STYLIZOVANÁ FAKTA EKONOMICKÝCH KRIZÍ NA PŘÍKLADU CHILE
STYLIZED FACTS OF ECONOMIC CRISES: THE EXAMPLE OF CHILE

Patrik Šváb [1]

Tento článek se zabývá stylizovanými fakty vývoje makroekonomických proměnných během krizí. Tyto závěry jsou ověřovány na časových řadách vybraných indikátorů chilské ekonomiky. Chile poskytuje zajímavý náhled do této problematiky kvůli své ekonomické historii. Na vzorku krizí od 70. let 20. století tato studie ukazuje, že přibližně v 60 % vývoj makroekonomických indikátorů kopíruje stylizovaná fakta. Světové HDP, saldo běžného účtu, směnné relace, příliv přímých zahraničních investic a devizové rezervy by bývaly byly spolehlivými indikátory nadcházejících krizí.[2]
Klíčová slova: ekonomická krize, finanční krize, stylizovaná fakta, mikroekonomické ukazatele, Chile

This paper focuses on the stylized facts of macroeconomic variables during crises. These findings are verified on the time series of selected indicators of the Chilean economy. Chile provides an interesting insight into this issue because of its economic history. On the sample of crises since the 1970s, this paper reveals that approximately 60% of macroeconomic indicators fulfilled the stylized theoretical facts. World GDP, the current account balance, terms of trade, foreign direct investment inflow, and foreign exchange reserves could have been possible indicators of the forthcoming crises.
Key words: economic crisis, financial crisis, stylized facts, macroeconomic indicators, Chile
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1 INTRODUCTION

Every country has its specific economic development, marked by different types and intensities of economic crises in each period. Chile formed a part of the Spanish Colonial Empire until the beginning of the 19th century. Like other members of the Empire, Chile was a source of raw materials and wealth for Spain, which determined its economic development. After independence, Chilean economic history was formed by different eras, each characterized by a dominating exporting material and a degree of state economic interventions. Between the 19th and 20th centuries, Chile became one of the most prosperous countries of Latin America, mainly due to the exportation of saltpetre and its reinforced position in the continent, gained by the victory in wars with neighbouring countries. However, in the 1930s, the economy was severely damaged by the Great Depression and state interventionism intensified. The abrupt decline in the world demand for saltpetre put copper in the leading position in exporting materials. In Latin America in the mid-20th century, there was a common consensus that it was vital to substitute the importation of technically sophisticated products with complex industrialization to reach economic prosperity. Although not always leading to positive outcomes, this ideology marked the economy until the 1970s.

The period that follows is analysed in this paper. This paper aims to verify the stylized facts about the development of macroeconomic variables during Chile's economic crises. In other words, observing the time series of macroeconomic indicators during Chilean economic crises in the context of the Chilean economic history can be assessed if the stylized facts, in their majority, hold for Chile. The following text focuses on analysing crises from the 1970s until today . All those analysed crises started and ended in the past; therefore, it is possible to monitor the economic development during all the years of crises. In other words, it will be answered if it had been likely to detect and possibly avoid incoming crises by observing those indicators and assuming their accurate forecasting for the future. After all the crises will have been analysed, this paper concludes and highlights the most critical observations in detail.

2 LITERATURE REVIEW AND METHODOLOGY

The analysis presented in this paper aims to verify the theoretical conclusions of different authors about the use of macroeconomic indicators for the description and forecasting of the incoming economic crises. These conclusions will be verified on the example of Chile, a country located in the Latin American region, providing substantial empirical evidence on various economic crises. The aim of this paper, in other words, is to answer the question if the macroeconomic indicators follow a normal development before, during, and after a crisis period, and it is, therefore, possible to

predict crises, assuming the early detection of the indicators and their correct estimation for the future.

Economic crises are divided into several types, according to their causes and characteristics. The economic crisis itself is usually defined by a decline in GDP, the financial crisis by a decrease in asset prices, the balance of payments crisis by current account discrepancies and changes in capital flow, and the currency crisis as a situation where a speculative attack causes a currency to depreciate, etc. (Radke 2009, pp. 71-74). Nevertheless, various types of crises usually occur at the same time. Therefore, the term economic crises often comprises all the subtypes in the literature. This paper aims to respect the particular denominations; however, due to their interconnectedness, it analyses them together.

The literature research on this topic reveals two major groups of papers: quantitative studies analysing predicting and describing economic and financial crises on the one hand and qualitative descriptions of the economic history of a particular country on the other. A significant part of the first group is the so-called Early Warning Systems (EWS) literature, which refers to the investigation of indicators that would enable to predict and avoid economic crises or, at least, moderate their intensity. Immense currency crises in the 1970s gave rise to the first publications in this field; however, this area was not fully developed until the 1990s (Babecký et al. 2011, pp. 5-6).

Academics started to publish papers about banking crises, balances of payments, or currency problems that laid the foundations of EWS. Current development of the EWS literature concerns, for instance, the rising international spillovers of financial crises or new econometric methods (Babecký et al. 2011). Babecký et al. (2011) develop discrete and continual models using logit and VAR for economic crises in general. Sayek et al. (2014) focus on financial and banking crises and investigate their common features across time through the propensity score matching method. Percic et al. (2019) use logit/probit models and models based on signal extraction to predict financial crises with respect to the implemented monetary policy.

The purpose of this paper is not to develop a new EWS model but to verify the conclusions of the existing research. A partial conclusion of this chapter would be a summary of economic indicators used by various authors, which will be verified in the following chapters.

Table 1: Economic indicators related to crises

Author	*Publication purpose*	*Type of crisis*	*Indicators used*
Babecký et al. (2011)	Econometric Analysis (EWS)	Economic	**GDP Growth (L)**, **External Imbalances (L)**, **Public Expenditure (L)**, **World GDP Growth (L)**, Food Prices (L), **Foreign Direct Investment (L)**, **Foreign Exchange Reserves (L)**, **Debt Structure (L)**
Gabellini et al. (2019)	Bibliometric Analysis	Economic	**(Domestic) Income per Capita**, **Unemployment Rate**, Industrial Production, Investment, Bankruptcies, **Consumer Prices**, Stock Market Indices, **Years of Contraction**
Hynková (2010)	Economic Crises Theory Summary	Economic	Stock Market Indices (L), Number of Orders (Contracts) (L), Number of Building Permits Issued (L), **Real GDP (C)**, **Unemployment rate (C)**, Producer Price Index (C), Wage Level (D), Retail Turnover (D), **Consumer Prices (D)**
Percic et al. (2019)	Econometric Analysis (EWS)	Financial	**Effective Exchange Rate (L)**, External Balance (L), **Import to Export Ratio (L)**, **Debt Growth (L)**, **Debt to Reserves Ratio (L)**, **Real GDP Growth (L)**, **Budget Deficits (L)**, **Inflation Rate (L)**, Private and Government Loans (L), Private Bank Deposits (L), Banking System "Contamination" (L), **Foreign Exchange Reserves (L)**, Monetary Aggregates, etc. (L)
Radke (2009)	Financial Crises Theory Summary	Financial	Monetary Aggregates, **Foreign Exchange Reserves**, Deposits and Loans, Interest Rates, Stocks and Real Estate Prices, **Real Exchange Rate**, **Foreign Exchange Reserves**, **Terms of Trade**, **Current Acc. Balance**, World Interest Rates, **Capital Inflow to GDP Ratio**, **GDP**, Investment to GDP Ratio, **Inflation**, **Fiscal Deficit to GDP Ratio**, Liquid., Profit, M. Valuation, Solvency
Sayek et al. (2014)	Econometric Analysis (EWS)	Financial	**Current Account to GDP Ratio (L)**, **Fiscal Balance to GDP Ratio (L)**, **Inflation (L)**, Private Sector Loans to GDP Ratio (L), Bank Deposits to GDP Ratio (L), **Public Debt to GDP Ratio (L)**

