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Sovereign debt defaults and currency crises in Latin America

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Chapter 6

Sovereign defaults, business cycles and diversity in impact

6.1 Introduction

One of the conclusions of the previous chapter is that there is diversity in the impact of sovereign debt defaults in different historical periods, and for different countries. We regard this variation in impact of past defaults as an opportunity to analyze the determinants of the length and severity of contraction following defaults, to paraphrase Cecchetti, Kohler and Upper (2009) in their analysis of banking crises.

One of the possible determinants of the diverse impact can be the timing of the default. Empirical research has found that in emerging economies sovereign borrowing is procyclical and defaults take place in recessions. However, Tomz and Wright (2007) find that the relationship between output and default is unexpectedly weak: only 62% of the defaults occur in a recession. They expect that other factors play a role, such as political circumstances, external trade, fiscal balance and international conditions. Several authors, like Furceri and Zdzienicka (2012) and Tomz and Wright (2007), hint at the diversity of the default impact. Reinhart and Rogoff (2009) note that external conditions such as world interest rates, global business cycles, commodity prices and contagion play an important role in the *likelihood* of sovereign

debt defaults, but no reference is made to the *severity* of these defaults.

We contribute to the sovereign debt default literature in two ways. First, we investigate if there exists a relation between business cycles and defaults, and whether other variables have a closer relationship with defaults. We extend the work of Aiolfi et al. (2011) on business cycles to defaults. We use a more homogeneous data set, with less sovereign debt defaults than Tomz and Wright (2007) do. We use different business cycle turning points: Aiolfi et al. (2011) based their index on a wider set of variables than just real GDP, which is used by Tomz and Wright (2007). Second, we analyze the differences in impact (severity and contraction period) of sovereign debt defaults. To the best of our knowledge this has not been done. We do not discuss causality, but we can provide insights through the stylized facts that we present in this chapter.

We find that the majority of the debt defaults (eleven out of fourteen, or 80%) starts in a recession phase of the business cycle. In ten cases (75%) the business cycle was in a recession phase one year before the default. On average, real GDP growth is negative in the year of the default and the year after, as shown in Chapter 5. Furthermore debt defaults take place when debt-to-GDP ratios and government expenditures as a percentage of government revenues are high. When the default occurs, debt increases, while GDP contracts, and government revenues drop even more than government expenditures do. This reflects the negative impact on a government's financial position. Prior to the default and in the first year of default the international conditions are adverse, with low global economic growth and high world interest rates. Sovereign debt defaults take place in periods of increased global capital mobility, which reflect financial liberalization. The majority of the defaults starts when terms of trade are unfavorable (indicating an overvalued currency) and exports are relatively low compared to imports. This quickly reverses when the default starts. The prices of most commodities decrease from the year prior to the default until one year after the default. Given the importance of commodities for the economies in Latin American countries, the drop in prices could well lead to debt service difficulties. Our results

fit into the boom-bust theories, because debt crises occur when a period of high growth and increasing commodity prices is followed by adverse international conditions including decreasing commodity prices. Our results also fit into the sudden-stop models, because capital inflows reverse, a currency devaluation follows, with a consequent drop in the terms of trade and a reversal in the current account.

The depth or severity of a default, measured as the cumulative output loss during the contraction period, is associated with domestic indicators: government expenditure and the stance of the business cycle prior to the default. The time it takes to reach the trough of the business cycle (the "contraction period") is associated with international variables; particularly pre-default commodity price increases tend to lengthen the contraction period. The latter is interesting in light of the significant differences between autocracies and democracies, as found by Arezki and Bruckner (2010) and Frankel, Vegh and Vuletin (2013). In autocracies positive commodity price shocks lead to increased government expenditures, while external debt is not significantly reduced. Fiscal policy is procyclical and positive windfalls from international commodity price shocks increase the risk of default on external debt. In democracies positive commodity price shocks lead to a significant reduction in external debt, while government expenditures do not increase. The risk of default in democracies decreases after positive windfalls from international commodity price shocks. Stronger checks and balances constrain policy space for politicians and increase accountability to the public. In a more democratic system the checks and balances are stronger, and fiscal policy is less procyclical. The four Latin American countries that we investigate pursued procyclical fiscal policy during most of its history. In the run-up to debt defaults these countries had an autocracy in eleven out of fourteen defaults.

Our results may be useful for policy makers to smooth the impact of debt defaults. The government can implement countercyclical rules that ensure that temporarily high fiscal revenues are saved rather than spent. This is precisely the policy that Chile has followed since 2001 (Frankel et al., 2013).

The remainder of the chapter is structured as follows. After a review of the literature in Section 6.2, Section 6.3 discusses how we measure the impact of sovereign debt defaults, and how we analyze the factors associated with the size and length of the impact. The empirical results are shown in Section 6.4. We discuss our results in Section 6.5, and Section 6.6 concludes.

6.2   Literature review

We review the literature related to the timing of the sovereign debt defaults in Section 6.2.1, and the literature related to the impact of defaults on economic growth in Section 6.2.2.

6.2.1   The timing of sovereign debt defaults

We first review literature on the relation between business cycles and sovereign debt defaults. Since we are interested whether sovereign debt defaults could be closer related to international conditions, we turn to the literature on commodity price cycles and sovereign debt defaults. The political economy literature provides an additional explanation for the relation between commodity prices and sovereign debt defaults. These theories also include an explanation for the relation between political elections and defaults.

Business cycles and sovereign debt defaults. Conventional wisdom is that countries default when output is low, and that a default provides costly insurance against economic adversity. In an unbalanced panel of 106 countries from 1820 to 2012 Tomz and Wright (2007) observe that only 62% of 169 default episodes begin in a recession phase. This is a less clear-cut relationship than expected according to theoretical models for emerging economies, which predict that defaults occur in recessions. Levy Yeyati (2006) finds that private lending to sovereigns is procyclical and official lending to sovereigns is countercyclical. Official flows consist of IMF lending, non-IMF multilateral lending (concessional and non-concessional), and bilateral lending.

