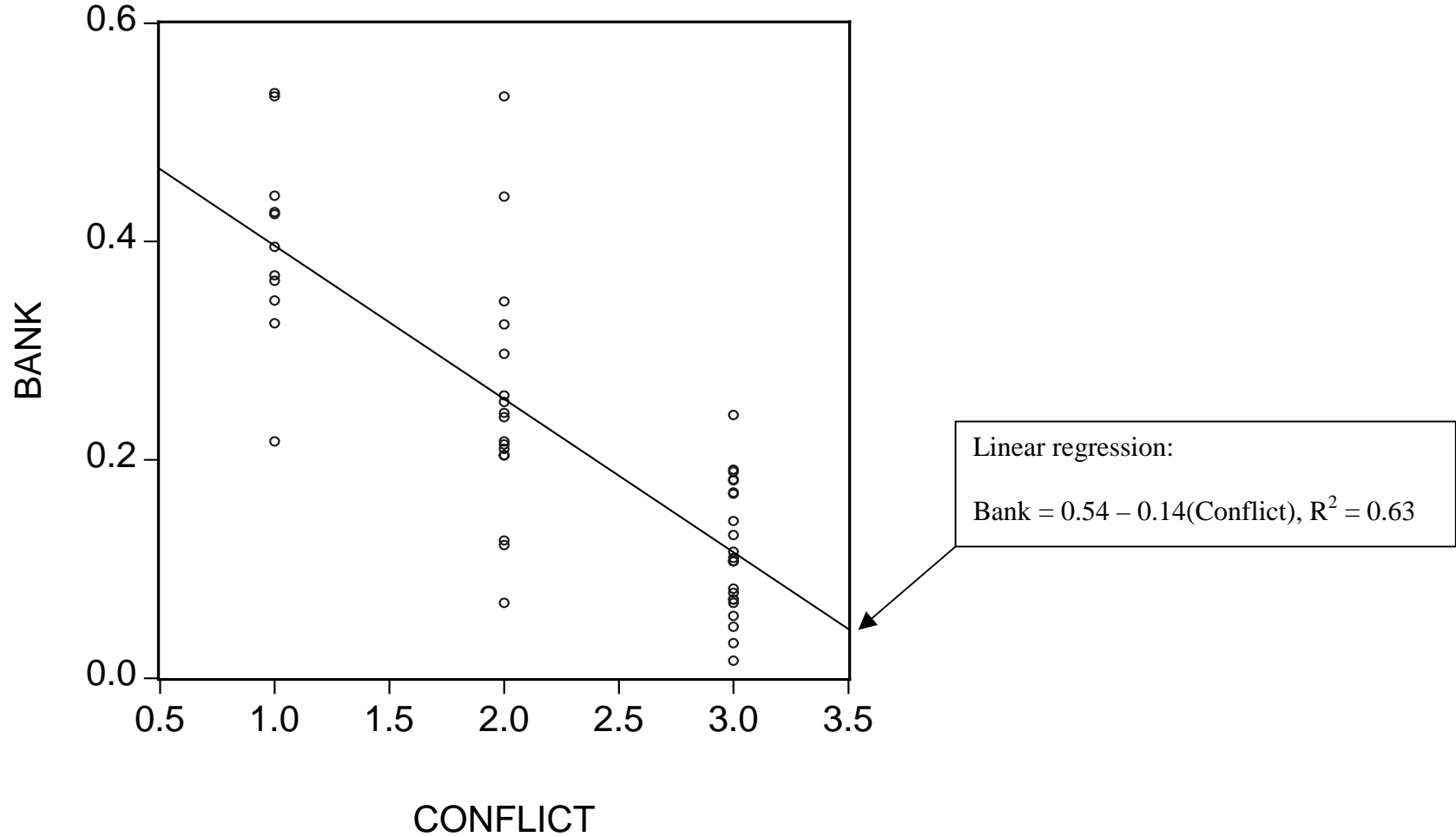
Table 1  
The BANK variable and countries with different CONFLICT intensity (n=51)

Level of CONFLICT Intensity	BANK	No. of countries
Low [1] (t-statistics)	0.398* (4.28)	11
Medium [2] (t-statistics)	0.253* (5.71)	17
High [3] (t-statistics)	0.116* (6.40)	23
F-value	12.1*	

*Note:*

An asterisk \* next to the BANK variable indicates that the average value is significantly different from the average value shown next below, at the 0.05 level. An asterisk and t-statistics in the third line refer to a comparison with the first line. An asterisk next to an F-value in the bottom line means that it exceeds the critical value, which is 3.1 in this case. Figures in [ ] next to each level of conflict intensity show the number used to measure that particular level of intensity in the data set.

Figure 2  
Bank vs. conflict resolution



The econometric analysis is based on a reduced-form equation that relates the financial indicator variable to the intensity of conflict while controlling for other factors that may affect financial stability in a country. In particular, based on the theoretical model presented earlier in the paper, we initially estimate the following equation:

$$\text{BANK}_{ij} = a_{0j} + a_{1j}\text{CONFLICT}_{ij} + a_{2j}\text{PCGDP}_{ij} + a_{3j}\text{D}_{ij} + a_{4j}\text{G}_{ij} + u_{ij} \quad (11)$$

where  $G_{ij}$  represent the  $j$ th governance index, with  $j=(1,\dots,5)$ , for the  $i$ th country in the sample;  $\text{BANK}_{ij}$  and  $\text{CONFLICT}_{ij}$  denote the financial indicator and the conflict variable, respectively, in country  $i$  when indicator  $j$  is used as the governance indicator;  $\text{D}_{ij}$  is a vector of other explanatory variables; and  $u_{ij}$  is an error term. Equation (11) is estimated separately for each of the five governance indicators. The results from the five different models are shown in Table 2.

