

CUBA'S SWAPS OF PETROLEUM FOR DOCTORS AND THE IMPACT OF CUTBACKS IN VENEZUELAN OIL DELIVERIES¹

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In a 2009 article, Jorge Pérez-López and Carmelo Mesa-Lago described Cuba's official GDP data as involving "discontinuities, obfuscation and puzzles." Something similar could be said about the statistics on petroleum trade published by the official Cuban statistical agency, Oficina Nacional de Estadística e Información (ONEI). Data for the value of fuel imports (which consist overwhelmingly of petroleum and products) are published with a considerable lag—one year beyond the already long publication lag for ONEI's annual *Anuario Estadístico de Cuba*. Exports of oil products (refined or blended in Cuba using crude oil imported from Venezuela) are not reported at all. And there is no information on the prices or of oil trade.

All this is unfortunate because the oil sector is of great interest to observers of the Cuban economy, given the island's heavy dependence on imported energy, particularly Venezuelan oil. There are, however, ways to overcome some of these problems and to resolve some of these puzzles, and this is done in the first part of this article. The second part examines the evolution of Cuba's oil trade in recent years. The third evaluates the impact of cuts in Venezuelan oil exports to Cuba since 2013, and estimates the effects of a hypothetical elimination of these exports in the period ahead. The fourth part explores the relation between Cuba's services exports and the output of Cuban medical personnel. The final part examines the impact of Venezuelan oil cutbacks on Cuba's bal-

ance of payments. Annex 1 describes the framework used to evaluate the impact of Venezuelan cuts on the Cuban economy. And Annex 2 clarifies the relation between ONEI and United Nations' data for Cuban exports of oil products.

FILLING THE GAPS

ONEI publishes the value of Cuba's fuel imports on a Standard International Trade Classification (SITC) basis, but with a long lag. For example, the value of imports for 2017 is omitted from the latest issue of ONEI's yearbook, which itself lags by more than a year (see Table 1 at the end of this article). However, this lag can be shortened by calculating fuel imports as a residual from ONEI's table on imports by main categories. (References to ONEI's Tables are provided in the footnotes to the tables in this paper). The validity of this trick can be confirmed by comparing the current estimate with ONEI's published number when it becomes available.

A proxy for fuel imports can also be obtained by looking at Direction of Trade (DOT) data compiled by the International Monetary Fund. Until 2015, Cuba's oil imports originated primarily from two countries: Venezuela (including imports routed through the Netherlands Antilles) and, to a lesser extent, Algeria. Adding up Cuba's imports from Venezuela and Algeria provides a proxy for Cuba's total fuel imports on a DOT basis. These imports are bartered against the services provided by Cuban profes-

1. This article has benefited from extensive discussions with Luis R. Luis and John Devereux.

sionals (mainly doctors and nurses, but also teachers, and security personnel). As shown in Table 1 the differences between the DOT and SITC series are small until 2015, and the two series are highly correlated. This is reassuring because it suggests a degree of consistency between data obtained through different methods.

Cuba's fuel exports consist of (i) petroleum products processed in the Cienfuegos refinery using crude oil imported from Venezuela (gasoline, diesel fuel and residual oils); and (ii) products from the blending operation performed by a joint venture with Petr leos de Venezuela (PDVSA), the Venezuelan oil company. Recently, PDVSA pulled out of the refinery, selling its 49% share to the Cuban company Cupet, which has now taken full ownership. According to Cuban sources, the action was taken to offset an unpaid debt of Venezuela to Cuba. The blending operation reportedly was closed, and the refining operation has experienced several interruptions and is now operating a reduced capacity.

ONEI's detailed table on Cuban exports by SITC categories carefully excludes any reference to fuel exports. However the data can be derived as a residual from ONEI's table on exports by main categories. As a check, oil exports can also be gauged approximately by looking at Cuba's (total) exports of goods to Venezuela, which appear to consist mostly of oil products. The difference between the DOT and SITC series is larger than in the case of imports, as Cuba does export oil products to other countries (see Annex 2), but the two export series are strongly correlated.

THE RECENT EVOLUTION OF CUBA'S OIL TRADE

Armed with these estimates and proxies we can try to understand the evolution of Cuba's oil trade during the period ended in 2017, the last year for which data are available. This period includes extraordinarily large movements in both prices and volumes.

- The value of Cuba's oil imports fell by about 60% from 2013 to 2017, owing largely to a 48% drop in price², although volume also contracted reflecting a cutback in Venezuelan oil deliveries (see Tables 1 and 3).
- SITC and DOT data remained very close until 2015, indicating that Venezuela and Algeria remained basically the only suppliers of oil to Cuba. In 2016 and 2017, however, the SITC numbers exceeded the DOT numbers by a significant margin. This suggests that Cuban diplomacy has been moderately successful in eliciting oil-for-doctors swaps from countries other than Venezuela and Algeria—a development that appears to be gaining importance. There have been unconfirmed reports of barter arrangements being negotiated with Qatar (where 400 Cuban doctors and nurses already work), the United Arab Emirates, and Saudi Arabia, although Cuban imports from these countries do not indicate any significant change, at least through 2017. Early in 2019, Russian government-controlled oil company Rosneft announced, for the first time since the Soviet era, a shipment of Russian oil and diesel fuel to Cuba. According to Jorge Pi on of the University of Texas at Austin, this would be part of a deal valued at \$105 million—a small contribution towards filling the gap resulting from Venezuelan cuts.
- From 2013 to 2017, the value of Cuba's *net* imports of fuels (a good proxy for domestic absorption) fell sharply, reflecting predominantly the drop in oil price. In real terms the decline in net imports was considerably smaller.
- Cuba has also exported doctors to countries other than Venezuela and Algeria, including Bolivia and, in the more distant past, Guatemala and Honduras. By far the most important of these arrangements was concluded in 2013 with Brazil. According to Nugent (2019), in November 2018 there were 8,300 Cuban doctors in Brazil.³ This was just before Cuba discontinued the pro-

