Foreign Trade of Capital Goods in the United States: A Persistent Deterioration

Comercio exterior de Bienes de capital en Estados Unidos: Un deterioro persistente

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Abstract

Foreign trade of capital goods in the United States from 1994 to 2016 is specifically examined. A lagging performance of exports *vis-à-vis* imports in terms of magnitude, growth rate as well as price reductions has led to the current deficit. Domestic industrial output is a determining factor in the extent of foreign trade of capital goods. It exposes very large coefficients in the long term for exports (2.89), as well as for imports (4.34). Concerning the effective exchange rate, coefficients are systematically negative and elastic. Hence, a depreciation of the dollar could further deteriorate the external accounts of this sector. The United States trade deficit is expected to continue. As a whole, it is based on a mutual need: it fulfills the private interests of the incumbent parties.

Keywords: Capital Goods; U.S. Trade Deficit; Industrial Output; Effective Exchange Rate.

Resumen

Se examina específicamente el comercio exterior de bienes de capital en Estados Unidos, de 1994 a 2016. Un rezago en el desempeño de las exportaciones *vis-a-vis* importaciones en términos de magnitud, tasa de crecimiento así como abatimiento de precios, ha conducido al actual déficit. Una alta respuesta tanto de importaciones como de exportaciones con respecto a la producción industrial interna confirma cómo el propio producto es determinante en el comercio exterior de bienes de capital. Registra muy altos coeficientes en el largo plazo para exportaciones (2.89), así como para importaciones (4.34). Por lo que concierne al tipo de cambio efectivo, tanto el coeficiente de exportaciones como el de importaciones son negativos y elásticos. Por ende, una depreciación del dólar puede incluso deteriorar aún más las cuentas externas en este sector. Se espera que el déficit comercial de Estados Unidos continúe. En términos generales, se finca en una necesidad mutua: satisfacer el interés privado de las partes involucradas.

Palabras clave: Bienes de capital; Déficit comercial de Estados Unidos; Producción industrial; Tipo de cambio efectivo.

Classification JEL: F14, F680, O510, P170.

1. Introduction

Foreign trade of capital goods is concentrated in seven countries, i.e. France, Germany, Italy, Japan, Sweden, United Kingdom and United States (Eaton and Kortum, 2001). During the 1980s, countries like Hong Kong, South Korea, Singapore and Taiwan, i.e. Asian Newly Industrialized Countries (NICs), were already competing with information-processing equipment producers in the United States (Orr, 1989). Recently China is also found to be present (Thorbecke, 2012; Holmes *et al.*, 2014). Besides trade of this class of goods, the above countries supply developing economies of what becomes equipment and machinery for the shop floor. However, most of the capital goods exported (60%) go to developed countries (Thorbecke, 2012). Capital goods are instrumental for producing articles and services for final consumption. They are the basis for manufacturing as well as for construction, mining and *inter alia* industrial activities, being a key element in enhancing labour productivity.

In economic terms, within capital goods fall an array of fixed assets, which can only be accounted for by the value partially transferred to the product. The term capital good itself has ideological connotations, let alone measurement problems. It is due to its generalized usage that is being utilized in this paper, albeit being incorrect.

There are three categories in which capital goods are classified. Computer and information processing equipment including mainframe computers themselves, PCs, semiconductors, magnetic and optical disks as well as telecommunications equipment as a first group. A second group comprises non-automotive transportation equipment, i.e. aircraft, satellites, railroad equipment. In a third group, traditional and non-traditional machinery and equipment is comprised: generators, motors, transformers, steam and gas turbines, nuclear power oilers, robots, numerical control machine tools, farming equipment, food processing equipment, textile machinery, hospital and medical equipment, etc. (Orr, 1989). Production of capital goods convey a fair degree of industrialization.

The growth of an economy as a whole is specifically subordinated to the availability of capital goods, whether they are locally produced or acquired abroad. It is by means of them that final goods and services are provided. Besides, the former are instrumental for the production of capital goods themselves.

The six groups under which foreign trade of goods is classified by the U.S. Bureau of the Census apply the criteria of principal end-use. The other five

groups within this classification are: i) industrial supplies; ii) consumer goods; iii) automotive vehicles, etc.; iv) foods, feeds and beverages, and v) other goods. The above source offers a parallel classification by producing a dichotomy between petroleum and non-petroleum, also formally considering their end-use.