Note: if this fact is explicitly stated in the literature, those indicators are indicated in the table as follows: (L) Leading; (C) Contemporaneous; (D) Delayed.
Source: author's adaptation.

Besides the EWS literature, there are other approaches to the use of macroeconomic indicators in the context of economic crises. Gabellini et al. (2019) see crises as self-fulfilling prophecies and conduct a bibliometric analysis that searches for keywords in the literature that could cause panic and trigger financial crises. Hynková (2010) summarizes the theory of business cycles and presents indicators that

accompany economic crises. Not only does she include leading indicators such as the EWS, but also contemporaneous and delayed indicators, which evolve in a specific way during and after a crisis, respectively. In an extensive study, Radke (2009) analyses many indicators in different stages of financial crises. The stylized facts according to Radke (2009) are verified in the following chapters. Table 1 summarizes the macroeconomic indicators used by mentioned authors with respect to economic and financial crises.

The most important criteria for the selection of the indicators for this paper were these that follow: frequency of their use by different authors (see Table 1); data availability; relevance for comparison with the qualitative knowledge about the economic development of the country; inclusion of indicators typical for both the economic and financial crisis and its subtypes, and the balance of payments crisis; inclusion of some contemporaneous and delayed indicators (to complete the early warning systems literature, which uses leading indicators). Selected indicators are marked in bold in Table 1. Each selected indicator tends to develop in a specific way during economic and financial crises. These stylized facts are summarized in Table 2.

Table 2: Stylized facts of selected macroeconomic variables

Indicator	Stylized facts
Gross domestic product	It declines significantly during the economic crisis for four consecutive quarters; As for the development of the financial crisis, we can usually observe an accelerated GDP growth in the period before the financial crisis, which points to a boom in the real sector that may eventually lead to overheating of the economy.
Unemployment rate	There is a negative relationship between GDP and the unemployment rate (the Okun's law); it is a delayed indicator of an economic crisis, as labour markets respond to the real output of the economy with a certain delay.
Budget deficit, public debt	Before the financial crisis, the ratio of budget deficit to GDP usually increases. This increase can be caused either by an increase in public spending or a decrease in revenues, which can have a structural cause (a result of budget planning) or a cyclical cause (a situation when a recession implies lower incomes and profits, which ultimately decreases tax revenues). After the crisis, this ratio decreases. Public debt is composed of accumulated budget deficits.
Inflation rate	If a demand shock causes a recession, in addition to a decline in the product, it should also lead to a fall in prices. This situation may occur by a downswing in some components of aggregate demand, i.e., consumption, investment, government purchases or net exports, or a decline in the money supply. If the negative shock is on the supply side (caused by a rise in costs such as nominal wages or raw materials prices), the price level should rise. Before the financial crisis, the inflation rate is used to be mostly above average. It usually drops slightly just before the

	crisis due to the efforts to mitigate the currency overvaluation and prevent the economy from overheating. After the financial crisis's start, inflation rises significantly due to the depreciation of the domestic currency. After the crisis, it begins to decline back to its typical values.
Foreign exchange reserves	In the period before the currency crisis, foreign exchange reserves fall due to an effort to prevent the exchange rate from depreciating. The amount of reserves increases after a currency devaluation or an eventual change to the floating exchange rate regime.
Real exchange rate	Before the financial crisis, the real exchange rate tends to be lower and continues to decline with the coming crisis. This phenomenon points to a real overvaluation of the domestic currency. After the onset of the crisis, the currency usually depreciates in nominal terms, which increases the value of the real exchange rate. This effect is generally intensified during the currency and twin crises. Real overvaluation is often maintained in efforts to stabilize the domestic inflation rate, which results, on the other hand, in decreased competitiveness of domestic goods. After the crisis, the real exchange rate usually appreciates.
Terms of trade	With the coming financial crisis, terms of trade fall and rise again to their average values after the crisis.
Current account balance	The start of the financial crisis is usually characterized by a deteriorating current account balance, i.e., an increase in the current account deficit. The economic boom often causes imports to grow and exports to fall. During the economic crisis and just after the financial crisis, the current account usually shows a surplus caused by a decline in imports due to low GDP.
Foreign direct investment inflow, portfolio investment	This ratio tends to grow and peak before the outbreak of the financial crisis. Then it decreases but remains above average. In particular, the inflow of portfolio investment increases rapidly before the crisis until it stops abruptly and triggers a financial crisis (and a balance of payments crisis), with a subsequent outflow of portfolio investment.

Source: author's adaptation based on Radke, 2005. Some remarks were included according to Babecký et al. (2011) and Hynková (2010) (in the latter case, mostly about economic crises).

This paper aims to fill the knowledge gap in economic crisis research by connecting this quantitative approach with the more qualitative one. Thus, various studies about the economic history of Chile (elaborated mainly by national and international economic institutions, e.g., the Chilean national bank or the IMF) are included in the following chapters as the second group of literature. This synthesis allows us to compare the general statistical observations with the economic reality of this country. In the following chapters, time series of selected macroeconomic indicators are displayed for the Chilean crises from the 1970s. While the theoretical

part tries to combine different approaches of various authors in order not to omit any important indicators, the analysis is elaborated in a unified way, using data from least sources as possible (World Bank and OECD in this case) to be able to be analysed in mutual context. Their development is compared to their stylized facts summarized in Table 2. Suppose the majority of the indicators behave according to the stylized facts. In that case, it can be assessed that the case of Chile verifies to some extent the possibility of monitoring economic crises through observing the development of macroeconomic indicators.

Figure 1: GDP growth in Chile, 1970–2019

Source: author's adjustment according to World Bank, 2021.

