The Road not taken: Pre-Revolutionary Cuban Living Standards in Comparative Perspective^{*}

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Summary

We examine Cuban GDP over time and across space. All indications are that Cuba was once a prosperous middle-income economy. On the eve of the revolution, we find that incomes were fifty to sixty percent of European levels. They were among the highest in Latin America at about thirty percent of the US. In relative terms, however, Cuba was richer earlier on. The crude income comparisons that are possible suggest that income per capita during the 1920's was in striking distance of Western Europe and the Southern States of the US. After the revolution, Cuba has slipped down the world income distribution. As best we can tell, current levels of income per capita are below their pre-revolutionary peaks.

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1. Introduction

The Cuban Republic was born in 1902. It perished in 1958 with the triumph of the revolution. In contrast to the intense interest in all aspects of revolutionary Cuba, we know little about the economic history of the Republic.¹ As it stands, Republican Cuba is a society largely without macroeconomic data. There are no consumer or producer price indices before 1953. There are no proper national accounts. We lack even rudimentary wage indices. Overall, we have less information on Republican Cuba than any other important Latin American economy.

This paper takes initial steps towards filling in the macroeconomic record. We provide international comparisons of Cuban living standards for the 1950's and the 1920's. We also construct a new Cuban GDP index from 1928 to 1958 with a cruder measure going back to 1902. Our work therefore provides a glimpse of the Cuban economy from the foundation of the Republic to the revolution.

Our first contribution is a 1953 benchmark estimate of purchasing power parity (PPP) adjusted Cuban GDP. The income benchmark allows us to compare Cuban income, labor productivity and consumption on the eve of the Revolution to the US and twenty-eight countries in Europe and Latin America. The results show that Cuba during the 1950's was a middle-income economy. We find that Cuban income per capita was fifty to sixty percent of European levels. It was close to the highest in Latin America and was about thirty percent of the US.

We also make some controlled conjectures about comparative living standards for earlier decades. To extrapolate the 1953 Cuban benchmark requires GDP data. We construct a new GDP index by extending the industrial production index of Pérez-López (1977) to cover overall GDP. We add new indices for agriculture, construction, transportation, wholesale and retail

¹ There is, however, a large literature on Cuban Sugar most recently by Alan Dye (1998).

trade and services. Using the GDP index, we examine living standards going back to 1928. On balance, the evidence suggests that the sugar boom produced impressive income levels. As best we can tell, Cuban incomes for the late 1920's were about eighty percent of European levels. We also compare living standards to US states. During the 1920's sugar boom, contemporary observers often compared Cuba to the Southern states of the US. Our estimates are consistent with this view.

We provide cruder GDP estimates going back to 1902. They show rapid growth during the early Republic with growth ceasing in the early 1920's. The 1920's are followed by a dramatic decline in income during the great depression and a slow recovery thereafter. Overall, we find that living standards for the late 1950's may have just regained their 1920 levels.

Finally, our paper provides an answer to a long running Cuban controversy, the road not taken. Did the revolutionary regime raise income per capita relative to what would have occurred if the revolution had not taken place? There are no good estimates of current Cuban income so our conclusions on this point are tentative. As best as we can tell, current income is well below its pre-revolutionary peak suggesting that despite possible accomplishments elsewhere the revolution permanently reduced Cuban income per capita.

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2. Comparative Cuban Living Standards on the Eve of the Revolution

This section presents a PPP adjusted Cuba/US income comparison for 1953. We construct this comparison because there are no purchasing power parity (PPP) adjusted Cuban income comparisons.² Even if we had a recent income benchmark, it is not obvious that extrapolating it backwards in time would tell us much about living standards for the Republic as the Cuban GDP series after the revolution are not comparable to those of market economies.³

(i) A 1953 Cuban/US Income Benchmark

Over the years, the work of the International Comparison Program (the ICP) has become familiar to economists as the source of the comparative GDP estimates of the Penn World Tables and Angus Maddison (Maddison (2007)). The ICP compares GDP in the following manner see Deaton and Heston (2009). First, they determine relative nominal income per capita expressed in a common currency. Next, they calculate real PPP adjusted income by deflating nominal income by their estimate of the relative price level obtained from survey data on prices.

The first input to any Cuban/US income comparison is therefore nominal GDP. The official GDP series for Republican Cuba begins in the late 1930's. As discussed later, there are some serious problems with the Republic's national accounts.⁴ Fortunately, we have the careful estimates of Cuban GDP for 1953 from Harry Oshima (1961), a leading scholar of national

² Cuba is one of the last economies without a proper PPP adjusted income comparison.

³ The problems continue. Pérez-López and Mesa Lago (2009) discuss the extraordinary difficulties with recent Cuban GDP statistics.

⁴ The flaws of the official GDP series were obvious to contemporary Cuban observers see Wallich (1950) and the Cuba Report of the World Bank (1951). In viewing the Cuban efforts during the 1950's, one should keep in mind that national income accounting was in its infancy during those years.

income accounting.⁵ There are, as it turns out, large differences between Oshima (1961) and the official series. The official series shows 1953 GDP per capita at \$348. Oshima (1961) puts it at \$468 exceeding the official estimates by thirty-five percent.

We chose 1953 as our benchmark year to avail of the Oshima estimates. Having settled on a comparison year, the next step compares price levels. Here we follow the methodology of Gilbert and Kravis (1954, 1958) rather than the ICP. The most important difference with the ICP is that Gilbert and Kravis use price and quantity comparisons whereas the ICP focuses on price comparisons.⁶

Gilbert and Kravis looked at prices and quantities to overcome some weak data. There were five countries in their 1950 study, the US, the UK, France, Germany and Italy. By 1950, the national accounts for the US and the UK were well established. In contrast, the estimates for the other countries were in their infancy. By using quantity and price comparisons, Gilbert and Kravis hoped to minimize measurement error. Given the rudimentary nature of the Cuban data, their price/quantity approach is more appropriate for our purposes than the ICP's concentration on prices. Our work follows Gilbert and Kravis (1954, 1958) in other respects too. Most notably, we compare price levels with a Fisher Ideal price index.⁷

⁵ Harry T. Oshima (1918-1998) was a protégé of Simon Kuznets. His Cuban work provides one of the most careful GDP estimates for developed economies up to that time.

⁶ The ICP uses quantity comparisons for service categories such as education and health where price comparisons are difficult see Deaton and Heston (2009).

⁷ The Penn World Tables (the PWT) and Maddison (2007) value income with world prices calculated using the Geary Khamis procedure. In simple terms, Geary Khamis world prices are the expenditure-weighted average of national prices for all economies. We lack sufficient data to calculate Geary Khamis price indices for Cuba. For our bilateral comparison, the Fisher Ideal index has theoretical advantages over the Geary Khamis index. In particular, it is a "superlative index" and does not suffer from a substitution bias arising from using a fixed set of world prices see Diewert (1976), see also Neary (2004).

Table One provides our expenditure breakdown. We adopt the Gilbert and Kravis (1954) classifications.⁸ Most notably, we allocate government expenditures on education and health to private consumption. Further details are in the appendix.

The Table also lists the price and quantity comparisons. We have price data for most expenditure categories with some important exceptions such as housing. In contrast, the quantity comparisons are restricted to certain categories of consumption.

⁸ We discuss the exceptions in the appendix.

Consumption	Price and Expenditure	Quantity Indicator
Food		
Cereals and Cereal products	Х	Х
Meats, Poultry and Fish	Х	Х
Dairy products	Х	Х
Fats and oils	Х	Х
Vegetables and Fruits	Х	Х
Potatoes	Х	Х
Non alcoholic beverages	Х	Х
Sugar and Sugar products	Х	Х
Alcoholic Beverages	Х	Х
Tobacco	Х	Х
Clothing and household textiles		
Footwear	Х	
Clothing and household textiles	Х	
Housing		Х
Fuel, light and water	Х	
Household Goods	Х	
Household and personal services		
Domestic services	Х	
Laundry, dry cleaning etc	Х	
Barber, beauty shops etc	Х	
Transportation equipment and services		
Purchases of transportation equipment	Х	Х
Operation of transportation equipment	Х	
Public transport		Х
Communication Services		Х
Recreation and entertainment		
Entertainment	Х	
Hotels, Restaurants and Cafes	Х	
Books, newspapers and magazines	Х	Х
Other recreation	Х	
Health		Х
Education		Х
Miscellaneous	Х	
Investment		
Producer Durables	Х	
Construction	Х	
Net Exports	Х	
Government		
Personnel	Х	
Goods and Services	X	

Table One: Breakdown of Price and Quantity Comparisons

Table Two provides the expenditure shares and the Cuban/US price levels used to calculate the overall Cuban/US price level. We take the Cuban expenditure shares from Oshima (1961) while the US shares are from the US National Income Accounts. As compared to the US, Cuba has a higher share of consumption in GDP. The other feature of the Cuban data is the remarkably high expenditures on health. As we shall see later, Cuba scored highly on many health indicators for the 1950's.

The appendix outlines the sources of the price data used in the price comparisons. In brief, we draw on comparative price data from the International Labor Organization, (ILO) for basic consumption items. We supplement the ILO data with price information from a wide variety of other sources.

