ECONOMIC CONSEQUENCES OF CUBA-U.S. RECONCILIATION

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This paper presents an assessment of economic implications of movement towards normal relations between Cuba and the United States. It gauges the likely impact of the new measures announced by Obama on December 2014. It then considers economic consequences in a longer time horizon given possible changes in U.S. laws and resolution of major legal issues. The analysis focuses on the implications of the on-going restraint in economic liberalization for foreign and domestic investment. A model is used to frame potential long-term paths for the economy. Finally observations are made regarding accelerating the speed of reform.

IMPACT OF THE OBAMA MEASURES OF DECEMBER 17, 2014

This section takes an initial look at economic implications of the new measures announced by President Obama on December 17, 2014. The author estimates the one-year positive impact of the measures at around 0.5% of Cuba's GDP, with the second year impact somewhat higher.[1] The impact, although significant, will by itself not rescue Cuba's economy from stagnation in the absence of major policy improvements and of changes to U.S. laws restricting trade, tourism and finance with Cuba. U.S. exports could increase substantially albeit from a low base as some of the rising transfers and expenditures by U.S. residents are used to finance U.S. purchases. A 1/3 recycling of these funds could increase U.S. exports to Cuba by 44%.

The new Cuba measures have significant implications for the island's economy. There will be an impact in 2015–2016 especially because of the enhanced remittance allowances and easing of bureaucratic rules for some U.S. visitors. Rising expectations are important following Obama's announcements involving the longer horizon for trade and investments. However, U.S. measures would have to be accompanied by decisive changes in economic policies in Cuba and not only wait for a lifting of American laws imposing trade and financial sanctions.

The main changes announced include the reestablishment of diplomatic relations, uplifting the profile of Cuba in the eyes of the international business community, the rise in the allowance for remittances by Cuban Americans to their relatives in Cuba from $500 to $2000 per quarter, and the sharp reduction in the paperwork needed for U.S. visitors to travel to Cuba under the 12 categories specified in current law. Further measures include allowing U.S. banks to establish correspondent relationships with Cuban banks, authorization for U.S. visitors to use credit and debit cards, and lifting the minimum amount of goods that can be brought back by U.S. visitors. American exporters will also be able to broaden the range of merchandise that can be sold to the country to include telecommunications equipment, construction and farm inputs, among others.

This comes at a time when the Cuban economy is stagnant with difficult prospects ahead for export

1. The effect is substantial in comparison with the estimated rate of real GDP growth of 1.3% for 2014.

growth and foreign investment. Exports of goods and services stagnated in 2013 according to official statistics.[2] In the five years to 2012, the most dynamic element of Cuban exports has been the supply of medical and other services. These services are centered on Venezuela, Brazil, and oil exporting nations such as Angola, Algeria and Saudi Arabia. Weakness in oil prices and widespread economic mismanagement in Venezuela are leading to a sharp fall in Cuban services export revenues in 2014 and 2015. Another leg of the government's growth strategy, a new opening to foreign investment, is moving slowly, largely because the government's caution in allowing new projects, its reputation as an inconsistent regulator and guarantor of contractual obligations, controls of prices and labor markets, and the closure of the U.S. market to Cuban exports and shipping. A question is whether or not the announced changes by the U.S. will offset the negative external currents facing the economy.

A precise assessment of the impact of the measures is difficult given uncertainties about implementation and regulations in both Cuba and the U.S. At the least a rough estimate for the two year impact of the new measures' impact on trade and finance can be established. These estimates provide a sense of the relative magnitude of the impact.

SHORT-TERM IMPACT

The three most important items of the economic opening involve remittances, visitors to Cuba and exports from the U.S. These elements are sustained by an easing of U.S. controls and changes in rules involving money transfers and bank transactions.

