SUS vulnerability regarding exchange rate variation: Analysis of the dynamics of drugs and health equipment import between 1996 and 2014

Vulnerabilidade do SUS em relação à variação cambial: análise da dinâmica de importações de medicamentos e equipamentos de saúde entre 1996 e 2014

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ABSTRACT This article is aimed at determining the vulnerability of the Unified Health System when subject to the influence of exchange rates variations on the dynamics of drugs and medical equipment import from 1996 to 2014. The hypothesis that guided this work is that external conditions and economics policies expressed in exchange rates do affect the dynamics of both production and innovation of the Economic-Industrial Complex of Health. It comes to the conclusion that, considering changes that took place, the elasticity of the relationship between import and exchange rate of the segments analyzed herein was not so heavily affected over the period. This result suggests the importance of designing economic models that incorporate those variables.

KEYWORDS Economics. Importation of products. Drug price. Equipment and supplies. Unified Health System.

RESUMO *Este artigo tem como objetivo verificar a vulnerabilidade do Sistema Único de Saúde ante a influência das variações cambiais sobre a dinâmica de importação de medicamentos e equipamentos médicos de 1996 a 2014. A hipótese que orientou o trabalho é que as condições externas e a política econômica, expressas nas taxas de câmbio, afetam a dinâmica de produção e inovação do Complexo Econômico-Industrial da Saúde. Conclui que a elasticidade da relação entre variação cambial e importação dos segmentos estudados foi relativizada no período, consideradas as mudanças ocorridas. Este resultado sugere a importância de desenhar modelos econômicos que incorporem essas variáveis.*

PALAVRAS-CHAVE *Economia. Importação de produtos. Preço de medicamento. Equipamentos e provisões. Sistema Único de Saúde.*

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Introduction

This article is aimed at verifying the vulnerability of the Unified Health System (Sistema Unificado de Saúde – SUS) subject to exchange rate variations, in order to gauge the magnitude of the influence of exchange rates on the dynamics of drugs and medical equipment imports from 1996 to 2004. Exchange rates have been the subject of dispute between economists, who consider it an adjustable index to a country's economy, given the productivity level of its workforce that determines the balance of trade (the neoclassical approach), besides others who conceive it as an indispensable tool for late-developing economies seeking to maintain employment levels and to create comparative advantages for high value-added goods (the post-Keynesian approach).

This subject has gained greater relevance in health as the 1988 Federal Constitution was enacted, establishing the access to health care as a right of all citizens and a duty of the State, based on which SUS was created. Besides being a structural element of the social welfare state, as the access to health care is considered a substantive freedom and a necessary condition for a society to be fair, in the present context, SUS aims at meeting the demands of an increasingly elderly society and to strive against new epidemics related to Brazilian characteristics of socioeconomic development and of the increasingly intense globalization.

Expanding access to health care has brought significant results for the well-being of the population, along with increased health expenditures. In recent years, an intensification in the incorporation of technology in health has also been observed in Brazil, as has the growth of expenses with drugs and medical equipment in the total budget of the sector. For the national productive basis related to health – or the Health Economic-Industrial Complex (HEIC) (Complexo Econômico-Industrial da Saúde – Ceis), which involves both industrial and service bases –, the exchange rate is a greatly important factor for maintaining its development (GADELHA, 2006), precisely due to the lack of competitiveness of the national production of high value-added goods, thus inhibiting the country´s capacity to replace imports when their relative price undergoes increases.

Given the growing importance of technology in health costs and the weakness of the national productive capacity, understanding the relationship between those two variables – import and exchange rates – becomes even more important, particularly when considering the political institutional model of the SUS, which stands security for the provision of universal, equanimous and comprehensive services. When observing the social and economic factors involved in health, it becomes evident that the relevance of such relationship also points to the need for a systemic approach.

Data from the Mercosur Common Nomenclature (NCM) were used, available online at the Foreign Trade Information System (AliceWeb), in order to measure the importance of the relationship between imports and exchange rate to drugs and health equipment. The selection of NCMs in both drugs and medical equipment sectors follows the methodology adopted by the Health Innovation Group (GIS/Ensp/Fiocruz – Sergio Arouca National School of Public Health/Oswaldo Cruz Foundation), which collects, systematizes, and analyzes foreign trade data in the health sector. This method is the primary reference for estimating the trading deficit of health-related segments. Imports are presented as aggregate costs, FOB (Free On Board), without discriminating amounts, since data are not available to all imported goods that are part of the value-added in drugs and medical equipment imports.