Table 2  
Cross-section regressions with BANK as the dependent variable  
(with no AFRICA dummy variable)

Variables	(1)	(2)	(3)	(4)	(5)
CONFLICT	-0.245 (3.15)	-0.212 (2.98)	-0.319 (4.12)	-0.298 (5.19)	-0.276 (4.94)
PCGDP	0.082 (3.55)	0.071 (3.10)	0.025 (2.56)	0.098 (2.18)	0.067 (2.83)
BUDGET	-0.480 (3.22)	-0.528 (2.86)	-0.425 (3.85)	-0.419 (4.10)	-0.688 (3.00)
EXCH	0.423 (3.10)	0.651 (4.18)	0.494 (3.90)	0.810 (4.75)	0.772 (3.19)
GRAFT	0.242 (3.99)				
LAW		0.574 (4.19)			
EFFECTIVE			0.670 (5.95)		
REGULATORY				0.358 (4.38)	
VOICE					0.644 (5.10)
adj. R <sup>2</sup>	0.43	0.50	0.48	0.49	0.51
<i>n</i>	79	79	79	79	79

*Note:* The figures in parentheses are the absolute values of White's heteroscedasticity consistent t-statistics.

Irrespective of the governance indicator used, the results are consistent across all the models. Positive coefficients for all of the governance indicators indicate a positive relation between good governance and regulatory capacity to the demand for money as an asset. CONFLICT has a statistically significant negative impact on BANK. The White's heteroscedasticity-consistent t-statistics are significantly high. The results support the hypothesis that the higher the intensity of conflict in a country, the lower the stability of the financial system. The coefficient of the per capita GDP is positive indicating that countries with higher levels of income, a proxy for development, usually experience a more stable financial system. Observe that the negative coefficient of

CONFLICT in Table 2 is highest when regressed along with EFFECTIVE, which is the best overall indicator of governance of all the five qualitative variables considered. Thus the presence of conflict and the absence of an effective government exert the greatest downward pressure on money demand.

The exchange rate regime has a positive and statistically significant impact on the financial indicator variable. This provides some support for the view that the adoption of a more flexible exchange rate system offers the possibility to run a more stabilizing monetary policy. The exchange rate could be used to absorb some of the real shocks that an economy faces. More precisely, confronted with an adverse external shock, a flexible exchange rate regime can let the exchange rate bear the brunt of the adjustment so that the interest rate need not be raised. Thus, output is protected through increased competitiveness and more favourable financial conditions.

The budget deficit variable has negative impact on the BANK variable suggesting that higher budget deficits reduce the attractiveness of money as an asset. Each one of the five governance indicator variables has a positive and statistically significant impact on the financial indicator variable. Of special significance is the coefficient on the regulatory burden variable. This provides support to our hypothesis that people do not want to put their money on deposit as banking regulation and supervision get worse with increasing conflict.

Next, equation (11) is reestimated after including an AFRICA country dummy to identify the African countries in the sample where the intensity of conflict is usually the highest. The results are reported in Table 3. The coefficient on the AFRICA dummy variable is negative and statistically significant suggesting that the African countries are more likely to have an unstable financial system than countries from other continents. Results for the remaining variables are qualitatively similar to those reported in Table 2, but quantitatively the magnitude of the CONFLICT and other governance variables are declining. This suggests that the intensity of conflict is greater in Africa, and governance indicators are worse in that region. It also implies that the Africa regional dummy goes some of the way to explaining good (or poor) governance and bad neighbourhood effects.

Finally, an interaction term of AFRICA and CONFLICT is added to equation (11). The estimation results are shown in Table 4. Irrespective of the governance indicator employed, the interaction term turns out to be negative and statistically significant. Interestingly, the CONFLICT variable loses much of its statistical significance compared to the previous two tables. The governance indicators decline in magnitude, except for GRAFT and LAW. Since the regulatory framework is more important for the type of dependent variable we consider, this result implies that the interaction of AFRICA and CONFLICT accounts for some of the poor regulatory framework, except for the effects via GRAFT and LAW. The results in both Tables 3 and 4 give further evidence on the negative effects of CONFLICT on financial deepening as measured by the BANK variable. Findings for the remaining variables in Table 4 are, again, qualitatively similar to those reported earlier in Table 2.

Table 3  
Cross-section regressions with BANK as the dependent variable  
(with AFRICA dummy variable)

Variables	(1)	(2)	(3)	(4)	(5)
CONFLICT	-0.103 (2.55)	-0.135 (2.07)	-0.201 (3.10)	-0.156 (3.16)	-0.188 (2.94)
PCGDP	0.247 (4.10)	0.154 (5.19)	0.239 (6.16)	0.319 (5.18)	0.322 (4.87)
BUDGET	-0.410 (4.89)	-0.390 (5.33)	-0.378 (5.90)	-0.644 (6.10)	-0.518 (6.88)
EXCH	0.193 (2.53)	0.181 (2.63)	0.381 (3.19)	0.264 (4.89)	0.299 (7.10)
GRAFT	0.217 (5.10)				
LAW		0.281 (5.58)			
EFFECTIVE			0.414 (8.19)		
REGULATORY				0.321 (7.88)	
VOICE					0.298 (4.10)
AFRICA	-0.402 (3.85)	-0.398 (4.10)	-0.444 (4.39)	-0.697 (6.32)	-0.510 (5.93)
adj. R <sup>2</sup>	0.59	0.55	0.57	0.53	0.59
n	79	79	79	79	79

Note: The figures in parentheses are the absolute values of White's heteroscedasticity consistent t-statistics.