Within the official U.S. classification, capital goods are used by firms for capital formation, i.e. investment in fixed assets, which in turn increase the capital stock. Besides, the above definition includes goods which are being used as intermediate inputs. As a result, electrical parts and future components of capital goods themselves are comprised within this group (Feenstra, 1998). In addition, semiconductors and inputs for telecommunications equipment, fall into this category. For instance, regarding maintenance purposes, replacement parts for an industrial sewing machine are capital goods (Hahn and Choi, 2010). If the previous elements were to be used for final consumption, the present classification would not apply.

Regarding foreign trade, Irwin (1996) and Feenstra (1998) note that the share of capital goods has increased dramatically since 1970, while industrial raw materials fell. Referring to an emblematic component of capital goods, Campa and Goldberg (1997) find that the share of imported inputs for industrial machinery and equipment rose as a share of imports as a whole, from 6.27% in 1975 to 27.82% two decades later. In an analysis for 20 manufacturing industries, these authors conclude that the export strength of sectors also holds for imports. It could be assumed that intra-industry trade plays a major role in the production of end-use capital goods. Intrafirm trade and outsourcing for its procurement should also be borne in mind.

Technically, the above supply arrangements are made possible by a fragmentation of the production process for re-exports. If this process is discrete, it could de divisible into separate phases taking place in different locations.[1] It also allows for product differentiation, making possible the satisfaction of distinctive requirements regarding final assembly. In this case, instead of resorting to arm's length agreements or procurement through unrelated parties, affiliates could privilege the supply of parts through intrafirm transactions with their parent company (Borga and Zeile, 2004). Although this last paper focuses on intermediate inputs, its conclusions could be extended to other principal end-use class of goods, provided that it entails a non-continuous manufacturing process.

Subject to the constraints of its definition for statistical purposes, capital goods have had a leading position in the US trade account. By 1994 it represented 28.7% of total exports and 14.6% in relation to total imports. When petroleum and the rest of industrial supplies are taken separately, each one is below capital goods in value terms as far as imports are concerned. By 2016, its participation grew substantially. The share of capital goods rose to 36.2% regarding exports and 28.8% in the case of imports.

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[1] Several authors have long ago labelled it coining their own phrases to illustrate this process. For instance, in Krugman (1995) it conveys a process of slicing up the value added chain, while for Leamer (1996) it is labelled as delocalization.

The structure of this paper is as follows. In the forthcoming section, an overview of capital goods is highlighted through three distinctive periods based on its trade account. Further, the growth rate of exports and imports within these periods is examined, along with its dispersion. The trend of price deflators of both sales abroad and foreign purchases of capital goods is being estimated, exposing its pace as well as its variability. In the third section, the response of exports and imports to industrial output and the effective exchange rate is estimated by means of cointegrating equations. In the fourth section, several policy implications are outlined, both regarding capital goods and external trade deficits as a whole. In the fifth section, the conclusions are being put forward.

2. Foreign trade in capital goods

2.1. A surplus turns into a deficit

Although at a different rate, exports and imports of capital goods have experienced a substantial growth. In terms of trade balance, three distinctive periods could be identified as from 1994. Until November of 2002, a surplus of 4,280 billion dollars at prices of 2009 was generated each month, on average. Between December of 2002 and July, 2010, foreign trade balance in capital goods was basically even. It is by August 2010 that its trade shows a continuous deficit. During this last period, the monthly figure was -4.4 thousand billion dollars, on average. This behavior contrasts with the total U.S. trade deficit, which has been negative as from 1994. Although its magnitude has varied, it is expected to continue being negative.

Table 1. United States. Value of foreign trade in capital goods.
Selected periods (Monthly average, U.S. $ billions of 2009).

	Exports	Imports	Balance
1994.01 - 2002.11	21,594	17,313	4,280
2002.12 - 2010.07	31,709	31,633	75
2010.08 - 2016.12	43,523	47,935	-4,412
1994.01 . 2016.12	31,083	30,630	454

Source: Own estimates on the basis of U.S. Bureau of the Census.