The paper include six parts: following the introduction, the second part presents the process of economic liberalization in Brazil

and its influence on the health care segment; the third part discusses the characteristics of the drugs sector and policies that have been implemented during the period analyzed; the fourthpart examines imports of medical equipment, how technological development in the area has affected the country and the role it plays in the global productive chain; the fifth part analyzes the elasticity between exchange rate and imports, comparing total imports to imports of drugs and medical equipment; to conclude, final considerations are presented.

Economic liberalization, exchange rates and the health care sector

National States often differ as to the extent and how their economies can be considered open to the international trade, deciding between different exchange arrangements and policies that directly affect imports. Once these are political decisions, though supported by each particular economic theory, one may define a movement seeking less State intervention in markets, such as the economics liberalization (CASTELAN, 2010).

In Brazil, this process starts during the post-military dictatorship re-democratization, during Sarney administration that considered problematic the relationship between the industry protection system and the level of national competitiveness. His view was that Brazilian economy should be gradually exposed to foreign competition as a means to modernize it by the technological development of national industries. In 1988, an import policy was implemented in order to intensify external competition, aiming at a more efficient allocation of resources. That same year, the new Import Tariff Reform, led to lower taxes (CASTELAN, 2010).

The economic liberalization was consolidated during Collor administration and the announcement, in March 1990, of measures that made exchange arrangements more flexible, suspending import restrictions to a list of 1,300 products and creating special import arrangements. In 1993, the Brazilian process of unilateral trade liberalization, which started in the late 1980s, was concluded (KUME; PIANI; SOUZA, 2003).

Itamar presidency introduced the Real Plan in 1994, which was followed by an even greater liberalization, necessary to control inflation by means of containing domestic prices subject to competition with similar imported products. Over that period, rates on imports were reduced, particularly on inputs and consumables (KUME; PIANI; SOUZA 2003).

Under Fernando Henrique Cardoso administration, tariff stability was more stable, which had to do with the loss of autonomy that resulted from the implementation of the Common External Tariff (CET) of the Mercosur. Besides adopting mechanisms such as the obligation of cash payment of imports with financing term under a year, in 1997 the government temporarily increased tariffs by three percent points in order to reduce the deficit in current transactions during the international financial crisis (KUME; PIANI; SOUZA, 2003).

Lula government introduced changes to Brazilian trade policy directions, so as to adapt them to the new objectives and priorities of both external and internal policies (VEIGA; RIOS, 2015). Among those changes, the Industrial, Technological and Foreign Trade Policy was formulated in 2004, aimed at articulating continuous action plans, strategic options and promising activities. The goal was to provide Brazil with a better insertion in the international trade, stimulating sectors in which the country had greater capacity or needed to develop competitive advantages, thus favoring greater activism in bilateral negotiations with the Southern countries (GADELHA, 2006).

Despite all efforts, Brazilian exports dropped during the second term under Lula

government. The decline was a consequence of the international crisis and the appreciation of the *real*, which did also affect imports, leading this sector to substantially grow over that period. As a result, some nontariff measures were taken, like increasing the number of products subject to antidumping duties, the local content requirement for access to credit and tax benefits, and preference for Brazilian companies in government procurement contracts. In 2012, taxes for imported products on both the Social Integration Program (Programa de Integração Social – PIS) and of the Contribution for Social Security Financing (Cofins) were increased (VEIGA; RIOS, 2015).

Since the beginning, Dilma administration worried about exports financing as a way to compensate rising trade deficits (VEIGA; RIOS; NAIDIN, 2013). In 2011, imports augmentation led to growing requests for protection of Brazilian industry. In this regard, the first measure taken by the government was launching the Bigger Brazil Plan (Plano Brasil Maior – PBM), intended to strengthen trade defense mechanisms.

> More than through import protection mechanisms, discrimination that would favor domestic production was operationalized in the PBM by measures to stimulate exports and investments, and by the adoption of preferences for domestic products in government purchases of goods and services. Accordingly, the PBM intensified the use of mechanisms aimed at increasing the national content of industrial goods, such as the granting of fiscal and credit incentives conditioned to the fulfillment of a certain degree of domestic content. This feature became even more evident with the announcement, in September 2011, of measures to support the automotive sector, which would originate, in 2012, the new automotive regime. (VEIGA; RIOS; NAIDIN, 2013, P. 19).

PBM measures to protect the national industry became active in the second half of 2011. In turn, the trade defense policy, which until then was performed by antidumping measures, was strengthened in 2012, when Mercosur authorized the temporary lifting of import tax rates for its members. One hundred products had their rates significantly increased, jumping from 13.7% to 23.6% on average, most of which inputs and capital goods. Furthermore, in spite of aiming at protecting the local industry, the policy failed to accomplish the result desired (VEIGA; RIOS, 2015).