We measure Cuban expenditures and price levels imperfectly. While the Oshima (1961) expenditure data are an improvement over the official series, they are not comparable in accuracy to US data. Turning to prices, we suspect that the ILO data may refer to quality levels for Cuba that differ from the US. The margins for error for the supplementary price data are surely greater given that these data are not designed for international comparisons. To counteract this possibility we adopt procedures that will tend to overstate the Cuban price level. If there is a bias in our procedures, it will probably work to overstate Cuban prices and thus understate Cuban income.

	US Expenditure Weights (%)	Cuban Expenditure Weights (%)	Relative Prices
	weights (%)	weights (%)	Cuba/US
Consumption	65.3	83.5	
Food	14.8	29.6	
Cereals and Cereal products	1.6	7.5	0.4
Meats, Poultry and Fish	4.6	6.8	0.5
Dairy products	3.1	4.4	1.0
Fats and oils	0.8	1.9	0.5
Vegetables and Fruits	2.9	6.0	0.3
Potatoes	0.3	0.6	0.5
Non alcoholic beverages	0.9	1.7	0.4
Sugar and Sugar products	0.7	0.7	0.2
Alcoholic Beverages	2.4	4.7	0.70
Tobacco	1.3	3.6	0.43
Clothing and household textiles	6.5	5.6	
Footwear	0.9	1.5	0.70
Clothing and household textiles	5.5	4.2	0.70
Housing	7.9	5.7	0.4
Fuel light and water	4.1	1.9	1.4
Household Goods	5.0	3.9	1.24
Household and personal services	3.3	5.7	
Domestic services	1.2	2.0	0.2
Laundry, dry cleaning etc	1.3	1.9	0.50
Barber beauty shops etc	0.8	1.9	0.50
Transportation equipment and services	7.1	3.1	
Purchases of transportation equipment	3.7	0.7	1.30
Operation of transportation equipment	2.6	0.5	1.09
Public transport	0.8	1.9	0.7
Communication Services	0.7	0.3	0.62
Recreation and entertainment	2.5	5.2	
Entertainment	0.4	1.7	0.50
Hotels, Restaurants and Cafes	0.6	1.7	0.50
Books, newspapers and magazines	0.9	1.5	1.12
Other recreation	0.6	0.4	0.50
Health	3.9	7.8	0.48
Education	3.8	4.1	0.19
Miscellaneous	1.9	1.7	0.50
Investment	17.3	9.7	
Producer Durables	6.6	4.6	1.3
Construction	10.2	5.0	0.6
Net Exports	-0.1	0.7	1.0
Government	17.6	6.6	
Personnel	11.6	5.2	0.3
Goods and Services	6.0	1.3	0.8

Table Two: Expenditure Shares and Relative prices

The final column in Table Two provides our price level estimates. As mentioned, we use price and quantity information. For some cases, most notably housing, we have only a quantity comparison. Here we determine the implied price from the information on expenditure shares and relative quantities. For most cases, the quantity comparisons accord with comparisons based on prices and expenditures. Consider food. There is a close correspondence between the price and quantity comparisons for most food items. There are two exceptions, fruit/vegetables and sugar where quantity data show higher Cuban consumption. In both cases, we took the simple average of the direct prices and the implicit prices implied by the expenditure and quantity estimates.

Table Three provides the price indices for consumption, government spending and investment derived from Table Two. We give the results obtained with US and Cuban weights. We also give the geometric average of the indices, the Fisher Ideal.

	US Weights	Cuban Weights	Fisher Ideal
Consumption	72	59	65
Investment	89	96	92
Government	47	40	43
GDP	70	62	66

Table Three: US/Cuba Price levels for 1953 (US = 100)

The Fisher ideal results in Table Three show that the overall Cuban price level for 1953 price level is two thirds of the US. Investment is ninety percent of the US. The relatively higher investment price level arises from machinery prices caused by transport costs, taxes and tariffs.

On the other hand, the price level for government services is low because of Cuban wages.⁹ These patterns, where the relative price of investment is higher than that for consumption and government spending, are found in nearly all price level comparisons across developing and developed nations.

Using the price benchmark we can compare income and consumption across the US and Cuba for 1953. The results of the comparison allow us to relate Cuba to the wider world.

(ii). 1950's Cuba in Perspective

How did Republican Cuba rank relative to other economies? We cannot compare Cuba to other countries with data from the Penn World Tables (the PWT) or Maddison (2007). The reason is that the PWT compares income with 2000 prices and Maddison uses 1990 prices. Our Cuba/US comparison uses 1953 prices and is not comparable to the estimates for other countries from the PWT or Maddison.¹⁰ We must therefore compare Cuba to other economies with price weights from years close to 1953.

Table Four collects 1955 comparative data on income per capita, output per worker and consumption per capita for Europe and Latin America and Cuba. The US is the base economy. We take the European estimates from Gilbert and Kravis (1958). They refer to 1955 and are in 1955 prices. For Latin America, we use Braitwaite (1968).¹¹ The Latin data are in 1960 prices.

⁹ The consumption results reveal the expected negative correlation between quantities and prices. The price level using Cuban weights is fifteen percent lower as compared to US weights.

¹⁰ Nuxoll (1994) provides a definitive account why base year prices matter for international comparisons.

¹¹ The Braitwaite (1968) study draws on a large high quality ECLA (Economic Commission for Latin America) price survey from the early 1960's. The only previous use of these data appears to be Leandro Prados de la Escosura (2007).

We extrapolate the Cuba/US 1953 comparison to 1955 with GDP growth rates.¹² Maddison (2007) provides the US GDP data. We discuss the Cuban GDP index in the next section.¹³ We also include a Soviet/US comparison for 1955 taken from Bergson (1972). The Soviet comparison is of interest given that Cuba changes to central planning after the revolution. All comparisons use Fisher Ideal indices.

Table Four shows Cuban income per capita averages fifty to sixty percent of European levels. In terms of income per capita, Cuba is most similar to Italy. We do not have 1950's comparative income data in 1950's prices for Spain or Portugal. There is, however, broad agreement that their living standards were below Italy. Thus, it is probably safe to assume that Cuban income exceeds that for the Iberian economies.

Turning to Latin America, Cuban income per capita is close to Argentina, Venezuela and Uruguay with Chile a little further behind. It is well above the rest of Latin America. For example, it exceeds Mexico by seventy percent. It is three times higher than the Dominican Republic.

¹² For 1953, the benchmark comparison shows income per capita relative to the US is twenty-eight percent of US levels. Output per worker is thirty-two while consumption per capita is thirty-seven,

¹³ We take the Maddison data from <u>http://www.ggdc.net/Maddison/</u>.

	PPP A	djusted	
	Income per capita	Output per worker	Consumption per capita
Belgium	53	56	52
Denmark	51	45	54
France	49	46	51
Germany FR	51	46	48
Italy	29	29	29
Netherlands	47	51	43
Norway	55	56	54
United Kingdom	57	52	59
Argentina	31	32	39
Bolivia	7	7	8
Brazil	9	11	11
Chile	23	27	28
Colombia	12	15	14
Costa Rica	16	21	19
Cuba	27	31	35
Dominican Republic	9	11	9
Ecuador	11	13	12
El Salvador	10	12	12
Guatemala	10	12	13
Haiti	3	3	5
Honduras	7	9	9
Mexico	17	23	23
Nicaragua	10	12	12
Panama	15	19	17
Paraguay	9	11	13
Peru	12	15	13
Uruguay	34	35	39
Venezuela	28	36	22
Soviet Union	29	21	24

Table Four: Income per capita, Output per Worker and Consumption for 1955 (US = 100)

The third column looks at output per worker. As compared to income per capita, the standing of Cuba improves relative to Europe reflecting differences in population structure. Cuban labor productivity averages fifty-five to sixty-five percent of most European economies and it exceeds labor productivity for Italy. The rankings within Latin America are similar to the income per capita standings. Cuba again occupies a place in the leading group with Argentina, Uruguay, Venezuela and Chile.

The final column gives consumption per capita. As we have seen, Cuba devoted a large share of its income to consumption. In relative terms, Cuban consumption exceeds Italy. It is seventy to eighty percent of other European economies. Ironically, given later events, Cuban consumption exceeds that for the Soviet Union by fifty percent.¹⁴

In sum, the comparative income data suggest that Republican Cuba was a middle-income country in the 1950's, comparable to Argentina/Uruguay in Latin America and Italy in Europe.¹⁵ As it turns out, these results are consistent with a wide range of other social and economic indicators.

¹⁴ As Bergson (1972) makes clear, his estimate is an upper bound on Soviet consumption due to difficulties in adjusting for lower Soviet quality as compared to Western economies.

¹⁵ There is one important caveat. The aggregate results neglect the large differences within Cuba particularly across urban and rural areas. Like other Latin economies, Republican Cuba had a sharply unequal distribution of income. How unequal we do not know. From the available information, we would hazard the guess that poverty was more prevalent in rural Cuba as compared to rural areas of the Southern Cone. The Cuban case also differs from the Southern Cone in that poverty had a racial component given Cuba's large Afro-Cuban population.

