

*Health and the Revolution: Explaining the Cuban Healthcare Paradox**

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Summary:

Cuba has infant mortality rates below the US. The extensive medical literature on Cuba attributes this to Cuba's unique system of community medicine. We show that the Cuban achievements are real but they are best understood in the context of a political system that targeted infant mortality using a set of policy instruments not available elsewhere. For this reason, we argue that Cuban model has few lessons for other developing economies.

Preliminary. Comments welcomed.

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Introduction

Cuba is an impoverished developing nation. Yet its outcomes in terms of infant mortality and life expectancy equal many developed economies. Indeed Cuban rates of infant mortality are now below the US. The combination of low income per capita with low infant mortality and high life expectancy is termed the “Cuban Health Care paradox” by healthcare professionals. What lies behind the Cuban health care numbers? Are they transferable to other countries? Will they survive political change in Cuba? We provide some tentative answers to these questions. Our focus is on infant mortality but our conclusions apply with equal force to the overall healthcare system.

Sometime in the early 1970’s infant mortality became a central goal of the Cuban authorities. Since then infant mortality has declined continuously. What explains the exceptionally low levels of Cuban infant mortality? How did a poor economy in the midst of an unending economic crisis achieve them? As we might expect, the Cuban model has attracted widespread attention from healthcare professionals.¹ The medical literature attributes the Cuban successes to its unique system of community medicine. We find considerable merit in this explanation. Cuba has indeed reduced infant mortality through a process of human and physical capital accumulation directed towards primary care and prevention. It is not widely appreciated, however, that the Cuban model of community medicine also depends on a unique set of institutions designed to monitor and control the behavior of patients and medical professional in ways that appear to have few parallels elsewhere.

¹ Drain and Barry (2010) laud Cuban healthcare in a recent issue of *Science*. Other positive accounts in the medical literature include Cooper, Kennelly and Ordunez-Garcia (2006) and Spiegel and Yassi (2004).

We show that part of the Cuban successes with infant mortality rests on two pillars. The Cuban system of community medicine is based on large numbers of doctors and other health professionals. The power of the Cuban state prevents these poorly paid but highly trained healthcare workers from leaving the system. The strength of the Cuban security apparatus is such that it can keep its doctors within the system even as it sends them abroad, most notably to Venezuela. The second pillar of the Cuban system is that it gives doctors levers to influence the behavior of expectant mothers that are not present in other more open systems.

We proceed as follows. The next section introduces the Cuban healthcare paradox as it relates to infant mortality. Section Three discuss the legacy of the Republic. As it turns out, the revolution inherited a health system with low rates of infant mortality. The next section outlines the institutions that underlie community healthcare. Here we argue that the Cuban model ultimately rests on the coercive power of the state. We conclude with an evaluation of the overall Cuban healthcare system.

2. *The Cuban Healthcare Paradox*

The World Health Organization (WHO) is the standard source of comparative data on infant mortality. WHO data for 2005 show infant mortality for Cuba at five deaths per one thousand live births.² This means Cuban infant mortality equals infant mortality for the United Kingdom and Canada. It is below the US rate of seven deaths per one thousand live births. Within Latin America, only Chile (eight) and Costa Rica (eleven) are close to Cuban levels. The full extent of Cuban achievements can be seen from the fact that the average for low income economies is seventy-two.

Using WHO data for one hundred and forty economies, Figure One looks at the relationship between infant mortality and purchasing power parity adjusted income per capita for 2005. The figure shows the expected negative relationship. Cuba stands out as it combines developed economy levels of infant mortality with low income per capita. Healthcare professionals call this the “Cuban Healthcare Paradox”.

