The cost of default: growth and official vs. private restructurings

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Abstract

This paper studies the relationship between debt default and short term GDP growth taking into account the depth of a debt restructuring. More specifically, creditors' losses (or haircuts) are used as proxies of the severity of the default episoded. Analyzing 89 defaults in 72 countries over the period 1979-2005, consistently with previous results in this literature, we find that defaults are correlated with significant contraction of short-term output growth. Moreover, controlling for the severity of the default through the haircut's size, we find that the severity of the default is indeed correlated with a further contraction in output one year after the default and with a positive increase in output three years after the default. Therefore, the use of a variable which is taken as a proxy of the severity of the default episode allows us to detect a more lasting (and eventually positive) link between debt default and growth.

Keywords: Haircuts, Output losses, Sovereign defaults

JEL Classification: F34, G15, H63,

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1 Introduction

Sovereign debt problems and debt restructuring have traditionally been very much topical for emerging economies in light of the debt crisis of the early 1980s and 1990s. After the recent European sovereign debt crisis, however, debt problems became important for developed economies as well (e.g., Zettelmeyer *et al.* 2013). Sovereign defaults and debt restructurings are not costless as a sovereign's unilateral decision to stop servicing its debt implies important economic costs. At least this is what the sovereign debt literature has assumed as a government's main incentive to honor its debt obligations.[1]

The (empirical) literature analyzing sovereign defaults has mainly looked at their effects on international trade, international credit market and GDP growth. There is evidence documenting trade cost of defaults in particular for export-oriented industries (Rose 2005, Borensztein and Panizza 2010).[2] Gaining access to capital markets after a default seems to be more affected by the general conditions of the capital markets than by discrimination against former defaulters (e.g., Lindert and Morton 1989, English 1996, Gelos *et al.* 2004). Apparently the access to credit market is influenced by more recent repayments but not by distant repayment history (e.g., Ozler 1993), which is also confirmed in more recent papers documenting a short-lived effect of default on spreads and market access (e.g., Borensztein and Panizza 2009, and Panizza *et al.* 2009).

Only very recently, Cruces and Trebesch (2013a) came to different conclusions, which are more in line with the effects of a default according to the theory. More specifically, by including in their analysis a measure of investors' losses (or "haircuts"), they show that restructuring involving higher haircuts are associated with significantly higher subsequent bond yield spreads and longer periods of capital market exclusion (that is credit markets do not seem to "forgive and forget," as in Bulow and Rogoff 1989).[3] Such different result with respect to the previous literature is remarkable and it is attributed to a more precise

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measurement of a country's repayment record. Therefore, their analysis does suggest that it is crucial to consider the magnitude of past defaults and not only the default event *per se*.

As the direct link between debt default and economic growth is concerned, a strong but *short-lived* negative contemporaneous effect on GDP growth is found by Sturzenegger (2004) and later confirmed by Borensztein and Panizza (2009) and De Paoli *et al.* (2006) and (2009). Furceri and Zdzienicka (2012) find also long-lasting output losses after debt crises, while Tomz and Wright (2007) find a negative but surprisingly weak relationship between economic output in the borrowing country and default on loans from private foreign creditors.[4] In all these cases, however, the effects specifically associated with a default (on the top of those related to the crisis itself) are quite difficult to identify. Therefore, while there is evidence that sovereign debt defaults are negatively correlated with economic growth, there is no study finding a causal relationship going from default to growth.[5]

In this paper we focus on the relationship between sovereign default, GDP growth and haircuts applying a similar methodology to Cruces and Trebesch's (2013a) to the analysis of the relationship between debt default and economic growth. Specifically, we take the creditors' losses (the so called haircuts) as proxy of the severity of the default episode and we verify if higher haircuts are correlated with a significant contraction of (annual) economic growth. While the overall evidence indicates that default episodes are negatively correlated with growth, in this literature the decision of a default has been modelled as a binary decision ignoring the large variation in restructuring outcomes. This circumstance implies, *de facto,* no distinction between the different degrees of severity of the default episodes and could (at least partially) explain why previous literature has so far detected negligible medium-run effects of debt defaults on growth. To the best of our knowledge this is the first time that such distinction is taken into account investigating the effects of defaults on economic growth.

Analyzing 89 defaults in 72 countries over the period 1979-2005, we find that defaults are correlated with a significant reduction of short-term output growth, consistently with previous results in this literature. However, controlling for the severity of the default

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The rest of this paper is organized as follows. Section 2 describes the empirical model and the data while the results are presented in Section 3. Finally, Section 4 summarizes and concludes.

2 Empirical model

In this section, we analyze the effects of a debt default on economic growth by controlling for the severity of the default episode. For this reason we include a measure of the creditors' losses (the so called haircuts) as a proxy of the severity of the default episode and we want to verify if higher haircuts have a stronger impact on (annual) growth.