Figure 1 depicts five major downswings of the GDP growth to negative values, which occurred in the Chilean economy from the 1970s (until 2019).[3] These correspond to significant economic crises that are further described in this paper.[4] The crises are put into the perspective of the world and the Chilean economy. Moreover, there are the selected macroeconomic indicators displayed in the corresponding figures. The time series are analysed before, during, and after the periods of crises. Thus, it can be assessed whether the development follows the stylized facts. The figures are classified into groups (according to Radke 2005) that are named after an area of economy and economics to which they are linked the closest:

- Real Sector: GDP growth and world GDP growth (annual % growth), unemployment rate (share of the total workforce, in %), inflation rate (annual growth, according to consumer prices, in %);

[3] Due to the fact that the coronavirus crisis is still ongoing at the time of writing this paper, it can be fully analysed using this methodology just after it will have been finished.
[4] The downfalls in 1972 and 1973 were shortly after followed by a downfall in 1975. Therefore, these years will be considered as one period of crisis.

- Current Account: current account balance (% of GDP), the exchange rate (annual average of the official exchange rate to USD), terms of trade (share of import index and export index, related to the year 2000);
- Financial Account: inflow of foreign direct investment (hereinafter "FDI"; net inflow, % of GDP), portfolio investment (at current prices in USD), foreign exchange reserves (total reserves excluding gold, at current prices in USD);
- Public Finance: budget deficit (% of GDP), public debt (% of GDP).

In the following parts, figures descriptions respect this grouping and indicators definitions.

3 THE CRISIS IN THE 1970S

At the beginning of the 1970s, the Chilean government was led by a left-wing coalition named Unidad Popular. On the one hand, they inherited an economy with a relatively high inflation rate and stagnating GDP on the other. The economic measures were very interventionist from the standpoint of fiscal and monetary politics since their objective was to allocate productive resources to government-determined areas. In 1970, many plans were put into place, many of which led to the nationalization of goods and copper mines. In addition to that, public expenditure increased abruptly. In 1971, the mood in the economy was very positive since there was a significant increase in GDP (almost by 10%), real income, and the labour share in GDP with a simultaneous decrease in the unemployment rate (Caputo and Saravia 2018, p. 11).

Nevertheless, it took just one year to reveal the other side of the coin. In 1972, there was a decrease in reserves, an increase in the fiscal deficit, and a significant increase in inflation (reaching the 100% threshold). Real income plunged as a consequence. The attempts to stabilize the economy, such as by devaluating the currency, were ineffective. The implementation of fixed prices and multiple exchange rates led to the expansion of a black foreign exchange market. In 1973, the economic issues mentioned above intensified (Caputo and Saravia 2018, p. 12). In addition, political problems appeared when the USA started its interventions, which were explained by their side as a necessary response to political risks. It culminated in the second half of this year when the famous political coup was executed and led to a takeover of the government by Augusto Pinochet (Schatan 2001, pp. 57-63).

Not a long time after the recovery, the crisis struck again in 1975, marked by a 13% decline in GDP. This severe crisis had various causes, including a fall in the price of copper and a simultaneous rise in the price of oil, which immediately led to a deterioration of terms of trade. Fiscal restrictions implemented by the new government to stabilize the budget deficit caused a decline in aggregate demand.

Despite that, the inflation rate remained very high (around 350% by the end of 1975), which was reflected in inflation expectations. At the same time, the monetary base declined, and the public debt increased, which originated, among other things, from the exchange rate devaluation (Caputo and Saravia 2018, p. 14).

Figure 2: Real sector, Chile, 1970–1980
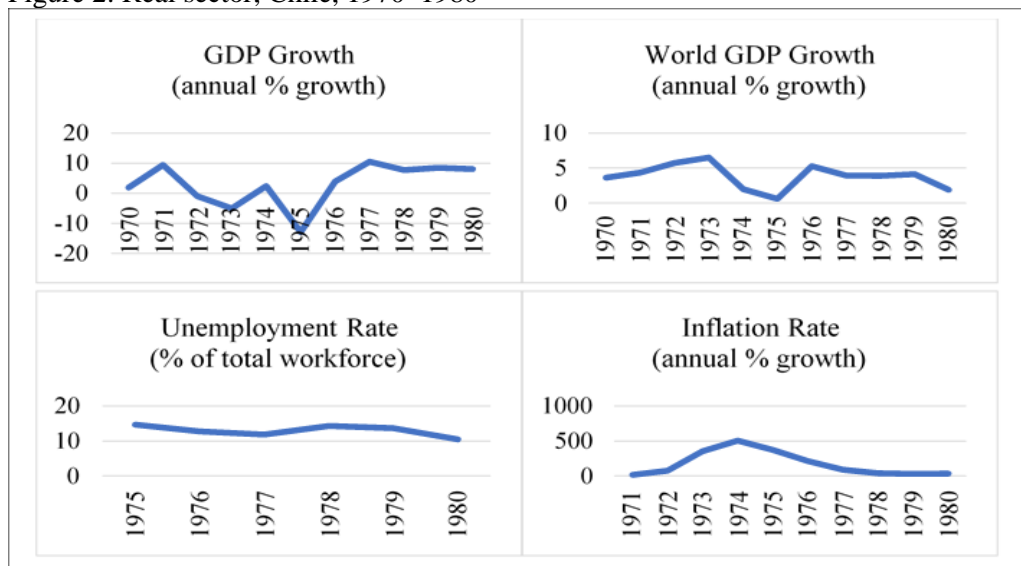
Source: author's adjustment according to World Bank, 2021.

Figure 3: Current account, Chile, 1970–1980
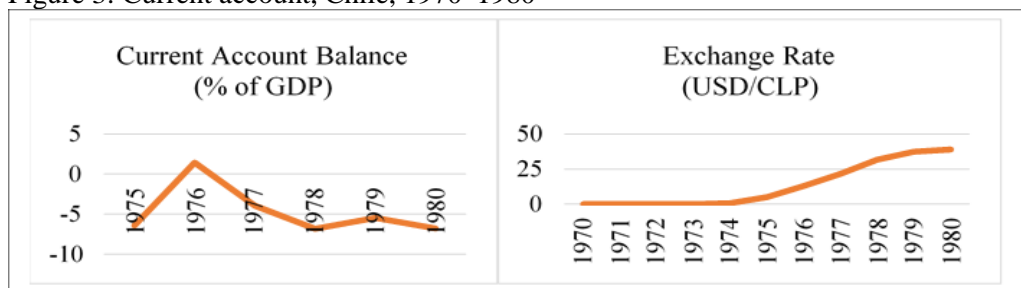
Source: author's adjustment according to World Bank, 2021.

If we compare the growth of Chilean and world GDP in Figure 2, we can observe that the crisis between 1972 and 1973 was generated mainly through endogenous shocks, as the Chilean GDP growth does not correspond to the development in the world economy. On the other hand, the crisis in 1975 followed approximately the world. Although the world GDP growth did not drop into negative values, a deceleration followed by a recovery shows a similar pattern to the Chilean economy. The inflation rate during the crisis 1972–1973 abruptly rose; from 1973, it

began to keep dropping until 1978. This evolution does not follow the stylized facts. The unemployment rate data are available from the year 1975. However, we still cannot observe any typical behaviour since no rise in unemployment follows. Figure 3 proves that the current account turned into a surplus after the crisis (in 1976). As for the exchange rate, a slight depreciation caused by the already mentioned devaluations was recorded in 1972–1973, and a very rapid depreciation began only from 1974. Figure 4 shows the typical development of FDI in the 1972–1973 crisis. During the 1975 crisis, on the other hand, FDI did not develop typically. In that year, a sharp increase was recorded, reflecting the decline in GDP. For this reason, the development of FDI around this year can be considered more or less stable, as can portfolio investment. In both crises, foreign exchange reserves show their expected development, i.e., a decline followed by growth.