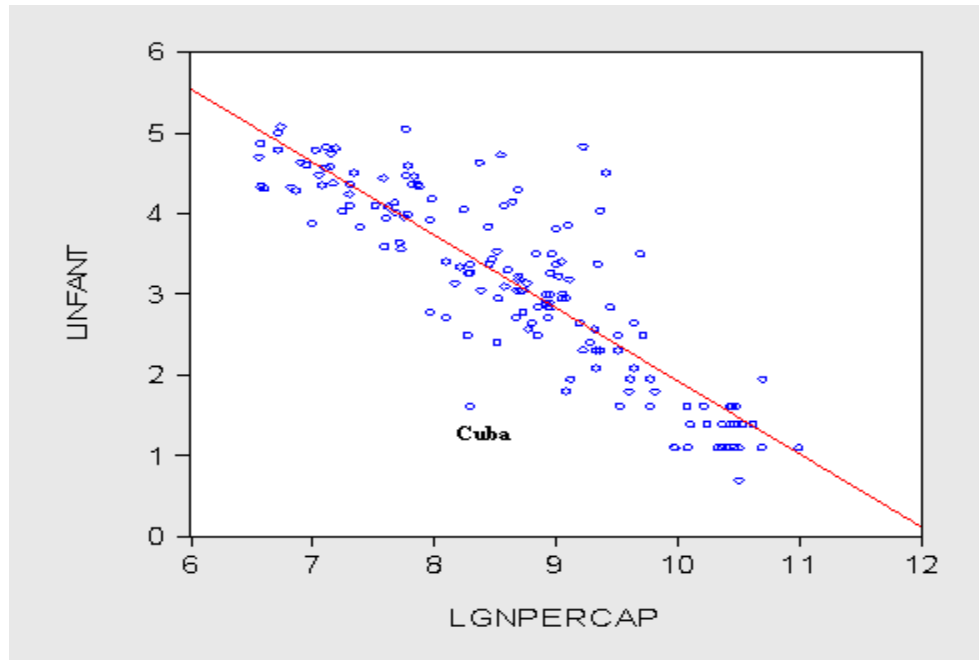
One way to illustrate Cuban exceptionalism is ask what level of income we would expect given Cuba’s infant mortality rate. Fitting a simple regression model to the data in Figure One implies that Cuban income per capita should equal \$21,800 in purchasing power parity adjusted international dollars. Current levels of Cuban income are between ten and twenty percent of this level.³

² We follow other scholars and international organizations by accepting the official data for Cuba. As discussed later, there are some biases in these data but we think that the balance of the evidence is consistent with low Cuban infant mortality.

³ WHO does not provide an estimate of Cuban income. We assume that in income per capita is equal to four thousand dollars in purchasing power parity terms, about the same as Ecuador. This is at the high end of estimates for Cuba. See Devereux and Seda (2010).

Figure One

Infant Mortality and Income



The next sections discuss how Cuba achieved low infant mortality.⁴ We begin with the fact, neglected in the health literature, that the revolutionary government inherited an advanced health care system. We then outline how Cuba succeeded in reducing infant mortality using its model of community medicine.

⁴ There are really three Cuban systems. The first is for ranking party members, the army and the security agencies. The second is devoted to foreigner patients. The third, and the focus of our paper, is the Cuban health system devoted to the great mass of its citizens.

3. *Health and the Republic*

When the revolution took power in 1959 it inherited a middle-income economy with a well developed healthcare system. To underline this fact, Table One compares Cuba with the US, Latin America and Western Europe in terms of income per capita and selected health indicators for 1955. As best we can tell, Cuban income per capita was about fifty percent of the Western European average.⁵ To put this into perspective, this is similar to Italy and it exceeded Spain, Portugal and Greece. Within Latin America, Cuba is equal to the Southern Cone economies of Argentina and Uruguay. It is about thirty percent of the US.

Table One: Income and health circa 1955

	Western Europe	Latin America	US	Cuba
Income/Capita Relative to US = 100, 1955	49	14	100	27
Infant Mortality Rate, 1955	34	89	26	36
Life Expectancy at Birth, 1955	71	51	69	62
Physians/10000 Persons, 1955	10.7	4.3	13.3	10
Daily Kcal/Capita, 1954-56	3018	2340	3150	2875

Source: Locay (2010).