As discussed above, since the late 1980s there has been a liberalizing movement in the economy to open the country to imports and foreign investments. It submitted the national economy to bigger competition and decreased the role of the State, whose services would be offered by private agents – in some cases, foreign or national intermediaries of finished or semi-finished imported goods. Some efforts were made in an attempt to introduce the country into the global production chains, usually by means of tax concessions, justified by the idea of favoring infant industries, which were considered essential for an advantageous insertion. Despite all efforts, during the period a significant growth in imports was noted, including in the manufacturing industry.

The intensification of trade liberalization without developed economy and a mature national productive base led to several impacts. As to health care, it is worth mentioning that, since SUS was implemented – its foundations were laid in 1986, during the VIII National Health Conference (NHC), and its institutionalization occurred in the Federal Constitution of 1988 and in the Organic Laws of Health, two years later –, there has been an important expansion in services and initiatives towards the provision, prevention, and promotion of universal, comprehensive and equanimous services, which implied higher public spending.

It should be stressed that, during this period, universal systems throughout the world began to question its sustainability, which mainly resulted from the ageing of the

population, associated with a new epidemiological profile, and the increasing incorporation of technology to health care services. Additionally, the intensification of the geopolitical process of globalization presented new challenges to public health, while exposing global access inequalities and the concentration of Research and Development (R&D) resources, to name just some few examples.

Taking into account the population size in Brazil, the new institutional and political model of the SUS drew attention, since its origin, to the threats subsequent to the lack of productive autonomy, which translated into the dependence on foreign inputs and products, essential to the health care system, as stated in the Final Report of the VIII NHC. Moreover, the economic liberalization would also affect the health care system, with oncreasing offer of private insurance plans and private hospitals, which were also responsible for the high levels of imports during the period, by virtue of their demands for state-of-the-art equipment and drugs, mostly imported.

Consequently, the health care system observed growth in imports, both in public and private sectors, in a context of ever higher complexity levels concerning drugs and medical equipment, as opposed to the the lack of a Brazilian endogenous basis of production and innovation, resulting in the growing national incapability to fulfill the increasing demand for quantity and quality (GADELHA *ET AL.*, 2012).

According to reviews by Maldonado (2015) and Vargas (2015), several initiatives have been taken to strengthen the productive basis. These studies conclude that, despite the priority granted to the health sector, it remained, just as others, dependent on imports, which can be observed by the growth of the trade deficit in the health care system, which went from US$3.2 billion, in 1996, to US$11.5 billion, in 2014.

This reality points to the fragility of the SUS, responsible for caring for a population whose most part (74%) (ANS, 2015) depends solely on it. It also points to potential growth in the influence of exchange rates on the access of health products and supplies, provided the other variables remain constant. According to Gadelha (2006),

> Any movement in the exchange rate can lead to an explosion of expenditures in health or imports. Under a given situation, at least at first, before generating its effects on reducing external acquisitions and increasing exports, the devaluation of the exchange rate can lead to pressure on healthcare spenditures (price increase of imports in reais), which is incompatible with budget availabilities. (GADELHA, 2006, P. 18).

In other words, the economic model of external and internal adjustment would have significant influence on health actions, acting directly and primarily on imports for this sector.

History of drugs imports in Brazil

The demand for drugs is directly related to the population´s income level. It also depends on other factors, such as its level of specificity and the quality of physician-patient communication, since consumers often ignore the possibility of replacing drugs prescription (PRADO, 2008). Asymmetric communication and the priority given by the public to this type of expenditure imply low price elasticity, thus strengthening laboratories´ market power and their possibilities of obtaining high profits.

This feature varies as it depends on different income levels, and is the most striking to the share of higher purchasing power, once people choose the most expensive treatment that, in theory, would be also the most efficient. On the other hand, medium-income patients are more likely to look for different

treatments or drugs, as costs vary significantly, but once people are not aware of alternatives available in the market, they are just slightly more sensitive to those changes, thus contributing to maintain low price-elasticity relations. Low-income people, on their turn, area hardly affected by this oscillation, once they substantially depend on drugs distributed by the government.