Commodity price cycles and sovereign debt defaults. Kaminsky and Reinhart (2009) observe that peaks and troughs in commodity price cycles appear

to be leading for peaks and troughs in capital flow cycles, with the latter troughs typically resulting in defaults. When terms of trade are favorable (for instance high prices for commodities to be exported), then borrowing speeds up. When the prices of commodities drop, then borrowing drops too, and the probability of default increases. Their data suggest that in the period from 1800 to 1940 spikes in commodity prices are almost invariably followed by waves of sovereign defaults. Kaminsky and Vega-Garcia (2014) note that Brazil's defaults in 1898 and 1914 are preceded by drastic declines in its terms of trade due to collapses in coffee prices (in 1898) and rubber prices (1914). The relation is less clear for the period 1940 to 2010.

Political economy. Apart from business cycles there are also political factors that play a role in sovereign debt defaults. We identify two mechanisms from the political economy literature that are relevant for sovereign debt. Political uncertainty leads to a higher level of debt, and excessive corruption leads to procyclical fiscal policy when it comes to revenues from windfalls in commodity prices. In autocracies political uncertainty and corruption is higher (Alesina and Tabellini, 1989; Alesina, Campante and Tabellini, 2008). In a sample of 93 countries in the period 1970–2008, Arezki and Bruckner (2010) find that in autocracies positive commodity price shocks lead to an increase in government expenditures, and not to a reduction in external debt. After positive windfalls from commodity price shocks, the probability of a debt crisis increases significantly in a country with an autocratic political system, while it decreases in democracies.

Policy makers who take the decision to default run a substantial and high probability of damage: they may loose their jobs and political career, and the ruling party typically loses in the next elections (Borensztein and Panizza, 2009). Levy Yeyati and Panizza (2011) show that policy makers have incentives to postpone the default. They define two types of default, the forced default when no other decision than default is possible, and the strategic default when the policy maker voluntarily chooses for a default even if it could have been avoided. The latter is considered more damaging for the policy maker. As a consequence, they will postpone a default until

there is no other solution then to default, and will thus provoke less damage to their political reputation.

6.2.2   Determinants of impact of debt default on economic growth

The literature distinguishes various transmission channels of debt defaults on economic growth. Some of the transmission channels provide arguments for a long-term impact, while for others there is no agreement on the length of the impact.

Capital market access and borrowing costs. Most studies find that defaulters regain access to new credit shortly after the end of the crisis. For example, Panizza et al. (2009) find that most countries regain access within one or two years after a debt default. Global credit cycles and the size of the 'haircut' (percentage creditor losses as a consequence of a default) are more important for re-access than default history (Richmond and Dias, 2009). Borensztein and Panizza (2009) find that the cost of borrowing immediately after the default is significantly higher, but that this effect fades away in approximately two years. On the other hand, Cruces and Trebesch (2013) and Richmond and Dias (2009) find that debt restructuring can have a significant and lasting impact on access to the financial markets after a default. The effect depends mainly on the outcome of restructuring, in particular on the size of the 'hair cut'.

Impact on trade. Findings for the impact on international trade are ambiguous. Rose (2005) studies the Paris Club rescheduling and observes large and long-lasting declines in bilateral trade. Both importers and exporters have less access to credit as a consequence of the default, which causes lower trade activity. However Borensztein and Panizza (2009) find that export oriented industries suffer more, but the effect is fairly short-lived.

Contagion to the financial sector. Sovereign defaults are associated with an increased probability of a banking crisis (Borensztein and Panizza, 2009; Levy Yeyati and Panizza, 2011; Reinhart and Rogoff, 2011). Sovereign debt restructuring can strongly affect the financial position of domestic banks, pension funds and other financial institutions, particularly if these institu-

tions have invested in sovereign debt. Private institutions, including banks, can not have a better rating than the government of the country in which they operate ('sovereign ceiling'). Therefore bank funding will be more expensive when the sovereign credit spread increases (Reinhart and Rogoff, 2011).

Studies on twin sovereign defaults and banking crises are relatively scarce, and the literature on the impact of these crises on economic growth is even thinner. The evidence is mixed. Furceri and Zdzienicka (2012) do not find a significant difference. De Paoli et al. (2009) find that the impact is larger when sovereign stress is accompanied by problems in the banking sector, and the recent European sovereign debt turmoil has shown that the economic impact of twin sovereign debt and banking crises can be deep and prolonged (Correa and Sapriza, 2015).

Reputational spillovers. Reputational spillover or panic and pessimism that follows a default may undermine the confidence in a government, with direct consequences for the corporate sector. Sovereign defaults lead to a fall in FDI flows into the country (Fuentes and Saravia, 2010), foreign credit to the private sector collapses after a default (Arteta and Hale, 2008), and sovereign downgrading will affect corporate ratings and thus increase the cost of funding for corporations (Borensztein and Panizza, 2009). A drop in investments will probably have a negative impact on the economy in the long run.

6.3   Methodology

6.3.1   Sovereign debt defaults and business cycles

To investigate whether sovereign debt defaults are related to business cycles or fluctuations in a narrower component of economic activity, such as exports or fiscal balance, we use event study graphs as used by Kaminsky et al. (1998). We plot the pattern of the variables around the time of the debt default and compare this with the average values in tranquil times (periods without debt defaults). We also include international, exogenous indicators

such as the world real interest rate, world economic growth (real GDP of the USA, the UK, France and Germany) and commodity prices.

Furthermore, we count the number of defaults for which the business cycle is in an expansion phase in the year before the default, the number of defaults for which world economic growth is below its level in tranquil times, et cetera.

