

## BRAZILIAN INDIRECT TRADE IN STEEL IN 1970-2011

November 2013



# Brazilian indirect trade in steel in 1970-2011

*A working paper issued by the World Steel Association (worldsteel)*

## Introduction

This paper aims to develop methodologies for determining long term data series for indirect trade in steel in general, and specifically to illustrate the relationship between indirect trade and macroeconomic indicators in Brazil. Detailed information on definitions and methodology can be found in the working paper *Indirect trade in steel: definitions, methodology and applications*, World Steel Association, P. Molajoni and A. Szewczyk, April 2012.

Indirect trade in steel – exports and imports of steel in the form of steel containing manufactured goods – is a critical element in estimating true steel use. Incorporating indirect trade in steel provides a more realistic picture of steel use across countries and over time.

## 1. The concept of indirect trade in steel

Indirect trade in steel represents export and import of steel through exports and imports of goods which contain steel. worldsteel has developed a concept called **true steel use (TSU)**, which incorporates indirect trade in steel to estimate the true use of steel used in a country to meet the country's needs. TSU is obtained by deducting net indirect exports of steel from **apparent steel use (ASU)**. TSU can be expressed in metric tons, finished steel equivalent.

### Definition of True Steel Use

$$\text{TSU} = \text{ASU} + \text{net indirect imports}$$

$$\text{ASU} = \text{deliveries} + \text{net direct imports}$$

TSU is a more relevant concept in understanding true steel demand of a country: ASU takes into account only the impact of direct trade in steel products in estimating steel use of a country and it does not take into account the part of steel used (not used) through imports (exports) of steel containing goods, i.e. indirect imports (exports) of steel. For example, if country A manufactures a car using one tonne of steel and exports it to country B, it will not affect ASU of country A or B. However, TSU of country A will decrease by one tonne and that of country B will increase by one tonne. Therefore, TSU more accurately reflects the amount of steel used in a country.

## 2. Methodological issues

Trade data of fabricated goods (**trade of steel containing goods**) are reported both in value and in volume terms. To calculate the **indirect trade in steel**, it is necessary to estimate how much steel is used in each manufactured product, namely steel coefficients. According to the worldsteel methodology, the **steel coefficient** is the amount of finished steel products (in tonnes) needed to produce one tonne of a manufactured product. This implies that the coefficient can be greater than one for certain products. For example, to produce one tonne of boilers it is estimated that 1.1 tonne of finished steel products is needed.

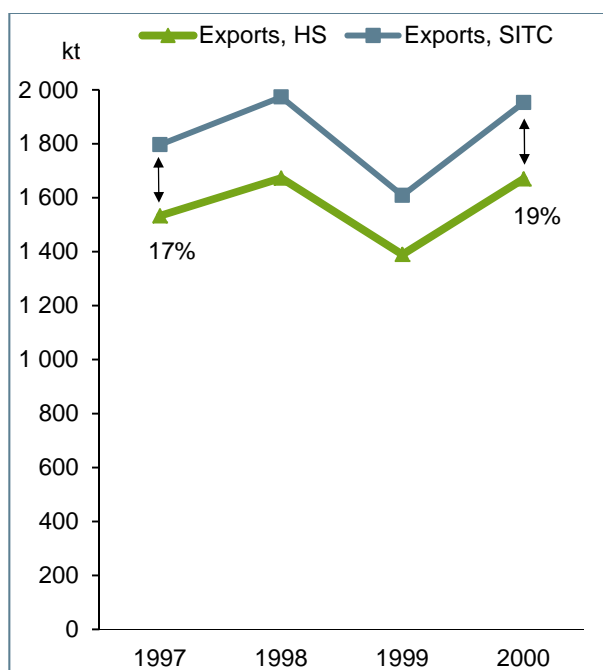
The source of trade data used in the current indirect trade estimation is the United Nations Commodity Trade Statistics Database (Comtrade). Comtrade provides sets of data expressed in volume (kg).

For product description and classification, worldsteel's indirect trade estimation has adopted all versions of the Harmonised Commodity Description and Coding System (HS) from 1997 onwards. For data prior to 1997 Standard International Trade Classification (SITC), rev. 1 was employed. It is necessary to use the two

classifications because data collected according to the HS are available only from the mid-90s. On the other hand the older historical data in the Comtrade database are provided only according to SITC rev. 1.

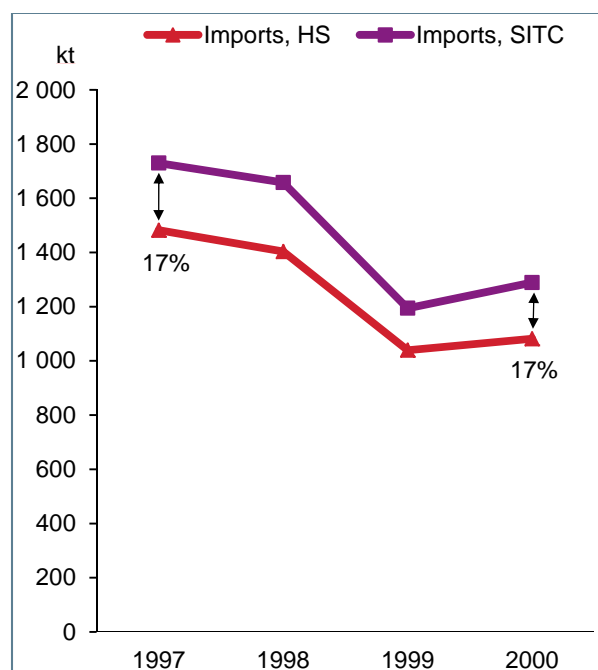
It is expected that the change of classifications will cause a data discrepancy due to two factors. First of all, a 1:1 relation between SITC rev. 1 and HS does not exist. So, although both classifications cover all products, they adopt different approaches to the list of products defined as steel containing goods. Secondly, because of the different classification it was necessary to employ two sets of steel coefficients.

worldsteel made an attempt to evaluate the impact of the change of classifications and steel weights on the long series data quality. Data in Comtrade are available for both classifications for the period 1997-2000. Calculations for HS classifications are lower both for exports and imports. However, trends of the two series are comparable. Results of the calculations are presented on Figure 1 and Figure 2.



**Figure 1: Comparison of HS and SITC indirect exports data for Brazil, thousand tonnes (kt), finished steel equivalent, 1997-2000**

Source: worldsteel



**Figure 2: Comparison of HS and SITC indirect imports data for Brazil, thousand tonnes (kt), finished steel equivalent, 1997-2000**