Turning to the health indicators, we see that Republican Cuba had achieved developed economy levels of infant mortality though not life expectancy. It had the lowest infant mortality in Latin America. Rates for Cuba were slightly above Western Europe. The explanation for low Cuban infant mortality lies in a well developed, largely

⁵ See Locay (2010) and Ward and Devereux (2009) for estimates of Cuban living standards during the 1950's.

private, health system see McGuire and Frankel, (2005).⁶ Notice that in terms of inputs as measured by doctors and hospital beds, Cuba is at Western European levels.⁷

In sum, the Cuban health paradox, where infant mortality is greater than income alone would suggest, pre-dates the revolutionary regime.⁸

To put subsequent developments in perspective, Figure Two traces infant mortality from 1958 to the present. For comparison, we also provide US data. Figure Two shows that infant mortality increased during the first decade of the revolution, peaking at forty-seven in 1969 see Diaz-Briquets (1983). This is well above the levels for the 1950's.⁹

⁶ We do not suggest that all was well with health care in the 1950's. The poor, particularly in rural areas, had little access to this system. On the other hand, Cuban infant mortality levels for the late 1950' were well below the Communist economies of Eastern Europe with the exception of Czechoslovakia.

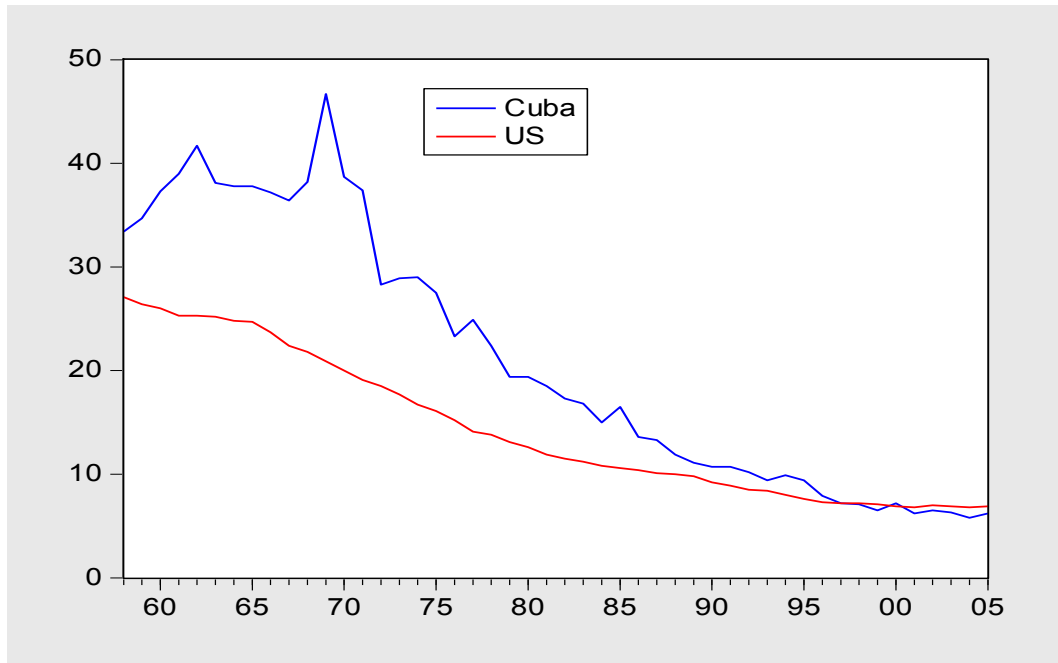
⁷ Oshima (1961) provides careful GDP estimates for 1953. His results suggest that Cuban health care expenditures were between six to eight percent of GDP, remarkably high by the standards of the time.

⁸ A simple regression model along the lines of Figure One suggests that Cuban levels of income mortality for 1955 were about forty percent higher than its income per capita would suggest.

⁹ Some of the increase during the 1960's may reflect better reporting. This likely plays a minor role see McGuire and Frankel, (2005) .