Figure 4: Financial account, Chile, 1970–1980
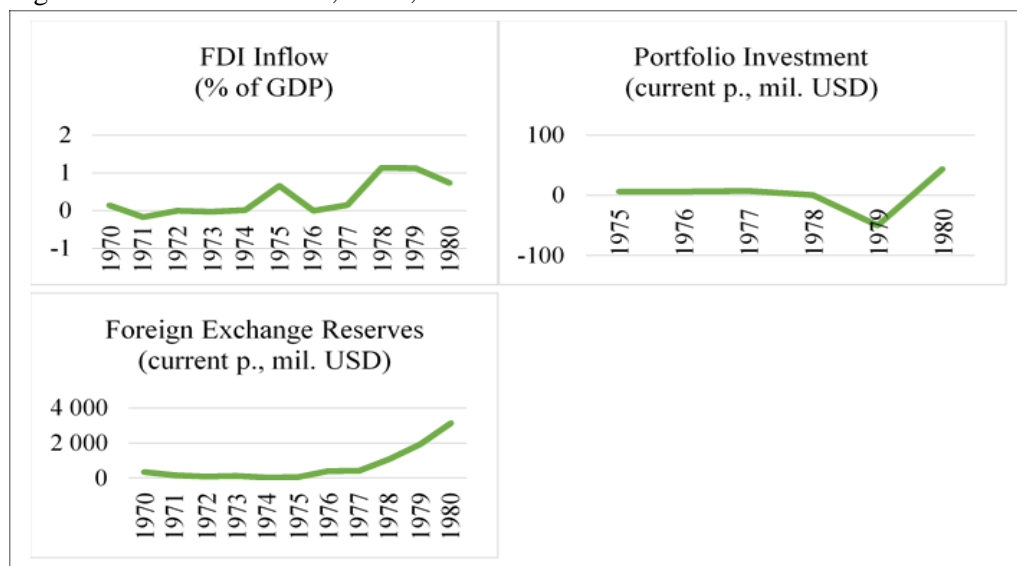
Source: author's adjustment according to World Bank, 2021.

4 THE BANKING CRISIS OF 1982

The military government set itself the goal of implementing many economic reforms. A group of economists called "the Chicago Boys," influenced by their liberal economic doctrine studies in the United States, recommended extensive reforms to the government to move to an open market economy. The reforms covered many areas, such as trade policy, characterized by tariff reductions, agriculture, in which land was privatized, and, last but not least, labour market reform. The importance of trade unions fell on the one hand, and public works programs were introduced on the other (Barandiarán and Hernández 1999).

This crisis is mainly associated with the banking and financial sector reform. Banks were privatized, and capital flows were liberalized, causing a massive capital inflow from abroad. This phase of rapid expansion ended in the early 1980s for several reasons. Foreign investors had overly optimistic expectations about the return on their investments, which often did not happen due to falling commodity prices. This resulted in a significant deterioration in terms of trade and the current account of the balance of payments. The capital was used mainly to finance consumption and government spending, which led to increased fiscal deficits and imports and an overvaluation of the real exchange rate. There was a considerable reduction in international liquidity and solvency due to the need for financing the external debt. Due to the boom of the supply economy in the US, interest rates rose. This situation further exacerbated the problem for developing countries, which had most of their external debt at floating interest rates (Radke 2005, pp. 84-85).

Figure 5: Real sector, Chile, 1980–1985
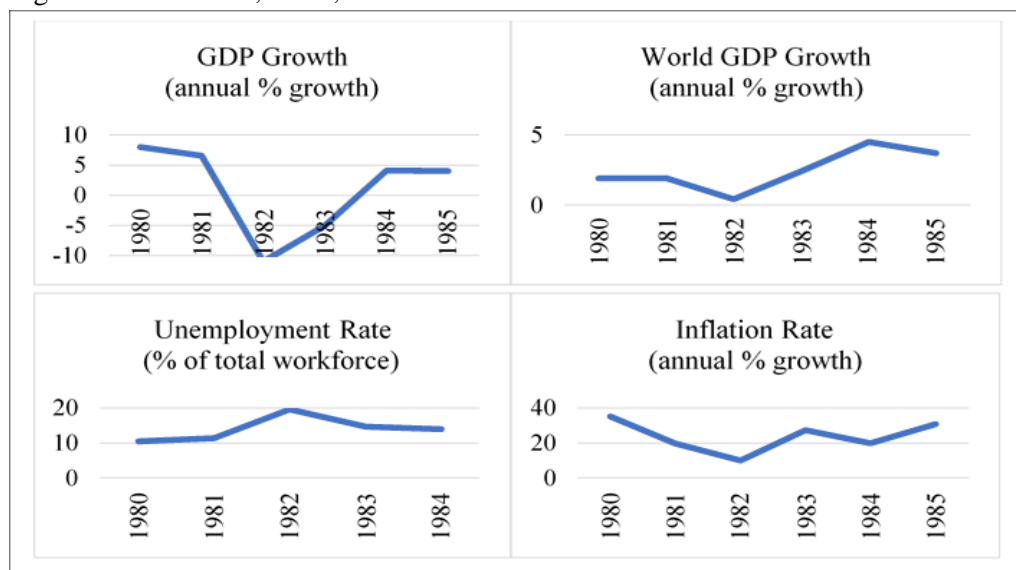
Source: author's adjustment according to World Bank, 2021.

This development was joint for many third-world countries, hit by a typical balance of payments crisis caused by the sudden stops. These causes of the crisis were exacerbated in Chile by some specific problems related to the banking sector. Banks were often exposed to risky behaviour, which was enabled by insufficient supervision of banking institutions. Banks accumulated a lot of bad loans, and there was an overall lack of savings in the economy caused by frequent purchases of shares in connection with the general privatization. The banking sector was promptly nationalized in 1983, and subsidies were provided to borrowers in response to the crisis. The public finance

deficit, one of the causes of inflation in the 1990s, widened. There was also a decline in industrial production. Despite the Chicago Boys' recommendations, a more interventionist policy was implemented in the 1980s (Barandiarán and Hernández 1999, p. 20).

The central authorities decided on exchange rate devaluations to support export growth and raised interest rates to prevent capital outflow. The second half of the 1980s was described by a return to liberal reforms, i.e., re-privatization and recapitalization, renewal of the banking system, further reduction of tariffs, etc. With the help of the International Monetary Fund and the World Bank, public debt, one of the world's most enormous debts per capita at that time, was also reduced and restructured. In summary, the liberal reforms ultimately positively impacted the Chilean economy, albeit with a delay. Between the later 1980s and 1990s, Chile experienced the most prominent economic growth of all Latin American countries (exceeding 5% annual increase in average) (Barandiarán and Hernández 1999, p. 51). For that reason, this period is aptly called "the Chilean Miracle".