The extent of capital goods imports by the United States is found to be consistent when compared to an array of countries, according to Mutreja *et al.* (2017). These authors base their conclusions on the ratio of imports to production of this class of goods, being negatively correlated with economic development.

Few countries engage in substantial research and development (R&D). A means by which other countries could benefit from it, is by importing capital goods which are endowed with this technology (Eaton and Kortum, 2001). Hence, a majority of countries make their productivity dependent on imported technology, as a necessary condition. In addition, these authors recall a key requirement. That is to say, importing countries exercise their ability and willingness to make use of the relevant equipment. Therefore, industrialization for newcomers appears to offer an even larger contingent of previously established competitors.

It is possible that a developing country can make a transit from assembly to innovation. In manufacturing, this could be done as returns are increased while skills are built. That is to say, technical change and learning could be achieved. This process by which back engineering or reverse engineering is a phase, has recent examples. China, for instance, has continued to implement this passage throughout the last decades.

Eaton and Kortum also use the term capital equipment in their paper in order to make comparisons among different nations. It is a proxy, including three groups for which they find data available for a cross section of countries: i) non-electrical equipment; ii) electrical equipment, and iii) instrument industries. On the whole, capital equipment is a highly traded item, including the United States. For this country, the authors report a ratio of imports to absorption,[2] higher for equipment (16.6%), in comparison to manufactures as a whole (11.9%). This figures are for 1985. It should be added that at the time, these shares appear to be the lowest among a set of 34 developed and underdeveloped countries, with the exception of Japan.

2.2. GROWTH RATES AND DISPERSION

Abiding by the same three distinctive periods, since 1995 exports of capital goods have grown systematically at a low pace compared to imports. Although such gap has narrowed when compared to the first period, according to the trend it was just a matter of time before imports would surpass exports, reaching the current deficit. While the trade gap did narrow during the interim period, as from August 2010 it is above a three percentage points.

The rate of growth in capital goods has been decreasing, both in terms of exports and imports throughout the three periods. This reduction is systematically larger regarding exports, falling more than one half between the first and last period, i.e. 8.4% and 3.6%. Hence, United States exports have been losing momentum throughout time.

Foreign purchases of U.S. capital goods fell during the last two periods.

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[2] Absorption is calculated as gross production plus imports less exports.

During the same time, United States imports have been basically stable, i.e., around a 7% growth. This rate almost doubles the level U.S. exports as from August 2010.

Table 2. United States. Growth of foreign trade in capital goods. Rate and Coefficient of Variation. Selected periods (Percentage and coefficient).

	Rate		Coefficient of variation	
	Exports	Imports	Exports	Imports
1995.01 - 2002.11	8.4%	13.0%	1.58	1.03
2002.12 - 2010.07	5.9%	7.0%	1.71	1.66
2010.08 - 2016.12	3.6%	6.8%	1.75	1.08
1995.01 . 2016.12	6.1%	9.1%	1.74	1.28

Note. Growth rates are estimated on an annual basis, i.e. (variable-variable$_{12}$)/variable-$_{12}$.
Source: Own estimates based on U.S. Bureau of the Census.

Concerning the stability of growth rates, those of imports systematically fluctuate far less than exports, particularly during the first and last periods, with a coefficient of variation slightly above one. Even the rise regarding imports observed during the interim period exposes a lower coefficient (1.66), in comparison to exports (1.71). On the whole, United States exports describe a tendency to increase its growth dispersion, in ostensible contrast with imports. In brief, export growth has evolved in a lagging fashion *vis-à-vis* imports in its growth pace, while depicting larger fluctuations.

2.3. Prices: behaviour and fluctuations

Despite its importance, the behaviour of price levels continues to receive scant consideration. This fact was acknowledged some time ago by Gordon (1961), while examining the performance of gross fixed capital formation and consumer's goods for the United States as well as other developed countries. In what follows, price indices referred to capital goods in the external sector are to be considered. These deflators are being provided by the U.S. Bureau of the Census.

Price indices of capital goods on the whole have been falling throughout the three periods. However, the pace of such diminution tends to be considerably reduced. The largest contraction was during the first period (1994.01-2002.11). While costs might have an important influence alongside higher profits, in the long run efficiency ought to be the driving force, making possible a lower price for the end-product. Technological advantage and even an upgrading in the quality of the product, becomes determinant for such reductions.