6.3.2   Severity and contraction period

To analyze why the impact of some debt defaults on the cumulative output loss is greater than others we first need to define the total impact of a debt default. We use two measures. Our first measure is the depth or severity, while our second measure is the length of the contraction period after a sovereign debt default. We use Levy Yeyati and Panizza (2011) as the definition of business cycle contraction: total cumulative output loss from the pre-default peak to the post-default trough of the business cycle. We make one adjustment, we start at the year of the default instead of the last peak before the default. The reason for this adjustment is that while Levy Yeyati and Panizza (2011) compare business cycle contractions in recessions with and without a default, we quantify the impact of a default compared to the pre-default period. In other words, the deviation of real GDP growth from its pre-crisis trend, from the year of default until the trough of the business cycle is reached.

We use the cumulative output loss instead of the cumulative output gap, because a trend based on a trend could bias the results. The contraction period of the defaults in our data sample is up to seven years, which implies that the growth in the first years of the debt default is included in the trend for the last years of the debt default episode. The length of the average pre-default growth is 5 years, for reasons exposed in section 5.3.2. Although one may argue that pre-default growth is typically high, and therefore output loss in a default is overestimated, this is not always the case. For instance in the Argentina 2001–2005 default the economic growth prior to the default was very low. To take the average historical growth over the entire time ho-

rizon would lead to inclusion of data that occur later and have nothing to do with the situation around the default. Besides, there are structural breaks in Latin Americas economic growth history, which makes this measure questionable.

The (cumulative) output loss is determined with the same definitions and equations as in Section 5.3.2, except that for the length we do not focus on the default episode, but on the contraction period.

6.3.3   Analyzing the severity of the impact

To analyze how the impact of sovereign debt defaults is related to other variables, we use event study graphs to compare the pattern of key variables for the five deepest sovereign defaults and the five mildest sovereign defaults. We also use simple cross-sectional models as in Cecchetti et al. (2009) for banking crises and Gupta, Mishra and Sahay (2007) for currency crises. The severity of the crisis (cumulative output loss) is the dependent variable, and the regressors are selected from a set of potentially relevant indicators. We also use simple cross-sectional models with the contraction period as the dependent variable. We use contemporary variables, but also lagged variables and pre-default and post-default averages. The crisis severity indicator is regressed on each variable separately. We only include the defaults for which we have a measure for the severity and length of the crisis.

6.4   Empirical results

We use the same data set as in Chapter 4 and 5. As in Chapter 5 we use the sovereign debt defaults (see Table 5.1). Details of the explanatory variables can be found in Appendix F. Wherever possible we have tried to distinguish the different transmission channels of debt defaults on economic growth.

6.4.1   Timing of sovereign debt defaults

We investigate a possible relation between sovereign debt defaults and fluctuations in exports, government balance, political conditions and international circumstances. We pool all defaults for all countries. Figures 6.1, 6.2 and 6.3 show how these variables fluctuate around the time of the debt default. The horizontal axis records the number of years before and after the initial year of the default (year T).

In Figure 6.1 we see in the upper left panel that government expenditures increase sharply in the year before the default. In the year of the default and the following year government expenditures decrease, which reflects the difficulty of government financing. In the upper right panel we can see that the ratio of government expenditures to government revenues increase as the default unfolds. This is caused by a larger decrease in revenues than in expenditures. In the middle left panel we see that the increase in central government debt to GDP continues after the default, which reflects the increase of arrears, and the decrease in GDP. The middle right panel shows that economic growth is negative in the year of default and the year after. After that a strong recovery sets in. This relatively fast recovery is in line with the findings of Levy Yeyati and Panizza (2011). In the bottom left panel we see that in the run-up to a default the inflation is equal to the average inflation in tranquil times. When the default unfolds, the inflation increases dramatically. The bottom right panel shows that on average defaults take place in more autocratic regimes, and that the political system changes to a less autocratic system in the years after a default.