Source: worldsteel

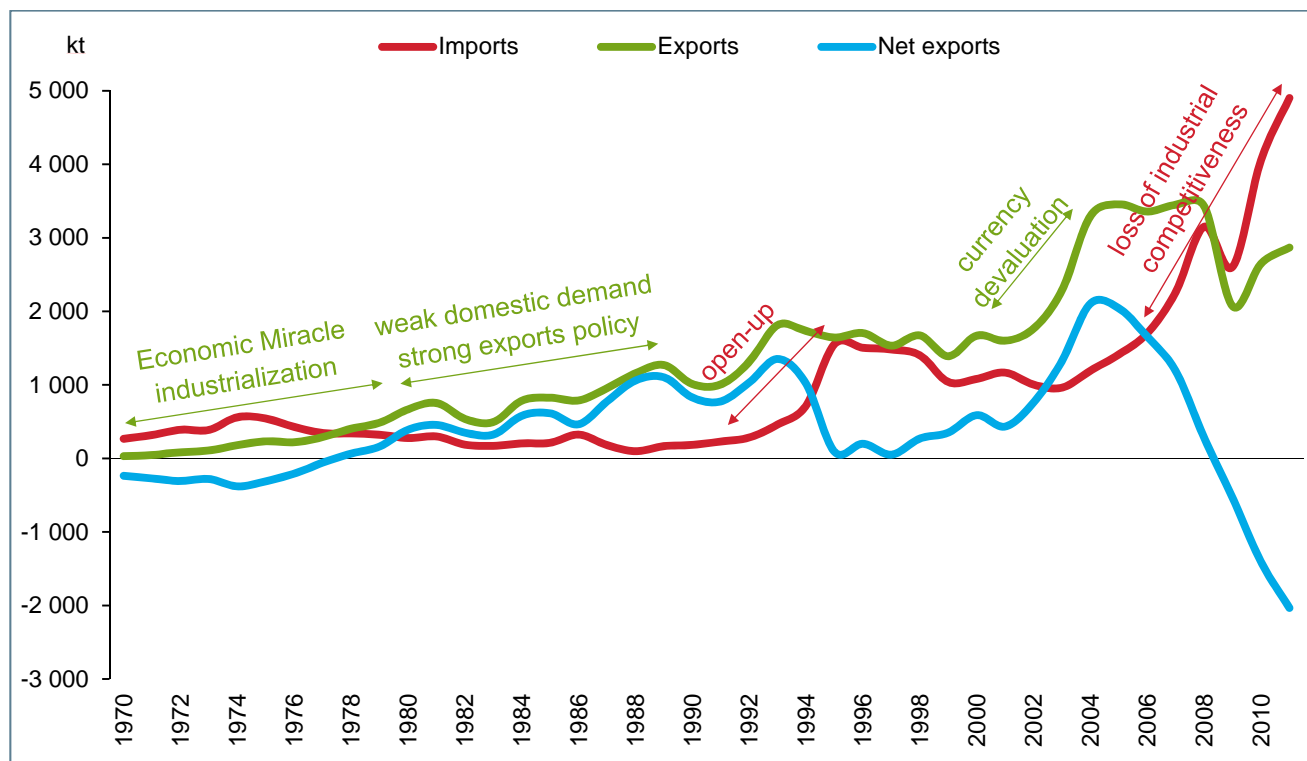
Trade data and results of computations have been presented in this study for six commodity groups: metal products, mechanical machinery, electrical equipment, domestic appliances, automotive and other transport (to match conventional steel-using sector groupings).

### 3. Overview of Brazilian indirect trade in steel

After reaching a peak of 3.5 mega tonnes (Mt) in 2008, indirect exports of Brazil amounted to 2.9 Mt in 2011 compared to 0.03 Mt in 1970 (Figure 3). At the same time indirect imports grew from 0.3 Mt in 1970 to 4.9 Mt in 2011. Whilst both indirect imports and exports showed significant increase, the dynamics over time were different.

Brazil went through a period of remarkable development in the 1970s. The period from 1968 to 1973 is known as “The Brazilian Economic Miracle”. GDP growth reached an average of 11% during this period (Figure 4), driven especially by manufacturing, particularly the durable goods sector. The manufacturing sector was

identified as the main engine for the economic development of Brazil and in order to build a new industrial sector it was necessary to increase capital goods imports. The Brazilian Government implemented in the late 1960's the National Steel Plan, with an intention of enlarging steel production capacity, especially that of state enterprises, and provide resources for the new industrial facilities, as highly steel intensive industrial projects were being implemented in the country.



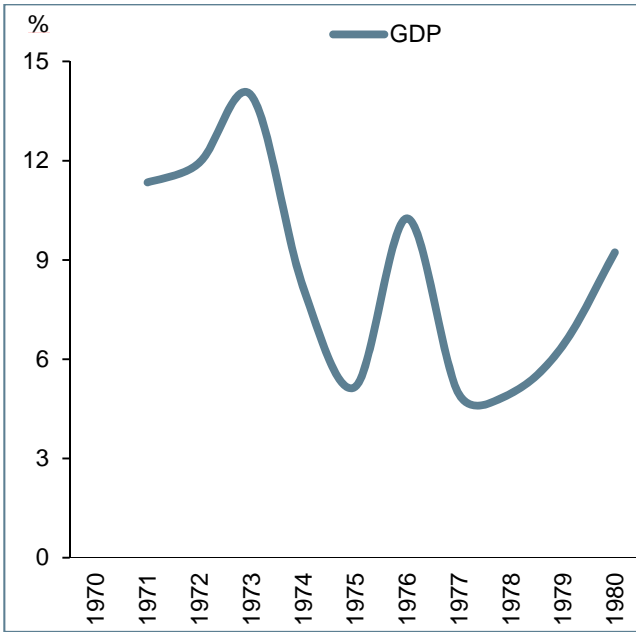
**Figure 3: Indirect trade in steel, Brazil, thousand tonnes (kt), finished steel equivalent, 1970-2011**

Source: worldsteel

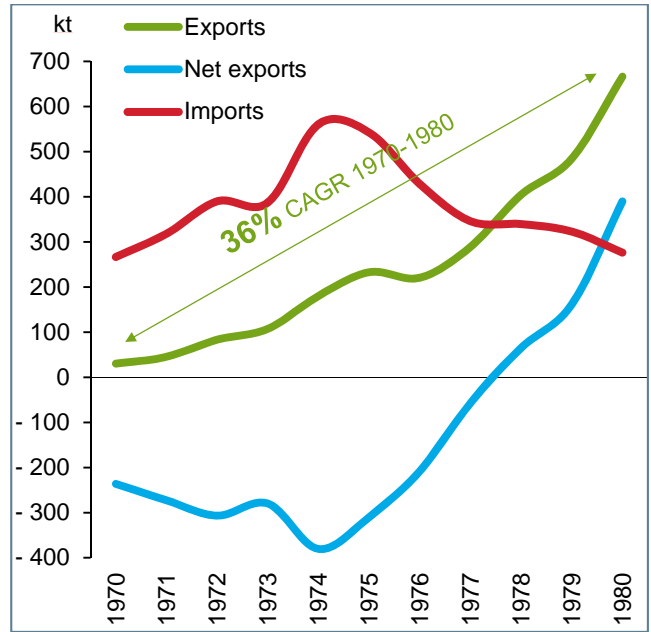
The new steel plants required also a high amount of imports of manufactured goods (such as machinery and equipment), since they were built using technology not available in Brazil. As a consequence, we notice in the early 1970s that the indirect imports were higher than indirect exports, reaching a peak in 1974 (Figure 5).

The indirect imports started to decrease just after the 1973 oil crisis. In order to reduce the country's dependence on imports, the Brazilian Government introduced an ambitious Development Plan – “PND II”, intensifying the imports substitution industrial policy and increasing investments to enlarge the domestic production capacity in strategic sectors, such as capital goods, oil and gas and steel industry. State enterprises were created in sectors that were not attractive for private investment due to the massive initial investments required (Figure 6). Thereupon, the country tapped the excess of international liquidity to support the planned investments. Huge infrastructure projects were also implemented, such as the construction of the world's largest hydroelectric plant, Itaipu, as well as highways, bridges and airports. The GDP average growth was 6.7% between 1974 and 1979, despite the impact of the 1970s world oil crisis (Figure 4).

