**From 2004 to 2010, Brazil's economy grew at an average of 4.2 percent annually, or more than twice as fast as it had grown from 1999-2003; or for that matter, more than twice as fast as its annual growth from 1980-2000. This was despite the impact of the world recession of 2009, which left Brazil with no growth for that year. What were the sources of this amazing economic growth dynamics? Compare the economic growth determinants of Brazilian economy with the factors that allowed to grow the Polish economy even during the global financial crisis. What are the similarities and differences?**

Possible title. "Brazil: short run stimulus does not substitute long run reforms"
Explanation. This title describes, in too direct way, the achievements of Brazilian government: they simply created additional "laboratory" which showed how to spend the natural resources on short run stimulation, or simply how money should not be spent. Of course, they helped some Brazilians to leave poverty; however, it does not create additional potential to the long run growth. This survey will show where Brazilian government spent money and where did not, where it got growth from and where did not. In any way, they bought the political stability for money, and decreasing money inflow created social unrest in 2013.

November 2014

# Introduction

Brazil is the largest country in South America region and the fifth largest country in the world, both by geographical area and by population. Furthermore, Brazil takes the seventh place by nominal gross domestic product, nominal GDP, in the world and by purchasing power parity as of 2012. Additionally, Brazil was included to acronym BRIC: Brazil, Russia, India, and China, by Jim O'Neill from Goldman Sachs in 2001 as one from largest emerging market economies with high potential of real GDP growth (O'Neill, 2001). Neill's report caused additional interest from investors and it helped in attracting investments into the BRICs country, and, in particular, in Brazil, therefore the forecasts in this report can be titled self-fulfilling prophecy. It was written that Brazil has follows growth potential for the next 10 years: in nominal GDP 7.5%, in real GDP 4.0%, in consumer price index, CPI, 3.5%. In fact, Brazils average growth figures for each year in 2003-2012 was as follows: nominal GDP 11.58%, real GDP 3.71%, and deflator of GDP 7.87%. Exclusion of GDP figure for 2009 leads to average real GDP growth 4.04% what is fully matched with the forecast of Jim O'Neill, but growth of prices was twice bigger. In this report it will be investigated the sources of excellent real GDP dynamics in this period.

# Chapter I. Short and Medium run growth determinants

From 1970 till 2012 Brazilian GDP in constant prices of 2005 year grew fivefold: from 544 bln. Real to 2 766 bln. Real. As it is shown on Fig. 1.1 the dynamics of Brazilian real GDP growth can be described in the form of linear trend with the equation:

$$Y = 45.6 * X + 573.2, \tag{1.1}$$

where

Y – GDP in 2005 constant prices,
X – number of years from 1970 year.

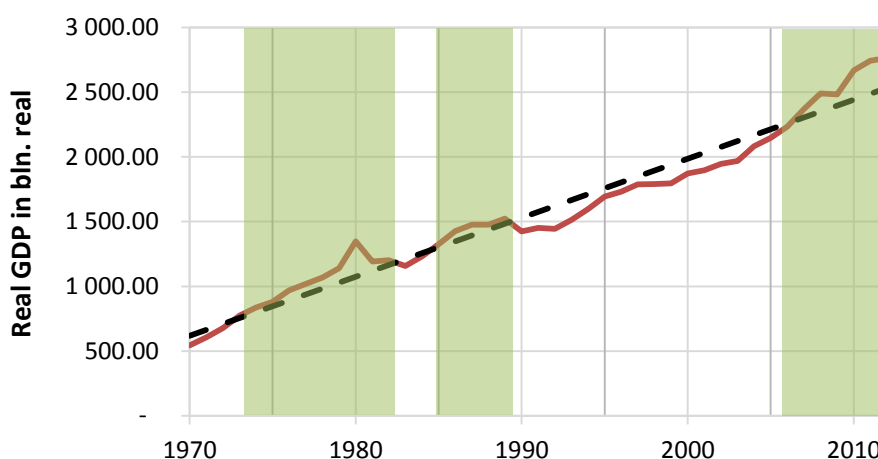Source: the United Nations Statistics Division; author's calculations

Fig. 1.1 GDP in 2005 constant prices and linear trend (dotted) from 1970 to 2012

Fig. 1.1 shows three periods above linear trend: 1974-1982, 1985-1989, 2006 and later. The last period of growth began in 2003 and its deviation from the trend reached the peak only in 2011 (about 300 bln. Real in 2005 constant prices). In 1970-2012, yearly growth of real GDP was 4.07%, but it is not equal on the whole period. The coefficient before number of years in equation (1.1) is 45.6, in other words, each year linear trend of real GDP grew on the 45.6 bln. Real. Therefore, real GDP growth rate in 1970 according to linear trend was 8.37% (45.6/544.6), but only 1.71% in 2010 (45.6/2669.2). In other words, it was observed decreasing of real GDP growth rate in five times from 1970 till 2010.

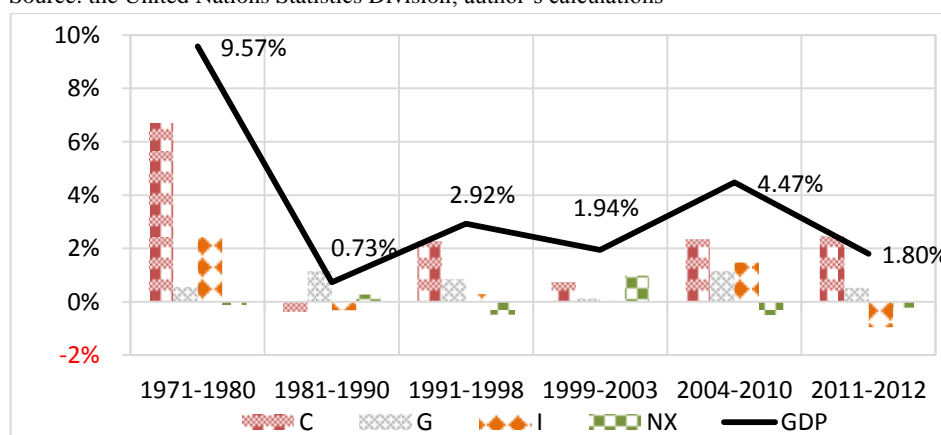Source: the United Nations Statistics Division; author's calculations

Fig. 1.2 Determinants of Brazilian real GDP growth by expenditures through periods

Speaking about the contributions into the real GDP growth, it is possible to look on the expenditures according to first decomposition of GDP (Fig. 1.2) or on the value added of economic sectors according to the third decomposition (Fig. 1.3). Except the period 1981-1990, the period of full instability, and 1999-2003, the post-crises period, from the perspectives of expenditures the main contributor in the growth of real GDP was consumer consumption (C). In the period 1981-1990, the main contributor was government consumption (G). Investments (I) made huge contribution in growth of the real GDP in 1971-1980 and in 2004-2010. In all other periods, the contribution of investments was about zero or negative.
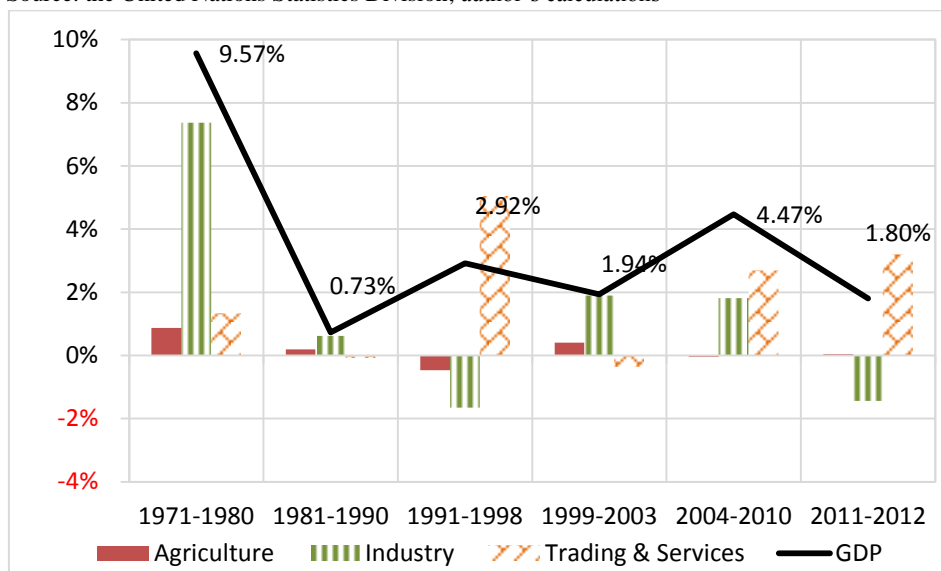
Fig. 1.3 Determinants of Brazilian real GDP growth by value added through decades