Figure 6: Current account, Chile, 1980–1985
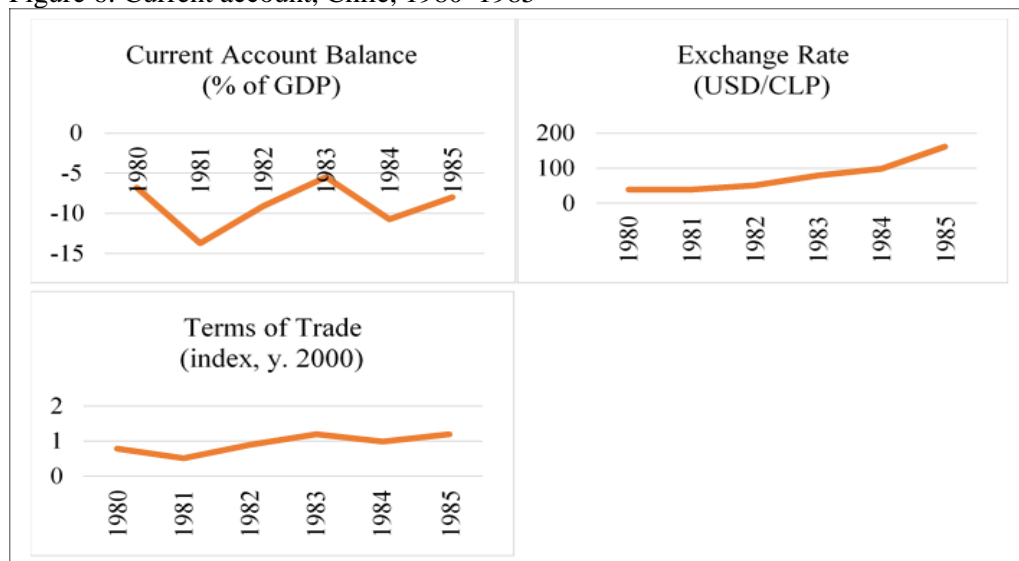
Source: author's adjustment according to World Bank, 2021.

Figure 5 shows the analogy between Chilean and world GDP growth during the 1975 crisis. The downturn and the subsequent recovery are similar to the global development. Unemployment rose already in 1982 but copies the stylized facts in principle. The inflation rate should reach above-average valuesbefore the crisis, fall just before the crisis, and increase after the crisis starts, which is precisely what happened during this crisis. The current account balance shown in Figure 6 also

follows the usual behaviour, i.e., a decline in the pre-crisis period followed by an increase in the post-crisis period. The exchange rate kept nominally depreciating against the dollar; therefore, the exchange rate development cannot be considered typical.

Figure 7: Financial account, Chile, 1980–1985
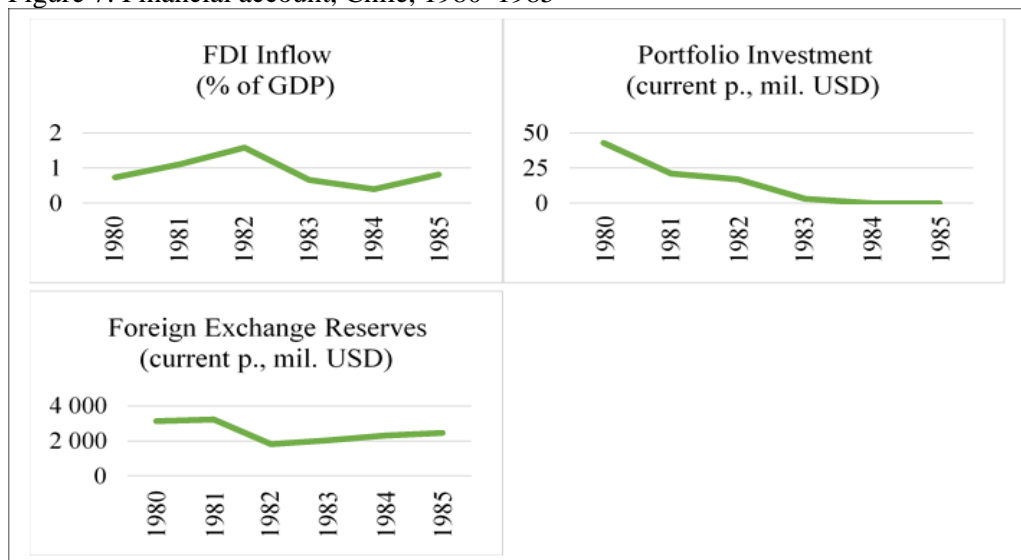
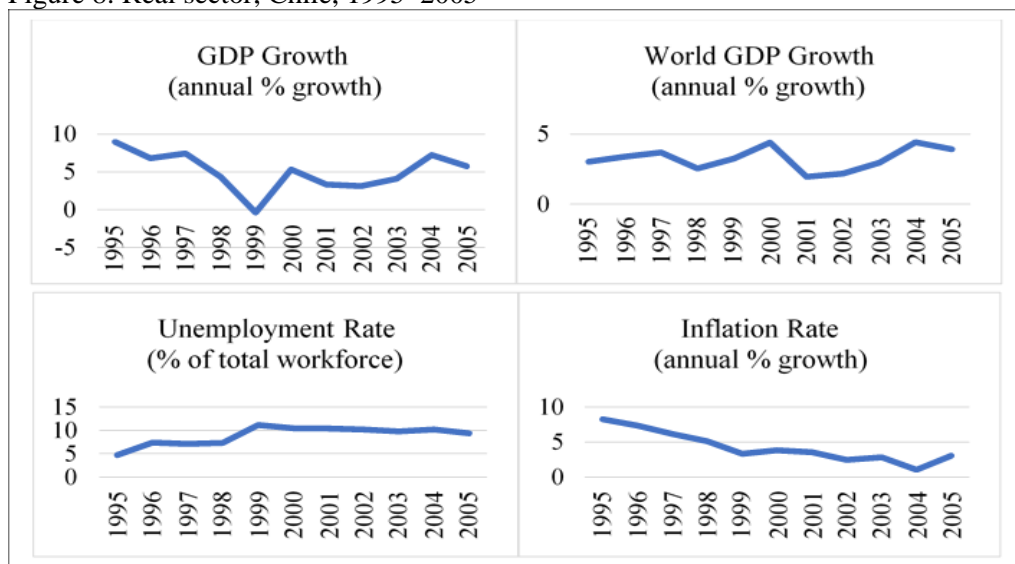Source: author's adjustment according to World Bank, 2021.

On the other hand, terms of trade went through a decline followed by an increase, as they should have. It is clear from the description of this crisis that there was a sharp increase in FDI inflows before the crisis and a subsequent significant decline after the crisis. This fact is also proven by Figure 7. The development of portfolio investment, on the other hand, would not be an adequate description of this crisis. Foreign exchange reserves, as in the case of previous crises, follow their normal development.