Remittances

Remittances are currently the most important element in the economic relation between U.S. and Cuban residents. There are no official figures. Estimates by The Havana Consulting Group indicate that cash remittances in 2013 reached $2.8 billion and remittances in kind were some $3.5 billion.[3] This estimate, obtained from sampling and retail data, also indicates that about 1.1 million Cuban-Americans were involved in sending cash remittances, which yields an average of slightly over $2500 per person. This compares to the annual limit of $2000 to any one Cuban national per remitter.[4] Estimates by Manuel Orozco and his team at the Inter-American Dialogue are much lower.[5] Based on surveys carried in 2013 and earlier, Orozco estimates 2014 annual remittances at $770 million. This includes only cash remittances. The new limit of $8000 per person will amply cover the gap between actual and allowed remittances even in the case of the much higher estimates by The Havana Consulting Group.

There is no way to precisely forecast how much of the higher allowance levels will be used; that will depend on funding availability by remitting relatives. To the extent cash remittances are used to finance small business operations. the impact will also vary with the ease with which Cuba will allow financing for equity and working capital in these firms. According to The Havana Consulting Group, during 2007–2013 cash remittances increased at an average yearly rate of 12.6%, while in 2013 the annual rate was 6.6%. Some of the slowdown can presumably be attributed to the official limit. As a working hypothesis for purposes of our calculations, we take the excess supply of 25% over the limit as an indication of potential expansion of remittances equivalent to 12% per year for the next two years, a rate close to the average growth of the last six years. Table 1 displays a range of estimates for the potential increase in remittances using Orozco's and The Havana Consulting

2. Oficina Nacional de Estadísticas, Cuentas Nacionales 2013, indicate that exports of goods and services reached 18.59 billion pesos in 2013 versus 18.65 billion in 2012.

3. "Emigrados cubanos enviaron más de 3500 millones de USD en remesas en especie en el año 2013", The Havana Consulting Group, July 2014.

4. Department of the Treasury, Office of Foreign Assets Control, *What you need to know about U.S. sanctions against Cuba*, http://cuba-embargo.procon.org/sourcefiles/OFAC_cuba-sanctions.pdf.

5. Manuel Orozco, Laura Porras and Julia Yansura, "Trends and Remittances to Latin America and the Caribbean in 2014", Inter-American Dialogue, February 24, 2015.

Group's estimates as low and high base data for 2014.

Table 1. Short-Term Impact of December 2014 Measures on Remittances and U.S. Visits (million U.S. dollars)

Remittances				
Base Data	**2014E**	**2015P**	**2016P**	**Δ2014–2016**
Orozco	770	865	970	200
THCG	2550	2860	3200	650
U.S. Visitors				
Base Data	**2014E**	**2015P**	**2016P**	**Δ2014–2016**
Orozco	95,000	170,000	350,000	255,000
THCG	90,000	200,000	420,000	330,000

Note: E—estimated, P—predicted

Source: Estimates by the author. Data for 2014 is taken from Orozco (2015), THCG (2014) and Oficina Nacional de Estadísticas.

Approved U.S. Visitors to Cuba

Official data shows that 92,348 non-Cuban U.S. residents visited the island in 2013, as against 98,050 in 2012.[6] These comprise individuals in 12 categories authorized by law to visit Cuba, plus other unauthorized individuals. It appears the lower number in 2013 was the result of delays arising from the licensing process involved in the program administered by the Office of Foreign Assets Control of the U.S. Treasury Department. The new regulations will only require general licensing and implementation directly by the entity organizing each trip. This should boost visits by U.S residents. At the same time allowing use of U.S. credit and debit cards may facilitate payments. This also applies to Cuban-Americans visiting relatives in the island.

Maximum allowed expenditure was the State Department's per diem of $188 for Havana, $147 for Santiago and less for other locations. Using these numbers and average stay rates for all visitors to Cuba indicates outlays of a little under $100 million for these visitors in 2013.[7] The calculation in Table 1 assume visitors expand by a factor of 3.5 by 2016 while the new regulations allow unlimited expenditure. So the monetary impact of increased U.S. visitors would be somewhere in the middle of the range estimated for remittances.