Figure Two

US and Cuban Infant Mortality, 1958-2005



Source: Sixto (2002) and WHO (2009)

During the early 1970's, the regime begins to target health and other social indicators.¹⁰ Reducing infant mortality preoccupies the Cuban authorities and receives attention from the highest levels of government. By 1989, infant mortality is down to eleven. The fall of the Soviet Union at the end of the 1980's delivers a crushing blow to the Cuban economy, reducing income per capita by thirty to forty percent as trading arrangements collapsed and the huge subsidies from the Soviet Union disappeared.¹¹ Despite these setbacks, infant mortality continues its decline. By 2001, it is below the US.

¹⁰ See Eberstadt (1988).

¹¹ By 1993, at the depths of the crisis, caloric intake was about one thousand eight hundred calories per day close to starvation levels see Sixto (2002).

4. *Infant Mortality and Cuban Central Planning*

Why did infant mortality fall so dramatically after the 1970's? The standard explanations emphasize Cuba unique system of community healthcare with its emphasis on primary care.¹² In 1965, Cuba instituted its system of community based polyclinics. These efforts were redoubled s in the 1970's. The authorities allocated increased resources to healthcare by introducing a building program for hospitals and polyclinics. The rough estimates of Sixto (2002) suggest that real expenditures trebled between 1976 and 1989. The emphasis in this period was on primary healthcare and preventative medicine. The final stage in Cuba's move to community medicine came in 1984 when Cuba introduced its neighborhood clinics called consultorios.¹³

The largest investment occurs in the training of healthcare professionals. Table Two shows the results of the move to community medicine in terms of the numbers of doctors and nurses in the system. Cuba did not regain its pre-revolutionary levels of doctors until the early 1970's, reflecting the exodus of doctors after the revolution. From 1970 to 1980, doctors per 10,000 inhabitants doubled. They doubled again during the next decade. A similar expansion took place for nurses.

¹² See Drain and Barry (2010) for references.

¹³ The other feature of the Cuban system is that it grants open access to its citizens. Indeed every Cuban must see a doctor at least once a year.

Table Two
Labor Inputs

	Per 10,000 People	
Year	Doctors	Nurses
1958	9.2	1.9
1970	7.2	13.8
1980	15.6	27.8
1990	36.5	65.1
2000	59.0	74.3
2005	59.0	74.0

Source: Sixto (2002) and WHO (2009).

By international standards, Cuba has a lot of doctors. It has fifty-nine doctors per ten thousand inhabitants for 2005. The average for low-income economies is five (WHO (2008)). For high-income countries, the average is twenty-eight, half that of Cuba. The number of nurses for Cuba is also high.¹⁴

To put the Cuban system in perspective, the next section develops a simple model of infant mortality estimated using cross-country data for 2005.

¹⁴ For recent years the number of doctors working in the health system is lower than the WHO estimates in Table Two would suggest. Some doctors have left for Venezuela and other countries at the behest of the authorities. Others appeared to have dropped out of the system due to low wages. We shall have more to say about this in later drafts.

The Determinants of Infant Mortality

Equation (1) provides a simple statistical model of the determinants of infant mortality.

$$(1) \quad x_i = a_i + b_i y_{ij} + c_i z_{ij} + d_c + e_{ij}$$

The dependent variable is the log of infant mortality per one thousand births given by x_i , y_{ij} is income per capita in purchasing power parity, z_{ij} is a set of other variables that influence infant mortality, and e_{ij} is an error term with standard properties.

Drawing on the healthcare literature, the other explanatory variables are total expenditures, public and private, on healthcare per capita in PPP terms (LnExpen) and the number of doctors (LnDoct) and Nurses (LnNurse) per ten thousand inhabitants. Finally, we consider the proportions of babies born underweight (LnBirth), a crucial determinant of infant mortality taken from the medical literature. All variables are in logs and come from the WHO (2008) database. The data refer to 2005 or the nearest available year. The final variable d_c is a country specific effect for Cuba. The value of this variable reflects unmeasured Cuban characteristics.

Table Three provides the empirical results. The first regression relates Cuban infant mortality to income per capita. As noted earlier, infant mortality for Cuba is lower than we would expect given its income per capita. The coefficient on the Cuban variable is large in economic terms with a low standard error.