Over the last decades, the global pharmaceutical industry has been experiencing significant growth, marked by industrial concentration, high profits, and, among other aspects, a combination of growth in drugs consumption along with prices increase. New opportunities and challenges lie on the basis of this process. Regarding opportunities, the exploration of new scientific and technological paths stands out, in particular, concerning particularly the potential impact of biotechnology. One should also highlight the various initiatives involving Science and Technology (S&T) policies of innovative national capacities, and specifically the signature, in the 1990s, of the Trade-Related Aspects of Intellectual Property Rights (Trips) by the members of the World Trade Organization (WTO). The agreement involved the recognition of pharmaceutical patents by a large number of countries, Brazil among them (GADELHA *ET AL.*, 2012). Amid the challenges, it is worth noting the growing competitive pressure associated with generic drugs while patents owned by leading drugs in the market were close to their expiration date. Additionally, the growing pressure in developed countries for the control of public spending in health care resulted in discussions that led to the adoption of public policies for the sector, aiming at reducing drugs prices. Besides, the combined effect of the new S&T approach and the new regulatory environment resulted in the increase in R&D costs (VARGAS *ET AL.*, 2013).

The main global pharmaceutical companies responded to such challenges by adopting, among other strategies: control systems that combined the centralization of decision-making process with global decentralization; productive and R&D activities; economies of global scale and scope, through acquisitions and mergers; diversification of companies that started to produce generic drugs and unethical products; leveraging of marketing and distribution resources through external acquisition of technology via licensing agreements, R&D contracts, joint ventures, alliances and acquisition itself – often the case of biotechnology companies. However, this strategic repositioning has not changed the essence of the industry structure or the competition standard in place.

In Brazil, the 1990s were a milestone for the national pharmaceutical industry, with the process of opening the economy in an international context of accelerated productive and financial globalization (PRADO, 2008). Radaelli (2003) states that the pharmaceutical industry has been the most affected by changes, due not just to the macroeconomic conditions mentioned above but also to the elimination of price controls, the inclusion of pharmaceutical products in patent legislation and the introduction of generic drugs into the market.

Brazilian regulatory environment has undergone major changes proposed by the Industrial Property Law (Law 9.279/96), in force in May 1997, regulating all issues related to patents granting (TEIXEIRA, 2014). This law did influence drugs prices, since companies holding patent privileges would sold their products at higher prices during the validity of the law, following the monopolistic logic. For this reason, despite the stability proposed by the Real Plan and the increase in real income, for most Brazilians – low-income people – access to drugs was still limited, and therefore, so was the possibility to enjoy the full right to health and social welfare (PRADO, 2008).

The local industry profile, with strong presence of multinational subsidiaries, reflects the dynamics of operations linked

to the international pharmaceutical industry. Nevertheless, it does not internalize an entire productive and technological structure, as is the case in more developed countries. Consequently, production and marketing structures focused on drugs production are in place throughout the country, and integration processes are just rarely observed in the pharmaceutical area or R&D activities (GADELHA, 2006).

In the 1970s, Brazil was already the leader in Latin American market and the seventh in the world market ranking, in a context where domestic drugs stock supplied the entire national market, although with high dependence on imports of pharmaco-chemical inputs (drugs and synthesis intermediates). Despite the maintenance of the general framework of the pharmaceutical industry and the increase in participation of foreign companies in the domestic market – from 77%, in the 1970s, to 85% (GADELHA, 1990), in the 1980s –, some initiatives were aimed at increasing the local production of drugs: the purchasing policy by the Ministry of Health, mechanisms of protection for the domestic market, by restricting imports, and the Patents Law current at that time, which made things easier for reproduction mechanisms of technological processes in the pharmaceutical area.

The processes of trade liberalization, economic opening and deregulation that took place in the 1990s, mentioned above, led to initiatives that pointed to structural changes in the industry that should be aborted. Brazilian pharmaceutical industry has become heavily dependent on imports, which were privileged at the expense of domestic production. Furthermore, in the scope of global strategies of multinational companies, having opted for the import from the main house or other subsidiaries, some pharmo-chemical units were deactivated (VARGAS *ET AL.*, 2012).

In January 1999, Brazilian Health Regulatory Agency (Agência Nacional de Vigilância Sanitária – Anvisa) was created. It expanded the supervision of quality control of drugs and price monitoring of health care products, and established preconditions for a possible increase in imports, by matching domestic and international standards (PALMEIRA FILHO; PAN, 2003). Afterwards, the Generic Drugs Act was enacted, provoking reactions from both retailers and the pharmaceutical industry. Once they are cheaper substitutes to the original, since their costs do not involve large risk investments, the production of generic drugs contributed to the growth of domestic enterprises, which raised from 8 companies, in 2000, to 101, in 2008 (TEIXEIRA, 2014).

