iscte

INSTITUTO
UNIVERSITÁRIO
DE LISBOA

Behaviour of Output and Determinants during Pure Sovereign Debt Crises

Ana Margarida Matias da Silva Alves

Master in Economics

Supervisors:
PhD Alexandra Maria do Nascimento Ferreira Lopes, Associate Professor,
Iscte-Iul

PhD Luís Filipe Farias de Sousa Martins, Associate Professor with aggregation,
Iscte-Iul

November, 2021

Behaviour of Output and Determinants during Pure Sovereign Debt Crises

Ana Margarida Matias da Silva Alves

Master in Economics

Supervisors:
PhD Alexandra Maria do Nascimento Ferreira Lopes, Associate Professor,
Iscte-Iul

PhD Luís Filipe Farias de Sousa Martins, Associate Professor with aggregation,
Iscte-Iul

November, 2021

Acknowledgments

First, I would like to thank to my supervisors, Professor Alexandra Ferreira-Lopes and Professor Luís Martins, who gave me the guidance I needed to succeed in the Master program. For the share of knowledge, patience and dedication, along with the unconditional support in the most challenging period of my life. I wished all students had the supervision and support that I had, and I am sure I would not have made it this far without them.

To my family, for the support they had given me throughout this year, in particular to my mother for never allowed me to give up, and to my father, for the ambition that was transmitted to me.

To my friends from Estarreja, for their affection and attention, and to my friends from Lisbon, for their support and companionship on this journey. To my friends Beatriz, Carlota and Fabiana, for all the encouraging words and for never leaving by my side.

I am grateful to everyone who have passed through my life throughout this year and contributed, in some way, to this dissertation.

Resumo

A presente dissertação tem por objetivo definir os determinantes macroeconómicos das crises puras de dívida soberana e estudar a sua ligação com o comportamento do produto, no período de 1970-2017. Foram construídas três medidas diferentes para calcular o crescimento económico, baseadas na variação do PIB, e no produto cíclico, calculado com os filtros *Hodrick-Prescott* e *Baxter-King*. Em 90 episódios, ocorridos em 54 países, os nossos resultados revelaram que: em 56% das crises, existiu uma aceleração (crises expansionistas), e em 44%, uma desaceleração (crises contracionistas), do crescimento económico; as crises expansionistas prevaleceram tanto em países de baixo rendimento, como de médio-alto rendimento; a década de 80 foi a que vivenciou crises mais severas. Os países com maiores valores de dívida de curto-prazo, em percentagem das reservas, termos de troca, dívida pública e sobrevalorização da taxa de câmbio efetiva real, foram os mais suscetíveis a uma desaceleração do crescimento económico. Foi realizado um estudo complementar com o intuito de compreender o comportamento dos determinantes em períodos sem ocorrência de crises. Foi possível concluir que a dívida externa, em percentagem do PIB, e a dívida de curto-prazo, em percentagem das reservas, levaram a uma diminuição do crescimento tanto em períodos de crise, como em períodos onde não se verificaram episódios de crises puras, sendo que o impacto aumentou consideravelmente em períodos de crise. O estudo foi re-estimado com um critério diferente de definição de crise pura de dívida soberana, e foram incluídas variáveis *dummy* alternativas relativas ao nível de rendimentos dos países e às décadas do período. Os resultados são robustos em todas as estimações.

Palavras-Chave: Crescimento económico; crises de dívida soberana; crises puras.

Códigos JEL: C21, H63, F43

Abstract

The current dissertation has the purpose to determine the macroeconomic determinants during pure sovereign debt crises and analyse their association with the behaviour of output, in the 1970-2017 period. Three different methods to measure economic growth were constructed, based on output variation and on detrend-output, with the Hodrick-Prescott and the Baxter-King filters. In 90 episodes, occurred in 54 countries, our findings revealed that: in 56% of total crises, there was an acceleration (expansionary crises), and in 44% there was a deceleration (contractionary crises) of the economic growth; expansionary crises prevailed in low- as well in middle-high-income countries; the 1980s were the decade with most severe crises. Countries with higher short-term debt, as a percentage of reserves, terms of trade, public debt and overvaluation of the real effective exchange rate, were the most susceptible to a slowdown in growth. A complementary study was implemented with the purpose of understanding the behaviour of the significant determinants in periods with no occurrence of crises. It was possible to conclude that external debt-to-GDP ratio and short-term debt-to-reserves, lead to a drop in growth in crisis periods, as well as in periods with no crisis' episodes, with the impact increasing considerably in times of crisis. As robustness examination, the study was re-estimated with a different criterion of defining pure sovereign debt crisis, and alternative dummies were included in the regression, namely decades and income-level dummies. Results are robust for all estimations.

Keywords: Economic growth; sovereign debt crises; pure crises.

JEL codes: C21, H63, F43

Table of Contents

List of Figures

x

List of Tables

List of Abbreviations

BK – Baxter-King

$BK_{post,1-pre,1}$ – Difference of the Baxter-King detrended output in the crisis year and the pre-crisis year.

d_cadeficit – Current account balance deficit dummy

d_crisis – Pure sovereign debt crises dummy

DebtServ – Debt service

DebtServ_Exp – Debt service as a share of exports

EMU – European Monetary Union

ExtDebt_st – Short-term external debt

ExtDebt_Y – External debt as a share of Gross Domestic Product

$g_{post_2} - g_{tranq,3}$ – Average real Gross Domestic Product growth rate in the first two years of crisis minus the average real GDP growth rate in the 3 nearest tranquil pre-crisis period

GDF – Global Development Finance

GDP – Gross Domestic Product

GKO – *Gosudarstvennyj Komitet Oborony*

GNI – Gross National Income

GNIpc – Gross National Income *per capita*

GovBal – Fiscal balance

HP – Hodrick-Prescott

$HP_{post,1-pre,1}$ – Difference of the Hodrick-Prescott detrended log output in the first crisis year and the pre-crisis year.

IMF – International Monetary Fund

Imp_g – Imports' growth

IncLevel – Income level dummy

IncLevel1 – Income level dummy after 1987

IncLevel2 – Income level dummy prior to 1987

Infl – Inflation rate

IntRate – Real interest rate

IntRate_US – United States real interest rate

N/A – Not Available

OECD – Organization for Economic Cooperation and Development

OECS – Organization of Eastern Caribbean States

OLS – Ordinary Least Squares

p.p. – percentage points

PubDebt_Y – Public debt as a share of Gross Domestic Product

REER – Real effective exchange rate

REER_ov - Real effective exchange rate overvaluation

REER_vol - Real effective exchange rate volatility

Req – External Financing Requirements

Res - Reserves

S&P – Standard & Poor's

StDebt_Res – Short-term external debt as a share of reserves

TBill – 3-months United States treasury bill

ToT – Terms of trade

ToT_vol – Terms of trade volatility

U.S. – United States

USD – United State dollars

VIF – Variance Inflation Factor

Y – Real Gross Domestic Product

Y_g – Real Gross Domestic Product growth rat

1. Introduction

"The European sovereign debt crisis," an announcement that most of individuals start to listen in 2010 and few will forget. It is not surprising as the event haunted Europe and the repercussions are still in sight. Nonetheless, if we focus on economic and political history, various countries have gone also through similar events. In fact, an alarming 30% of sovereigns have defaulted since the earlies 1970s (Beers & Mavalwalla, 2016).

One of the main contributions of this research is related with the intense lack of attention by specialists. Foremost, sovereign debt crisis is possibly the type of financial crisis with least research. Countless authors dedicate most of their investigation to banking and currency crises, probably for being the types of crises with more occurrences. This study is useful to policymakers, since studying sovereign debt crises by anticipating and collecting useful information, it is possible to guarantee a systematic, proactive, and integrated risk management by governments, in order to prepare against financial shocks.

On the other hand, regardless several studies attempt to answer what may (or may not) cause recessions, such is the case of Demirgüç-Kunt and Detragiache (1999) for banking, Cuaresma and Slacik (2009) for currency, and even Jemović and Marinković (2021) for financial crises in general, few are those who take into consideration the prevalence of simultaneous shocks. As typically crises come in pairs, an economy can find itself witnessing two (or more) different types of financial crises simultaneously, i.e., non-pure crises. Nevertheless, researchers still use these non-pure episodes assuming as being just one type of crisis, resulting in non-reliable results and conclusions. Thus, it is crucial to study pure crises in order to identify the determinants responsible for each type of crisis, individually.

But what is considered a sovereign default? Are there specific criteria for a country to be officially decreed defaulted? Are these standards common in all corners of the world? Surprisingly, the answer is not positive. The dispute in defining sovereign default is problematic. Different concepts lead to divergent conclusions, the impossibility of linking research and, consequently, unfeasibility of sharing reliable information. Therefore, the kick-off of our study focused on this issue, with the analogy of diversified definitions, both from credit ratings agencies, such as Moody's and Standard & Poor's, as well as from databases and empirical studies, such as Reinhart and Rogoff (2009), Detragiache and Spilimbergo (2001), Bank of Canada-Bank of England database and Beim and Calomiris (2001).

The second step in preparing the research went through the collection of a list of pure sovereign debt crises episodes. It stood out that most episodes occurred in developing countries.

From this point forward, the motivation and contribution of the research increased considerably given the duty to contribute to the growth and development of the most disadvantaged countries.

Hereupon, one question holds: What are the macroeconomic variables and its association/impact on output growth in the episodes of "pure" sovereign debt crises, during the period between 1970 and 2017?

Our period of analysis sets between 1970 and 2017, and compromises 90 pure sovereign debt crises episodes in 54 countries. The economic growth measurement along with the empirical methodology is similar to Gupta et al. (2017), which performed the analysis for currency crisis. We used cross-sectional data with observations occurred in the crisis' periods in order to establish the macroeconomic determinants behind pure sovereign debt crises, through the Ordinary Least Squares (OLS) with White heteroscedasticity-consistent standard errors estimation method. Moreover, using panel data, with observations for the whole sample period, and a fixed effects model with heteroscedastically consistent and autocorrelation standard errors, we tested if the statistically significant variables could affect the economy in periods with no crisis's occurrence.

Our results revealed that pure sovereign debt crises are predominantly expansionary both in low- and middle-high-income countries. Middle-high-income countries' economic growth has a higher acceleration in expansionary crises as well as a higher deceleration in contractionary crises, even though the proportion is not equal (contractionary growth has more 3 percentage points compared to the lowest income group). Additionally, regarding the comparison across decades, we found that the 1980s were the one with more critical crises and the severity of collapses has been falling through time.

Considering what determines pure sovereign debt crises, countries with higher short-term debt-to-reserves ratio, terms of trade, public debt and real effective exchange rate overvaluation saw their output growth deteriorate in crisis periods. On the opposite side, several macroeconomic variables of external content were significant in explaining acceleration of the variable of interest, such as external debt, short-term external debt, external financing requirements, imports' growth and real effective exchange rate volatility. Overall, domestic non-policy variables prevailed as determinants.

Curiously, when the behaviour of determinants was tested in periods of healthy economy, it was found that the intensity of indicators increased considerably. Additionally, external debt-to-GDP ratio, short-term debt-to-reserves and external financing requirements had a significant impact in output growth in both periods of crisis and non-crisis, and short-term external debt, import's growth, terms of trade, public debt-to-GDP ratio, real effective exchange rate

overvaluation and volatility proved to affect the economy solely in times of pure sovereign debt crises. This information is useful for policymakers to predict, design a policy, and beware of the events of economic collapse.

Results were robust to different crisis definitions. Moreover, the study was re-estimated also with the inclusion of alternative decades and income-level *dummies* variables in the multiple linear regression, with the specific to-general approach. Results are robust for all estimations.

The dissertation is organized in the following structure: In Section 2 is the literature review, where we explain the challenge in defining sovereign default. Moreover, it also includes a descriptive narrative of some of the most important episodes of sovereign debt crises, namely the Latin, the Russian, and the European debt crises, the empirical literature of determinants of non-pure sovereign debt crises, and the discussion of the gap in the literature. Section 3 follows with the empirical methodology description, in Section 4 are the empirical results of the modelling behavior of output and the determinants subsections and, lastly, in Section 5, the conclusion.

2. Literature Review

2.1. The Challenge of Defining Sovereign Default

The genesis for any empirical research and analysis of sovereign debt crises is the definition and characterization of the fundamental occurrence that conducts to debt crises – Sovereign default.

Remarkable events in history proved the importance to set sovereign default, as is the case with the Greek and Argentine sovereign debt crises. In the former, the Greek government neither failed payments, nor violated other contract clauses. Nevertheless, Greece demanded new terms and the creditors consented, contributing to be declare a sovereign default by the rating agencies. In the latter case, Argentina announces the payments suspension on November 2001 and rating agencies listed the country as defaulting, although Argentina only put an end to the payments on January 2002 (Tomz & Wright, 2013).

Herewith, it is strongly necessary to conceptualize sovereign default. Notwithstanding, hardly any empirical research concerns on the crucial, nonetheless complex, problematic of defining correctly the concept. Countless studies cease to establish different definitions, which even with the same database and analytical framework, results can present divergent or inconclusive findings (Ishihara, 2005; Megersa, 2019).

Detragiache and Spilimbergo (2001) classified a sovereign default episode if it fulfilled either or both of the following criteria: (i) If there are arrears of principals or interest on external obligations regarding commercial creditors of more than 5 percent of total commercial debt pendent; (ii) If there is a debt restructuring or rescheduling agreement with commercial creditors, as listed in the Global Development Finance database (GDF), published by World Bank. In simple terms, a default episode is determined once the country has accumulated a large amount of arrears. Nevertheless, this definition does not differentiate between sovereign and private arrears and can, possibly, exclude some initial crises avoided in time by financial support of official creditors (Manasse & Roubini, 2009). Moreover, regardless the selection criteria were able to identify 54 debt crises in the baseline sample, the definition does not capture some default observations, such as countries which find it difficult to meet its external payments, although did not result in arrears or rescheduling, as is the case of 1995 Mexican crisis. Consequently, it was only possible to identify four crises in the 1994-1998 period with the presented default definition (Pescatory & Sy, 2007).

In the BoC-BoE database (Bank of Canada – Bank of England) of 2014, sovereign default was defined has "one that tracks both interruptions of scheduled debt service and changes in debt payment terms that result in creditor losses." Nevertheless, other government fiscal acts indicate that it should be expanded, since late payments often produce commitments to domestic creditors that are in default and must be resolved (Beers, Jones & Walsh, 2020).

While the previous default definitions focus on the defaults on external debt, Beim and Calomiris (2001) concept groups the subsequent defaults together, more specifically, that occur within 5 years. Their definition includes bonds, supplier's credits and bank loans, and exclude defaults with political sources, such as intergovernmental loans.

Moreover, according with Reinhart and Rogoff (2009), a sovereign default observation is described as the failure of a government to meet a principal or interest payment on the due date, which includes instances where rescheduled debt is extinguished in terms less favourable than the original obligation. This definition is similar to the Standard & Poor's (S&P), that is presented below, with the exception of using slightly different sources. (Kuvshinov & Zimmermann, 2019). It is, identically, used and followed by Pancrazi et al. (2017).

Rating credit agencies default definitions are essential and indispensable, considering that they inform ratings actions (Ams, et al., 2019). Hereupon, much of the data on sovereign default is produced by credit rating agencies, with emphasis in Moody's and S&P.

Moody's (Zazzarelli, 2007) defines sovereign default when "there is a missed or delayed disbursement of interest and/or principal, and when a distressed exchange occurs". Similarly, Standard & Poor's (Chambers et al., 2011) defines a sovereign default in a country when the central government either do not pay scheduled debt service on due date or tenders an exchange offer of new debt with less-favourable terms than the original issue.

Other sources follow the definition of the rating credit agencies, such as is the case of Rho & Saenz (2021), Tomz & Wright (2013), Ams et al. (2019), Kuvshinov & Zimmermann (2019), etc. Therefore, it is the most dependable sovereign default definition and should be the one used within all those mentioned, particularly the definition given by S&P, since it reveals to be slightly more complete than the Moody's concept.

Table 1. Possible Definitions of Sovereign Default

Source	Definition	Key criteria
Standard & Poor's	Failure to pay on the due date by the central government, and/or makes and offer of exchange of a new debt with less favourable conditions than the original offer.	Legal
Moody's	Missed or delayed payment of interest and/or principal; Occurrence of a distress exchange.	Legal
Reinhart and Rogoff (2009)	Similar to S&P, with the exception of using, to a moderate extent, different sources.	Legal
Detragiache and Spilimbergo (2001)	If there are arrears of principals/interest on external obligations of more than 5% of total commercial debt outstanding or if there is a debt restructuring or rescheduling contract, as listed in GDF.	Legal + size of the debt
BoC-BoE	Track of interruptions of scheduled debt service and changes in the clauses that result in losses to the creditor.	Legal
Beim and Calomiris (2001)	Includes bonds, supplier's credits and bank loans, and exclude intergovernmental loans. Groups the subsequent defaults together that occur withing 5 years.	Legal + duration of the specific crisis

Adapted from: Kuvshinov, D., & Zimmermann, K. (2019)

2.2. Episodes of Sovereign Debt Crises: An Historical Overview
2.2.1. The Latin American Crisis

Latin American countries have been experiencing several waves of debt accumulation in 1970-1989, 1990-2001 and 2002-2009. (Kose et al., 2020). Nevertheless, the debt crisis of the 1980s was considered the most traumatic event in Latin America's history within the periods mentioned (Ocampo, 2014). In fact, this tragic decade is referred to as the *Lost Decade*, due to the previous developments in social policy that failed during the period (Shefner & Panageotou, 2015).

In the 1970s, debt markets' structure changes favourably for the emerging and developing countries, with the development of the syndicated loan market, characterized by loan assignments from a group of commercial banks to a single borrower – corporations, including sovereign governments – in order to perform an efficient and safe operation, considering banks end up to share the associate risks between them (Dennis & Mullineaux, 2000; Kose et al., 2020). The syndicated loans rapidly expanded and some least developed countries took advantage of the new market.

Moreover, the syndicated loans market expansion can be justified by the significant rise of oil prices in the 70s, leading to current account imbalances, although benefiting the oil-exporters economies. Or at least, that it was what would be expected (Westphalen, 1984). Curiously, these group of countries suffered from a slowdown in growth, due to the decline in terms of trade supported primarily by the oil-exporters nations (Kaminsky & Pereira, 1996).

At the same time, the allowance of the high budgetary deficits, such as a defective taxation system, in the United States caused a significant increase in LIBOR rates (Westphalen, 1984) in nominal and real terms, even though they persisted incredibly low. This turned out a weight in times of high inflation (Westphalen, 1984; Kose et al., 2020). Moreover, the continuous real interest rate growth led to Latin American real interest payments that amount to 3.3% of their Gross Domestic Product (GDP) in 1983, which would be 0.5% if the real rates did not suffer their respective rise (Dornbusch & Fischer, 1986).

It should also be highlighted the fact that a large amount of Latin America borrowing was unjustified (Dornbusch & Fischer, 1986), considering it mostly financed consumption and the deficit in the government budgets, rather than investment as it should. As a matter of fact, according with Ramirez (2006), the average investment to GDP ratio for Latin America increased just three-tenths of a percentage point (p.p.) between the decades of 1970 and 1990, mainly owing to the significant decrease in its public investment dimension. Despite the economics causes, it was also involved some psychological effects, such as the impairment of the region's creditworthiness as a result of the 1982 Mexican Crisis (Westphalen, 1984).

In addition to the external stimuli mentioned, internal causes also play an important role in the history of the Latin American Crisis. Some specific incorrect decisions on economic and development policy (Westphalen, 1984) can partially explain the economic growth decline in the Latin countries, even in countries as Argentina and Chile, which followed different internal policies (Kaminsky & Pereira, 1996). Domestic policies, through an inadequate management of the exchange rate, were probably one of the main crisis contributors, since it was allowed the real exchange rate to become dangerously overvaulted when countries started to have difficulties in paying their loans (Rodriguez & Edwards, 1997). In fact, the currency overvaluation contributed to the large-scale capital flight of Argentina, Mexico and Venezuela (Kose et al., 2020), by a total of 60 billion dollars, which is equivalent to 67 percent of their gross capital inflows, according to the World Bank. Even when the capital flight arrived in New York in the form of deposits with lending banks, they returned more loans to the countries as if they were funding profitable investments, which could only be justified if they were *too big to fail* (Dornbusch & Fisher, 1986). In this extent, the earnest bad management by the commercial

banks translated into a chaos, and a growing loss of confidence in the government (Westphalen, 1984).

During the 1977-1982 period, developing countries were not only borrowing enough money to pay back the interests and debt, but also borrowed greater amounts in order to finance a trade deficit. Therefore, synthetically, the origin of the debt crisis is justified by the imprudent borrowing terms in the debtor countries and lending by commercial banks, contributing to worsen the world recession (Dornbusch and Fisher, 1986).

The Latin America Crisis of 1980 was officially announced when Mexico was not able to service its debts. The contagion was fast enough to damage surrounding countries in Latin America, around 16, and even some emerging and developing economies outside the region, such as Algeria, Nigeria and Niger (Kose et al., 2020), that fell into arrears in their debts' payments.

2.2.2. The Russian Crisis

In August of 1998, the Russian financial system collapsed resulting into, mainly, a sovereign debt crisis, but also with banking and currency crisis evidences (Sutela, 2000).

Russia was in the middle of a transaction from a centralized economy to a decentralized capitalism system (Humayun Kabir & Kabir Hassan, 2009), at the time of the crisis. In fact, according with Åslund (1998) and Slay (1999), it was never recognized as a capitalist system, but as social formation of emergent capitalism with considerable evidences of the old Soviet socialism, without the central system. Nevertheless, it was the emergence of democracy, capitalism and federal state in Russia at the time, so an economy in process has the capacity to create financial problems for market participants, such as international investors, lenders, banks, investment institutions and hedge funds (Humayun Kabir & Kabir Hassan, 2009). The financial sector was still underdeveloped (Humayun Kabir & Kabir Hassan, 2009) so the crisis was a very serious concern even for other countries.

At the pre-crisis period, Russia was at a favorable development and economic growth situation. The GDP was at record levels, showing a marginal increase of 0.9% between 1996 and 1997, consumer price inflation was low, which seemed to have been achieved by unconventional monetary means (Hanson, 1999), production levels were finally increasing, the trade surplus was healthy, considering the high oil prices, and the ruble – the official currency of the Russian Federation - was up (Åslund, 1998).

Total debt reached around 50% of the GDP by the mid-1998 and 70% at the end of the year, which seemed attractive for the western countries. However, between the 1993-1998 period, the revenue-to-GDP decreased significantly, more exactly from 14.5% to 9%. With these numbers, the ridiculous low revenue-to-GDP made the debt reduction even harder. Indeed, it is possible to attribute the blame to the tax collection system, considering the arrears have increased progressively since 1992 (by July 1998, the arrears amounted 35% of GDP). Moreover, firms persisted in the supply of goods to the governments, as a compensation of the taxes revenues (Gobbin & Merlevede, 2000) and individuals would fail to pay, as in the Soviet era they would simply not do it (Hakamada, 1999). Hence, the Russian State could not perform their most basic function in paying the expenses and debts of the country (Gobbin & Merlevede, 2000).

Although fiscal imbalances and external debt contributed to the Russian disaster, these factors alone could not provoke such crisis (Butorina, 2000). In addition to the problem of the taxes collection, and according with Hakamada (1999), the government had to deal with a several of other economic problems that were linked with the low level of trust from the Russian individuals.

Firstly, the capital did not flow into productive investment as it should. Instead, the external investment, and a significant part of the revenue from exports of natural resource, were direct invested in commerce and other services, rather than into any part of the real economy. Therewithal, the Russian citizens would not make bank deposits, but instead converted what they could into dollars and hide it in their homes.

Secondly, another problem arose through the irresponsible emission of short-term bonds by the government, the so-called *Gosudarstvennyj Komitet Oborony* (GKO). In an attempt to restore confidence and overtake the fiscal crisis, the International Monetary Fund (IMF) and the World Bank, as well as other industrialized nations, put together a 22.6 billion dollars bailout package (Simon, 1999). As a condition, Russia had to impose fiscal restrictions, control the hyperinflation the country was facing (Humayun Kabir & Kabir Hassan, 2009), and prohibited the uncontrolled printing money. Russia followed strictly the rules and inflation fell. Yet, the country took other risky strategy in emitting GKO at ridiculous high interest rates. Their strategy was successful in attracting foreign investors from financial institutions. However, the Russian government was at a vicious cycle and had to issue more and more GKO in order to pay the interests and rescue GKO. This process was a failure either by the IMF as by the Russian state.

An additional problem was the deterioration of the international economic environment and the flight of capital. The Asian Crisis and the worldwide collapse of the energy prices, together, had a direct impact in the fiscal situation of Russia. Consequently, 6 billion dollars were taken from Russia in order to help the countries affected, and considering Russia was very dependent of the natural resources' exports, the country was impacted by the sharp decrease in oil prices.

On August 17, also known as the Black Monday, the nation announced the rouble devaluation, freeze external private debt and transform the short-term bonds into long-term ones. These actions triggered a world collapse in the price of stocks and destroyed financial institutions and emerging economies that were dependent on the Russian growth (Hakamada, 1999).