Table Three
Explaining Infant Mortality

Ln y	-0.91*	-0.46*
	(0.04)	(0.13)
LnExpen		-0.16
		(0.11)
LnDoct		-0.17*
		(0.06)
LnNurse		0.02
		(0.06)
LnBirth		0.37*
		(0.13)
Cuba	-1.85*	-1.16**
	(0.56)	(0.52)
C	10.98*	7.56*
	(0.36)	(0.72)
R-squared	0.80	0.83
S.E.E	0.54	0.50
n	140	140

Notes: Standard errors are in parenthesis. *, **, *** reflect statistical Significance at the one, five and ten percent levels.

The next regression controls for other factors believed to influence infant mortality. The results are broadly in line with expectations. An increase in expenditure on healthcare lowers infant mortality. While the coefficient on expenditure is large in an

economic sense, it has a high standard error.¹⁵ Increasing the number of doctors also reduces infant mortality whereas the availability of nurses has little effect. Finally, we get the standard result that low birth weight raises infant mortality. Overall, the model has reasonable explanatory power with an r-squared over eighty percent.

The additional variables reduce but do they do not eliminate the “Cuban healthcare paradox”. The country specific effect for Cuba remains large.¹⁶ Given Cuba’s income and the observed characteristics of its health system, the model predicts that infant mortality should be seventeen. As we have seen, Cuban infant mortality is five. The results are crude but they are consistent with the notion that there are unique features to the Cuban system.

The inability of the standard models to explain Cuban infant mortality is easiest to see after 1989 when the collapse of the Soviet Union produced a severe economic downturn. During those years, known as the special period, income dropped by between thirty to forty percent and health care spending also fell. The recovery of the economy from the special period was slow and halting. There is even some dispute as to whether living standards ever regained their 1989 levels. Despite these difficult conditions, infant mortality has continued to fall.

The next section argues that to understand the Cuban successes we must take into account the institutional features of the Cuban system

¹⁵ One possibility is measurement error. It is extraordinary difficult to adjust healthcare spending for differences in prices levels.

¹⁶ Our data likely probably overstate GDP and the numbers of health professionals for Cuba. For that reason, the results in Table Three may understate the Cuban healthcare paradox.

5. *The Institutional Setting*

We know surprisingly little about how the Cuban community care system actually works in practice. For the most part, outside doctors and scholars rely on statistics or on short visits to Cuba rather than direct observation. The only fieldwork on Cuba is Kath (2006, 2009) and Hirschfeld (2007, 2006).¹⁷ This section draws on their work to argue that the coercive power of the state underlies the Cuban model of community healthcare.

The medical literature on Cuba typically downplays the fact that Cuban medical authorities act within essentially a closed society. A society, moreover, where dissent is criminalized and the authorities have considerable powers to enforce compliance from medical practitioners and patients. The most important example of the power of the state is its ability to prevent the defection of healthcare professionals despite low salaries.¹⁸ The state controls doctors even when they work abroad as in the case of Venezuela. Without such controls we would likely see an exodus of medical personnel.

The Cuban authorities also use the full range of its coercive powers to alter the behavior of patients and healthcare providers in ways that tend to reduce infant mortality. Take doctors. Despite their low pay, all indications suggest that Cuban doctors make exceptional efforts to ensure the health of pregnant women.¹⁹ The explanation for this fact is straightforward. The state places extraordinary pressure on Cuban doctors and hospitals to ensure healthy births. The best evidence for this is seen in the fact that the authorities carefully investigate every infant death. They can and do impose severe

¹⁷ Our discussions with émigré Cubans in Miami and New York are broadly consistent with their accounts.

¹⁸ Drain and Barry (2010) put Cuban doctor salaries in urban areas at between \$216 and \$324 per year.