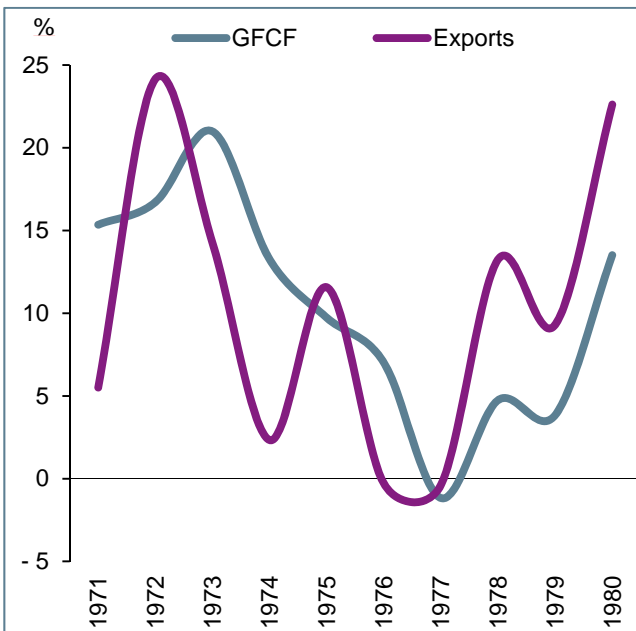
At the same time, exports were encouraged by the Government as a way to promote industrial growth. The Brazilian Government introduced in 1972 a program that established tax exemptions for new industries designed to export. The automotive, capital goods and shipbuilding industry are among the sectors which benefitted from this tax exemption program. In 1978 Brazil became an indirect net exporter of steel. Indirect exports increased every year on average by 36% in the 1970s, growing from 0.03 Mt in 1970 to 0.7 Mt in 1980 (Figure 5).



**Figure 4: Real GDP growth, Brazil, y-o-y (%), 1970-1980**  
 Source: Global Insight



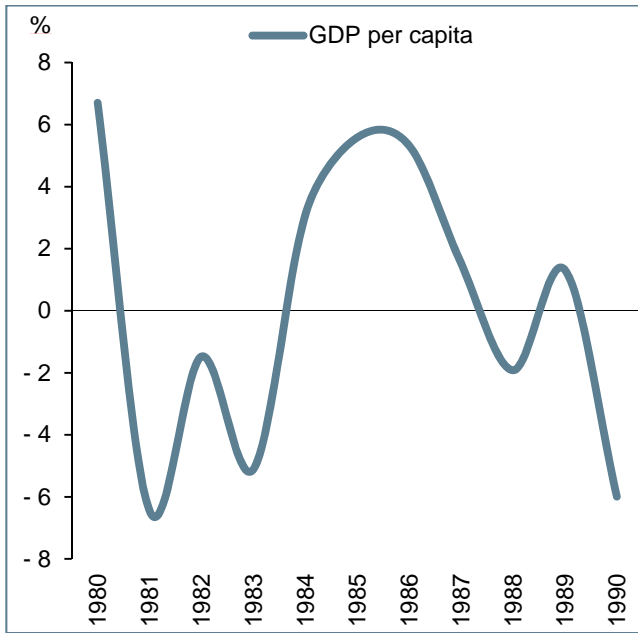
**Figure 5: Indirect trade in steel, Brazil, thousand tonnes (kt), finished steel equivalent, 1970-1980**  
 Source: worldsteel



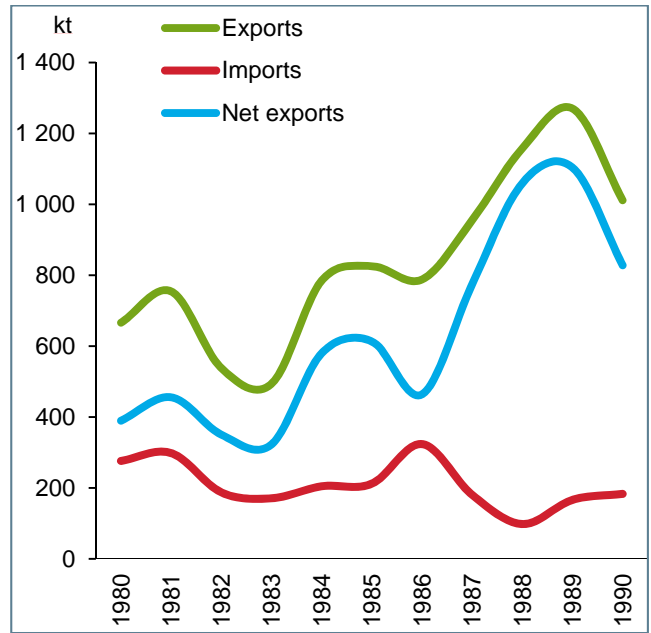
**Figure 6: Real fixed investment and real exports, Brazil, y-o-y (%), 1970-1980**  
 Source: Global Insight

If the 1970s was the decade of “economic miracle”, the 1980s is known in Brazil as the “lost decade”. The huge capital inflows that financed the construction of the new industrial sector became a problem, since international interest rates rose intensely in the late 1970s. As a consequence, by the early 1980s, Brazil had the world’s largest foreign debt. Besides that, the domestic demand was depressed, reinforcing the recession in the country. Therefore, the Government increased export incentives in order to drain the excess of domestic production, promoting strong currency devaluations. As a consequence, there was a massive growth of

manufactured goods exports, which reached 57% of the total Brazilian exports in 1988. In the 1980s indirect exports of steel increased from 666 thousand tonnes in 1980 to 1 270 thousand tonnes in 1989 (Figure 8).

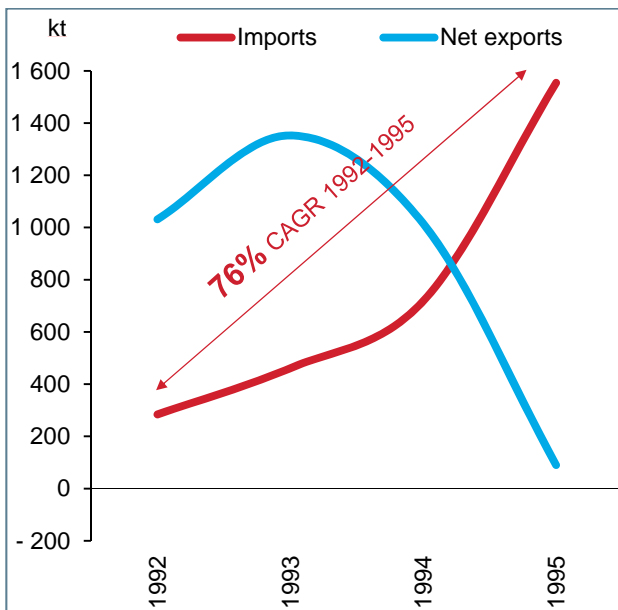


**Figure 7: Real GDP per capita growth, Brazil, y-o-y (%)**, 1980-1990  
Source: Global Insight

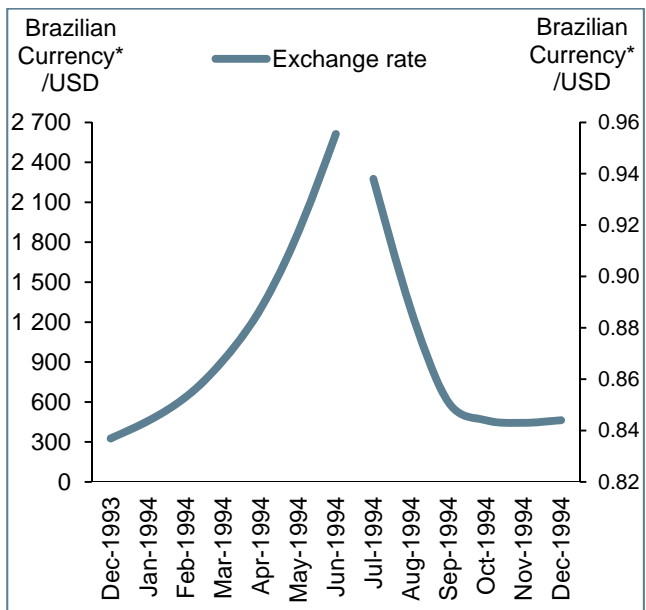


**Figure 8: Indirect trade in steel, Brazil, thousand tonnes (kt)**, finished steel equivalent, 1980-1990  
Source: worldsteel

In the early 1990s, following the international trade liberalization policies, the elimination of non-tariff barriers and the reduction of taxes on imports stimulated a huge import growth in Brazil. The average tariff was reduced from 32% in 1990 to 14% in 1999. As a consequence of the trade liberalization, there was a strong competitive pressure on the Brazilian industries.