2.2.3. The European Debt Crisis

Economists are contradictory when it comes to the causes of the European crisis, leading to the existence of difference propositions for the EMU countries indebtedness rather than just one single story (Beker, 2014). Some agree with being the consequence of the American subprime crisis, others support alternative explanations.

The former assumption is related to the market integration and financial globalization - followed by an increase of capital mobility -, which resulted into more and more contagious financial crises (Bordo & Eichengreen, 1999, as cited in Ureche-Rangau & Burietz, 2013). Ureche-Rangau & Burietz (2013) research focus on a deeper analysis of the link between the 2008 American Subprime crisis, triggered by the collapse of Lehman Brothers – one of the biggest investment banks in the United States – and the European Sovereign Debt crisis, in 2010. The fact that nowadays banks are all connected made the crisis transmission from the United States to Europe, and other countries in the world, more contagious than it would be in the past. Moreover, banks were responsible for other fiscal complications in several European countries (Wegener et al.,2019).

The alternative explanations are associated with the inherent problems of the European Union at the time. A common one is the fact that the European Debt Crisis was a result of the introduction of the euro, which lead to interest rates to fall in the countries where the expectation of high inflation used to keep interest rates high. Therefore, bond buyers assumed that bonds issued by any governments were equally safe between countries of the European Monetary Union (EMU). The response by the governments to these low interest rates was to increase their borrowing (Beker, 2014).

Nevertheless, the high debt proportions and houses bubbles in the group of countries named GIPS (Greece, Ireland, Portugal and Spain), and other peripheral nations, was already present before the crisis triggered (Kim & Lee, 2019). For example, both Greece and Italy were already heavily indebted in 1996, long before the American collapse, which do not exclude the hypothesis of linkage between both crises (Beker, 2014). Moreover, these countries showed to be overspending, overborrowing and poorly prepared for a financial crisis, in the pre-crisis period (Kim & Lee, 2019).

Regardless the correct hypothesis, there is little literature in the matter explaining how the crisis occurred and propagated to other sectors with subsequent crisis (Kim & Lee, 2019). Therefore, more theoretical and empirical literature should focus on the matter (Meier et al., 2021).

In very simple terms, the European crisis can be characterized by over-leveraged countries, excessive accumulation by individuals, easy access to credit by the Southern countries when they joined the euro at the lowest interest rates, and the fact that individuals, especially in these group of countries, borrowed more than what they could afford, and used the money to buy houses, cars and even to go on vacations. By 2011, the total debt to GDP ratio had risen above 300% in France, Italy and Spain, 250% in Greece and approximately 240% in the "fiscally conservative" Germany (Esposito & Et, 2014).

The fact that the EMU has a common currency aggravated the problem, considering the euro reduced even more the barriers to trade. In a non-crisis period, trade would promote wealth creation, especially in capital-based economies, and bubbles and overspending in the Southern countries. Nevertheless, monetary policy eliminated the hypothesis of inflating the currency to pay off debt (usually a strategy of the Southern countries), resulting into worse bubbles problems. These actions had a severe impact in the economy of the European Union. Once the single currency was directly affected, the Northern economies were directly impacted by the economic difficulties of the Southern countries (Esposito & Et, 2014).

Despite both the United States (U.S.) and Europe used similar stimulus packages, it has been more difficult for Europe to stabilize its economy, possibly because it does not have a fiscal union as the United States (Sharma, 2014).

2.3. Determinants during Sovereign Debt Crises

Through the descriptive and theoretical literature of specific episodes or a particular type of crisis, it is possible to retain the main variables that trigger sovereign debt crises. Furthermore, there is an extensive empirical literature on the search for determinants during sovereign debt crises, both at the economic, political, social and institutional levels, and even concentrated on debt management, structure and sustainability (Jeanne & Guscina, 2006; Das et al., 2010; Contessi, 2012).

The principal aim of these type of studies is, usually, to understand the behaviour of the variables that determine sovereign debt crises, in order to predict and prevent future economic and financial collapses.

We will now on refer to these episodes as non-pure crises, as they do not consider the simultaneous occurrence of other types of crises in the same period.

Despite some similar patterns that help to identify certain characteristics of defaulters, not all crises are equal. Manasse and Roubini (2009) were able to distinguish them depending on whether the government was facing insolvency – characterized by the occurrence of high inflation and high debt –, illiquidity – where large shocks of short-term liabilities relative to foreign services are dominants – or various macroeconomic risks, in which occurs large overvaluation and negative growth shocks. Their findings were also able to define a "risk-free" country, i.e., a country where the probability to enter into default is low, characterized by low total external debt relative to ability to pay, low short-term debt over foreign reserves, low public external debt over fiscal revenue and an exchange rate not exceedingly overvalued.

Moreover, their research selected 10 economic and political variables out of the 50 in their candidates list, namely: total external debt in percent of GDP; short-term debt relative to reserves; public external debt in percent of public revenues; real GDP growth; inflation; the U.S. treasury bill rate; exchange rate overvaluation; exchange rate volatility; external financing requirements to foreign reserves ratio; and the number of years before a presidential election.

In addition, Ghulam and Derber (2018) research focus on the variables and conditions that have an impact (increase/decrease) on the probability of sovereign default. Their results show that either political uncertainty, imports growth and higher debt to GDP ratio increase the probability of the economies to default. Additionally, an increase of 1% of inflation would increase the probability of default by 7% and an increase of external debt by 1% to an increase of 5% to 7% of default probability. The episodes of sovereign default in which occurred previously a banking crisis, contributed to a rise in the risk of default, which is also consistent

with Reinhart and Rogoff (2009). According with this empirical study, the factors that would initiate defaults and turn difficult for countries to come out are higher US treasury rates, central government debt/GDP, a higher current account deficit and exchange rate volatility.

Likewise, Bhattacharya and Inekwe (2021) studied the probability of default of a country being in a sovereign default club. Their significant determinants at political and institutional level, are represented by regulatory quality, government effectiveness and control of corruption. These three determinants, decrease the probability to enter into a sovereign default club by 6.2 p.p., 6.9 p.p. and 4.6 p.p., respectively. In contrast, and in the same conditions, it increases the risk for a country to belong to a default club by 20 p.p., 22.7 p.p. and 14.2 p.p., respectively. As for political instability, its existence increases by 0.6 p.p. the risk to belong to a high default club. In brief, institutional conditions proved to have an important role in creating convergence towards lower probability of sovereign default.

Regarding macroeconomic variables, the high level of external debt relative to Gross National Income (GNI), high inflation and current account balance increase the probability of a country belonging to a default club by 5.7 p.p., 2.8 p.p. and 5.7 p.p., respectively. On the other hand, trade openness reduces that risk by 4.0 p.p.

According with Kohlscheen (2010)'s analysis of domestic and external debt crises, macroeconomic variables, such as GDP growth and debt service relative to exports proved to be positive determinants of default, as the stock of international reserves relative to imports decreases that risk. Moreover, parliamentary democracies tend to be more reliable debtors. Additionally, Akemann & Kanczuk (2005) results exposed the high interest rates detrimental to the financial situation of the Government and, consequently, the likelihood of default.

On the other hand, some authors focus their attention to study the relation of volatility and sovereign defaults, as is the case of Catão and Sutton (2002), which results show that countries with higher terms of trade, policy volatility and historical macroeconomic volatility, have a higher probability to enter in default. Regarding the macroeconomic determinants, their study shows that real GDP growth, debt service relative to exports and net international reserves to debt ratios, fiscal balance, the U.S. interest rate and the real effective exchange rate are all significant to higher default probabilities.

Hilscher and Nosbusch (2010) presented, as well, evidenced of volatile variables as determinants during sovereign defaults, such as high levels of volatility of terms of trade and volatility of GDP growth. Additionally, when a country show signs to be entering into default soon, the economy tends to have been exposed to negative terms of trade shocks, low GDP

growth and high levels of debt to GDP ratio. Moreover, countries that are about to enter in default often had a default recently.

Equally important, Detragiache and Spilimbergo (2001) research focus on the relation between external liquidity and sovereign debt crises. The liquidity variables are composed by short-term external debt, debt repayment due, and reserves, and all displayed to be highly significant and positive correlated with the debt crises, as well as the external debt in GDP ratio. Thus, with these observations, it was possible to conclude that the less liquid is a country, the higher the probability to default and all of the three variables representative of liquidity can be useful to predict sovereign debt crises. Regarding the macroeconomic variables tested in the model, none of them showed to be significant at any levels.

In order to have the information of this section in a simplified and succinct form, Table 2 represents a summary of determinants taken from the literature above. Table 3 follows, which presents a summary of empirical literature, with essential information of periods, countries, definition of default and econometric method used, as well as their determinants.

Table 2. Summary of Determinants during Sovereign Debt Crises

	Variables	Author(s)
Macroeconomic determinants	Total external debt/GDP	Manasse and Roubini (2009)
		Ghulam and Derber (2018)
		Hilscher and Nosbusch (2010)
	Total external debt/GNI	Bhattacharya and Inekwe (2021)
	Short-term debt / reserves	Manasse and Roubini (2009)
	Public external debt / revenue	Manasse and Roubini (2009)
	Real GDP growth	Manasse and Roubini (2009)
		Kohlscheen (2010)
		Catão and Sutton (2002)
		Hilscher and Nosbusch (2010)
	Inflation	Manasse and Roubini (2009)
		Ghulam and Derber (2018)
		Bhattacharya and Inekwe (2021)
	U.S. treasury bill rate	Manasse and Roubini (2009)
		Ghulam and Derber (2018)
	Exchange rate overvaluation	Manasse and Roubini (2009)
	External financing requirements / foreign reserves	Manasse and Roubini (2009)

Table 2 (cont.). Summary of Determinants during Sovereign Debt Crises

	Variable	Author(s)
Macroeconomic determinants	Exchange rate volatility	Manasse and Roubini (2009) Ghulam and Derber (2018)
	Import's growth	Ghulam and Derber (2018)
	Current account deficit	Ghulam and Derber (2018) Bhattacharya and Inekwe (2021)
	Debt service/exports	Kohlscheen (2010) Catão and Sutton (2002)
	Interest rates	Kohlscheen (2010)
	Terms of trade	Catão and Sutton (2002) Hilscher and Nosbusch (2010)
	Fiscal balance	Catão and Sutton (2002)
	U.S. interest rate	Catão and Sutton (2002)
	Real affective exchange rate	Catão and Sutton (2002)
	Terms of trade volatility	Hilscher and Nosbusch (2010)
	GDP growth volatility	Hilscher and Nosbusch (2010)
	Short-term external debt	Detragiache and Spilimbergo (2001)
	Debt service	Detragiache and Spilimbergo (2001)
	Reserves	Detragiache and Spilimbergo (2001)
Political and institutional determinants	Number of years before a presidential election	Manasse and Roubini (2009)
	Political uncertainty	Ghulam and Derber (2018)
	Regulatory quality	Bhattacharya and Inekwe (2021)
	Government effectiveness	Bhattacharya and Inekwe (2021)
	Control of corruption	Bhattacharya and Inekwe (2021)
	Political instability	Bhattacharya and Inekwe (2021)
	Policy volatility	Catão and Sutton (2002)

Table 3. Summary of the Empirical Literature Regarding the Determinants during Sovereign Debt Crises

Author(s)	Period	No. of countries	Definition of default	No. of episodes	Econometric approach	Determinants
Manasse and Roubini (2009)	1970-2002	47 emerging market countries	Definition by S&P or if it receives a large non-concessional IMF loan.	54 default episodes (21 from the IMF criterion).	Classification and Regression Tree.	Total external debt / GDP; Short-term debt / reserves; Public external debt / public revenues; Real GDP growth; Inflation; U.S. treasury bill rate; Exchange rate overvaluation; Exchange rate volatility; External financing requirements / foreign reserves; And the number of years before a presidential election.
Ghulam and Derber (2018)	1970-2010	70 countries	Definition by Reinhart and Rogoff (2009).	37default episodes	Advanced duration analysis approach.	Total external debt / GDP; Inflation; U.S. treasury bill rate; Exchange rate volatility; Import's growth; Current account deficit; Political uncertainty.
Bhattacharya and Inekwe (2021)	1990-2015	101 developing countries (27 low-income, 39 lower-middle-income and 35 upper-middle-income countries).	Ratio of accumulated arrears to external debt as proxy for default.	Number of default episodes not referred.	Club convergence algorithm.	Total external debt / GDP; Total external debt / GNI; Inflation; Current account deficit; Regulatory quality; Government effectiveness; Control of corruption; Political instability. Policy volatility.

Table 3. (cont.) Summary of the Empirical Literature Regarding the Determinants during Sovereign Debt Crises

Author(s)	Period	No. of countries	Definition of default	No. of episodes	Econometric approach	Determinants
Kohlscheen (2010)	1980-2005	53 emerging countries.	Definition by Reinhart and Rogoff (2009).	52 default episodes	Bivariate and multi-variate analysis.	Real GDP growth; Debt service / exports; Interest rates.
Catão and Sutton (2002)	1970-2001	25 emerging markets countries.	Default definition not referred.	22 default episodes	Logit cross-country panel regression model	Real GDP growth; Debt service / exports; Terms of trade; Fiscal balance; U.S. interest rate; Real effective exchange rate; Policy volatility.
Hilscher and Nosbusch (2010)	1994-2006	32 emerging market countries	Default definition not referred.	38 default episodes	Linear regression model	Total external debt / GDP; Real GDP growth; Terms of trade; Terms of trade volatility; GDP growth volatility.

2.4. General Limitations and Gap in the Literature

The list of potential determinants is in line with the historical overview of crises, since authors base their variables' choice on the theoretical and descriptive literature. However, there is a lack of justification by researchers regarding the emergence and respective selection of determining variables.

Secondly, a large dimension gap of the presented literature are the data limitations, which is probably the main problem to point out, since researchers do not take into consideration that most sovereign debt crises episodes are not pure. Consequently, results may be influenced by other type of shocks, such as a banking or a currency crisis that occurs at the same period and, therefore, both output and macroeconomic variables behaviour do not transmit reliable conclusions concerning one specific type of crisis.

It is also noteworthy the lack of analysis on the relation between the determinants of a crisis and the output behaviour, that Gupta et al. (2017) has inspired by applying to currency crises. Empirical studies related to the search for determinants of financial crises, such as Bhattacharya and Inekwe (2021), Manasse and Roubini (2009), Kohlscheen (2010), etc., should include these topics of the research, considering is important to understand, for example, how a debt crisis triggers some negative effects in output, if the output contraction is persistent, the economic growth behaviour throughout the various crises' decades and if the macroeconomic variables, that proved to be significant, have an impact on non-crises periods as well. Furthermore, these researches concern mostly on one country or on panel data from several countries, in which an attempt is made in order to estimate the probability of a crisis occurring. In our study, the focus is only on moments of crisis, and therefore the information is at the sectional level.

Ultimately, the lack of research in sovereign debt crises constitutes also a gap. During the information gathering step, it stood out the lack of scientific information related to sovereign debt crises when compared to the immense amount of information available on banking and currency crises. As several authors claim, sovereigns avoid debt and tend to be careful with the debt levels, since they fear wars and financial crises (Kalemli-Özcan et al., 2016). To this extent, although research on all financial crises topics is relevant and deserves the respective attention, the less treated type, sovereign debt crises, needs to be more explored.

3. Data & Methodology

In this section, the data and econometric methods applied will be discussed. The period of analysis occurs between 1970 and 2017[1], for the 54 countries that witnessed, in total, 90 episodes of pure sovereign debt crisis. The empirical methodology is a replica of Gupta et al. (2017), adapted according with the purpose of the paper.

The study is divided into two segments. First, we conduct a simple but fundamental analysis on the behaviour of output during pure sovereign debt crises. In a second part, the aim goes through the association of output and the macroeconomic variables that are the determinants of this specific type of crisis. The acronyms of the variables are in parentheses in the next sub-sections and succinct information regarding its data source can be found in Table A1, along with time availability of the data in Table A2.1 and A2.2 in the Appendix.

3.1. Data
3.1.1. Dependent Variable
3.1.1.1 Measures of Output Change

We constructed three different alternatives measures of output change based on different lengths of pre- and post-crisis periods and on detrend-output. The first measure of output change equals to the difference of the average growth rate in the crisis period and the tranquil pre-crisis period, which excludes any crisis years. The second and third measures detrend the output series, through Hodrick-Prescott (HP) and Baxter-King (BK) filters, respectively. Alternatives of each measure can be seen in Table A3, in Appendix.

We report results for three different measures: $g_{post\_2} - g_{tranq,3}$, which stands for the average real GDP growth rate in the first two years of crisis minus the average real GDP growth rate in the 3 nearest tranquil pre-crisis period; $HP_{post,1-pre,1}$, defined by the difference of the HP detrended log output in the first crisis year and the pre-crisis year; and $BK_{post,1-pre,1}$, which denotes the difference of the BK detrended output in the crisis year and the pre-crisis year.

The figures below represent the relationship between the three different measures that will be used as dependent variables. Each measure is an annual average from all countries involved

---

[1] The last year of analysis is correspondent to the last year with available information on episodes of pure sovereign debt crisis.

in our study. The correlations between measures are high or moderately high and significant at the 1% level, which can be observed in Table A4, in the Appendix.
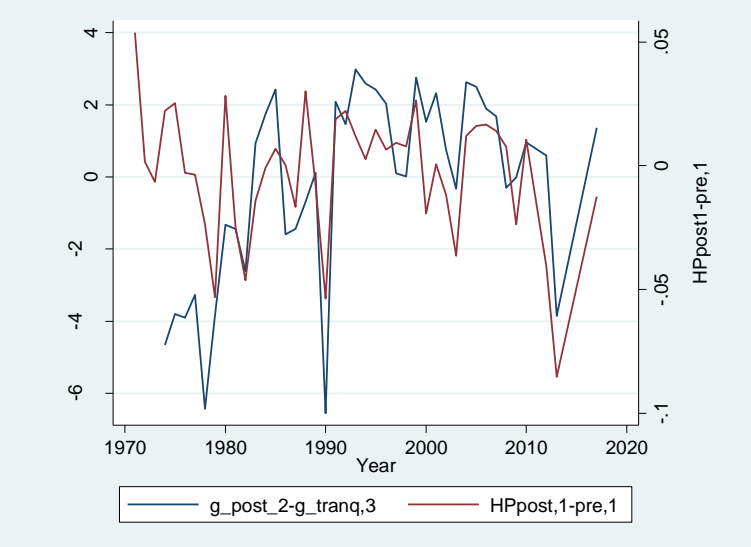
Figure 1. Measures of Output Change Based on Pre- and Post-Crisis Period and on HP Detrended Output
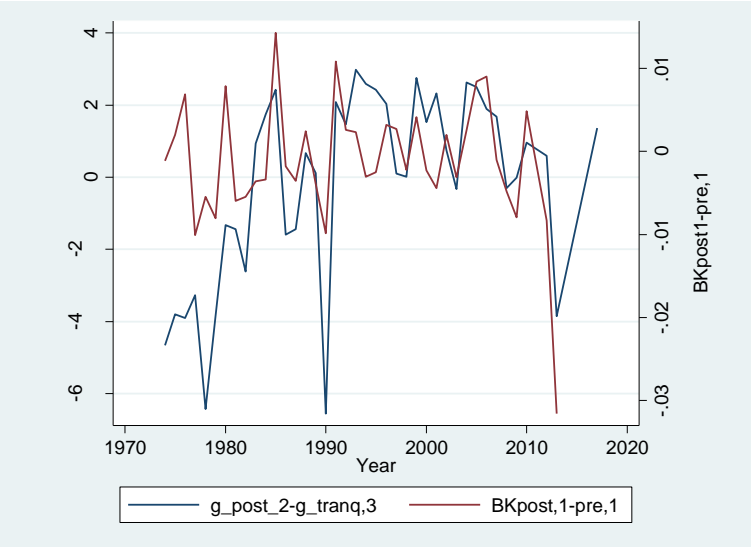
Figure 2. Measures of Output Change Based on Pre- and Post-Crisis Period and on BK Detrended Output
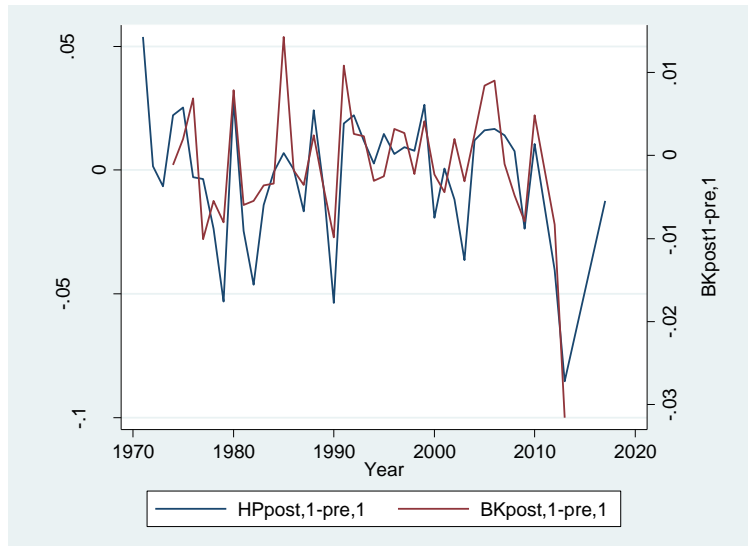
Figure 3. Measures of Output Change Based HP Detrended Output and BK Detrended Output

- **Real GDP growth rate (Y_g)**

For the construction of measures of output change based on pre- and post-crisis periods, we used the real Gross Domestic Product (GDP) growth, as it is the most classic way of measuring the economic growth of a country. The data corresponds to the annual percentage growth of GDP at market prices, based on constant 2010 U.S. dollars (USD), converted from local currencies using 2010 official exchange rates, and is a collection of the World Bank national accounts data and the Organisation for Economic Cooperation and Development (OECD) data files, from the World Bank database.

- **GDP (Y)**

GDP data was used in order to set the output-detrended measures. Information about the data is the same as for real GDP growth rate. The data is in constant 2010 USD. The data was gathered from the World Bank national accounts data and the OECD National Accounts data files, from the World Bank database.

3.1.1.2. Dependent related Variables

Moreover, in order to perform an analysis of the behaviour of output, the following variables were used:

- **Pure Sovereign Debt Crises Dummy (d_crisis)**

The foremost procedure in our study was to identify the episodes of pure sovereign debt crises. The criterion to be considered a pure crisis was the non-occurrence of other type of crises in the same year nor in the year before a debt crises episode, considering the risk of the variables being influenced by other type of financial crisis. We use three different dummies, one for each type of crisis - currency crises, banking crises, and sovereign debt crises., to isolate pure sovereign debt crises. The data regarding the crises dummies are a compilation of the databases of Carmen M. Reinhart[2], Duca et al. (2017) and Laeven and Valencia (2018). The list of episodes can be seen in Table A5 in the Appendix.

Through the presented rule, it was possible to identify 90 episodes of pure debt crises and 220 crisis-years, of which 30 occurred in the 1970s, 79 in the 80s, 46 in the 1990s, 53 in the 2000s, and 12 in the 2010s, until 2017. Nonetheless, due to the lack of output data, the following episodes were excluded: Angola (1976), Liberia (1980), Romania (1981, 1982, and 1986), Russia (1970, 1971, 1972, 1973, 1974, 1978, 1980, 1985, and 1986), Tanzania (1983), and Venezuela (2017).

- **Income level (IncLevel)**

Country classification by income level allows to distinguish the World's economies into various income groups, from low-, middle-, and high-income countries and, occasionally, other intermediary categories.

The World Bank provides data regarding four income groups: low, lower-middle, upper middle, and high-income countries. The classification is based on Gross National Income (GNI) *per capita* in current USD, calculated through the World Bank Atlas Method, updated annually for inflation (**IncLevel1**), through the income classification criteria. Nevertheless, the data in line with this criterion is only available from 1987 onwards, which is not sufficient since our period of analysis starts in 1970. Prior to 1987, according with the annual World Bank Development Reports, the classification was made by just dividing into low- and middle-high-income countries (**IncLevel2**), through the Civil Works Preference[3] criteria, considering the GNI *per capita*, also annually updated (**GNIpc**). The annual criterion of both sorts of income level classification can be found in Table A6, in the Appendix.

Taking this into consideration, for the calculation of the variable, we assemble both series. Subsequently, we proceeded to the aggregation of three classes (low-middle, upper-middle, and high-income) into one, denominated middle-high, and isolating the low level in another class, in order to make the two periods compatible and increase the sample size.

3.1.2. Independent Variables

In this subsection, we present two databases as a means of having a more meticulous and thorough analysis. First and foremost, we created a cross-sectional database using only crisis-years observations to establish the determinants of pure crises. Additionally, another database was constructed, this time in panel data, and using crisis and non-crises years observations, with the intention of understanding if the same set of variables could affect economic growth in non-crises periods as well. Both datasets are unbalanced.

As possible determinants of pure sovereign debt crises, we recurred to the literature on macroeconomic determinants of sovereign debt crises (non-pure) and their results, namely of Detragiache and Spilimbergo (2001), Catão and Sutton (2002), Manasse and Roubini (2009), Reinhart and Rogoff (2009), Hilscher and Nosbusch (2010), Kohlscheen (2010), Bhattacharya and Inekwe (2021) and Ghulam and Derber (2018). The list is presented in Table 2, in the Literature Review section.