From the perspective of value added, in 1991-2000, 2004-2010, and 2010-2012 periods, the main contributor into real GDP growth was trading and services. However, industry contributed more than three quarter of real GDP growth in 1971-1980 and a little below 50% in 2004-2010. Agriculture, made very little contribution in real GDP growth.
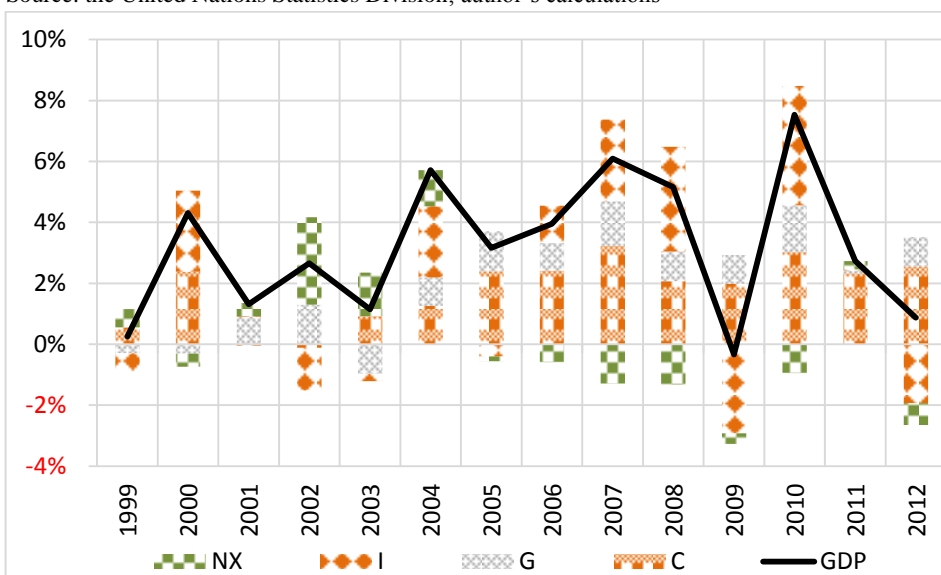
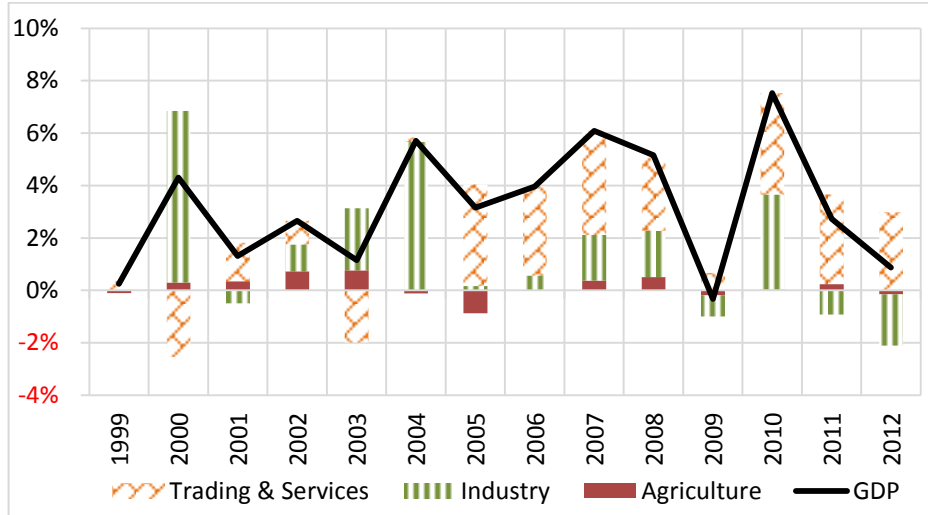Fig. 1.4 Determinants of Brazilian real GDP growth from 1999 till 2012

Fig. 1.5 Determinants of Brazilian real GDP growth by value added from 1999 till 2012

On the Fig. 1.4 and Fig. 1.5 it is shown the yearly decomposition of GDP on the expenditures and value added accordingly. For example, in 2009 the main contributor in negative GDP growth was investments drop (also as in 2012), while contribution of consumer and government spending stayed on level of 2008 or 2006 year, and less in a half times than in 2007. However, already in 2010, the contribution in real GDP growth of consumer and government spending returned to the level of 2007. Also, Fig. 1.4 shows that net export made the negative contribution to the real GDP growth in the period 2005-2010, while it was positive from 2001 till 2004. In 2009, shortage of investments led to the meager changing of value added of economic sectors, and only trading and services showed positive dynamics.
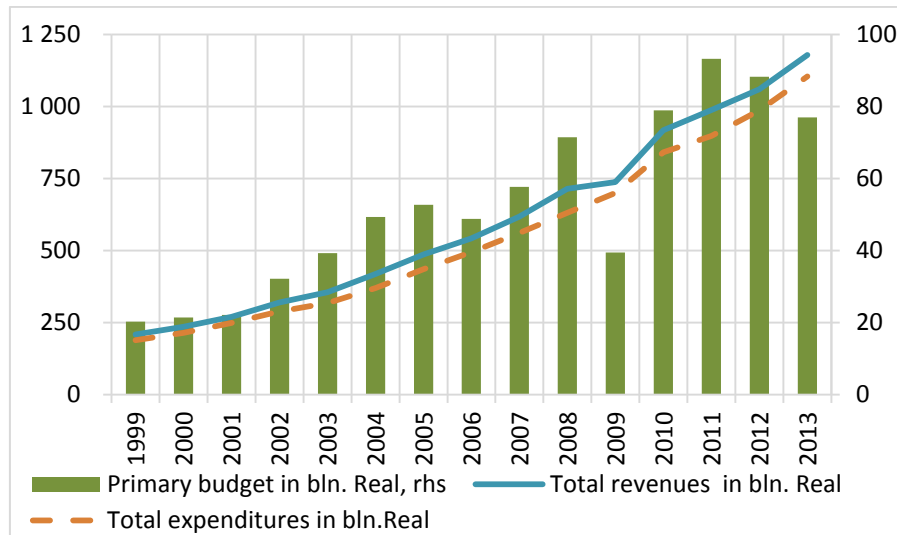
Fig. 1.6 Total revenues & expenditures of Brazilian government and primary budget

For creating IS-LM diagrams it is necessary to investigate the dynamics of the main tools of the short run policy: government spending and money supply. On the Fig. 1.6 is shown the dynamics of total revenues and expenditures of Brazilian government which increased more than five times from 1999 till 2013. The linear trend of total expenditures grew exponentially during the period 1999-2013 with the next equation:

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$$Y = 171.0 \ e^{0.1282*X}, \tag{1.2}$$

where

Y – total expenditures,

X – number of years from 1999 year (1999 equal 1).