2.1 Data on haircuts and defaults

The data on haircuts and defaults come from the database built by Benjamin and Wright (2009), which is in turn drawn from a variety of sources.[6] The database covers 90 defaults episodes by 73 countries focusing on defaults of sovereign debts owed to private creditors (banks and bondholders).[7] Benjamin and Wright (2009) base their measures of haircuts on the World Bank's estimates of debt stock reduction, interest and principal forgiven, and debt buybacks, as published in the Global Development Finance (GDF). Specifically, they combine the World Bank's estimates of the reduction in the face value of the debt with estimates of the forgiveness of arrears on interest and principal. As the World Bank data do not make any distinction between debt forgiveness by private creditors and official creditors, they scale the amount of forgiveness using estimates of the total amount of debt renegotiated, and based on the proportion owed to private creditors taken from both GDF

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Figure 1 shows that the haircut takes the value zero in 13 default episodes in our sample. The majority of the haircuts lies in the interval 31-70% (more specifically in both the intervals 41-50% and 61-70%). The average haircut value is about 37%, while the median value is 42%.[9]

2.2 Method

We examine the impact of default on growth over the 1978-2008 period. We obtain an unbalanced panel which comprises a maximum of 72 developing countries, depending on the control variables we include. We adopt a OLS fixed effects estimator in order to control for country unobservables and to correct for heteroskedasticity. The results are qualitatively unchanged when we correct for cross-sectional heteroskedasticity across countries and autocorrelation within panels, we do not lag the explanatory variables, or we omit year dummies.

Specifically we test

$$\begin{aligned} y_{it} &= \alpha + \beta X_{it} + \gamma H_{it-1} + \gamma_1 H_{it} + \gamma_2 H_{it+1} + \gamma_3 H_{it+2} + \gamma_4 H_{it+3} + \\ &\quad \delta D_{it-1} + \delta_1 D_{it} + \delta_2 D_{it+1} + \delta_3 D_{it+2} + \delta_4 D_{it+3} + \eta_i + \tau_t + u_{it}, \end{aligned} \tag{1}$$

where y_{it} represents per capita growth in country i at period t, H_{it} is the haircut associated to the default of the year t in country i, D_{it} is a binary variable equal to

[8] Losses in different years were added together and discounted back to the time of the default using a ten percent discount rate. Benjamin and Wright (2009), in appendix C of their paper, shows that their estimates correlate closely with those of other studies (like for example Cline 1995, and Sturzenegger and Zettelmeyer 2008).

[9] For more details see Benjamin and Wright (2009).

one in case of a default of country i in the year t, and X is a vector containing our control variables. Following the way in which the haircut variable has been built by the two authors, the haircut takes its own value only when the (binary) variable denoting default is equal to one, being equal to zero otherwise. We have then generated four more dummies which are equal to one the year before the default (D_{it-1}), and the three following years after the default episode (i.e., D_{it+1}, D_{it+2} and D_{it+3}). Following Cruces and Trebesch (2013a) we used the same procedure for the haircut. We then generated four more variables denoting the haircut at $t-1$ (H_{it-1}) and at the three following years after the default episode (i.e., H_{it+1}, H_{it+2}, and H_{it+3}). Finally, η_i and τ_t denote country and time dummies, respectively, which allow us to control for both countries unobservables and common macroeconomic factors.

Our choice of control variables follows the literature on the impact of default on output growth such as Levy Yeyati and Panizza (2011) and the empirical literature on the determinants of growth (see, for example, Barro and Sala-i-Martin 2004). Our selection then includes economic, institutional, and social variables. More specifically, we control for the log of GDP per capita at the start of each period, measures for human resources (life expectancy and fertility rate), investments as a percentage of GDP, a measure of openness (exports and imports over GDP), inflation, government expenditure and an index of democracy as defined in the Polity IV dataset (ranging from -10 to 10). We have also included a dummy for a banking and a currency crisis as debt crises, currency crises and banking crises are often correlated. We lag all the control variables by one year.[10] The list of countries is presented in appendix A, the list and description of the variables is provided in appendix B, while the descriptive statistics are presented in appendix C.

3 Empirical results

The results of the model of equation (1) are presented in Table 1. In column 1, 2 and 3 we report only the coefficients of the haircut, of the default and of both variables together, respectively. Column 4 reports the coefficients of the haircut in the year of the default and one year before and after the default episode. Column 5 reports the coefficients of the default in the year of the default and one year before and after the default, while column

[10] We also tried to include some of the ICRG indicators but missing data reduced the sample substantially, so we do not report the results below. We have also included some measures for "education" (see for example Barro and Lee 2010) but they were never significant. Different specifications are available upon request.

6 reports all these coefficients together. Column 7 adds the coefficients of the default two and three years after the default episode to the specification shown in column 4, while column 8 adds the coefficients of the haircut two and three years after the default episode to the specification of column 5. Finally column 9 reports the full model. While all these results are reported for comparison, we largely base our discussion on the full model.

As can be seen, all our control variables have the expected impact on growth. Growth rates significantly increases with lower initial GDP, higher investment and greater openness, while it decreases with higher public expenditure, higher inflation and after the occurrence of a banking crisis. The coefficients of a currency crisis, life expectancy, fertility and democracy are not significant, which is probably due to their (annual) frequency.