Table 3. United States. Foreign trade. Price growth of capital goods.
Selected periods. (Rate and Coefficient of variation)

	Rate		Coefficient of variation	
	Exports	Imports	Exports	Imports
1994.01 - 2002.11	-2.7%	-5.8%	-1.20	-0.95
2002.12 - 2010.07	-0.4%	-1.1%	-3.69	-1.93
2010.08 - 2016.12	-0.04%	-0.7%	-28.49	-3.09
1994.01 . 2016.12	-1.1%	-2.7%	-2.25	-1.64

Note. Growth rates are estimated on an annual basis, i.e. (variable-variable$_{-12}$)/variable-$_{12}$.
Source: Own estimates based on U.S. Bureau of the Census.

When comparing export to import prices, the last item falls at a higher rate. Judging by the data, a decrease of competitiveness in the United States is evinced, compared to its foreign partners from whom imports are acquired. This is not a new phenomenon. Between 1975 and 1981, Orr (1989) points out that export prices of capital goods rose 12% faster than import prices.

As an effort to reduce prices throughout the three periods appears to become more cumbersome, price instability rises. This phenomenon is particularly distinctive regarding exports. Here, instability reaches high levels, particularly as from August, 2010. It contrasts sharply with the low level of price fluctuations attained by imports, despite the fact that the last ones also increased in comparison to previous time periods. As a result, price reductions encounter higher difficulties to maintain price stability, particularly when exports of capital goods take place. In general, price advantage of imports throughout time becomes apparent.

Exports of capital goods both in terms of lagging growth and lesser price reductions expose more volatility in comparison to imports. If comparative advantage was at stake, the unsavoury conclusion would be that the United States is losing its grip. The whole situation has additional implications. In order to further examine these peculiarities, other elements are to be taken into consideration.

3. Industrial production, effective exchange rates and foreign trade

Previously, a revision as to how foreign trade of capital goods have behaved in magnitude, growth and relative prices has been made. In what follows, the response of exports and imports with respect to U.S. industrial output and the effective exchange rate of the dollar is being considered.

3.1. A model

Traditionally, models for foreign trade tend to rely on estimating the response of exports and imports to income, or more specifically to GDP. This,

besides relative prices.[3] Alongside when dealing with exports, income alludes to the rest of the world, while imports refers to the country under study.

Capital goods are not meant to be acquired by income as such, where the largest portion of it accrues to final consumption. Therefore, a change in the specification of the model is in order. Here, the industrial production index is to take the place of income. This is reinforced by the fact that a modest share of income finds its way to the purchase of capital goods. Its equivalent would be equipment, in this case.[4]

In the model, exports are considered by the following equation:

$$\log ex_k = \beta_o + \beta_1 \log Qind_t + \beta_2 \log E_{r\,t} + \varepsilon_{1t} \tag{1}$$

where ex_k are the are exports of capital goods, $Qind$ is the U.S. industrial production index, E_r stands for the dollar exchange rate and $\boldsymbol{\varepsilon}_{1t}$ is the error term. The variables are to be expressed in logarithms.

Imports take the following form:

$$\log im_k = \delta_o + \delta_1 \log Qind_t + \delta_2 \log E_{r\,t} + \varepsilon_{2t} \tag{2}$$

where im_k, represents the imports of capital goods. While the rest of variables were defined before, $\boldsymbol{\varepsilon}_{2t}$ is the error term for this second equation.

In both expressions, the level of industrial production determines the amount of foreign sales and purchases regarding capital goods. A positive and elastic coefficient is being expected in both cases. As far as effective exchange rates are concerned, a negative and elastic coefficient is assumed for exports, as a depreciated dollar would make capital goods from the United States less expensive in terms of foreign currency. Regarding imports, a positive and elastic coefficient is expected. Here, it is assumed that an appreciation of the dollar would be conducive to an increase in the demand for capital goods.[5]

The above estimates are to be made by cointegrating equations. Previous assumptions on the value of coefficients refer exclusively to the long term. Coefficients in the short term are expected to bear low values. This is in so far as foreign trade of capital goods decisions ought to take place in the long run.