5 THE ASIAN CRISIS

In 1990, Patricio Aylwin and his government started to administrate the country. The economy had shown stable macroeconomic indicators since the mid-1980s, but on the other hand, it faced significant income inequality, inadequate social security, and a lack of investment in public infrastructure. Therefore, this government's goal was to implement political and social reforms while maintaining the previous government's macroeconomic stability and liberal economic aspects (Toro 2012, pp. 99-100).

The crisis did not occur in the economy until the end of the 1990s when the so-called Asian crisis started. In many Asian countries, there was a sudden deterioration in the trade balance after a period of sharp growth, followed by capital outflow. Thus, several balance of payments, currency, and financial and economic crises started. This crisis hit Chile mainly due to the economy's vast openness and export partners' low diversification. In 1999, there was a decline in exports, a decline in GDP, and a significant rise in unemployment. At the same time, the economy was struggling with high indebtedness and financial speculations, to which the central bank responded by raising interest rates. However, this measure further worsened the ongoing crisis. For Chile, the crisis showed that they should improve the regulation of the financial system, diversify exports, and create sufficient central bank reserves and government savings in years of prosperity. This slowdown was followed by a period of the so-called "Second Economic Miracle of Chile" (Covarrubias 2002). It was interrupted only by the Financial and Economic Crisis in 2008–2009.

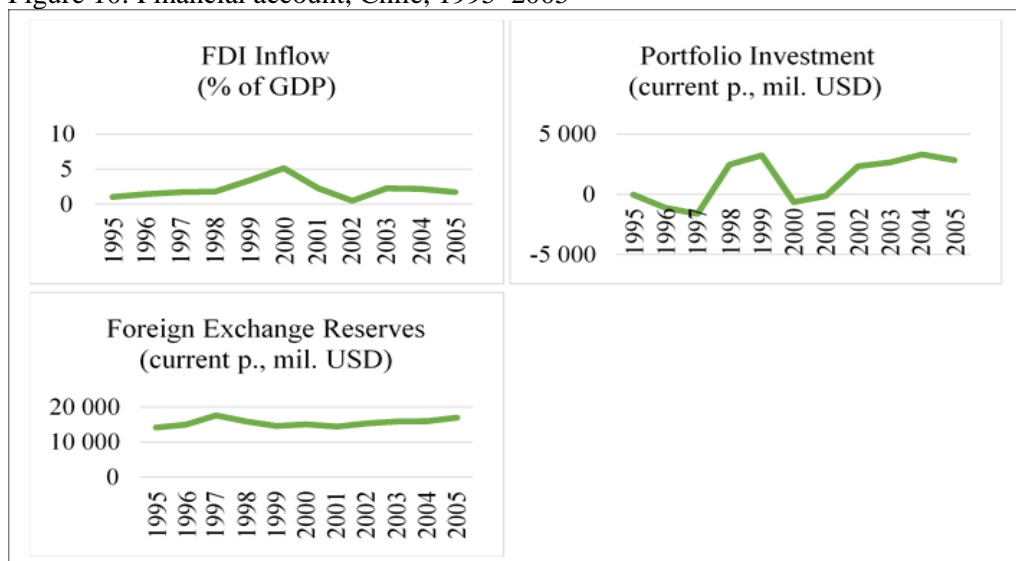Figure 8: Real sector, Chile, 1995–2005

Source: author's adjustment according to World Bank, 2021.

Figure 9: Current account, Chile, 1995–2005
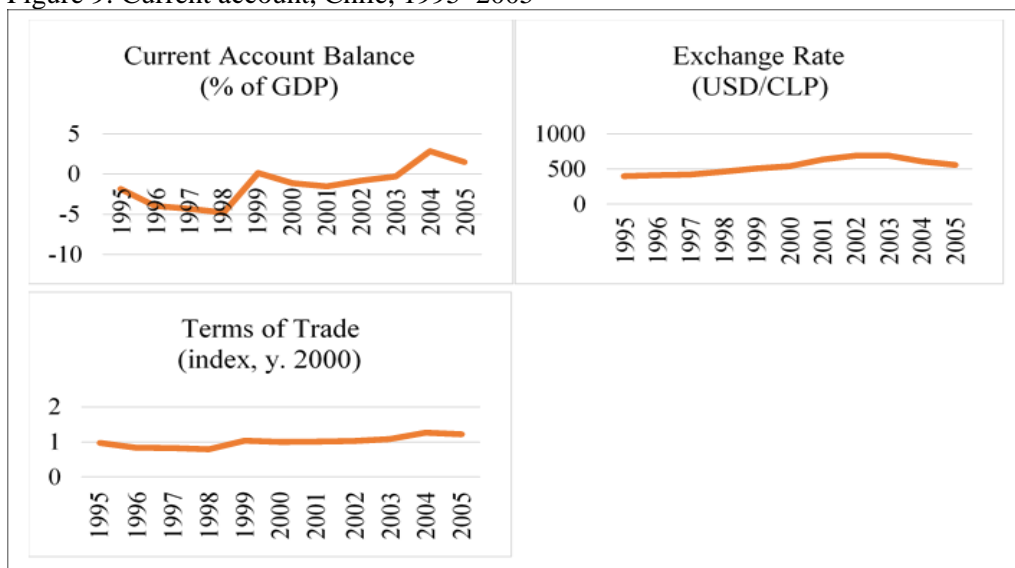
Source: author's adjustment according to World Bank, 2021.

Figure 10: Financial account, Chile, 1995–2005

Source: author's adjustment according to World Bank, 2021.

Figure 8 shows that the development of Chilean GDP with a lag is approximately in line with world GDP growth. This development is not entirely consistent because the Asian crisis, as its name implies, did not affect all regions of the world with a similar intensity as, for example, the crisis in 2008–2009 did. This is further discussed in the following subchapter. The unemployment rate was

significantly affected by this crisis. The inflation rate during the crisis years also showed normal development. The development of the current account and terms of trade in Figure 9 does not entirely copy the typical scenario, as both variables improved between 1998 and 1999. The exchange rate has already moved in a more stable and usual way. Still, the nominal appreciation does not occur until several years after the end of the crisis, so it once again cannot be declared a reliable indicator of a crisis. FDI inflow, shown in Figure 10, increases during the crisis and declines only after the crisis. In contrast, portfolio investment rises sharply and subsequently declines, making it a more reliable indicator in this case. Foreign exchange reserves show the typical behaviour again.

6 THE FINANCIAL AND ECONOMIC CRISIS OF 2008–2009

The financial and economic crisis, triggered by the collapse of the Lehmann Brothers investment bank in the United States in 2008, had many causes that had accumulated in the global economy. Very low interest rates led to a significant increase in loans and capital inflows from developing countries. Together with the over-indebtedness of economies, bubbles in stock and real estate markets, underestimation of credit risk, and the creation of poor financial assets created an economic crisis that could spread rapidly around the world. It eventually severely affected many economies, including Chile. Adverse shocks were distributed within the Chilean economy through various channels. Greater risk aversion led to an increase in risk premiums and currency depreciation. Extensive financing problems arose due to the loan restrictions, which affected companies in particular. The global crisis led to a decline in exports in Chile, a deterioration in terms of trade, and a fall in raw material prices. For instance, the price of copper was reduced by more than half in a short period. Private consumption and investment fell, and the unemployment rate rose (Vial 2009).