U.S. Exports to Cuba

American exports to Cuba are restricted to foodstuffs and medical products and have been declining steadily since their peak in 2008. In 2013 exports were $359 million, compared to $464 million in 2012 according to U.S. Department of Commerce data.[8] 2014 exports fell 17% to $299 million. The declining trend comes about from displacement of American products by imports from Brazil, Vietnam and other nations and by strained international liquidity in Cuba. U.S. market share of the Cuban foodstuff market is about 15%. Lower prices of farm products are also contributing to the soft numbers. Payment in cash required by U.S. law also places exporters at a disadvantage. While the new measures will not allow credit, a new definition of "cash in advance" will allow trade to take place upon documentary collection. This will provide more guarantees to the Cuban importer and facilitate the banking transaction. In this context US banks will in the future be allowed to open correspondent relationships with Cuban banks eliminating the need for third-country banks in many transactions.

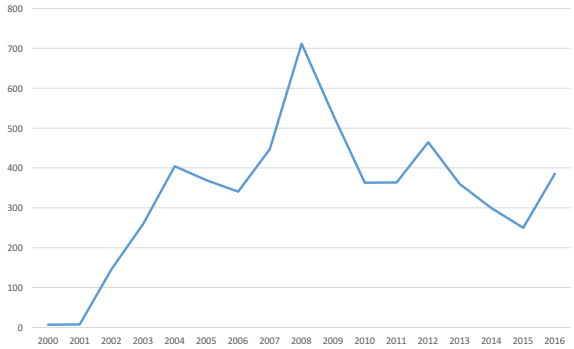
Cuba's weak external financial position does not augur well for U.S. exports in the near term, particularly as concessionary official financing is available from competing suppliers in Brazil, China, Vietnam and others. Data for the first four months of 2015 still show a sharp declining trend of U.S. exports, $86 million versus $164 million in 2014. As a working hypothesis it is reasonable to assume that part of the increase in net inflows from remittances and U.S. visitors will be used to finance U.S. imports. A recycling of 1/4 of these funds would lead to a maximum of $140 million or a 55% increase in U.S. exports in the

6. Oficina Nacional de Estadísticas, *Anuario Estadístico 2013*.

7. These calculations do not include Cuban receipts for processing fees, international flights and licenses. A 30% mark-up is assumed in the calculations below.

8. Census Bureau, U.S. Department of Commerce data bank.

Chart 1. U.S. Exports to Cuba (million U.S. dollars)



Note: 2000–2014 actual data; 2015–2016 forecast.

Source: U.S. Bureau of the Census and forecast by the author.

second year. As Chart 1 shows, this would place U,S, exports at around $400 million, all below the peak reached in 2008.

Overall Short-Term Impact 2015–2016

The considerations above imply an increase of $300 million to $500 million per year in services and transfers for Cuba, with a heavier weight in the second year. There are potential benefits in terms of remittances in kind and increased spending by Cuban-American visitors. These are more difficult to quantify, but will probably amount to a much smaller figure than the gains attributed to the measures on remittances. These numbers amount to an annual impact of around 0.5% of GDP in the first year and somewhat more in the second year because of multiplier effects. A more rapid increase of U.S. visitors may add another 0.1% of GDP to this estimate. The impact of the new measures, though significant, will not change Cuba's path of slack output and productivity growth although relative to the estimated 1.3% rise in real GDP in 2014, the change is relevant.

LONG-TERM HORIZON

The longer horizon for Cuba would be improved if the trade, tourism and finance restrictions embodied in U.S. law were lifted, although the timing is unknown. Importantly these prospective changes in U.S. policy must be accompanied by a forceful impulse to market reforms in the island. Otherwise the expanded opportunities provided by normalization of economic relations will be dissipated and largely wasted.

The pace of reform in Cuba has been restrained. This is consistent with statements by Raul Castro that he does not intend to install a capitalist economy. The partial reforms, centered in low capitalization activities such as self-employment and small farming, do not represent a major improvement in relation to the overall economy which remains mired in deep problems of production and consumption. Likewise the conversion of small and medium sized state companies into cooperatives is not equivalent to the privatization of these entities. The cooperatives remain heavily dependent on the state for overall direction, production inputs, technical advice and distribution.

A gauge of Cuba's reform efforts is to score the country on the reform scale developed by the European Bank for Reconstruction and Development (EBRD).[9] While grading this scale involves qualitative evaluation, the score is based on clear criteria developed by the EBRD. The resulting score presents a reasonable picture of reform efforts towards a fully functioning market economy.