3.2. Results

Regarding trade flows, data on imports and exports of capital goods as end-use products correspond to those published by the U.S. Bureau of the Census at 2009 chain-weighted dollars, not seasonally adjusted. The industrial production index is published by the Federal Reserve Bank System. The effec-

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[3] Ball and Mavwah (1962), and Kreinin (1967), are a couple of early works in the subject.
[4] In the United States, since 2012 the share of fixed investment in equipment has remained just above six percent of GDP, duly deflated by the corresponding implicit price index.
[5] An increment in the effective exchange rate represents an appreciation of the U.S. dollar.

tive exchange rate is provided by the Bank for International Settlements.[6] The period comprises from 1994 to 2016, on a monthly frequency. The variables of both equations expose a long-term relation.[7] The residuals obtained from equations (1) and (2), were tested for stationarity.[8] An error correction mechanism was applied in both equations, reconciling the short run with the long run behaviour the variables involved.

The classification of capital goods in the United States conveys end-use products. Therefore, intermediate inputs whose purpose is to produce capital goods also enter into this classification. Hence, electrical parts of a motor, or a semiconductor for an electronic device are also classified as capital goods.[9] Therefore, it would be expected that intra-industry trade also flourishes in capital goods.

Meanwhile, it is plausible that intermediate goods could cross borders more than once in the disintegration of the production process. Hence, trade data could comprise double-counting. Therefore, the above elasticities would be estimated under a magnified foreign trade data, up to a degree. Production at home could become relatively narrowed (Feenstra, 1998), as the supply chain would now be crossing borders. With the previous proviso is that the quantitative estimates are being made.

3.2.1. INDUSTRIAL OUTPUT

- Long term

The elastic response of exports to the industrial production index is substantial (2.89) for the long term (Table 4). The time span is from 1994 to 2016, on a monthly basis. Imports expose an even higher response (4.34) to industrial output during the same period. These gap confirms the Houthakker and Magee (1969) asymmetry. Considering foreign trade as a whole in the United States from 1951-1966, these authors find a larger coefficient for imports (1.51), in comparison to exports (0.99). A gap of a similar extent is reported for the United Kingdom, i.e. 1.66 regarding imports and 0.86 for exports.

Regarding exports of capital goods in the United States, Gruber *et al.* (2011), find an elastic coefficient (1.48) with respect to GDP in the long run (1995.2-2008.3). When comparing this result with other classes of end-use exports, they concede that this sector exposes the highest sensibility.

[6] Consumer price index based, broad indices; monthly averages.
[7] The cointegration tests are reported on Table A.1, in the Appendix.
[8] Stationarity tests are specified in the Appendix, on Table A.2.
[9] This, in so far as they do not become consumer goods.

Table 4. United States. Foreign trade elasticities with respect to industrial production and effective exchange rate (Coefficients).

		Dependent variable			
		Exports		Imports	
	Term	long	short	long	short
Independent variables					
$Qind$		2.89 (46.12)***		4.34 (52.46)***	
$\Delta Qind$			0.23 (2.77)***		0.20 (2.78)***
E_r		-1.34$_{-1}$ (-16.83)***		-1.52 (-14.31)***	
ΔE_r			-0.23$_{-1}$ (-1.71)*		-0.23 (-2.09)**
$Residual_{-1}$			-0.06 (-4.12)***		-0.03 (-3.24)***
Intercept		3.43 (7.42)***	0.005 (2.81)***	-2.35 (-3.85)***	0.01 (5.04)***
R^2 adjusted		0.90	0.07	0.91	0.05
Akaike info. criterion		-1.55	-4.38	-0.96	-4.74
Durbin-Watson		0.32	2.45	0.34	2.19
Observations		275	274	276	275
Period		1994.02-2016.12	1994.03-2016.12	1994.01-2016.12	1994.02-2016.12

Note 1. The subindex in the coefficient is indicating the number of lag periods.
Note 2. T statistical values in parenthesis. Significance: ( )***: 99%; ( )**: 95%; ( )*: 90%.
Source: Own estimates based on Bank for International Settlements, Federal Reserve Bank System and U.S. Bureau of the Census.