¹⁹ We could not find a single reference to either Kath (2006, 2009) or Hirschfeld (2007, 2006) in the medical literature.

sanctions on doctors and hospitals. As a result, health workers pay particularly careful attention to pregnant mothers and young infants, perhaps to the exclusion of other patients.²⁰

As we have seen, the Cuban system places family doctors and clinics in each community. As it happens, neighborhood doctors in Cuba work closely with the local agencies of the state, the Committees for the Defense of the Revolution and Federation of Cuban Women, to keep detailed records for each family.²¹ The Cuban system thus allows doctors to monitor the health of pregnant women and young infants, perhaps to a greater degree than for developed economies. The Cuban community care system thus provides its doctors with direct access to women who because of social or other problems might avoid treatment in other societies.²²

The Cuban system also allows doctors to compel certain actions from mothers that likely reduce measured infant mortality. These options are not present in other medical systems. The first example of this is the Cuban system of maternity homes.

Maternity Homes (hogar materno)

Cuba developed its maternity homes as a way of ensuring safer pregnancies for rural women with poor access to healthcare. Over time, the role of the maternity home

²⁰ These pressures also lead doctors to underreport infant deaths. The émigré press contains many accounts of such underreporting. While this likely occurs, it probably does not change the fact that Cuban infant mortality rates are indeed low.

²¹ The records were originally used to monitor dissent but now incorporate medical information and other information.

²² Outside scholars emphasize that the Cuban system is open to all. In a sense, this is beside the point as Cuban citizens, and particularly pregnant women, are compelled to avail of the system whether they want to or not.

has changed. Currently, women that are underweight, women pregnant with twins and women who have what Kath (2006 page 357) calls “social problems” are assigned to the maternity homes. Stays are as short as a few days or they can last for the entire pregnancy. During the early 1970’s, four percent of mothers used maternity homes. By 1989, this had increased to twenty three percent. By 2000, forty percent of mothers were resident for some period in the homes see Sixto (2002).

The homes improve nutrition and provide health care to at risk women.²³ The choice of whether to send women to maternity homes is made by family doctors in conjunction with the local organs of the state. Women have little say in the matter. As Kath (2006 page 358) documents, they need official passes to leave the building. Kath (2006) also shows that women are often kept against their will.

The second example of arises with the termination of pregnancies.

Terminating Pregnancy

In the Cuban system, pregnant women are compelled to have at least two ultrasound tests with more at any signs of trouble. Among outside observers, there is a widespread belief that the appearance of abnormalities or any indication of potential problems leads to abortion. We do not know how much pressure doctors apply to mothers in these circumstances, but accounts from émigrés suggest that it is

²³ We suspect that these homes have played a key role in reducing low weight births. The proportion of Cuban babies born under weight is low by developed economy standards. This was not always the case. In 1974, twelve percent of children were born underweight. Since then the proportion has fallen to six see Sixto (2002) and WHO (2009).

overwhelming. There may even be instances of forced abortions.²⁴ What is certain is that Cuba has a high abortion rate. Over recent decades, the abortion rate averaged between thirty-five and forty-five for each one hundred live births.²⁵

We cannot determine the role that maternity homes and the termination of risky pregnancies have played in reducing Cuban infant mortality. The point of this discussion, however, is that pregnant women in Cuba have no choice about maternity homes and they may have little choice about abortion.²⁶ These policies are unlikely to have much appeal outside the closed society of Cuba.

How much of the reduction in infant mortality is rooted in the power of the Cuban state? We do not know. One way of thinking about this question is to consider the effects of political reform on Cuban infant mortality. By reducing the power of the state, reform will mean fundamental changes for Cuban healthcare. Any decline in local party entities such as the committees for the defense of the revolution will lessen the Cuban

²⁴ Kath (2006) and Hirschfeld (2007) provide instances of what appeared to be compulsory abortion. It is worth noting that Cuba's best known dissident, Dr Oscar Biscet, is imprisoned for his role in publicizing what he claimed were cases of forced abortions.

²⁵ See Henshaw, Singh and Haas (1999) for comparative data. Others who have worked in the Cuban system put the number at closer to seventy.

²⁶ A more controversial question regards the forced sterilization of women with physical or mental disabilities. Consider the following from account from a Cuban doctor interviewed by Kath (2006 pages 358-359).