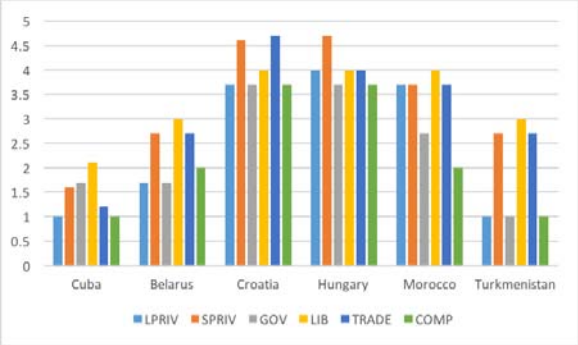
The EBRD criteria are based on the presumption that competitive markets with proper regulation will provide optimum efficiency. Though one may disagree with this proposition on the basis of ideology, social justice or other factors, it is widely accepted that properly functioning markets provide the best basis for the allocation of resources and productive efficiency.

Chart 2 shows that Cuba ranks low in all key transition indicators:

- With respect to Large Privatization (LPRIV), Cuba is graded at 1, "little private ownership" out of a maximum of 5, and less than 2 on Small-scale Privatization (SPRIV) where 2 implies "Substantial share privatized".

9. EBRD, Transition Indicators Methodology, London, 2005.

Chart 2. Comparative Transition Indicators, 2014



Source: EBRD and author estimates for Cuba.

- With respect to Governance and Enterprise Restructuring (GOV), the score of 1.5 we have assigned to Cuba implies less than a "Moderately tight credit and subsidy policy, but weak enforcement of bankruptcy legislation and little action taken to strengthen competition and corporate governance".
- Regarding Price Liberalization (LIB), Cuba scores 2, which means "Some lifting of price administration, but state procurement at non-market prices remains substantial".
- The last two categories, Trade and Foreign Exchange System (TRADE) and Competition Policy (COMP), are very weak areas for Cuba, with "widespread import and/or export controls" and "No competitive legislation and institutions."

Thus, EBRD Transition Indicators would place Cuba at the bottom of its 33 ranked countries in Eastern Europe, Central Asian and North Africa. As a gauge, Chart 2 includes Turkmenistan, the lowest ranked economy with respect to transition indicators in the EBRD universe.

A key element for the longer term is the impact on foreign investment. This in turn will depend on prospects for implementation of policies in Cuba that improve substantially the operating environment for foreign firms. Today such changes are not evident in spite of revised legislation enacted in early 2014, and foreign direct investment is placed at around 1% of GDP. It is estimated that to reach government growth targets foreign direct investment will have to increase to at least 3.5% of GDP.[10] The recent measures announced by Obama are not sufficient to accomplish this. Further easing of U.S. restrictions could generate sizable investments in sectors such as tourism and mining that can operate in relative isolation from domestic markets. However the economy remains distorted as a result of central planning, pervasive controls on prices and wages and discretionary regulations that hit large and medium sized enterprises. Foreign investment in sectors such as tourism and mining will likely yield a growth upsurge, but not sustained expansion in the absence of broad reforms to establish working product and labor markets and a balanced regulatory framework.

Nonetheless taking into account potential tourism, trade and direct and portfolio investment, the impact on the Cuban economy will be sizable. In round numbers, gauging gross domestic investment in the island at an additional 5% of GDP (3% from foreign investment and 2% financed from national savings) as a result of reconciliation could raise average yearly economic growth to about 6% according to a growth model of the Cuban economy.[11] While this mechanical calculation shows a favorable potential path of economic growth, a crucial question remains: Is this potential growth rate sustainable?

Sustainability will depend on a favorable business environment for foreign investors as well as for domestic firms. This will require the application of fair rules in a stable legal framework. Such a legal framework exists, but implementation is subject to considerable discretion that raises risk and delays investment decisions. The operating environment will have to show large improvement in employment conditions, domestic market regulations, flexibility of

10. Luis, L.R., "Cuba's Growth Strategy Features Human Capital and Foreign Investment: May it Work?", ascecuba.org/blog, April 19, 2014.