In 2014, Brazilian pharmaceutical market ranked eighth in the international ranking of global sales of the pharmaceutical industry, and counted on a turnover of R$65.8 billion. Despite the clear predominance of the large multinational companies that dominate the national market in different segments and therapeutic classes, there was an increase in the participation of national companies in the market during the decade of 2000. Such growth is directly associated to the increase in public spending in the health sector in recent years, and also to the consolidation of generic drugs, which represent the majority of the production of national companies (VARGAS *ET AL.*, 2016).

Notwithstanding these advances, national drug and pharmaceutical companies still show reduced size when compared to multinational conglomerates and an incipient insertion in higher value-added product niches, particularly in the case of drugs and medications produced from biotechnological routes.

This segment accounts for a high participation in the trade deficit of the country, which is related to several factors, including bottlenecks in the productive chain, specially concerning the national production of drugs. If, on the one hand, the recent resumption of growth in the pharmaceutical sector, stimulated by the expansion of the

generic drugs market, made it possible for national companies to go strengthened, on the other hand it served as an impulse for the entry of large multinational pharmaceutical laboratories, through the acquisition of local enterprises. Finally, these national companies have reduced investments in innovation and R&D activities when compared to international standards (VARGAS *ET AL.*, 2012).

In short, the period from 1996 to 2014 was plenty with reforms in the pharmaceutical sector, which affected drugs imports into the country, either directly or indirectly. The period was also rich in lost opportunities, as noted with the entry of countries such as India and China into the market. The numerous and, in some cases, drastic changes in the exchange rate not only directly influenced the prices of imported products – thus affecting its demand and the total value of imports –, but also served to justify some of these reforms, such as those that sought to remedy the problem of trade deficit.

History of medical equipment import in Brazil

The demand for health equipment in Brazil is related to the challenge of having a universal health system that serves over 200 million people. It is also affected by the political-territorial organization based on the principles of decentralization of the decision-making power, of the responsibility and the resources spread between the entities of the federation, and service regionalization. The decentralization of both the management and the resources of public health services affects the medical equipment industry by dispersing demand over a large number of institutions, such as state and municipal departments, where each bureau buys its products through its own biddings. Additionally, public hospitals and philanthropic entities, by benefiting from differentiated tax treatments, make their own purchases, invariably opting for importing products. As to the private health, the increase in average income and its better distribution allowed for the growth of health insurance plans, with the number of users doubling between 2000 and 2012, from 25 to 50 million. Such growth exerts a strong influence on the demand for medical equipment, specially innovative products (LANDIM *ET AL.*, 2013), mainly because commercialization channels of this industry are 65% private (GUTIERREZ; ALEXANDRE, 2004).

Brazilian industry of medical products emerged in the 1950s and reached its apex in the 1970s. Over the three last decades, transformations in the national and international scene have brought new challenges to the industry. Market opening in the 1990s, promoted the emergence of a new competitive environment, leading to an increasing dependence of the country on equipment imports, mainly those of greater technological density. A series of products that had been incorporated into local production in previous decades was no longer produced in the Brazil – for example, implantable pacemakers and more sophisticated laboratory devices, or even radiological equipment –, due to the lack of competitiveness against multinational companies (MANFREDINI, 2006).

It is important to emphasize that if, on the one hand, new regulatory and economic factors made the expansion of the industry more arduous, on the other hand they induced a significant improvement in the quality of technologies manufactured in the country. Market regulation initiated by the Ministry of Health in 1992 and its developments catalyzed by Anvisa proposed not only new concepts, but also the requirement to meet minimum quality standards.

During the second half of the 1990s, these aspects were responsible for the significant expansion of the industry, associated with the growth of domestic demand, development of SUS, and the weight of public demand upon

the market. A remarkable expansion of the industry has been witnessed in recent years, capable of accounting for about 50% of the national market and having reached a turnover value of R$8.57 billion in 2015 (ABIMO, 2016).

In spite of promising results, the trade deficit has been growing, indicating a loss of competitiveness in the industry. In addition, the production carried out by companies located in the national territory still heavily relies on imported inputs of greater technological content, reaching up to 50% in some segments (GADELHA *ET AL.*, 2012).