Table 4  
Cross-section regressions with BANK as the dependent variable  
(with AFRICA\*CONFLICT interaction term)

Variables	(1)	(2)	(3)	(4)	(5)
CONFLICT	-0.067 (2.45)	-0.044 (1.99)	-0.089 (2.16)	-0.083 (2.09)	-0.100 (2.26)
PCGDP	0.265 (3.82)	0.210 (3.77)	0.259 (5.14)	0.203 (4.67)	0.188 (4.10)
BUDGET	-0.553 (5.18)	-0.642 (5.90)	-0.488 (4.81)	-0.561 (5.33)	-0.617 (6.12)
EXCH	0.314 (2.80)	0.288 (3.27)	0.421 (4.25)	0.477 (5.46)	0.315 (4.19)
GRAFT	0.441 (5.27)				
LAW		0.387 (3.82)			
EFFECTIVE			0.297 (3.25)		
REGULATORY				0.282 (3.97)	
VOICE					0.231 (4.90)
AFRICA*CONFLICT	-0.631 (4.49)	-0.697 (5.91)	-0.772 (6.30)	-0.492 (5.44)	-0.546 (6.04)
adj. R <sup>2</sup>	0.55	0.54	0.55	0.51	0.58
n	79	79	79	79	79

Note: The figures in parentheses are the absolute values of White's heteroscedasticity consistent t-statistics.

### 3.3 Baseline regressions and sensitivity analysis

Most cross-country studies consider only a small number of explanatory variables in trying to establish a statistically significant relationship between any two specific variables. In our study, economic theory does not provide a complete specification of which variables are to be held constant when statistical tests are performed on the relation between a financial variable and conflict (Cooley and LeRoy 1981). Thus it is likely that many candidate regressions may have equal theoretical basis, but the coefficient estimates on the conflict variable may depend on the conditioning set of information. In order to investigate the robustness of coefficient estimates, reported in the earlier section, to changes in the conditioning set of information, a test using a variation of Leamer's (1983) extreme bounds analysis, as suggested in Levine and Renelt (1992), is employed.

In particular, the following baseline regression is estimated:

$$\text{BANK} = a + b_m M + b_i \mathbf{I} + b_z \mathbf{Z} + u \quad (12)$$

where  $M$  is the Conflict variable,  $\mathbf{I}$  is the set of base variables included in all regressions and  $\mathbf{Z}$  is a subset of variables selected from a pool of variables identified by past studies as potential important explanatory variables of BANK.<sup>9</sup>

We first select the CONFLICT variable ( $M$ ), and run a base regression that includes only the  $\mathbf{I}$ -variables and CONFLICT. Then we compute the regression results for all possible linear combinations of up to three  $\mathbf{Z}$  variables and identify the lowest and highest values for the coefficient of the CONFLICT variable,  $b_m$ , that cannot be rejected at the 5 per cent level of significance. If the estimated coefficient of CONFLICT remains significant over this procedure, the correlation is said to be 'robust'. The 'extreme bounds' are the highest estimated correlation plus two standard errors and the lowest minus two standard errors. If the coefficient fails to be significant in some regression, the correlation is termed as 'fragile'. Widmalm (2001) has suggested that, to reduce multicollinearity, no pair of variables in  $\mathbf{I}$ ,  $\mathbf{Z}$ , or  $M$  should measure the same underlying phenomenon.

Following Levine and Renelt (1992) and Widmalm (2001), the set of variables in the  $\mathbf{I}$  set are as follows: a lagged value of the log of per capita GDP, an exchange rate regime variable, and the average annual growth rate of population.<sup>10</sup>

The pool from which the set of control variables  $\mathbf{Z}$  is drawn includes variables that are considered to be potential determinants of the BANK variable. The first variable is the Export/GDP ratio which measures the degree of openness of the country's economy. The ratio of the government's budget deficit/surplus to GDP since fiscal policy affects

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9 Following Kormendi and Meguire (1985), it is assumed that the explanatory variables in equation (1) are independent and linear.

10 Although few empirical studies in the growth literature include all of these three variables, most studies control for some subset. Levine and Renelt (1991) survey forty-one studies on economic growth and provides a list of variables included in these studies. Moreover, these variables are consistent with new growth models that depend on constant returns to reproducible inputs or endogenous technological change (Barro 1990, Romer 1990).



development for the reasons given earlier. These two variables help to control for differences in total factor productivity. The Gini coefficient is included to represent the income distribution in the country. Finally, the five governance indicators are also included as control variables.

The extreme bound results for estimating equation (2) are shown in Table 5. The correlation between BANK and the CONFLICT variable turns out to be robust. The coefficients are negative and statistically significant suggesting that conflict retards financial deepening and, thus, financial growth. Irrespective of the variables included in the **Z** set, the relationship between CONFLICT and BANK appears to be consistent. This provides empirical support to the robustness of the results presented in Tables 2-4 and rules out multicollinearity.