According to equation (1.2) the total expenditures grew each year on 13.68% in the period 1999-2013 what is bigger than nominal GDP growth. Such high growth has been possible because total revenues have risen fast, too, by reason of nominal GDP growth and because businesses have left the informal economy. However, due to hard peg of minimum wages and pensions to the inflation, the social expenses grew automatically in 1999-2013 on 6.43% in average, even without accounting for increasing number of pensioners, unemployment people, or public servants and new social benefits programs. Therefore, the bigger part of growth in total expenditures did not go on investments: in 1999 the share of capital and current investments was 19.9%, 47 bln. Real, and in 2013 was 31.7%, 348.1bln. Real: growth on 300.9 bln. Real from 914.9 bln. Real growth of total expenditures. Thus, it is fairly to say that government expenditure is fully short run tools, because money from government spending is used on paying social transfer and payroll on excess public servants, but not on investments in infrastructure. By estimation of The McKinsey Global Institute, just 1.5% of Brazil's GDP is spent on infrastructure, whereas global average is 3.8%, and the total value of infrastructure stock is 16% of GDP, whereas in German is 70%, in Poland is 80%, in Japan is 179%. To reach the level of German, Brazil government needs to spend 4.7% of GDP each year till 2030 (McKinsey, 2013).
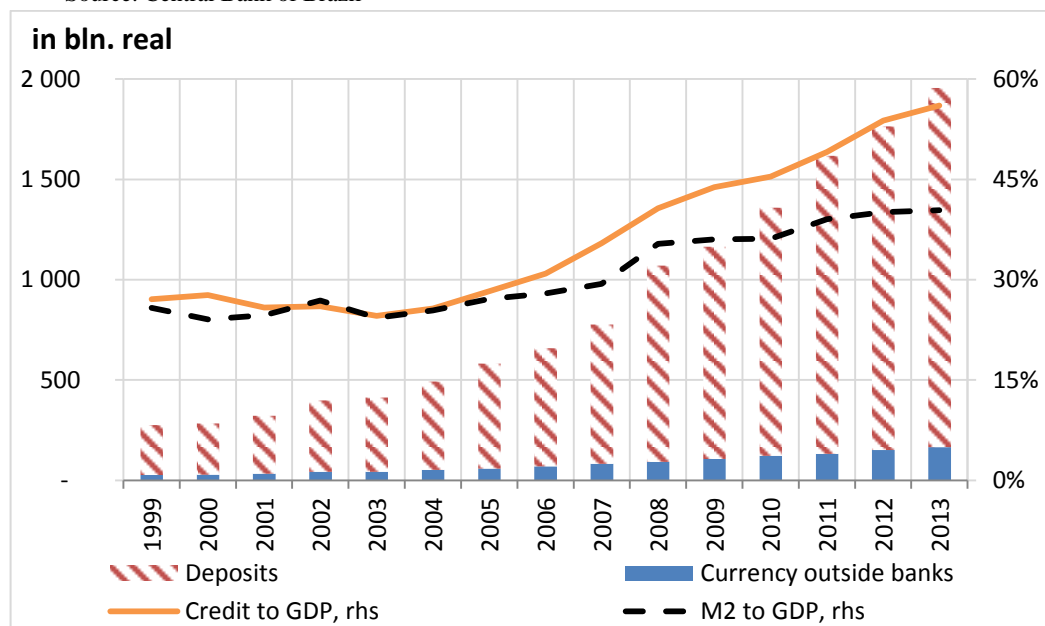
Source: Central Bank of Brazil



Fig. 1.7 Money supply in 1999-2013

The dynamic of second tool, money supply, in 1999-2013 is shown on Fig. 1.7. Money supply (M2) grew faster than nominal GDP and consumer price index: the ratio M2 to GDP grew on a half, the ratio M2 to P (price level) grew in two and half times. However, the supply of credits grew faster and the difference was financed from abroad[1]. On Fig. 1.8 shows that in period 2001-2012 Brazil had positive balance of payments in each year. It is important to pay

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[1] From 1999, in Brazil is used floating exchange rate regime and inflation targeting policy.

attention to two facts: portfolio investment was very meager in 2008, but the negative effects on investments were observed only in 2009; splash in positive balance of payments matched with growth of Credit to GDP ratio and of Central Bank's foreign reserves. Compared with money supply, money demand (currency outside banks) increased slower from 1999 till 2012: 634.6% against 712.2%.
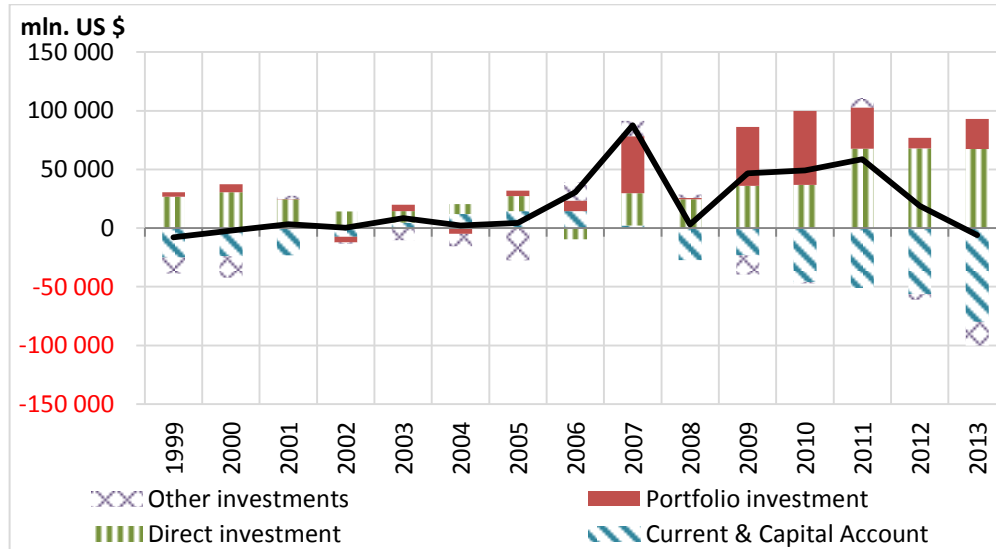


Fig. 1.8 Balance of payments in 1999-2013

As the conclusion of short and medium run it is necessary to look on the IS-LM diagram for understanding policy mix of Brazilian government before the global financial crisis (Fig. 1.9) and in 2009 (Fig. 1.10), and on AS-AD diagram (Fig. 1.11) for understanding the issue with short run stimulation without limits.
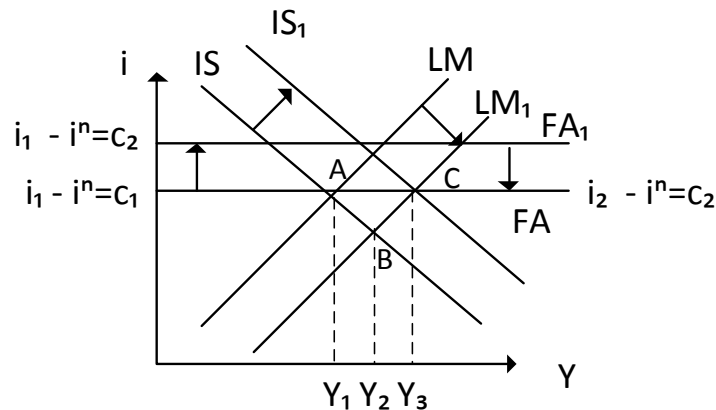