The explanatory variables that succeed to be significant in the referred authors' studies, and meet the necessary conditions to be part of our analysis, are the following: Total external debt-to-GDP ratio, GDP short-term debt (% reserves), short-term external debt, inflation, interest rate, U.S. interest rate, U.S. 3-month treasury bill rate, external financing requirements, current account deficit, real effective exchange rate, exchange rate overvaluation, exchange rate volatility, debt service, debt service (% exports), imports growth, terms of trade, terms of trade volatility, fiscal balance, and reserves. Moreover, if we return to the definition of sovereign default and the common characteristics of sovereign debt crises episodes, it is noticed that public debt is an important indicator and must enter in our analysis as a possible determinant, adding to the numerous empirical researches focus on the linkages of public debt and the probability of financial crises. Accordingly, we add public debt (% GDP) to our list of independent variables.

- **Total external debt-to-GDP ratio (ExtDebt_Y)**

The total external debt (**ExtDebt**) corresponds to the external debt stock, in current USD. It represents the current liability owed from a resident to a non-resident, which requires payments to the principal and/or interests in the future. The debtors can be governments, corporations, or private households and the creditors commercial banks, foreign governments, or international financial institutions. The variable is measured as a percentage of GDP, in current USD (i.e., ExtDebt_**Y**). Both the fundamental variables for the construction of the dependent variable were taken from World Bank database, being the GDP a compilation of World Bank National Accounts data and the OECD National Accounts data files.

External debt can have nonlinear impacts on GDP growth. In this sense, at low levels of indebtedness, an increase in the external debt to GDP ratio can promote economic growth, and at high levels can lead to economic recessions (Casares, 2015). Likewise, we expect external debt to have a nonlinear influence in our measures. Moreover, according with Manasse and Roubini (2009), countries with external debt greater than 50 percent of GDP have more probability to enter into sovereign default.

- **Short-term external debt (ExtDebt_st)**

Short-term external debt, also referred as short-term external debt stock, comprehends all debt obligations with an original maturity of one-year or less and interest in arrears on long-term debt. The data is in current USD and was collected from the World Bank database.

Crises history proves that the presence of short-term debt haunted large-scale crises. Thus, this indicator is highly associated with financial crises, despite most of the literature do not directly refer to sovereign debt crises, much less pure ones. Nevertheless, we expect short-term debt to be negatively related with our dependent variables and a significant determinant of pure sovereign debt crises, due to its constant presence in crises episodes, such as the Mexican, in 1994, the East Asian, in 1997, and the Russian crisis, in 1998 (Dadush et al., 2000).

- **Short-term debt as a share of reserves (StDebt_Res)**

Short-term debt as a share of total reserves (e.g., gold and foreign currency are included), is a determinant of sustainable level of external debt and an indicator of debt sustainability. Data regarding the variable were taken from the World Bank database.

When nations have excessively more short-term debt than reserves, they face serious problems in the fast payment to the creditors. In fact, according to the National Bureau of Economic Research (NBER), along with Schimmelpfennig et al. (2003), the linkage between short-term debt as a share of reserves and economic growth was already noticed in the past debt crises, particularly in the East Asia collapses, whereupon economies with larger short-term debt, as well as smaller reserves, were the most affected. Therefore, it is expected a negative relation between short-term debt (% of total reserves) and our measures.

- **Inflation (Infl)**

The inflation rate, in annual percentage change, corresponds to the growth rate of the average consumer price index (CPI). The CPI is the measure of the average level of prices of an economy, based on the cost of typical consumer goods and services, in a given period. The data regarding the variable were taken from the dataset World Economic Outlook (October 2020), from the International Monetary Fund (IMF).

Many theoretical literature, and even empirical studies, have shown contradictory evidence on the relationship between inflation and economic growth, on whether if it is positive, negative or non-significant, even so all agree that the connection is, in fact, complex, and dependent on other factors, such as the level of inflation rates and the level of development of countries (Sarel, 1996; Ghosh & Phillips, 1998; Khan & Senhadji, 2001). Moreover, we expect it to be a significant determinant of debt crises, since it has the ability to affect debt in several ways. If inflation rises, it can possibly decrease the real value of Government debt, at least in advanced economies (Akitoby et al., 2017; Fukunaga et al., 2019). On the other hand, it also makes the Government to pay higher interest payments (Tanzi et al., 1998).

- **Interest rate (IntRate)**

The lending interest rate is defined as the percentage charged by the bank that commonly meets the short and medium-term financing needs of the private sector. It has a maturity of around ten years. Usually, the interest rate is adjusted according with the creditworthiness and objectives of borrowers. Data is in annual and real terms, since has been adjusted to remove inflation effects, in order to reflect the real costs and yields to the borrower and to the lender, respectively. The data was extracted from the World Bank database, which used compiled information from the IMF, International Financial Statistics and data files, also using World Bank data for the GDP deflator.

We expect interest rates to be a determinant of pure crises, with a negative relation between our measures of output change. An increase in the interest rates tend to increase the costs of borrowing and, consequently, the costs of investment. Thus, investment levels drop, which results into a decrease of economic growth (IMF, 1983).

- **U.S. interest rate (IntRate_US)**

The current data corresponds to the real lending interest rate of the United States of America, with a maturity of ten years. The data was collected from the World Bank database, which used compiled information from the IMF, International Financial Statistics and data files, using World Bank data on the GDP deflator.

According with the Federal Reserve System, during an U.S. monetary tightening (through the increase of the short-term interest rates), impacts were felt both in the American GDP, as well as in foreign countries, experiencing a larger decline in emerging than in advanced economies. Therefore, we expect a negative relation with economic growth.

- **U.S. Treasury Bill Rate (T-Bill)**

Foremost, a Treasury bill (T-bill) is a short-term debt obligation, supported by the United States Treasury Department, with a maturity of one year or less. In this sense, the 3 – month Treasury bill rate equals to the average interest rate at which T-bills with a 3-month maturity are sold on the secondary market. The longer the maturity date, the higher the interest rate that the T-bill will pay to the investor. The data is in annual frequency, and was taken from the Board of Governors of the Federal Reserve System.

McMillan (2021) is one of the few examples of empirical literature that proved that the rise of this interest rates suggests a future decrease of economic growth. On that account, we expect U.S. treasury bill rates to have a negative relation with our measures during sovereign debt crises episodes.

- **External financing requirement-to-reserves ratio (Req)**

According with the International Monetary Fund (IMF), among other variables, external financing requirement is a debt profile vulnerability indicator. It is the sum of the short-term debt with the amortization of medium and long-term debt, minus the current account balance. Nevertheless, for the reason of not having access to medium and long-term debt amortization data, we adjusted the formula by omitting the variable. Therefore, we consider external financing requirement to be equal to short-term debt (ExtDebt_st) minus current account

balance (Cab). The data information regarding short-term debt is already referenced above, as is one of the determinants for our analysis, and the data for current account balance, in USD, was taken from the World Economic Outlook (October 2020) dataset, from the IMF database. Information regarding reserves can be found in the reserve's subsection below.

This indicator provides useful information regarding the vulnerability of emerging markets. Countries with high external financing requirements are more susceptible to a tightening of global financial conditions (IMF, 2018). Thus, we expect external financing requirement-to-reserves ratio to be negative related with the measures of output change.

- **Current account deficit (d_cadeficit)**

Current account deficit is represented by a dummy variable, through the current account balance. Succinctly, current account balance is an important indication of the state of a country and can be expressed as the difference between the value of exports and imports of goods and services or as the difference between national (public and private) savings and investment. If the dummy is equal to 1 (negative current account balance), the current account is in deficit; If the dummy is equal to 0 (positive current account balance), it does not exist a current account deficit.

The link between current account deficit and economic growth is still controversial. When imports are greater than exports, it can be an indicator of competitiveness problems. Nevertheless, if investment levels are higher than savings levels, it can also be a signal of economic growth. In this sense, there is no good or bad deficit, since it may be desirable or undesirable for a country, at a particular moment in time (Ghosh & Ramakrishnan, 2020).

We expect that current account deficit and economic growth tend to move together, considering its possible positive relation.

- **Real Effective Exchange Rate (REER)**

The Real Effective Exchange Rate (REER) index is a measure of the value of a currency related with a weighted average of various foreign currencies, in real terms, and is expressed as an index with base year 2010. The REER aims to evaluate prices competitiveness or a country's costs relative to their main competitors in international markets. The data was taken from the World Bank, that uses the International Financial Statistics of the IMF.

A fall in the exchange rate is usually referred as devaluation or depreciation, depending if it was a conscious decision or an unintended fall in the value of currency, respectively. More specifically, it means that the respective currency is worth less when compared to other countries' currencies. Consequently, the value of exports gets cheaper and imports gets more expensive, promoting economic growth. Nevertheless, emerging countries experience more real exchange rate depreciations around defaults events and increases the probability of default (Asonuma, 2017). The same logic applies for the opposite case, presented below.

- **Exchange Rate Overvaluation (REER_ov)**

The variable is represented as a dummy, assuming the value of 1 if the exchange rate is overvalued, and 0 if not. It is considered overvaluation (relative to the base year) when the effective exchange rate is greater than 100, since real effective exchange rate is an index and does not measure absolute values.

An overvalued exchange rate suggests that a country currency is too high for conditions of the economy. In this manner, and following the above reasoning, an overvaluation tends to depress domestic demand and encourage spending in imports (Shatz & Tarr, 2017). It is, usually, a phenomenon in periods of slow growth, so we expect to have a negative relation with the dependent variables.

- **Exchange Rate Volatility (REER_vol)**

The exchange rate volatility represents the degree to which the real effective exchange rate changes over time. It was calculated using REER, through time-varying covariates.

Following Barguellil et al. (2018), volatile exchange rate increases uncertainty and risk, by exposing the potential to lose money by the change in the exchange rate. Consequently, foreign trade decreases and decisions on investment become more difficult. Moreover, the authors' research concluded that exchange rate volatility has a negative effect on economic growth. In this sense, we expect the real effective exchange rate volatility to be negatively associated with the independent variables.

- **Debt service (DebtServ)**

The multilateral debt service, expressed in current USD, corresponds to the value required to cover the repayment of interest and principal on debt, actually paid in currency, goods or services on long-term debt, interest paid on short-term debt and repayments to the IMF. The multilateral public loans and with public collateral include loans and credits from the World

Bank, regional development banks, and other multilateral and intergovernmental agencies. The data was collected from the International Debt Statistics dataset from the World Bank database.

According with Serieux and Samy (2001), debt service has a negative effect on growth in low-income countries, through the decrease capital imports and, consequently, investment and economic growth. Despite the literature does not relate with cases with sovereign debt crises, we expect also a negative relation between debt service and our measures of output change.

- **Debt service as a share of exports (DebtServ_Exp)**

The ratio is defined as the external debt-service payments of interest on short and long-term debt to exports of goods, services and primary income. Data with respect to the variable was taken from the International Debt Statistics dataset of the World Bank database.

The debt service – exports ratio indicates how much of a country's exports revenue will be used up in servicing its debt. Therefore, is an indicator of debt sustainability, since it informs if a country is likely to face debt-servicing difficulties. Moreover, the debt service to exports ratio calls attention to countries with significant short-term external debt.

Some authors such as Koh et al. (2020), showed that the debt service-exports ratio increase the probability of a country to enter in sovereign default and in banking crises, in which they examine the consequences of debt accumulation in emerging and developing economies. In this sense, we expect a negative relation between the debt service – exports ratio and economic growth or non-linear impacts, depending on the indebtedness levels.

- **Imports' growth (Imp_g)**

The imports of goods and services (annual percentage growth) based on constant 2010 USD represent the value of all goods and other market services received. It includes the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services as communication, construction, financial, information, business, personal, and government services. The compensation of employees and factors services and transfer payments are not included. The data regarding imports growth is from the World Bank, which compiled information of the World Bank national accounts data and the OCDE data files.

Import's growth is a tricky variable. According with Wolla (2018), despite its positive growth can be a case of growing and of an open economy, it has a negative sign in the GDP calculation, giving a false perception of what it actually means. By this reason, we expect imports positive growth to contributes to the decline of our measures of growth.

- **Terms of trade (ToT)**

Net barter terms of trade, expressed as index with base year 2000, is defined as the ratio between the export unit value indexes to import unit value indexes. The data was taken from the compilation of the United Nations Conference on Trade and Development, Handbook of Statistics and data files, and International Financial Statistics of the IMF, from the World Bank database.

Cuadra and Spriza (2006) studied the role of terms of trade and its influence in inducing output fluctuations. Their results show that terms of trade experienced larger fluctuations in emerging than in developed economies, which also result in more default episodes. For the authors, in an extremely indebted country, it is common to increase taxes in order to repay the debt. Nonetheless, if the country is facing a collapse in its terms of trade, causing a decline in output and, consequently, in consumption, the measure would only worse the level of consumption. Therefore, countries would prefer to default on its sovereign debt in order to avert the aggravation of consumption.

- **Terms of trade volatility (ToT_vol)**

Terms of trade volatility can be influenced by several factors, such as the slow supply response of agricultural production, anticompetitive practices, and Government export restrictions (Steenkamp, 2014). The data regarding the variable was converted using terms of trade, through time-varying covariates.

A study by Brueckner and Carneiro (2015) assessed the terms of trade volatility impact on economic growth. The research proved that, in the last 45 years, around 50% of output variation could be explained by the level and volatility of terms of trade, in the Organization of Eastern Caribbean States (OECS) member states, which are countries characterized by external shocks vulnerability and high debt issues. Hence, we expect terms of trade volatility to have a negative relation with the GDP growth, mostly in developing and commodity-exports countries.

- **Fiscal balance (GovBal)**

Fiscal balance is defined as the difference between Government revenue, Government expenditures and net investment in nonfinancial assets. Moreover, this variable demonstrates to which extent the Government is putting or creating financial resources at the disposal of or by other economy sectors or abroad. The fiscal balance is represented by the general Government net lending (+) / borrowing (-) as a share of GDP. When it is negative, is a deficit fiscal balance, and when positive, is a surplus fiscal balance. The data source was the World

Bank, which used the Government Financial Statistics Yearbook dataset and data files from the IMF.

Fiscal deficit has been increasing significantly in developing countries due to the expansionary fiscal policies imposed (Thung, 2018). However, its impact on the output of a country is contradictory among the economic literature. If within the fiscal deficit, the investment exceeds the financing cost, this can bring positive impacts on economic growth (Hussain & Haque, 2017). At the same time, other authors argue that the fiscal deficit can only be beneficial up to a certain level limit (Iqbal et al., 2017). On the opposite, in a surplus situation, it is presumed to be positive correlated with economic growth, not contributing, at least directly and acting alone, to a debt crisis.

Moreover, according with Willett and Wihlborg (2013), sovereign debt crises occur when a combination of the level government's debt and consecutive fiscal deficits raises doubts regarding the capacity to pay all the obligations. On that account, due to the presented contradictory arguments, there is an uncertainty regarding the relation of fiscal balance with our measures of output growth.

- **Reserves (Res)**

Total bank reserves are the minimum holdings of monetary gold, special drawing rights, reserves of IMF member held by the IMF, and holding of foreign exchange under the monetary authorities' control. Reserves have the aim of meeting any large and unexpected demand for withdrawals, and so they must be kept by financial institutions and, therefore, cannot be lent. The data is expressed in current USD, and is from the World Bank database, which used the International Financial Statistics and data files from the IMF.

According with Sula and Oguzoglu (2021), the relationship between reserves and growth is positive but the impact weakens as the opportunity cost of reserves holdings increases. At low spreads, an increase in reserves should lead to an increase in economic growth rate. Hernández (2018) adds that international reserves play a significant role in reducing the probability of occurring a sovereign debt crisis. Therefore, we expect reserves to be a significant determinant of sovereign debt crises, with a positive relation with our measures of output change.

- **Public debt as a share of GDP (PubDebt_Y)**

Public debt as a share of GDP corresponds to the Central Government debt (in % of GDP). Government debt is the total stock of contractual direct obligations of fixed-term to other outstanding. It includes domestic and foreign liabilities, such as currency and deposits, securities (excluding shares) and loans. The data regarding the variable was taken from the Global Base Database from the IMF.

According with Reinhart and Rogoff (2010) results, both for advanced and emerging economies, public debt (% of GDP) and economic growth link depends on the level of the debt, showing to be positive for low levels of debt – lower than 90% - and negative for high levels – greater than 90%. Caner et al. (2010) produced similar results. Thereupon, we expect public debt to have nonlinear effects in our dependent variables.

3.2. Methodology

The methodological component presented in the current sub-section is intended to provide the most appropriate analysis in order to fulfil the general aims of the study. As aforementioned, the research is divided into two cores – modelling behaviour of output and uncover the determinants during pure sovereign debt crises.

The tool selected for the performance of the dissertation is the statistical software Stata 14, which will allow to execute the fundamental statistical analysis and estimating the econometric models.

Regarding modelling the behaviour of output, the methodological approach has more emphasis on the statistical analysis of data, using graphs. The aim is to analyse some characteristics of economic growth during pure sovereign debt crises, in which we divided into three topics: comparison of economic growth during crises; comparison of growth across countries; and comparison of growth across decades. We briefly describe the methods used to analyse these topics.

- **Comparison of Economic Growth during Crises**

In this element, the goal is to classify crises by their variation in output – if expansionary or contractionary – and quantify their proportion. The most accurate method is with frequency distribution tables. Nevertheless, the Jarque-Bera test, which includes the skewness and kurtosis tests statistics, is crucial in order to test for normally distributed data.

- **Comparison of Economic Growth across Countries**

34

Output behaviour differs across different income-level countries, namely low- and middle-high-income countries. In order to proceed to its estimation, it will be necessary to regress the measures of output change on the income-level dummies using the OLS method. In this manner, we aim to observe if the income-level has an influence on the severity of pure sovereign debt crises. Moreover, the Wald Test must be applied to examine if the dummies' coefficients are statistically different from each other.

- **Comparison of Economic Growth Across Decades**

As economic growth quite possibly changes across decades, an OLS estimation is also going to be applied similarly to the previous section, with the exception that we will regress the measures on the decades. In addition, with the purpose of comparing the seriousness of crises across decades, identifying different patterns, and possible similarities of growth, we will resort to a variety of graphs, more specifically, to scatter plots and frequency distribution tables.

Concerning the determinants during pure sovereign debt crises, the methodological approach focuses on econometric models.

Cross sectional empirical work is used to explain a precise extent of time, which helps to determine and interpret the prevailing characteristics of specific time intervals or significant events. Applying the theory to this study in concrete, only crisis years observations are used. In addition, regressions are estimated using OLS with White heteroscedasticity-consistent standard errors. In a first stage, it will be performed a simple linear regression, followed by a multiple linear regression. The former, involves analysing the strength of the relation between two variables – the independent variable, which correspond to our measures of output change and each one of the explanatory variables, represented by the possible macroeconomic determinants. Accordingly, it is desirable to reject the null hypothesis of $H_o: \beta_j = 0$, i.e., reject the hypothesis that the independent variable has no effects on the measures. The latter, the multiple linear regression, seeks to obtain the relationship between two or more explanatory variables, in order to observe what may be causing the variation in the independent variable. Therefore, the null hypothesis is represented by $H_o: \beta_1 = \beta_2 = \cdots = \beta_n = 0$, i.e., no relation between the explanatory variables and the measures of output change. In this regression model, we applied the model-selection method specific-to-general approach, which consists in starting from a simple model, and adjust along for undesired properties, adding independent variables to the model considering their common features.

Formally, the first model (1) is simply described as follows:

$$g_i = \alpha_i + \sum_k \beta_k X_{ki} + \varepsilon_i, \qquad \varepsilon_i \approx N(0, \sigma_i^2), \qquad i = 1,2,\dots,I, \qquad \text{(1)}$$

where g_i constitutes our measures of output change, represented by $g_{post\_2} - g_{tranq,3}$, $HP_{post,1-pre,1}$, and $BP_{post,1-pre,1}$, X is an IxK matrix with k explanatory variables, represented by the determinants supported by the literature as previously mentioned, and ε is the error term, which is supposed to be normally distributed with mean 0 and variance σ_i^2, $\varepsilon_i \approx N(0, \sigma_i^2)$. i represents the number associated to the crisis' episode.

We perform some specification tests on the regression, namely the Link, Reset, and the White's test. The former (-linktest-) estimates if the fitted model is an adequate fit to the data (no misspecification error). The RESET test (-ovtest-) assesses if the model is correctly specified in its functional form for the variables included in the regression, being this condition its null hypothesis. The latter (-imtest, white-) tests for heteroscedasticity, i.e., error variances are not equal and are a multiplicative function of one or more variables.

In addition, for the second part of the analysis, another model was constructed in order to have a more extensive analysis of the possible influence of explanatory variables on the economies affected by this specific type of crisis. The dataset is in the form of panel data since it provides information of all countries involved in the sample and over time, and, therefore, includes observations of crisis as well as non-crisis periods. Due to this description, the dependent variable in this model is represented by output growth, since we want to analyse if the relationship between the explanatory variables and the independent variable changes in non-crises periods, and the measures of output change are computed uniquely considering crisis-years.

We estimate the regression with a fixed effects model with heteroscedastic consistent and autocorrelation adjusted standard errors, in order to control for the average differences within countries across time. The model is represented as follows:

$$Y_{g_{it}} = \alpha_i + \gamma_t + \sum_k \beta_k X_{kit} + \sum_k \gamma_k (X_{kit} \times d\_crisis) + \varepsilon_{it}, \varepsilon_{it} \approx N(0, \Sigma),$$
$$i = 1,2,\dots,I; t = 1,2,\dots,T$$

$$\text{(2)}$$

$Y_{g_{it}}$ represents the output growth. Additionally, we added to the original regression a set of interaction variables between the explanatory variables and the pure sovereign debt crisis

dummy, represented by d_crisis. An interaction variable indicates that the effect that an explanatory variable has on the independent variable can be different, considering distinct scenarios.

4. Empirical Results

4.1. Modelling the Behaviour of Output

4.1.1. Comparison of Economic Growth during Crises

Figure 4 is a representation of a percentage frequency distribution of the first measure of output change $g_{post2} - g_{pre3tranq}$[4], and displays the percentage of episodes that exist in each interval of the measure used. Through the figure, it is possible to understand that the growth rates are more inclined towards a positive variation, with 56% of the total pure sovereign debt crises corresponding to expansionary crises and 44% to contractionary crises. Nevertheless, there are eight crisis-years - all of which occurred in the 1980s and 1990s - with a contraction greater than 10 p.p., a relatively high rate when compared with the four crisis-years where an expansion of more than 10 p.p. was experienced, namely in Nicaragua (1981,1982 and 1983) and Panama (1991).

According to the Jarque-Bera test, we do not reject the null hypothesis of normally distributed data.

Figure 4. Frequency Distribution of Economic Growth during Pure Sovereign Debt Crisis Relative to the Pre-Crisis Period

---

[4] Even though the same distribution was applied to the other measures of output change, $HP_{post,1-pre,1}$ and $BP_{post,1-pre,1}$, the maximum and minimum values are comprised, approximately, between -1.3 and 0.08, and -0.06 and 0.09, respectively. Hence, the frequency distributions for the detrended-output measures are not sufficiently relevant for its introduction and analysis.

Regarding the measure of output change generated with the HP filter, 51% of the crises demonstrated to be expansionary and 49% contractionary. These outcomes evidenced to be quite similar to the BK detrended output measure, in which 49% of crises were expansionary and 51% contractionary. In sum, the three measures provide robust results.

It is noteworthy to point out that when we mention to expansionary and/or contractionary crises, we refer to the acceleration and/or deceleration of the measure of output change during pure sovereign debt crises, respectively, and not to the absolute levels of GDP.

A summary of the results previously manifested can be found below, in Table 4. More detailed descriptive statistics regarding the measures of output change are established in Table A7, in the Appendix.

Table 4. Summary Information of Output Growth during Pure Sovereign Debt Crises

	$g_{post2} - g_{pre3tranq}$	$HP_{post1-pre1}$	$BK_{post1-pre1}$
All countries			
Average growth during crises	0.3 p.p.	-0.002%	-0.0006%
Percentage of expansionary crises	56%	51%	49%
Average growth in expansionary crises	3.6 p.p.	0.03%	0.01%
Percentage of contractionary crises	44%	49%	51%
Average growth in contractionary crises	-3.9 p.p.	-0.03%	-0.01%

4.1.2. Comparison of Economic Growth across Countries

Interestingly, when observing the average growths during crises in Table 5, with $g_{post2} - g_{pre3tranq}$ as the measure of output change, both rates showed to be positive, with the particularity that the low-income countries' growth rate is substantially higher (1.17 p.p.) when compared with the growth rate of middle-high-income countries (0.09 p.p.). In addition, there exists a similarity in both income level groups regarding the percentage of expansionary and contractionary crises, with pure sovereign debt crises being constituted by 60% expansionary crises and 40% contractionary crises. Nevertheless, an important detail to highlight is the average growth rate during contractionary crises in middle-high-income countries, which was significantly lower when compared to the average rate in low-income countries (-4,6 p.p. and -

1,7 p.p., respectively). More information, and for other measures of output change[5], can be found in Table 5.