2. The price variable used is an average of the Venezuelan export price provided by PDVSA before 2013 (the last year for which PDVSA provided the information) and the Cushing Oklahoma oil price thereafter (see Table 3). The two series were strongly correlated before 2013.

gram following a dispute with Brazil over the discriminatory and confiscatory compensation of doctors by the Cuban government. How these exports are paid for is not known, but they are probably not bartered against oil shipments.⁴

- The value of Cuba’s oil exports collapsed from 2013 to 2017, reflecting sharp declines in both volume and price. The large drop in real terms confirmed the Cuban government’s decision to reduce the output of its oil processing industries, with implications for GDP and unemployment, in order to protect household consumption from the Venezuelan cuts. Data for 2018 show that these exports have come virtually to a standstill (see Annex 2).

THE IMPACT ON THE CUBAN ECONOMY

Before estimating the impact of Venezuelan actions on the Cuban economy we must deal with an important methodological issue. The national accounts statistics presented by ONEI include exports of services as part of GDP. As both Devereux (2018) and Luis (2019) have pointed out, Cuban “exports” of professional services do not directly affect the island’s GDP because they involve productive activities that take place abroad, and *not* within the territory of Cuba. However, these differences do affect gross national income (GNI). For the purposes of this article GNI equals GDP plus net factor income from abroad.⁵ I shall therefore use the concept of GNI, which has now been adopted by several international organizations including the World Bank. To simplify

things, however, I will continue to use the term “exports of services” to denote the income received by Cuba for the work of its professional abroad.

Using a simple accounting framework⁶ without multiplier effects I have estimated that:

- The drop in oil imports from Venezuela over the period 2013–2017 lowered real absorption⁷ by 2.1%, or just over 0.5% at annual rate. This may appear to be small, but it should be recalled that the fall in *real* oil imports during that period was not very large (most of the decline in nominal imports reflected the plunge in the price of oil), and that imports from Venezuela are a small share of aggregate absorption in Cuba.
- The fall in real oil real exports of goods and services is estimated to have lowered real GNI by 4.9% from 2013 to 2017⁸ (a little more than 1% at average annual rate).⁸ This reflects the impact of (i) the fall in real exports of goods (refined or blended petroleum products); and (ii) the fall in real exports of services provided by Cuba to Venezuela that are partly, albeit not entirely, bartered against Cuban oil imports.

So much for the past. The key question now is what would happen to the Cuban economy if the Accord with Venezuela were abolished. Using the accounting framework of Annex 1, I estimated that:

- the complete elimination of Cuban oil imports from Venezuela would reduce real absorption in Cuba by 2%; and

3. Other estimates are higher, however. Frist (2015) estimated the number of Cuban doctors in Brazil at 4,000 in 2013 and 11,429 in 2014, approximately 30% of all Cuban doctors working abroad.

4. Nugent reports that in 2013 Brazil paid the Cuban government \$3,600 per doctor per month, only a small fraction of which is paid to the doctors, with the rest captured by the Cuban government. This would amount to \$522 million a year—a significant number but well below the \$6 billion value of Venezuelan oil exports to Cuba in that year. These numbers have to be taken with grain of salt, however: other estimates put the monthly payment per doctor anywhere between \$1,200 and \$5,000.

5. The reason is that GDP includes only production carried out by anyone (resident or non-resident) *within the country*. By contrast, GNI includes GDP plus income earned abroad by the country’s residents. In our case this means that wages earned by Cuban doctors and other professionals working abroad are part of Cuba’s GNI, but not of Cuba’s GDP, as implied in ONEI’s data.

6. Details on the calculations underlying this framework are spelled out in Annex 1.

7. Absorption is defined as total consumption plus investment by the state and household sectors.

8. This implies that the average growth of real GNI in the period 2013–2017 would have been 3.2% per annum in the absence of the Venezuelan actions, compared with an actual growth rate of 1.9%.

- the disappearance of oil products and professional services exports to Venezuela would lower real GNI by 7%.

These estimates are considerably lower than those relating to the termination of Soviet/Russian assistance to Cuba in the early 1990s—an episode that involved a much larger loss of foreign assistance and a severe supply-side shock, as domestic enterprises were unable to repair or replace a capital stock based almost entirely on Soviet technology. In an earlier article (2013), I had estimated the cost of the elimination of Soviet/Russian aid at 38% of GNI, more than five times the estimated cost of ending current arrangements with Venezuela.