Table 5  
Results from the extreme bound analysis of the BANK and CONFLICT variables

M-Variable	Bound	$b_m$	$R^2$	Z
CONFLICT	high	-0.204 (4.76)	0.51	GRAFT, BUDGET, EXP/GDP
	base	-0.245 (4.37)	0.49	
	low	-0.267 (3.89)	0.48	GRAFT
CONFLICT	high	-0.181 (4.23)	0.47	LAW, BUDGET, EXP/GDP
	base	-0.202 (4.24)	0.48	
	low	-0.234	0.49	LAW
CONFLICT	high	-0.226 (3.20)	0.51	EFFECTIVE, BUDGET, EXP/GDP
	base	-0.288 (3.93)	0.49	
	low	-0.303	0.52	EFFECTIVE
CONFLICT	high	-0.344 (2.55)	0.50	REGULATORY, BUDGET, EXP/GDP
	base	-0.324 (3.66)	0.51	
	low	-0.320 (4.10)	0.49	REGULATORY
CONFLICT	high	-0.099 (2.57)	0.51	VOICE, BUDGET, EXP/GDP
	base	-0.123 (3.06)	0.53	
	low	-0.175 (3.47)	0.55	VOICE

*Note:* The base 'b' is the estimated coefficient of the M-variable in equation (2) when BANK is regressed, using 2SLS, on the M- and I-variables. The high 'b' is the estimated coefficient from the regression with the extreme high bound ( $b_m +$  two standard deviations); the low 'b' is the coefficient from the regression with the extreme lower bound. The I variables are the per capita GDP, gini coefficient, and foreign exchange regime. In the Z column are the additional variables that produce the extreme bounds (high and low, respectively). These variables are the governance indicators, Export/GDP ratio (EXP/GDP), and Government budget surplus(deficit)/GDP ratio (BUDGET). The figures in parentheses are the absolute values of White's heteroscedasticity consistent t-statistics.

### 3.4 Long run impact multipliers

In order to analyse the effect of a change in each explanatory variable on financial depth, the method described in Chowdhury (2001) is utilized to calculate the long run impact multipliers. The multipliers measure the long run influence of a unit change in the explanatory variable and are reported in Table 6 and graphed in Figures 3 to 6. Table 7 summarizes the ranking of the variables. The values suggest that in our sample countries conflict, fiscal policy, and various governance indicators have a significant adverse effect on financial depth.

Table 6  
Effect of long-run impact multiplier on financial depth

Variables	CONFLICT			No conflict
	High intensity	Medium intensity	Low intensity	
CONFLICT	-5.18	-4.32	-3.70	-
BUDGET	-3.71	-3.60	-3.88	-2.26
GRAFT	-2.45	-2.80	-2.14	-1.46
LAW	-1.96	-2.04	-1.72	-1.04
EFFECTIVE	-4.08	-3.12	-2.80	-2.18
REGULATORY	-4.20	-3.66	-3.96	-2.72
VOICE	-3.04	-2.76	-2.30	-1.66

The figures represent the percentage change in financial depth due to a unit change in each of the explanatory variables.

Table 7  
Ranking of variables in order of long run impact on financial depth

High	Intensity of CONFLICT		
	Medium	Low	No CONFLICT
CONFLICT	CONFLICT	REGULATORY	REGULATORY
REGULATORY	REGULATORY	BUDGET	BUDGET
EFFECTIVE	BUDGET	CONFLICT	EFFECTIVE
BUDGET	EFFECTIVE	EFFECTIVE	VOICE
VOICE	GRAFT	VOICE	GRAFT
GRAFT	VOICE	GRAFT	LAW
LAW	LAW	LAW	