The dynamics of innovation in the industry is one of the fundamental aspects that point to this fact. In general, medical products can be grouped into two segments: high technology and more conventional products. The high technology segment comprises sophisticated devices for therapeutic and diagnostic uses. They are associated with high-risk R&D activities, clinical research and administrative and regulatory processes for market access. Products of this segment have great growth potential, mainly in private and supplementary health markets. However, the risk of rapid technology obsolescence is high, since the constant technological evolution of both materials and components used in the manufacture of medical products implies products with a progressively shorter life cycle (18 to 24 months). The conventional product segment consists of products such as syringes, gauze and intravenous products, as well as a wide range of products for diagnostic and therapeutic purposes, and is associated with low-profit margins and large production volumes.

In an industry characterized as highly concentrated, differentiated oligopoly, even large corporations find it difficult to master the vast scientific and technological domains already known. Products with the greatest technological intensity are usually destined to private and supplementary health markets, since they remarkably burden the costs of health care (MALDONADO; VALADARES, 2014).

The evolution of the dynamics of this sector combined with the country's technological gap characterizes an increasing dependence on imports, especially on high technology products, underlining an important vulnerability of the national health policy, and threatening the continuity of health care under SUS responsibility. Additionally, the country has gradually lost competitiveness in the niche market it was specialized in over the last few decades: low-technology intensity products, produced on a large scale at low-profit margins, to countries such as China and Singapore. In those countries, many institutional issues (low standards of health regulation and lack of labor legislation, for example) significantly reduce production costs and put products on the international market at extremely competitive prices. Faced with the relative fragility of the domestic industry, imports of medical equipment tend to rise continuously and, among several other factors, the fluctuations in exchange rates influence the obligation to meet health needs of the population.

Analysis of the elasticity between exchange rate and imports in the health care sector

The elasticity analysis was meant to assess the vulnerability of the health sector, specifically concerning variations in the exchange rate. However, despite evidence that suggested an inversely proportional causal relationship between exchange rate and demand for these imported goods, data analyzed in the study point to the exchange rate as just one amid other factors that will define the level of imports of a country over a given period. Therefore, it was decided to analyze as well the exchange elasticity of those imports to represent the intensity of the relationship between exchange and

import variations. Elastic demand would be the most sensitive to exchange rate changes, increasing or decreasing more than proportionally to a change in exchange rate policy.

The chart below presents the annual variations in exchange rate, drugs and medical equipment imports, and the total value of Brazilian imports from 1997 to 2014.

Chart 1. Annual variation of exchange rates. drugs and equipment imports and total Brazilian imports. 1997-2014

Year	Exchange rates	Drugs imports: variation and elasticity		Equipment imports: variation and elasticity		Total imports: variation and elasticity	
1997	7%	43%	5,93	-4%	-0,58	12%	1,65
1998	8%	4%	0,51	12%	1,51	-3%	-0,43
1999	56%	18%	0,31	-25%	-0,45	-15%	-0,26
2000	1%	-12%	-14,17	-2%	-2,75	13%	15,57
2001	28%	-2%	-0,06	16%	0,55	0%	-0,02
2002	24%	1%	0,03	-13%	-0,55	-15%	-0,62
2003	5%	-3%	-0,58	-14%	-2,66	2%	0,43
2004	-5%	15%	-3,05	17%	-3,38	30%	-6,06
2005	-17%	11%	-0,68	25%	-1,47	17%	-1,02
2006	-11%	26%	-2,43	23%	-2,18	24%	-2,27
2007	-10%	26%	-2,51	25%	-2,43	32%	-3,05
2008	-6%	13%	-2,21	20%	-3,46	43%	-7,46
2009	9%	-1%	-0,08	2%	0,17	-26%	-2,94
2010	-12%	19%	-1,60	26%	-2,20	42%	-3,56
2011	-5%	4%	-0,90	10%	-2,14	24%	-5,05
2012	17%	5%	0,29	3%	0,17	-1%	-0,08
2013	10%	3%	0,32	11%	1,05	7%	0,71
2014	9%	-5%	-0,54	-1%	-0,16	-4%	-0,49

Source: Prepared by the author, based on data from Ipeadata (IPEA, 2016).

Chart 1 presents the elasticity-exchange relation, which allows for identifying the impacts of the increased exchange rate (price) on the imports volume (demand). If the result obtained in the elasticity calculation is greater than 1, the variable in question is considered 'elastic'; if less than 1, it is considered 'inelastic'; and if it is equal to 1, 'unitary'. The degree of elasticity represents how sensitive a given variable is to the detriment of the variation of another one – that is, how the imports volume response occurs in relation to a variation in the exchange rate (FERNANDES, 2014).