It could be argued that there is no Venezuelan assistance to Cuba because oil shipments received by Cuba are paid for by the services of Cuban doctors. It is likely, however, that the compensation paid by Venezuela for these services has been at times much higher than what a market solution would have produced, so that there was probably a real net transfer of resources from Venezuela to Cuba. As far as I know, the only serious study of this problem was provided by Luis (2019) who calculated the difference between the value of Venezuelan oil exports to Cuba and the market equivalent value of compensation received by Cuban doctors.⁹ Luis estimates that the grant element provided by Venezuela reached \$4.2 billion dollars in 2012, before declining steadily thereafter to virtually zero in 2018. In any event, this would pale in comparison with Soviet assistance through 1989.

The estimated costs of ending the 2000 Accord with Venezuela, combined with the costs of the cuts that had already occurred since 2013, are nevertheless substantial. The estimates could be even larger for three reasons.

1. ONEI translates dollar values into non-convertible pesos (CUPs) at the overvalued official ex-

change rate of 1 CUP for 1 US dollar, thus artificially lowering the ratios of exports to GDI and imports to absorption. Taking into account multiplier effects could raise the negative effects on absorption.

2. The removal of Cuban doctors from Brazil could raise the impact on real GNI from 7% to nearly 8%.
3. The adverse effects could also be larger than estimated if the cutbacks in oil deliveries had adverse supply-side effects. In particular, the loss of currently subsidized energy could force Cuban enterprises to modify existing energy-intensive production methods, and/or to cut production and fire redundant workers. The possible policy responses are considered below.

EXPORTS OF DOCTORS AS “EXPORTS” OF SERVICES

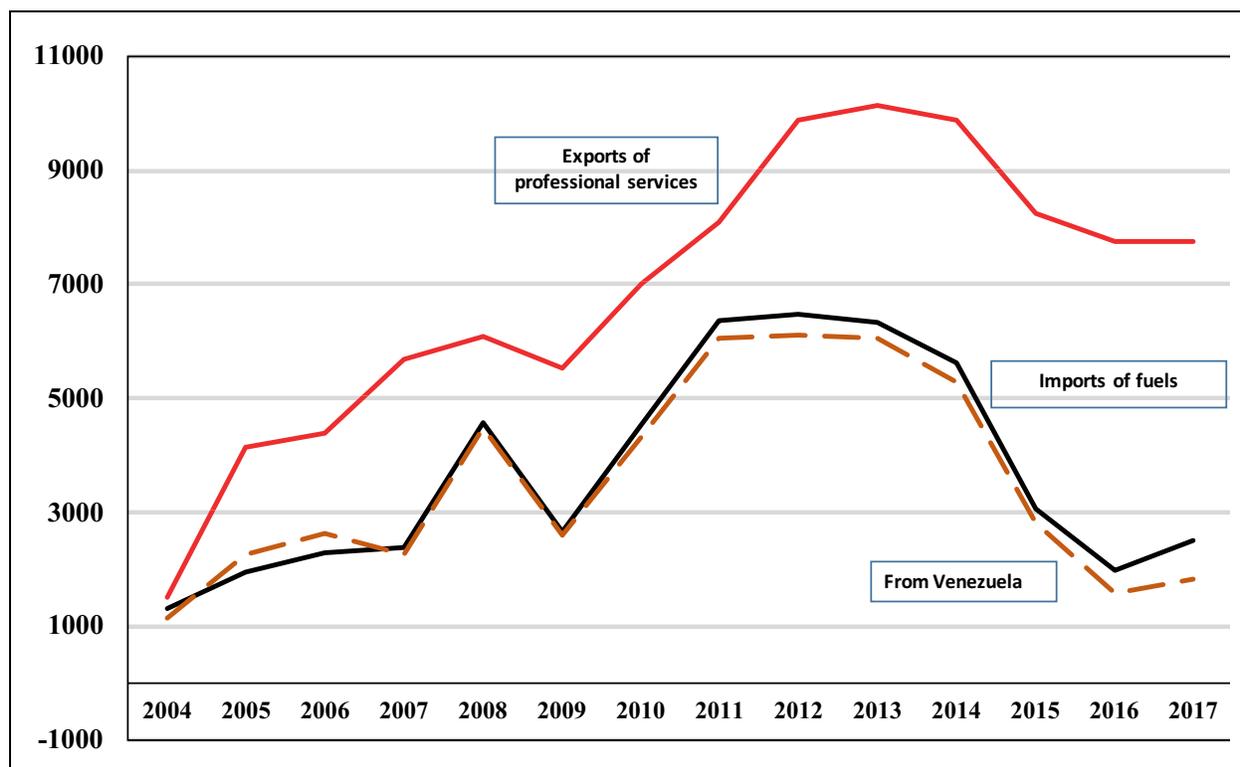
We know that Cuba's oil imports from Venezuela are not paid in cash or by borrowing but are bartered against exports of Cuban professionals—mostly doctors (similar arrangements apply to oil imports from Algeria). This is not the end of the story, however, because, as shown in Figure 1, Cuban exports of professional services exceed oil imports by a wide margin. The reason is that Cuba has shipped doctors to a number of countries (including notably Brazil), and that their services have *not* been bartered for oil, but paid for in cash, investments and/or loans. The counterpart of these payments (for which no data is available) affects the capital account of the balance of payment but not the current account.