Figure 3  
Impact multiplier: high intensity conflict

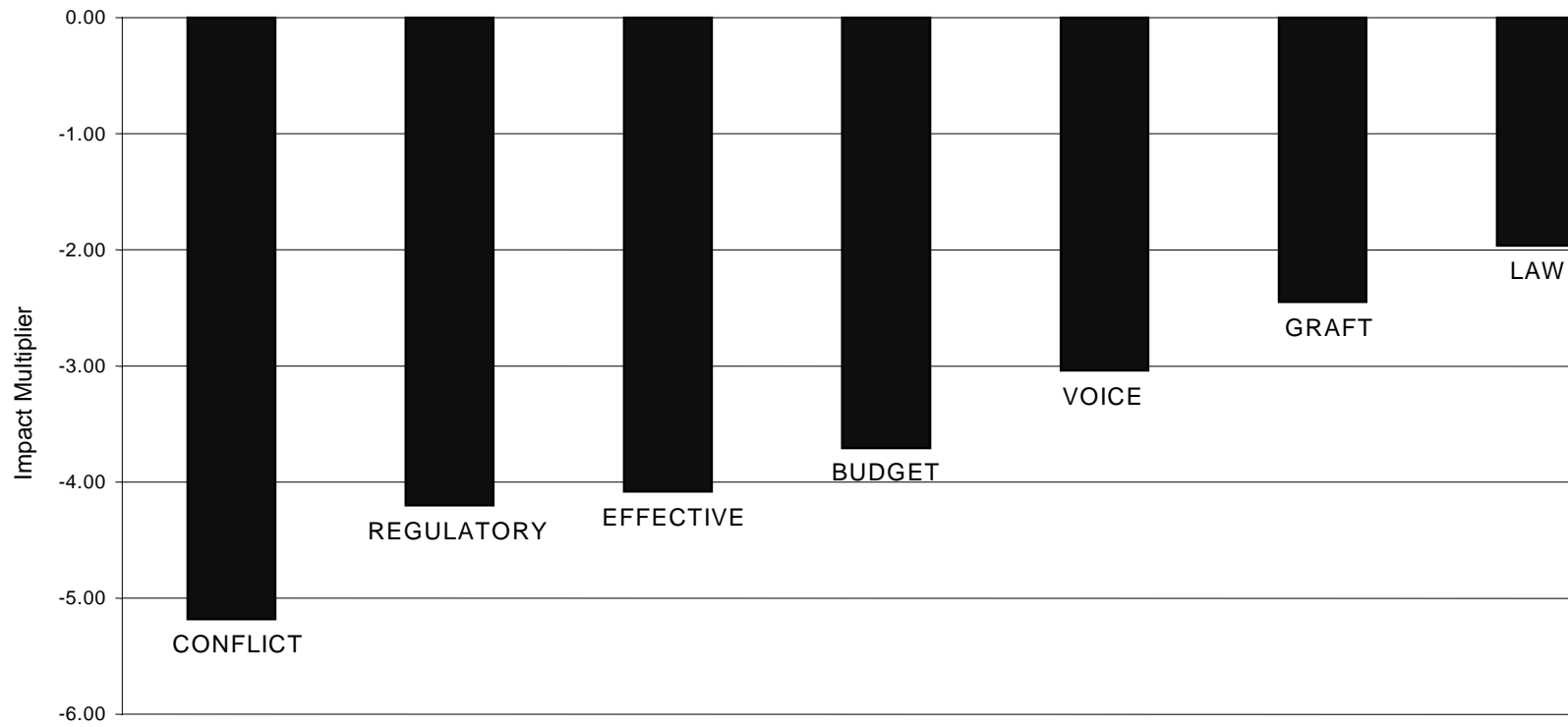


Figure 4  
Impact multiplier: medium intensity conflict