11. Luis, L.R., "Cuba's Growth Strategy: Human Capital and Foreign Investment", *Cuba in Transition,* Volume 24, 2014. An additional 5% of GDP corresponds to $4 billion per year in terms of 2014 GDP.

Table 2. Simulation Results (% annual growth and % of GDP)

Scenario	Output	State Sector	Private Sector	Labor Productivity	Private % year 5
1. BASE Savings 9%, FDI 1.5%	4.1	2.6	5.0	4.0	28.5
2. INFLUX FDI Savings 11%, FDI 3%	5.2	3.5	9.6	5.1	29.6
3. MODERATE PRIVATIZATION Labor force 5%, savings 11%, FDI 3%	5.6	2.6	8.4	5.8	34.6
4. MASS PRIVATIZATION Labor force 15%, savings 12%, FDI 5%	6.2	-1.5	17.3	6.1	48.2

Source: Simulations by the author with the model shown in the Appendix.

product pricing and currency convertibility, to mention some key areas. The absence of freely operating product and labor markets for enterprises will dissuade foreign investment and hinder the efficiency of domestic firms, including state companies, which benefit from faster growth. The resulting pattern of foreign investment may largely be of the "enclave" type of operations in tourism and mining, with reduced linkages to the economy. The growth pattern would be uneven, with lower benefit for the population.

Just as importantly, greater operating flexibility for private firms will help boost domestic investment, raise productivity and widen the array of products available to the population. Currently the self-employed are injecting dynamism to sectors such as restaurants and private lodging, highlighting the benefits of market liberalization.

GROWTH SIMULATIONS

In this section, I frame more precisely the discussion regarding the long term outlook for Cuba using a two-sector growth model developed by the author.[12] This allows analysis of alternative assumptions regarding foreign investment, privatization and domestic savings. The economic impact of reconciliation is channeled through increased foreign investment and higher domestic savings resulting from a more open economy and greater availability of remittances. Economic policies are modeled by the transfer of labor from the state sector (central government, state enterprises and cooperatives) to the private sector. The simulations enable an evaluation of the economy under alternative scenarios (see Table 2). These scenarios are not forecasts. They describe potential output paths for the economy, its sectorial composition and values for related variables such as labor productivity and employment. The simulations assume lifting of U.S. trade and finance restrictions that impact the model through a rise in foreign investment and in domestic savings.

The simulations show results for the economy for a ten year period. They are obtained from the model described in the Appendix. Parameters of the model correspond to current structural conditions of the economy regarding production, the labor force, capital intensity and sectorial composition of output. A key feature of the model is a parameter representing a shift of the labor force to the private sector. This is a policy variable that aims to shift a percentage of the unutilized work force of the state sector and is used in the simulations to capture the impact of privatization. The model also incorporates human capital in production and an assumption of a 5% per year real increase in non-tourist services exports for all scenarios. The model has foreign investment going directly to the private sector. As joint ventures are a prime feature of FDI in Cuba, an increase in FDI implies higher domestic savings financing the state's participation in the joint venture.

The BASE scenario assumes the 2013 level of domestic savings of close to 9% of GDP. FDI is 1.5% of GDP, which lies above the 1% upper end of the range estimated for 2014 by the author. In the base scenario real output expands at an annual rate of 4.1%. This means that under existing conditions, the economy has a potential growth of about 4%. However this takes for granted that there will be a smooth allocation of resources with no production and investment bottlenecks.

12. See Luis (2014b).

The second scenario represents an INFLUX OF FDI. Foreign direct investment doubles to 3% of GDP per year and domestic savings is 11%. In this scenario output growth is 5.2%. The private sector's share of output on year 5 goes up 1 percentage point to 29.6%.

In the third scenario there is MODERATE PRIVATIZATION. While in the first two scenarios it is assumed that 1.5% of the labor force in the state sector shifts yearly to the private sector, in this scenario the shift is 5% or some 200,000 persons. The economy grows at 5.6% and the private sector accounts for 35% of output in five years.

The last scenario represents MASS PRIVATIZATION. In this case the government goes all out for privatization, engineering a shift of 15% of the labor force per year. Growth reaches 6.2% per annum while the state sector contracts in real terms. New foreign investment is generated by privatization on the presumption that foreign investment will participate in the new private firms so that FDI is 5% of GDP.