(iii). A Cross-Check

How well do the comparative income estimates accord with evidence from other areas? As it turns out, Cuba also scored well on other economic and social measures during the 1950's. To illustrate this, Table Five compares Cuba to the other economies in Table Four using a standard set of indicators.¹⁶ Sources are in the appendix. Most data refer to the period around 1955. The data on TV's/radios refer to 1960.¹⁷

	Europe	Latin America	US	Cuba	
Income per Capita Relative to US, 1955	49	14	100	27	
Passenger Cars/1000 Persons, circa 1955	44	8	314	20	
TVs/1000 Persons, 1960	81	11	308	73	
Radios/1000 persons, 1960	269	96	941	152	
Infant Mortality Rate, circa 1955	32	105	26	33	
Life Expectancy at Birth, circa1955	71	50	69	64	
Doctors/10000 Persons, circa 1955	11	4	13	10	
Literacy Rate, circa 1955	98	58	99	79	

Table Five: Income per capita and Socioeconomic Indicators

On most measures, Cuba ranks at the highest or close to the highest in Latin America.¹⁸

One feature of the data is that Cuba does especially well on health indicators. By the mid

¹⁶ We adapt the format of the Table from Locay (2009). Our sources are in the appendix. We omit the Soviet Union.

¹⁷ We lack data on TV's for Bolivia, Chile, Ecuador, Haiti, Honduras and Paraguay. TV either was in its infancy or did not exist for these economies. We also lack data on radios for Panama.

¹⁸ This is well known. Baklanoff (1998), Smith and Llorens (1998), Locay and Gonzalez (2008) and Locay (2009) reach similar conclusions. Cuba compares favorably with Spain and Portugal on most socioeconomic measures.

1950's, its infant mortality rates are the lowest in Latin America. Indeed, they are at developed economy levels.¹⁹ The number of TV's for Cuba is high relative to Europe. Finally, the lower level of Cuban literacy reflects sharp differences across urban and rural areas.

These data suggest a simple crosscheck of the income estimates. Consider the simple statistical model in equation (1) were y_i is the log of per capita income from Table Four, x_{ij} is country *i*'s value of indicator *j* from Table Five in logs, z_i is a dummy variable for Cuba and e_{ij} is an error term with standard properties

(1)
$$y_i = a_i + b_i x_{ij} + c_i z_{ij} + e_{ij}$$

Equation (1) captures the relationship between income and the social indicators. It states that we can predict the level of income given information on the social indicator. The model tests whether the estimate of relative Cuban income per capita in Table Four is consistent with the estimated relationship between GDP and the indicator for other economies. A negative coefficient for the Cuban dummy implies that Cuban income is understated since our estimate of Cuban income is below that predicted by the relationship between income and the indicator. A positive coefficient implies that Cuban income is overstated. The results of the tests are in Table Six.

¹⁹ There is some debate over the exact level of Cuban infant mortality see McGuire and Frankel (2005). Using their higher estimates of 39 does not change the results.

Table Six: A Crosscheck

	b	с	r ²	n	
Passenger Cars/1000 Persons, circa 1955	0.60*	-0.01	0.80	29	
	(0.04)	(0.04)			
TVs/1000 Persons, 1960	0.47*	-0.49	0.70	23	
	(0.07)	(0.45)			
Radios/1000 persons, 1960	0.79*	0.12	0.84	28	
	(0.07)	(0.47)			
Infant Mortality Rate, circa 1955	1.15*	-0.48	0.82	29	
	(0.11)	(0.79)			
Life Expectancy at Birth, circa 1955	3.83*	-0.20	0.87	29	
	(0.28)	(0.31)			
Doctors/10000 Persons, circa 1955	0.88*	-0.30	0.80	29	
	(0.09)	(0.40)			
Literacy Rate, circa 1955	1.59*	0.03	0.73	29	
	(0.18)	(0.08)			

Notes: Standard errors are in parenthesis. * Significant at the five percent level.

The explanatory power is high. In all cases, r-squared is above 0.70. For two indicators, (literacy, and radios) the results suggest that Cuban income is overstated. The positive coefficients are small with high standard errors. For five cases, (cars, infant mortality, life expectancy, doctors and TV's) the results suggest that income is understated. The negative coefficients are large in an economic sense for infant mortality, doctors and TV's suggesting that income is understated by from thirty to fifty percent. The standard errors of the coefficients, however, are also large. Overall, we see little evidence from Table Six to suggest that our estimates of relative GDP systematically overstate Cuban income.²⁰

²⁰ We looked at a wide variety of other indicators such as caloric intake etc with similar results. The indicators also provide indirect evidence supporting the Oshima GDP estimates over the official series for the Republic. Using an estimate of relative Cuban/US GDP calculated from the official series on nominal GDP, we find that Cuban income is understated in all cases. The estimates range from thirty to seventy percent.

3. Looking back from the 1950's

For the remainder of the paper, we turn our attention to the longer run. To establish comparative Cuban living standards before the 1950's, we extrapolate the estimates of Table Four backwards in time using GDP. The resulting comparisons compare income with 1950's prices leaving us open to the charge that we neglect changes in relative prices.²¹ As we shall see, an equally pressing concern is the quality of the series for Cuban GDP.

(i) Cuban GDP

There are three problems with the national accounts for Republican Cuba. As discussed earlier, the official GDP series understate the level of nominal income. Second, the official series are in nominal terms only as there are no GDP deflators. To obtain real GDP, researchers have to deflate Cuban GDP by a crude CPI series based on food.²² The final problem is that there are no national income accounts before the late 1930's. Rather, scholars rely on a short cut series devised in 1950 by the director of research at the Cuban Central Bank, Julián Alienes Urosa. Alienes (1950) constructs his nominal GDP using the nominal series for imports, government revenue and bank deposits. He deflated his nominal GDP series by the US wholesale index, given that there were no Cuban price indices.²³

The Alienes (1950) short cut GDP estimates are problematic. There is little reason to expect the relationship between nominal GDP on the one hand and imports, government revenue

²¹ Ideally, we would directly compare Cuban income to the US and other economies for earlier years using the approach of the 1953 benchmark. For data reasons this is not possible.

²² Republican Cuba imported much of its food. For some periods, observers believed that there were differences between movements in food prices and the overall price level see Wallich (1950) page 157.

²³ The official CPI and WPI indices for the Republic begin in 1953. An earlier CPI from 1939 covered food. Zanetti and García (1976) provide a food price index stretching back further into the past.

and bank deposits on the other to be stable over time. Along similar lines, the US wholesale price index is unlikely to provide a good approximation to a Cuban GDP deflator. There are vastly different weights for Cuba and the US and it is by no means clear that the US WPI and the Cuban GDP deflator should even move together over the long run given what appear to be divergent trends in economic growth across the economies.

Moreover, the Alienes series is implausible in other respects. For instance, it suggests that GDP per capita for 1905 is twice the 1953 level. It also shows exceptionally large year-to-year movements in GDP.²⁴ The extreme volatility also exists for the official series deflated by the food CPI during the Second World War. For example, real GDP grows by thirty percent in 1941 and falls by twenty six percent in 1942.

Given the limitations of the existing series, we decided to construct a new volume index for GDP. We are fortunate that we can build on the carefully constructed industrial production index of Pérez-López (1977). The Pérez-López index covers manufacturing, mining, and public utilities. We add new indices for agriculture, construction, transportation, wholesale and retail trade and services. We also extend the industrial production index back to 1928.

Table Seven compares the sectoral weights for the Industrial Production and GDP index. Both indices are in 1953 prices.

²⁴ There are other series based on Alienes (1950). Brundenius (1984) takes the Alienes nominal series and deflates it using the food CPI from Zanetti and García (1976). The resulting series also have enormous year-to-year volatility and show income for the early Republic that is too high. The recent GDP index from Sanatamaria (2000) suffers from similar problems.

	Pérez-López (1977)	
	Industrial Production	GDP Index
Non-Sugar Agriculture		14.8
Mining and quarrying	8.2	1.2
Sugar	43.7	15.2
Non Sugar Manufacturing	37.3	14.7
Construction		3.5
Electricity gas and water	10.8	1.4
Transport and communication		5.1
Wholesale and retail		14.8
Banking and insurance		2.4
Services and government		26.9
	100.0	100.0

Table Seven: Comparing Weights for the Cuban Output Index

The key difference between the GDP index and the industrial production index is the reduced importance of sugar. Sugar dominates the industrial production production index with a weight of 0.44. In contrast, the overall sugar weight in GDP value added for 1953 is 0.15.

Further details along with the indices for each sector are in the appendix. We construct the GDP index with the best information available to us. The final series require considerable interpolation as well as some strong assumptions. For that reason, we see the index as providing a rough measure of trends in overall GDP. It is not suitable for study of cyclical fluctuations.

Figure One compares the Industrial Production Index of Pérez-López (1977) with the new output index.



Figure One: Industrial Production and Overall Output (1953=100)

The overall trends for industrial production and GDP are essentially the same. As we would expect, the GDP series is less volatile because of the smaller share of the exceptionally volatile sugar sector in GDP and the lower volatility of services as compared to the components of industrial production. Note, for example, industrial production falls by more than GDP in the great depression.

Moving from overall GDP to GDP per capita, Figure Two compares income per capita calculated from the new output index with earlier GDP per capita estimates for Cuba. Before 1938, we use the Alienes short cut estimates of nominal GDP deflated by the US WPI. After 1938, we use the official GDP numbers deflated by food prices. We term the spliced series the Alienes series.