In column 1 we can observe that the relationship between debt default and growth is negative and highly significant. In particular growth decreases by about 2.3 percentage points. Column 2 shows that haircuts are also a negatively (and highly significantly) correlated with economic growth. An increase of one standard deviation in the haircut decreases growth by about 0.37 per cent. However, when these two variables are included together (in column 3), they both keep their negative sign but only the default dummy remains significant.

Similar results are obtained when we first include both the lagged and the lead values of a default (in column 4), and then both the lagged and the lead values of the haircut (in column 5). They both have a negative and significant impact on growth the year of the default and also two years after the default (for the haircut).[11] When all these variables are included together, in column 6, the coefficient of the (contemporaneous) default remains negative and significant (even if smaller in magnitude), while the coefficient of an haircut becomes significant only one year after the default.

More interesting results are obtained when we control for the link between default and haircuts from one year before the default up to three years after the default episode (see columns 7 and 8). In particular, column 8 shows that the coefficient of an haircut is still significant in the third year after the default, when it shows a positive sign, which is maintained in the full specification of column 9. This result suggests that countries which have experienced more severe default, but benefitted by greater haircuts, eventually experience an increase in their rates of growth in the third year after the default episode.

[11] Levy Yeyati and Panizza (2011) obtain similar results in Table 2 of their paper. More specifically, they report a negative and significant coefficient for the lagged and the contemporaneous value of a default.

The coefficient of the default dummy remains instead significant only in the year in which the default occurs. Our results are similar to those of Cruces and Trebesch (2013a) who are also able to detect a long lasting effect of a default on the ability to re-access credit markets by controlling for the intensity of the default through the haircut's size.

TABLE 1 HERE

Finally, we replicated the analysis by using a GLS estimator correcting for cross-sectional heteroskedasticity across countries and autocorrelation within panels. The results are presented in appendix D and confirm the results obtained trough OLS.[12]

4 Conclusions

This paper investigates the relationship between debt default and economic growth taking the depth of the debt restructuring into account. More specifically, the creditors' losses (or haircuts) are used as proxies of the severity of the default episode. Analyzing 89 defaults in 72 countries over the period 1979-2005, we find that defaults have a negative and significant impact on short-term output growth. Controlling for the intensity of the default through the haircut's size, we find that more severe defaults are correlated with a further contraction in output one year after the default and with a positive increase in output three years after the default. Our results are consistent with previous results in the literature as far as the (short-term) effects of a debt default on growth are concerned. More importantly, we show that the simple use of a variable controlling for the severity of the default episode allows us to detect a more lasting (and eventually positive) effect of the debt default on growth.

Thus, more severe haircuts seem, at the same time, more costly in terms of growth in the short-term but also more beneficial in the medium-term. In other words, there should exist an optimal size of the haircut balancing the *ex-ante* efficiency of a debt restructuring with its efficiency *ex-post*. Deriving implications concerning the optimal size of the haircut, however, is not so obvious. For example, lowering too much the costs of renegotiations could make a default too easy by increasing the spread requested ex ante by the investors.

[12] In particular, the results of the full specification in column 9 of appendix E are very similar (but smaller in magnitude) to those presented in column 9 of Table 1.

We should finally emphasize that the direction of causality in the relationship between sovereign defaults and growth raises some questions and thus a robust association between debt defaults and low growth can only be indicative of a correlation between the two variables. Lower growth might not be the consequence of a default *per se* but of other factors affecting debt sustainability as well. Thus, both the determinants and the effects of a debt restructuring should be more carefully investigated.

For example, additional data on haircuts (such those recently made available by Cruces and Trebesch 2013b) would allow us to use more precise information concerning the haircut of every single restructuring episode rather than after a default episode only. Besides using different data for haircuts, we also plan to check the robustness of the results to using quarterly output data (as in Levy Yeyati and Panizza 2011) and different subsamples, looking at levels and deviations from trend as well as growth rates. We leave this to further research.

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We examine the impact of default on growth over the 1978-2008 period. We obtain an unbalanced panel which comprises a maximum of 72 developing countries, depending on the control variables we include. We adopt a OLS fixed effects estimator in order to control for country unobservables and to correct for heteroskedasticity. The results are qualitatively unchanged when we correct for cross-sectional heteroskedasticity across countries and autocorrelation within panels, we do not lag the explanatory variables, or we omit year dummies.

Specifically we test

$$\begin{aligned} y_{it} &= \alpha + \beta X_{it} + \gamma H_{it-1} + \gamma_1 H_{it} + \gamma_2 H_{it+1} + \gamma_3 H_{it+2} + \gamma_4 H_{it+3} + \\ &\quad \delta D_{it-1} + \delta_1 D_{it} + \delta_2 D_{it+1} + \delta_3 D_{it+2} + \delta_4 D_{it+3} + \eta_i + \tau_t + u_{it}, \end{aligned} \tag{1}$$

where y_{it} represents per capita growth in country i at period t, H_{it} is the haircut associated to the default of the year t in country i, D_{it} is a binary variable equal to

[8] Losses in different years were added together and discounted back to the time of the default using a ten percent discount rate. Benjamin and Wright (2009), in appendix C of their paper, shows that their estimates correlate closely with those of other studies (like for example Cline 1995, and Sturzenegger and Zettelmeyer 2008).