Table 5. Summary Information of Output Growth during Pure Sovereign Debt Crises Considering the Income Level

	$g_{post2} - g_{pre3tranq}$	$HP_{post1-pre1}$	$BK_{post1-pre1}$
Low-income countries			
Average growth during crises	1.17 p.p.	0.05%	0.002%
Percentage of expansionary crises	59%	52%	54%
Average growth in expansionary crises	2.98 p.p.	0.03%	0.01%
Percentage of contractionary crises	41%	48%	46%
Average growth in contractionary crises	-1.7 p.p.	-0.01%	-0.003%
Middle-high-income countries			
Average growth during crises	0.09 p.p.	-0.004%	-0.001%
Percentage of expansionary crises	58%	52%	47%
Average growth in expansionary crises	3.9 p.p.	0.26%	0.01%
Percentage of contractionary crises	42%	48%	53%
Average growth in contractionary crises	-4.6 p.p.	-0.22%	-0.01%

Furthermore, we regressed the measure of output change $g_{post2} - g_{pre3tranq}$ in the income level dummies. The results showed the low-income and middle-high-income dummy estimated coefficients to be both positive, which confirms the results presented above. Nonetheless, the coefficient of the middle-high-income countries dummy is not statistically significant. Considering the Wald test, we do not reject the null hypothesis that the income level dummies are statistically equal, thus we find evidence in favour of equal impact between low and middle-high-income countries.

Regarding the other measures of output change, coefficients did not show to be statistically significant and we do not reject the null hypothesis that the coefficients are statistically different. By way of explanation, and statistically speaking, income level dummies coefficients are indistinguishable for all measures of output change.

All the regressions' results of the measures of output change on alternatives dummies – which includes the income-level dummies in this subsection, and the decades dummies in the

---

[5] For summary reasons, there may be lack of analysis for some measures of output change. Nonetheless, all data or regressions from the same measures are always included in Tables and/or Figures.

next subsection – can be found in Table A8, along with the Wald tests results, in Table A9, in the Appendix.

4.1.3. Comparison of Economic Growth across Decades
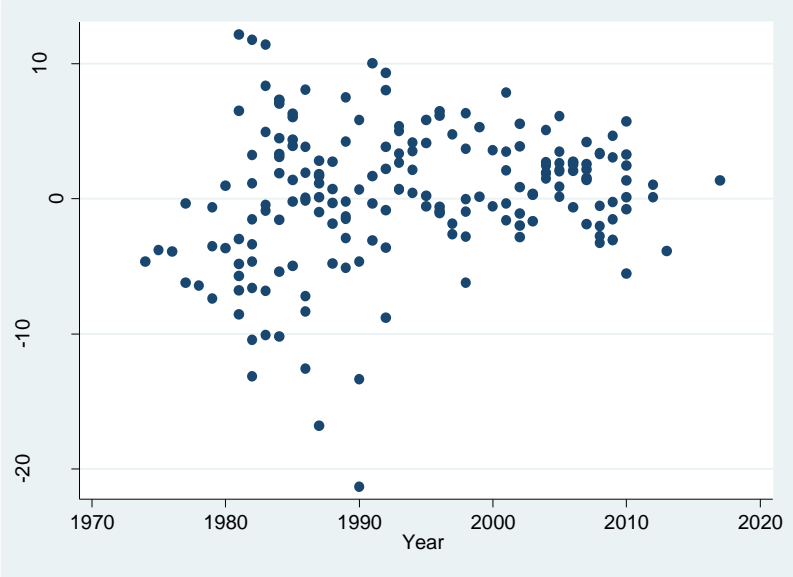
Figure 5. Scatter Plot of Economic Growth during Pure Sovereign Debt Crises Relative to the Pre-Crisis Period across Decades
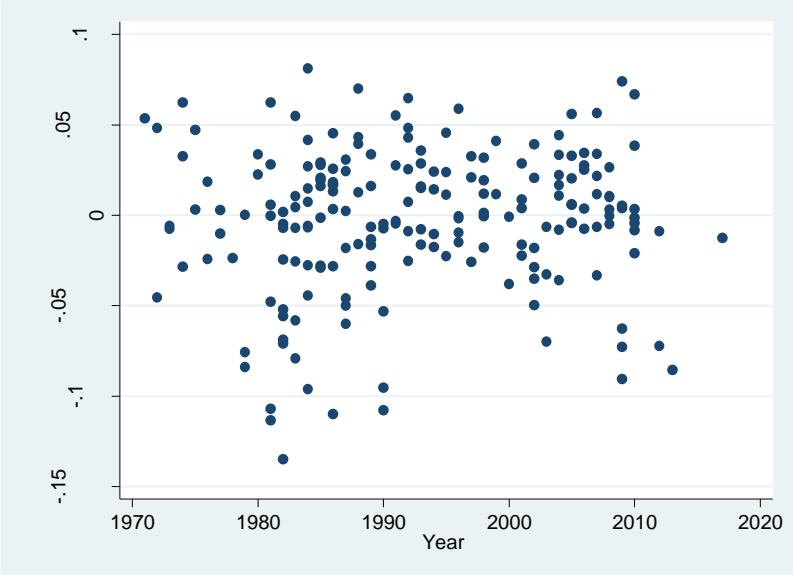
Figure 6. Scatter Plot of Economic Growth during Pure Sovereign Debt Crises with HP Detrended Output Measure
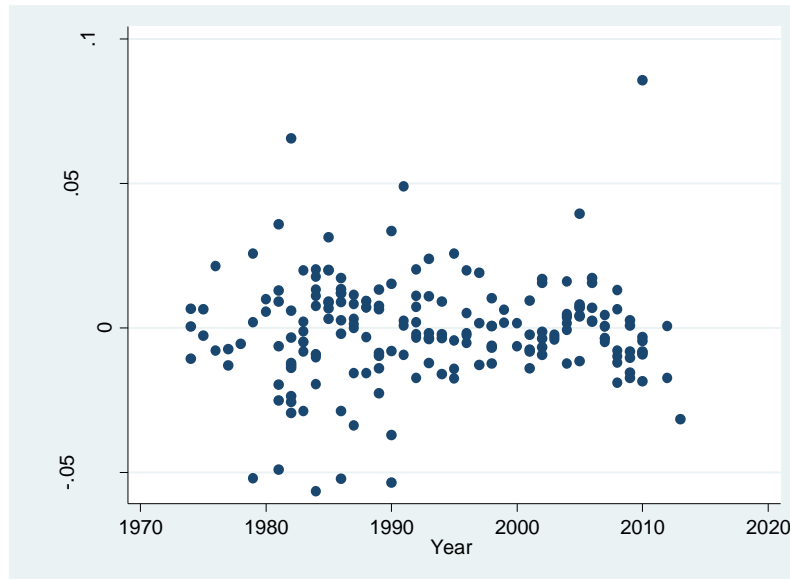
Figure 7. Scatter Plot of Economic Growth during Pure Sovereign Debt Crises with BK Detrended Output Measure

According with the scatter plots produced for all measures of output change in Figures 5 and 6, it does not exist a defined pattern of economic growth across decades. Rather, there seems to exist more dispersion in the first half of the sample compared to the second half. When observing the scatter plot for the BK detrended-output measure in Figure 7, a cyclical trend seems to emerge. Hence, for this measure we may be witnessing cyclical oscillations between expansionary and contractionary crises in historical overview.

Furthermore, a simple linear regression of the first measure of output change is made on each of decade's dummies. It is notorious that the severity of contractionary crises has been fallen across decades, and that the average of crises became expansionary from 1990 onwards. According to the Wald test, only the dummy of the 1970s is distinguishable from all other decades.

When the study was restrictive to expansionary crises, we find that the 1970s did not witness any experience of expansionary sovereign debt crisis, when computed with the first measure of output change. Moreover, the 1980s were the decade with the greatest contraction. The decades proved to be statistically distinguishable from each other, with the exception of the pairs 1980s and 1990s, and 2000s and 2010s.

Regarding contractionary crises, it was witnessed a continuous drop on the dimension of contraction across decades, until the 2010s. Concerning the Wald test, only the coefficients of 1980s and 2000s proved to be indistinguishable.

Considering the other measures of output change based on detrended output, coefficients did not prove to be significant, and when performed the Wald test, the majority of the coefficients were statistically equal.

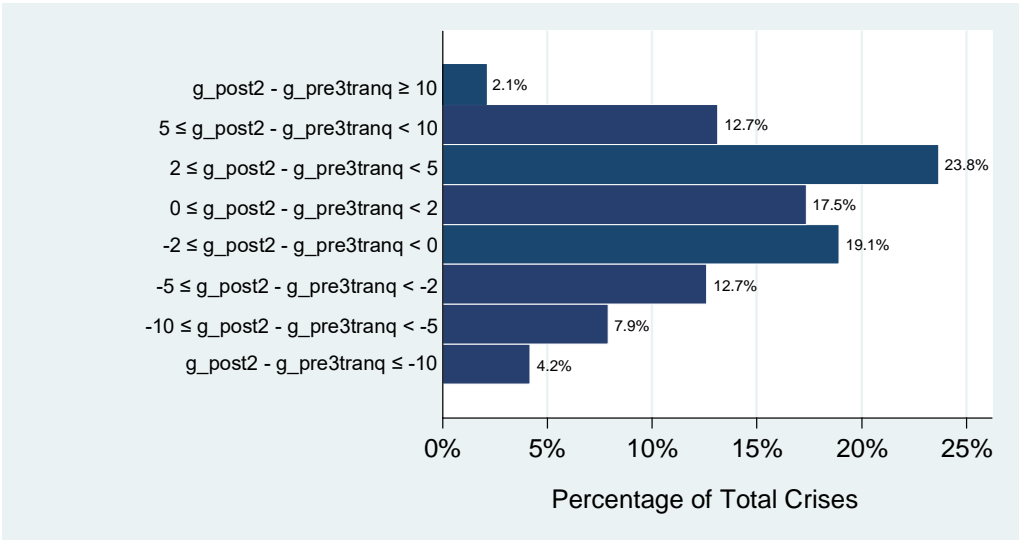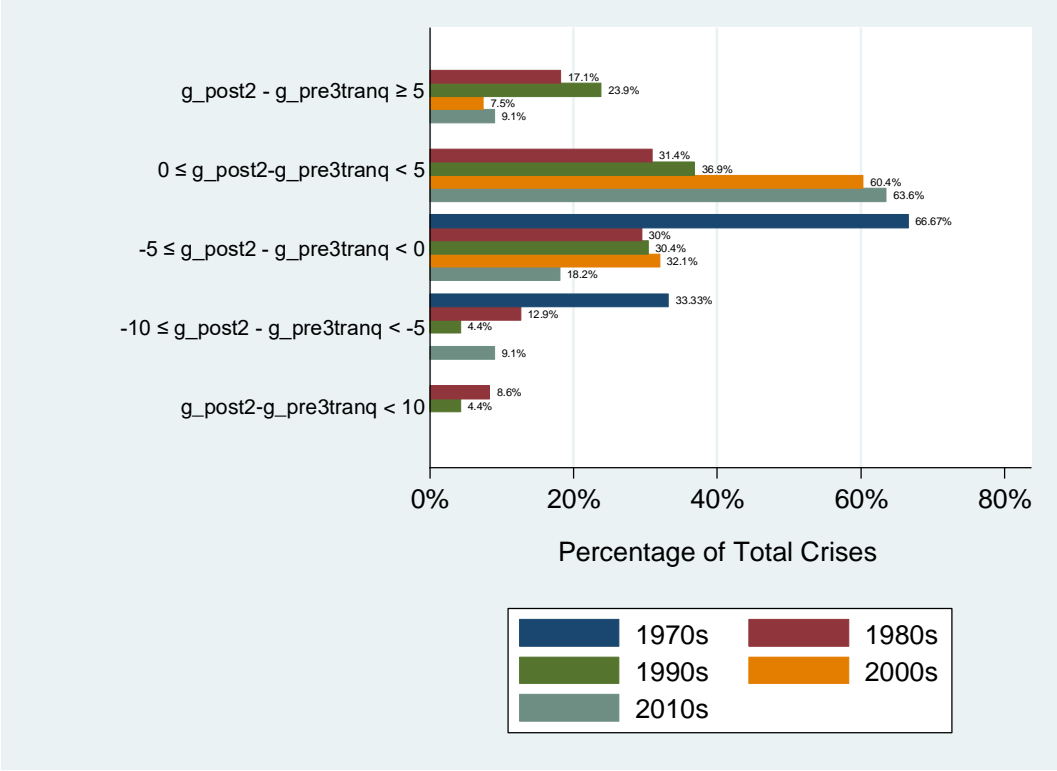**Figure 8. Frequency Distribution of Economic Growth during Pure Sovereign Debt Crisis Relative to the Pre-Crisis Period across Decades**
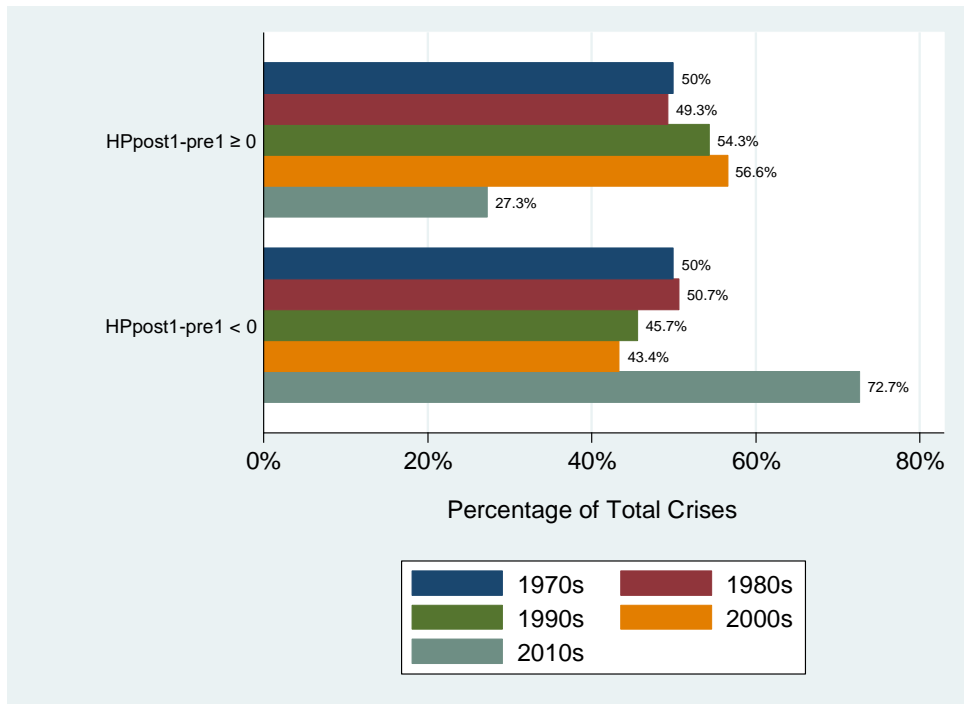
Figure 9. Frequency Distribution of Economic Growth during Pure Sovereign Debt Crises with HP Detrended Output Measure
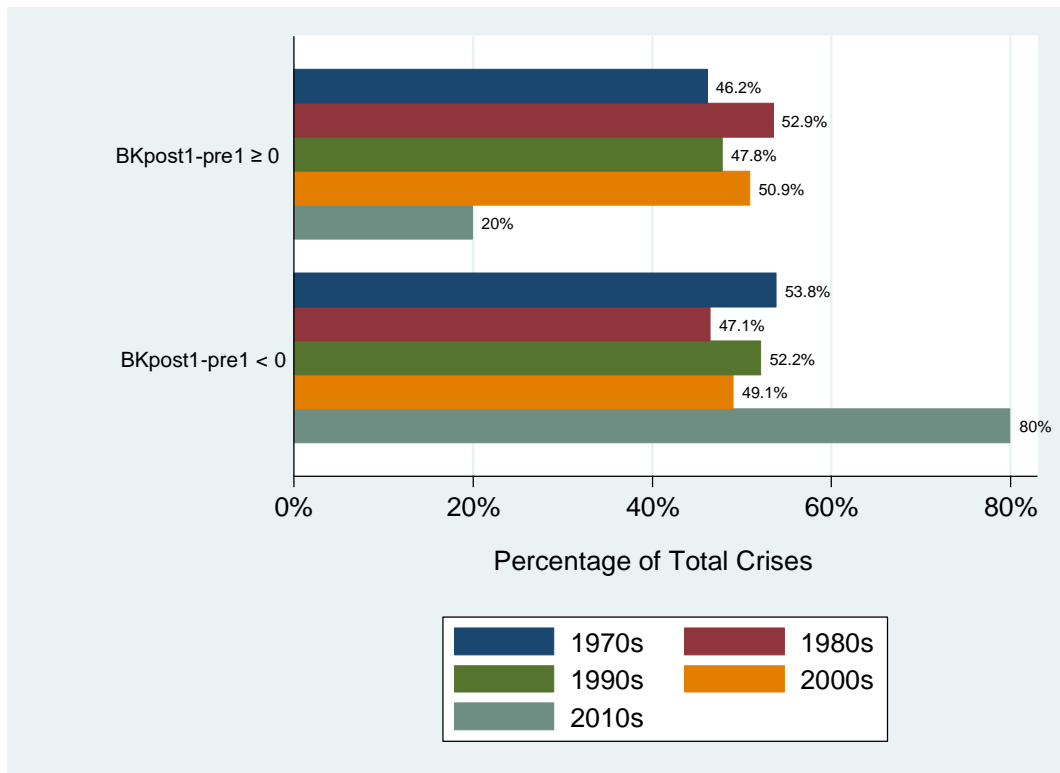
Figure 10. Frequency Distribution of Economic Growth during Pure Sovereign Debt Crises with BK Detrended Output Measure

Figure 8, 9, and 10 are a representation of frequency distributions of economic growth for all the alternative measures of output change. For the first measure $g_{post2} - g_{pre3tranq}$, in the 1970s, there was no evidence of pure expansionary sovereign debt crises, as was previously ascertained. Regarding the remaining decades, 49% of total crises were expansionary in the 1980s, 61% in the 1990s, 68% in the 2000s, and 73% in the 2010s. Concerning contractionary crises, the 1980s and 1990s were the only decades that experienced a contraction of less than -10 p.p. of economic growth.

The measures based on trend-filtered output produced similar results, with the exception of the 1970s[6], with 50% and 46% of expansionary crises, and the 2010s, in which expansionary crises proved to represent 27% and 20% of total pure sovereign debt crises, respectively for the HP and BK filters.

To sum up the "Modelling the Behavior of Output" section, we can conclude some facts regarding pure sovereign debt crises, and for the first measure of output change, $g_{post2} - -g_{pre3tranq}$: 56% of total pure debt crises were expansionary, while the remain 44% were contractionary; the occurrence of expansionary crises was predominant in low and middle-high-income countries. Lastly, the 1980s were the decade with the highest expansionary and contractionary average crisis.

The HP and BK filters have some similar conclusions, or even in common, which differ to some extent from the conclusions of the first measurement. However, there are some consistent elements between the three, such as the fact that average growth in low-income countries is positive, which is also in line with the proportion of crises in this group being mostly expansionist. Additionally, it is the 1980s that constitute the most severe contractionary crises -with greater variation in the independent variable - in all measures.

---

[6] This particularity can be partially explained by the fact that the detrended-output measures do not have included in their calculation a period prior to the crisis – what we previous called "tranquil period" – as the first measure of output change has.

4.2. Determinants during Pure Sovereign Debt Crises

4.2.1. The impact of macroeconomic determinants in crisis periods

The macroeconomic variables were divided into three categories, in order to understand which of the sets has a greater influence on growth during pure sovereign debt crises, being the sequence also used in the multiple linear regression, with the specific-to-general modelling specification: domestic non-policy, external conditions, and domestic policy. The former includes the variables that cannot be controlled by governments and are related with activity within borders. External economic conditions group is constituted by indicators inherent to foreign countries, that can influence the economy of the surrounding economies. The latter, refers to variables that, based on the known circumstances, can be dominated, theoretically, by the authorities.

Table 6 presents the estimated regression of the measures of output change on the macroeconomic determinants of our study, through the OLS estimator, with White heteroscedasticity-consistent standard errors. The coefficients of the explanatory variables with a significant level of at least 10% are highlighted in bold, for a better and easier interpretation of the results.

Table 6. Results of the Cross-section Regressions

	$g_{post2} - g_{pre3tranq}$	$HP_{post1-pre1}$	$BK_{post1-pre1}$
Domestic non-policy variables			
ExtDebt_Y	**2.56803***	-.0130633	.0020416
	(1.428709)	(.0108146)	(.0040563)
ExtDebt_st	3.73e-11	**1.39e-12***	3.00e-13
	(8.62e-11)	(8.28e-13)	(4.15e-13)
StDebt_Res	**-.0016343***	**-.000023***	**-.0030e-06***
	(.0004913)	(5.73e-06)	(1.79e-06)
Req	**-.1518309***	**-.0020036***	**-.0005053***
	(.0425991)	(.0004592)	(.0001069)
d_cadeficit	-.2714035	-.0027158	.0005035
	(.9517013)	(.0069005)	(.0031048)
DebtServ	1.03e-09	1.24e-11	7.26e-14
	(6.57e-10)	(7.78e-12)	(2.95e-12)
DebtServ_Exp	.0047767	-.000054	.000089
	(.0299989)	(.0002305)	(.0001062)

Table 6. (cont.) Results of the Cross-section Regressions

	$g_{post2} - g_{pre3tranq}$	$HP_{post1-pre1}$	$BK_{post1-pre1}$
Domestic non-policy variables			
Imp_g	**.1177693***	**.0014997***	**.0003474**
	(.0359903)	(.000275)	(.0001419)
ToT	.0038329	.0000534	7.67e-06
	(.0059271)	(.0000442)	(0000173)
ToT_vol	-.0013524	**-.0000113***	**-.92e-06**
	(.0009626)	(6.95e-06)	(3.29e-06)
GovBal	.1425502	.0030427	-.0000136
	(.1672797)	(.0019269)	(.0014539)
Res	4.90e-11	4.96e-13	-6.54e-14
	(3.66e-11)	(5.50e-13)	(1.33e-13)
PubDebt_Y	-.012532	**-.0002747**	-.0000228
	(.0125583)	(.0001218)	(.0000454)
External condition variables			
IntRate_US	-.0972499	**-.0022192***	-.0003244
	(.1694553)	(.0013367)	(.0006157)
TBill	**-.2358015**	**-.0018814***	-.0002956
	(.1150217)	(.0010459)	(.000472)
Domestic policy variables			
Infl	**.0461787***	-.0000655	-.0000918
	(.0248543)	.0001515	(.0000877)
IntRate	-.0364053	.0000348	.0001485
	(.0558595)	(.0003903)	(.0001481)
REER	**-.0177504***	**-.0001552***	**-.000042***
	(.0055445)	(.0000181)	(.0000124)
REER_ov	**-2.392381***	**-.0118944***	-.0036087
	(.9279667)	(.0071289)	(.0030577)
REER_vol	**-.0038761***	-2.22e-06	-2.64e-06
	(.0010246)	(5.83e-06)	(3.30e-06)

Robust standard errors are between parentheses; *, ** and *** represent the statistical significance at 10%, 5% and 1%, respectively. Coefficients of the explanatory variables that proved to be significant are shown in bold. Constants not reported.

Interestingly, an outstanding number of macroeconomic variables turned out to be, simultaneously, statistically significant for all alternative measures and contributors to contractionary growth, which is the case of short-term debt-to-reserves ratio, external financing

requirements, and REER. Moreover, imports' growth was also important in explaining expansionary crises for all alternative dependent variables.

In practice, the interpretation of these coefficients and for $g_{post2} - g_{pre3tranq}$, is performed as follows: a 1 p.p. increase in short-term debt as a share of reserves is associated with a -0.0016 percentage points change in the difference of the average of the two years post-crisis period minus the average of the three tranquil years prior to the crisis; An increase of 1 unit of external financing requirements leads to a decrease of 0.15 p.p. in the measure of output; A 1p.p. increase in imports growth has an effect of 0.118 p.p. in output growth; and an increase of 1p.p. in real effective exchange rate leads to a drop in the independent variable of 0.018 p.p., *ceteris paribus*.

All signs of statistically significant coefficients meet the expectations established previously.

On the other hand, current account balance deficit, debt service, debt service-to-exports ratio, terms of trade, government balance, reserves and interest rate were the macroeconomic variables that were commonly non-significant in any of the regressions.

In addition, we proceeded with multiple linear regression in order to estimate the strength of the relationship between output variation and the macroeconomic determinants. We start, merely, with domestic non-policy variables[7], following additional external economic variables, and, lastly, with the inclusion of domestic policy variables. Results for the regressions are established in Table 7, Table 8, and Table 9, respectively.