Figure 6.1. Pattern of macroeconomic indicators around the time of the first year of a sovereign debt default in Argentina, Brazil, Chile and Mexico, 1870–2012 (pooled data). The dotted line represents the average level of the indicator during tranquil periods. The solid line represents the indicator around the time of the beginning of the debt default. T: first year of the debt default; $T - 1$: 1 year before the default entry, $T + 1$: 1 year after the default entry.
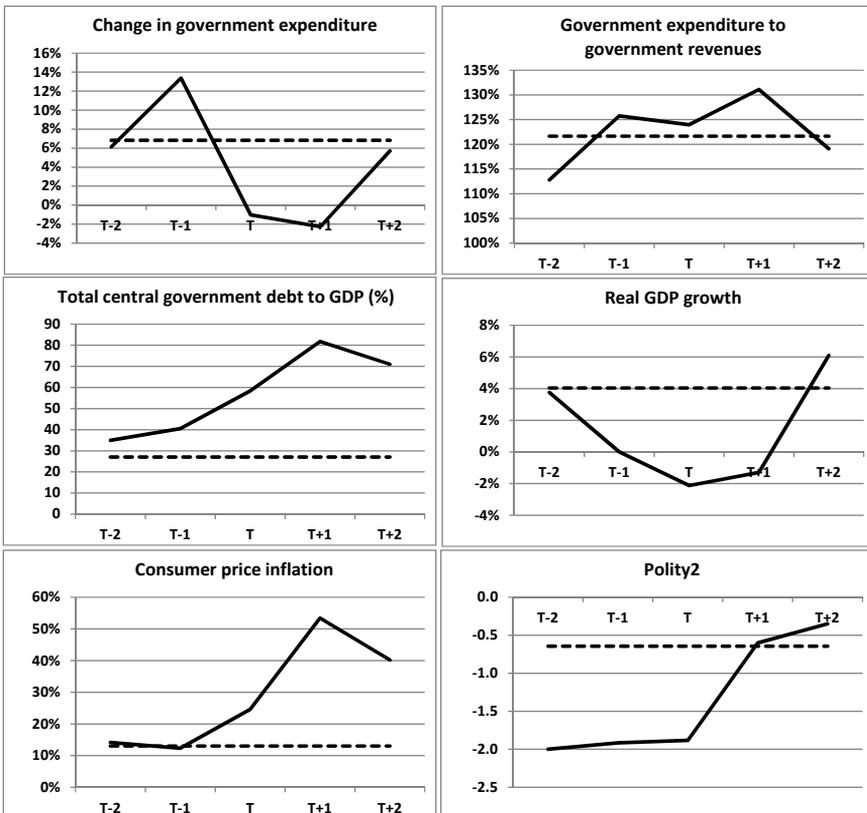
The upper panels in Figure 6.2 present indicators for the world economic situation . The graphs suggest that defaults coincide with bad international circumstances. World economic growth is at its lowest level in the year of default, and the world real interest rate levels peak a year before the default. We see the same pattern when we count the crises. Nine out of 14 debt defaults occur when world economic growth in the year of the default is below its long-term average growth rate, and 12 out of 14 debt defaults occur when world real interest rate in the year prior to the default is above its level in tranquil times. Summarizing, the majority of the defaults starts when international conditions are unfavorable, which confirms the conclusion of Reinhart and Rogoff (2008). Historically, financial crises have followed financial liberalization. Global capital mobility is strongly correlated with financial liberalization, so it should not come as a surprise that in 10 out of 14 debt defaults global capital mobility is higher than in tranquil times. This can also be observed in the middle left panel. The middle right panel shows the deviation of the Real Effective Exchange Rate (REER) from its 5 year average. In the run-up to the default the REER is above the level in tranquil times, which indicates an overvalued currency. The REER rapidly decreases in the year of the default and the years after. The same pattern is found in the terms of trade (shown in the bottom left panel). The ratio of exports to imports (shown in the bottom right panel) shows an opposite pattern. Prior to the crisis we see on average a lower level than in tranquil times, and 11 out of 14 debt crises occur when the exports to imports ratio in the year prior to the default is below its level in tranquil times. This quickly reverses when the default takes place.

Figure 6.2. Pattern of world economic and external trade indicators around the time of the first year of a sovereign debt default in Argentina, Brazil, Chile and Mexico, 1870–2012 (pooled data). The dotted line represents the average level of the indicator during tranquil periods. The solid line represents the indicator around the time of the beginning of the debt default. T: first year of the debt default; $T - 1$: 1 year before the default entry, $T + 1$: 1 year after the default entry.
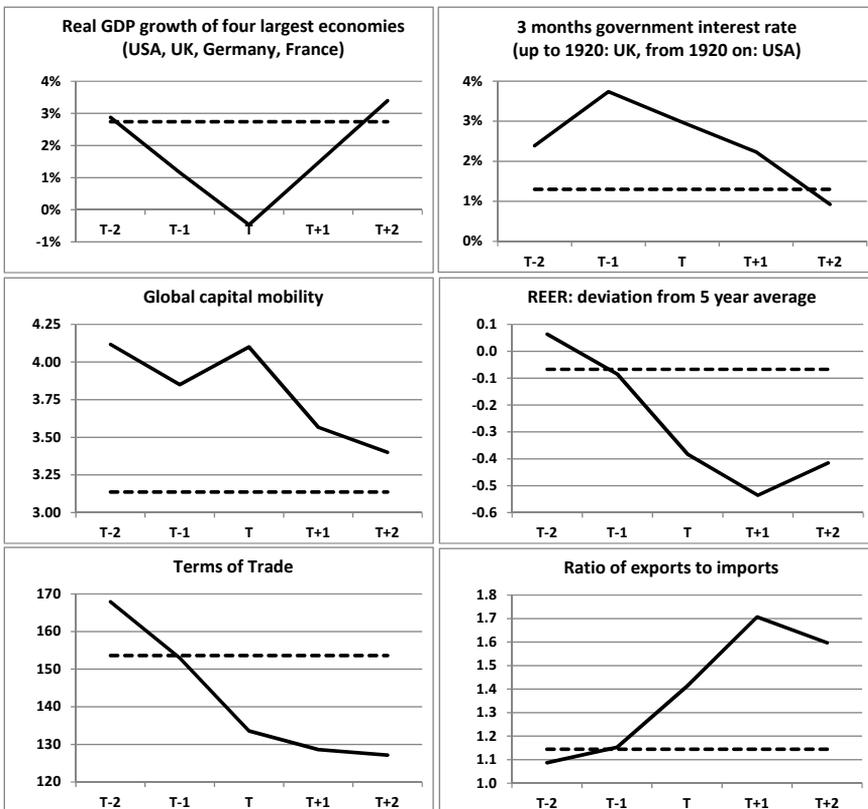
Figure 6.3. Pattern of commodity prices around the time of the first year of a sovereign debt default in Argentina, Brazil, Chile and Mexico, 1870–2012 (pooled data). The dotted line represents the average level of the indicator during tranquil periods. The solid line represents the indicator around the time of the beginning of the debt default. T: first year of the debt default; $T-1$: 1 year before the default entry, $T+1$: 1 year after the default entry.
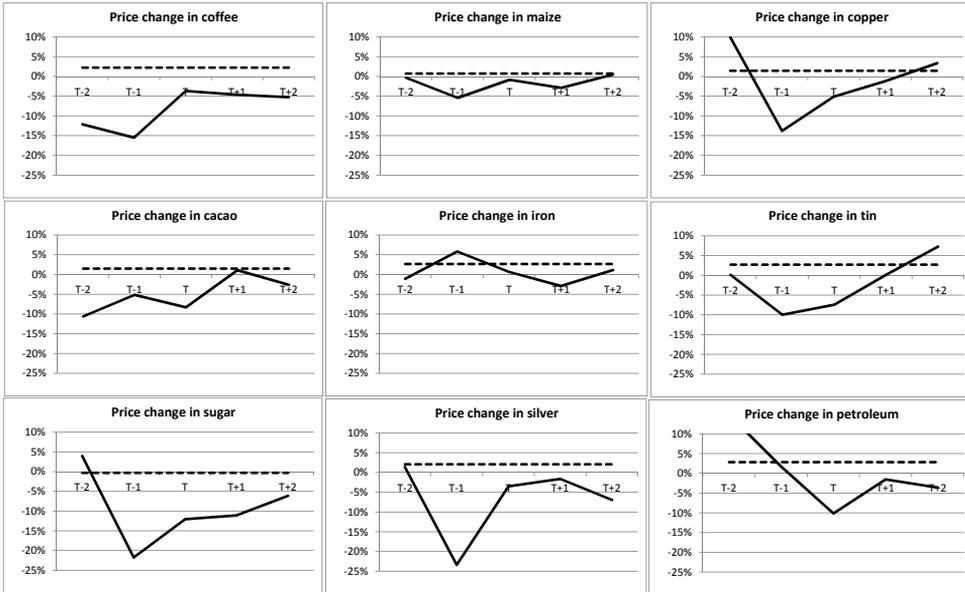