In general, during the period under analysis, there were significant fluctuations in the variables considered. For instance, the year 2000 can be considered of high-elasticity exchange-import, as there was a significant increase in the total of trading imports (13%), followed by a slight variation (1%) in the exchange rate, resulting in a 15.5 elasticity. As there is a lag of a few months between the variations in both the exchange rate and imports, it is reasonable to assume that part

of the increase is related to the exchange devaluation in the previous year.

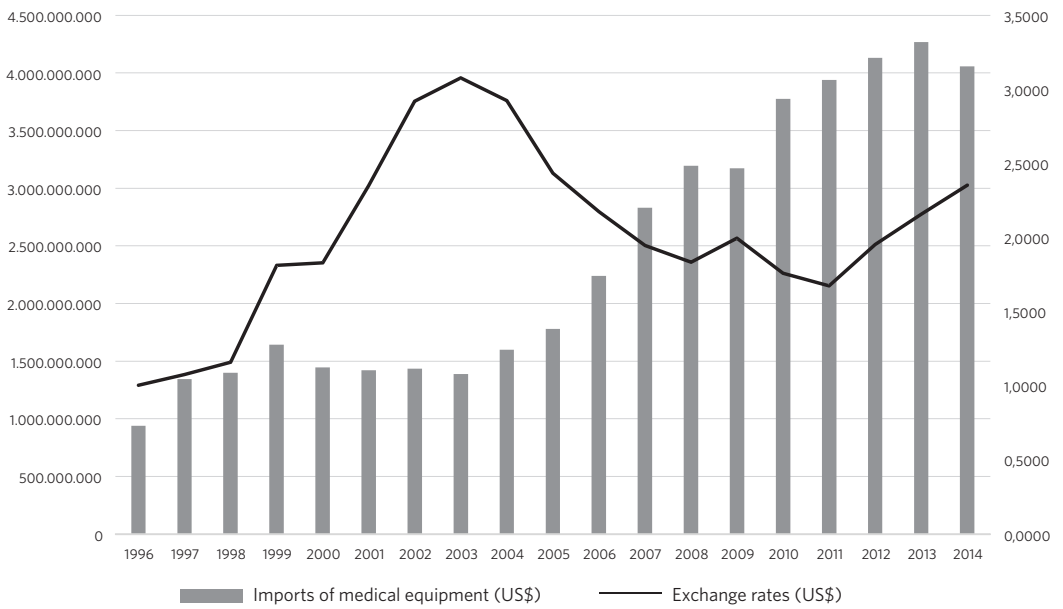
The exchange rate reached its highest value in 2003 – R$3.077/US$1.0 –, and total imports obtained the second lowest value for the entire period – US$48.3 billion. That year, the elasticity of imports in relation to the exchange rate was not very significant (0.42), which may be related to the small improvement (2%) in imports in relation to the massive drop in the previous year (-15%).

Except for year 2009, marked by an international crisis, from 2004 to 2011 there was a significant increase in the total of Brazilian imports associated to the exchange devaluation. In theory, a depreciated currency means a price increase of the product imported. What was observed contradicts this hypothesis, pointing to a reasonably inelastic demand for imported goods, probably due to the favorable domestic macroeconomic scenario, hence favoring consumption and imports in the period.

In *graphs 1* and *2*, one can observe the curve presented by the variation in the exchange rate compared to the bars that represent the value of imports of medication and equipment, from 1996 to 2014, respectively.