We had at one stage a problem with a nineteen-year old patient who had a slight mental delay but she was in secondary school ... [and she was] a patient with whom one could have a conversation. She fell pregnant with [a heart condition that prevented a normal pregnancy] meaning we had to order a termination.....Despite the fact that we recommended very specifically that this patient should *not* be sterilized the obstetrician responsible for carrying out the pregnancy termination on this young woman went ahead and sterilized her, without our consent, without the patient's consent and without the family's consent

physician's ability to monitor and coerce their patients. It will reduce power of the state to punish severely those doctors who do not meet targets for infant mortality. Perhaps most importantly, reform will reduce the number of healthcare professionals in the system as doctors leave for higher incomes elsewhere the moment state controls are relaxed.

6. *Evaluating Overall Cuban Healthcare*

What does infant mortality tell us about the overall quality of the Cuban system? By focusing on infant mortality and life expectancy, we get a misleading impression of Cuban healthcare. If Cuba has achieved remarkable health outcomes for infant mortality and life expectancy, we have good reason to suppose that the other parts of the system are less impressive.²⁷ Outside of pre-natal care, the Cuban system lacks even the most simple and essential drugs.²⁸ Almost all accounts agree that its infrastructure is crumbling. Cubans rely on black and grey markets for much of their medical care (see Hirschfeld [2006, 2007]).²⁹

²⁷ Healthcare is not the sole determinant of life expectancy or infant mortality. Factors outside the health system such as smoking, alcohol consumption and accidents influence life expectancy. For example, US life expectancy lags behind other developed economies. The available evidence suggests that the quality of US healthcare is significant better than for other developed economies in important respects see Preston and Ho (2009). Along similar lines, infant mortality depends crucially on birth weight reflecting in turn social conditions.

²⁸ Cubans who return to the island bring medical items that are in ready supply for even the poorest of developing economies.

²⁹ We have more than anecdotal evidence to support such claims. In the course of an ambitious attempt to rank healthcare systems, the 2000 World Health Report (WHO (2000)) ranked countries in terms of what it called the responsiveness of their healthcare systems. The WHO scored health care systems from zero to ten on criteria such as dignity, autonomy and confidentiality along with prompt attention, quality of basic healthcare amenities, and access to social support networks during care and choice of care provider. The WHO then combined scores for each component into a composite overall score using the results of a cross-country survey on preferences for health care. As we might expect, rich developed economies dominate the ranking. The US is, by some distance, at the top of the rankings. It is followed by Switzerland,

The example of maternal mortality provides a useful example. If Cuba leads developing economies in terms of infant mortality, its performance in terms of maternal mortality is less impressive. The World Health Organization puts Cuba's maternal mortality rate at forty-five per ten thousand births for 2005. This is similar to Turkey and China. The Cuban rate is well above developed economies where maternal mortality rates are typically between three and eight. As it turns out, the WHO estimates may understate maternal mortality. Cuba has recently changed its definition of maternal mortality. Using the old definition, overall maternal mortality is approximately sixty, similar to Mexico.³⁰