**Figure 9: Indirect trade in steel, Brazil, thousand tonnes (kt)**, finished steel equivalent, 1992-1995  
Source: worldsteel



**Figure 10: Exchange rate, Brazil, EOP (Cruzeiros reais/USD)**, Dec 1993-Dec 1994

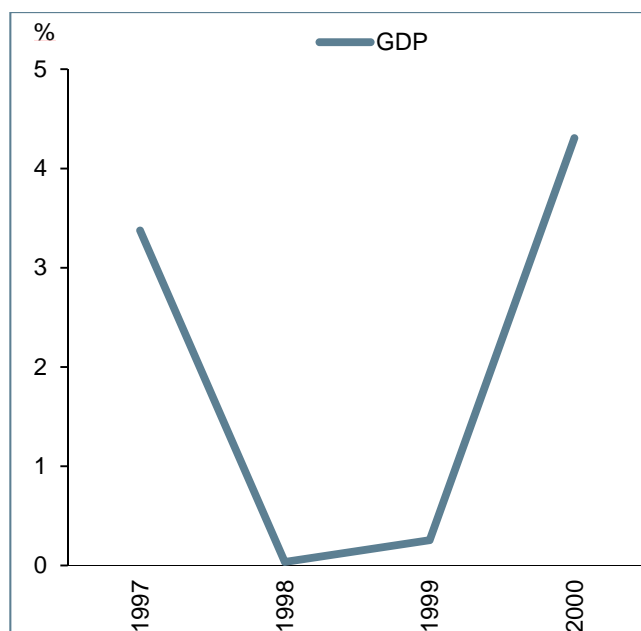
Source: Banco Central do Brasil

\*) Brazilian Currency: Cruzeiros reais until 30 June 1994 and reais from 1 July 1994 on.

Additionally, in 1994, after decades of chronic inflation, the Brazilian government implemented the Real Plan, a stabilisation plan that substituted the currency then in use with the real. The new currency was linked to the dollar on a one-to-one basis and the exchange rate became an instrument of inflation control. The success of the Real Plan depended on maintaining the exchange rate artificially appreciated forcing Brazilian producers to keep their prices down, as otherwise consumers would import. As part of the Real Plan, the Brazilian government also increased the official interest rate as a way of controlling inflation. As a result, net capital inflows increased significantly, contributing to the real reaching 0.84 per dollar by the end of 1994 (Figure 10).

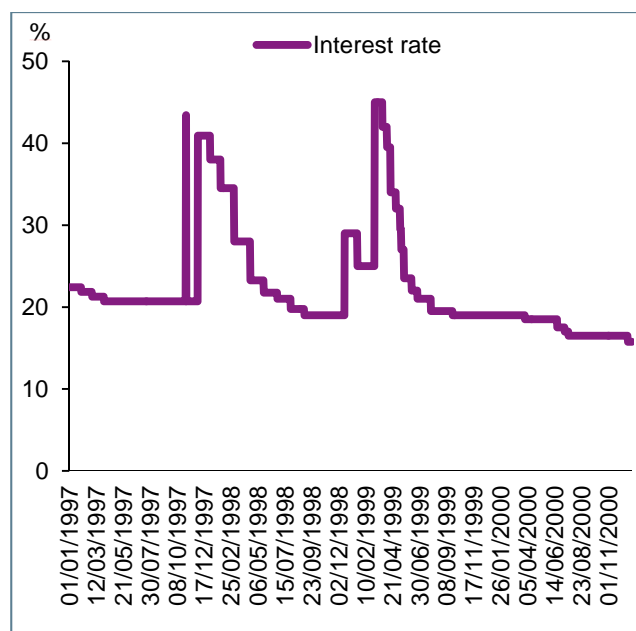
As a consequence of the opening-up of the country and the strong appreciation of the Brazilian currency in 1994, the country's trade balance, which had been positive since 1981 turned negative in 1995 and indirect imports of steel soared (Figure 9). Average annual growth rate between 1992 and 1995 was 76%.

The Real Plan was very successful in terms of price stability, but there were some side effects. The main one was deterioration of both the Brazilian current account and public sector balance. As a consequence, the Brazilian economy became dependent on the inflow of foreign capital and the government was forced to raise interest rates to stimulate foreign inflows that financed the deficits.



**Figure 11: Real GDP growth, Brazil, y-o-y (%), 1997-2000**

Source: *Global Insight*



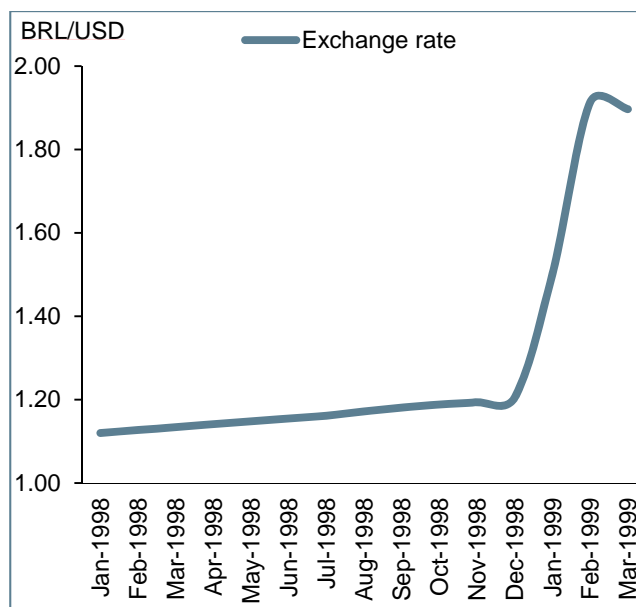
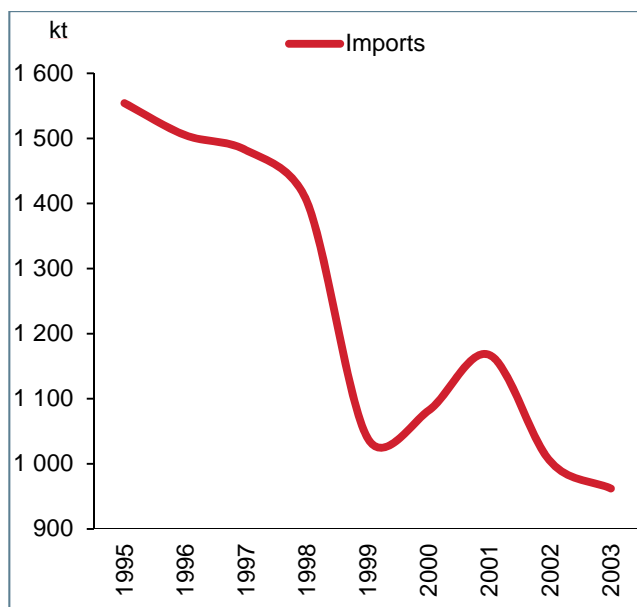
**Figure 12: Interest rate, Brazil, percentage, Jan 1997-Dec 2000**

Source: *Ipeadata*

After the Asian and Russian crises of 1997 and 1998, the international financial position of Brazil became fragile, as foreign portfolio investments left the emerging markets. There was a massive reduction of national reserves due to capital outflow caused by fears of default or a possible strong devaluation of the Real. In order to attract investors, the authorities increased the interest rates even more, which were raised by approximately 10% points between 1997 and 1998 (Figure 12), leading to deterioration of the Government's already difficult fiscal position. Besides, the economic activity was depressed due to high interest rate level.