As shown by Figure Two the series for GDP differ greatly. The older series shows much higher income for earlier years. Income is fifty percent higher for 1928 as compared to 1958. In

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contrast, the new series shows a twenty percent increase in income over these years. Note also that income levels during the Second World War for the old series exceed their 1928 and 1958 levels! The new series is more plausible in all cases.



Figure Two: Income per Capita 1928-1958 (1953 = 100)

What does the output index tell us about growth during the last decades of the Republic? The index shows a large fall in income per capita after 1930 with the collapse of sugar prices and the depression. By 1933, income per capita is forty percent below its 1928 levels.²⁵ A slow recovery follows. Income reaches its 1928 levels only by the end of the Second World War. The waning years of the Republic see some growth and income per capita for 1958 is twenty percent higher than for 1928.²⁶

²⁵ Dye and Sicotte (2005) discuss the devastating impact of the great depression and the Smoot Hawley tariffs on Cuban sugar prices, see also the report by the Foreign Policy Association (1935). As shown later, the output index understates Cuban misery during these years because it ignores changes in the external terms of trade.

²⁶ Factoring in the large increases in life expectancy over these years suggests that the welfare of the average Cuban improved substantially. Life expectancy increased from 39 in 1925 (McGuire and Frankel (2005)) to 64 by 1960.

There are two drawbacks to the GDP index. First, it reaches only to 1928. Ideally, we would like to go further back. Second, it is a volume index in 1953 prices. It thus ignores changes in relative prices. In particular, it ignores changes in the external terms of trade, potentially an important determinant of living standards for a small export economy such as Cuba.

(ii) Extensions

The output index stops at 1928 as data becomes scarce for non-sugar manufacturing, public utilities, financial services and construction. On the other hand, we have indices for agriculture, sugar manufacturing, wholesale/retail trade, transportation and services that go back to 1902. In total, the covered sectors account for seventy seven percent of GDP for the base year of 1953. Using these indices, we calculated a reduced coverage index of GDP from 1902 to 1928. We used this index to extrapolate the output index back to 1902 and the birth of the Republic. The quality of the underlying series falls as we go backwards from 1928 and the results are rough estimates.²⁷ Sources and methods are in the appendix.

Figure Three gives the resulting series for income per capita from the dawn of the Republic to its demise in 1958.

²⁷ The reduced coverage index tracks the GDP index almost perfectly after 1928.

Figure Three: Income per Capita 1902-1958 (1953 = 100)



The index suggests rapid, albeit volatile, growth over the first two decades of the Republic. This finding is consistent with standard accounts of the period. From 1902 to 1920, growth in GDP per capita averaged three to four percent year, high by the standards of the time. Income peaks during the boom year of 1920. After 1920, growth ceases. Income collapses during the depression followed by a long slow recovery.

The remarkable feature of Figure Three is that Cuban GDP never exceeds its peaks of the 1920's. GDP per capita is 110 for 1920. The Republic regains this level again in 1957. Our GDP estimates are thus consistent with the claims of scholars sympathetic to the revolution that Cuban incomes stagnated after the early 1920's see, for example, the report of the Seers mission to Cuba, Seers (1964).²⁸

²⁸ Thomas (1998) provides a poignant account of the effects of slow growth on Cuban society during the twilight years of the Republic.

There is wide agreement among national accountants that it is important to adjust the GDP volume measures to reflect the changes in purchasing power arising from changes in world prices.²⁹ Our second extension adjusts GDP to allow for the effects of changes in the external terms of trade.

Republican Cuba suffered from extraordinary volatility in its external terms of trade.³⁰ Figure Four gives our estimates of the external terms of trade for Cuba from 1902 to 1953. Sources and methods are in the appendix.



Figure Four: The External Terms of Trade 1902-1953

The volatility of the external terms of trade during the early part of the century reflects the gyrations in sugar prices. Sugar dominates exports throughout. During the early 1920's,

²⁹ The literature on how to adjust GDP for changes in the external terms of trade dates back to the 1950's, see Gutman (1981). Recent papers include Kohli (2004) and Feenstra, Heston, Timmer and Deng (2009).

³⁰ Blattman, Hwang and Williamson (2007) argue that terms of trade volatility reduces growth.

there is a sharp decline in the external terms of trade with the fall in the price of sugar. The low point occurs during the depression. Thereafter the terms of trade improve with the various trade agreements allowing Cuba access to the US market and partly insulating Cuba from developments on world sugar markets.

We give compare GDP with GDP adjusted for changes in the external terms of trade in Figure Five. The resulting series provides a better measure of welfare as compared to the GDP volume index.³¹ Details of the calculations and the underlying data are in the appendix.

Figure Five: Adjusting Income per Capita for changes in the External Terms of Trade (1953 = 100)



The terms of trade adjustments have large effects on income for two periods. The first period is for the early 1920's. An increase in sugar prices raises the terms of trade from 116 in 1919 to 180 in 1920. This era in Cuban history is often known as the "dance of millions".

³¹ We could find no previous example in the literature where a long run GDP series is adjusted for terms of trade changes.

Without adjusting for changes in the terms of trade, 1920 income per capita is 110. Taking into account changes in the terms of trade raises income to 135.

In contrast, the fall in the price of sugar reduced real income by more than GDP volumes would suggest during the 1930's. The terms of trade falls from 97 in 1928 to 58 in 1932. Without adjusting for the external shock, income per capita is 65. Including changes in the external terms of trade lowers income per capita to 54.³²

Figure Five thus suggests real living standards were in 1932 were forty percent of their 1920 levels. The Cuban economy and society may never have recovered from the shock. From the early 1930's, extreme political instability and social polarization would characterize the Republic.

(iii) 1928 Cuban Income in Comparative Perspective

To conclude the section, we place Cuban income for the 1920's in comparative perspective. To determine 1928 relative incomes, we extrapolate comparative income in 1950's prices from Table Four backwards with growth rates of GDP per capita. We chose 1928 as it is the last year for which we have an index that covers overall GDP. In addition, the Cuban terms of trade for 1928 are approximately equal to their level in 1953 suggesting that terms of trade effects are unlikely to distort the results.³³ By choosing 1928 as our comparison year, we

 $^{^{32}}$ The change in income between peak and the trough year yields an income disaster of between forty-six and fiftytwo percent between 1929 and 1932 depending on whether we adjust for changes in the terms of trade. The decline in income is akin to that suffered by combatants in World War Two such as France and Belgium see Barro and Ursua (2008) appendix C page 323.

³³ We do not have the data required to adjust the extrapolations for changes in the external terms of trade.

understate the economic achievements of the Republic as compared to, say, 1920.³⁴ We rely on Maddison (2007) GDP data for countries other than Cuba.

Before turning to the results, it is worth remarking on the fact that after 1928 Cuban growth is slow by international standards. To show this, Table Eight provides the growth rates of income per capita from 1928 to 1955 for the countries in Table Four as calculated from Maddison (2007).

Euro	pe and the US	Latin Am	nerica
	% growth rate		% growth rate
	from 1928 to 1955		from 1928 to 1955
Belgium	22	Argentina	22
Denmark	55	Brazil	66
France	42	Chile	19
Germany	42	Colombia	59
Italy	55	Costa Rica	46
Netherlands	28	Cuba	10
Norway	103	El Salvador	54
UK	47	Guatemala	30
		Mexico	48
US	66	Peru	30
		Uruguay	37
		Venezuela	186

Table Eight: GDP Per Capita Growth Rates from 1928 to 1955

The sample is smaller than Table Four as some of the poorer Latin economies do not have GDP series for earlier years.³⁵ Table Eight shows Cuba has the lowest growth rate

³⁴ There are other effects that work in the opposing direction. For example, by using 1953 weights for our output index we may overstate income levels for the earlier period. We were unable to obtain the data necessary to construct value added weights for an earlier year.

followed by Argentina and Chile. Using an earlier year would put Cuba in a worse light. Table Nine provides the 1928 extrapolations of income per capita and output per worker for 1928. We do not have the data to extrapolate consumption.

Table Nine: Relative Income per Capita and Output per Worker for 1928 in 1950's Prices (US=100)

	PPP A Income per capita	Adjusted Output per worker
Belgium	72	63
Denmark	55	49
France	57	43
Germany	60	47
Italy	31	26
Netherlands	61	61
Norway	45	44
UK	64	55
Argentina	42	40
Brazil	9	10
Chile	32	41
Colombia	12	16
Costa Rica	18	13
Cuba	40	45
El Salvador	10	12
Guatemala	12	14
Mexico	19	22
Nicaragua	12	13
Peru	12	12
Uruguay	42	44
Venezuela	16	20

³⁵ We omit Honduras where the Maddison estimates shows an implausibly large fall in GDP.

As we have seen, 1950's Cuba is a relatively prosperous economy. If Cuban income per capita grows slowly between 1928 and 1955 then this implies that Cuban incomes were higher in relative terms for earlier years. This is indeed the case. Cuban income for 1928 is three quarters of the European average. It exceeds income for Italy by a considerable margin. Moreover, output per worker is closer to European levels. Excluding Italy, Cuban output per worker is ninety percent of Europe.