[9] For more details see Benjamin and Wright (2009).

one in case of a default of country i in the year t, and X is a vector containing our control variables. Following the way in which the haircut variable has been built by the two authors, the haircut takes its own value only when the (binary) variable denoting default is equal to one, being equal to zero otherwise. We have then generated four more dummies which are equal to one the year before the default (D_{it-1}), and the three following years after the default episode (i.e., D_{it+1}, D_{it+2} and D_{it+3}). Following Cruces and Trebesch (2013a) we used the same procedure for the haircut. We then generated four more variables denoting the haircut at $t-1$ (H_{it-1}) and at the three following years after the default episode (i.e., H_{it+1}, H_{it+2}, and H_{it+3}). Finally, η_i and τ_t denote country and time dummies, respectively, which allow us to control for both countries unobservables and common macroeconomic factors.

Our choice of control variables follows the literature on the impact of default on output growth such as Levy Yeyati and Panizza (2011) and the empirical literature on the determinants of growth (see, for example, Barro and Sala-i-Martin 2004). Our selection then includes economic, institutional, and social variables. More specifically, we control for the log of GDP per capita at the start of each period, measures for human resources (life expectancy and fertility rate), investments as a percentage of GDP, a measure of openness (exports and imports over GDP), inflation, government expenditure and an index of democracy as defined in the Polity IV dataset (ranging from -10 to 10). We have also included a dummy for a banking and a currency crisis as debt crises, currency crises and banking crises are often correlated. We lag all the control variables by one year.[10] The list of countries is presented in appendix A, the list and description of the variables is provided in appendix B, while the descriptive statistics are presented in appendix C.

3 Empirical results

The results of the model of equation (1) are presented in Table 1. In column 1, 2 and 3 we report only the coefficients of the haircut, of the default and of both variables together, respectively. Column 4 reports the coefficients of the haircut in the year of the default and one year before and after the default episode. Column 5 reports the coefficients of the default in the year of the default and one year before and after the default, while column

[10] We also tried to include some of the ICRG indicators but missing data reduced the sample substantially, so we do not report the results below. We have also included some measures for "education" (see for example Barro and Lee 2010) but they were never significant. Different specifications are available upon request.

6 reports all these coefficients together. Column 7 adds the coefficients of the default two and three years after the default episode to the specification shown in column 4, while column 8 adds the coefficients of the haircut two and three years after the default episode to the specification of column 5. Finally column 9 reports the full model. While all these results are reported for comparison, we largely base our discussion on the full model.

As can be seen, all our control variables have the expected impact on growth. Growth rates significantly increases with lower initial GDP, higher investment and greater openness, while it decreases with higher public expenditure, higher inflation and after the occurrence of a banking crisis. The coefficients of a currency crisis, life expectancy, fertility and democracy are not significant, which is probably due to their (annual) frequency.

In column 1 we can observe that the relationship between debt default and growth is negative and highly significant. In particular growth decreases by about 2.3 percentage points. Column 2 shows that haircuts are also a negatively (and highly significantly) correlated with economic growth. An increase of one standard deviation in the haircut decreases growth by about 0.37 per cent. However, when these two variables are included together (in column 3), they both keep their negative sign but only the default dummy remains significant.

Similar results are obtained when we first include both the lagged and the lead values of a default (in column 4), and then both the lagged and the lead values of the haircut (in column 5). They both have a negative and significant impact on growth the year of the default and also two years after the default (for the haircut).[11] When all these variables are included together, in column 6, the coefficient of the (contemporaneous) default remains negative and significant (even if smaller in magnitude), while the coefficient of an haircut becomes significant only one year after the default.

More interesting results are obtained when we control for the link between default and haircuts from one year before the default up to three years after the default episode (see columns 7 and 8). In particular, column 8 shows that the coefficient of an haircut is still significant in the third year after the default, when it shows a positive sign, which is maintained in the full specification of column 9. This result suggests that countries which have experienced more severe default, but benefitted by greater haircuts, eventually experience an increase in their rates of growth in the third year after the default episode.

[11] Levy Yeyati and Panizza (2011) obtain similar results in Table 2 of their paper. More specifically, they report a negative and significant coefficient for the lagged and the contemporaneous value of a default.

The coefficient of the default dummy remains instead significant only in the year in which the default occurs. Our results are similar to those of Cruces and Trebesch (2013a) who are also able to detect a long lasting effect of a default on the ability to re-access credit markets by controlling for the intensity of the default through the haircut's size.