Thus, in January 1999, the Government abandoned the exchange rate anchor as the stabilisation instrument of the economy and let the currency float. Following that decision, there was a maxi-devaluation of the Brazilian currency in a short period of time – the real depreciated by 57% in just two months (Figure 14). As a consequence of the change in the stabilisation policy and devaluation of the currency, there was a significant decrease in indirect imports (Figure 13).

Fearing inflationary pressures, just after the maxi-devaluation episode, the Central Bank raised interest rates to a record level of 45%. This increased confidence of international investors and caused appreciation of the Brazilian currency. When the exchange rate stabilized, the authorities loosened the monetary policy (Figure 12) and the official interest rate fell by more than 20% points to 19.5% in August 1999, stimulating the economy and industrial activities. GDP growth rate increased slightly from 0% in 1998 to 0.3% in 1999, and jumped to 4.3% in 2000 (Figure 11). Industrial activities led the GDP growth in 2000 and indirect exports of steel started to recover the previous rhythm.



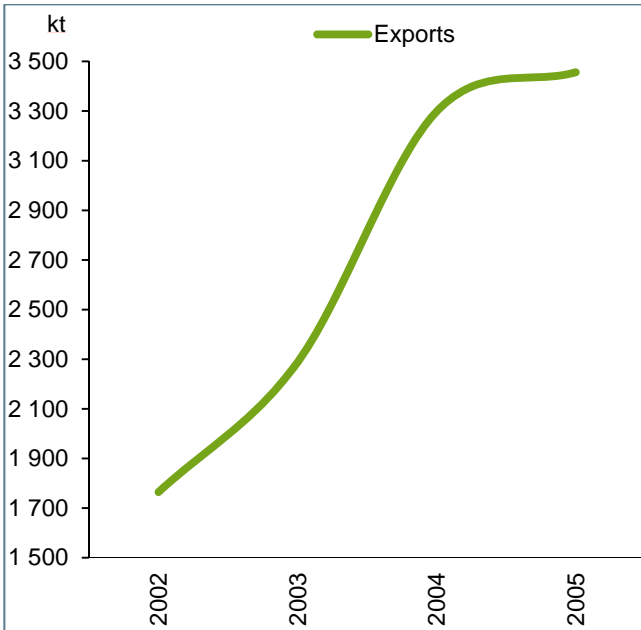
**Figure 13: Indirect trade in steel, Brazil, thousand tonnes (kt), finished steel equivalent, 1995-2003**  
Source: worldsteel

**Figure 14: Exchange rate, Brazil, EOP (BRL/USD), Jan 1998-Mar 1999**  
Source: Banco Central do Brasil

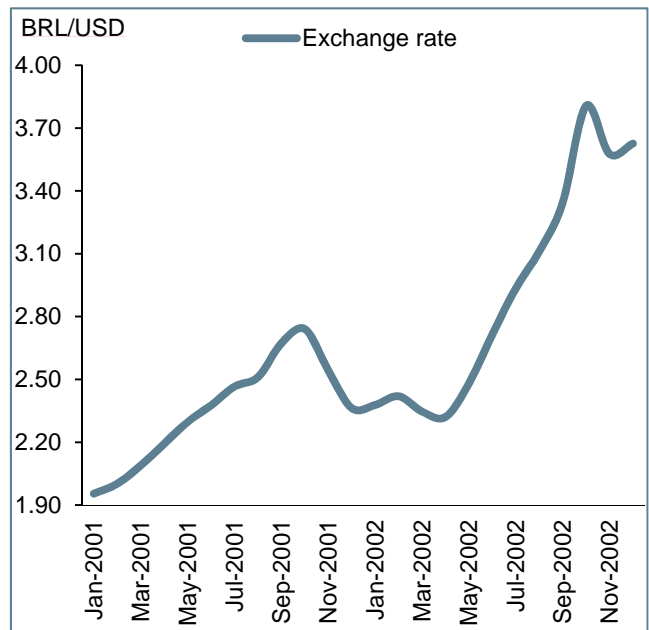
The period 2002-2005 saw a strong increase in indirect exports, up from 1.8 Mt to 3.5 Mt (Figure 15). This increase was a result of another huge depreciation of the Brazilian currency in 2002 initiated by investors' concerns about the Argentinian currency crisis and intensified by political uncertainty caused by the election in October 2002 of the leftist Workers' Party candidate, Lula. The exchange rate reached its highest level in real terms since the early 1980s (Figure 16).

In the early years of the new millennium, rising international commodity prices, thanks to the Chinese growth, brought about rising domestic wealth effects for natural resource owners, resulting in increase of real wages and an enormous growth in domestic consumption. Those factors combined with minimum wage policies, favourable credit conditions and the emergence of a new middle class stimulated by the social inclusion policies contributed to rising imports and pressure on domestic prices.



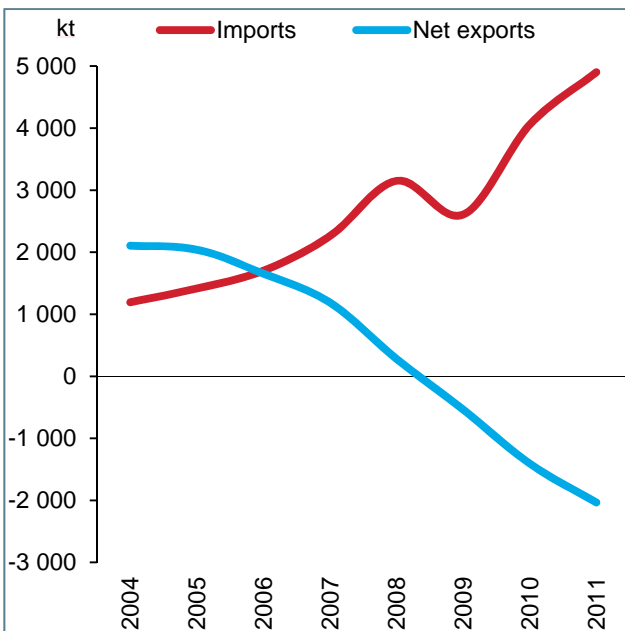


**Figure 15: Indirect trade in steel, Brazil, thousand tonnes (kt), finished steel equivalent, 2002-2005**  
Source: worldsteel

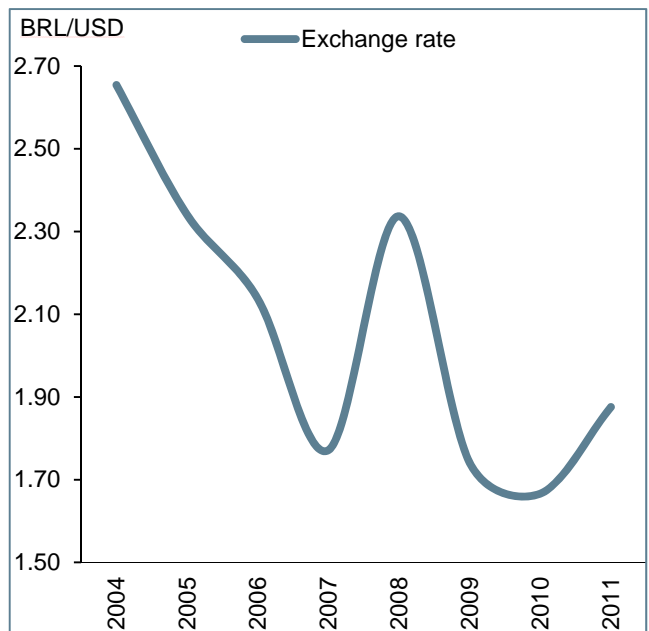


**Figure 16: Exchange rate, Brazil, EOP (BRL/USD), Jan 2001-Dec 2002**  
Source: Banco Central do Brasil

Since 2009, Brazil became a net importer in terms of indirect steel trade balance (Figure 17). The rising indirect imports of steel registered in the last years have been exerting negative impacts on the manufacturing sectors, particularly in the automotive and machinery sectors. The competitiveness of Brazilian industry has been undermined by a number of factors collectively referred to as “Brazil cost”.