Fig. 1.9 Brazilian IS-LM diagram for pre-crisis year

The Brazilian economy relied strongly on foreign capital inflow. In classical IS-LM diagram with float exchange rate and perfect capital mobility it is supposed that, in equilibrium state, interest rates in both markets, domestic and foreign, are equal. However, on practice it is not possible because of premium for risk in developing countries. Therefore, on Fig. 1.9 the initial equilibrium state is found where domestic rate, $i_1$, is higher than foreign interest rate, $i^n$, on some constant, $c_1$. Fig 1.9 is processed in the next order: $c_1$ decreases to $c_2$ due to improvement in foreign investors' expectations; foreign capital flows into Brazil, exchange rate appreciated,

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and money supply increases; increase in money supply shifts LM-curve down to point B that lowers interest rate and increases output; decrease of interest rate and exchange rate, growth of import make balance of payment zero; IS-curve shifts right because new investment, consumption and government expenditure growth is higher than decrease of net export; new equilibrium, point C, shows more output, lower domestic interest rate, and lower risk premium.
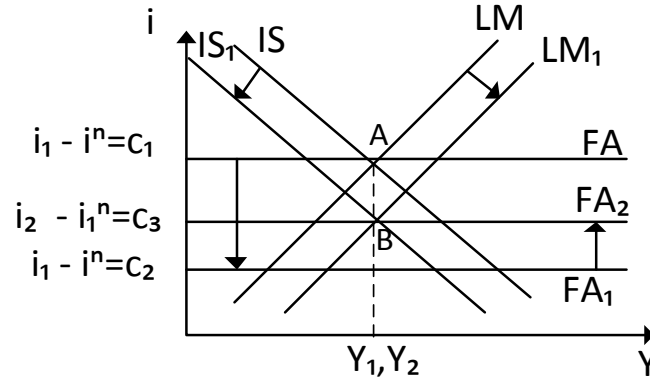


Fig. 1.10 Brazilian IS-LM diagram for 2009

However, in the global financial crisis was observed another situation, which is shown on Fig. 1.10: $c_1$ fell to $c_2$ due to the global financial crisis; the capital inflow disappeared, exchange rate depreciated, FA curve is moving; the central bank took steps to monetary stimulation and money supply grew; increasing in money supply shift LM-curve to the right to point B that lowers interest rate and increases output; decreasing of interest rate, and growth of exchange rate made the Brazilian economy more attractive for foreign investments: $c_2$ rise to $c_3$, and FA curve shifts up to point B; IS curve shifts left to point B because the drop in investment is higher than growth of consumption and government expenditures which is stimulated through monetary and fiscal stimulation; new equilibrium, point B, shows about the same output (in constant prices) and lower domestic interest rate.
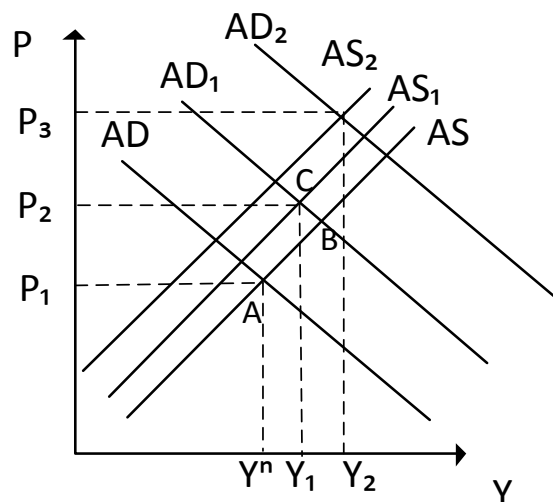


Fig. 1.11 AS-AD diagram for overheated economy

Finally, AS-AD diagram from Fig. 1.11 shows how dangerous could be short term unlimited growth without long-term reforms. Each year output is growing (Fig. 1.9) and AD-

curve shifts right (for example, from point A to point B). The shift of AD-curve influences price levels and price expectations which begin to grow, however, with the lower rate than output is growing: AS-curve move from the point B to point C. Finally, there is new equilibrium (point C) with higher price level and output. The repeats of such movements create the positive output gap without natural level changing. In some future point that gap must be closed through higher inflation or recession.

# Chapter II. Long run growth determinants

On Fig. 2.1 is shown Solow's decomposition of real GDP growth for each year from 1990 till 2013 according to The Conference Board calculations. For example, the recession of 2009 was observed due to drop in total factor productivity, TFP. However, Solow's decomposition is part of the long run analysis and, therefore, it is better to look on the aggregate data. In the 1990-2013, average growth of real GDP in Brazil was 2.5% what was caused by growth in labor force on 1.0% per year, by accumulation of capital on 1.7% per year, and by fall in TFP on 0.2%. That adds one more argument that Brazilian government does not make enough for modernization of Brazilian economy, and relies fully on speculative capital inflow and growing labor force, on natural potential of country. Such growth pattern is not stable in long perspective.
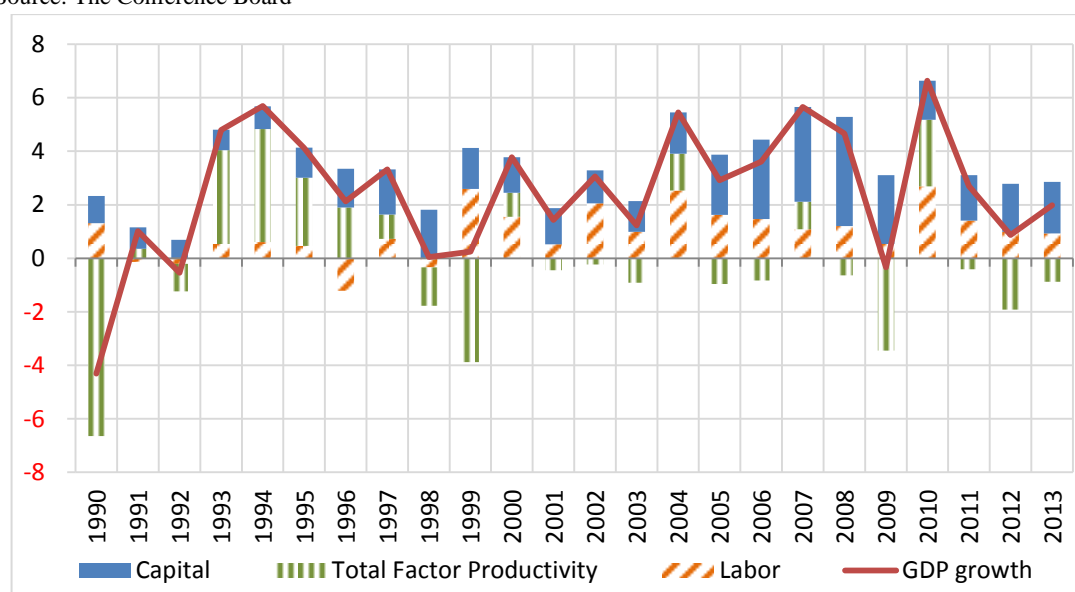
Source: The Conference Board



Fig. 2.1 Solow's decomposition of Brazilian real GDP growth from 1990 till 2013

Fig. 2.2 shows that from 1990 the share of investments in GDP was a little lower than 20%, as the share of government spending, and stable. However, before 1990, the share of government spending was near 10% of GDP, and the share of investments was bigger than 20% of GDP. Such low ratio of investments to GDP is specific for developed countries[2] (figures as of 2012): European Union 17.9%, G7 18.0%, but not developing country: Mexico 24.2%, Advanced Economies (excluding G7 and Eurozone) 24.4%. Low investment in Brazil is due to low savings: IMF calculated that ratio savings to GDP in 2010 should be about 25% (actual was about 17%) according to regression model based on an unbalanced panel of 49 advanced and emerging economies (IMF, 2013). Therefore, Brazilian economy could be described as dynamically efficient economy and Brazilians need to lower consumption for getting higher future consumption. However, Brazilian government can also lower taxes, but then they should to find new sources of revenues abroad. The Brazilian ratio of taxes to GDP is also specific for developed countries (Fig. 2.3), but not developing.