For Latin America, Cuba, Argentina, Chile and Uruguay again have the highest incomes in the region while pre-oil Venezuela is a relatively poor economy. The rankings are similar using output per worker.³⁶

From Table Nine, Cuban income per capita for 1928 is forty percent of US levels.

During the early 1920's, outside observers often considered Cuba to be comparable to the poorer US Southern states in terms of living standards and growth potential.³⁷ Do our estimates support such claims?

Table Ten compares Cuba to the fifteen poorest US States for 1929 where income is given relative to the overall US average.³⁸ As it turns out, Cuban income is indeed higher than for Southern states such as South Carolina and Mississippi.³⁹

³⁶ After analyzing levels and patterns of capital goods imports, Tafunell and Carreras (2005) conclude that Cuba ranked with Argentina, Chile and Uruguay as the richest economies in Latin America. Our estimates provide independent confirmation for their claims.

³⁷ See Dye (1998) page 257-258 or Speck (2005, 2006).

³⁸ Data on State incomes is not available for 1928.

³⁹ The comparison probably overstates relative Cuban income as it ignores price level differences within the US. We would have expected price levels to be lower the for poorer US states. On the other hand, using a comparison year from the early 1920's would certainly put Cuba in a better light.

	Income Per Capita		Income Per Capita
	(Overall US = 100)		(Overall US = 100)
South Carolina	38	North Dakota	54
Mississippi	40	Kentucky	56
Cuba	41	New Mexico	58
Arkansas	44	Louisiana	59
Alabama	46	South Dakota	60
North Carolina	47	Virginia	62
Georgia	49	Oklahoma	65
Tennessee	54	West Virginia	66

Table Ten: Cuban Income Per Capita relative to US States in 1929 (Overall US = 100)

Note: We estimate Cuban income relative to US states by using the ratio of Cuba/US and State_i/Overall US. The data on state incomes are from the BEA.

We suggest that caution be used with Tables Nine and Ten. Given the infirmities of the Cuban data and the conceptual difficulties associated with extrapolations, our estimates of relative Cuban living standards for 1928 are rough guides. Nonetheless, once we accept that Cuba experienced slow or no growth over the final decades of the Republic then this surely implies that Cuban incomes were higher in a relative sense for the earlier years. The only question is how much higher.

4. Looking Back from the Twenty First Century

This brings us to our final question, how does income per capita in present day Cuba compare to the Republic? There can be no precise answer to this question without comparative data on Cuban GDP. As mentioned, such estimates do not exist. Controlled conjectures, however, are still possible. After reviewing the evidence, Roger Betancourt (2008) concludes that income per capita for 2003 was around two thousand dollars in 1996 Geary Khamis international prices, about the level of Honduras, with an upper limit of three thousand dollars. ⁴⁰

How does this income compare with 1957, the pre-revolutionary peak? Assume, for the moment, that Betancourt's upper limit of three thousand dollars for 2003 is correct. We then have to come up with an estimate of 1957 Cuban income in 1996 world prices. There are a number of ways to do this. They all lead to the conclusion that current Cuban income per capita is well below the 1957 level.

The simplest approach assumes that Cuban incomes for 1957 in 1996 prices are similar to Argentina and Uruguay. From the Penn World Tables, Mark 6.1, we have estimates of 1957 income per capita for Argentina and Uruguay in 1996 prices. Taking the average of the two countries, we get \$6,700.⁴¹ If this estimate is correct, then Cuban income per capita for 2003 is fifty percent of its 1957 levels.⁴²

An alternative approach is to perform a benchmark comparison of Cuban income for a recent year, and link the results to the Penn World Table, Mark 6.1 data in a similar manner as

⁴⁰ Maddison (2007) assumes without discussion that Cuban income for 1990 is fifteen percent below the average for Latin America and extrapolates backwards and forwards. The CIA and the Human Development Index also provides what they calls a PPP adjusted income for Cuba but it is not clear how they make their estimates, See Meso Lago and Pérez-López (2005).

⁴¹ After looking at the data in a variety of ways, Locay and Gonzalez (2008) put Cuban income per capita for 1960 at \$6,000 in 1996 prices. See also Locay (2009).

⁴² We would again emphasize that this conclusion is tentative and a definitive answer awaits better data on Cuban income per capita.

above. As mentioned, we do not have comparative data on Cuban GDP. We can, however, provide a partial comparison using consumption data. The United Nations Civil Service Commission provides detailed data on Cuban prices collected using International Comparison Program (ICP) classifications for 2000 and 2001. We also have Cuban GDP data collected using the UN System of National Accounts for these years.⁴³ We use these two sources to compare Cuban and Costa Rican consumption levels in 2000.⁴⁴ This comparison yields Cuban consumption per capita that is forty-seven percent of Costa Rican levels in 2000. Using the Costa Rican consumption estimates from PWT 6.1 gives Cuban consumption per capita in 1996 dollars of \$1615. From Table Four, Cuban consumption levels in 1955 were ninety percent of Argentine levels. This gives Cuban consumption in 1955 of \$4295 in 1996 dollars. This leaves Cuban consumption levels in 2000 at thirty-eight percent of 1955 levels. Allowing for growth in consumption after 2000 using Economic Commission for Latin America (ECLA) data, this yields an estimate of consumption for 2007 at fifty-three percent of 1955.

Thus, our results provide a partial answer to the old question of the road not taken. What path would income per capita have followed for Cuba had the revolution not taken power? Since current income appears to be below the levels of the late Republic it is hard to visualize any scenario where the Republic would not have outperformed the Revolutionary economy by a considerable margin at least in terms of income per capita. Whatever the achievements of the revolution elsewhere, it appears to have permanently reduced income per capita.

⁴³ The Economic Commission for Latin America and the Caribbean (ECLA) provides data on Cuban GDP using the UN System of National Accounts framework for the period 1985 to 2002. The data after 2002 are difficult to interpret as Cuba no longer follows the standard system of national accounting.

⁴⁴ The reasons for our use of Costa Rica as the basis for comparison, and the details of the comparison are in the appendix.

Of course, an evaluation of the overall record of the revolutionary regime must confront its record with regard to income distribution, health, education as well as individual liberties in addition to income per capita. Such issues are contentious and are well outside the scope of our paper. It remains the case, however, that knowledge of living standards during the Republican era will largely determine the lens through which we view the economic and social record of the revolutionary regime.⁴⁵

5. Concluding Comments

All indications are that Republican Cuba once was a prosperous middle-income economy. On the eve of the revolution, we find that Cuban incomes were fifty to sixty percent of European levels. They were among the highest in Latin America and were about thirty percent of the US. The sugar boom of the first decades of the twentieth century seems to have produced yet higher relative Cuban income levels. The crude income comparisons possible suggest that by the mid-1920's Cuban income per capita may have been in striking distance of Western Europe and the Southern States of the United States. In stark contrast, the best information available suggests that income has declined under the revolutionary regime and may be significantly below its levels of the 1950's.

In sum, the story of Cuba since the 1920's is the story of how it has fallen in the world income distribution. As best we can tell, Cuba now occupies a position similar to the poorest

⁴⁵ The Cuban economist Carlos Diaz Alejandro (Diaz Alejandro (1973 page 91)) suggests that we evaluate the revolutionary regime along the following lines:

[&]quot;Consider a mental experiment in which one is to choose where to be reborn as a new baby, but without knowing where that miracle will occur in a rich or poor family in city or country...... Would one choose Guatemala, Brazil or Cuba?"

Given Cuba's standing in the 1950's in terms of income per capita, a more appropriate comparison is Argentina/Chile/Cuba or Spain/Italy/Portugal/Cuba or even Cuba/Puerto Rico.

countries of Central America. What went wrong? With hindsight, the fact that the central planning has ended badly should come as no surprise. Over the last fifty years, Cuba has replicated the failings of command systems elsewhere albeit in a uniquely Cuban fashion. In our view, a greater puzzle concerns economic performance in the decades after the end sugar boom. As Dye (1998) and Speck (2006) convincingly demonstrate, the Cuba of the Sugar boom showed impressive levels of technological advance and institutional innovation rooted in the activities of Cuban entrepreneurs.⁴⁶ Why did the dynamism of the Sugar era not carry over to the last decades of the Republic? After all, the late Republic had moderate tariffs and open capital markets along with a stable monetary regime based on a hard fix to the US dollar. A closer look shows that all this is true but also that it may be beside the point. Starting in the late 1920's, Cuba began to regulate its product and factor markets. The policy changes gathered pace in the 1930's after the devastating shock of the great depression. As a result, late Republican Cuba had exceptionally distorted labor, capital and product markets even by the high standards of Latin America see World Bank (1951).

Does the move to regulation explain the slow recovery of the 1930's? Does it also explain the anemic growth of the 1940's and 1950's?⁴⁷ Did the severe labor market distortions worsen unemployment and income distribution? Or perhaps the explanations lie elsewhere. Engermann and Sokoloff (1997) suggest that initial factor endowments led to the development of institutions that inhibited growth in Latin American countries. Given the remarkable institutional changes in Cuba over the last century, from a colony to a protectorate of the US and

⁴⁶ The high relative Cuban living standards in the early Republic appear to go much further back in time. Coatsworth (1998) Table 1.1 page 126 suggests that Cuban income per capita was higher than the US until 1830.