TABLE 1 HERE

Finally, we replicated the analysis by using a GLS estimator correcting for cross-sectional heteroskedasticity across countries and autocorrelation within panels. The results are presented in appendix D and confirm the results obtained trough OLS.[12]

4 Conclusions

This paper investigates the relationship between debt default and economic growth taking the depth of the debt restructuring into account. More specifically, the creditors' losses (or haircuts) are used as proxies of the severity of the default episode. Analyzing 89 defaults in 72 countries over the period 1979-2005, we find that defaults have a negative and significant impact on short-term output growth. Controlling for the intensity of the default through the haircut's size, we find that more severe defaults are correlated with a further contraction in output one year after the default and with a positive increase in output three years after the default. Our results are consistent with previous results in the literature as far as the (short-term) effects of a debt default on growth are concerned. More importantly, we show that the simple use of a variable controlling for the severity of the default episode allows us to detect a more lasting (and eventually positive) effect of the debt default on growth.

Thus, more severe haircuts seem, at the same time, more costly in terms of growth in the short-term but also more beneficial in the medium-term. In other words, there should exist an optimal size of the haircut balancing the *ex-ante* efficiency of a debt restructuring with its efficiency *ex-post*. Deriving implications concerning the optimal size of the haircut, however, is not so obvious. For example, lowering too much the costs of renegotiations could make a default too easy by increasing the spread requested ex ante by the investors.

[12] In particular, the results of the full specification in column 9 of appendix E are very similar (but smaller in magnitude) to those presented in column 9 of Table 1.

We should finally emphasize that the direction of causality in the relationship between sovereign defaults and growth raises some questions and thus a robust association between debt defaults and low growth can only be indicative of a correlation between the two variables. Lower growth might not be the consequence of a default *per se* but of other factors affecting debt sustainability as well. Thus, both the determinants and the effects of a debt restructuring should be more carefully investigated.

For example, additional data on haircuts (such those recently made available by Cruces and Trebesch 2013b) would allow us to use more precise information concerning the haircut of every single restructuring episode rather than after a default episode only. Besides using different data for haircuts, we also plan to check the robustness of the results to using quarterly output data (as in Levy Yeyati and Panizza 2011) and different subsamples, looking at levels and deviations from trend as well as growth rates. We leave this to further research.

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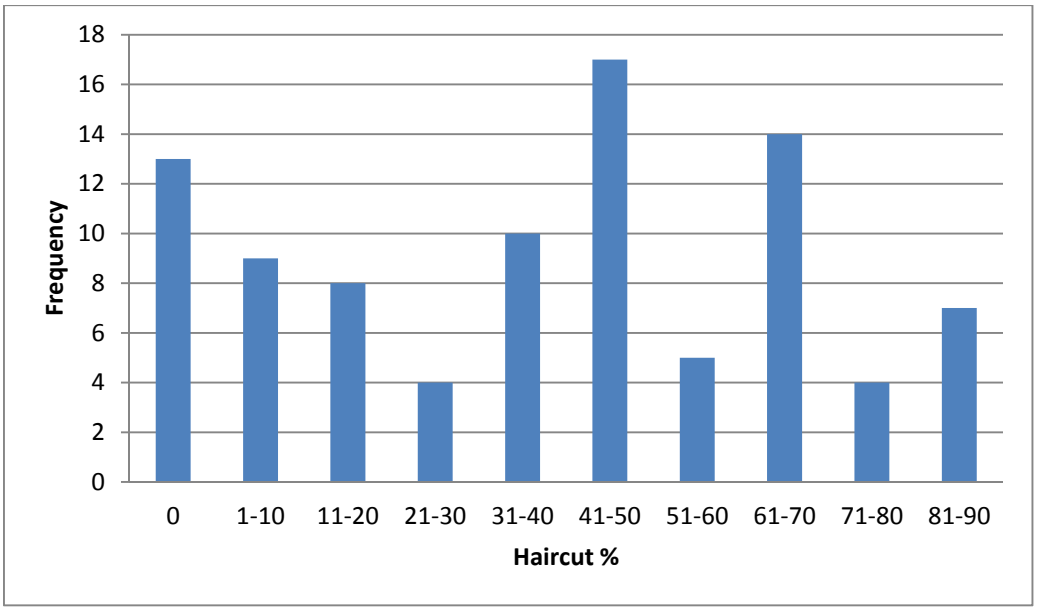

Figure 1: haircut distribution. Source Benjamin e Wright (2009)