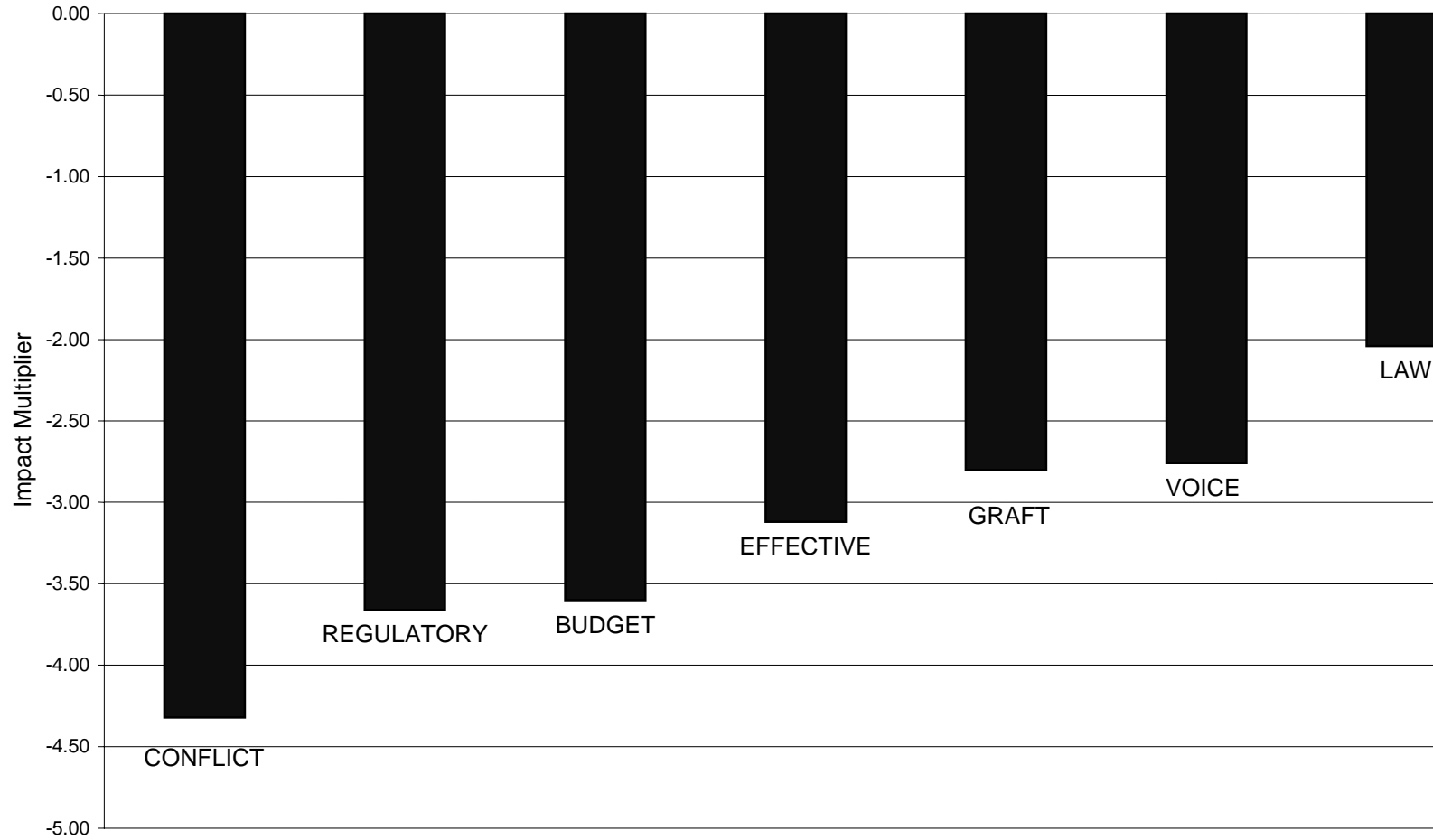


Figure 5  
Impact multiplier: low intensity conflict

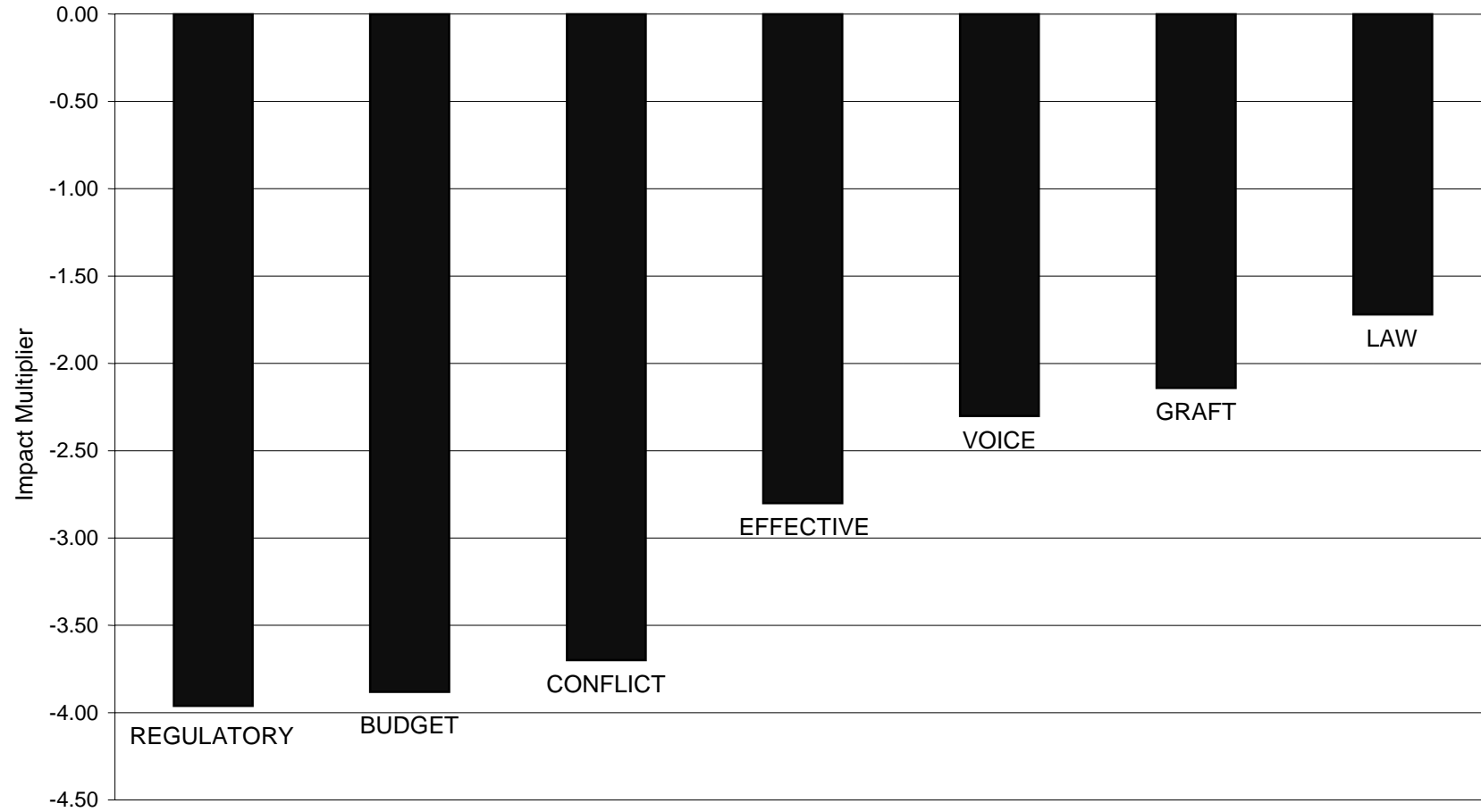
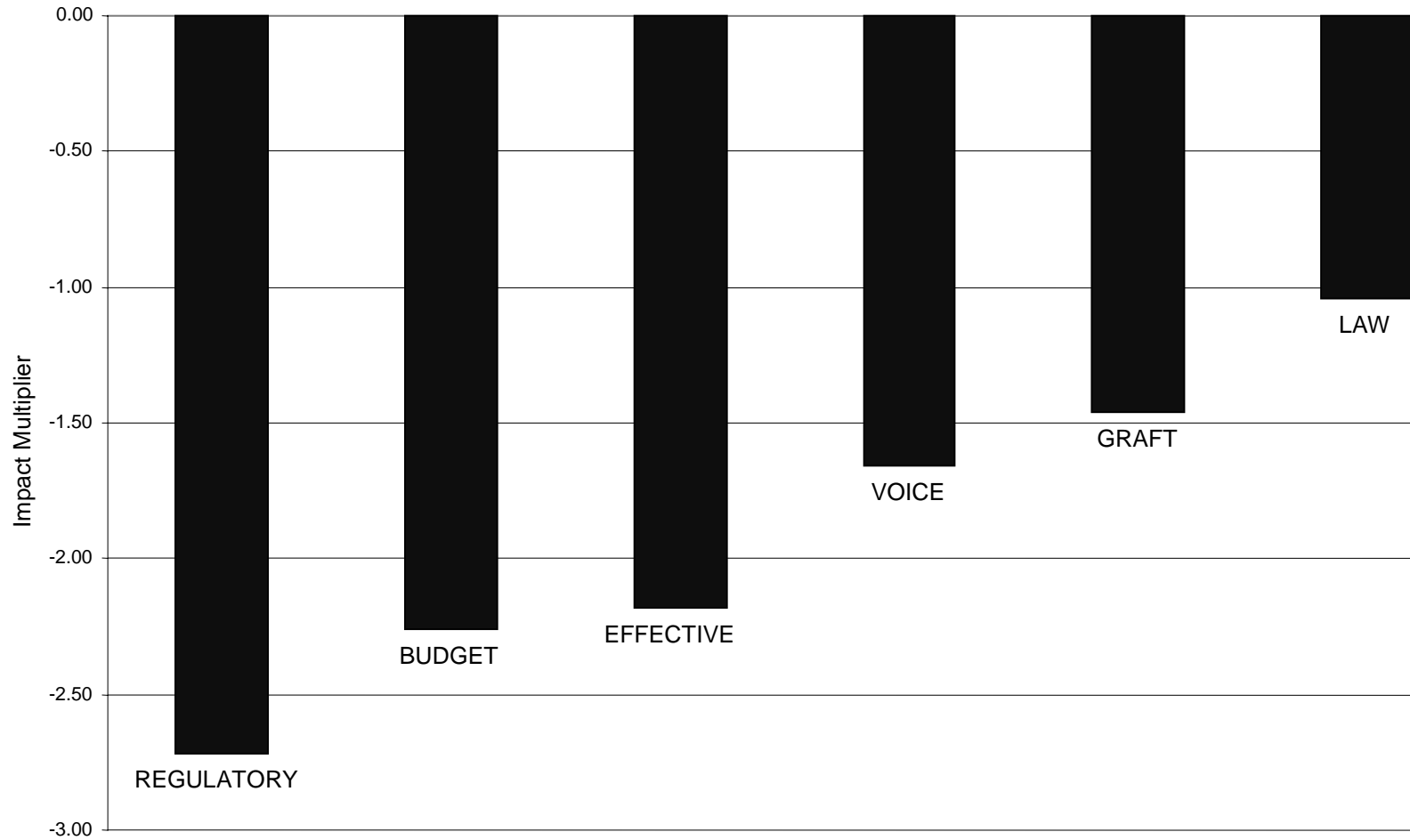