Figure 6.3 shows the pattern of changes in commodities prices. We can observe a decrease of prices in eight out of nine commodities in the year prior to the default, in the year of the default itself and in the year after the default. Commodities are important for the Latin American economies, as it affects output, government revenues, exports and foreign currency receipts. With lower government revenues and foreign currency receipts the servicing of sovereign debt obligations becomes increasingly difficult, particularly on foreign currency denominated debt.

Sovereign debt defaults and business cycles

Most sovereign debt defaults start in a recession phase (11 out of 14, or 80%), which is relatively more than Tomz and Wright (2007) find. Our results are in line with the sovereign debt default models adjusted for emerging markets dynamics (see Arellano, 2008). There are two defaults that occur one year after the business cycle peak was reached, five defaults start two years after the peak, one default starts three years after the peak and three defaults start more than three years after the peak. For seven defaults the trough of the business cycle is reached within one year, for one default the trough is reached in two years, and for three defaults it takes three years or more to recover. This confirms our findings in Chapter 5 that for one group recovery after a default is fast, while for another group recovery after a default lasts long.

6.4.2   Severity of output losses and contraction period

Table 6.1 lists the fourteen sovereign debt defaults, ordered for cumulative output loss during the crisis contraction period. The debt defaults of Mexico in 1982 and 1928, Chile in 1931, Argentina in 1890, and Brazil in 1937 had a deep impact on economic growth. We call these five crises the top 5 deep crises. Similar, the top 5 mild crises consist of the sovereign debt defaults that had the mildest impact on the cumulative output loss: Chile 1880, Brazil 1898, Mexico 1914, Chile 1983 and Brazil 1983. The Mexico 1982 crisis has a very large cumulative output loss, which can be attributed to the high pre-default growth (on average 8% per year in the five years preceding the default), and the low growth in the contraction period during the lost decade. The 1980s Latin American debt default had stronger effects in Mexico than in the other three countries.

6.4.3   Analyzing the severity of the impact

We compare the pattern of economic and political indicators during crisis periods in two ways, by event study graphs à la Reinhart et al. (1998) and

Table 6.1. Severity of the output loss and contraction period of sovereign debt defaults in Argentina, Brazil, Chile and Mexico 1870–2012. The defaults are ordered based on severity (cumulative output loss).

| Country	Year of default	Contraction period	Cumulative output loss
Mexico	1982	7	223.1%
Brazil	1937	6	90.0%
Mexico	1928	5	69.3%
Chile	1931	2	60.3%
Argentina	1890	2	51.6%
Argentina	2001	2	28.7%
Brazil	1914	2	19.3%
Argentina	1982	4	13.6%
Brazil	1931	1	8.7%
Brazil	1983	1	6.4%
Chile	1983	1	3.5%
Mexico	1914	3	−14.9%
Brazil	1898	4	−28.5%
Chile	1880	NA	*NA*

Notes:
Cumulative output losses are defined to be positive, so a negative coefficient implies a cumulative output gain. The 1880–1883 crisis in Chili began an expansion phase, and the economy continued this path after the crisis unfolded. According to our definition there is no contraction period, and therefore no cumulative output loss.

through simple cross-sectional regressions. We compare the pattern of deep versus mild crises for domestic indicators in the event study graphs in Figure 6.4. We observe that deep crises are associated with an increase in government expenditures in the year prior to default and a decrease in the year after the default, while mild crises show a moderate growth in the years before the default and negative growth in the year of the default and the year after (upper left panel). For deep crises, in the year of the default and the year after the default the ratio of government expenditure to government revenue (upper right panel) increases, which must be caused by a decrease in government revenues. Furthermore, deep crises coincide with a higher

level of debt which also increases faster (middle left panel), high real GDP growth in the years before the default and negative growth in the year of the default and the year thereafter (middle right panel) and a lower inflation rate (bottom left panel).