One related reason is that Cuban services exports to foreign allies, particularly Venezuela, included not only doctors but also educators, military officers, and spies. There is no data on these transactions, but Juan Antonio Blanco and his associates (2019) have reported that in early 2019 there were between 3,000 and 5,000 Cuban security, intelligence and counter-intelligence specialists in Venezuela.¹⁰

9. Luis takes the per capita compensation of Cuban doctors by the Brazilian government as a market equivalent wage, and multiplies it by 40,000—his assumption about the number of Cuban professionals in Venezuela.

10. The number of Cuban soldiers is probably much smaller. However it has been reported that an elite unit of the Cuban Revolutionary Armed Forces (FAR) is now in Venezuela and has been sent to the Colombian border.

Figure 1. Cuba: Exports of Non-Tourist Services and Imports of Fuels (Millions of current dollars)



As for Cuban doctors thousands have been sent to various countries, notably (albeit temporarily) to Brazil. Unfortunately, there are no official statistics on these transactions. Therefore, the relation between services “exports” and foreign payments for doctors cannot be tested directly. There is, however, an indirect way to test that relation. This is important because, if that relation holds, it would mean that the sharp rise in both exports of services and real GNI after the turn of the century was not the result of data manipulation but a reflection of the surge in exports of professionals.¹¹

The test involves two steps.

First, ONEI’s data on exports of services were adjusted to exclude tourism, international travel and communication services, all of which are unrelated to exports of professional services (see Table 4).¹² The

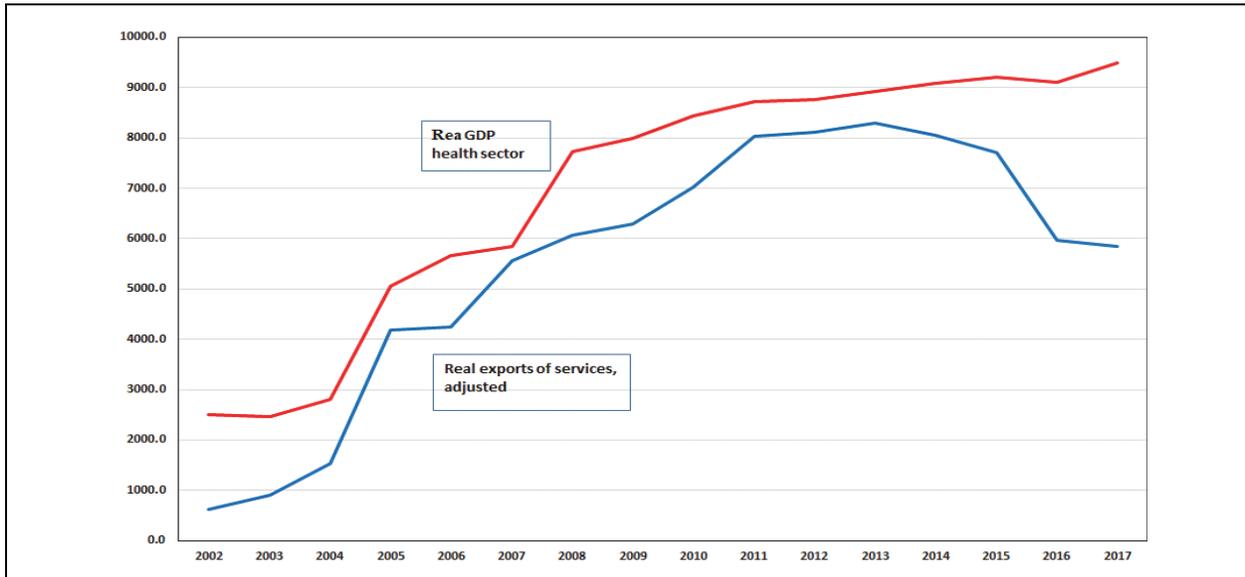
resulting variable was then converted from nominal to real terms.

Second, I ran a regression relating GDP in the health sector to exports of services (properly adjusted), with both variables measured in real terms. The adjusted R^2 of the regression was 0.8767 and the t-statistic on the coefficient of services exports was 10.4. The estimated coefficient of the export services variable (0.95) was not significantly different from one at the 99% confidence level. There was a positive and significant constant term that presumably captured the output of health practitioners operating in Cuba, which was assumed to be roughly constant. The justification for this assumption is that the Cuban population has not changed much during the sample period and that domestic health indicators, like the number of beds in hospitals, have been roughly con-

11. This important question was first raised by John Devereux (2018).

12. Adjustment for other exports such as financial, computer and information services, would have been appropriate but was not feasible due to lack of data.

Figure 2. Cuba: Real GDP, Health Sector and Adjusted Exports of Services (Millions of 1997 Pesos)



stant. The high correlation between GDP in health and exports of non-tourist services also holds when the two variables are expressed in nominal terms, and when they are specified as first differences.

As illustrated in Figure 2, the correlation between the two variables is quite high from 2002 to 2015.¹³ But the relation appears to break down in the last two years of the period. Services exports fall after 2015, as expected since a decline in Cuban oil imports from Venezuela must be accompanied by a decline in Cuban services exports, but GDP in the health sector continues to rise. The reason for this lack of parallelism is unclear.