⁴⁷ As it turns out, Cuba reversed many of these policies during the last years of the Republic see US Department of Commerce (1956) and especially Baklanoff (1998, 2009). It is certainly the case that investment surged during the 1950's despite the political unrest.

to an independent Republic and finally a Communist regime, Cuba provides a remarkable case study for their thesis. Blattman, Hwang and Williamson (2007) argue that terms of trade volatility such as that experienced by Cuba prior to the 1930s reduces growth. The various hypotheses are plausible but they require further work to be substantiated.⁴⁸ On the other hand, there can be little doubt that slow growth after 1920 hastened the demise of the Republic and partly led to the tragedies that would follow over the course of five long decades of revolutionary rule.

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⁴⁸ The Cuban experience over the last decades of the Republic provides a remarkable example of what Kehoe and Prescott (2007) call "great depressions" where output remains below its trend value for a long time. Their definition of a great depression is that output takes at least ten year to return to trend. Output per worker never returned to its pre-1920's trend for the Republic.

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Data Appendix

We begin by describing the 1950's real income comparisons for Cuba and other economies. Next, we provide details of the output index. We then outline the terms of trade adjustment to GDP. We conclude by providing the socioeconomic indictors underlying Table Five in the text.

i. The 1953 benchmark

We start with the 1953 Cuba/US GDP comparison. We calculate real income per capita for Cuba in terms of the US as $y_{c,us} = Y_{c,us}/p_{c,us}$ where $y_{c,us}$ is real income per capita for Cuba in terms of the US, $Y_{c,us}$ is nominal income per capita relative to the US and $p_{c,us}$ is the Cuba/US price level.

We compare Cuba/US price levels using the Gilbert and Kravis (1954) approach. There are two key points in their methodology. First, they use a Fisher Ideal price index. Second, they compute the overall price level from urban and rural prices. In practice, urban/rural differences appear to be mainly for food and housing.

Nominal Income per capita

The US nominal income per capita for 1953 is the standard national account series from the BEA. Nominal GDP for Cuba is from Table 1 page 215 in Oshima (1961). Oshima estimates Cuban GDP for 1953 from the expenditure and output side. We use the expenditure estimates to be consistent with Gilbert and Kravis (1954). The choice does not influence the results.

Expenditure Shares

Table Two in the text provides 1953 expenditure shares for Cuba and the US. The Cuban estimates are from Oshima (1961) while the US shares are from the BEA national accounts. We modify the US and Cuban classifications to match those of Gilbert and Kravis (1954) Table 27 page 113. Unlike Gilbert and Kravis, we do not adjust expenditure shares for tobacco or alcohol.

Price data

We rely mostly on the ILO price level comparisons for food and other consumption items for October 1952 (ILO (1955)). We assume that there is no change in prices for 1953. We supplement the ILO data with Oshima (1961), the World Bank Cuba Study (World Bank (1951), the US Department of Commerce (1956) and the Cuban Economic Research Project (1965). We cross check the results using direct price level comparisons for other Latin Economies from the Economic Commission for Latin America (ECLA (1963)). The comparative Cuban wage data is for October 1952 and is from ILO (1955).

Table Two in the text provides the price level comparisons. The sources are as follows:

Food Prices

The ILO data refer to urban prices. It appears that Oshima (1961) values Cuban food consumption at urban prices. For that reason, we decided not to adjust Cuban food prices to reflect possible differences between urban and rural prices. Gilbert and Kravis (1954) find that overall US food prices were five percent below urban levels. We make no adjustment to US food prices. Our quantity comparisons for food use food quantities taken from the food balance

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sheets from Oshima (1961) for Cuba and the balance sheets from Historical Statistics of the US for the US. Unless otherwise stated, the price and quantity data accord.

Cereals and Cereal products: We use rice and flour prices from the ILO with the exception of Cuban flour prices taken from Oshima (1961).

Meats, poultry and Fish: Oshima (1961) for Cuba and ILO (1955) for the US. The ILO Cuban meat prices are too low and appear to reflect price controls on meat.

Dairy products: ILO (1955). Milk.

Fats and oils: ILO (1955). Lard.

Vegetables and Fruits: ILO (1955). Simple average of ILO price data for beans, onions, oranges and prunes. The quantity comparison suggests the implied quantities produced by the price comparison are too low. We average the direct price and the implied price yielded by the quantity comparison.

Potatoes: ILO (1955).

Non alcoholic beverages: ILO (1955). Coffee.

Sugar and Sugar products: ILO (1955). Sugar. The quantity comparison suggests a much lower Cuban price so we average the price and quantity comparison.

Other Items

Alcoholic Beverages and Cigarettes: For cigarettes, we use the ILO (1955). For alcohol, we use wholesale price of beer in Cuba from Pérez-López (1977) adjusted to a retail level. *Clothing and household textiles*: We could find no estimates of clothing prices for Cuba so we use the ECLA comparisons for 1960 (ECLA (1963)) where we assume that the relative

Cuban/US price level equals the average of the Dominican Republic and Panama. We choose these economies because of the overall similarity between their price structures and Cuba. *Housing*: We could find no rent comparisons for Cuba. Gilbert and Kravis (1954) page 153-154 show how to make quantity comparisons for housing. We adapt their approach to the Cuban case. As it happens, the quality of Cuban housing exceeds that assumed by Gilbert and Kravis for Italy so our estimate probably overstate Cuban rents.

Fuel light and water: We use ILO (1955) for electricity. In accordance with contemporary accounts, the price of electricity is much higher for Cuba than the US. For Fuel, we use the price of gasoline for Cuba from Cuban Economic Research Project (1965). The overall index is an equally weighted average of electricity and fuel prices.

Household and personal services: We use unskilled construction wages to proxy for domestic services. For other personal services, we use an index with equal share for unskilled wages and the nonfood price index. We cross-check the results with ECLA (1963) estimates for personal care for Panama and the Dominican Republic.

Transportation equipment and services: We take the estimate of relative capital good prices from the Report on Cuba (1951) page 99 for the purchase of transportation equipment. We use gas prices taken from the Cuban Economic Research Project (1965) to proxy for cost of operation of transportation equipment. For public transport, we used the San Juan/US comparison from Synder (1956). We checked this against a quantity comparison following the approach of Gilbert and Kravis (1954),

Communication Services: This is a rough quantity comparison following the example of Gilbert and Kravis (1954) using data on letters, phone calls and telegraphs.

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Recreation and entertainment: For books, newspapers and magazines, we used a quantity comparison based on newspapers. For all other items, we used an index based on an equal weight of unskilled wages and nonfood portion of GDP. *Health:* Quantity comparison following Gilbert and Kravis (1954). *Education:* Quantity comparison following Gilbert and Kravis (1954). *Miscellaneous*: We set this equal to recreation and entertainment. *Net exports*: Following Gilbert and Kravis (1954) we set this to one.

Investment

Producer Durables: World Bank Report on Cuba (1951) page 99.

Construction: We use an equally weighted average of construction wages and material costs.

Construction wages are from the ILO (1955) while we assume that material costs are the same in the US and Cuba.

Government

Wages: ILO (1955).

Good and Services: We use the Cuban/US relative nonfood price levels calculated from the information in Table One.

ii. The 1950's Comparisons for other economies

Europe: Gilbert and Kravis (1958) Table 8 page 40 provide Fisher Ideal indices covering income and consumption for 1955. The benchmarks cover the US and eight European economies. They are in 1955 prices.

Latin America. Braithwaite (1968) Table 3 page 129 for 1955. The estimates are in 1960 prices.⁴⁹

Soviet Union: Bergson (1972) Table Two page 149.

Labor Force

Labor force data for 1955 are from the implied ratios of the labor force to population from the Penn World Tables 6.2. We take the labor force data for 1928 from the appendix to Baier, Dwyer and Tamura (2006).

iii. The Output Index

Our point of departure is Pérez-López (1977). His carefully constructed index of industrial production covers manufacturing, mining, and public utilities from 1930 to 1958. To extend his index to overall output, we develop new indices for agriculture, construction, transportation, wholesale and retail trade and services. We also provide estimates for 1928 and 1929.

⁴⁹ The methodologies of Braitwaite (1968) and Gilbert and Kravis (1954, 1958) differ in some respects. First, Braithwaite's Fisher indices have same price weights for all for Latin American economies. Second, he collected Latin price data only for capital cities. Third, his US price data are from two cities, Los Angeles and Houston. Some rough calculations suggest that the Braitwaite (1968) procedures may understate income for Latin economies by from five to ten percent. The Braitwaite methods are not well documented so it is difficult to be more precise.

The output index is in 1953 prices. We take the weights, given in Table Seven in the text, from Oshima (1961).

(i) Agriculture

The agricultural index is an index of gross output. It covers Sugar, Rice, Tobacco, Beef, Pork, Poultry, Milk and Eggs. We use the following 1953 weights calculated from Oshima (1961).

Sugar	0.350
Rice	0.059
Coffee	0.063
Tobacco	0.084
Beef	0.191
Pork	0.064
Chickens	0.023
Milk	0.154
Eggs	0.008

Table 1a Agricultural Weights

The output data for Sugar, Tobacco and Coffee are of reasonable quality. The indices for other sectors are less reliable and require considerable interpolation as well as some strong assumptions.

Sugar: Cuban Economic Research Project (1965).