What conclusions can we reach from these simulations?

1. Although foreign investment allows economic growth to accelerate, Cuba is not posed to reach very fast growth without boosting domestic savings and investment. Domestic savings in the best case would only be 12%, at the bottom of the range for transition economies. Scenario 3, with potential growth of around 5.5%, shows what is possible given sturdy FDI of 3% of GDP and moderate privatization.
2. Mass privatization results in modestly faster growth than in the case of moderate privatization. More rapid growth is restrained by a shortage of capital despite a surge in FDI. Moreover mass privatization is tough to implement managerially and politically. This means that enhanced market mechanisms, governance in state and private firms and a broad international opening are needed to place the economy near its path of potential output. In other words, it matters greatly how privatization is implemented.
3. The simulations point to a plausible economic rationale for the government's lethargic approach to reform and foreign investment: the base scenario is not bad—modest reforms may well do. The potential growth path of around 4% would lift productivity and income. However the base case is benign—it assumes a rise in FDI from recent very low levels and a 5% real increase in export receipts from medical and other services. These assumptions are optimistic given current policies in Cuba and weakening demand for Cuban services in key countries such as Venezuela, Algeria, Angola and Brazil. So the actual growth path will lie well below the base scenario.
4. The simulations show potential paths for the economy and do not answer the question whether or not these paths are sustainable. This will depend strongly on the reform process. Critically, reforms must be self-supporting. So that, for example, privatization without banking, regulatory and competition enhancing measures will become ineffective and even counterproductive as well as tainted by potential collusive behavior. At the same time FDI needs to be freed from the micromanagement and centralization that hinders creation of beneficial economic linkages to the US and other advanced economies.

RECONCILIATION AND CUBAN ECONOMIC POLICY

Will the Cuban government continue to control tightly the pace of market reforms?[13] The answer is unclear. As long as key elements of the Cuban leadership continue to view the spread of markets as a threat, there is scant hope for deep advance in economic reforms. In this regard ideological arguments also play a role within the Party. The recent history in communist economies such as China and Vietnam

13. For a discussion of policies that enhance the benefits of reconciliation see Ernesto Hernández-Catá, "Preparing for a Full Restoration of Economic Relations Between Cuba and the USA", ASCEBLOG, January 5, 2015.

suggests that pragmatism should win the day, but here we are dealing with Cuba.

On the face of it, expanding economic relations with the U.S. should stimulate economic reforms. Several areas stand out:

- U.S. demand for Cuban services and merchandise exports require capacity expansion—transport and tourism infrastructure, industrial capital. This in turn should lead the government to improve the operating climate for foreign investment as well as the quality of domestic investment by state and private firms. Efforts in this direction have been piecemeal and frustrated by seemingly political constrains on both the opening to foreign investment and the autonomy granted to large and medium sized enterprises now wholly under state control.
- Access to the U.S. market will require competitive Cuban firms to take full advantage of opportunities for export. This will require a far more important role for markets in setting prices for intermediate and final goods than is now the case, and a proper competition and regulatory framework. Along the same lines, opening of Cuban firms to foreign trade will allow the flow of imported inputs as well as direct marketing channels for exports.
- Resurgent trade and investment between the two countries points to the need for deep financial sector and banking reforms. The Cuban banking system does not operate properly as an intermediary between savers and investors. It does not allocate credit on the basis of risk and return. Making the best of opening U.S.-Cuba economic relations is not possible given the current limited financial and technical capabilities of banks operating in the island.
- The international investment profile of Cuba can benefit significantly from the opening of trade and other economic relations with the U.S. It would be shameful to waste this opportunity by not pushing forward the deep economic reforms needed in the island and move competitiveness to the level of other transition economies. Yet the institutional makeup of Cuban state enterprises, which in effect are controlled by a handful of holding companies in tourism, retail and wholesale trade and telecommunications, suggests that establishing competitive markets will be difficult.