EFFECTS ON THE BALANCE OF PAYMENTS

So far, this paper has focused on the effects on GNI and absorption of the fall in oil imports and payments for professional services. These cuts also have a significant effect on Cuba's balance of payments.

Table 5 shows the actual values of key variables in 2017 (labeled A) as well as two scenarios (labeled B and C) illustrating the possible consequences of terminating transactions with both Venezuela and Bra-

zil, which are assumed to occur in or after 2019. (The program of Cuban doctors in Brazil was ended in December 2018.)

Both scenarios assume that (i) Cuban imports of oil from Venezuela vanish; (ii) Cuban exports of petroleum products and of professional services to Venezuela also disappear; and (iii) exports of doctors to Brazil are eliminated. In both scenarios the disappearance of oil imports from Venezuela is offset by a corresponding fall in payments for Cuban professionals.

Scenario B (cold turkey) shows the consequences of accepting the contraction of oil imports without policy response. The current account balance deteriorates but remains in surplus. However, the country would be deprived of a large share of its energy resources, leading enterprise to cut production and employment and rationing electricity and gasoline—in fact, seemingly random power outages and shortages of gasoline have already occurred.

A costly alternative would be to increase the already large government subsidies to enterprises and finance

13. ONEI registers payments to Cuban professionals abroad as exports of services. Strictly speaking they should be registered as factor income receipts, in which case these transactions would influence national income but not GDP. The effect on absorption would be the same under both classifications.

Table 5. Cuba: Effects on the Energy-related Balance of Payments of ending Transactions with Venezuela and Brazil (Million U.S. dollars)

	(A) Actual 2017	(B) Cold turkey 2019	(C) Optimistic 2019
1 Exports of professional services	7,763	2,236	2,303
1.1 To Venezuela	4,777	0	0
1.2 To Brazil	750	0	0
1.3 To Algeria	295	295	325
1.4 To others	1,941	1,941	1,978
2 Exports of oil products	225	0	0
3 Imports of oil	-2,504	-665	-2,922
3.1 From Venezuela	-1,839	0	0
3.2 From Algeria	-295	-295	-325
3.3 From others	-370	-370	-407
3.4 From the market	0	0	-2,190
4 Current account balance	5,484	1,571	-619

Note:

Signs are based on balance of payments conventions (imports are negative)

Line 1 excludes tourism, international travel and communication services

Lines 1.1 through 1.4 are author's estimates (see Annex).

Line 2. SITC basis (Table 2). Line 3. SITC basis (from Table 1). Lines 3.4 is hypothetical.

Line 4: Sum of lines 2, 3, and 4

the resulting fiscal deficits through monetary expansion—the failed policy adopted in response to the post-Soviet crisis in the early 1990s. This policy might prevent a rise in open unemployment but only to produce an equivalent increase in disguised unemployment while raising an already large fiscal deficit. Once introduced, the subsidies would be hard to remove, as revealed by the experience of the 1990s.

The somewhat more optimistic Scenario C illustrates the consequences of purchasing oil in the world market and reaching agreement with non-traditional partners (and with Algeria) on new exports of doctors against oil, loans or cash. These agreements are assumed to raise exports of services from these countries by 10%. The purchases of oil in the market would restore the level of net imports roughly to the level of 127 thousand barrels per day prevailing in 2017. Assuming a world oil price of \$49.52 (the Cushing-Oklahoma level prevailing at the end of 2018), the required purchases would amount to \$2.2 billion a year—which would restore oil consumption to the pre-disturbance levels but would not allow a full resumption of exports by the Cienfuegos refinery.

The problem with this scenario is that Cuba's current account balance would suffer a large deterioration and shift into a significant deficit. This deficit would have to be financed either by drawing down the Central Bank of Cuba's foreign exchange reserves (which could not go on for long since reserves are small and finite) or by attracting new capital inflows (of direct investment or loans, for example). This would require ending the bureaucratic hassles that currently discourage foreign investors and improving the confidence of foreign lenders in the Cuban economy—which in turn would require action to moderate the highly expansionary fiscal and monetary policy pursued in recent years.

The silver lining in Scenario C could be that the desperate need for foreign exchange could provide an incentive to adopt market-oriented reforms in various areas. In particular, an increase in exports of goods following their disastrous performance in the past decade would improve the current account balance and the liquidity position of the central bank—provided the government stops dragging its feet and finally moves to unify and liberalize the exchange rate system.

For Cuba, there is no easy way to deal with the problems caused by Venezuelan and Brazilian actions. The possible remedies—rationing, subsidies or market purchases—all have their costs. If oil transactions with Venezuela disappear and Brazil stops paying for Cuban doctors, the celebrated merits of the doctors-

for-oil or money programs would have been reversed. The chicken would have come home to roost and, one more time, Cuba will pay the price for its politically-based trade agreements with unreliable foreign governments.