On the other hand, the inflation rate decreased even down to the central bank's target due to falling oil prices, among other things. The Chilean economy was better prepared to deal with this crisis than in the previous cases. According to the central bank, this was mainly due to adequate fiscal and monetary policy, the openness of the economy, and the diversification of exports. After the previous crisis, the regulation and supervision of financial institutions increased. The economy entered a crisis with a relatively low public debt, and the declining dependence of the economy on copper prices also helped (De Gregorio 2008). Although the interconnectedness of the banking sector cannot be eliminated entirely in today's globalized world, the International Monetary Fund study showed that Chilean institutions were relatively less vulnerable to the development of the foreign banking sector during this crisis (Chan Lau 2010, p. 19).

Figure 11 shows that Chilean and world GDP behaved almost identically in this global crisis. Unemployment was also significantly affected by this crisis, not only in Chile. As it was already mentioned, the inflation rate did not behave typically in Chile during the crisis due to falling oil prices, which was reflected in falling fuel prices. According to Figure 12 and the theoretical assumption, the current account and terms of trade deteriorated during the crisis and improved after the crisis. The exchange rate depreciated nominally during the crisis and appreciated again after the crisis; thus, in contrast to the previous crises, it followed its typical development. Based on Figure 13, there was a standard pre-crisis increase in FDI inflows, followed by a slump and recovery.

Figure 11: Real sector, Chile, 2005–2015
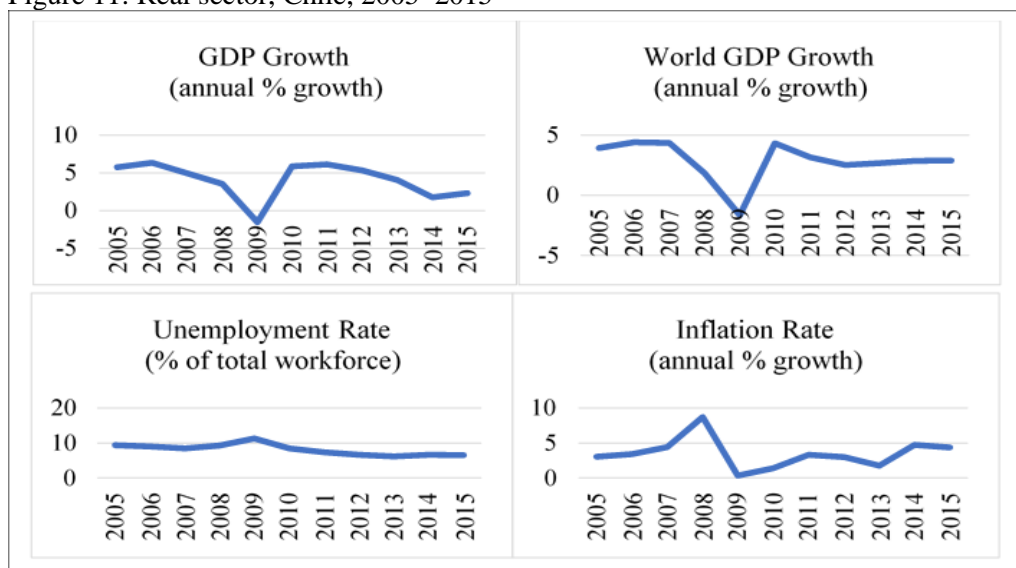
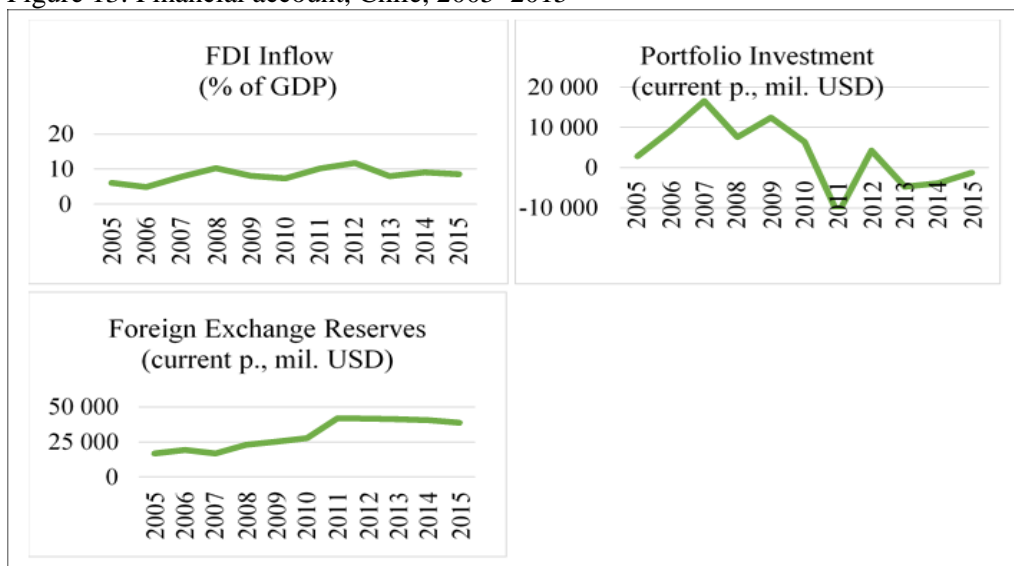Source: author's adjustment according to World Bank, 2021.