Table 7. Results of the Multiple Linear Cross-Section Regression of Domestic Non-Policy Variables

	$g_{post2} - g_{pre3tranq}$	$HP_{post1-pre1}$	$BK_{post1-pre1}$
Domestic non-policy variables			
ExtDebt_Y	**6.567667***	.0150995	**.0170726***
	(1.634291)	(.0211136)	(.0085736)
ExtDebt_st	**6.59e-09***	9.14e-13	3.81e-13
	(1.66e-09)	(1.19e-11)	(5.38e-12)
StDebt_Res	**-.0366942****	.0000519	-.0000178
	(.0130678)	(.0000991)	(.0000459)

---

[7] Current account balance deficit dummy (d_cadeficit) was excluded from the models due to collinearity, i.e., independent variables are linear combinations of each other or are identical, which presents to be a common problem of cross-sectional data.

Table 7 (cont.). Results of the Multiple Linear Cross-Section Regression of Domestic Non-Policy Variables

	$g_{post2} - g_{pre3tranq}$	$HP_{post1-pre1}$	$BK_{post1-pre1}$
Domestic non-policy variables			
Req	**.368043****	.0005736	**-.0019466****
	(.1411608)	(.0011906)	(.000707)
DebtServ	-2.17e-09	**-5.87e-11*****	1.41e-11
	(2.44e-09)	(1.94e-11)	(1.21e-11)
DebtServ_Exp	-.0372311	**-.0006417*****	**-.0002724****
	(.0287239)	(.000171)	(.0001094)
Imp_g	**.0788963***	**.0020042*****	.0001379
	(.0437153)	(.0004163)	(.0001566)
ToT	**-.0899442*****	**-.0003944****	**-.0001404***
	(.0215213)	(.0001673)	(.0000726)
ToT_vol	.0034379	**.0000323****	-2.71e-06
	(.0024007)	(.0000142)	(8.67e-06)
GovBal	.1951203	**.005138*****	**.0026711****
	(.2065109)	(.001717)	(.0011428)
Res	-4.67e-10	**1.05e-11*****	1.82e-12
	(7.28e-10)	(3.20e-12)	(2.61e-12)
PubDebt_Y	**-.0613779*****	.0001547	-.0000272
	(.0141867)	(.0001444)	(.0000761)
intercept	9.556669***	.0161896	.0134441
	(2.291359)	(.0184188)	(.0090769)
R^2	0.7855	0.8268	0.6255
linktest	0.531	0.243	0.929
ovtest	0.1239	0.0792	0.2750
imtest, white	0.4167	0.4167	0.4154

Standard errors are between parentheses; *, ** and *** represent the statistical significance at 10%, 5% and 1%, respectively. Coefficients of the explanatory variables that proved to be significant are shown in bold. linktest has the null hypothesis of no misspecification error; ovtest has the null hypothesis of no omitted variables in the model; imtest is a White test for the null hypothesis of homoscedasticity. d_cadeficit was omitted due to collinearity.

In regard to $g_{post2} - g_{pre3tranq}$, short-term debt relative to reserves, terms of trade and public debt relative-to-GDP are the statistically significant determinants related with output contraction, at a level of at least 5% significance. Moreover, external debt as a share of GDP, short-term external debt, short-term debt as a share of reserves, external financing requirements and imports growth contributed positively to economic growth, being all significant at least at a 10% level.

In respect to detrended-output measures, there were fewer significant variables overall. The common significant variables in the measures constructed with the HP and BK filter were the debt service-to-exports ratio, the terms of trade, and fiscal balance. The former two variables contributed to the deterioration of economic growth and the latter, despite being a determinant of pure sovereign debt crises, contributed to an expansionary economy.

We do not reject the null hypotheses for all statistical tests at a 5% significance level.

To sum up, despite the terms of trade being the only significant variable common to the three measures of output change, the regression restricted to macroeconomic non-policy related variables evidenced to have powerful determinants during pure debt crises. Additionally, there was no evidence of non-significant variable common to the three alternative independent variables.

Subsequently, external conditions variables were included in the multiple regression, namely U.S. interest rate and the 3-month U.S. Treasury bill. For space consideration reasons, only the included variables are presented in Table 8.

Table 8. Results of the Multiple Linear Cross-Section Regression of Domestic Non-Policy and External Condition Variables

	$g_{post2} - g_{pre3tranq}$	$HP_{post1-pre1}$	$1/HP_{post1-pre1}$	$BK_{post1-pre1}$
External condition variables				
IntRate_US	.0034608	**.0072813****	.0084777	**.0045276****
	(.5192298)	(.0031946)	(.0063274)	(.0016949)
TBill	-.2799093	-.001793	-.0010387	-.0019826
	(.3422913)	(.0016004)	(.0030093)	(.0012052)
intercept	11.28699***	-.0001803	.0730063**	.0086944
	(3.060254)	(.0166319)	(.0236414)	(.0100417)
R^2	0.8092	0.8795	0.9541	0.7120
linktest	0.3773	0.433	0.986	0.971
ovtest	0.827	0.0082	0.9989	0.7719
imtest	0.4167	0.4167	0.3971	0.4154

Standard errors are between parentheses; *, ** and *** represent the statistical significance at 10%, 5% and 1%, respectively. Coefficients of the explanatory variables that proved to be significant are shown in bold. linktest has the null hypothesis of no misspecification error; ovtest has the null hypothesis of no omitted variables in the model; imtest is a White test for the null hypothesis of homoscedasticity. d_cadeficit was omitted due to collinearity. 1/ New functional form of the regression with the HP output-detrended measure.

Surprisingly, no statistically significant linear dependence on the external economic conditions was detected. Only the American interest rate proved to be decisive in triggering pure sovereign debt crises, exclusively with the output-detrended measures.

The first model with the HP filter had omitted variables detected through the RESET test (p-value=0.0082<0.01), which means that the functional form of the model is inaccurate. Therefore, a variable was transformed, more concretely ExtDebt_st, into logarithms in order to force a linear relationship with the independent variable. Consequently, the RESET test is now successful, and we do not reject the null hypothesis of no omitted variables in the model (p-value=0.9989>0.01), indicating that the model functional form is correct. As a result, the U.S. interest rate, which was before statistically significance, lost the explanatory power in the regression.

For last, the domestic policy categorization - in which is included inflation, interest rate, real effective exchange rate, real effective exchange rate overvaluation and real effective exchange rate volatility - was incorporated into the regression.

Table 9. Results of the Multiple Linear Cross-Section Regression of Domestic (Non-Policy and Policy) and External Condition Variables

	$g_{post2} - g_{pre3tranq}$	$HP_{post1-pre1}$	$BK_{post1-pre1}$
Domestic policy variables			
Infl	-.0425433	-.0000418	-.0001075
	(.1781483)	(.0006655)	(.0003574)
IntRate	-.0303945	.0002238	-.0002484
	(.1042325)	(.0006324)	(.0002233)
REER	.1050681	.0031193	5.03e-06
	(.055263)	(.0015549)	(.0000894)
REER_ov	**-3.510312***	-.0471365	-.0041058
	(1.823358)	(.0209205)	(.0069865)
REER_vol	**.000912***	**-.0000681***	-.0000384
	(.0104242)	(.0000504)	(.0000368)
intercept	3.599811	-.3127312*	-.0019009
	(.503157)	(.134282)	(.0129014)
R^2	0.7778	0.9625	0.6558
linktest	0.901	0.491	0.623
ovtest	0.2454	0.0580	0.9005
imtest	0.4125	0.3946	0.4110

Standard errors are between parentheses; *, ** and *** represent the statistical significance at 10%, 5% and 1%, respectively. Coefficients of the explanatory variables that proved to be significant are shown in bold. linktest has the null hypothesis of no misspecification error; ovtest has the null hypothesis of no omitted variables in the model; imtest is a White test for the null hypothesis of homoscedasticity. d_cadeficit was omitted due to collinearity.

According with the specification tests, we do not reject the null hypothesis of no omitted variables in the model, no misspecification error and homoscedasticity, for all measures. Nevertheless, the Variance Inflation Factor (VIF) test, which identifies and quantifies the proportion of multicollinearity, forced to remove manually two variables from the regressions, the ExtDebt_st (since it is a component or is included in other explanatory variables) and the TBill (which, despite not being included in the calculation of other determinant, it is strongly correlated with IntRate_US). d_cadeficit was omitted from the beginning by the software itself for giving signs of perfect collinearity.

Domestic policy variables showed unsatisfactory results overall. For $g_{post2} - g_{pre3tranq}$, only real effective exchange rate overvaluation and real effective exchange rate volatility proved to be determinants, contributing to an expansionary and a contractionary pure sovereign debt crisis, respectively, implying that domestic policy variables are not the problem when it comes to pure sovereign debt crises.

Regarding the output-detrended measures, uniquely real effective exchange rate volatility, and only for the independent variable measured with the HP filter, proved to be significant and negatively correlated with output growth.

To sum up the subsection on the determinants during pure sovereign debt crises, we selected various macroeconomic variables as possible determinants during pure sovereign debt crises, following the empirical literature. Through the respective list, we uncover the variables that are behind the origin of pure sovereign debt crises and their impact on output variation, which influenced both positively as negatively. The coefficients of variables did not suffer from significant variation across regressions.

We concluded that, for the output measure with $g_{post2} - g_{pre3tranq}$, domestic non-policy variables had more proportion of determinants, since more than half had statistically significant coefficients. Within this category, countries with more external debt-to-GDP, short-term external debt, external financing requirements and imports' growth help to explain expansionary crises, as short-term debt-reserves, terms of trade and public debt as a share of GDP contributed to the deterioration of the economy. External economic conditions, such as the U.S. interest rate and Treasury bill rate, do not have an effect in economic growth as it was previously presumed.

4.2.2. The impact of macroeconomic determinants in non-crisis periods

Table 10 introduces the estimation results for the panel fixed effects regression, with heteroscedastically consistent and autocorrelation adjusted standard errors. The information is presented concisely in order to have a more succinct interpretation. For brevity motives, it is only visible the determinants that proved to be significant in the above multiple linear regression for $g_{post2} - g_{pre3tranq}$ as dependent variable, since it was the measure which displayed more significant results overall.

Table 10. Results of the Fixed Effects Regression

	Output growth (Y_g)		
d_crisis	19.5021***		
	(1.42975)		
ExtDebt_Y	-3.298893**	ExtDebt_Y*d_crisis	-4.508286***
	(1.197734)		(1.012429)
ExtDebt_St	9.82e-13	ExtDebt_St*d_crisis	8.10e-08***
	(1.22e-10)		(1.08e-08)
StDebt_Res	-.0688556**	StDebt_Res*d_crisis	-.502543***
	(.0280238)		(.0419875)
Req	6.315472*	Req*d_crisis	24.42326**
	(3.004275)		(5.844503)
Imp_g	.0751853	Imp_g*d_crisis	-.6063501***
	(.0496106)		(.0772647)
ToT	.0113772	ToT*d_crisis	-.0657952***
	(.0093316)		(.0170505)
PubDebt_Y	-.0063707	PubDebt_Y*d_crisis	.0439262***
	(.0107427)		(.0118577)
REER_ov	-.3565987	REER_ov*d_crisis	-4.179476***
	(.5132411)		(.5766956)
REER_vol	.0002471	REER_vol*d_crisis	-.0128462***
	(.0009086)		(.002 3112)
		intercept	-.9054994
			(5.039595)

Standard errors are between parentheses; *, ** and *** represent the statistical significance at 10%, 5% and 1%, respectively. Coefficients of the explanatory variables that proved to be significant are shown in bold.

One of the benefits of the regression is that it revealed the macroeconomic determinants that only have an effect in output growth in periods of crises. This may support in crisis

prevention plans, by anticipating and respond promptly to variations of the significant macroeconomic determinants. These variables are represented by imports' growth, terms of trade, real effective exchange rate overvaluation and volatility, as they have a negative effect on real output growth, along with short-term external debt and public debt to GDP, positively correlated with the independent variable.

Furthermore, it is also possible to retain which ones also seem to haunt the victims-countries in periods where there is no crisis occurrence, such as the external debt-to-GDP ratio short-term debt-to-reserves, and external financing requirements, being the latter the only with a positive effect on growth. Interestingly, although the relation does not change from one period to another, the impact increases outstandingly in crisis-periods, as well as the significance.

All interactive terms are significant, which reinforces the importance of the method.

As our empirical methodology is based on Gupta et al. (2017), it would be interesting to consult the following table that compares the results of the authors' study in currency crises, with our study applied to pure sovereign debt crises.

Table 11. Comparison of Empirical Results

	Gupta et al. (2017)	The dissertation
Comparison of economic growth	All countries: 40% of crises were expansionary and 60% contractionary in the average crisis; In developing countries: 52% expansionary and 48% contractionary; In emerging economies: 28% expansionary and 72% contractionary.	All countries: 56% expansionary and 44% contractionary; In low-income countries: 59% expansionary and 41% contractionary; In middle-high-income countries: 58% expansionary and 42% contractionary.
Comparison of economic growth across decades and countries	The most severe decade was the 1980s; Currency crises were one and a half times often more contractionary in emerging economies than in developing countries; The severity of crises has not increase across decades, in emerging economies.	The most severe decade was the 1980s; Pure sovereign debt crises were two more times more severe in middle-high-income countries than in low-income countries; The severity of crises has fallen across decades.
Determinants of currency crises *versus* Determinants during pure sovereign debt crises	Domestic non-policy variables were the category that stood out the most regarding the significance of the determinants it encompassed. No external economic variables revealed to be determinant in currency crises. In domestic policy variables, only real domestic interest rate was significant.	Domestic non-policy variables were the most significant across specifications. No external economic variable revealed to be determinant in pure sovereign debt crises. Surprisingly, domestic policy variables were not so significant as expected.

Table 11. (cont.) Comparison of Empirical Results

	Gupta et al. (2017)	The dissertation
The impact of macroeconomic determinants in non-crisis periods	The relation between the determinants and economic growth was significantly different when comparing both economic periods.	The relation between the determinants and the measures of output growth increased in the crisis-period.
	Determinants exclusively significant in crisis periods: Capital inflows, trade openness, extent of capital account liberalization, and external long-term indebtedness.	Determinants exclusively significant in crisis periods: short-term external debt, imports' growth, terms of trade, public debt-to-GDP ratio, real effective exchange rate overvaluation and real effective exchange rate volatility.
		Determinants significant in both periods: External debt-to-GDP ratio, short-term debt-to-reserves ratio and external financing requirements-to-reserves ratio.

4.3.   Robustness

As robustness check, we run the regressions with some modifications to test the validity of the econometric models.

The first robustness analysis refers to the definition created around pure sovereign debt crises. We recall that the criteria used to consider a pure crisis was the non-occurrence of other type of crises in the same year nor in the year before a debt crises episode. We estimated the models once more, yet with a different definition of pure crisis, being the non-occurrence of another type of crises in that year the only condition. This new definition increased the number of total pure sovereign debt crises in 55 crisis-years.

Regarding the Modelling Behaviour of Output econometric approaches, results are extremely similar, with the significance of coefficients and their respective signs being the same. Some differences were only visible with regard to the significance of coefficients of the different variations in output growth, specifically when the regressions were restricted to expansionary and contractionary crises.

Moreover, concerning the Determinants section, in addition to the other estimations, the multiple linear regressions with the specific-to-general modelling specification starts with similar results to the previous concept. Nevertheless, as we include the macroeconomic determinants from the remaining categories in the linear model, the significance power of the

explanatory variables begins to decrease. Although this particularity is not an outstanding interpretation of the robustness results, it is certainly questionable.

A second robustness analysis to evaluate the validity of the economic approach of this study is related with the inclusion of the income levels and decades dummies in the multiple linear regression, that includes all categories of explanatory variables. The coefficients did not prove to be significant, as it occurred previously.

All the robustness results can be found from Table A10 to Table A17, in the Appendix.

5. Conclusion

The identification of the macroeconomic determinants that trigger pure sovereign debt crises and their association with economic growth brings several contributions to the empirical literature on the matter. From the analysis of this particular type of financial crisis with lack of existing empirical studies, to the treatment of pure crises, the current research came to fill an existing gap, and which is part of a topic that requires additional research since it has numerous economic, social and political consequences.

With our criteria definition of pure sovereign debt crisis, it was possible to identify 90 episodes, in 54 countries, from 1970-2017. Moreover, we created three different ways to measure economic growth, using different methods. Additionally, we seek to understand if the same set of determinants had influence in periods with no occurrence of crises. The results below are for the measure of economic growth based on pre- and post-crisis period.

Our results showed that in almost 40% of total crises, output growth saw a deceleration in its value, and around 60% were represented by expansionary crises; expansionary crises were uppermost, both in low- and middle-high-income countries; the 1980s were the most catastrophic decade, with the highest average expansionary and contractionary crises growth rate.

Relative to the determinants of pure sovereign debt crises, several findings were obtained: Regarding the simple linear regression, short-term debt relative to reserves, external financing requirements, imports' growth and real effective exchange rate were the common significant determinants for all ways of measuring economic growth. Additionally, current account deficit, debt service-related variables, terms of trade, fiscal balance, reserves, and interest rate were the common determinants without significance.

Considering the multiple linear regression, the explanatory variables that revealed to be macroeconomic determinants of pure sovereign debt crises and, simultaneously, lead to a decline in output growth were short-term debt as a share of reserves, terms of trade, public debt-to-GDP ratio, and real effective exchange rate overvaluation. On the other hand, the variables that contributed for the acceleration of economic growth were represented by external debt-to-GDP ratio, short-term external debt, external financing requirements-to-reserves, imports' growth and real effective exchange rate volatility, although this last one has hardly any explanatory power. Overall, domestic policy variables are, undoubtedly, the biggest contributor. None of the external economic conditions proved to cause pure sovereign debt crises.

Based on the fixed effects model, total external debt, short-term debt-to-reserves and external financing requirements are the macroeconomic determinants present in both periods of crises and non-crises. Moreover, their intensity strengthened from the period of non-crisis occurrence to crisis events. On the opposite side, short-term external debt, imports 'growth, terms of trade, public debt-to-GDP, real effective exchange rate overvaluation and real effective exchange rate volatility were the ones that left repercussions exclusively in periods of pure sovereign debt crises.

Some robustness exercises were performed. Firstly, we changed our definition of pure sovereign debt crises and re-estimated all the econometric models. Results showed to be similar, apart from the multiple linear regression "general approach", in which the explanatory power of macroeconomic variables dropped intensively. In a second robustness analysis of our estimations, we add the alternative dummies – income levels and decades – in the multiple linear regressions. Results remain similar.

The study has some limitations. First and foremost, although the measure based on the pre- and post-crisis period provided more significant coefficients when compared with the output-detrended measures, this does not mean that it is the most effective measure of output change, which raises some doubts when interpreting and discussion the data. Although the detrended filters' disadvantages are well-known in the economic field, it is the correct method to forecast the values of any time series.

Additionally, there are some data limitations regarding the data processing and the outliers. Considering the data processing, there is a problem of strong correlation among the explanatory variables. Thus, if this study is replicated again, we advise to be extremely careful and meticulous when choosing the potential determinants.

Concerning the outliers, some economists and statisticians advocate the elimination of outliers, arguing that they are influential observations that condition the results. Other economists and statisticians advocate the inclusion of outliers for the same reason. In agree with the latter group, we decided not to exclude them, as they are part of the available information.

Further investigation should be made in order to understand which measure of economic growth is the most reliable. Moreover, it would also be interesting to study the values that the determinants have to reach to trigger a sovereign debt crisis, since it would help immensely in preventive measures.

6. References

Akemann, M., & Kanczuk, F. (2005). Sovereign default and the sustainability risk premium effect. *Journal of Development Economics*, *76*(1), 53–69. https://doi.org/10.1016/j.jdeveco.2003.12.011

Akitoby, B., Binder, A., & Komatsuzaki, T. (2017). Inflation and Public Debt Reversals in the G7 Countries. In *Journal of Banking and Financial Economics*. https://doi.org/10.7172/2353-6845.jbfe.2017.1.2

Ams, J., Baqir, R., Gelpern, A., & Trebesch, C. (2019). Sovereign Default. In *Sovereign Debt: A Guide for Economists and Practitioners*. Oxford: Oxford University Press. https://doi.org/10.1093/oso/9780198850823.003.0008

Åslund, A. (1998). Russia's financial crisis: causes and possible remedies. *Post-Soviet Geography and Economics*, *39*(6), 309–328. https://doi.org/10.1080/10889388.1998.10641079

Asonuma, T. (2016). Sovereign Defaults, External Debt, and Real Exchange Rate Dynamics. *IMF Working Papers*, *16*(37), 1. https://doi.org/10.5089/9781475597738.001

Barguellil, A., Ben-Salha, O., & Zmami, M. (2018). Exchange rate volatility and economic growth. *Journal of Economic Integration*, *33*(2), 1302–1336. https://doi.org/https://doi.org/10.11130/jei.2018.33.2.1302

Beers, D., & de Leon-Manlagnit, P. (2020). The BoC-BoE Sovereign Default Database: What's New In 2019? (June 2020). Bank of England Working Paper No. 829, https://doi.org/10.2139/ssrn.3460540

Beers, D., & Mavalwalla, J. (2016). *Database of Sovereign Defaults*.Technical Reports 101. Bank of Canada. https://doi.org/10.2139/ssrn.3000226

Beim, D. O., Beim, D. O., & Calomiris, C. W. (2001). Emerging Financial Markets. McGraw-Hill/Irwin.

Beker, V. A. (2014). The European Debt Crisis: Causes and Consequences. *Journal of Stock & Forex Trading*, *3*(115), 2. https://doi.org/10.4172/2168-9458.1000115

Bhattacharya, M., & Inekwe, J. (2021). Convergence in Sovereign Debt Defaults: Quantifying the Roles of Institutions. *Oxford Bulletin of Economics and Statistics*. https://doi.org/10.1111/obes.12411

Brueckner, M., & Carneiro, F. (2015). The Effects of Volatility, Fiscal Policy Cyclicality and Financial Development on Growth Evidence for the Eastern Caribbean. *World Bank Policy Research Working Paper*, *7507*.

Butorina, O. (2000). Implications of the Russian crisis. *Post-Communist Economies*, *12*(4), 409–424. https://doi.org/10.1080/14631370050216489

Caner, M., Grennes, T., & Köhler-Geib, F. (2010). Finding the Tipping Point - When Sovereign Debt Turns Bad. In *Policy Research Working Paper* (Issue 5391). https://doi.org/10.2139/ssrn.1612407

Casares, E. R. (2015). A relationship between external public debt and economic growth. *Estudios Económicos*, *30*(2), 219–243. https://doi.org/https://doi.org/10.24201/ee.v30i2.27

Catão, L., & Sutton, B. (2002). Sovereign Defaults: The Role of Volatility. In *IMF Working Papers* (No. 02/149). https://doi.org/10.5089/9781451856903.001

Chambers, J., Ontko, J., & T Beers, D. (2011). *Default, Transition and Recovery: Sovereign Defaults and Rating Transition Data, 2010 Update*. Ratings Direct, Standard & Poor's Financial Services LLC (S&P), New York https://www.standardandpoors.com/ja_JP/delegate/getPDF?articleId=1498474&type=COMMENTS&subType=

Contessi, S. (2012). An application of conventional sovereign debt sustainability analysis to the current debt crises. *Federal Reserve Bank of St. Louis Review*, 197–220. https://doi.org/10.20955/r.94.197-220

Crespo Cuaresma, J., & Slacik, T. (2009). On the Determinants of Currency Crises: The role of model uncertainty. *Journal of Macroeconomics*, *31*(4), 621–632. https://doi.org/10.1016/j.jmacro.2009.01.004

Cuadra, G., & Sapriza, H. (2006). Sovereign Default, Terms of Trade and Interest Rates in Emerging Markets. *Working Paper Banco de Mexico*.

Dadush, U., Dasgupta, D., & Ratha, D. (2000). The Role of Short-Term Debt in Recent Crises. *Finance and Development*, *37*(4), 54–57.

Das, U. S., Surti, J., Ahmed, F., Papaioannou, M. G., & Pedras, G. (2010). Managing Public Debt and its Financial Stability Implications. In *IMF Working Papers* (No. 10/280). https://doi.org/10.5089/9781455210879.001

Davis, M. (2000). Crises Increased by Excessive Short-term Debt. *National Bureau of Economic Research*. Retrieved from https://www.nber.org/digest/mar00/crises-increased-excessive-short-term-debt

Demirgüç-Kunt, A., & Detragiache, E. (1999). The Determinants of Banking Crises: Evidence from Industrial and Developing Countries. *Policy Research Working Papers*

Dennis, S. A., & Mullineaux, D. J. (2000). Syndicated Loans. *Journal of Financial Intermediation*, *9*(4), 404–426. https://doi.org/10.1006/jfin.2000.0298

Detragiache, E., & Spilimbergo, A. (2001). Crises and Liquidity: Evidence and Interpretation. In *IMF Working Papers* (No. 01/2). https://doi.org/10.5089/9781451841763.001

Dornbusch, R., & Fischer, S. (1986). Third world debt. *Science*, *234*(4778), 836–841. https://doi.org/10.1126/science.234.4778.836

Esposito, M., & Et, A. (2014). The European Financial Crisis - Analysis and a Novel Intervention. In *Havard University*.