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Annex 1

ESTIMATING THE IMPACT OF CHANGES IN VENEZUELAN OIL TRADE WITH CUBA

Gross National Income (y) is the sum of absorption (a) and net exports of goods and services plus ($x - m$). Exports of services include factor income from abroad. Absorption (a) is defined as consumption plus investment by governments and households. It includes all goods sold in the domestic market: those produced domestically (d) and those imported (m). The external current account balance is the difference between exports (defined to include factor in-

come) and imports, ($x - m$). All variables are in real terms.

$$y = (d + m) + (x - m) \quad (1)$$

The m 's cancel out and thus:

$$y = d + x \quad (2)$$

Gross national income is the sum of all goods and services produced internally, including those sold in

the domestic market (d) and those sold abroad including factor income receipts from abroad (x). We use equation (2) to estimate the impact of changes in exports to and imports from Venezuela on Cuba's GNI and absorption.

Taking first differences in equation (2) and given that there is no direct change in d as a result of Venezuelan actions, we have:

$$\Delta y/y_0 = \Delta x/x_0 \cdot x_0/y_0 \quad (3)$$

Where the subscript 0 denotes the value of the variable at the beginning of the period. In words, the percentage change in Cuban GNI resulting from the change in exports to Venezuela equals the percentage change in exports times the share of those exports in GNI.

Table 6. Estimated Effects of Changes in Venezuelan Policies on Cuba's Real Gross National Income and Absorption

Effects on Real GNI	% Change in Exports	Exports/GNI Ratio	Impact (% Of GNI)
2013–2017	-39%	0.125	-4.9%
After 2019	-100%	0.070	-7.0%

Effects on absorption	% change in imports	import/absorption ratio	Impact (% of absorption)
2013–2017	-26%	0.081	-2.1%
After 2019	-100%	0.020	-2.0

Note: Exports include goods sold to Venezuela and factor income payments related to Cuban professionals in Venezuela. Imports are both directly from Venezuela and indirectly through the Netherland Antilles. All trade between Cuba and Venezuela is assumed to stop after 2019.

In a similar vein, absorption (a) consists of domestically produced and imported goods sold in the domestic market. Therefore, the change in absorption

resulting from a change in Cuban imports from Venezuela is:¹⁴

$$\alpha/\alpha_0 = \Delta m/m_0 \cdot m_0/\alpha_0 \quad (4)$$

In words, the impact on absorption is the percentage change in imports from Venezuela times the share of these imports in absorption. The results of the exercise are summarized in Table 6.¹⁵

The data utilized to generate Table 6 are as follows: fuel imports from Venezuela from Table 1; exports of goods to Venezuela from Table 2; and adjusted exports of services to all countries from Table 4.

Table 7. Estimated Country Distribution of Cuban Services Exports

	Million US		% of total	
	\$ 2013	2017	2013	2017
Exports of services ^a	9867	7455	100%	100%
Venezuela	6919	4546	70%	61%
Brazil	173	750	1.8%	10.1%
Algeria	308	295	3.1%	4.0%
Others	2467	1864	25%	25%

a. Adjusted for tourism, international travel, and communication services

There is no published information on the share of Venezuela in Cuban exports of professional services. A proxy for this variable was estimated by subtracting the shares of Brazil (obtained from various press reports) and Algeria (from Table 1) from total services exports (properly adjusted), and assuming that the share of other countries remained unchanged at approximately 25%. The combined share of Brazil and Algeria rises from 4.7% in 2013 to 13.5% in 2017; as a result the share of Venezuela declines from 70% to 62%.

14. In order to neutralize differences between trade prices and national accounts deflators, the share of imports in absorption is specified in nominal terms. This amounts to using the share in real terms multiplied by the ratio of imports to the deflator for absorption.

15. The data utilized to generate this table are as follows: Fuel imports from Table 1; exports of goods from Table 2; and exports of services from Table 4. The share of Venezuela in exports of services exports was calculated by subtracting the shares of Brazil (from various press reports) and Algeria (from Table 1) from the total and assuming that the share of other countries remained unchanged at the 2013 level of 22%.

Annex 2
DATA ON CUBAN EXPORTS OF FUELS:
THE GORDIAN KNOT UNTIED

Statistics on Cuban exports of petroleum products are a puzzle wrapped in a mystery. As explained in the first section of this article, these exports can be identified by calculating the residual from ONEI's table on Cuban exports by main SITC categories. They are listed on line 1 of Table 8, below. The United Nations (UN) tables in COMSTAT also provide data on Cuba's exports of blended and refined products (gasoline, jet fuel and residual fuel oils) that are known to constitute most or all of Cuban fuel exports. The UN data are shown on line 2 of Table 8. The difference between the two series, is shown on line 3, and the puzzle is why these ONEI and COMSTAT numbers differ so much, i.e., why are the numbers in line 3 so large?

In my interpretation, the explanation is that UN data exclude exports to Venezuela while ONEI's data includes them. UN omits Venezuela because COMSTAT data are based on information provided by reporting partner countries, and Venezuela does not report. So, we expect the difference between the two

series to reflect Cuban fuel exports to Venezuela. Can that be shown?

Fortunately, ONEI publishes data on Cuban exports to Venezuela—in principle these are for all commodities, but they are known to include mostly oil products. So, we compare lines 3 and 4 and find that the two series are strongly correlated, as suggested by Figure 3. The small gap between the two series probably reflects timing differences and exports to countries (other than Venezuela) that do not report to the United Nations.