Table 1: default haircuts and growth, 1978-2008, OLS

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Haircut (-1)					-0.003	0.015		-0.001	0.017
					(-0.236)	(0.744)		(-0.064)	(0.834)
Haircut		-0.047***	-0.017		-0.050***	-0.020		-0.047***	-0.017
		(-2.957)	(-0.925)		(-2.978)	(-1.019)		(-2.773)	(-0.870)
Haircut (+1)					-0.039**	-0.049*		-0.036**	-0.047*
					(-2.132)	(-1.952)		(-2.014)	(-1.893)
Haircut (+2)								0.018	0.003
								(1.010)	(0.130)
Haircut (+3)								0.023*	0.036*
								(1.724)	(1.891)
Default (-1)				-0.472		-1.031	-0.402		-1.014
				(-0.957)		(-1.630)	(-0.806)		(-1.628)
Default	-2.269***		-1.669***	-2.350***		-1.639***	-2.272***		-1.625***
	(-3.829)		(-3.214)	(-3.777)		(-3.012)	(-3.663)		(-3.105)
Default (+1)				-1.062		0.569	-0.982		0.595
				(-1.388)		(0.613)	(-1.307)		(0.653)
Default (+2)							0.947		0.809
							(1.413)		(1.131)
Default (+3)							0.555		-0.760
							(0.974)		(-0.990)
(log) GDPpc (-1)	-8.231***	-8.206***	-8.201***	-8.161***	-8.099***	-8.069***	-8.134***	-8.138***	-8.099***
	(-5.693)	(-5.744)	(-5.695)	(-5.626)	(-5.722)	(-5.651)	(-5.752)	(-5.838)	(-5.774)
Gov. Expend (-1)	-0.142**	-0.144**	-0.143**	-0.141**	-0.145**	-0.143**	-0.137**	-0.139**	-0.137**
	(-2.249)	(-2.300)	(-2.268)	(-2.237)	(-2.327)	(-2.290)	(-2.182)	(-2.228)	(-2.195)
Investments (-1)	0.177***	0.176***	0.176***	0.174***	0.172***	0.173***	0.175***	0.175***	0.175***
	(4.066)	(4.051)	(4.060)	(4.029)	(3.935)	(3.934)	(4.013)	(3.964)	(3.949)
Openness (-1)	0.023*	0.023*	0.023*	0.023*	0.023*	0.022*	0.022*	0.023*	0.022*
	(1.950)	(1.971)	(1.950)	(1.934)	(1.988)	(1.928)	(1.889)	(1.975)	(1.936)
Inflation (-1)	-10.991***	-10.960***	-10.987***	-10.972***	-10.906***	-10.956***	-11.006***	-10.909***	-10.958***
	(-4.924)	(-4.964)	(-4.936)	(-4.873)	(-4.924)	(-4.903)	(-4.902)	(-4.916)	(-4.900)
Banking crisis	-1.555***	-1.587***	-1.558***	-1.519***	-1.573***	-1.509***	-1.531***	-1.582***	-1.522***
	(-3.634)	(-3.732)	(-3.647)	(-3.510)	(-3.630)	(-3.497)	(-3.490)	(-3.605)	(-3.477)
Currency (crisis)	0.458	0.400	0.446	0.483	0.404	0.442	0.497	0.423	0.453
	(1.173)	(1.016)	(1.140)	(1.230)	(1.011)	(1.113)	(1.265)	(1.051)	(1.131)
(log) Fertility (-1)	-1.845	-1.936	-1.881	-1.848	-2.014	-1.938	-1.789	-1.837	-1.759
	(-1.042)	(-1.089)	(-1.064)	(-1.045)	(-1.131)	(-1.096)	(-1.012)	(-1.026)	(-0.987)
(log) Life Exp (-1)	2.111	2.075	2.075	1.924	1.885	1.912	2.126	2.115	2.152
	(0.747)	(0.734)	(0.736)	(0.688)	(0.675)	(0.693)	(0.760)	(0.756)	(0.778)
Democracy	0.024	0.021	0.023	0.022	0.019	0.022	0.023	0.016	0.019
	(0.562)	(0.501)	(0.545)	(0.514)	(0.432)	(0.507)	(0.534)	(0.379)	(0.439)
Costant	52.355***	52.432***	52.345***	52.689***	52.628***	52.245***	51.564***	51.672***	51.167***
	(3.471)	(3.483)	(3.475)	(3.492)	(3.524)	(3.522)	(3.458)	(3.484)	(3.473)
Observations	1,514	1,514	1,514	1,514	1,514	1,514	1,514	1,514	1,514
R-squared	0.301	0.300	0.301	0.303	0.304	0.306	0.305	0.307	0.309
Number of id	64	64	64	64	64	64	64	64	64

Notes: Robust t-statistics in brackets, *** p<0.01, ** p<0.05, * p<0.1. All regressions include country fixed effects and time dummies.