Fukunaga, I., Komatsuzaki, T., & Matsuoka, H. (2019). Inflation and Public Debt Reversals in Advanced Economies. In *IMF Working Papers* (Vol. 18, Issue 297). https://doi.org/10.5089/9781513521596.001

Ghosh, A., & Phillips, S. (1998). Warning: Inflation May Be Harmful to Your Growth. *IMF Staff Papers*, *45*(4), 672–710. https://doi.org/10.2307/3867589

Ghulam, Y., & Derber, J. (2018). Determinants of sovereign defaults. *Quarterly Review of Economics and Finance*, *69*, 43–55. https://doi.org/10.1016/j.qref.2017.12.003

Gobbin, N., & Merlevede, B. (2000). The Russian crisis: A debt perspective. *Post-Communist Economies*, *12*(2), 141–163. https://doi.org/10.1080/14631370050043616

Gupta, P., Mishra, D., & Sahay, R. (2007). Behavior of output during currency crises. *Journal of International Economics*, *72*(2), 428–450. https://doi.org/10.1016/j.jinteco.2006.10.003

Guscina, A., & Jeanne, O. (2006). Government Debt in Emerging Market Countries: A New Data Set. In *IMF Working Papers* (No. 06/98). https://doi.org/10.5089/9781451863581.001

Hakamada, S. (1999). Factors behind the Russian crisis. *Asia-Pacific Review*, *6*(1), 35–42. https://doi.org/10.1080/13439009908720004

Hanson, P. (1999). The Russian economic crisis and the future of Russian economic reform. *Europe - Asia Studies*, *51*(7), 1141–1166. https://doi.org/10.1080/09668139998471

Hernández, J. (2018). How International Reserves Reduce the Probability of Debt Crises. *Inter-American Development Bank Discussion Paper NºIDB-DP-579*, Society for Economic Dynamics

Hilscher, J., & Nosbusch, Y. (2010). Determinants of sovereign risk: Macroeconomic fundamentals and the pricing of sovereign debt. *Review of Finance*, *14*(2), 235–262. https://doi.org/10.1093/rof/rfq005

Humayun Kabir, M., & Kabir Hassan, M. (2009). Russian financial crisis, US financial stock returns and the IMF. *Applied Financial Economics*, *19*(5), 409–426. https://doi.org/10.1080/09603100801935362

Hussain, M. E., & Haque, M. (2017). Fiscal deficit and its impact on economic growth: Evidence from Bangladesh. *Economies*, *5*(4). https://doi.org/10.3390/economies5040037

International Monetary Fund. (1983). II Interest Rates and Interest Rate Policies: An Overview. In *Interest Rate Policies in Developing Countries* (pp. 161–196). https://doi.org/10.1007/978-3-642-54539-9_10

International Monetary Fund. (2018). A Bumpy Road Ahead. In *Global Financial Stability Report: A Bumpy Road Ahead* (pp. 1–54).

Iqbal, N., Din, M., & Ghani, E. (2017). *The Fiscal Deficit and Economic Growth in Pakistan: New Evidence*. *22*, 53–72.

Ishihara, Y. (2005). Quantitative Analysis of Crisis: Crisis Identification and Causality. *World Bank Policy Research Working Paper*.

Jemović, M., & Marinković, S. (2021). Determinants of Financial Crises—An early warning system based on panel logit regression. *International Journal of Finance and Economics*, *26*(1), 103–117. https://doi.org/10.1002/ijfe.1779

Kalemli-Özcan, S., Reinhart, C., & Rogoff, K. (2016). Sovereign debt and financial crises: Theory and historical evidence. *Journal of the European Economic Association*, *14*(1), 1–6. https://doi.org/10.1111/jeea.12167

Kaminsky, G. L., & Pereira, A. (1996). The debt crisis: Lessons of the 1980s for the 1990s. *Journal of Development Economics*, *50*(1), 1–24. https://doi.org/10.1016/0304-3878(96)00002-8

Khan, M., & Senhadji, A. (2001). Threshold Effects in the Relationship Between Inflation and Growth. *48*(1), 1–21.

Kim, Y. J., & Lee, C.-I. (2019). Sovereign debt crisis in a monetary union: Accounting for excessive debt, housing bubbles and the transmission of crises. *Economic Inquiry*, *57*(2), 1098–1119. https://doi.org/10.1111/ecin.12745

Koh, W. C., Kose, M. A., Nagle, P. S. O., Ohnsorge, F., & Sugawara, N. (2020). Debt and Financial Crises. In *Policy Research Working Paper* (Issue 9116). https://doi.org/10.2139/ssrn.3535970

Kohlscheen, E. (2010). Domestic vs external sovereign debt servicing: An empirical analysis. *International Journal of Finance and Economics*, *15*(1), 93–103. https://doi.org/10.1002/ijfe.414

Kose, M. A., Nagle, P., Ohnsorge, F., & Sugawara, N. (2020). Global Waves of Debt: What Goes up Must Come Down? In *Global Waves of Debt* (Advance ed, pp. 57–111). World Bank. https://openknowledge.worldbank.org/handle/10986/32809

Kuvshinov, D., & Zimmermann, K. (2019). Sovereigns going bust: Estimating the cost of default. *European Economic Review*, *119*, 1–21. https://doi.org/10.1016/j.euroecorev.2019.04.009

Manasse, P., & Roubini, N. (2009). "Rules of thumb" for sovereign debt crises. *Journal of International Economics*, *78*(2), 192–205. https://doi.org/https://doi.org/10.1016/j.jinteco.2008.12.002.

McMillan, D. G. (2021). When and why do stock and bond markets predict US economic growth? *The Quarterly Review of Economics and Finance*, *80*, 331–343. https://doi.org/https://doi.org/10.1016/j.qref.2021.03.004.

Megersa, K. (2019). Determinants of Sovereign Debt Default: Some Evidence from FCAS and MENA Countries. *K4D Helpdesk Report.* U.K. Institute of Development Studies

Meier, S., Gonzalez, M. R., & Kunze, F. (2021). The global financial crisis, the EMU sovereign debt crisis and international financial regulation: lessons from a systematic literature review. *International Review of Law and Economics*, *65*(105945). https://doi.org/10.1016/j.irle.2020.105945

Pancrazi, R., Seoane, H. D., & Vukotić, M. (2020). Welfare gains of bailouts in a sovereign default model. *Journal of Economic Dynamics and Control*, *113*, 103867. https://doi.org/10.1016/j.jedc.2020.103867

Pescatori, A., & Sy, A. N. R. (2007). Are debt crises adequately defined? *IMF Staff Papers*, *54*(2), 306–337. https://doi.org/10.1057/palgrave.imfsp.9450010

Ramirez, M. (2006). Latin American Investment Perfomance During the 1980-2002 Period: A Panel Cointegration Approach. *Applied Econometrics and International Development*, *6*(2).

Reinhart, C. M., & Rogoff, K. S. (2009). *This time is different: Eight centuries of financial folly*. https://doi.org/10.1080/09585206.2010.512722

Reinhart, C. M., & Rogoff, K. S. (2010). Growth in a Time of Debt. *American Economic Review*, *100*(2), 573–578. https://doi.org/10.1257/aer.100.2.573

Rho, C., & Saenz, M. (2021). Financial stress and the probability of sovereign default. *Journal of International Money and Finance*, *110*, 102305. https://doi.org/10.1016/j.jimonfin.2020.102305

Rodriguez, M., & Edwards, S. (1997). Crisis and Reform in Latin America, From Despair to Hope. *The Journal of Finance*, *40*(2), 98. https://doi.org/10.2307/2329458

Sarel, M. (1996). Nonlinear effects of inflation on economic growth. *IMF Staff Papers*, *43*(1), 199–215. https://doi.org/10.2307/3867357

Schimmelpfennig, A., Roubini, N., & Manasse, P. (2003). Predicting Sovereign Debt Crises. *IMF Working Papers*, *2003*(221), 41. https://doi.org/10.5089/9781451875256.001

Serieux, J., & Samy, Y. (2001). The Debt Service Burden and Growth: Evidence from Low Income Countries. In *Parallel Session 4.2*.

Sharma, S. D. (2012). *Global Financial Contagion: Building a Resilient World Economy After the Subprime Crisis*. https://doi.org/10.1017/CBO9781139225656

Shatz, H. J., & Tarr, D. G. (2017). Exchange Rate Overvaluation and Trade Protection: Lessons from Experience. *World Bank Publications*, 115–127. https://doi.org/10.1142/9789813108448_0005

Shefner, J., & Panageotou, S. (2015). Crisis Management and the Institutions of Austerity: A Comparison of Latin American and Greek Experiences. *Comparative Sociology*, *14*(3), 301–327. https://doi.org/10.1163/15691330-12341349

Simon, R. (1999). Russia's Crises. *Capital & Class*, *23*(2), 1–7. https://doi.org/10.1177/030981689906800101

Slay, B. (1999). An interpretation of the Russian financial crisis. *Post-Soviet Geography and Economics*, *40*(3), 206–214. https://doi.org/10.1080/10889388.1999.10641112

Steenkamp, D. (2014). How volatile are New Zealand's terms of trade? An international comparison. *Reserve Bank of New Zealand Bulletin*, *77*(2), 3–14.

Sula, O., & Oguzoglu, U. (2021). International Reserves and Economic Growth. *International Review of Economics & Finance*, *72*, 16–28. https://doi.org/https://doi.org/10.1016/j.iref.2020.10.022.

Sutela, P. (2000). The Financial Crisis in Russia. In *Global Financial Crises*. https://doi.org/10.1007/978-1-4615-4367-1_7

Tanzi, V., Blejer, M. I., & Teijeiro, M. O. (1988). II The Effects of Inflation on the Measurement of Fiscal Deficits. *Measurement of Fiscal Impact*. https://doi.org/10.1177/000271628145600107

Tomz, M., & Wright, M. L. J. (2013). Empirical research on sovereign debt and default. In *Annual Review of Economics*. https://doi.org/10.1146/annurev-economics-061109-080443

Tung, L. T. (2018). The effect of fiscal deficit on economic growth in an emerging economy: Evidence from Vietnam. *Journal of International Studies*, *11*(3), 191–203. https://doi.org/10.14254/2071-8330.2018/11-3/16

Ureche-Rangau, L., & Burietz, A. (2013). One crisis, two crises...the subprime crisis and the European sovereign debt problems. *Economic Modelling*, *35*, 35–44. https://doi.org/10.1016/j.econmod.2013.06.026

Wegener, C., Kruse, R., & Basse, T. (2019). The walking debt crisis. *Journal of Economic Behavior and Organization*, *157*, 382–402. https://doi.org/10.1016/j.jebo.2017.10.008

Westphalen, J. (1984). Origin and consequences of the debt crisis and ways of solving it. *Intereconomics*, *19*(2), 71–77. https://doi.org/10.1007/BF02928296

Willett, T. D., & Wihlborg, C. (2013). Chapter 31 - Varieties of European Crises. *Handbook of Safeguarding Global Financial Stability*, 309–322. https://doi.org/https://doi.org/10.1016/B978-0-12-397875-2.00046-5

Wolla, S. A. (2018). How Do Imports Affect GDP? *Page One Economics*, 1–6. Federal Reserve Bank of St. Louis. research.stlouisfed.org

Zazzarelli, A. (2007). Sovereign Default and Recovery Rates, 1983-2006. In *Moody's Investors Service, Global Credit Research*.

7. Appendix

Table A1.Summary Table of Data Sources

Acronym	Data	Unit	Source
Y_g*	GDP growth (annual %)	Percent	World Bank national accounts data and OECD data files from the World Bank
Y*	GDP	Constant 2010 USD	World Bank national accounts data and OECD data files from the World Bank
$g_{post\_2} - g_{tranq,3}$	1st Measure of Output Change	Percentage points	Authors' calculation
$HP_{post,1-pre,1}$	2nd Measure of Output Change	Percent	Authors' calculation
$BK_{post,1-pre,1}$	3rd Measure of Output Change	Percent	Authors' calculation
IncLevel1*	Historical classification by income (since 1987)	1 if low, 2 if lower-middle, 3 if upper-middle, 4 if high income	World Bank
GNIpc*	GNI per capita, Athlas method	Current USD	World Bank national accounts data and OECD National Accounts data files from the World Bank
IncLevel2*	Historical classification by income (prior to 1987)	1 if low-income, 2 if middle-income	World Bank
IncLevel	Income level	1 if low-income, 2 if middle-high-income	Authors' calculation
d_crisis	Sovereign debt crisis dummy	0 if no pure debt crisis, 1 if pure debt crisis	Carmen M. Reinhart, Duca et al. (2017) and Laeven and Valencia (2018).
ExtDebt*	External debt stocks, total	Current USD	World Bank National Accounts data and OECD National Accounts data files from the World Bank
Y*	GDP	Current USD	World Bank national accounts data and OECD data files from the World Bank
ExtDebt_Y	Total external debt/GDP	Ratio	Authors' calculation
ExtDebt_st	External debt stocks, short-term	Current USD	International Debt Statistics from the World Bank
StDebt_Res	Short term debt (% Reserves)	Percent	International Debt Statistics from the World Bank

Table A1 (cont.). Summary Table of Data Sources

Acronym	Data	Unit	Source
Infl	Inflation rate, average consumer prices	Percent	World Economic Outlook (October 2020) from the IMF
IntRate	Real interest rate	Percent	International Financial Statistics of the IMF and data files using World Bank data on the GDP deflator from the World Bank
IntRate_US	U.S. real interest rate	Percent	International Financial Statistics of the IMF and data files using World Bank data on the GDP deflator from the World Bank
TBill	3-month U.S. treasury bill rate	Percent	Board of Governors of the Federal Reserve System
Cab*	Current account balance	Current USD	World Economic Outlook (October 2020) from the IMF
Req	External financing requirements/Reserves	Ratio	Authors' calculation
d_cadeficit	Current account deficit dummy	0 if no deficit, 1 if deficit	Authors' calculation
REER	Real effective exchange rate index, 2010=100	Index	International Financial Statistics from the IMF
REER_ov	Exchange rate overvaluation	0 if no overvalue, 1 if overvalue	Authors' calculation
REER_vol	Exchange rate volatility	Percent	Authors' calculation
DebtServ	Multilateral debt service	Current USD	International Debt Statistics from the World Bank
DebtServ_Exp	Total debt service (% of exports of goods, services and primary income)	Percent	International Debt Statistics from the World Bank
Imp_g	The imports of goods and services annual growth	Percent	World Bank national accounts data and OECD data files from the World Bank
ToT	Net barter terms of trade index, 2000=100	Index	United Nations Conference on Trade and development, Handbook of statistics and data files and International Financial Statistics of the IMF from the World Bank
ToT_vol	Terms of trade volatility	Percent	Authors' calculation
GovBal	Net lending (+) / Net borrowing (-) (% GDP)	Percent	Government Financial Statistics Yearbook dataset and data files from IMF from the World Bank

Table A1 (cont.). Summary Table of Data Sources

Acronym	Data	Unit	Source
Res	Reserves (including gold)	Current USD	International Financial Statistics and data files from IMF from World Bank
PubDebt_Y	Central Government Debt (% GDP)	Percent	Global Base Database from IMF

* Variables used for the construction of macroeconomic determinants

Table A2.1.Time Availability of Data for the Dependent and Dependent Related Variables

Country	Y_g	$Y_{constantUSD}$	$g_{post\_2} - g_{pre\_3}$	$HP_{post,1-pre,1}$	$BK_{post,1-pre,1}$	IncLevel1	GNIpc	IncLevel2	IncLevel	d_crisis
Albania	1981-2017	1980-2017	1990	1990	1990	1990-2017	1986-2017	1986-1989	1986-2017	1970-2017
Angola	1970-2017	1970-2017	1985-1990	1985-1990	1985-1990	1988-2017	1985-2017	1985-1987	1985-2017	1970-2017
Argentina	1970-2017	1970-2017	2005; 2007-2010	2005; 2007-2010	2005; 2007-2010	1987-2017	1976-2017	1970-1986	1970-2017	1970-2017
Belize	1970-2017	1970-2017	2007; 2012; 2017	2007; 2012; 2017	2007; 2012	1987-2017	1982-2017	1970-1986	1976-2017	1970-2017
Bolivia	1981-2017	1980-2017	1991-1993	1991-1993	1991-1993	1987-2017	1970-2017	1976-1986	1982-2017	1970-2017
Bulgaria	1970-2017	1970-2017	1990	1990	1990	1989-2017	1982-2017	1982-1988	1983-2017	1970-2017
Cameroon	1970-2017	1970-2017	1989	1989	1989	1987-2017	1970-2017	1970-1986	1970-2017	1970-2017
Central African Rep.	1970-2017	1970-201\7	1984-1987; 2001-2010	1984-1987; 2001-2010	1984-1987; 2001-2010	1987-2017	1970-2017	1970-1986	1970-2017	1970-2017
Congo, Republic	1970-2017	1970-2017	1986	1986	1986	1987-2017	1970-2017	1970-1986	1970-2017	1970-2017
Costa Rica	1970-2017	1970-2017	1983-1986; 1989-1990	1983-1986; 1989-1990	1983-1986; 1989-1990	1987-2017	1970-2017	1970-1986	1970-2017	1970-2017
Côte d'Ivoire	1976-2017	1970-2017	1983-1987; 1993; 1996-1998; 2000-2010	1983-1987; 1993; 1996-1998; 2000-2010	1983-1987; 1993; 1996-1998; 2000-2010	1987-2017	1970-2017	1970-1986	1970-2017	1970-2017
Cyprus	1976-2017	1975-2017	2013	2013	2013	1987-2017	1977-2017	1977-2017	1977-2017	1970-2017
Dominica	1970-2017	1977-2017	2002	2002	2002	1987-2017	1979-2017	1979-2017	1979-2017	1970-2017
Dominican Rep.	1970-2017	1970-2017	1975-1984; 1992-1995; 1998-2001	1975-1984; 1992-1995; 1998-2001	1975-1984; 1992-1995; 1998-2001	1987-2017	1970-2017	1970-1986	1970-2017	1970-2017
Ecuador	1970-2017	1970-2017	1994; 2008	1994; 2008	1994; 2008	1987-2017	1970-2017	1970-1986	1970-2017	1970-2017
El Salvador	1970-2017	1970-2017	1981-1985; 1991-1996	1981-1985; 1991-1996	1981-1985; 1991-1996	1987-2017	1970-2017	1970-1986	1970-2017	1970-2017
Gabon	1970-2017	1970-2017	1986; 2002	1986; 2002	1986; 2002	1987-2017	1970-2017	1970-1986	1970-2017	1970-2017

72

Table A2.1 (cont.) Time Availability of Data for the Dependent and Dependent Related Variables

Country	Y_g	Y$_{constantUSD}$	$g_{post\_2} - g_{pre\_3}$	$HP_{post,1-pre,1}$	$BK_{post,1-pre,1}$	IncLevel1	GNIpc	IncLevel2	IncLevel	d_crisis
Ghana	1970-2017	1970-2017	1974	1974	1974	1987-2017	1970-2017	1970-1986	1970-2017	1970-2017
Greece	1970-2017	1970-2017	2012	2012	2012	1987-2017	2006-2017	N/A	1987-2017	1970-2017
Grenada	1976-2017	1977-2017	2004	2004	2004	1987-2017	1979-2017	1979-1986	1979-2017	1970-2017
Guyana	1970-2017	1970-2017	1982	1982	1982	1987-2017	1970-2017	1970-1986	1970-2017	1970-2017
Honduras	1970-2017	1970-2017	1981-1989; 1992; 1998; 2004-2010	1981-1989; 1992; 1998; 2004-2010	1981-1989; 1992; 1998; 2004-2010	1987-2017	1970-2017	1970-1986	1970-2017	1970-2017
India	1970-2017	1970-2017	N/A	1972-1976	1974-1976	1987-2017	1970-2017	1970-1986	1970-2017	1970-2017
Indonesia	1970-2017	1970-2017	N/A	N/A	N/A	1987-2017	1970-2017	1970-1986	1970-2017	1970-2017
Iran	1970-2017	1970-2017	1992	1992	1992	1987-2017	1978-90; 1995-2017	1978-1986	1978-2017	1970-2017
Jamaica	1970-2017	1970-2017	2010	2010	2010	1987-2017	1970-2017	1970-1986	1970-2017	1970-2017
Kenya	1970-2017	1970-2017	19947-1998; 2001-2003	19947-1998; 2001-2003	19947-1998; 2001-2003	1987-2017	1970-2017	1970-1986	1970-2017	1970-2017
Liberia	2001-2007	2000-2017	N/A	N/A	N/A	1987-2017	2002-2017	N/A	1987-2017	1970-2017
Madagascar	1970-2017	1970-2017	1981	1981	1981	1987-2017	1970-2017	1970-1986	1970-2017	1970-2017
Malawi	1970-2017	1970-2017	1982	1982	1982	1987-2017	1970-2017	1970-1986	1970-2017	1970-2017
Moldova	1996-2017	1970-2017	2002	2002	2002	1991-2017	1997-2017	N/A	1991-2017	1970-2017
Morocco	1970-2017	1970-2017	1986-1990	1986-1990	1986-1990	1987-2017	1970-2017	1970-1986	1970-2017	1970-2017
Mozambique	1981-2017	1980-2017	1984	1984	1984	1989-2017	1993-2017	N/A	1987-2017	1970-2017

Table A2.1 (cont.) Time Availability of Data for the Dependent and Dependent Related Variables

Country	Y_g	$Y_{constantUSD}$	$g_{post\_2} - g_{pre\_3}$	$HP_{post,1-pre,1}$	$BK_{post,1-pre,1}$	IncLevel1	GNIpc	IncLevel2	IncLevel	d_crisis
Myanmar (Burma)	1970-2017	1970-2017	1984; 2005-2006; 2009-2010	1984; 2005-2006; 2009-2010	1984; 2005-2006; 2009-2010	1987-2017	2002-2017	N/A	1987-2017	1970-2017
Nicaragua	1970-2017	1970-2017	1981-1984; 1998-1999; 2004-2010	1981-1984; 1998-1999; 2004-2010	1981-1984; 1998-1999; 2004-2010	1987-2017	1970-2017	1970-1986	1970-1986	1970-2017
Nigeria	1970-2017	1970-2017	2001; 2004-2010	2001; 2004-2010	2001; 2004-2010	1987-2017	1970-2017	1970-1986	1970-1986	1970-2017
Panama	1970-2017	1970-2017	1983-1987; 1991-1996	1983-1987; 1991-1996	1983-1987; 1991-1996	1987-2017	1970-2017	1970-1986	1970-1986	1970-2017
Paraguay	1970-2017	1970-2017	1982; 1998; 1991; 2004	1982; 1998; 1991; 2004	1982; 1986-1992; 2003-2004	1987-2017	1995-2017	N/A	1987-2017	1970-2017
Peru	1970-2017	1970-2017	1995-1997	1995-1997	1995-1997	1987-2017	1970-2017	1970-1986	1970-2017	1970-2017
Philippines	1970-2017	1970-2017	1989; 1992	1989; 1992	1989; 1992	1987-2017	1970-2017	1970-1986	1970-2017	1970-2017
Romania	1991-2017	1991-2017	N/A	N/A	N/A	1987-2017	1992-2017	N/A	1987-2017	1970-2017
Russia	1990-2017	1990-2017	N/A	N/A	N/A	1991-2017	1991-2017	\N/A	1991-2017	1970-2017
Senegal	1970-2017	1970-2017	1981	1981	1981	1987-2017	1970-2017	1970-1986	1970-2017	1970-2017
Sierra Leone	1970-2017	1970-2017	1977	1977	1977	1987-2017	1970-2017	1970-1986	1970-2017	1970-2017
South Africa	1970-2017	1970-2017	1987; 1993	1987; 1993	1987; 1993	1987-2017	1970-2017	1970-1986	1970-2017	1970-2017
Sri Lanka	1970-2017	1970-2017	1982; 1996	1982; 1996	1982; 1996	1987-2017	1970-2017	1970-1986	1970-2017	1970-2017
Sudan	1970-2017	1970-2017	1979	1979	1979	1987-2017	1970-2017	1970-1986	1970-2017	1970-2017
Tanzania	1989-2017	1988-2017	N/A	N/A	N/A	1987-2017	1990-2017	N/A	1987-2017	1970-2017

Table A2.1 (cont.) Time Availability of Data for the Dependent and Dependent Related Variables

Country	Y_g	$Y_{constantUSD}$	$g_{post\_2} - g_{pre\_3}$	$HP_{post,1-pre,1}$	$BK_{post,1-pre,1}$	IncLevel1	GNIpc	IncLevel2	IncLevel	d_crisis
Togo	1970-2017	1970-2017	1979	1979	1979	1987-2017	1970-2017	1970-1986	1970-2017	1970-2017
Trinidad and Tobago	1970-2017	1970-2017	1989	1989	1989	1987-2017	1970-2017	1970-1986	1970-2017	1970-2017
Tunisia	1970-2017	1970-2017	1980-1982	1980-1982	1980-1982	1987-2017	1970-2017	1970-1986	1970-2017	1970-2017
Venezuela	1985-2017	1984-2017	1988; 1998	1988; 1998	1988; 1998	1987-2017	1970-2017	1970-1986	1970-2017	1970-2017
Vietnam	1970-2017	1970-2017	N/A	1985	N/A	1987-2017	1989-2017	N/A	1987-2017	1970-2017
Zimbabwe	1970-2017	1970-2017	N/A	1971-1974	1974	1987-2017	1970-2017	1970-1986	1970-2017	1970-2017