In a dynamic ordinary least squares (DOLS) panel study for capital goods exports for six developed countries,[10] Thorbecke (2012) obtains inelastic coefficients for the United States of 0.72 with respect to real GDP for the 1990-2009 period. For this study, capital goods comprise aeronautics, agricultural equipment, arms, commercial vehicles, computer and construction equipment, electrical apparatus and equipment, precision instruments, ships, specialized machines and telecommunications equipment.[11]

- Short term

In the short term, the effect of both exports and imports regarding industrial output is inelastic with extremely low coefficients despite their positive sign, i.e. 0.23 and 0.20, respectively (Table 4). This confirms that foreign trade in

[10] China, France, Germany, Japan, United Kingdom and United States.
[11] The database used is CHELEM (Comptes Harmonisés sur les Echanges et L'Economie Mondiale), hosted at CEPII (Centre d'Etudes Prospectives et d'Informations Internationales).

capital goods convey an element of prevision based in the long run. This results contrast with the ones obtained by Gruber *et al.* (2011). These authors report a positive and elastic short run coefficient (1.77) of capital goods exports, somehow higher in comparison to what they obtain for the long run (1.48). However, they do not discuss these results.

3.2.2. Effective exchange rate

- Long term

Regarding capital goods exports, their elasticity with respect to the effective exchange rate is negative and elastic (-1.34) in the long run, with a one month lag (Table 4). Turning into imports, it is remarkable that they behave as if they were exports, exhibiting a negative and elastic coefficient (-1.52).

An explanation for the above counterintuitive result is that a substantial contingent of those imports finds its origin in intrafirm trade. That is to say, U.S. owned companies abroad could be supplying produce to their headquarters, for instance, taking advantage of a depreciated dollar. Likewise, output from U.S. subcontractors could be finding their way into U.S. territory. These elements not only enhance import accounts of the United States. It rounds up the effect of industrial output in acquiring plant and equipment, either finished or in process, from abroad. An overvaluation of the dollar would hinder such efforts, reducing intra-firm trade and therefore reducing imports from abroad, as this coefficient suggests. As a result, deficits would increase on account of a dollar appreciation.[12] If this was the case, the United States economy would also be supplying its capital goods industry in a fair proportion from its own sources abroad.

In general, the coefficients reported in the literature appear to be far lower. An exception is Houthakker and Magee (1969), who find a negative and elastic coefficient (-4.05) for finished manufactured goods, with respect to a price ratio. This last one is the import price for this class of goods divided by the wholesale price index for all United States commodities. These estimates are based on quarterly data from 1947 to 1966 for the long run. In particular, this last sector rose its share from about one-seventh in 1947 to one-half by 1966, according to the same authors.

Gruber *et al.* (2011), report a negative and elastic coefficient (-0.889) of exports with respect to the effective exchange rate in the long run. This result comprises from the second quarter of 1995 to the third quarter of 2008. Thorbecke (2012), finds an inelastic coefficient for exports (-0.48) with respect to the real exchange using a DOLS panel data. This result comprises the 1990-2009 period.

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[12] Marquez (1988) is of a different opinion. He claims that the U.S. trade deficit will improve as a result of a real depreciation of the dollar.

• Short term

In the short term, an inelastic and negative coefficient (-0.23) is found regarding the effective exchange rate with respect to exports, with a one month lag, as shown in Table 4. The coefficient for imports with respect to the effective exchange rate happens to result in the same value (-0.23), although no lag is involved. This results confirm that import decisions regarding capital goods are grounded in the long term. In other study referred to the short term, a coefficient close to zero (-0.187) is reported, i.e. Gruber *et al.* (2011). This result is regarding exports with respect to the effective exchange rate, being along the lines with the one reported in Table 4.

4. POLICY IMPLICATIONS

4.1. CAPITAL GOODS

A depreciation of the dollar would certainly increase exports of capital goods. However, in so far as the effective exchange rate for imports is larger, the deficit far from narrowing, would expand. As a result, a dollar depreciation would just make matters worse, making external deficits more vigorous.