Appendix A: data on default and haircuts

Country	Default begins	Default ends	Haircut	Country	Default begins	Default ends	Haircut
Albania	1991	1995	38	Mozambique	1983	1992	57
Algeria	1991	1996	0	Myanmar	1997	2003	43
Angola	1985	2004	69	Nicaragua	1979	2003	75
Argentina	1982	1993	30	Niger	1983	1991	89
Argentina	2001	2005	63	Nigeria	1982	1992	70
Bolivia	1980	1993	58	Nigeria	2002	2002	8
Brazil	1983	1994	21	Pakistan	1998	1999	29
Bulgaria	1990	1994	46	Panama	1983	1996	34
Burkina Faso	1983	1996	61	Paraguay	1986	1993	62
Cameroon	1985	2003	61	Paraguay	2003	2004	0
Capo Verde	1981	1996	46	Peru	1980	1980	0
Chile	1983	1990	46	Peru	1983	1997	29
Colombia	1985	1991	2	Philippines	1983	1992	35
Costa Rica	1983	1990	43	Poland	1981	1994	42
Ivory Coast	1983	1998	52	Dominican Rep.	1983	1994	47
Ivory Coast	2000	2004	41	Romania	1981	1983	9
Croatia	1992	1996	0	Russia	1991	1997	32
Dominica	2003	2004	0	Russia	1998	2000	32
Ecuador	1982	1995	23	Rwanda	1995	1995	0
Ecuador	1999	2000	34	Sao Tome & Principe	1987	1994	48
Ecuador	2000	2001	0	Senegal	1990	1990	3
El Salvador	1981	1996	64	Senegal	1992	1996	10
Ethiopia	1991	1999	44	Seychelles	2000	2002	12
Gabon	1986	1994	42	Sierra Leone	1986	1995	85
Gabon	1999	2004	85	Sierra Leone	1997	1998	51
Gambia	1986	1990	63	Solomon Islands	1996	2004	90
Jamaica	1987	1993	60	South Africa	1993	1993	0
Jordan	1989	1993	44	Sri Lanka	1996	1996	4
Guatemala	1989	1989	14	Tanzania	1984	2004	63
Guinea	1986	1988	8	Thailand	1997	1998	0
Guinea	1991	1998	14	Togo	1991	1997	66
Guinea-Bissau	1983	1996	70	Trinidad & Tobago	1988	1989	4
Guyana	1982	2004	85	Uganda	1980	1993	90
Haiti	1982	1994	65	Ukraine	1998	2000	1
Honduras	1981	2004	72	Uruguay	1990	1991	16
Central African Rep.	1983	2004	66	Uruguay	2003	2003	0
Kenya	1994	2004	85	Venezuela	1990	1990	14
Macedonia	1992	1997	60	Venezuela	1995	1997	2
Madagascar	1981	2002	68	Venezuela	1998	1998	0
Mauritania	1992	1996	48	Venezuela	2005	2005	0
Mexico	1982	1990	34	Vietnam	1985	1998	58
Moldova	1998	1998	15	Yemen	1985	2001	35
Moldova	2002	2002	42	Zambia	1983	1994	45
Mongolia	1997	2000	0	Zimbabwe	2000	2004	19
Morocco	1986	1990	42				

Source: Benjamin and Wright (2009)

Appendix B: sources and definition

Variable	Definition	Unit	Source
DEPENDENT VARIABLE			
GDP growth	Per capita GDP (constant 2000 US$)	Annual rate of change	WDI (2011)
VARIABLES OF INTEREST			
Haircut	Private creditors haircut are calculated taking into account only defaults on sovereign debts owed to private sector creditors (banks and bondholders). Measures are based on the World Bank's estimates of debt stock reduction, interest and principal forgiven, and debt buybacks, as in the Global Development Finance (GDF), combined with estimates of the Institute for International Finance. Losses in different years were added together and discounted back to the time of the default using a 10% discount rate.	Percentage of the outstantding debt	Benjamin & Wright (2009)
Default	Default is defined as in Standard and Poors, namely if a payment is not made within any grace period specified in the contract, or if debts are rescheduled on terms less favorable than those specified in the original debt contract	Dummy equal to 1 the year of the default, 0 otherwise	Benjamin & Wright (2009)

CONTROL VARIABLES			
Initial per cap. GDP (log)	Log of per capita GDP at the beginning of the period	Constant 2000 US $	WDI (2011)
Investment	Gross fixed capital formation	Ratio to GDP	WDI (2011)
Government consumption	General Government Final Consumption Expenditure	Ratio to GDP	WDI (2011)
Inflation	Inflation, consumer price	Annual rate of change	WDI (2011)
Openness	Exports plus Imports of goods and services	Ratio to GDP	WDI (2011)
Life fertility (log)	Fertility rate (birth per woman)	Unit	WDI (2011)
Life exp. (log)	Log of life expectancy	Unit	WDI (2011)
Democracy	Polity2 score taken from the Polity IV dataset	Unit (+10 democray, -10 autocracy)	Marshall and Jaggers (2009)
Banking crisis	We mark a banking crisis by two types of events: (1) bank runs that lead to the closure, merging, or takeover by the public sector of one or more financial institutions; (2) if there are no runs, the closure, merging, take-over or large-scale government assistance of an important financial institution (or group of institutions) that mark the start of a string of similar outcomes for other financial institutions (see Reinhart e Rogoff 2009).	Dummy equal 1 in the case of a banking crisis, 0 otherwise	Reinhart and Rogoff (2009)
Currency crisis	An annual depreciation versus the U.S. dollar 15% or more (see Reinhart and Rogoff 2009)	Dummy equal 1 in the case of a currency crisis, 0 otherwise	Built by the authors (based on World Bank 2011)

Appendix C: descriptive statistics

Variable	Observations	Average	Standard deviation	Min	Max
GDP growth	1514	1.36	4.94	-29.48	37.12
(log) GDPpc	1514	6.92	1,05	4.63	9.30
Gov. Expenditure	1514	14.17	5.38	2.68	64.39
Investment	1514	19.93	6.57	2.00	65.56
Openness	1514	67.79	33.11	10.83	213.33
Inflation	1514	0.13	0.16	-0.13	0.99
Banking crisis	1514	0.18	0.38	0	1
Currency crisis	1514	0.26	0.44	0	1
(log) Fertility	1514	1.35	0.50	0.09	2.14
(log) Life Expectancy	1514	4.11	0.17	3.29	4.37
Democracy	1514	2.12	6.42	-10	10
Default	1514	0.03	0.18	0	1
Haircut	1514	1.20	8.04	0	89