Table A2.2. Time Availability of Data for the Independent and Independent Related Variables

Country	ExtDebt	$Y_{currentUSD}$	ExtDebt_Y	ExtDebt_st	StDebt_Res	Infl	IntRate	cab	Req
Albania	1991-2017	1984-2017	1991-2017	1977-2017	1993-2017	1990-2017	1986-1997; 1999-2017	1980-2017	1993-2017
Angola	1989-2017	1980-1990; 1994-2017	1989-1990; 1994-2017	1989-2017	1977-2017	1980-2017	1995-2017	1980-2017	1995-2017
Argentina	1970-2017	1970-2017	1970-2017	1970-2017	1970-2017	1998-2013; 2017	2010-2017	1980-2017	1980-2017
Belize	1970-2017	1970-2017	1970-2017	1977-2017	1977-2017	1980-2017	1982-2017	1980-2017	1980-2017
Bolivia	1970-2017	1970-2017	1970-2017	1970-2017	1970-2017	1980-2017	1987-2017	1980-2017	1980-2017
Bulgaria	1981-2017	1980-2017	1981-2017	1985-2017	1991-2017	1980-2017	1992-2017	1980-2017	1991-2017
Cameroon	1970-2017	1970-2017	1970-2017	1970-2017	1970-2017	1980-2017	N/A	1980-2017	1980-2017
Central African Rep.	1970-2017	1970-2017	1970-2017	1970-2017	1970-2017	1980-2017	N/A	1980-2017	1980-2017
Congo, Republic	1970-2017	1970-2017	1970-2017	1970-2017	1970-2017	1980-2017	1982-2017	1980-2017	1980-2017
Costa Rica	1970-2017	1970-2017	1970-2017	1970-2017	1970-2017	1980-2017	2005-2017	1980-2017	1980-2017
Côte d'Ivoire	1970-2017	1970-2017	1970-2017	1970-2017	N/A	1980-2017	1979-2017	1980-2017	N/A
Cyprus	N/A	1975-2017	N/A	N/A	1981-2017	1980-2017	1979-2017	1980-2017	N/A
Dominica	1981-2017	1977-2017	1981-2017	1981-2017	1970-2017	1980-2017	1991-2017	1980-2017	N/A
Dominican Rep.	1970-2017	1970-2017	1970-2017	1970-2017	1970-2017	1980-2017	N/A	1980-2017	1980-2017
Ecuador	1970-2017	1970-2017	1970-2017	1970-2017	1970-2017	1980-2017	N/A	1980-2017	1980-2017

76

Table A2.2 (cont.) Time Availability of Data for the Independent and Independent Related Variables

Country	ExtDebt	$Y_{currentUSD}$	ExtDebt_Y	ExtDebt_st	StDebt_Res	Infl	IntRate	cab	Req
El Salvador	1970-2017	1970-2017	1970-2017	1977-2017	1977-2017	1980-2017	N/A	1980-2017	1980-2017
Gabon	1970-2017	1970-2017	1970-2017	1970-2017	1970-2017	1980-2017	N/A	1980-2017	1980-2017
Ghana	1970-2017	1970-2017	1970-2017	1970-2017	1970-2017	1980-2017	N/A	1980-2017	1980-2017
Greece	N/A	1970-2017	N/A	N/A	N/A	1980-2017	N/A	1980-2017	N/A
Grenada	1970-2017	1977-2017	1977-2017	1977-2017	1977-2017	1980-2017	1978-2017	N/A	N/A
Guyana	1970-2017	1970-2017	1970-2017	1972-2017	1972-2017	1980-2017	1981-2017	1980-2017	1980-2017
Honduras	1970-2017	1970-2017	1970-2017	1977-2017	1977-2017	1980-2017	1982-2017	1980-2017	1980-2017
India	1970-2017	1970-2017	1970-2017	1970-2017	1970-2017	1980-2017	1978-2017	1980-2017	1980-2017
Indonesia	1970-2017	1970-2017	1970-2017	1970-2017	1970-2017	1980-2017	1986-2017	1980-2017	1980-2017
Iran	1980-2017	1970-1990; 1993-2017	1980-1990; 1993-2017	1980-2017	1980-1982	1980-2017	2004-2016	1980-2017	1980-1982
Jamaica	1970-2017	1970-2017	1970-2017	1970-2017	1970-2017	1980-2017	1976-2017	1980-2017	1980-2017
Kenya	1970-2017	1970-2017	1970-2017	1970-2017	1970-2017	1980-2017	1971-2017	1980-2017	1980-2017
Liberia	1970-2017	2000-2017	2000-2017	1971-2017	1974-1989; 1991-2017	2000-2017	1970-2017	N/A	N/A
Madagascar	1970-2017	1970-2017	1970-2017	1974-2017	1974-2017	1980-2017	1989-2017	1980-2017	1980-2017
Malawi	1970-2017	1970-2017	1970-2017	1977-2017	1977-2017	1980-2017	1979-2017	1980-2017	1980-2017
Moldova	1992-2017	1992-2017	1995-2017	1993-2017	1993-2017	1993-2017	1996-2017	N/A	N/A
Morocco	1970-2017	1970-2017	1970-2017	1970-2017	1970-2017	1980-2017	N/A	1980-2017	1980-2017

Table A2.2 (cont.) Time Availability of Data for the Independent and Independent Related Variables

Country	ExtDebt	$Y_{currentUSD}$	ExtDebt_Y	ExtDebt_st	StDebt_Res	Infl	IntRate	cab	Req
Mozambique	1984-2017	1991-2017	1991-2017	1984-2017	1984-2017	1980-2017	1997-2017	1980-2017	1984-2017
Myanamar (Burma)	1970-2017	1999-2017	1999-2017	1976-2017	1976-2017	1998-2017	1994-2017	N/A	N/A
Nicaragua	1970-2017	1970-2017	1970-2017	1970-2017	1970-1982;1987-2017	1980-2017	1988-2017	1980-2017	1980-1982; 1987-2017
Nigeria	1970-2017	1970-2017	1970-2017	1970-2017	1970-2017	1996-2017	1970-2017	1980-2017	1980-2017
Panama	N/A	1970-2017	N/A	N/A	N/A	1980-2017	1996-2017	1980-2017	N/A
Paraguay	1970-2017	1970-2017	1970-2017	1972-2017	1970-2017	1980-2017	1994-2017	1980-2017	1980-2017
Peru	1970-2017	1970-2017	1970-2017	1970-2017	1970-2017	1980-2017	1985-2017	1980-2017	1980-2017
Philippines	1970-2017	1970-2017	1970-2017	1970-2017	1970-2017	1980-2017	1976-2017	1980-2017	1980-2017
Romania	N/A	1987-2017	N/A	N/A	N/A	1980-2017	1993-2017	1980-2017	N/A
Russia	1992-2017	1988-2017	1992-2017	1992-2017	1993-2017	1991-2017	1997-2017	N/A	N/A
Senegal	1970-2017	1970-2017	1970-2017	1971-2017	N/A	1980-2017	2005-2017	1980-2017	N/A
Sierra Leone	1970-2017	1970-2017	1970-2017	1970-2017	1974-2017	1980-2017	1970-2017	1980-2017	1980-2017
South Africa	1994-2017	1970-2017	1994-2017	1994-2017	1994-2017	1980-2017	1970-2017	1980-2017	1994-3017
Sri Lanka	1970-2017	1970-2017	1970-2017	1970-2017	1970-2017	1980-2017	2001-2017	1980-2017	1980-2017
Sudan	1970-2017	1970-2017	1970-2017	1970-2017	1970-2017	1980-2017	N/A	1980-2017	1980-2017
Tanzania	1970-2017	1988-2017	1988-2017	1970-2017	1970-2017	1980-2017	1992-2017	1980-2017	1980-2017
Togo	1970-2017	1970-2017	1970-2017	1970-2017	N/A	1980-2017	2005-2017	1980-2017	N/A
Trinidad and Tobago	N/A	1970-2017	N/A	N/A	N/A	1980-2017	1979-2017	1980-2017	N/A

78

Table A2.2 (cont.) Time Availability of Data for the Independent and Independent Related Variables

Country	ExtDebt	$Y_{currentUSD}$	ExtDebt_Y	ExtDebt_st	StDebt_Res	Infl	IntRate	cab	Req
Tunisia	1970-2017	1970-2017	1970-2017	1970-2017	1970-2017	1980-2017	N/A	1980-2017	1980-2017
Venezuela	1970-2017	1970-2017	1970-2014	1970-2017	1970-2017	1980-2017	1984-2014	1980-2017	1995-2017
Vietnam	1981-2017	1985-2017	1985-2017	1987-2017	1995-2017	1980-2017	1993; 1996-2017	1980-2017	1987-2017
Zimbabwe	1970-2017	1970-2017	1970-2017	1970-2017	1970-2017	1981-2017	2012-2017	1980-2017	1980-2017

Table A2.2 (cont.) Time Availability of Data for the Independent and Independent Related Variables

Country	d_cadeficit	REER	REER_ov	REER_vol	DebtServ	DebtServ_Exp	Imp_g	ToT	ToT_vol
Albania	1980-2017	1980-2017	1980-2017	1981-2017	1980-2017	1991-2017	1977-2017	2000-2017	2001-2017
Angola	1980-2017	N/A	N/A	N/A	N/A	1989-2017	2001-2017	1985-2017	1986-2017
Argentina	1980-2017	N/A	N/A	N/A	N/A	1976-2017	1970-2017	1980-2017	1981-2017
Belize	1980-2017	1983-2017	1983-2017	1984-2017	1983-2017	1984-2017	1981-2017	2000-2017	2001-2017
Bolivia	1980-2017	1980-2017	1980-2017	1981-2017	1980-2017	1976-2017	1970-2017	1980-2017	1981-2017
Bulgaria	1980-2017	1993-2017	1993-2017	1994-2017	1993-2017	1981-2017	1981-2017	2000-2017	2001-2017
Cameroon	1980-2017	1980-2017	1980-2017	1981-2017	1980-2017	1977-2017	1970-2017	1980-2017	1981-2017
Central African Rep.	1980-2017	1980-2017	1980-2017	1981-2017	1980-2017	1977-2017	2010-2017	1980-2017	1981-2017
Congo, Republic	1980-2017	N/A	N/A	N/A	N/A	1978-2017	1970-2017	1980-2017	1981-2017
Costa Rica	1980-2017	1980-2017	1980-2017	1981-2017	1980-2017	1977-2017	1970-2017	1980-2017	1981-2017
Côte d'Ivoire	1980-2017	1980-2017	1980-2017	1981-2017	1980-2017	1975-2017	2009-2017	1980-2017	1981-2017
Cyprus	1980-2017	1980-2017	1980-2017	1981-2017	1980-2017	N/A	1976-2017	1980-2017	1981-2017
Dominica	1980-2017	1979-2017	1979-2017	1980-2017	1979-2017	1981-2017	N/A	2000-2017	2001-2017
Dominican Rep.	1980-2017	1980-2017	1980-2017	1981-2017	1980-2017	1970-2017	1970-2017	1980-2017	1981-2017
Ecuador	1980-2017	N/A	N/A	N/A	N/A	1976-2017	1970-2017	1980-2017	1981-2017
El Salvador	1980-2017	1985-2017	1985-2017	1986-2017	1985-2017	1976-2017	1970-2017	1980-2017	1981-2017
Gabon	1980-2017	1980-2017	1980-2017	1981-2017	1980-2017	1978-2017	1970-2017	1980-2017	1981-2017
Ghana	1980-2017	1980-2017	1980-2017	1981-2017	1980-2017	1975-2017	2007-2017	1980-2017	1981-2017
Greece	1980-2017	N/A	N/A	N/A	N/A	N/A	1970-2017	2000-2017	2001-2017
Grenada	N/A	1979-2017	1979-2017	1980-2017	1979-2017	1977-2017	N/A	2000-2017	2001-2017

Table A2.2 (cont.) Time Availability of Data for the Independent and Independent Related Variables

Country	d_cadeficit	REER	REER_ov	REER_vol	DebtServ	DebtServ_Exp	Imp_g	ToT	ToT_vol
Guyana	1980-2017	1980-2017	1980-2017	1981-2017	1980-2017	1977-2017	N/A	2000-2017	2001-2017
Honduras	1980-2017	N/A	N/A	N/A	N/A	1974-2017	1970-2017	1980-2017	1981-2017
India	1980-2017	N/A	N/A	N/A	N/A	1975-2017	1970-2017	1980-2017	1981-2017
Indonesia	1980-2017	N/A	N/A	N/A	N/A	1981-2017	1970-2017	1981-2017	1982-2017
Iran	1980-2017	1979-2017	1979-2017	1980-2017	1979-2017	1980-2017	1970-2017	2000-2017	2001-2017
Jamaica	1980-2017	N/A	N/A	N/A	N/A	1976-2017	2008-2017	2000-2017	2001-2017
Kenya	1980-2017	N/A	N/A	N/A	N/A	1975-2017	1970-2017	1980-2017	1981-2017
Liberia	N/A	N/A	N/A	N/A	N/A	1979-1987; 2004-2017	2001-2017	1980-1987; 2000-2017	1981-1987; 2001-2017
Madagascar	1980-2017	1970-2017	1970-2017	1971-2017	1970-2017	1974-2017	1970-2017	1980-2017	1981-2017
Malawi	1980-2017	1980-2017	1980-2017	1981-2017	1970-2017	1977-2017	2003-2017	1980-2017	1981-2017
Moldova	N/A	1994-2017	1994-2017	1995-2017	1993-2017	1994-2017	1996-2017	1980-1999	1981-2017
Morocco	1980-2017	1988-2017	1988-2017	1989-2017	1970-2017	1975-2017	1970-2017	1980-2017	1981-2017
Mozambique	1980-2017	N/A	N/A	N/A	1984-2017	1984-2017	1981-2017	1970-2009	1971-2009
Myanamar (Burma)	N/A	N/A	N/A	N/A	1970-2017	1976-2017	2011-2017	1981-2017	1982-2017
Nicaragua	1986-2017	1986-2017	1986-2017	1987-2017	1970-2017	1977-2017	1970-2017	1980-2017	1981-2017
Nigeria	1980-2017	1980-2017	1980-2017	1981-2017	1970-2017	1977-2017	1982-2017	1980-2017	1981-2017
Panama	1980-2017	N/A	N/A	N/A	N/A	N/A	1970-2017	1980-2017	1981-2017
Paraguay	1980-2017	1980-2017	1980-2017	1981-2017	1970-2017	1975-2017	1970-2017	1980-2017	1981-2017

Table A2.2 (cont.) Time Availability of Data for the Independent and Independent Related Variables

Country	d_cadeficit	REER	REER_ov	REER_vol	DebtServ	DebtServ_Exp	Imp_g	ToT	ToT_vol
Peru	1980-2017	N/A	N/A	N/A	1970-2017	1977-2017	1970-2017	1980-2017	1981-2017
Philippines	1980-2017	1979-2017	1979-2017	1980-2017	1970-2017	1977-2017	1970-2017	1980-2017	1981-2017
Romania	1980-2017	1991-2017	1991-2017	1992-2017	N/A	N/A	1991-2017	2000-2017	2001-2017
Russia	N/A	1994-2017	1994-2017	1995-2017	1992-2017	1994-2017	1991-2017	2000-2017	2001-2017
Senegal	1980-2017	N/A	N/A	N/A	1970-2017	1974-2017	1970-2017	1980-2017	1981-2017
Sierra Leone	1980-2017	1980-2017	1980-2017	1981-2017	1970-2017	1977-2017	1970-2017	2000-2017	2001-2017
South Africa	1980-2017	1979-2017	1979-2017	1980-2017	1999-2017	1994-2017	1970-2017	1980-2017	1981-2017
Sri Lanka	1980-2017	N/A	N/A	N/A	1970-2017	1975-2017	1970-2017	1980-1997; 2000-2017	1981-1997; 2001-2017
Sudan	1980-2017	N/A	N/A	N/A	1970-2017	1977-2017	1970-2017	1980-2017	1981-2017
Tanzania	1980-2017	N/A	N/A	N/A	1970-2017	1976-2017	1991-2017	1987-2017	1988-2017
Togo	1980-2017	1980-2017	1980-2017	1981-2017	1971-2017	1974-2017	1970-2017	1980-2017	1981-2017
Trinidad and Tobago	N/A	1979-2017	1979-2017	1980-2017	N/A	N/A	N/A	1980-1990; 2000-2017	1981-1990; 2001-2017
Tunisia	1980-2017	1979-2017	1979-2017	1980-2017	1970-2017	1976-2017	1970-2017	1980-2017	1981-2017
Venezuela	1980-2017	1980-2017	1980-2017	1981-2017	1970-2017	1970-2017	1974-2014	1980-2017	1981-2017
Vietnam	1980-2017	N/A	N/A	N/A	1981-2017	1996-2017	1990-2017	2000-2017	2001-2017
Zimbabwe	1980-2017	N/A	N/A	N/A	1970-2017	1977-2017	1977-2017	1980-2017	1981-2017

Table A2.2 (cont.) Time Availability of Data for the Independent and Independent Related Variables

Country	GovBal	Res	PubDebt_Y
Albania	1995-1998; 2002-2004; 2011-2017	1993-2017	1994-2017
Angola	1999-2017	1995-2017	1995-2017
Argentina	1990-2004; 2014-2017	1970-2017	1970-2017
Belize	1990-2017	1970-2017	1970-2017
Bolivia	N/A	1970-2017	1970-2017
Bulgaria	1990-1994; 2005-2017	1991-1970	1981-1970
Cameroon	1990-1995; 1998-1999; 2012-2017	1970-2017	1970-1996; 1998-2017
Central African Rep.	2004; 2008-2012; 2014-2017	1970-2017	1970-2017
Congo, Republic	2001-2017	1970-2017	1970-2017
Costa Rica	1973-2014	1970-2017	1970-2017
Côte d'Ivoire	2003-2017	N/A	1970-1983; 1985-1997; 1999-2017
Cyprus	1975-2017	1970-2017	2000-2017
Dominica	N/A	1975-2017	1975-2017
Dominican Rep.	1972-1976; 1978-2017	1970-2017	2000-2017
Ecuador	N/A	1970-2017	1990-2017
El Salvador	1998-2017	1970-2017	1970-2017
Gabon	2012-2017	1970-2017	1970-2017
Ghana	2001-2017	1970-2017	1970-2017
Greece	1972-1990; 1995-2017	1970-2017	1970-2017

Table A2.2 (cont.) Time Availability of Data for the Independent and Independent Related Variables

Country	GovBal	Res	PubDebt_Y
Grenada	2000-2017	1970-2017	1970-2017
Guyana	2000-2017	1970-2017	1970-2017
Honduras	1980-2017	1970-2017	1970-2017
India	1980-2017	1970-2017	1970-1997; 1999-2017
Indonesia	1981-2017	1970-2017	1972-2017
Iran	2000-2017	1970-1982	1970-1977; 1980-2017
Jamaica	2000-2017	1970-2017	1970-2017
Kenya	1980-2017	1970-2017	1970-2017
Liberia	1980-987; 2000-2017	1974-1989; 1991-2017	1973-1983; 2000-2017
Madagascar	1980-2017	1970-2017	1970-2017
Malawi	1980-2017	1970-2017	1970-2017
Moldova	1980-1999	1991-2017	1995-2017
Morocco	1980-2017	1970-2017	1970-2017
Mozambique	1970-2009	1984-2017	1999-2017
Myanamar (Burma)	1981-2017	1970-2017	1970-1980; 1989-1994; 1998-2017
Nicaragua	1980-2017	1970-1982; 1987-2017	1997-2017
Nigeria	1980-2017	1970-2017	1970-2017
Panama	N/A	1970-2017	N/A
Paraguay	1005-2017	1970-2017	1970-2017
Peru	1972-2017	1970-2017	2002-2017

Table A2.2 (cont.) Time Availability of Data for the Independent and Independent Related Variables

Country	GovBal	Res	PubDebt_Y
Philippines	1991-1993; 2000-2017	1970-2017	N/A
Romania	1981-2017	1973-2017	1995-2017
Russia	1994-1995; 1998-2017	1993-2017	1992-2017
Senegal	2015-2017	N/A	1970-2017
Sierra Leone	N/A	1970-2017	1970-2017
South Africa	1972-2017	1970-2017	1970-2017
Sri Lanka	1990-2017	1970-2017	1970-2017
Sudan	1998-1999; 2009-2010; 2012-2016	1970-2017	1992-2017
Tanzania	2009-2017	1970-2017	N/A
Togo	2004-2017	N/A	1970-2017
Trinidad and Tobago	2001-2017	1970-2017	1970-1976; 1978-2017
Tunisia	1972-2017	1970-2017	1970-2017
Venezuela	N/A	1970-2017	1970-2015
Vietnam	N/A	1995-2017	1991-2008; 2010-2017
Zimbabwe	2009-2012; 2015-2017	1970-2017	1970-2004; 2006-2017

IntRate_US	TBill
1970-2017	1970-2017

Table A3. Alternative Measures of Output Change

Measure	Definition	Acronym	
Difference of average growth rate in the crisis period from the average growth rate in the pre-crisis period	Growth in crisis period (T and T+1) – Growth in pre-crisis period (T-1 and T-2)	$g_{post\_2} - g_{pre\_2}$	(I)
	Growth in crisis period (T and T+1) – Growth in pre-crisis period (T-1, T-2 and T-3)	$g_{post\_2} - g_{pre\_3}$	(II)
	Growth in crisis period (T, T+1 and T+2) – Growth in pre-crisis period (T-1, T-2, T-3)	$g_{post\_3} - g_{pre\_3}$	(III)
Difference of the average growth rate in the crisis period from the average growth rate in the tranquil pre-crisis years	Growth in crisis period (T and T+1) – Growth in 2 nearest tranquil years	$g_{post\_2} - g_{tranq,2}$	(IV)
	Growth in crisis period (T and T+1) – Growth in 3 nearest tranquil years	$g_{post\_2} - g_{tranq,3}$	(V)
Difference of output from its trend level in the crisis years from the pre-crisis year, using the HP filter	Difference of the HP detrended log output in T and T-1	$HP_{post,1-pre,1}$	(VI)
	Difference of the HP detrended log output in (T and T+1) – (T-1)	$HP_{post_2-pre,1}$	(VII)
Difference of output from its trend level in the crisis years from the pre-crisis year, using the BK filter	Difference of the BK detrended log output in T and T-1	$BK_{post,1-pre,1}$	(VIII)
	Difference of the BK detrended log output in (T and T+1) – (T-1)	$BK_{post_2-pre,1}$	(IX)

Table A4. Correlations across Measures of Output Change

	$g_{post\_2} - g_{pre\_2}$	$g_{post\_2} - g_{pre\_3}$	$g_{post\_3} - g_{pre\_3}$	$g_{post\_2} - g_{tranq\_2}$	$g_{post\_2} - g_{tranq,3}$	$HP_{post,1-pre,1}$	$HP_{post_2-pre,1}$	$BK_{post,1-pre,1}$	$BK_{post_2-pre,1}$
$g_{post\_2} - g_{pre\_2}$	1								
$g_{post\_2} - g_{pre\_3}$	0.9139***	1							
$g_{post\_3} - g_{pre\_3}$	0.8616***	0.9383***	1						
$g_{post\_2} - g_{tranq\_2}$	0.7583***	0.7967***	0.7567***	1					
$g_{post\_2} - g_{tranq,3}$	0.6681***	0.7618***	0.6897***	0.8340***	1				
$HP_{post,1-pre,1}$	0.4104***	0.4941***	0.3705***	0.4452***	0.5416***	1			
$HP_{post_2-pre,1}$	0.5813***	0.6790***	0.5138***	0.6115***	0.7119***	0.8948***	1		
$BK_{post,1-pre,1}$	0.3276***	0.5826***	0.4544***	0.4378***	0.5394***	0.5632***	0.6912***	1	
$BK_{post_2-pre,1}$	0.5165***	0.7081***	0.6095***	0.5609***	0.6303***	0.5985***	0.7614***	0.9490***	1

*, ** and *** represent the statistical significance at 10%, 5% and 1%, respectively. Coefficients of the explanatory variables that proved to be significant are shown in bold.