**Figure 17: Indirect trade in steel, Brazil, thousand tonnes (kt), finished steel equivalent, 2004-2011**  
Source: worldsteel



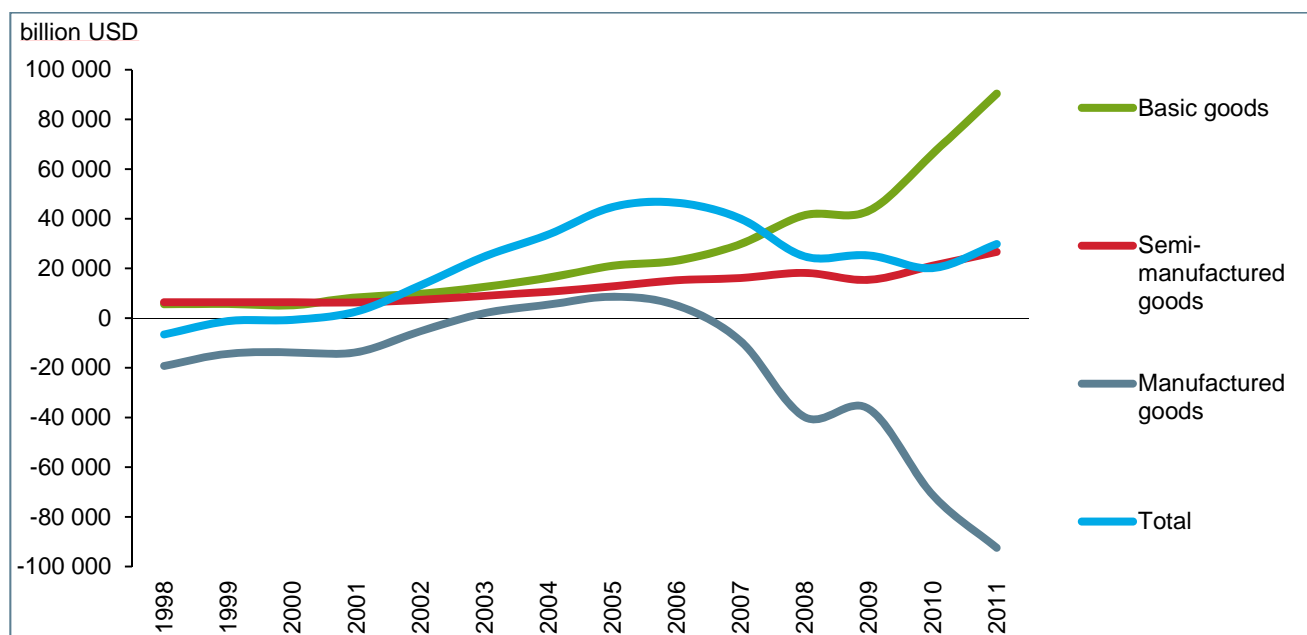
**Figure 18: Exchange rate, Brazil, EOP (BRL/USD), 2004-2011**  
Source: Banco Central do Brasil

One of the main factors is Brazil’s onerous and complex tax structure. According to a Booz and Company study commissioned by the Brazil Steel Institute in 2012 the steel industry in Brazil would be globally competitive if

production costs without taxes were considered. The Brazilian tax burden raises production costs more than in main competing countries (Germany, China, USA, Russia and Turkey).

Other components of the “Brazil cost” are high costs of electricity (that rank Brazil among the highest in the world) and logistics and infrastructure bottlenecks. High interest rates and an appreciating currency (Figure 18) have also been undermining the competitiveness of the Brazilian industry.

The high cost of doing business in Brazil has been contributing to the narrowing of Brazilian foreign trade surplus due to the rising deficit in the manufactured goods trade, which reached 92 billion USD in 2011 (Figure 19).



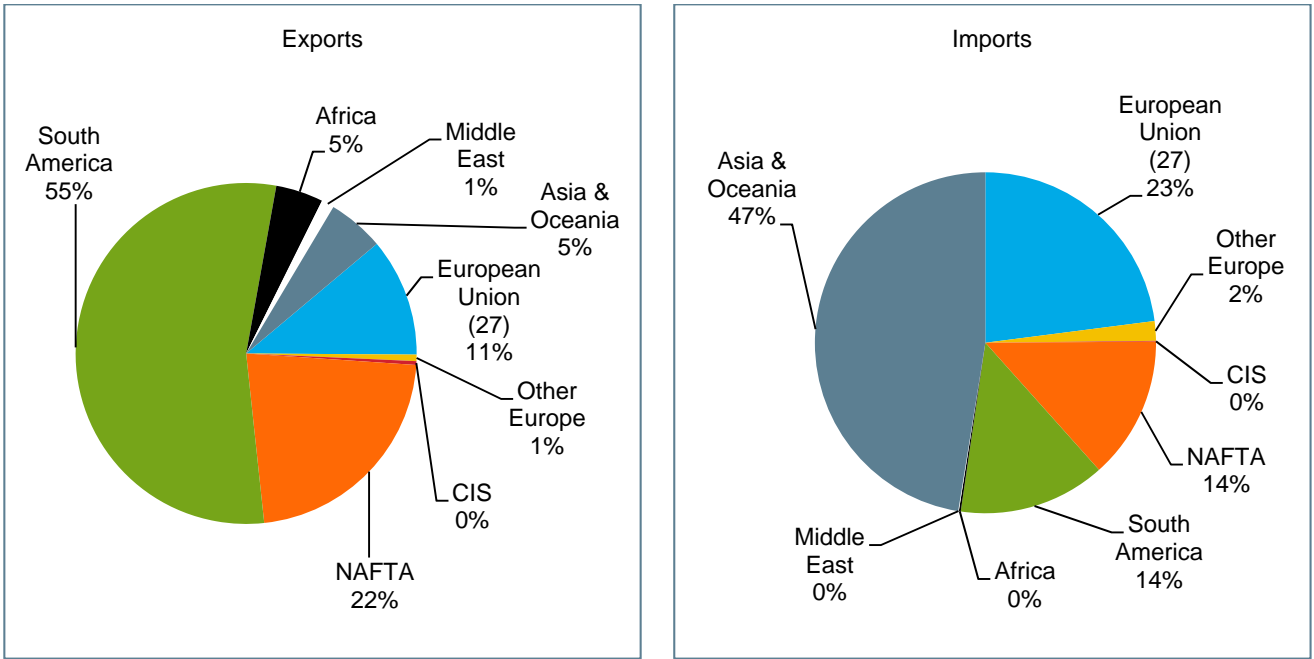
**Figure 19: Trade Balance by Class of Products, Brazil, billion USD, 1998-2011**