CONCLUSIONS

The measures announced on December 17, 2014, by Obama will have a positive impact on the Cuban economy estimated by the author at around 0.5% of GDP per year. A greater surge of U.S. visitors will raise this by another 0.1% of GDP. Long-term effects of an opening of Cuba to U.S. trade, tourism and investments would be much larger. These would depend critically on the extent of reform measures in Cuba. Rough calculations from a simulation model of the economy suggest that the potential growth path of the economy would increase from 4% to 5.5% per year given foreign investment of 3% of GDP and moderate privatization. Determined privatization and complementary reforms lifting domestic and foreign savings push potential growth over 6%. Sustainability of higher growth paths would depend on the implementation of market reforms, which are well behind the pace of other transition economies. Reconciliation between Cuba and the U.S. offers clear incentives for reform though opposition remains strong among the Cuban leadership.

APPENDIX
SIMULATION MODEL

The growth model of the Cuban economy incorporates physical and human capital, labor and foreign investment in the state and private sectors.[14] The model is an extension of well known approaches to the theory and empirics of growth by Lucas (1988) and Mankiw, Romer and Weil (1992). The derived simulations are not forecasts. They are mechanical calculations of potential growth paths given different economic policies and are consistent with the broad parameters of the economy.

The model utilized here is based on production functions including a variable for human capital and an efficiency mechanism lowering disguised employment in the state sector. The human capital variable enters indirectly into the production of non-tourism services exports, where it may be paid closer to its marginal product than domestically, to the state if not to individual professionals. The main parameters of the model are derived wherever possible from national accounts and labor force data. The capital elasticity of output for the state sector of 0.6 is close to the average of seven estimated equations by Hernández-Catá (2014) and matches the capital share of income in the national income accounts. The labor share of income is adjusted for income from non-tourism service exports. Foreign direct investment is incorporated as capital flowing to the private sector. A policy variable has to do with the shift of labor from the state to the private sector. This critical mechanism is linked to privatization policies which directly and indirectly involve shifting of labor from the state sector to private firms and single proprietorships.

The model consists of the following equations:

$$X_t=AK_t^{\alpha}(L_t-W_t)^{\lambda}M_t^{1-\alpha-\lambda} \quad (1)$$

$$X^*t=AK^*t^{\beta}(L^*t-W^*t)^{\mu}M^*t^{1-\beta-\mu} \quad (2)$$

$$\Delta K= s(1- \delta)Xt-1 \quad (3)$$

$$\Delta K^*= s(1- \delta)X^*t-1 + Ft-1 \quad (4)$$

$$\Delta H = (1+g)(Lt-1 - \rho Wt-1) - Wt \quad (5)$$

$$\Delta H^* = (1+g)L^*t-1 + \rho Wt-1 - W^*t \quad (6)$$

$$\Delta M = (1+\pi)Mt-1 \quad (7)$$

$$\Delta M^* = (1+\pi)M^*t-1 \quad (8)$$

$$\Delta L = (1+g)(Lt-1 - \rho Wt-1) \quad (9)$$

$$\Delta L^* = (1+g)L^*t-1 + \rho Wt-1 \quad (10)$$

$$Ft = \gamma(Xt-1 + X^*t-1) \quad (11)$$

$$Ht \equiv Lt - Wt \quad (12)$$

In the model the * variables correspond to the private sector. So Xt is state sector output in year t and X*t private sector. Augmented production functions determine sectorial output where Kt is capital, Lt labor available, Wt unutilized labor and Mt human capital of the Mankiw, Romer and Weil (1992) variety. Ht and H*t are effective labor used by each sector, entering directly into the production functions. The production functions are linear and homogeneous on parameters α, λ and β, μ. Other parameters are s, the savings rate, deemed to be equal for both sectors, g the overall rate of increase of the labor force, π the growth rate of non-tourism services exports, ρ the proportion of unutilized labor in the state sector shifted to the private sector and δ the capital depreciation rate. Ft is foreign direct investment, a constant fraction of output γ, set by a policy target. Δ denotes a first difference.

The system is simulated recursively with initial conditions matching 2013 sector shares of output consistent with production functions. The initial endowment of human capital is derived residually by making output consistent with the production functions.

14. The model is described more fully in Luis (2014b).

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