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[2] For developing countries investments should be higher than depreciation of investments, however, developed countries could make investments on level of depreciation.
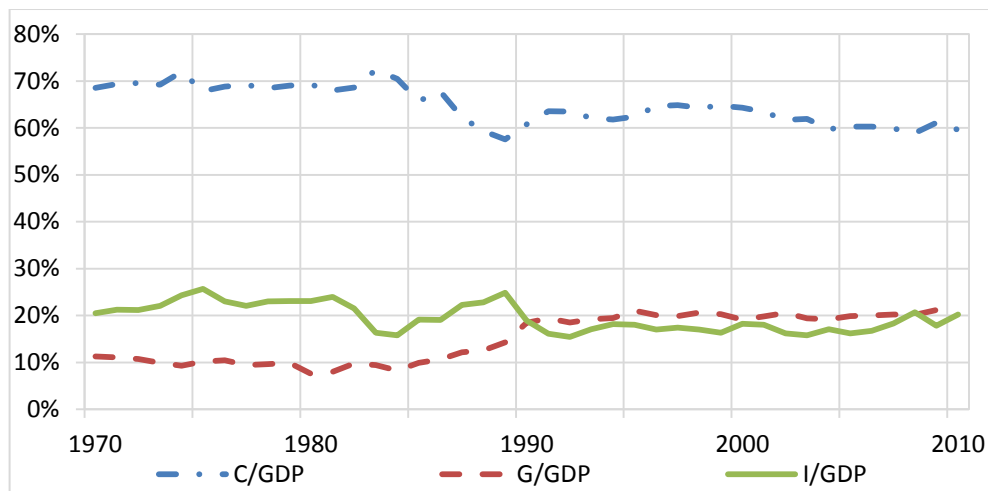
Fig. 2.2 The ratio of GDP's components to the GDP

According to Joyce, there are reforms which Brazil should implement if its government expects the high and stable long term growth: political reform, pension reform, labor reform, and tax reform (Joyce, 2013). Nothing was done with these reforms in the time of Lula da Silva and Dilma Rouseff presidency. Therefore, now Brazilians have two choices, according to Joyce (2013, p.14): "accepting cutbacks in overgenerous handouts or continuing to put up with appalling infrastructure and public services".
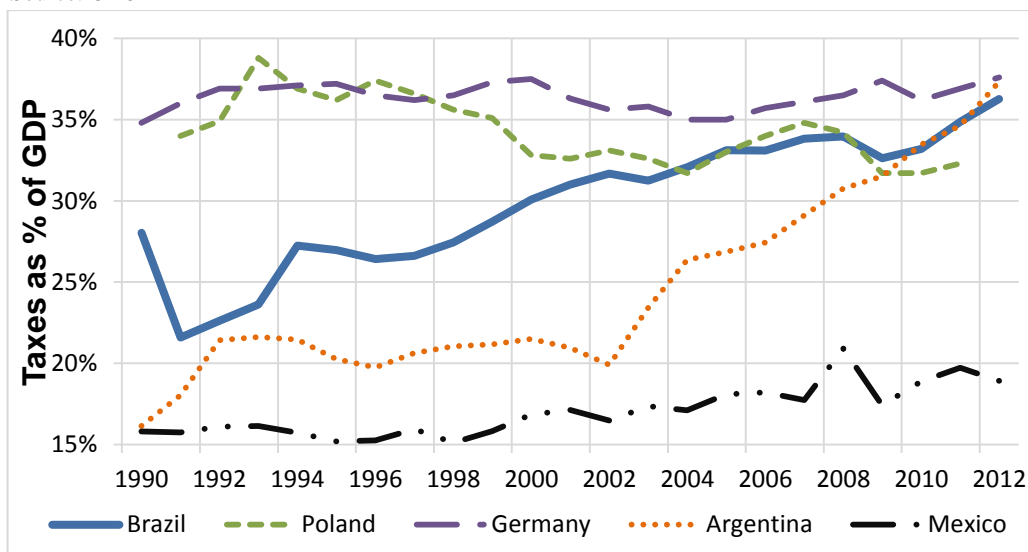
Fig. 2.3 The ratio of taxes to the GDP

# Chapter III. Comparison with Poland

From 1991 till 2012 Poland GDP grew almost in 2.3 times: from 542 bln. zl. to 1 318 bln. bln. zl (in constant prices of 2005). The dynamics of Poland real GDP growth in 1991-2012 can be described in the form of linear trend with the equation:

$$Y = 37.8 * X + 461.6, \tag{3.1}$$

where

      Y – GDP in 2005 constant prices,
      X – number of years from 1991 year.

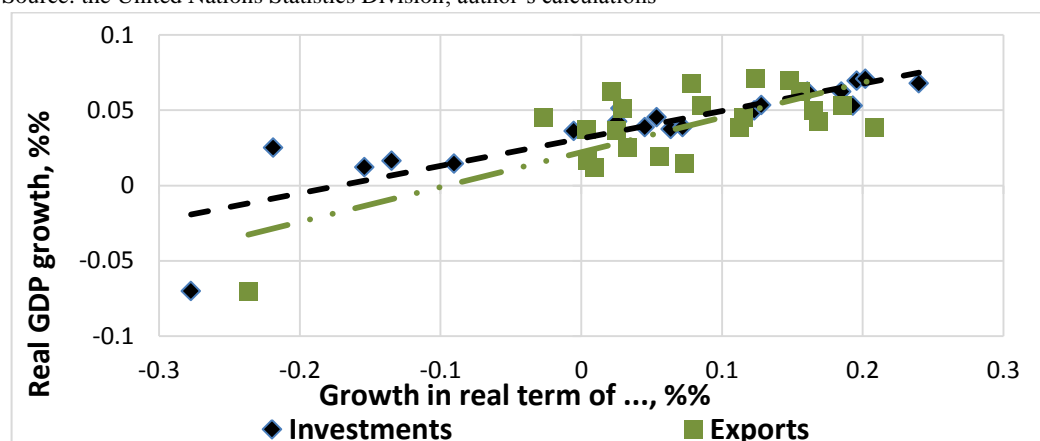Source: the United Nations Statistics Division; author's calculations



Fig. 3.1 Relation of real GDP growth with growth of investments and exports in 1991-2012

According to linear trend, the growth rate of Brazil was 1.71% as of 2010, whereas in Poland 3.05% (37.8/1 238). According to decomposition of GDP by expenditures consumers spending was the main contributor to the Polish real GDP growth in 1991-2012: 2.98% from 3.83% of real GDP growth per year; the contribution of other components of GDP was as follow: government spending 0.58%, investments 0.64%, net export -0.367%. However, the components of GDP with the highest explanatory power (according to $R^2$) were investments (75.44% of variance) and exports (55.44%) compared with consumer spending (71.4%) and investments (48.7%) for Brazil.