Figure 6  
Impact multiplier: no conflict



The presence of CONFLICT is found to be extremely costly in terms of a long-run reduction in financial depth. The presence of high intensity conflict is, for example, responsible for a long-run reduction in financial depth by 5.18 per cent. The corresponding reduction in countries with medium and low intensity conflict are 4.32 and 3.70 per cent, respectively. More interestingly, a reduction in the intensity of conflict from high to medium would lead to a 16.6 per cent drop in the reduction in financial depth. A similar shift from a medium to low intensity conflict would lead to a 14.4 per cent drop in the reduction in financial depth. Hence any policy measures that would reduce the intensity of conflict would go a long way to enhancing financial deepening in the developing countries.

Among the variables considered, the presence of conflict, in the countries with high and medium intensity conflict, has the highest long-run adverse effect on financial depth. In the high intensity conflict countries, two governance indicators—EFFECTIVE and REGULATORY—follow conflict in their adverse effect on financial depth. A worsening of the regulatory indicator reduces depth by 4.2 per cent while a similar worsening in the effective indicator leads to a 4.08 per cent reduction. Fiscal policy, as measured by the budget deficit (BUDGET), reduces depth by 3.71 per cent.

Similar results can be seen in the countries with medium intensity conflict. The CONFLICT variable has the highest long-run adverse effect on depth (see Figure 4). It is followed by REGULATORY, BUDGET, and EFFECTIVE variables, respectively. The net impact on depth of each of these variables are smaller in magnitude than the results for the high conflict intensity countries. This confirms our previous findings that the more intense the conflict, the higher will be the magnitude of the adverse effect that other variables have on financial depth.

Interesting results are found in the low conflict intensity countries. The CONFLICT variable is no longer the largest contributor to the long-run adverse impact on depth (see Figure 5). REGULATORY and BUDGET variables reduce financial depth in the long run by 3.96 and 3.88 per cent, respectively; while CONFLICT reduces depth by 3.7 per cent.

Overall, the value of the multipliers from the countries with no conflict (last column in Table 6) are smaller in magnitude than those from the conflict-prone countries. REGULATORY, BUDGET, and EFFECTIVE variables have the highest long-run adverse effects on depth. The REGULATORY variable leads the list with a value of 2.72 per cent and is followed by the BUDGET at 2.26 per cent.

Finally, irrespective of the intensity of conflict, GRAFT, LAW and VOICE appear to have a relatively smaller adverse impact on financial depth.

#### **4 Conclusions**

This paper has argued that conflict has a significantly negative effect on financial development, and that this effect increases as the intensity of conflict increases. Conflict both lowers the demand for the domestic currency as an asset, and causes a deterioration in governance which weakens financial-sector regulation. These effects of conflict

remain valid even after dummy variables for Africa (which has a high share of contemporary conflicts and a poor record of governance) are included.

Several policy conclusions follow from these results. First, measures to reduce conflict are not only desirable from a humanitarian perspective, they also have positive effects on economic development. Therefore the prevention and resolution of conflict—through democratization, better peace-keeping, and broad-based reconstruction—need more support from the international community. Second, it follows that financial reform will have more positive effects when complemented by conflict-reducing measures. The benefits of reform to the countries themselves will be higher, and the effectiveness of aid in support of such reform will also be greater. Third, while it is highly desirable to eliminate conflict entirely—from both humanitarian and economic-development perspectives—we have shown that there are still substantial gains from the more modest objective of lowering the level of conflict (from either high intensity to medium intensity, or from medium intensity to low intensity). This is encouraging given the longstanding and complex nature of many conflicts in poor countries, and the time and effort which is often required to achieve complete peace.