Coffee and Tobacco: Mitchell (1993).

Rice: Mitchell (1993) supplemented by information from the World Bank (1951) and the Cuban

Economic Research Project (1965).

Beef and Pork: Mitchell (1993) provides cattle numbers. The Cuban Economic Research Project (1965) provides slaughter numbers and carcass weights for selected years. The World Bank (1951) and the Foreign Policy Association (1935) also provide information on slaughter weights. Using the various sources, we estimate beef production by making assumptions about slaughter rates and carcass weights. The results are close to Oshima (1961) for 1953 providing a check. *Milk*. Mitchell (1993) supplemented by World Bank (1951) and the Cuban Economic Research Project (1965).

Poultry and Eggs. The US Commerce department (Department of Commerce (1956)) provides data on poultry numbers for selected years. The Cuban Economic Research Project (1965) estimates production of poultry meat for 1940. We calculated poultry production by assuming that poultry meat yield is constant over time. As it turns out, the resulting estimates for 1953 are similar to independent estimates from Oshima (1961).

(ii) Other Sectors

Non-Sugar Manufacturing, Electricity and Gas, Mining and Fishing from Pérez-López (1977). These indices cover 1930 to 1958. To get to 1928, we extrapolate Electricity and Gas using data on electricity generation from Mitchell (1993). Next, we assume Mining and Fishing are constant at their 1930 levels. For non-sugar manufacturing, we extrapolate using the scattered data on manufacturing output for these years.

Construction: We used construction materials from Pérez-López (1977) where we extrapolate to 1928 using non-sugar manufacturing.

Transportation: The index covers railway and road transportation. For Railways, we use Mitchell's (1933) data on freight and passengers where we use sugar to interpolate for missing

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years for freight. For road freight and passenger traffic we proxy output using the vehicle numbers from US Department of Commerce (1956). We form the overall index using the weights suggested by World Bank (1951) and US Department of Commerce (1956). *Wholesale and Retail Trade*: We form an index by assuming that all non-sugar manufacturing output as well as imports move through the wholesale and retail sectors. Non-sugar manufacturing is from Pérez-López (1977) while we estimate the quantum of imports using our terms of trade estimates discussed later. We combine the indices using 1953 weights. *Finance*: We assume that the output of the financial sector is proportional to the real value of deposits of the banking system where data on deposits is from the Cuban Economic Research Project (1965). We deflate deposits by the consumer price index for food from the OXLAD database and adapted from Zanetti and García (1976) spliced to the food price data from the Cuban Economic Research Project (1965) after 1938.

Other Sectors: These are almost all service sectors plus the government. We proxy output by employment obtained using census and population data from the Cuban Economic Research Project (1965).

Table 2a gives the indices for agriculture while Table 3a gives the overall indices.

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Table 2a. The Agricultural Output Index

Year	Sugar	Rice	Coffee	Tobacco	Beef	Pork	Poultry	Milk	Eggs	Total
1928	80	14	77	54	48	45	115	62	115	63
1929	102	14	81	62	53	44	115	69	115	74
1930	92	14	92	74	54	49	115	71	115	73
1931	61	16	104	74	47	53	124	61	124	61
1932	51	16	104	32	49	59	134	63	134	55
1933	39	16	100	34	45	65	145	58	145	50
1934	44	16	108	42	49	71	156	64	156	55
1935	50	16	142	38	56	71	168	66	168	61
1936	50	16	119	38	64	70	160	69	160	61
1937	59	16	123	50	72	68	152	72	152	67
1938	59	16	119	50	85	67	144	79	144	70
1939	54	16	123	42	80	66	137	69	137	65
1940	55	25	115	52	93	64	130	75	130	70
1941	47	25	119	38	91	67	124	70	124	65
1942	66	25	138	46	89	71	118	65	118	72
1943	56	25	135	38	87	75	112	60	112	67
1944	82	25	100	60	85	62	106	55	106	74
1945	68	33	81	64	85	50	101	55	101	67
1946	78	42	135	72	100	100	96	63	96	83
1947	112	36	135	72	100	100	97	68	97	95
1948	116	36	108	52	98	100	97	72	97	93
1949	100	31	154	62	91	100	98	79	98	91
1950	106	39	127	62	100	100	99	84	99	94
1951	110	61	112	72	100	96	100	90	100	97
1952	138	85	104	70	99	96	99	93	99	108
1953	100	100	100	100	100	100	100	100	100	100
1954	94	94	150	100	101	102	101	107	101	102
1955	87	112	215	100	110	104	104	116	104	108
1956	91	145	142	92	120	107	104	126	104	109
1957	108	136	169	104	131	112	104	137	104	122
1958	111	132	115	106	143	112	104	150	104	123

	Mining		Non Sugar				Banking and				
Year	Ag	quarrying	sugar	Manufact	Const	Utilities	Trans	Trade	insurance	Other	Total
1928	63	40	80	30	60	23	101	27	71	58	54
1929	74	40	102	34	68	26	101	27	64	59	59
1930	73	40	92	34	68	26	104	27	43	60	58
1931	61	30	61	22	12	23	66	16	35	66	47
1932	55	20	51	18	8	21	60	13	42	66	43
1933	50	28	39	20	8	21	59	14	42	66	42
1934	55	28	44	25	13	23	64	19	38	67	46
1935	61	27	50	28	17	25	69	21	42	67	49
1936	61	39	50	34	26	27	75	26	50	68	52
1937	67	54	59	38	30	31	71	30	52	69	55
1938	70	43	59	41	27	32	77	31	52	70	57
1939	65	38	54	45	32	34	76	34	49	70	56
1940	70	41	55	45	38	35	65	33	49	71	57
1941	65	54	47	60	38	37	77	44	50	72	60
1942	72	53	66	51	41	38	64	41	51	72	61
1943	67	59	56	54	42	40	74	48	62	79	64
1944	74	53	82	61	43	43	84	58	78	80	71
1945	67	63	68	67	44	49	93	64	81	82	71
1946	83	63	78	72	59	53	98	68	86	83	78
1947	95	42	112	70	68	57	104	86	84	85	87
1948	93	38	116	70	70	64	106	85	76	87	87
1949	91	40	100	72	77	69	101	78	88	89	85
1950	94	44	106	86	78	75	117	94	103	91	93
1951	97	55	110	88	94	83	117	107	101	93	98
1952	108	80	138	99	103	91	112	108	101	95	105
1953	100	100	100	100	100	100	100	100	100	100	100
1954	102	88	94	104	103	108	97	95	108	102	100
1955	108	99	87	107	112	119	95	95	125	104	103
1956	109	89	91	120	145	131	97	102	145	106	109
1957	122	92	108	128	158	134	100	116	158	108	118
1958	123	93	111	133	176	145	104	120	151	112	122

Table 3a. The Output Index

iv. The Reduced Information Index

The weights for the reduced information output index are in Table 4a. We derive the weights from the 1953 value added data from Oshima (1961).

Agriculture	0.30
Sugar Manufacturing	0.09
Trans and	
communications	0.07
Wholesale and retail	0.19
Other	0.35
GDP	1.00

Table 4	la	
Reduced Information Index	Weights in	1953 Prices

Note that agriculture includes sugar cane while manufacturing sugar is the processing of sugar.

We give the individual indices form 1902 to 1928 in Table 5a.

Year	Agriculture	Sugar Manufacturing	Trans and communication	Wholesale and retail	Other
1902	18	17	13	27	29
1903	21	20	14	28	30
1904	23	21	16	31	31
1905	27	23	17	36	31
1906	28	25	19	43	32
1907	37	29	21	38	33
1908	28	19	22	38	33
1909	39	31	24	33	34
1910	40	37	26	38	34
1911	32	29	28	43	35
1912	35	38	30	44	35
1913	44	49	35	50	35
1914	47	52	39	41	36
1915	46	52	44	48	36
1916	50	61	50	74	37
1917	52	61	58	60	37
1918	57	69	59	52	38
1919	65	80	61	57	37
1920	67	75	62	78	38
1921	64	80	64	59	39
1922	65	81	66	44	41
1923	62	73	70	66	42
1924	65	82	76	72	44
1925	72	104	91	69	46
1926	70	99	85	61	47
1927	69	90	88	65	49
1928	63	80	75	59	48

Table 5a Output Indices 1902-1928

v. Adjusting GDP for terms of trade changes

To adjust the GDP volume index for changes in the terms of trade we need a terms of trade index. There are no official terms of trade indices for Republican Cuba. Birnberg and Resnick (1975) give import and export price indices calculated using Fisher Ideal indices from 1902 to 1937 while the UN (UN (1959) give import/export price indices 1934-1937 and 1944-1953. Interpolating with data from OXLAD, we get our series on import and export prices from 1902 to 1953 given in Table 6a.

Equation (1) measures the effects of changes in the external terms of trade on GDP where p is an overall price index, px and pm are the export and import price index, x and m are volumes of exports and imports and T is the impact on the volume of GDP.⁵⁰

$$T = \text{effects of terms of trade} = x\left(\frac{px}{p} - 1\right) + m\left(1 - \frac{pm}{p}\right)$$

There is debate in the national accounting literature on the appropriate deflator. Following the US approach, we use the import price index. Our measure is thus equivalent to the command measure of GDP from the US national accounts.