Source: the United Nations Statistics Division; author's calculations
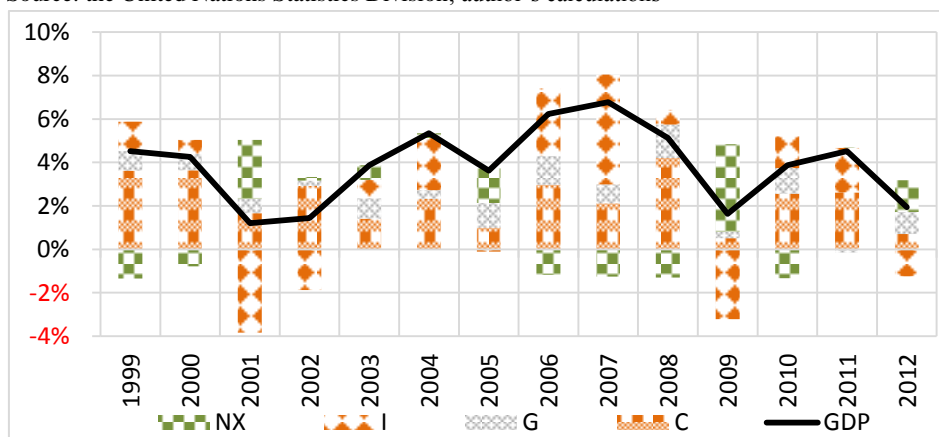


Fig. 3.2 Determinants of Poland real GDP growth from 1999 till 2012

In 2009, as Fig. 3.2 shows, the positive contribution of net exports exceeded the negative contribution of investments, 4.55% against 3.22%; consumer and government spending added a little. As was mentioned in Chapter I, in Brazil the drop in investments was also presented, but there was no growth in net exports. Decomposition of net export on export and import shows that import fell in Poland as in Brazil, however, the export in Poland grew a little, whereas, the export in Brazil fell at the same rate as import. Therefore, the main source of excellent growth rate of real GDP in crisis was stability of Poland export. The macroeconomic theory says that export is influenced by real exchange rate and output in foreign country. Poland and Brazil was in almost the same situations with output of foreign country (even though there are differences in export structure, its influence cannot be so huge). However, the policy on foreign exchange rate, in fact, differed a lot. Foreign exchange rate of both country had fell in 2008 end, but in 2009, Real return to the level of 2007, whereas, zloty foreign exchange rate to US dollar stayed flat (Fig. 3.3), therefore "the flexible exchange rate represents a key counter-cyclical force" for Poland (Andrle, Garcia-Saltos, Ho, 2014).
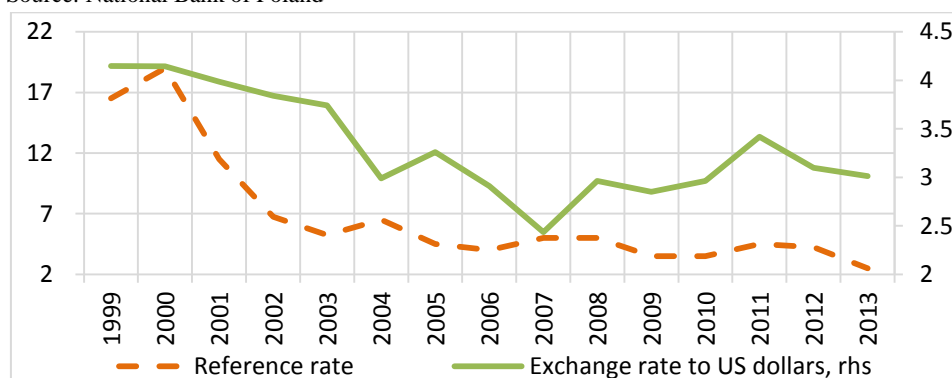
Source: National Bank of Poland



Fig. 3.3 Reference rate (CB rate) and foreign exchange rate

Sometimes, it is said that government spending could be used as counter-cyclical tools. However, after the global financial crisis, it was not observed the substantially faster growth rate of total expenditures in Poland and in Brazil than according to exponential trend (Fig. 1.7 and Fig. 3.4). Therefore, it is more correctly to say that best counter-cyclical tools is not the government spending itself, but the continuation in growth of total expenditures, even in the time when the growth rate of total revenues slow or show a little drop, and hope that total revenues returns to the pre-crisis trend (Brazil returned already in 2010, Poland one year later in 2011).

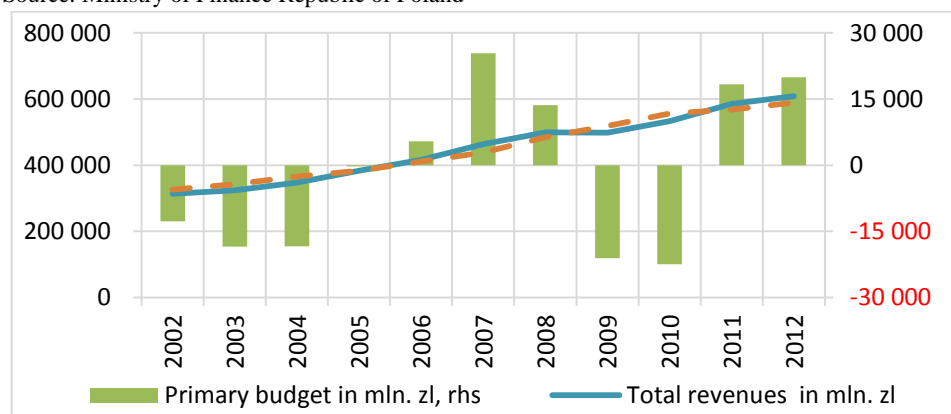Source: Ministry of Finance Republic of Poland



Fig. 3.4 Total revenues & expenditures of Poland government and primary budget
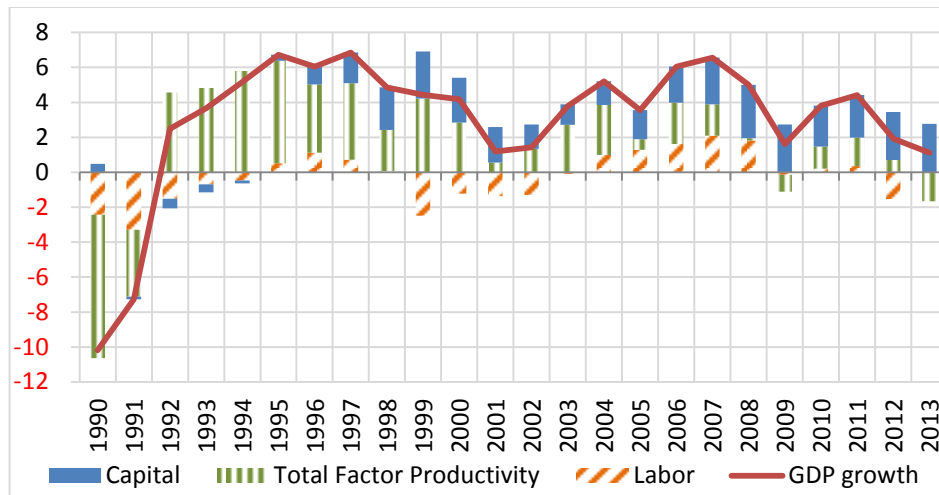
Fig. 3.5 Solow's decomposition of Polish real GDP growth from 1990 till 2013