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## Appendix

The sample includes the following 79 countries. The letter ‘c’ within parentheses besides a country denotes the countries with conflict.

### African countries

Algeria (c)	Ghana	Rwanda (c)
Angola (c)	Guinea-Bissau (c)	Senegal (c)
Burkina Faso	Kenya	Sierra Leone (c)
Burundi (c)	Lesotho (c)	Somalia (c)
Cameroon (c)	Liberia (c)	South Africa (c)
Chad (c)	Malawi	Sudan (c)
Congo, Dem. Rep. (c)	Mali (c)	Tanzania
Congo, Rep. of (c)	Morocco	Togo
Côte d’Ivoire	Mozambique (c)	Tunisia (c)
Eritrea (c)	Niger (c)	Uganda (c)
Ethiopia (c)	Nigeria	Zambia

### Non-African countries

Argentina	Guatemala (c)	Mexico
Azerbaijan (c)	Haiti (c)	Myanmar (c)
Bangladesh	Honduras	Nepal (c)
Bolivia	India (c)	Nicaragua (c)
Bosnia and Herzegovina (c)	Indonesia (c)	Pakistan (c)
Brazil	Iran (c)	Paraguay
Cambodia (c)	Iraq (c)	Peru (c)
Chile	Israel (c)	Philippines (c)
Colombia (c)	Jamaica	Singapore
Costa Rica	Laos (c)	Sri Lanka (c)
Croatia (c)	Lebanon (c)	Thailand
Dominican Republic	Libya (c)	Uruguay
Ecuador	Macedonia (c)	Venezuela (c)
Egypt (c)	Madagascar	Yemen (c)
El Salvador (c)	Malaysia	
Georgia (c)	Maldives	

## VARIABLES USED

### I. FINANCIAL VARIABLES

Two indicators of financial development have been used:

- (i) DEPTH: a proxy for the overall size of the formal financial intermediary sector, measured as M2/GDP.

Source: IFS (lines 34 + 35)/line 99b.

(ii) **BANK**: emphasizes the risk sharing and information services that banks are most likely to provide. Measured as deposit money bank domestic assets divided by deposit money bank domestic assets plus central bank domestic assets.

Source: IFS (lines 12a-f)/[(lines 12a-f)+(lines 22a-f)].

## II. CONFLICT

(i) **low intensity armed conflict**: at least 25 battle-related deaths per year and fewer than 1000 battle-related deaths during the course of the conflict.

(ii) **medium intensity armed conflict**: at least 25 battle-related deaths per year and an accumulated total of at least 1000 deaths, but fewer than 1000 deaths per year.

(iii) **high intensity armed conflict**: at least 1000 battle-related deaths per year.

Source: Data based on Wallensteen, P. and M. Sollenberg, 'Armed Conflict and Conflict Complexes, 1989-97', *Journal of Peace Research*, 35(5), 1998, 621-34; and updated by the Uppsala conflict Data Project: States in Armed Conflict, Uppsala University, Sweden.

## III. CONTROL VARIABLES

**PCGDP**: Per capita GDP.

Source: IFS—line 99b/line 99z.

**POP**: Population.

Source: IFS—line 99z.

## IV. GOVERNANCE INDICATORS

(i) **GRAFT**: measures the perception of corruption, generally defined as the exercise of public power for private gain.

(ii) **LAW**: represents the rule of law which includes several indicators measuring the extent to which agents have confidence in, and abide by, the rules of society.

(iii) **EFFECTIVE**: measures government effectiveness which combines perception of the quality of public service provision, the quality of the bureaucracy, the competence of civil servants, the independence of the civil service from political pressures, and the credibility of the government's commitment to policies.

(iv) **REGULATORY**: represents regulatory burden and includes measures of the incidence of market-unfriendly policies, such as price controls or inadequate bank supervision, as well as perception of the burdens imposed by excessive regulation in several areas, such as foreign trade and business development, among others.

(v) **VOICE**: this represents voice and accountability and is composed of several measures relating to the political process, civil liberties, and political rights.

The governance indicators are measured in units ranging from about -2.5 to 2.5, with higher values corresponding to better governance outcomes.

Sources: Kaufman, Daniel, Aart Kraay, and Pablo Zoido-Lobaton (1999a), 'Aggregating Governance Indicators', World Bank Discussion Paper Series No. 2195.

Kaufmann, Daniel, Aart Kraay, and Pablo Zoido-Lobaton (1999b), 'Governance Matters', *World Bank Discussion Paper Series No. 2196*.

## V. OTHER VARIABLES

(i) EXCH: represents the exchange rate regime.

0 for fixed exchange rate

1 for managed or floating exchange rate

Source: IMF, *Annual Report on Exchange Rate Arrangements and Exchange Rate Restrictions*.

(ii) EXP/GDP: measures the ratio of exports to GDP.

Source: IFS—line 70/line 99b.

(iii) GOVTEX/GDP: the ratio of government expenditures to GDP.

Source: IFS—line 82/line 99b.

(iv) BUDGET: the ratio of budget surplus (deficit) to GDP.

Source: IFS—line 80.

(v) GINI: measures income inequality.

Source: Deininger, Klaus and Lyn Squire (1996) 'A New Data Set Measuring Income Inequality', *World Bank Economic Review*, 10, 565-591.

(vi) AFRICA: 1 if the country is in Africa.

0 if the country is not in Africa