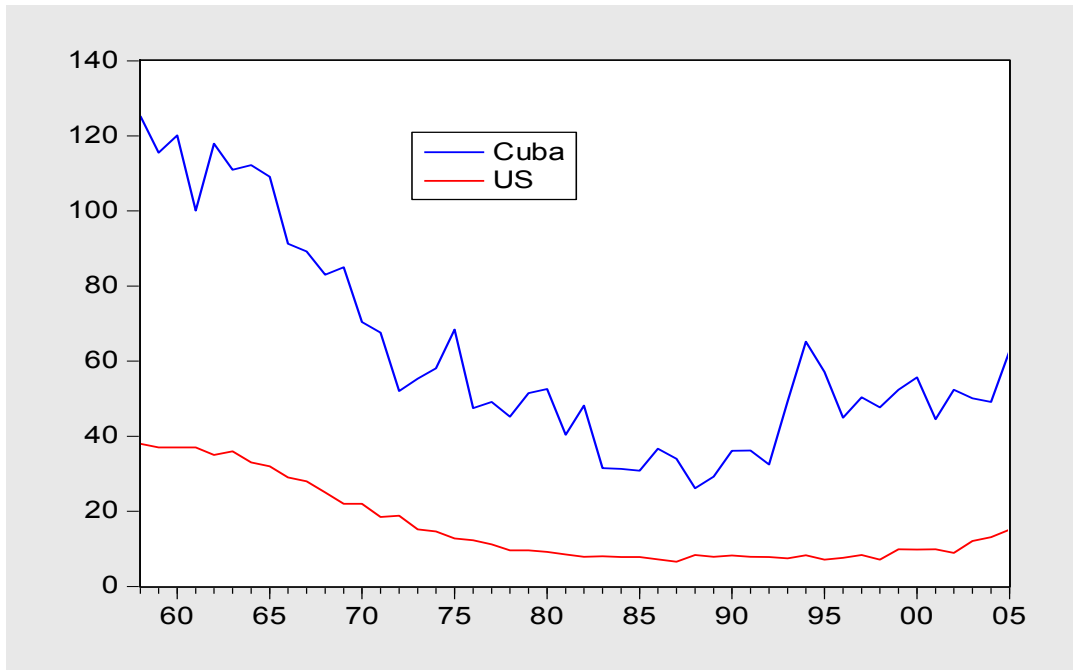
Figure Three looks at maternal mortality rates per ten thousand births for Cuba since the revolution.³¹ For comparison, we also provide US data.

Luxembourg, Denmark, Germany and Japan. Cuba is down the pack and it ranks at one hundred and sixteenth, joint with Guatemala. Chile is forty-five while Costa Rica comes in at sixty-eight.

³⁰ For poorer Cuban provinces, rates of maternal mortality approach ninety even using the new definition.

³¹ We use the older Cuban definition that is closer to that used by the WHO for other countries.

Figure Three
Maternal Mortality, 1958-2005
Rates per 10,000



The behavior of maternal mortality differs from infant mortality in three respects. First, maternal mortality declines during the first decade of the revolution. Second, Cuba never approaches US or developed economy levels. Finally, maternal mortality increases during the special period and never recovers.

Yet it remains the case that maternal maternity for Cuba remains well below the levels of developing economies at similar levels of income. The point is again that the achievements of Cuban healthcare are real. The problem is that these achievements rest, at least to some extent, on coercive institutions that have little appeal outside Cuba and are unlikely to survive political change.

The rise in maternal mortality probably reflects a decline in the overall system. There are a number of factors behind the decline. Resources going to healthcare fell

during the special period. Furthermore, an increasing portion of health spending appears to be directed towards the task of producing ever lower infant mortality. In addition, the real income of doctors and other medical workers have fallen dramatically, dispiriting some and causing others to exit from the profession. Finally, we suspect that the ability of the state to monitor and control the overall healthcare system is in decline leading the regime to concentrate its declining power towards reducing infant mortality yet further.

7. *Summing Up*

For many, the Cuban healthcare system is the one unambiguous success story of the revolution. The Cuban achievements in the areas of infant mortality and life expectancy have also led health professionals and other social scientists to look in the Cuban system for answers to problems elsewhere. In contrast, we argue that the Cuban successes also rest on the power of the Cuban state. An evaluation of welfare effects of these policies has to weigh low infant mortality against the coercive nature of Cuba's health institutions. It must also wrestle with the question of what would the Cuban healthcare system look like if the revolution had never succeeded.

For some purposes, however, we do not need to address such difficult issues. If, as we have argued, much of the Cuban success arises with regard to infant mortality arise from the power of the Cuban state then the Cuban system will not work outside Cuba. The suppression of patient rights inherent in the Cuban system is unlikely to have wide appeal. Moreover, even if developing economies had the political will to impose the Cuban model, they are unlikely to have the institutional capabilities to do so. The Cuban system is characterized by its large and well financed security apparatus. These

conditions are not present in other developing economies. We conclude that while the Cuban successes are real, the lessons of the Cuban model for other developing economies are few.

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