There are also differences between Poland and Brazil in long run growth (in production function). On Fig. 3.5 is shown Solow's decomposition of Polish real GDP growth for each year in 1990-2013 according to The Conference Board calculations, and it differs from Brazilian. For example, in 2009 there was drop in TFP, but it was much lower than in Brazil. On the whole, in the 1990-2013, average growth of real GDP in Poland was 3.26% what was caused by growth in TFP on 1.97%, by accumulation of capital on 1.53%, and by drop in labor force on 0.24%. As was mentioned in Chapter 2, the main contributors to the Brazilian long run growth were capital accumulation and labor force, but in Poland there are TFP and capital accumulation. Therefore, Poland is less dependent on capital growth and natural resources, and its long run growth is more stable. The result of the divergence in drivers of economics is shown on Fig. 3.6.
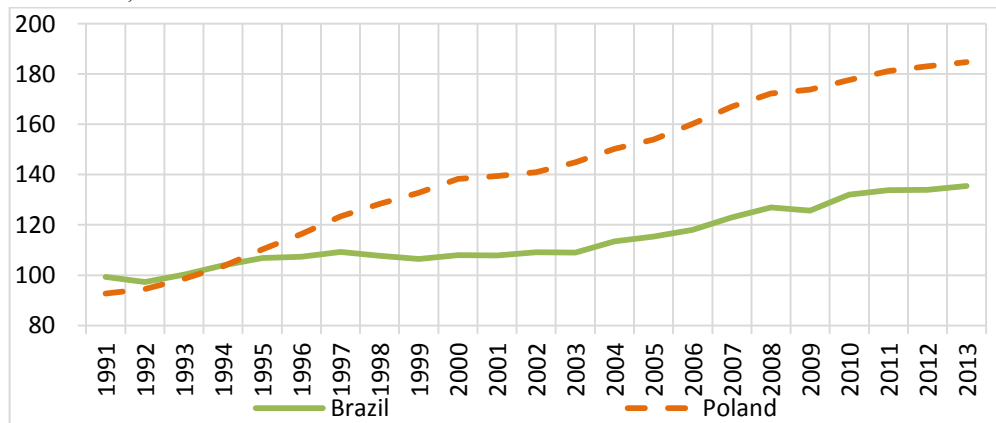
Fig. 3.6 GDP per capita index, 1990 year is equal 100

# Conclusion

The inclusion Brazil in acronym BRIC's played rather bad role for Brazilian economy. It is possible that Brazilian economy would be overheated by speculative foreign capital due to high natural growth potential anyway, however, the lower accent on its positive sides could lead to additional long run growth reform: political reform, pension reform, labor reform, or tax reform, as it was in 90's (The Real Plan, the target inflation policy, the floating currency rate, etc). In fact, Brazil became the country just with short run vision. It is not hard to be reelected if you can pay money to poor people from government expenses, but it is more complicated if you decide to create some opportunities for long run growth while lowering the payment to poor people. Therefore it is understandable why political elite of Brazil chooses simplest way. However, it is bad for long term growth and GDP per capita which showed very poor performance: growth only on 35.5% from 1991 till 2013 (21.2% in 2004-2010). For example, GDP per capita of Poland grew on 84.7% for the same period of time (22.6% in 2004-2010).

The excellent short run strategy of Brazil in 2001-2013 was as follows: give money to poor people and widen middle class; take more taxes from GDP, which is pumped up through consumption of newly created middle class and squeeze in informal sector; make a little investment for getting additional speculation foreign capital and make bigger payment to the poor and newly created middle class; and so on. However, the flow of money is not infinite and such strategy could not last forever; strength of its crash in the end depends on the deviation from the natural level.

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# Appendix I. Historical reference

The first oil shock doubled Brazilian import within a year and the second set off uncontrolled inflation that caused 110% price rise for 1980. However, first oil crisis did not influence the growth rate which in the period 1971-1980 did not fall below 4.93%. At the same time, the unmanageable inflation together with political reform, taking steps to democracy from military government which took place in 1979, caused the drop of GDP in 1981 on 11.55% after growth on 18.25% in 1980. Furthermore, default of Mexico in 1982 caused the default of Brazil in 1983, too, and made the task of curbing inflation impossible to solve till August of 1994. The Brazilian government made four useless attempts to bring some stability into the economics: The Cruzardo Plan, The Bresser Plan, The Verao Plan, and The Collor Plan, and three denomination of currency (1986, 1989, and 1993). However, only The Real Plan and new currency, Brazilian Real, solved this problem in 1994. The period of positive real GDP growth began in 1993, withstood four exterior crises: the tequila crisis (1994), the Asia crisis (1997), the Russia and LCTM crisis (1998), the dotcom crash and Argentina's default (2001), and was interrupted only in 2009 after the global financial crisis (The Economist, 2009).

# Appendix II. Relation between GDP and its components

On the Fig. II.1 is shown the relation between real GDP growth and two of its components with the highest explanatory power (according to $R^2$): consumer spending (independently explains 71.4% of variance in real GDP growth) and investments (48.7% of variance). The equation of this relation is shown below.

**Consumer spending:** $\qquad$ **$Y = 0.778 * X_1 + 0.012$,** $\qquad\qquad$ **(II.1)**

**Investments:** $\qquad\qquad$ **$Y = 0.28 * X_2 + 0.028$,** $\qquad\qquad\qquad$ **(II.2)**

where

$Y$ – rate of real GDP growth,

$X_1$ – rate of consumer spending growth in real term,

$X_2$ – rate of investments growth in real term.

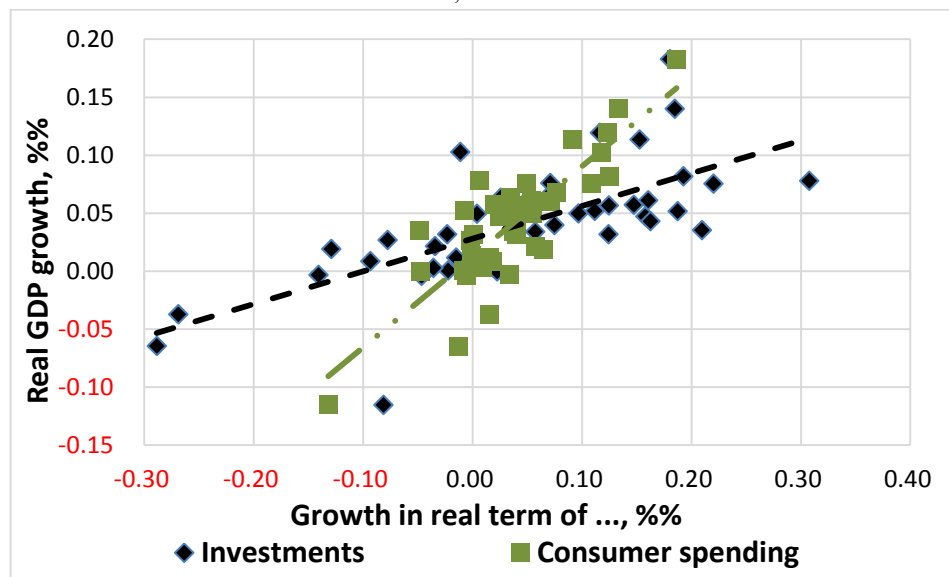Source: the United Nations Statistics Division; author's calculations



Fig. II.1 Relation of Brazilian real GDP growth with growth of investments and consumer spending in 1971-2013

The equations (II.1) and (II.2) are important for policy decision because they show the historical relation between real GDP growth and consumer spending or investments growth. For example, the equation (II.1) shows that if government creates some policy mix which will stimulate consumptions spending on 1% then it can expect the growth of real GDP on 0.77%. For the investments the effect is three times lower, only 0.28%. Unfortunately, in the period 1971-2013, the government spending did not show the stable relation with real GDP growth (explain only 1.3% of variance in real GDP growth), therefore, it is impossible to use equations like (II.1) or (II.2) for policy decision about the suitable level of government spending. Additionally, decision maker need to be careful, because $R^2$ and relation coefficients was different for four decades. For example, $R^2$ for investments was grown from 26.65% in 1971-1980 to 85.24% in 2001-2010, while policy effect was fallen from 0.32% in 1971-1980 to 0.19% 2001-2010. At the same time, $R^2$ for consumer spending was fallen from 77.66% in 1971-1980 to 31.03% in 2001-2010, while policy effect showed high stability: 0.70% in 1971-1980, 0.71% in 1981-1990, 0.58% in 1991-2000, and 0.72% in 2001-2010.