An overvaluation of the dollar could be an alternative to hinder imports of capital goods. But, although to a lesser degree, it would also harm exports of this class of goods. It is to the point to recall the experience of the first half of the 1980s, when as a result of the overvaluation of the dollar, U.S. producers ventured to manufacture capital goods abroad. As a result, exports from U.S. territory were substituted as a source of supply for foreign United States customers (Orr, 1989). Once this affiliates came into operation, intrafirm trade becomes a *modus operandi*.

As imports have overtaken exports of capital goods in the United States, an increasing industrial complementariness is being apparent. Whether such goods cross the border throughout their process of production, or they are finally ready to be incorporated as a means of production, a mutual reliance comes to the fore.

Industrial activity in the United States has to a larger extent an effect on imports *vis-à-vis* exports of capital goods. Within this state of affairs, it is relevant to succinctly consider the United States foreign trade position.

4.2. TRADE DEFICITS

Regarding the extent of the U.S. trade deficit as a whole as well as its diagnosis, perceptions differ. At times, a normative judgement is first issued. For instance, in the long term and in the name of economic health and sustainability, it is stipulated that external and internal imbalances should be corrected. This applies for the United States and trading partners (Mann, 2004). A step ahead is Collins (1999), who concedes that the sustainability of the trade deficit could

encounter difficulties. In the eventuality of such happening, she is cautious al-
beit confident that orderly adjustments would take place. Chinn (2004), for its
part, assures that most observers would agree that trade and current balance
must move to a surplus. However, he does not enter into specifics as to who
these observers are, or how such call is to be fulfilled.

Afterwards, a positive judgement is frequently provided. There are struc-
tural characteristics and policy stances between the United States and its trad-
ing partners, which constitute a co-dependency. This is so strong that it would
be difficult to undo. A possible cause for its possible undoing, would be any-
thing short of a global economic crisis (Mann, 2004).

Leaving aside the economic scene as it should be and concentrating in
what such scene is, there are several widely acknowledged elements involved.
Surplus countries have been willing to underwrite U.S. deficits in exchange for
the acquired surplus earned through exports. The value of goods sold in excess
of imports for which sovereign debt has been received, exists in the form of
liabilities of the U.S. Treasury. They are means of payment, i.e. credit money.
If they were to massively reach the market for redemption, a major disruption
would ensue. Depending on the interest rate, the surplus countries holding
such debt become rentiers in U.S. dollars. This, provided that such rate is posi-
tive. If not, it takes the place of a non-interest loan.

Considering a growing deficit, Dooley *et al. (2000),* envisaged the possibility
of surplus countries being targeted to become capital goods importers from the
United States. So far, there has been no need to exert a commercial pressure
of this nature. Besides, one of the causes for the lukewarm response of capital
goods exports has been the international supply chain for capital goods produc-
tion based in China, a state of affairs which has been here to stay (Mann, 2005).

Meanwhile, United States has been a net importer of goods, either for final
or intermediate consumption, or for capital equipment. In this last instance, it
could be associated with a possible decrease in its technological edge. As a
whole, the deficit has been paid for by debt issuing. On the whole, consump-
tion has remained robust in the United States. Government savings continue
being negative with a GDP share of net personal savings well below a two digit
figure. U.S. debt has become a spur for economic growth worldwide. Co-de-
pendency has been built on lower costs abroad. In the United States, this state
of affairs has allowed for a reduction of the cost of living of labour on the whole
which has been conducive, in turn, to an increase in profitability. Based exclu-
sively on private interests, it is difficult to conceive that the U.S. economy could
afford to undo this structure.

In the process, surplus countries have been able to build, maintain and
expand an industrial capacity with a fully-fledged capital equipment in op-
eration, capable to deliver goods for the world market, including the United
States. Alongside, the surplus countries have enhanced a skilled labour force,
both on the shop floor as well as in production, innovation and construction of
equipment. It continues to be the alternative to exercise an export-led growth.
At the same time, the US continues to make use of its privilege as the reserve

currency. In so far as the United States continues to be the largest economy, both sides need each other to maintain this mutually beneficial state of affairs.

5. Conclusions

Exports of capital goods have an outstanding role within US foreign trade. In 2016, this sector represented more than a third (36.2%) of total exports and in excess of a quarter (28.8%) of total imports. According to the U.S. Bureau of the Census, this classification includes capital goods in process. Discrete production has made possible the fragmentation of production, making possible its production abroad. This could take place either by affiliates of US companies, through arms-length agreement or acquisitions in the open market.