Source: Funcex

#### 4. Brazilian indirect trade in steel by regions

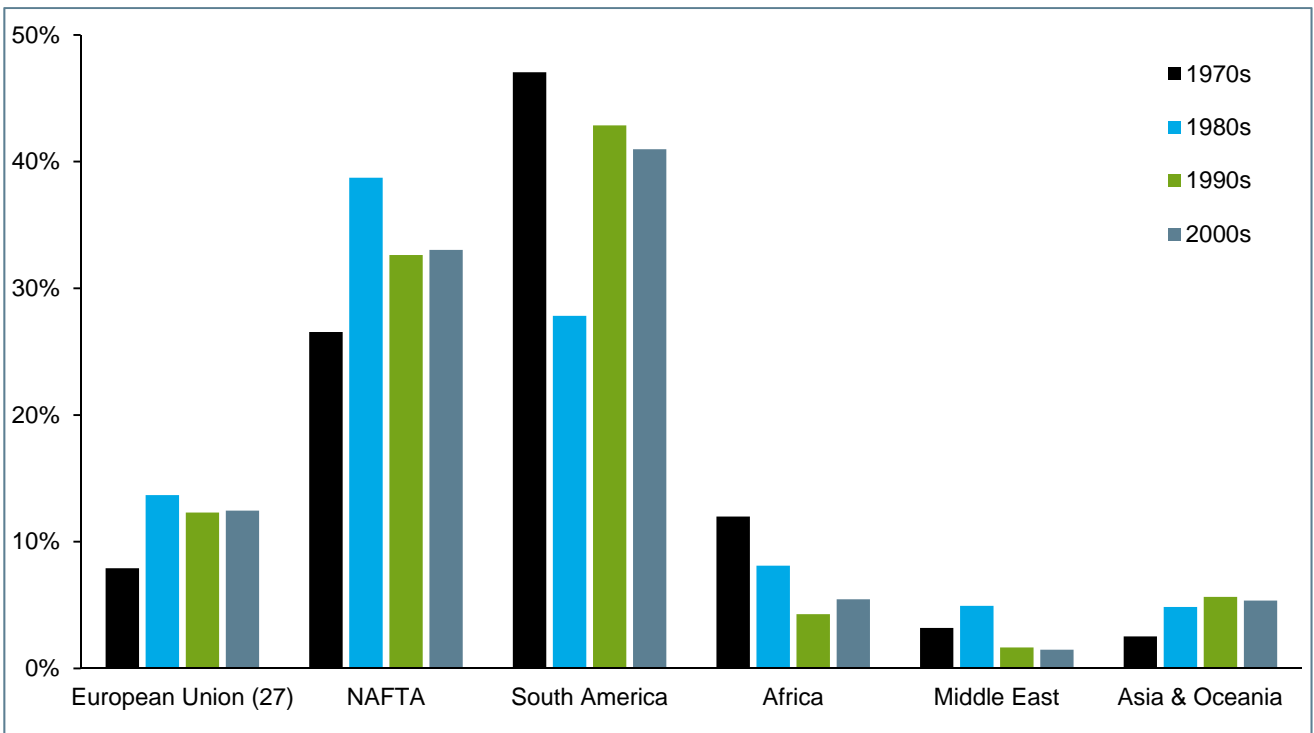
In 2011 the main destinations of the Brazilian indirect exports of steel were those countries in South America, which accounted for 55% of total indirect exports (Figure 20). NAFTA accounted for 22%, EU (27) 11% and other regions 12%. Evolution of indirect exports to selected regions is shown in Figure 21.

Indirect imports came mainly from Asia & Oceania in 2011 (Figure 20), which accounted for 47% of Brazilian indirect imports of steel. EU (27) share was 23%, NAFTA 14%, South America 14%. Indirect imports from other regions amounted to 2%. Evolution of indirect imports from selected regions is shown in Figure 22.

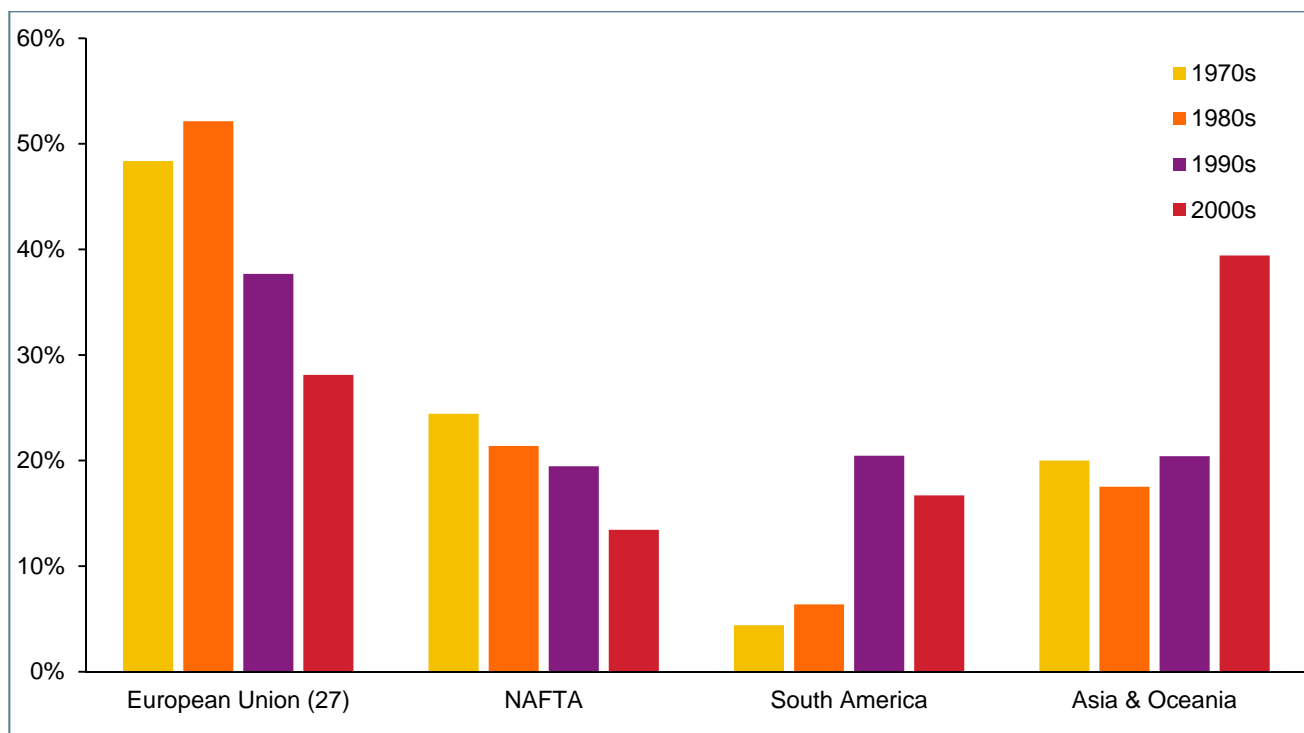


**Figure 20: Indirect trade in steel, Brazil, percentage (%), finished steel equivalent, by regions, 2011**  
 Source: worldsteel

As can be seen in Figure 21, since the 1970s the main destination of Brazilian indirect exports was South American countries. However, because of the international crisis that affected most of the emerging countries during the 1980s, South America lost its position to NAFTA. The region regained first position in 1990s, after the creation of Mercosur, the economic and political agreement between some South American countries (Southern Common Market) in 1991.