Figure 6.4. Pattern of macroeconomic indicators around the time of the first year of a sovereign debt default in Argentina, Brazil, Chile and Mexico, 1870–2012 (pooled data): deep versus mild crises. The solid (blue) line represents the average of 5 deep crises (Mexico 1982, Brazil 1937, Mexico 1928, Chile 1931, Argentina 1890). The dotted (red) line represents the average of 5 mild crises (Chile 1880, Brazil 1898, Mexico 1914, Chile 1983, Brazil 1983) and the intermittent (black) line represents the average in tranquil times.
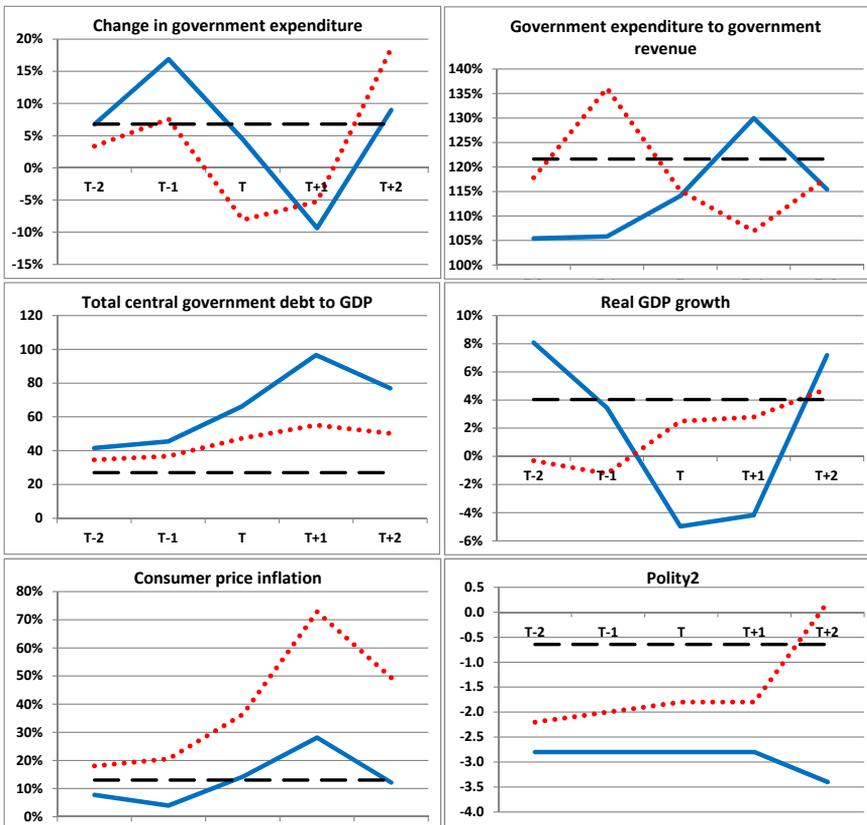
Deep crises crises occur on average in a more autocratic system than mild crises. Two years after the default the political system moves to a more democratic system for mild crises, while in deep crises the system becomes more autocratic (bottom right panel).

We turn to the pattern of world economic and external indicators around the time of defaults in the event study graphs presented in Figure 6.5. The upper left panel shows that deep crises are associated with high world economic growth rates in the run-up to the default, a slowdown in the year of the default and the year after the default, and a recovery to the non-default economic growth level. Mild crises are associated with a low economic growth prior to the default, and strong economic growth in the year after the default. For deep crises the real interest rates in the international capital markets (represented by the UK up to 1920 and the USA thereafter) increases well above the level in tranquil periods, peaking in the year after the default. For mild crises the pattern is the opposite. In the run-up to the default the real interest rate is higher than in tranquil times, but decreases to reach negative levels in the years that follow the first year of default (upper right panel). We conclude that while the deep crises meet favorable international circumstances in the run-up to the default and adverse circumstances in the year of the default and thereafter, mild crises have unfavorable international circumstances in the run-up to the crisis and favorable circumstances once the default occurs. Capital mobility around the time of mild crises is higher than for deep crises. All mild crises occur in periods with high capital mobility—either in the first globalization era (1870–1913), or in the second globalization era (1972–2012). The majority of the deep crises occurs in the 1930s when capital mobility is low. The terms of trade (bottom left panel) are often used as a proxy for external competitiveness; high terms of trade reflect an overvalued exchange rate, which makes imports relatively cheap and exports relatively expensive. In deep crises the terms of trade are higher in the years prior to the default than in tranquil times. Once a default hits, the terms of trade decrease, which reflect a restoration of the external competitiveness. In mild crises the terms of trade remain all the years below

Figure 6.5. Pattern of world economic and external trade indicators around the time of the first year of a sovereign debt default in Argentina, Brazil, Chile and Mexico, 1870–2012 (pooled data): deep versus mild crises. The solid (blue) line represents the average of 5 deep crises (Mexico 1982, Brazil 1937, Mexico 1928, Chile 1931, Argentina 1890). The dotted (red) line represents the average of 5 mild crises (Chile 1880, Brazil 1898, Mexico 1914, Chile 1983, Brazil 1983) and the intermittent (black) line represents the average in tranquil times.
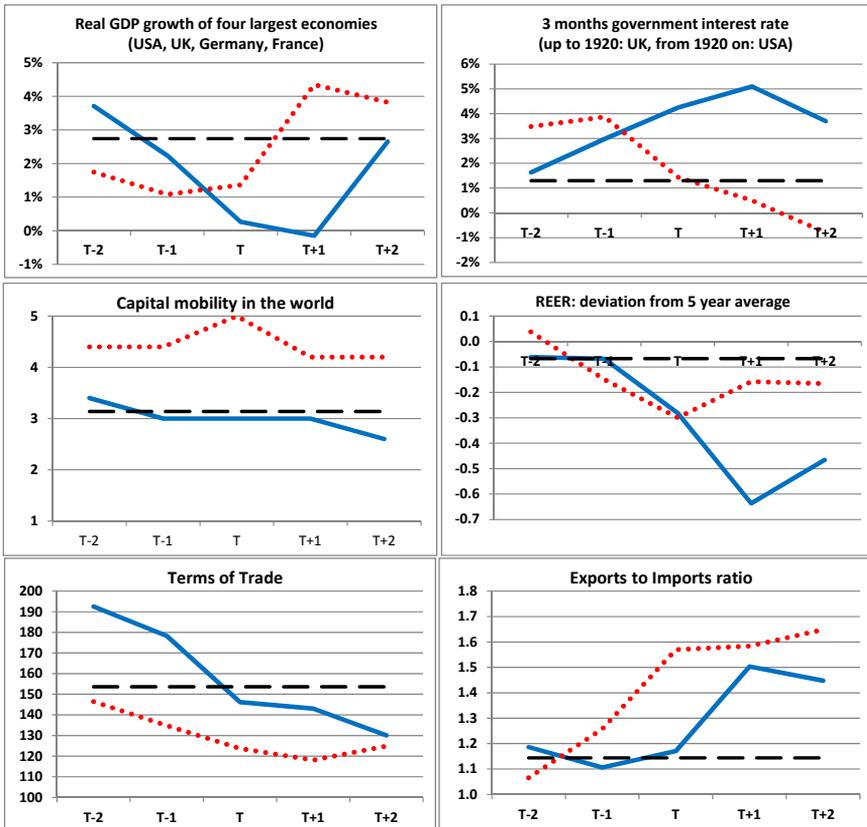
the level in tranquil times. In deep crises the ratio of exports to imports (bottom right panel) increases after the first year of default, while in mild crises this ratio increases already the year before default. This quick recovery of exports may help to mitigate the negative effects of the debt default.