Table A5. Episodes of Pure Sovereign Debt Crises

Country	Nº of episodes	Average length	Crisis-years	Crisis periods
Albania	1	1.0	1	1990
Angola	2	3.5	7	1976; 1985-1990
Argentina	2	2.5	5	2005; 2007 - 2010
Belize	3	1.0	3	2007; 2012; 2017
Bolivia	1	3.0	3	1991 – 1993
Bulgaria	1	1.0	1	1990
Cameroon	1	1.0	1	1989
Central African Rep.	2	7.0	14	1984 – 1987; 2001 - 2010
Congo, Republic	1	1.0	1	1986
Costa Rica	2	3.0	6	1983 – 1986; 1989 – 1990
Côte d'Ivoire	4	5.0	20	1983 – 1987; 1993; 1996 – 1998; 2000 - 2010
Cyprus	1	1.0	1	2013
Dominica	1	1.0	1	2002
Dominican Republic	3	6	18	1975 – 1984; 1992 – 1995; 1998 - 2001
Ecuador	2	1.0	2	1994; 2008
El Salvador	2	3.0	6	1981 – 1985; 1991 – 1996
Gabon	2	3.5	7	1986; 2002
Ghana	2	1.0	2	1970; 1974
Greece	1	1.0	1	2012
Grenada	1	1.0	1	2004
Guyana	1	1.0	1	1982
Honduras	4	4.5	18	1981 – 1989; 1992; 1998; 2004 - 2010
India	1	5.0	5	1972 - 1976
Indonesia	1	1.0	1	1970
Iran	1	1.0	1	1992
Jamaica	1	1.0	1	2010
Kenya	2	2.5	5	1997 – 1998; 2001 – 2003
Liberia	1	1.0	1	1980
Madagascar	1	1.0	1	1981
Malawi	1	1.0	1	1982
Moldova	1	1.0	1	2002
Morocco	1	5.0	5	1986 – 1990
Mozambique	1	1.0	1	1984
Myanmar (Burma)	3	1.67	5	1984; 2005 – 2006; 2009 – 2010
Nicaragua	3	4.33	13	1981 – 1984; 1998 – 1999; 2004 – 2010
Nigeria	2	1.5	3	2001; 2004 – 2005

Table A5 (cont.). Episodes of Pure Sovereign Debt Crises

Country	Nº of episodes	Average length	Crisis-years	Crisis period
Panama	2	5.5	11	1983 – 1987; 1991 – 1996
Paraguay	4	1.0	4	1982; 1988; 1991; 2004
Peru	1	3.0	3	1995 - 1997
Philippines	2	1.0	2	1989; 1992
Romania	2	1.5	3	1981 – 1982; 1986
Russia	3	3,67	11	1970 – 1974; 1977 – 1980; 1985 – 1986
Senegal	1	1.0	1	1981
Sierra Leone	1	1.0	1	1977
South Africa	2	1.0	2	1987; 1993
Sri Lanka	2	1.0	2	1982; 1996
Sudan	1	1.0	1	1979
Tanzania	1	1.0	1	1984
Togo	1	1.0	1	1979
Trinidad and Tobago	1	1.0	1	1989
Tunisia	1	3.0	3	1980-1982
Venezuela	3	1.0	3	1988; 1998; 2017
Vietnam	1	1.0	1	1985
Zimbabwe	1	5.0	5	1970 - 1974
	Total: 90	Average: 2.12	Total: 220	

Based on Manasse and Roubini (2009).

Table A6.1.World Bank Income Level Criteria before 1987 (in USD)

Year	Civil Works Preference
1970	N/A
1971	<=200
1972	N/A
1973	N/A
1974	<=250
1975	<=265
1976	N/A
1977	N/A
1978	<=320
1979	<=345
1980	<=370
1981	<=405
1982	<=410
1983	<=400
1984	<=400
1985	<=400
1986	<=425

Table A6.2. World Bank Income Level Criteria since 1987 (in USD)

Year	Low income	Low-middle income	Upper-middle income	High income
1987	<=480	481-1940	1941-6000	>6000
1988	<=545	546-2200	2201-6000	>6000
1989	<= 580	581-2,335	2,336-6,000	> 6,000
1990	<= 610	611-2,465	2,466-7,620	> 7,620
1991	<= 635	636-2,555	2,556-7,910	> 7,910
1992	<= 675	676-2,695	2,696-8,355	> 8,355
1993	<= 695	696-2,785	2,786-8,625	> 8,625
1994	<= 725	726-2,895	2,896-8,955	> 8,955
1995	<= 765	766-3,035	3,036-9,385	> 9,385
1996	<= 785	786-3,115	3,116-9,645	> 9,645
1997	<= 785	786-3,125	3,126- 9,655	> 9,65
1998	<= 760	761-3,030	3,031-9,360	> 9,360
1999	<= 755	756-2,995	2,996-9,265	> 9,265
2000	<= 755	756-2,995	2,996-9,265	> 9,265
2001	<= 745	746-2,975	2,976-9,205	> 9,205

Table A6.2 (cont.). World Bank Income Level Criteria since 1987 (in USD)

Year	Low-income	Low-middle-income	Upper-middle-income	High-income
2002	<= 735	736-2,935	2,936-9,075	> 9,075
2003	<= 765	766-3,035	3,036-9,385	> 9,385
2004	<= 825	826-3,255	3,256-10,065	> 10,065
2005	<= 875	876-3,465	3,466-10,725	> 10,725
2006	<= 905	906-3,595	3,596-11,115	> 11,115
2007	<= 935	936-3,705	3,706-11,455	> 11,455
2008	<= 975	976-3,855	3,856-11,905	> 11,905
2009	<= 995	996-3,945	3,946-12,195	> 12,195
2010	<= 1,005	1,006-3,975	3,976-12,275	> 12,275
2011	<= 1,025	1,026-4,035	4,036-12,475	> 12,475
2012	<= 1,035	1,036-4,085	4,086-12,615	> 12,615
2013	<= 1,045	1,046-4,125	4,126-12,745	> 12,745
2014	<= 1,045	1,046-4,125	4,126-12,735	> 12,735
2015	<= 1,025	1,026-4,035	4,036-12,475	> 12,475
2016	<= 1,005	1,006-3,955	3,956-12,235	> 12,235
2017	<= 995	996-3,895	3,896-12,055	> 12,055

Table A7. Descriptive Statistics of All Measures of Output Change

	$g_{post2} - g_{pre3tranq}$	$HP_{post1-pre1}$	$BK_{post1-pre1}$
Number of crisis-years	189	199	192
Number of countries	46	49	48
Mean	0.31	-0.002	-0.0006
Median	0.71	0.002	-0.0009
Minimum	-21.33	-0.13	-0.06
Maximum	12.18	0.08	0.09
Standard deviation	5.03	0.04	0.02
Skewness test	-0.82		
Kurtosis test	5.006		
Jarque-Bera test	52.71		

Table A8. Results of the Regressions of the Measures on Alternative Dummies

	$g_{post2} - g_{pre3tranq}$	$HP_{post1-pre1}$	$BK_{post1-pre1}$
Comparison of Economic Growth Across Countries			
Low-income countries	1.166905***	.0047642	.0023986
	(.4042934)	(.0044851)	(.0021059)
Middle-high-income countries	.0881061	-.0035857	-.0012008
	(.4719589)	(.0034323)	(.0015366)
Comparison of Economic Growth Across Decades			
1970s	-4.097443***	-.0019691	-.0027372
	(.778213)	(.0096886)	(.0050827)
1980s	-.3189175	-.0084708	-.0014
	(.7319567)	(.0053604)	(.0024136)
1990s	.8657051	.0056809	.0004824
	(.8355833)	(.0050581)	(.0024966)
2000s	1.352148***	.0009718	.0002806
	(.3548391)	(.0046269)	(.0014549)
2010s	.4897386	-.0095031	-.0014247
	(.9122772)	(.0124407)	(.0097266)
Expansionary crises			
1970s		.0299003***	-.0004048
		(.0063658)	(.0124254)
1980s	4.5413***	.0264051***	.0121729***
	(.5738165)	(.003228)	(.0046623)
1990s	4.046453***	.0286525***	.0221128***
	(.5130387)	(.0038195)	(.0060941)
2000s	2.790653***	.0233115***	.0141675***
	(.2760035)	(.0034867)	(.004404)
2010s	1.939768***	.036272***	.0057495
	(.6320863)	(.0110259)	(.0137241)
Contractionary crises			
1970s	-4.097443***	-.0338385***	-.0140927**
	(.7920785)	(.0093103)	(.0061174)
1980s	-4.909123***	-.0423779***	-.0175119***
	(.7179887)	(.0060357)	(.0025539)
1990s	-4.082124***	-.0216663***	-.0106687***
	(1.301545)	(.0063804)	(.0024775)
2000s	-1.6941***	-.0281671***	-.0078403***
	(.2507575)	(.0054335)	(.0009912)

Table A8. (cont.) Results of the Regressions of the Measures on Alternative Dummies

	$g_{post2} - g_{pre3tranq}$	$HP_{post1-pre1}$	$BK_{post1-pre1}$
Contractionary crises			
2010s	**-3.377007*****	-.0266687	**-.0125773*****
	(1.179018)	(.011173)	(.0031967)

*, ** and *** represent the statistical significance at 10%, 5% and 1%, respectively. Coefficients of the explanatory variables that proved to be significant are shown in bold; The dummy of the 1970s was omitted due to collinearity with $g_{post2} - g_{pre3tranq}$ as dependent variable.

Table A9. The Wald Test for the Regressions of the Measures on Dummies

	$g_{post2} - g_{pre3tranq}$	$HP_{post1-pre1}$	$BK_{post1-pre1}$
Comparison of Economic Growth Across Countries			
Low=Middle-high	**0.0842***	0.1409	0.1690
Comparison of Economic Growth Across Decades			
1970s=1980s	**0.0005*****	0.5578	0.8124
1970s=1990s	**0.0000*****	0.4848	0.5703
1970s=2000s	**0.0000*****	0.7844	0.5688
1970s=2010s	**0.0002*****	0.6333	0.9049
1980s=1990s	0.2876	**0.0563***	0.5884
1980s=2000s	0.0414	0.1839	0.5517
1980s=2010s	0.4902	0.9393	0.9980
1990s=2000s	0.5927	0.4929	0.9444
1990s=2010s	0.7615	0.2596	0.8496
2000s=2010s	0.3794	0.4310	0.8625
Expansionary crises			
1970s=1980s	**0.0000*****	0.6255	0.3456
1970s=1990s	**0.0000*****	0.8669	0.1070
1970s=2000s	**0.0000*****	0.3662	0.2717
1970s=2010s	**0.0028*****	0.6179	0.7403
1980s=1990s	0.5217	0.6541	0.1983
1980s=2000s	**0.0071*****	0.5165	0.7565
1980s=2010s	**0.0029*****	0.3926	0.6586
1990s=2000s	**0.0335***	0.3043	0.2933
1990s=2010s	**0.0111***	0.5153	0.2786
2000s=2010s	0.2202	0.2652	0.5606
Contractionary crises			
1970s=1980s	0.4500	0.4435	0.6072
1970s=1990s	0.9920	0.2837	0.6051
1970s=2000s	0.0049	0.6001	0.3156
1970s=2010s	0.6134	0.6232	0.8267
1980s=1990s	0.5796	**0.0205***	**0.0575***
1980s=2000s	**0.0001*****	**0.0835***	**0.0006*****
1980s=2010s	0.2705	0.2192	0.2309
1990s=2000s	0.0755	0.4399	0.2919
1990s=2010s	0.6891	0.6983	0.6381
2000s=2010s	0.1666	0.9043	0.1603

Values represent the *p*-values of the Wald restriction test; *, ** and *** represent the statistical significance at 10%, 5% and 1%, respectively, and appear in bold.

Table A10. Robustness: Regressions of the Measures on Alternative Dummies

	$g_{post2} - g_{pre3tranq}$	$HP_{post1-pre1}$	$BK_{post1-pre1}$
Comparison of Economic Growth Across Countries			
Low-income countries	**.8957206****	.0056567	.0017737
	(.478527)	(.0043181)	(.0016544)
Middle-high-income countries	.1474169	.0000225	-.0001932
	(.4457878)	(.0031403)	(.0014379)
Comparison of Economic Growth Across Decades			
1970s	**-3.149441*****	-.0018524	.0003835
	(.8200277)	(.0085037)	(.0044934)
1980s	-.0854602	-.0068788	-.0016108
	(.6561404)	(.0048862)	(.0022496)
1990s	.0792446	**.0091539****	.0008283
	(.6602785)	(.0044289)	(.0019924)
2000s	**1.657863*****	.0064686	.0018646
	(.6010211)	(.0045788)	(.0014954)
2010s	.3069916	-.0131913	-.0023805
	(1.07339)	(.0119213)	(.0088664)
Expansionary crises			
1970s	**1.255968*****	**.0272162*****	-.0005651
	(.1243555)	(.0065267)	(.0101337)
1980s	**4.332456*****	**.0271147*****	**.0098358****
	(.4769878)	(.0033011)	(.0046014)
1990s	**4.074036*****	**.0303932*****	**.0279518*****
	(.5193544)	(.0034662)	(.0051598)
2000s	**3.917789*****	**.0287552*****	**.01713*****
	(.7200364)	(.0034226)	(.0047862)
2010s	**2.81438****	**.036272*****	.0057495
	(1.416586)	(.0124976)	(.013645)
Contractionary crises			
1970s	**-4.030523*****	**-.033828*****	**-.0140927****
	(.7098576)	(.0083489)	(.0060897)
1980s	**-5.183056*****	**-.0416817*****	**-.0180764*****
	(.6634638)	(.0055654)	(.002587)
1990s	**-3.445571*****	**-.0239794*****	**-.0100402*****
	(.745465)	(.0056974)	(.0020126)
2000s	**-2.297007*****	**-.0278184*****	**-.0074218*****
	(.3631193)	(.0048729)	(.0008821)

Table A10. (cont.) Robustness: Regressions of the Measures on Alternative Dummies

	$g_{post2} - g_{pre3tranq}$	$HP_{post1-pre1}$	$BK_{post1-pre1}$
Contractionary crises			
2010s	**-2.200397***	**-.029679***	**-.0125063***
	(.7158266)	(.0103129)	(.0028295)

*, ** and *** represent the statistical significance at 10%, 5% and 1%, respectively. Coefficients of the explanatory variables that proved to be significant are shown in bold.

Table A11. Robustness: The Wald Test for the Regressions of the Measures on Dummies

	$g_{post2} - g_{pre3trang}$	$HP_{post1-pre1}$	$BK_{post1-pre1}$
Comparison of Economic Growth Across Countries			
Low=Middle-high	0.2537	0.2924	0.3705
Comparison of Economic Growth Across Decades			
1970s=1980s	**0.0039***	0.6088	0.6918
1970s=1990s	**0.0024***	0.2521	0.9280
1970s=2000s	**0.0000***	0.3898	0.7548
1970s=2010s	**0.0111**	0.4395	0.7812
1980s=1990s	0.8597	**0.0158**	0.4178
1980s=2000s	**0.0513***	**0.0474**	0.1995
1980s=2010s	0.7554	0.6246	0.9330
1990s=2000s	**0.0784***	0.6737	0.6778
1990s=2010s	0.8567	**0.0802***	0.7243
2000s=2010s	0.2733	0.1250	0.6373
Expansionary crises			
1970s=1980s	**0.0000***	0.9889	0.3518
1970s=1990s	**0.0000***	0.6680	**0.0134**
1970s=2000s	**0.0004***	0.8349	0.1169
1970s=2010s	0.2753	0.5218	0.7109
1980s=1990s	0.7147	0.4946	**0.0099***
1980s=2000s	0.6320	0.7307	0.2740
1980s=2010s	0.3119	0.4799	0.7771
1990s=2000s	0.8606	0.7372	0.1267
1990s=2010s	0.4054	0.6511	0.1305
2000s=2010s	0.4888	0.5628	0.4328
Contractionary crises			
1970s=1980s	0.2382	0.4355	0.5483
1970s=1990s	0.5710	0.3321	0.5288
1970s=2000s	**0.0319**	0.5355	0.2806
1970s=2010s	**0.0722***	0.7551	0.8137
1980s=1990s	**0.0845***	**0.0283**	**0.0157**
1980s=2000s	**0.0002***	**0.0636***	**0.0002***
1980s=2010s	**0.0028***	0.3080	0.1490
1990s=2000s	0.1689	0.6096	0.2359
1990s=2010s	0.2309	0.6295	0.4790
2000s=2010s	0.9044	0.8707	**0.0890***

Values represent the *p*-values of the Wald restriction test; *, ** and *** represent the statistical significance at 10%, 5% and 1%, respectively, and appear in bold.

Table A12. Robustness: Cross-section Regressions

	$g_{post2} - g_{pre3tranq}$	$HP_{post1-pre1}$	$BK_{post1-pre1}$
Domestic non-policy variables			
ExtDebt_Y	**1.680525***	.0060667	.0002658
	(1.067124)	(.0068721)	(.0028602)
ExtDebt_st	8.49e-11	6.30e-13	4.58e-13
	(8.27e-11)	(5.26e-13)	(2.84e-13)
StDebt_Res	**.0000697****	**6.38e-07****	**8.92e-07***
	(.0002901)	(2.46e-07)	(5.72e-07)
Req	.0070162	.000092	.0000851
	(.0296916)	(.0000786)	(.0000587)
d_cadeficit	-.2103977	-.0032561	-.0027052
	(.930083)	(.0077445)	(.0035093)
DebtServ	-7.71e-10	-1.76e-12	7.91e-13
	(1.25e-09)	(.49e-12)	(4.11e-12)
DebtServ_Exp	-.0210301	-.000083	-.0000755
	(.0348958)	(.0002621)	(.0001618)
Imp_g	-.023006	-.0001575	-.0001012
	(.0317437)	(.0002325)	(.0001167)
ToT	-.003072	.0000267	**.0000376***
	(.0050429)	(.0000343)	(.0000207)
ToT_vol	**-.0022385*****	-4.00e-06	8.89e-07
	(.0006311)	(1.14e-06)	(2.04e-06)
GovBal	**-.3215752***	**-.0031585***	**-.0015607****
	(.1647348)	(.0017285)	(.0007323)
Res	-3.03e-11	3.87e-14	1.11e-13
	(1.36e-11)	(5.42e-13)	(2.78e-13)
PubDebt_Y	.0075258	.0000653	-6.00e-06
	(.012537)	(.0000857)	(.0000365)
External condition variables			
IntRate_US	-.0359629	-.0012935	-.0003528
	(.1486651)	(.0011416)	(.0005291)
TBill	.1309854	-.0007306	-.0002289
	(.0978924)	(.0008591)	(.0003706)
Domestic policy variables			
Infl	**.0148503*****	**.0000687****	**.0000603*****
	(.0029527)	(.00003)	(.0000173)
IntRate	-.0685548	-.0008278	-.0000314
	(.0715513)	(.0005057)	(.0002484)

Table A12. (cont.) Robustness: Cross-section Regressions

	$g_{post2} - g_{pre3tranq}$	$HP_{post1-pre1}$	$BK_{post1-pre1}$
Domestic policy variables			
REER	**.0068032***	4.60e-06	-2.49e-07
	(.0025086)	(.0000181)	(.72e-06)
REER_ov	**-1.5909***	-4.84e-06	.0008251
	(.9410026)	(1.83e-07)	(.0039349)
REER_vol	**-.0009836***	-.0062348	**-1.68e-06***
	(.0000846)	(.0075983)	(.25e-07)

Robust standard errors are between parentheses; *, ** and *** represent the statistical significance at 10%, 5% and 1%, respectively. Coefficients of the explanatory variables that proved to be significant are shown in bold. Constants not reported.

Table A13. Robustness: Multiple Linear Cross-Section Regression of Domestic Non-Policy Variables

	$g_{post2} - g_{pre3tranq}$	$HP_{post1-pre1}$	$BK_{post1-pre1}$
Domestic non-policy variables			
ExtDebt_Y	**5.95583***	.2124091	**.1637323***
	(11.79537)	(.1726315)	(.0390185)
ExtDebt_st	-1.46e-08	1.78e-11	-1.77e-11
	(1.42e-08)	(.20e-11)	(3.94e-11)
StDebt_Res	**-1.015602***	-.0078735	**-.0033592****
	(.5066244)	(.0062181)	(.0012759)
Req	.28625	.5782616	.2363862
	(.00223)	(.544848)	(.1348681)
DebtServ	-9.23e-09	-4.81e-11	4.63e-11
	(1.31e-08)	(2.01e-11)	(2.74e-11)
DebtServ_Exp	**-.2729668****	**-.0022684***	**-.0010571***
	(.0865945)	(.0005882)	(.0001918)
Imp_g	**.0353064***	.0006608	.0000237
	(.1305384)	(.0008992)	(.0003278)
ToT	.1027533	.0001449	.0004895
	(.0680867)	(.0004215)	(.0002812)
ToT_vol	-.0015201	.0000224	-.0000393
	(.0190586)	(.000106)	(.0000474)
GovBal	1.314796	.000323	-.0005872
	(.7828249)	(.0074249)	(.0015635)
Res	6.52e-09	-3.68e-12	1.11e-11
	(4.37e-09)	(3.33e-11)	(.21e-11)
PubDebt_Y	**-.005052****	-.0007683	**-.0005707****
	(.0863451)	(.0009097)	(.000181)
intercept	-8.12732*	-.0247	-.1092249
	(2.1037)	(.1244667)	(.0593839)
R^2	0.7154	0.6072	0.8626
linktest	0.894	0.786	0.261
ovtest	0.9906	0.4197	0.3065
imtest, white	0.3918	0.3946	0.3918

*, ** and *** represent the statistical significance at 10%, 5% and 1%, respectively. Coefficients of the explanatory variables that proved to be significant are shown in bold. ExtDebt_st was omitted due to collinearity.

Table A14. Robustness: Multiple Linear Cross-Section Regressions of Domestic Non-Policy and External Condition Variables

	$g_{post2} - g_{pre3tranq}$	$HP_{post1-pre1}$	$BK_{post1-pre1}$
IntRate_US	-4.770112	**-.0333668***	-.0008081
	(2.757844)	(.0133237)	(.0071935)
TBill	1.777512	**.0134727***	.0020745
	(.9717936)	(.0053528)	(.0026957)
intercept	3.78456	.0432868	**-.1291062***
	(.3225)	(.1118164)	(.0509118)
R^2	0.8532	0.8288	0.8932
linktest	0.835	0.469	0.702
ovtest	0.6975	0.8396	0.7950
imtest, white	0.3918	0.3946	0.3918

*, ** and *** represent the statistical significance at 10%, 5% and 1%, respectively. Coefficients of the explanatory variables that proved to be significant are shown in bold. ExtDebt_st was omitted due to collinearity.

Table A15. Robustness: Multiple Linear Regressions of Domestic (Non-Policy and Policy) and External Condition Variables

	$g_{post2} - g_{pre3tranq}$	$HP_{post1-pre1}$	$BK_{post1-pre1}$
Infl	.4519622	.0017434	-.0053379
	(.3447782)	(.0023104)	(.0037417)
IntRate	**.4278271****	-.0002225	.0005373
	(.1475941)	(.001452)	(.0019114)
REER	-.0011069	.0000606	.0000289
	(.0193998)	(.0000783)	(.0000646)
REER_ov	**-3.171799****	**.0309093***	**-.0370827***
	(1.215739)	(.0332077)	(.0191437)
REER_vol	-.0016588	**-.0000161***	**.0000268***
	(.0019914)	(.16e-06)	(.0000156)
intercept	1.529723	.0704593	.047025
	(5.368222)	(.0441131)	(.0577781)
R^2	0.6039	0.6442	0.7171
linktest	0.721	0.030	0.723
ovtest	0.6070	0.1272	0.9708
imtest, white	0.3856	0.3856	0.3856

Table A16. Robustness: Fixed Effects Regressions

	Output growth (Y_g)		
d_crisis	**-1.175983****		
	(1.386357)		
ExtDebt_Y	-1.449554**	**ExtDebt_Y*d_crisis**	**-2.095089*****
	(.9196534)		(1.382306)
DebtServ_Exp	-.0596773	**DebtServ_Exp*d_crisis**	**.0284499***
	(.0176143)		(.0272749)
Imp_g	**.1170448*****	**Imp_g*d_crisis**	**-.0390686****
	(.0235561)		(.0277897)
PubDebt_Y	**-.0147132****	**PubDebt_Y*d_crisis**	**.0211746*****
	(.0144402)		(.0198289)
IntRate	.0863809	**IntRate*d_crisis**	**-.0963029*****
	(.0276308)		(.0420793)
REER_ov	-.4983851	**REER_ov*d_crisis**	**-1.804433****
	(.5100997)		81.322557)
		intercept	4.92436***
			(.5207146)

*, ** and *** represent the statistical significance at 10%, 5% and 1%, respectively. Coefficients of the explanatory variables that proved to be significant are shown in bold.

Table A17. Robustness: Results of the Regressions of the Measures on Alternative Dummies (2ⁿᵈ Part of the Analysis)

	$g_{post2} - g_{pre3tranq}$	$HP_{post1-pre1}$	$BK_{post1-pre1}$
Comparison of Economic Growth Across Countries			
Low-income countries	**13.74092****	.0066732	.0327741
	(5.541166)	(.0754729)	(.0708765)
Middle-high-income countries	**9.20955***	.0000518	.0401563
	(4.108951)	(.0734479)	(.0738913)
Comparison of Economic Growth Across Decades			
1980s	-1.79975	-.0392517	.0174409
	(2.394317)	(.09437)	(.0230427)
1990s	-3.832476	-.0557752	.0134017
	(2.779752)	(.0848178)	(.020793)
2000s	-3.6539	-.0477676	.0199443
	(6.697561)	(.0613678)	(.0176005)
2010s	-6.039166	-.0498731	.0251113
	(5.749013)	(.0733616)	(.0219371)

*, ** and *** represent the statistical significance at 10%, 5% and 1%, respectively.