⁵⁰ See Gutman (1981) and Kohli (2004) for derivations.

Year	PX	PM	PX/PM	Year	PX	PM	PX/PM
1902	32	32	100	1941	58	54	107
1903	34	29	116	1942	68	61	112
1904	38	31	122	1943	72	63	113
1905	46	31	149	1944	73	65	112
1906	41	33	126	1945	81	66	123
1907	44	34	128	1946	96	80	120
1908	44	35	126	1947	120	101	119
1909	40	34	117	1948	111	109	102
1910	48	35	138	1949	107	93	115
1911	45	36	125	1950	112	87	129
1912	49	38	131	1951	125	104	120
1913	41	38	108	1952	115	103	112
1914	44	39	113	1953	100	100	100
1915	59	40	148				
1916	70	45	155				
1917	80	61	131				
1918	83	77	108				
1919	98	85	116				
1920	175	97	180				
1921	68	82	83				
1922	47	55	86				
1923	85	55	154				
1924	77	54	142				
1925	50	58	86				
1926	44	58	75				
1927	52	53	97				
1928	44	49	91				
1929	36	49	74				
1930	29	48	60				
1931	25	36	68				
1932	17	30	58				
1933	21	28	74				
1934	27	34	79				
1935	31	37	84				
1936	35	39	91				
1937	40	42	94				
1938	34	39	88				
1939	39	43	90				
1940	49	51	97				

Table 6a: The Cuban Terms of Trade, 1902-1953

vi. Socioeconomic Indicators

Table 7a provides the relative income per capita and socioeconomic indicator estimates

for the economies in Table Five.

	Income							
	per		Life	Infant				
country	capita	Literacy	expectancy	Mortality	Doctors	Cars	TV's	Radio
		_			per	per	per	per
	US = 100	0		per 1000	10000	1000	1000	1000
Belgium	53	99	70	41	11	51	68	289
Denmark	51	99	72	25	11	50	118	333
France	49	99	70	34	9	69	42	240
Germany FR	51	99	70	42	14	36	84	287
Italy	29	91	69	51	12	18	42	160
Netherlands	47	99	73	20	8	25	70	272
Norway	55	99	73	21	11	36	14	285
United Kingdom	57	99	71	26	11	70	212	290
Argentina	31	90	63	60	13	18	22	169
Bolivia	7	38	42	152	3	3	na	73
Brazil	9	55	49	115	4	6	17	65
Chile	23	82	53	118	6	7	na	131
Colombia	12	66	53	79	3	6	10	125
Costa Rica	16	81	59	87	4	13	2	62
Cuba	27	79	64	33	10	20	73	152
Dom Republic	9	54	48	102	2	3	3	34
Ecuador	11	61	51	107	3	2	na	38
El Salvador	10	45	47	129	1	6	8	89
Guatemala	10	33	42	136	2	4	8	53
Haiti	3	14	39	169	0.4	1	na	6
Honduras	7	43	43	137	2	2	na	64
Mexico	17	63	53	94	6	10	18	89
Nicaragua	10	43	43	130	4	4	4	53
Panama	15	70	56	58	3	14	10	na
Paraguay	9	70	52	67	5	2	na	82
Peru	12	56	44	142	4	6	3	114
Uruguay	34	88	67	48	12	22	10	315
Venezuela	28	57	56	56	6	24	33	164
US	100	99	69	26	13	314	308	941
				-	-	-		

Table 7aSocioeconomic Indicators circa 1955

The data, with the exception of TV's and radio, refer to 1955 or surrounding years. TV's and radio are for 1960. For the most part, we took data for Latin America from OXLAD while the European data are from the UN Statistical Yearbook various issues. The estimates for Cuban infant mortality and life expectancy are from Sixto (2002). Information on TV and Radios come from the World Bank's World Tables Third Edition Volume II Social Data and refer to 1960.

vii. Cuba/Costa Rica Consumption Comparison for 2000

We draw on the methodology of the International Comparison Program (ICP) and the Penn World Tables for the Cuba/Costa Rica consumption comparison. We use quality adjusted data on consumption prices and national accounts data for both countries.

The fact that Cuba uses UN national accounting procedures from 1985 to 2002 ensures that we can avoid the difficult task of reconstituting the Cuban national accounts.⁵¹ The United Nations Civil Service Commission provides data on Cuban prices collected using ICP classifications and adjusted for quality. The price data are available in detail for two years, 2000 and 2001.⁵²

Traditionally, the US is the base country for international comparisons. For our purposes the US is not a suitable base. First, the UN collects prices for mostly capital cities. It collects US price data for New York, the headquarters of the UN. We require that the capital city prices be representative for the overall economy. This rules out the US given the differences in price

⁵¹ Some ambiguities remain about nominal Cuban GDP. For example, we do not know how the authorities compute nominal GDP given the existence of two currencies. We also do not know how housing services are priced and so on.

⁵² The UN collects these data to adjust the salaries of its employees for differences in costs of living. The UN provides Cuban data for other years but they are at a much higher level of aggregation.

levels between New York and the rest of the US. It also rules out large economies such as Brazil and Mexico where we expect large regional price level variation.

To minimize problems with quality we prefer consumption patterns to be as close to possible to Cuba. This suggests that we focus on the Spanish speaking economies of Central America and the Caribbean. UN price data are available for Costa Rica, the Dominican Republic, Guatemala, Honduras, Panama and Nicaragua. We settled on Costa Rica as it possible to compare certain items, most notable healthcare and education, for Costa Rica but not for the other Latin economies on the list.⁵³

The UN data price data cover consumption only. We follow the standard methodology for consumption comparisons. This means that we include government provided education and healthcare in consumption. We compare price levels with Costa Rican expenditure weights.

Table 8a provides the relative prices and expenditure shares used in the Cuba/Costa Rica price level comparison. The price level comparison excludes housing. Given the distorted nature of the Cuban housing market, it would be inappropriate to use the rents charged to foreign nationals in Havana as a measure of Cuban housing costs.⁵⁴ The overall Cuban consumption price level is seventy-three percent higher than Costa Rica in 2000.⁵⁵

⁵³ Mesa-Lago (2000) argues that Costa Rica is a natural comparison for Cuba.

⁵⁴ The Cuban housing market is extremely distorted as it is difficult to transfer ownership. There is a further problem. The data show that almost all Cubans have access to running water, electricity and sanitary facilities. Indeed Cuba compares favorably to other Latin economies on these measures. Yet the statistics paint an inaccurate picture of the Cuban housing stock. By all accounts, water and electricity is irregular and the most materials necessary for maintenance are unavailable or priced beyond the range of Cubans. As a result, a large portion of the housing stock appears to be in poor condition,

⁵⁵ One problem with the price comparisons occurs with rationed items such as food. Some portion of food consumption, perhaps less than twenty percent, is supplied at extremely low prices. The UN prices reflect those on the open (legal) markets.

Table 8a

Expenditure Weights and Relative Prices for Private Consumption excluding Housing

	Expenditure	weights
		Rica
	Costa	Relative
	Rica	Price
Bread and cereals	0.09	1.75
Meat	0.07	2.18
Fish	0.01	1.72
Milk, cheese and eggs	0.04	1.87
Oils and fats	0.01	2.43
Fruit, vegetables and potatoes	0.05	1.94
Other food	0.05	2.21
Total Food	0.32	
Non-alcoholic beverages	0.03	1.38
Alcoholic beverages	0.03	0.97
Tobacco	0.01	0.71
Medical and health services	0.09	2.21
Personal transportation equipment	0.02	1.68
Operation of transportation		
equipment	0.07	1.68
Purchased transport services	0.11	1.68
Communication	0.02	4.21
Recreation and culture	0.05	0.82
Restaurants, cafes and hotels	0.10	1.83
Other goods and services	0.15	0.92
Overall price level excluding housin	g	1.70

The final step compares consumption levels for Cuba and Costa Rica. The results are in Table 9a. The first row compares private consumption, excluding housing. We calculate this as the ratio of consumption at official exchange rates (0.66) adjusted for the differences in price levels (1.70). Private consumption, excluding housing, is forty percent of Cost Rica.

Table 9aComparing Consumption for 2000

Cost Rica = 1	100
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Private Consumption excluding housing	39
Private Consumption including housing	43
Private Consumption plus public provided Healthcare Private Consumption plus publicly provided Healthcare and	43
Education	47

The next row adds housing to get private consumption. Our rough estimate is that Cuban housing services per capita are seventy percent of Costa Rica. With housing Cuban consumption is forty-three percent of Costa Rica.

The final comparison adds public spending on healthcare and education. In each case, we use WHO and ECLA estimates adjusted for purchasing power parity. The addition of education and healthcare raises overall Cuban consumption reflecting the largely public provision of these services for Cuba. The final row shows that overall Cuban consumption is forty seven percent of Costa Rica.⁵⁶

⁵⁶ By comparing price levels using Costa Rican price weights, we value consumption at Cuban prices. Under weak assumptions, this can be shown to understate Cuba's relative standing. We plan to remedy this in a later version of the paper. On the other hand, the standard methodology of international comparison biases the results in favor of Cuba in other ways. The ICP/PWT approach focuses on prices and ignores the services of the retail sector. The Cuban retail sector is rudimentary.