Next, we present our results of the simple cross-sectional models. We only include the 13 defaults for which we have a measure for the severity and length of the crisis. This means that we exclude the Chile 1880–1883 crisis. As a consequence we have limited degrees of freedom.

Table 6.2. Determinants of severity of the impact of sovereign defaults in Argentina, Brazil, Chile and Mexico, 1870–2012.

Dependent variable: cumulative output loss			
	coefficient	standard error	adjusted R^2
Business cycle dummy 1 year before default	1.049***	0.310	0.465
Pre-default 3 year average real GDP growth	9.729**	3.802	0.316
Real GDP growth 1 year before default	4.127*	2.205	0.173
Change in government expenditure 1 year before default	2.992***	0.896	0.458
Pre-default 3 year average change in government expenditure	5.692**	2.113	0.343
Pre-default 3 year average change in sugar price	1.873*	0.960	0.189
Pre-default 3 year average change in silver price	2.613*	1.423	0.165
Change in silver price 1 year before default	-1.413*	0.718	0.193

Table 6.2 lists the variables which are significant at the 10% level. The domestic indicators (business cycle dummy, real GDP growth before default and government expenditure) can explain most of the variation of the dependent variable. If a business cycle is in expansion in the year before the default, then the impact is deeper. Similarly, high pre-crisis growth is associated with a larger cumulative output loss. In other words, defaults that occur shortly after the economy is in expansion tend to have a deep impact, while defaults that occur when the economy was in the recession phase for at least one year prior to the default and experienced low growth tend to

have a less severe impact. An increase in government expenditures in the years prior to default is associated with a larger cumulative output loss. High prices for sugar and silver in the three years before the default are positively correlated with the severity of a default: an increase (decrease) in the sugar or silver price amplifies (reduces) the impact of the debt crisis. This points towards a boom-bust pattern. When the prices of commodities increase this may lead to a boom, normally accompanied by overinvestments, increased government expenditures and overborrowing. When the prices decrease the boom busts and a government may not be able to service its debt obligations.

Table 6.3. Determinants of contraction period of the impact of sovereign defaults in Argentina, Brazil, Chile and Mexico, 1870–2012.

Dependent variable: crisis contraction period			
	coef-ficient	standard error	adjusted R^2
World real GDP growth 3 years prior to default	49.551*	25.107	0.194
World real GDP growth 1 year before default	23.357*	12.412	0.174
US real GDP growth 3 years prior to default	37.352*	17.358	0.232
US real GDP growth 1 year before default	17.927**	7.750	0.266
Change in government expenses in year of the default	9.105***	2.775	0.449
Business cycle dummy 1 year before default	2.500**	1.310	0.244
Business cycle dummy in year of default	2.864*	1.332	0.232
Terms of Trade 1 year before default	0.015*	0.007	0.198
Pre-default 3 year average change in cacao price	5.934*	3.276	0.160
Pre-default 3 year average change in copper price	17.331**	6.475	0.339
Change in iron price 1 year before default	-12.658*	5.993	0.224
Pre-default 3 year average change in maize price	12.279**	5.458	0.253
Change in maize price 1 year before default	16.004***	3.266	0.657
Pre-default 3 year average change in silver price	12.013***	3.438	0.483
Pre-default 3 year average change in sugar price	7.222**	2.634	0.352
Pre-default 3 year average change in tin price	9.747*	4.629	0.222
Change in zinc price 1 year before default	6.908**	2.796	0.298
Pre-default 3 year average change in zinc price	18.826**	6.266	0.401

Table 6.3 presents the variables that affect the length of the contraction period that follows the default and that are significant at the 10% level. Global conditions prior to the default dominate. Increasing commodity prices in the three years before the default are associated with a longer contraction period, while decreasing prices prior to the default are associated with shorter contraction periods. Latin America is a large producer of commodities. Commodities do not only have a direct impact on output, but also an indirect effect, because it sustains government revenues, and export revenues which generate foreign currency. The impact of a decrease in commodity prices is larger when the commodity prices have boomed before the decrease. When world economic growth prior to the default is high, then the length of the contraction period is longer. World economic growth has an impact on the commodity prices, because a decrease in global demand reduces the demand for commodities and its prices. The global conditions seem to fit within the boom-bust model. A boom in the commodity markets can end abruptly when international conditions deteriorate. The decrease in demand and prices of commodities will heavily hit commodity producing and exporting countries. When the boom period is accompanied by a boom in investments and increased government borrowing and expenditures, then a bust of commodity prices may have an even stronger impact, and lead to a sovereign default. Particularly the sovereign defaults from the 1980s follow this mechanism.