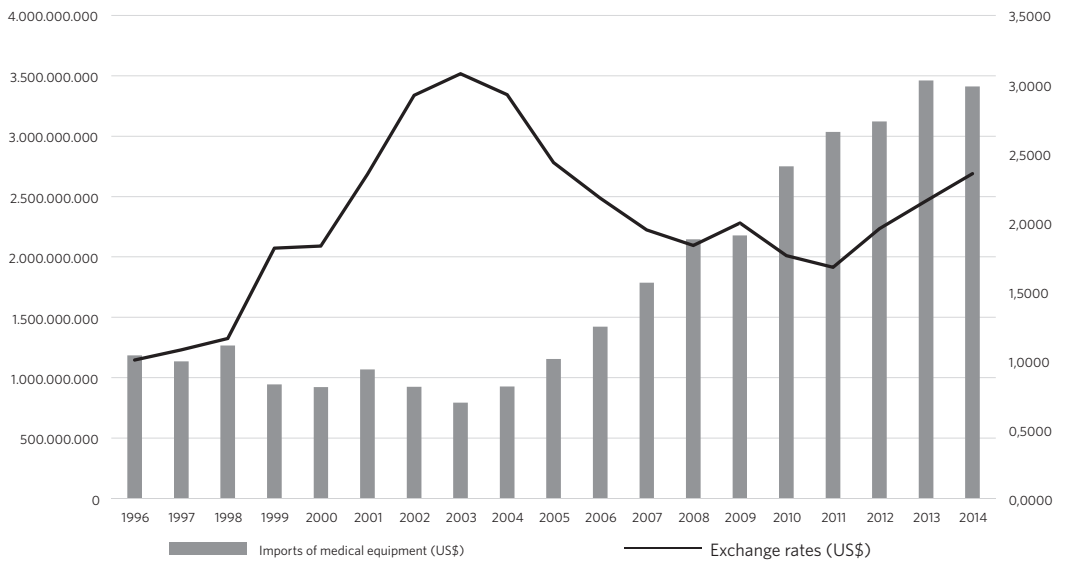
The deficit in the trade balance of medication was close to US$800 million in 1996, reaching US$1.17 billion in the following year, against a scenario of liberalization of the sector. In 2015, it reached US$2.4 billion – that is, 200% compared to the base year of the analysis. In medical equipment, the trade deficit jumped from US$200 million, in the late 1980s, to around US$800 million, in the mid-1990s. It was mostly composed of electronic products (GADELHA, 2007). In the recent period, the trade balance reversed this trend, standing at around US$2.8 billion in 2013 and 2014, despite having presented a reduction in the three-year period 2002/04, associated with exchange devaluation, political crisis, credit shortage, among other factors. In 2015, combined with the current crisis, there was a small reduction of this deficit, which was US$2.3 billion (GIS, 2016).

Chart 1. Evolution of exchange rates and of Brazilian importd of drugs (1996-2014)



Source: Prepared by the author, based on data from Ipeadata (IPEA, 2016).

Chart 2. Evolution of exchange rates and of Brazilian imports of medical equipment (1996-2014)



Source: Prepared by the author, based on data from Ipeadata (IPEA, 2016).

In general, the growth of this deficit was accompanied by exchange devaluations. Negative elasticity points to an inelastic exchange rate-import demand, for both drugs and medical equipment. This is partly because imports of electronic components and various chemical compounds in Brazil – respectively, for medical equipment and drugs industries – escalate in downturns, and when their international prices increase, since domestic production is strongly based on goodsassembly. The domestic offer becomes insufficient to meet the national demand, and despite the increase in international prices, imports keep on growing. Data point to a fragility of Brazilian innovative and productive base, unable to meet the national demand, according to SUS precepts.

Final considerations

To understand how growth occurred in the period between 1996 and 2004, this work assumed that changes in exchange rate and imports of medical equipment and drugs are inversely proportional. However, focus on the exchange rate was insufficient to explain the full magnitude of such growth.

Incorporation of analysis on policies, development of the health system and demands associated with it are necessary to understand the data set presented herein, particularly considering the expansion in health observed in the period. Variables related to population ageing, epidemiological profile and increased technological incorporation also need to be included in the period analyzed. Similarly, in the decade of 2000 there was a remarkable evolution of the population purchasing power, which also affects the consumption of health services and inputs.

Thus, one cannot confirm the assumption of a negative relation between the variation of imports and exchange rate, since other factors of the economy – which did not remain constant throughout the period

– had important influence on this result.

The significant imports increase may be associated with a combination of further liberalization of imports during those years, the disparity of Brazilian technical capacity when compared to the rest of the world, and expansion of both the SUS and the purchasing power of the population. The Brazilian HEIC has become unable to supply the domestic market with high value-added medical equipment and drugs that result from large R&D investments. Consequently, there is a risk of permanently preserving a weak productive base.

Although the variation in the exchange rate may not be enough to explain by itself the Brazilian situation, it must be analyzed and monitored considering the specificities of the national industry and policies for the sector, which currently fail to rise to the challenge of integrating social programs, industrial production and technological development. A way of dealing with the fragility of the health productive base that poses threats to SUS success would be to expand a new scenario of convergence between Health Policy and Industrial and Science Policy, Technology and Innovation that could be the basis to enable solid future innovation strategies, guided by social demands.

Further studies on the topic would help deepening knowledge of these opportunities and understanding the best strategies to avoid wasting them. It would require a more detailed survey on specific policies for the sector and its specificities, in order to determine the necessary imports for the development of scientific research in the medical field in Brazil, and to assess which imports do contribute to the de-industrialization of the HEIC. It would also involve econometric studies to increase the analysis of exchange elasticity of drugs and medical equipment imports. Other relevant data can also be obtained by choosing a few representative equipment and medication, in order to understand how their demand has changed over the period. ■

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