On the other hand, portfolio investment continued to grow during the crisis. Following an untypical development, foreign exchange reserves also grew throughout the crisis period. This phenomenon was probably caused by the already mentioned preparedness of the Chilean economy for the crisis, while it was not necessary to reach for more significant monetary measures. Data on public finance, displayed in Figure 14, were already available to analyse this crisis. However, Chile's public finance did not enter a deficit until the crisis. Even public debt was not above its pre-crisis levels, so none of these indicators can be considered reliable for describing the crisis.
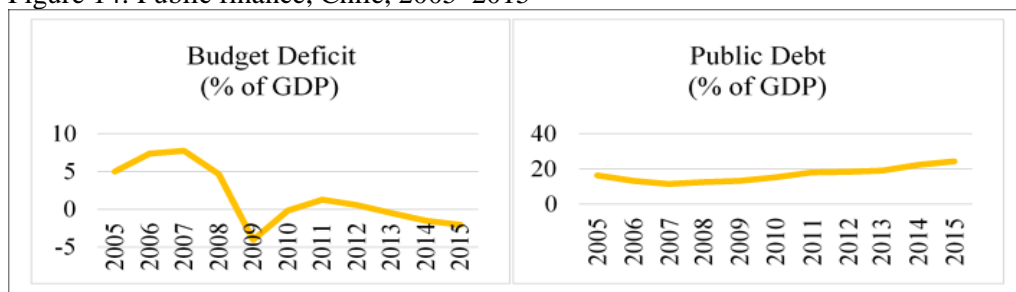
Figure 12: Current account, Chile, 2005–2015
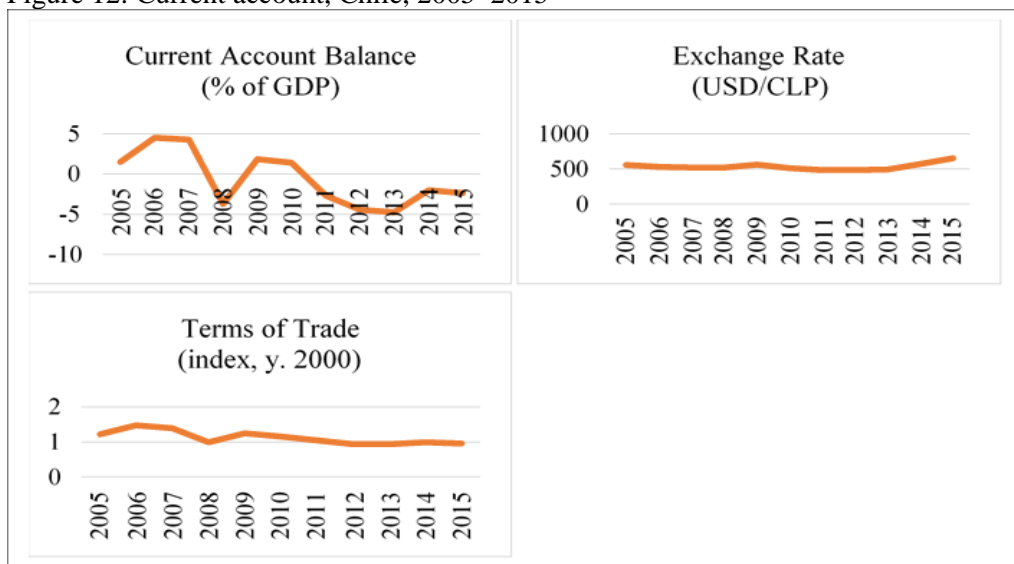
Source: author's adjustment according to World Bank, 2021.

Figure 13: Financial account, Chile, 2005–2015

Source: author's adjustment according to World Bank, 2021.

Figure 14: Public finance, Chile, 2005–2015

Source: author's adjustment according to World Bank, 2021.

7 SUMMARY AND DISCUSSION

In the previous subchapters, 47 time series of selected indicators for all crisis periods of the Chilean economy from the 1970s to the present were analysed. The results of the analysis are summarized in Table 3.

Table 3: Macroeconomic indicators analysis summary, 1970–2015 (Years of Crisis Evaluation)

Indicators	*1972–1973*	*1975*	*1982*	*1998–1999*	*2008–2009*
GDP growth	Yes	Yes	Yes	Yes	Yes
World GDP Growth	No	Yes	Yes	Yes	Yes
Unemployment Rate	N/A	No	Yes	Yes	Yes
Inflation Rate	No	No	Yes	Yes	No
Current Acc. Balance	N/A	Yes	Yes	No	Yes
Exchange Rate	No	No	No	No	Yes
Terms of Trade	N/A	N/A	Yes	No	Yes
FDI Inflow	Yes	No	Yes	No	Yes
Portfolio Investment	N/A	No	No	Yes	No
Foreign Ex. Reserves	Yes	Yes	Yes	Yes	No
Budget Deficit	N/A	N/A	N/A	N/A	No
Public Debt	N/A	N/A	N/A	N/A	No

Note: Yes – the indicator develops during the crisis according to the stylized facts, No – the indicator does not develop during the crisis according to the stylized facts, N/A – time series are not available for the crisis period.
Source: author's adaptation.

The examined indicators showed their typical behaviour in 28 cases out of the total of 47 time series, i.e., they corresponded to the development described by the theory in approximately 60%. We could therefore state, on the example of Chile, that macroeconomic indicators usually show a particular development in crises that is

useful to observe. In the practical application of this statement, however, it is necessary to consider the partial conclusions and limitations:

- GDP growth corresponds best to crisis development. This conclusion is apparent because this indicator explicitly defines economic crises.
- World GDP also appeared to be a reliable indicator, especially in crises driven mainly by exogenous factors. Given the growing interconnectedness of the world economy, it can be expected that the importance of this indicator in forecasting crises will grow over time.
- The unemployment rate also describes economic crises reliably. However, this is rather a contemporaneous or delayed indicator of a crisis, so its application possibility for forecasting is limited.
- Other macroeconomic indicators, which in most cases showed their typical development, were the current account balance, terms of trade, foreign direct investment inflow, and foreign exchange reserves. This fact may highlight the importance of this region's balance of payments crises. These indicators already bring more possibilities to the field of forecasting economic crises.
- On the other hand, the development of portfolio investments would not be reliable for crisis detection. Nor would the inflation rate, which stops being a valuable indicator in countries that have experienced some periods of uncontrolled price level growth. That is often the case in developing countries.
- Different theoretically defined variables tend to have different empirical measurability. Some indicators, such as the exchange rate, are usually reported only in nominal terms, so it is possible to evaluate just nominal appreciation or depreciation without further adjustments. Furthermore, the exchange rate time series are used to be related to one specific currency, typically the USD. Thus, foreign factors are not filtered out, and changes in the exchange rate may not have been caused by factors in the domestic economy. For these reasons, its application is problematic.
- Some time series are not available until the recent history, especially in the case of developing countries. It concerned budget deficit and public debt in this case. These public finance indicators were only available for the Financial and Economic Crisis 2008–2009 when they did not follow the stylized facts.
- The variables during the banking crisis of 1982 showed the highest compliance with the theory. In contrast to the following crises, endogenous causes prevailed in this one. It can be assumed that since

most of the frequently used indicators describe just one economy, they would be more helpful in forecasting endogenous crises.

8 CONCLUSION

This paper has aimed to verify stylized facts of macroeconomic variables during economic crises by comparing them with the evolution of time series available at the World Bank and OECD databases. This comparison was done on the example of Chile from the 1970s onwards in the context of actual events that happened in the economy. Of the 47 available time series, 28 showed their typical development, approximately 60%. On the example of Chile, it can be assumed that macroeconomic indicators usually show a specific development during crises and that their observation could be meaningful for observing incoming crises. The indicators that would have been the most reliable for detecting Chilean crises are world GDP, the current account balance, terms of trade, foreign direct investment inflow, and foreign exchange reserves. Having been observing the indicators in advance, countries could potentially avoid or mitigate the impact of economic crises. This approach, however, has various limitations, i.e., availability and empirical measurability of certain variables, their limited predictive power, or the fact that a lot of the observed economic events were region-specific and thus not replicable to all countries. Any future research built up on this paper could investigate other countries or include a multidimensional analysis of the variables.

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