As was the case for the severity measure, the stance of the business cycle is significant for the length of the contraction period. If the economy is in an expansion phase one year before the default, the contraction period lasts longer. An increase in the terms of trade in the pre-default year is associated with a longer contraction period. Unfavorable terms of trade point towards an overvalued currency, which increase the probability of a depreciation or devaluation. This leads to difficulties servicing foreign currency sovereign debt, because of the currency mismatches in the assets and liabilities of the country (original sin).

6.5   Discussion

The majority of the defaults starts when international conditions are unfavorable, terms of trade are high (often associated with an overvalued currency) and exports are relatively low compared to imports. The latter two reverse when the default starts. In the year prior to the default and the first year of the default prices of commodities tend to be below the level in tranquil times. Government expenditures increase sharply in the year before the default, while economic growth is well below its level in tranquil times. Government debt increases in the run-up to a default and then accelerates.

Deep crises are associated with worse international conditions in the year of default and years thereafter. The external trade situation is less favorable in terms of trade and currency (over)valuation. Exports relative to imports are low, and take more time to pick up for deep crises. Terms of trade are high, which points towards currency overvaluation. Only after the default the terms of trade drop below the level in tranquil times. This rapid change in terms of trade points towards an important exchange rate adjustment, which implies increased debt service difficulties (original sin). Deep crises are correlated with commodity price increases and increasing government expenditures in the run-up to a default. Also, the debt overhang is greater, particularly after the default. On average, defaults coincide with autocratic regimes, and mild crises show a move towards more democratic systems, while deep crises show a tendency for more autocracy.

Our stylized facts provide support for boom-bust mechanisms, sudden-stop models and for the political economy theories. It is important to keep in mind that we can only speculate about causality. The transmission mechanism of the boom-bust theories are centered in commodity prices. In the four Latin American countries that we study, commodities are important for both the economy and the government. Commodities prices depend on supply and demand of the commodity in the world market. From the commodity lottery we know that not all commodity prices move in the same direction and size. For instance, supply of agricultural products can

change as a consequence of droughts, and demand for a particular metal can change after a technology innovation. Commodity prices also depend on global economic conditions. Prices increase when world economic growth is high, for example, when world economic growth increases demand for food products increases. Higher commodity prices lead to increased expectations, resulting in lower interest rates, overinvestments, capital inflows, and overborrowing. Government revenues as well as government expenditures increase. When commodity prices decrease after an extended period of price increases, then this will lead to a decrease in output, foreign currency inflows, government revenues and expectations. The government has to cut expenditure and/or borrow more, which increases the debt level and interest rates because of an increased probability of a default. This affects the government budget, private and public investments, and output further. If this occurs when international capital market conditions are unfavorable, then access to additional debt to finance the deficit will be even more expensive and difficult to obtain. The increase of the fiscal deficit and negative outlook, combined with a high debt level, may then lead to a sovereign debt crisis.

In the sudden-stop model of Calvo (1998, 2003) a sharp drop in commodity prices can lead to negative expectations, which cause a sudden stop in capital flows. This can lead to a sovereign debt default through two (not mutually exclusive) channels. The sudden stop can cause a currency crisis, which complicates debt servicing if sovereign debt is denominated in foreign exchange (original sin). The sudden stop causes a downturn in economic activity, which affects the government budget and makes debt servicing more difficult. Additionally, interest rates will increase as investors perceive a higher risk of default. The fiscal deficit increases further and could eventually lead to a sovereign debt default.

The political economy theory of Arezki and Bruckner (2010) combines commodity price booms with the political system. In autocracies the additional revenues from international commodity price windfalls are used for government expenditures, while democracies use the additional reve-

nues to reduce their external debt levels. In autocracies the risk of default on external debt increases when international commodity prices increase. The four Latin American countries that we investigate experience an equal number of years with autocracy and with democracy. However, defaults occur when there is an autocracy in eleven (out of fourteen) crises.

6.6   Conclusion

This chapter investigates the relation between sovereign debt defaults, business cycles and economic growth for four Latin American countries: Argentina, Brazil, Chile and Mexico. These countries experienced fourteen sovereign defaults during the period from 1870 to 2012.

We find that 80% of the sovereign defaults start in the recession phase of the business cycle. Defaults often occur in autocratic political systems and when government expenditures are high. A high and fast increasing debt level and adverse international conditions (low economic growth, high interest rates and decreasing commodity prices) are associated with sovereign defaults. Another finding is that the higher domestic and world economic growth, government expenses and commodity prices in the three years prior to the default, the higher the cumulative output loss and the longer the contraction period.

Our results fit into boom-bust theories, sudden-stop models and political economy theories. Original sin is involved as currency devaluations make debt servicing on foreign currency denominated debt more complicated.

Latin America has a long history of recurrent debt defaults. Our findings show that procyclical fiscal policy and reliance on commodities have made the countries vulnerable to unfavorable international developments (low economic growth, high interest rates and decreasing commodity prices). In the most recent commodity boom (2002–2007) most Latin American countries have used the extra revenues to reduce debt positions, to increase foreign reserves and to maintain the fiscal balance. This has allowed Brazil and Chile to follow countercyclical fiscal policy during the Global Financial

Crisis that hits emerging countries in the fall of 2008. Although the region is hit hard by the crisis, the GFC does not lead to financial crises other than a currency crisis in the region, contrary to past global crises.

Our policy recommendations are that Latin American countries continue with the countercyclical fiscal policy and maintain debt levels low. Positive windfalls from international commodity price shocks should be used to reduce debt and not to increase government expenditures. Furthermore, it is important to reduce the dependency of commodities for the economy, government budget and exports. The government can diversify the economy by implementing economic policies such as the promotion of the manufacturing and services industry. To decrease dependency in the fiscal area the government can broaden the tax revenue base.