Appendix D: default haircuts and growth, 1978-2008, GLS

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Haircut (-1)					-0.005	0.012		-0.003	0.015
					(-0.534)	(0.796)		(-0.316)	(0.950)
Haircut		-0.021**	-0.002		-0.029***	-0.008		-0.027**	-0.007
		(-2.161)	(-0.137)		(-2.827)	(-0.531)		(-2.566)	(-0.453)
Haircut (+1)					-0.029***	-0.032**		-0.025**	-0.030*
					(-2.864)	(-2.189)		(-2.312)	(-1.931)
Haircut (+2)								0.015	0.010
								(1.440)	(0.651)
Haircut (+3)								0.014	0.023*
								(1.512)	(1.671)
Default (-1)				-0.599		-1.018	-0.536		-1.029
				(-1.391)		(-1.556)	(-1.239)		(-1.578)
Default	-1.124***		-1.063*	-1.433***		-1.150*	-1.360***		-1.098*
	(-2.706)		(-1.675)	(-3.251)		(-1.722)	(-3.060)		(-1.648)
Default (+1)				-0.766*		0.226	-0.574		0.340
				(-1.849)		(0.374)	(-1.332)		(0.544)
Default (+2)							0.635		0.279
							(1.486)		(0.449)
Default (+3)							0.172		-0.546
							(0.432)		(-0.918)
(log) GDPpc (-1)	-8.596***	-8.615***	-8.582***	-8.521***	-8.603***	-8.526***	-8.513***	-8.668***	-8.578***
	(-10.481)	(-10.503)	(-10.471)	(-10.337)	(-10.393)	(-10.297)	(-10.362)	(-10.487)	(-10.369)
Gov. Expend (-1)	-0.119***	-0.120***	-0.119***	-0.118***	-0.118***	-0.117***	-0.117***	-0.115***	-0.114***
	(-4.080)	(-4.121)	(-4.083)	(-4.037)	(-4.041)	(-4.008)	(-3.986)	(-3.930)	(-3.890)
Investments (-1)	0.191***	0.192***	0.191***	0.191***	0.192***	0.191***	0.192***	0.195***	0.193***
	(7.949)	(7.986)	(7.957)	(7.921)	(7.946)	(7.896)	(7.964)	(8.061)	(7.962)
Openness (-1)	0.013*	0.013*	0.013*	0.013*	0.013*	0.013*	0.013*	0.013*	0.012*
	(1.865)	(1.855)	(1.856)	(1.788)	(1.865)	(1.753)	(1.749)	(1.784)	(1.701)
Inflation (-1)	-9.054***	-9.048***	-9.050***	-8.984***	-9.012***	-9.016***	-9.048***	-9.033***	-9.045***
	(-10.830)	(-10.804)	(-10.824)	(-10.727)	(-10.698)	(-10.723)	(-10.753)	(-10.709)	(-10.735)
Banking crisis	-1.025***	-1.035***	-1.027***	-0.995***	-1.027***	-0.980***	-1.020***	-1.049***	-1.017***
	(-4.502)	(-4.537)	(-4.505)	(-4.344)	(-4.483)	(-4.269)	(-4.436)	(-4.555)	(-4.391)
Currency crisis	0.030	0.008	0.030	0.032	-0.008	0.009	0.047	0.016	0.031
	(0.137)	(0.035)	(0.133)	(0.142)	(-0.035)	(0.043)	(0.209)	(0.070)	(0.140)
(log) Fertility (-1)	-0.729	-0.728	-0.730	-0.854	-0.848	-0.797	-0.771	-0.624	-0.542
	(-0.602)	(-0.602)	(-0.604)	(-0.699)	(-0.699)	(-0.660)	(-0.628)	(-0.515)	(-0.450)
(log) Life Exp (-1)	1.921	1.633	1.839	1.830	1.207	1.378	1.896	1.153	1.258
	(0.976)	(0.830)	(0.935)	(0.920)	(0.606)	(0.694)	(0.952)	(0.577)	(0.627)
Democracy	0.024	0.024	0.025	0.020	0.017	0.020	0.022	0.017	0.019
	(0.929)	(0.923)	(0.939)	(0.755)	(0.646)	(0.745)	(0.855)	(0.657)	(0.729)
Costant	43.338***	44.555***	43.578***	71.425***	46.338***	45.196***	43.051***	46.476***	45.477***
	(4.996)	(5.148)	(5.026)	(6.519)	(5.307)	(5.182)	(4.917)	(5.304)	(5.170)
Observations	1,514	1,514	1,514	1,514	1,514	1,514	1,514	1,514	1,514
Number of id	64	64	64	64	64	64	64	64	64

Notes: Robust z-statistics in brackets, *** p<0.01, ** p<0.05, * p<0.1. All regressions include country fixed effects and time dummies.