An external deficit of capital goods has been a feature of the United States economy as from the end of 2010. While it has been due to a sharper growth of imports in relation to exports, other elements are considered. As from 1994 until the end of 2002, a surplus of capital goods was achieved. Imports grew at a faster rate than exports. In addition, this last group exposes a higher instability in its growth behaviour. Price deflators of exports and imports of capital goods have been falling as from 1994, although to a lesser extent. In particular, it is imports of this type of goods which expose a higher descent. They have been presumably stimulated by lower costs abroad, alongside possibly higher profits. Exports witness difficulties in reducing its variability in price reduction when compared to imports.

Exports and imports of capital goods are highly responsive to industrial production, with elasticities of 2.89 and 4.34, respectively. Such asymmetry is conducive to a trade deficit building. The effective exchange rate results in an elastic and negative coefficient, both regarding exports (-1.34) and imports (-1.52). A depreciation of the dollar, for instance, has not contributed to a reduction of the external deficit on capital goods. All the previous results refer to the long term. In the short run, coefficients are ostensibly inelastic. A diminishment in U.S. technological pre-eminence, translated in a growing capital goods trade deficit, should not be discarded.

The complementariness or co-dependency of external deficits between the United States and the rest of the world has several components. On the one hand, there is the presence of US affiliates producing abroad, exercising intrafirm trade. The US foreign trade is predicated on a deficit in which capital goods is a key contributor. On a normative basis, debt issuing has been criticized by its lack of sustainability. It ought to be corrected, is the moral. On a positive basis, it has not encountered limits, so far.

Such deficit is underwritten by surplus countries, who keep such liabilities issued by the US Treasury. These countries become rentiers of US debt, whose interest rate is expected to be positive. The deficit itself has been an instrument for an economic stimulus throughout the world, as a means of demand creation. In return for such means of payment, the United States has had access to cheaper goods, becoming instrumental to reduce the cost of living.

Although there has been a generalized benefit from trade, surplus countries have been able to enhance a productive base capable of supplying the world markets. In particular, they have provided the U.S. with capital goods, intermediate supplies and consumer goods. In the process, they have strengthened a skilled and dexterous labour force. Within this state of affairs, the United States has exercised this privilege through the dollar, being the reserve currency. This state of affairs is expected to continue, enhancing mutual interests.

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APPENDIX

Table A.1. Johansen Cointegration tests.
Sample (adjusted): 1994:06 to 2016:12.
Included observations: 271 after adjustments.
Lags interval (in first differences): 1 to 4.

Hypothesized number of cointegrating equations	Eigenvalue	Trace statistic[†]	0.05 Critical value	Probability[††]
Series: $ex_k, Q_{ind;} E_r$				
Trend assumption: No deterministic trend				
None *	0.0690	26.0491	24.2760	0.0296
At most 1	0.0195	6.6787	12.3209	0.3583
At most 2	0.0049	1.3391	4.1299	0.2891
Series: $ex_k, Q_{ind;} E_r$				
Trend assumption: Quadratic deterministic trend				
None *	0.0826	38.1259	35.0109	0.0225
At most 1	0.0452	14.7602	18.3977	0.1501
At most 2	0.0082	2.2227	3.8415	0.1360

[†] Trace test indicates 1 cointegrating equation at the 0.05 level.
[††] MacKinnon-Haug-Michelis (1999) p-values.
* Denotes rejection of the hypothesis at the 0.05 level.

Table A.2. stationarity tests.

	Exogenous:	ADF[1] test statistic	Test critical values [2]
equation (1) residual	Constant	-2.97	-2.87 **
	Constant, linear trend	-3.30	-3.14 *
	None	-2.99	-2.57 ***
equation (2) residual	Constant	-2.95	-2.87 **
	Constant, linear trend	-3.71	-3.43 **
	None	-2.98	-2.57 ***

[1] Augmented Dickey-Fuller.
[2] McKinnon (1996) one-sided p-values. Significance: (   ): 99%; (   ): 95%; (   ): 90%.

$\begin{smallmatrix} R \\ E \\ M \end{smallmatrix}$