# Appendix III. Foreign exchange rate and inflation targeting policy

The stable positive balance of payments is consequence of The Real Plan and inflation targeting regime, which was enacted in 1999, and the stable positive balance of payments could also be the cause of different issues in Brazilian economics: Brazil imports monetary policy of another country (mostly USA and Europe union, but also China); stable capital inflow could make economy overheated (through the value of currency and assets). On the Fig. III.1 and Fig III.2 it is shown the relations between net investment position of Brazil and exchange rate between Real and US dollar and between IPCA (official consumer price index of Brazil) and Selic rate (the short term rate of Central Bank of Brazil).
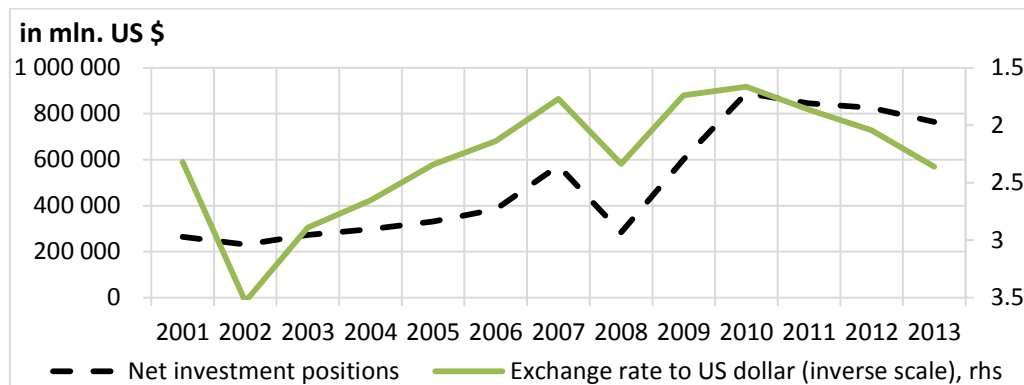
Source: Central Bank of Brazil



Fig. III.1 Relation between net investment positions and foreign exchange rate

From Fig. III.1 could be seen that after 2005 the dynamics of Exchange rate is followed the dynamics of the investment positions, and also balance of payments, because in 2008 Central bank does not use the foreign reserves for supporting foreign exchange rate of Real. At the same time, the growth of IPCA (or slowing in decreasing) is followed by the growth of Selic rate due to inflation target regime and, also, by market rates, which "are quite sensitive to changes in the policy rate" (Minella and Souza-Sobrinho, 2009, p.6). Considering all, it is understandable why purchasing power of Brazilians is so low: positive and stable capital inflow causes inflation and high exchange rate; inflation causes higher interest rate, what causes higher speculative capital inflow; finally, this creates self-feeding feedback, very expensive currency, and overheated economy (The Economist, 2011). However, fully disruption of this feedback cannot solve the problem, because country would fall in recession like Spain after the global financial crisis.
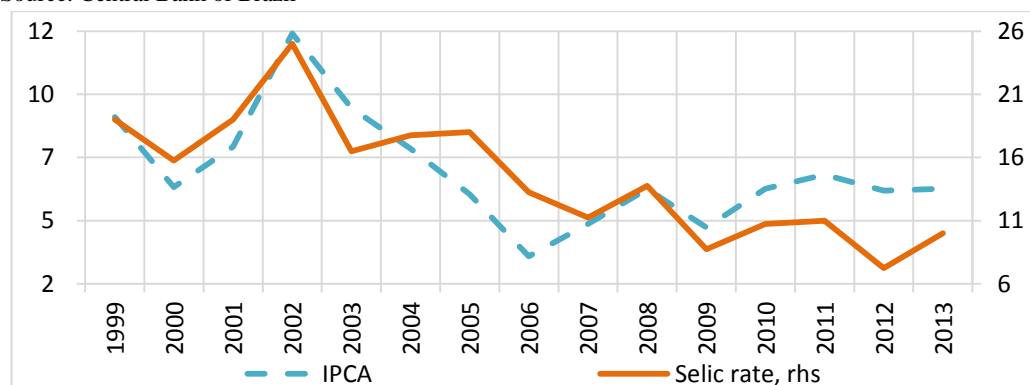
Source: Central Bank of Brazil



Fig. III.2 Relation between IPCA (Extended Consumer Price Index) and Selic rate (CB rate)

# Appendix IV. Description of data and time series

**Nominal GDP and its components**: consumer spending, government Spending, gross fixed capital formation, changes in inventories, exports of goods and services, imports of goods and services, for both countries: Brazil and Poland, were taken from the site of United Nations Statistics Division (http://unstats.un.org/unsd/snaama/selbasicFast.asp). These data show first decomposition of GDP by expenditures in current prices from 1970 till 2012.

**Nominal GDP and its components**: agriculture, hunting, forestry, fishing; mining, manufacturing, utilities; construction; wholesale, retail trading, restaurants and hotels; transport, storage and communications; other Services, for Brazil, were taken from the site of United Nations Statistics Division (http://unstats.un.org/unsd/snaama/selbasicFast.asp). These data show third decomposition of GDP by value added in current prices from 1970 till 2012.

**Deflator** was taken from the site of United Nations Statistics Division (http://unstats.un.org/unsd/snaama/selbasicFast.asp). This data shows the index for transformation GDP data from current prices into constant prices of 2005 year.

**Growth accounting and total factor productivity country details** were taken from the site of The Conference Board (https://www.conference-board.org/data/economydatabase/index.cfm). These data describe Solow's decomposition of GDP growth in five parts: contribution of labor quantity; contribution of labor composition index; contribution of information and communication technology, ICT, capital services; contribution of non-ICT capital services; and total factor productivity growth estimated as Tornqvist index, from 1990.

**Taxes and its structure**, for all countries, were taken from the site of OECD Statistics (http://stats.oecd.org/Index.aspx?DataSetCode=RSLACT#). These data describes the sources of collected taxes for countries of OECD and Latin America from 1990.

**Balance of payments and its components**: Current & capital account, direct investment; portfolio investments; other investments; financial derivatives; and errors and omissions, were taken from the sites of central banks of Brazil and Poland (Brazil: https://www3.bcb.gov.br/sgspub/localizarseries/localizarSeries.do?method=prepararTelaLocalizarSeries, Poland: www.nbp.pl/homen.aspx?c=/ascx/subgen.ascx&navid=5088). These data show the dynamics of inflow and outflows of foreign currency from 1947 for Brazil and from 2004 for Poland.

**Net investment position and central bank reserves** were taken from annual report of Central bank of Brazil (http://www.bcb.gov.br/?RED-ANNUALREPORT). These data show assets and liabilities in foreign currency, incl. central bank reserves in reserve foreign currencies and banking precious metals from 2001.

**Market indicators**: Selic Rate, IPCA, and foreign exchange rate, were taken from the site of Central bank of Brazil (https://www3.bcb.gov.br/sgspub/localizarseries/localizarSeries.do?method=prepararTelaLocalizarSeries). These data show the changes of central bank interest rate, official consumer price index and exchange rate of Brazilian Real to US dollar for different periods of time.

**Budget of government and its components**: total revenues, total expenditures, primary budget, capital and current expenditures, etc., were taken from the site of Central bank of Brazil

(https://www3.bcb.gov.br/sgspub/localizarseries/localizarSeries.do?method=prepararTelaLocalizarSeries) and Ministry of Finance of Poland (http://www.mf.gov.pl/en/ministry-of-finance/sdds/gfs-annual-data). These data show the revenues and expenditures of government, budget before interest payments, and the structure of revenues and expenditures from 1997 for Brazil and from 2002 for Poland.

**Monetary indicators**: currency outside banks, deposits, M1, M2, and total outstanding credit, were taken from the site of Central bank of Brazil (https://www3.bcb.gov.br/sgspub/localizarseries/localizarSeries.do?method=prepararTelaLocalizarSeries). These data show the dynamics of credits, deposits, currency and monetary index for different periods of time.