COMTRADE also publishes data for individual reporting countries included in line 2. The numbers are fairly small, and most of these countries import infrequently. The largest importers were Belgium (with average annual imports of \$45 million in the period 2009 to 2018), the United Kingdom (\$42 million), Spain (\$23 million), and Denmark (\$22 million.)

Table 8. Cuba: Comparing Data on Fuel Exports as reported by ONEI and by UNCOMSTAT (Millions of dollars)

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Exports of fuels, SITC basis (ONEI)	305	813	513	1,883	2,682	2,697	2,613	2,327	1,150	374	225
Exports of petroleum products (COMTRADE)	139	209	150	184	354	287	431	336	160	15	71
Difference (line 1 minus line 2)	166	604	363	1,699	2,328	2,410	2,182	1,991	989	359	154
Cuban exports to Venezuela (ONEI)	450	414	528	1,717	2,273	2,484	2,266	2,070	1,438	642	375

Figure 3. Cuban Exports of Oil Products (ONEI minus COMTRADE) and Cuban Exports to Venezuela (Million US Dollars)

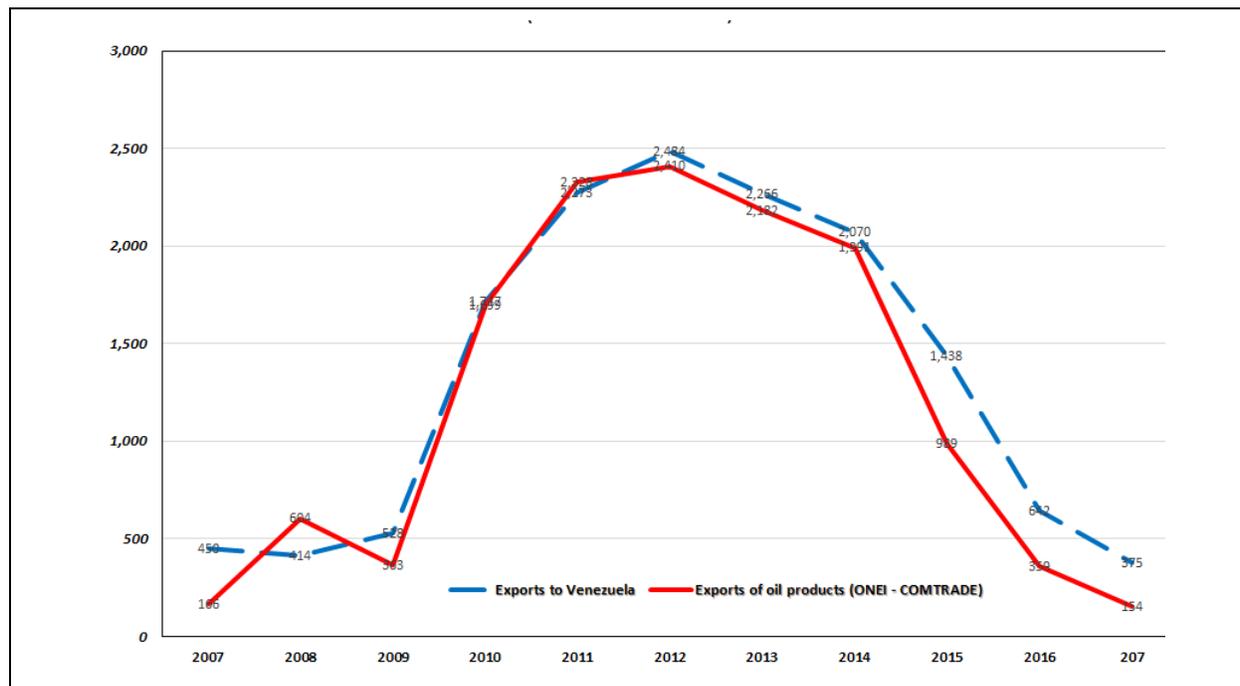


Table 1. Cuba: Imports of Fuels (Million U.S. dollars unless otherwise noted)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Imports from Venezuela	1143	2265	2641	2243	4473	2608	4302	5902	6079	4802	5189	2794	1583	1839
Imports from the Netherland Antilles	0	0	1	1	1	0	39	150	30	1241	94	27	0	0
Imports from Algeria	64	142	228	225	244	169	213	309	331	308	292	194	252	295
Imports of fuels and lubricants (DOT)	1207	2407	2870	2470	4718	2777	4554	6361	6440	6350	5575	3015	1834	2134
Imports of fuels and lubricants (SITC)	1310	1946	2287	2383	4562	2650	4530	6370	6475	6343	5617	3058	1990	2504
<i>difference: Line 4 minus line 5</i>	<i>-103</i>	<i>462</i>	<i>584</i>	<i>87</i>	<i>156</i>	<i>127</i>	<i>24</i>	<i>-9</i>	<i>-35</i>	<i>7</i>	<i>-42</i>	<i>-43</i>	<i>-156</i>	<i>-371</i>
Imports of fuels (DOT) thousand bpd	82	143	140	105	149	133	172	172	171	177	173	185	116	115
Imports of fuels (SITC) thousand bpd	88	115	111	101	145	127	171	173	172	177	174	188	126	135

Note:

DOT = Direction of Trade; SITC = Standard International Trade Classification

Lines 1, 2 and 3: from ONEI, Table 8.6

Line 4: sum of lines 1, 2, and 3

Line 5: from ONEI, Table 8.12. Entry for 2017 is calculated as a residual from ONEI Table 8.10