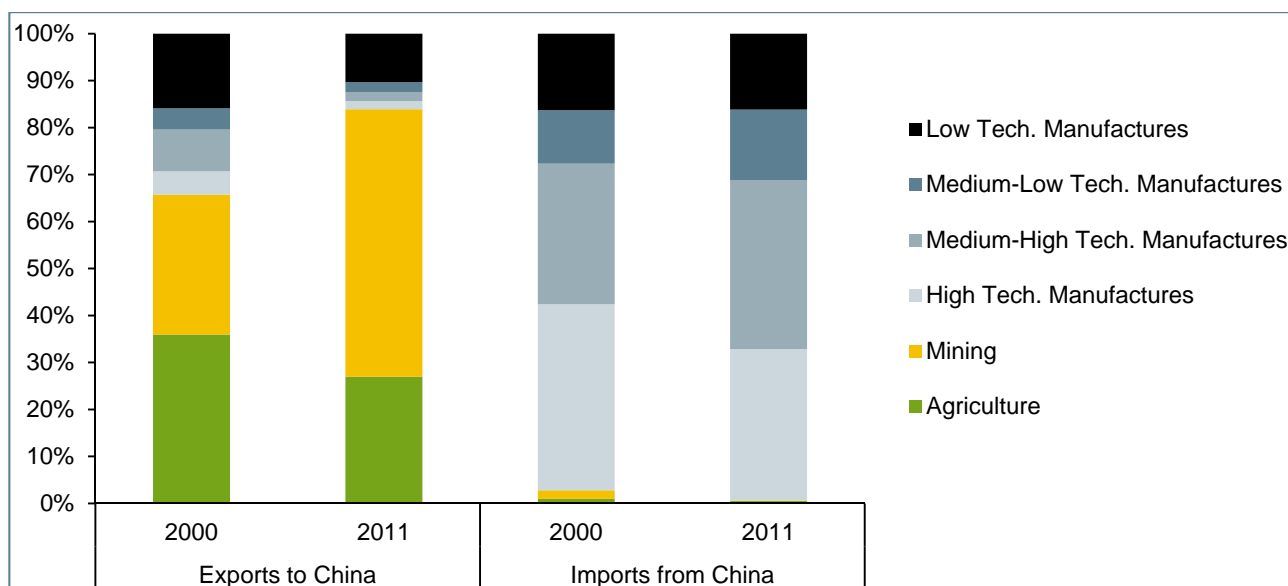
**Figure 21: Indirect trade in steel, exports from Brazil, percentage (%), finished steel equivalent, selected regions, average for 1970s, 1980s, 1990s and 2000s**  
 Source: worldsteel



**Figure 22: Indirect trade in steel, imports to Brazil, percentage (%), finished steel equivalent, selected regions, average for 1970s, 1980s, 1990s and 2000s**

Source: worldsteel

During the 1970s and the 1980s, when the country was building a new industrial sector and it was necessary to acquire technology from the developed nations, most indirect imports came from Europe and NAFTA. In the 1990s, after the creation of Mercosur, South American countries' share in indirect steel trade increased significantly. In the 2000s, there was a substantial growth of Asia and Oceania's share, as a consequence of the Chinese economic boom. In 2011 84% of Brazil's exports to China consisted of primary goods, up from 66% in the year 2000, and manufactures exported to China consisted mostly of Low-technology manufactures. Conversely, 99% of imports from China consisted of manufactures, mostly High- and Medium-High technology goods.



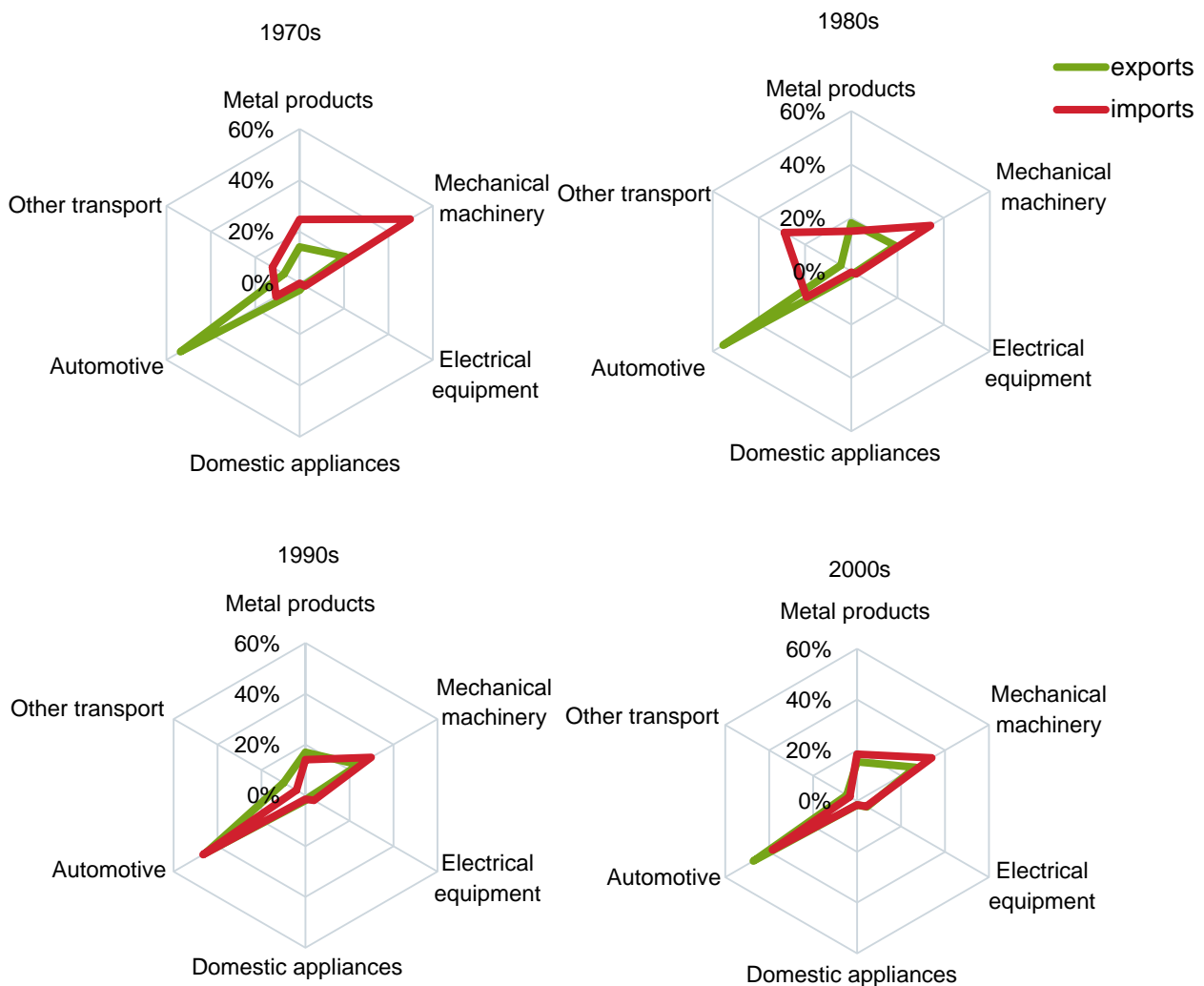
**Figure 23: Trade of Brazil with China by technology level, percentage, 2000 and 2011**

Source: OECD, STAN Database

## 5. Brazilian indirect trade in steel by sectors

The structure of Brazil's indirect exports of steel by sector did not change significantly over the past decades (Figure 24). The automotive sector has always been considered by the Brazilian Government as one of the main engines for the economic development of the country. As a consequence, the sector received a lot of incentives throughout those decades. The automotive sector constituted 54% in the 1970s, 55% in the 1980s, 45% in the 1990s and 47% in the 2000s of total indirect exports.

The composition of indirect imports of steel was changed substantially. In the 1970s the mechanical machinery and metal products sectors made up 74% of the imports, because the country's industrial park was built during that decade. In the following decades the share of the automotive sector increased from 11% in the 1970s to 39% in the 2000s, due to the improvement in the income distribution, the expansion of the middle class and the rise in the household income.



**Figure 24: Indirect trade in steel, Brazil, percentage (%), finished steel equivalent, by sectors, average for 1970s, 1980s, 1990s and 2000s**

Source: worldsteel

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Last updated on 12 November 2013

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