Lines 6 and 7= lines 4 and 5, each divided by price variable from Table 3.=

Table 2. Cuba: Proxies for Exports of Fuels (Million U.S. dollars, unless otherwise noted)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Cuban exports to Venezuela (DOT)	367	402	409	450	414	528	1,717	2,273	2,484	2,266	2,070	1,438	642	375
Cuban exports of fuels (SITC)	175	131	267	305	813	513	1,883	2,682	2,697	2,613	2,327	1,150	374	225
Fuel imports minus imports for consumption	-18	253	384	221	1617	725	1,944	3,039	3,036	2,795	n/a	n/a	n/a	n/a
<i>Difference: Line 1 minus line 2</i>	<i>192</i>	<i>270</i>	<i>142</i>	<i>145</i>	<i>-399</i>	<i>15</i>	<i>-166</i>	<i>-409</i>	<i>-213</i>	<i>-347</i>	<i>-258</i>	<i>288</i>	<i>268</i>	<i>150</i>
Exports of fuels (SITC), thousand barrels/day	12	7.8	13.0	12.9	25.8	24.7	71.2	72.7	71.4	73.0	72.1	70.6	23.7	12.1
Memorandum items:														
Imports of fuels (SITC)	1310	1946	2287	2383	4562	2650	4530	6370	6475	6350	5617	3058	1990	2504
Imports from Venezuela under Accord	1328	1693	1903	2162	2945	1925	2586	3331	3439	3555	n/a	n/a	n/a	n/a

Note:

DOT = Direction of Trade; SITC = Standard International Trade Classification

Line 1: from ONEI, Table 8.11

Line 2: from ONEI, Table 8.9; by residual: total exports minus sum of identified exports.

Line 3: Line 4 minus Line 5

Line 4: ONE Table 8.12. Entry for 2013 is from Table 2, line 4.

Line 5: PDVSA, financial reports; volume times basket price

Table 3. Cuba: Net Imports of Fuels (Million U.S. dollars, unless otherwise noted)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Net imports (DOT)	840	2006	2461	2019	4304	2249	2837	4088	3956	4084	3506	1577	1192	1758
Net imports (SITC)	1135	1814	2019	2077	3749	2137	2647	3688	3778	3730	3290	1908	1616	2279
Oil price (\$/barrel)	40.6	46.2	56.4	64.7	86.5	57.0	72.4	101.1	103.4	98.1	88.4	44.7	43.2	50.8
Net imports (DOT), thousand barrels/day	57	119	120	85	136	108	107	111	105	114	109	97	76	95
Net imports (SITC), thousand barrels/day	77	108	98	88	119	103	100	100	100	104	102	117	102	123
<i>Difference: Line 2 minus line 3</i>	<i>-19.9</i>	<i>11.4</i>	<i>21.5</i>	<i>-2.5</i>	<i>17.6</i>	<i>5.4</i>	<i>7.2</i>	<i>10.8</i>	<i>4.7</i>	<i>9.9</i>	<i>6.7</i>	<i>-20.3</i>	<i>-26.9</i>	<i>-28.1</i>

Note:

DOT = Direction of Trade; SITC = Standard International Trade Classification

Line 1: Imports minus exports, DOT basis. From Tables 1 and 2.

Line 2: Imports minus exports, SITC basis. From Tables 1 and 2.

Line 3: PDVSA basket price before 2013; Cushing Oklahoma price thereafter.

Lines 4 and 5 = lines 1 and 2 divided by line 3

Table 4. Cuba: Exports of Services, Compensation of Professional Abroad, and GDP in the Health Sector (Million U.S dollars unless otherwise noted)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Exports of services	2350	2845	3634	6551	6667	7952	8566	7819	9765	11149	12760	13027	12663	11369	11144	11379
Tourism	1769	1999	2113	2399	2235	2236	2347	2082	2218	2503	2613	2608	2646	2819	3069	3302
Communications	18	20	26	14	63	81	279	390	446	436	517	553	456	590	628	622
Exports of services, adjusted	562	826	1496	4138	4369	5634	5940	5346	7101	8210	9630	9867	9561	7960	7447	7455
Deflator, exports of services	91.2	92	97.6	98.9	102.7	101.2	97.8	85.1	101	102.1	118.8	118.8	118.8	103.3	124.8	127.4
Real exports of services, adj.	616	897	1532	4184	4254	5567	6074	6282	7031	8041	8106	8305	8048	7706	5967	5852
Real GDP, health sector	2511	2466	2808	5051	5664	5850	7722	7984	8432	8722	8756	8917	9095	9204	9103	9497

Note:

Line 1 from ONEI, Cuadro 5.17/

Line 2 from ONEI cuadro 15.15. Includes international travel.

Line 3 estimated from ONEI 2018 data and data for Venezuela's comunicatios.

Line 4 = line 1 minus line 2 minus line 3. Proxy for earnings of Cuban professionals abroad.

Line 5 Exports of services (current prices divided by 1977 prices). From ONEI, cuadro 5.17

Line 6 = at 1977 prices; line 4 divide by line 6

Line 7 from ONEI cuadro 5.7