Public Policies for Human Development

Achieving the Millennium Development Goals in Latin America

Edited By

Marco V. Sánchez

Rob Vos

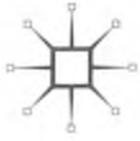Enrique Ganuza

Hans Lofgren

and

Carolina Díaz-Bonilla

palgrave
macmillan

In Association with
UNDP
UN-DESA
The World Bank

Contents

List of tables and figures

Tables

Figures

7
Costa Rica

Marco V. Sánchez

Introduction

The degree of progress made towards the Millennium Development Goals (MDGs) has been uneven in Latin America and the Caribbean (See Chapter 2 and ECLAC, 2005). Costa Rica has shown notable progress towards most of the goals, and this has been possible in large part because the country's social policies historically have gone hand in hand with economic policy making. This policy approach contributed to the country's good economic performance. Real GDP per capita grew by 1.8 per cent per year in the 1960s and by 3.4 per cent per year in the 1970s. Improvements in prosperity were temporarily interrupted by the foreign debt crisis in the period between 1980 and 1983, when real GDP per capita fell by 4.3 per cent per year. Stabilization policies were introduced in response to the crisis, followed by a series of structural adjustment reforms that allowed the country to resume growth of per capita output at a pace of 1.7 per cent per year between 1983 and 1989. During the 1990s, this pace was stepped up to slightly above 3 per cent per year, less than the growth achieved in the 1970s and below the outcome expected from the structural reforms. During 2000-05, growth of per capita output decelerated to 1.9 per cent per year, close to the rate of income improvement of the 1960s, but under circumstances of a more unequal income distribution.

These historic trends raise the question of whether Costa Rica's economy has the capacity to sustain a rate of growth that is sufficient to support increased social investments needed to achieve the MDGs. Nonetheless, per capita income stood at $4,580 in 2005, a high development level by Latin American standards. Furthermore, the country's social policies have proven to be highly effective, also during periods of economic turbulence. Broadly, main social indicators have kept improving since the foreign debt crisis. The country has progressed satisfactorily towards the achievement of most of the MDGs and several of the internationally agreed targets linked to the MDGs have already been reached

ahead of schedule. Paradoxically, though, given the degree of progress made, meeting all targets has become a greater challenge.

This chapter attempts to do three things: quantify the public spending required to achieve the MDGs in primary education, under-five child mortality, maternal mortality and coverage for drinking water and basic sanitation systems; determine the most viable financing mechanism for covering that expenditure; and identify macroeconomic trade-offs as well as any repercussions there might be in terms of poverty and inequality if public spending increases and is financed for this purpose. The methodological framework used is provided by a computable general equilibrium model called MAMS, which has the unique characteristic of including a module of determinants for the MDGs that are the subject of this study (see Chapter 3 of this volume). The goal for reducing extreme poverty is an exception in that MAMS does not identify any public spending that can be directly associated with that goal and the model further lacks sufficient detailed specification of the income distribution in order to analyse poverty changes in a rigorous manner. The analysis with MAMS is therefore combined with the application of a microsimulation methodology (see Chapter 2, Appendix A2) in order to determine how changes in the labour market affect poverty and inequality, with and without increases in public spending aimed at meeting the other MDGs.

The chapter is structured as follows. The next section reviews the main reforms that have been part of Costa Rica's economic development in the last few years, in order to place the economic changes of the 1985-2005 period in context. It also identifies the key vulnerabilities of the economy. The third section deals with social policy aspects and the progress made towards the MDGs and the prospects of achieving the pre-established targets in the future. The steps for implementing the modelling techniques with Costa Rican data are explained in the fourth section. The subsequent section analyses the various scenarios simulated through MAMS and the microsimulations. The final section presents the main conclusions as well as some policy recommendations.

Economic reforms, performance and vulnerabilities

Once the foreign debt crisis had been overcome and the economy was stabilized, Costa Rica chose to reorient its pattern of economic development towards deeper integration with the rest of the world. Trade reforms were introduced, including measures of export promotion that were effective until the late 1990s and various rounds of unilateral, bilateral and multilateral trade liberalization.[1] Taxes on exports were by and large eliminated and the average tariff on imports had fallen to 2 per cent by 2000-03 as a result of these reforms (Sánchez, 2005). The impact on trade can be seen from Table 7.1. For example, total trade in goods and services expanded markedly, reaching 93 per cent of

GDP on average between 2000 and 2005. Imports of intermediate and capital goods increased significantly, dominating the structure of imported goods. Imports of fuel and lubricants, in particular, increased in importance, representing almost 7 per cent of imports on average during 2000-05, after expanding at 31.4 per cent per annum in that same period. The rising dependence on imported oil products made the production sectors more vulnerable to external shocks, especially in the light of rising world market prices for oil from 2002.

Exports grew strongly in the 1990s, especially during the second half of the decade when they increased at a rate of almost 15 per cent per year (see Table 7.1). After a precipitous decline of 14.2 per cent per year in 2000-01—the result of a contraction in INTEL microprocessor exports and lower export prices for coffee and bananas—exports recovered in the next biennium at a pace of 8.9 per cent per year.[2] Future export growth is highly dependent on the performance of the microprocessor sector. Traditional vulnerability to falling primary commodity prices is much less, as export production has become much more diversified. Non-traditional exports represented on average almost 87 per cent per year of total merchandise exports during 2000-05. Because of the good export performance, the trade deficit averaged around 2.6 per cent of GDP in 2000-05; much less than that recorded at the beginning of the 1990s. As Sánchez and Sauma (2006) show, economic growth has been export-led over the past two decades.

Exchange-rate policies have been crucial to the export performance. A regime of mini-devaluations of the *colon*, using the multilateral real effective exchange rate as a reference for the adjustments, kept the real exchange rate relatively stable and competitive during the period between 1985 and 2005, with the exception of the short period between 1990-95 when the exchange rate appreciated following the elimination of capital controls and the resulting strong influx of capital (see Table 7.1). As the exchange rate had become predictable with the system of mini-devaluations and the economy had become increasingly dollarized, a mechanism of managed floating of the currency was adopted in October 2006 with bands determined by the Central Bank of Costa Rica (BCCR).

As mentioned, the elimination of capital controls in 1991 boosted capital inflows (see Table 7.1). Much of the capital inflows are invested in productive activities, stimulated by the economic reforms, the political and economic stability of the country, as well as by special guarantees to foreign investors created for this end. Annual inflows of net foreign direct investment (FDI) increased to an average of 3.2 per cent of GDP in 2000-04.

Domestic price controls and state monopolies on trade in basic consumption goods have been eliminated. Fiscal reforms have been slower, though tax collection has been improved, public employment has been reduced, and spending policies have become more restrictive. Tax revenues have increased, but less than spending (see Table 7.1). The fiscal deficit of the central government

Table 7.1   Costa Rica: indicators of production, employment, external sector and public finances, 1985-2005 (annual period averages)

	1985-1989	1990-1994	1995-1999	2000-2005
Production and employment				
Real GDP (annual percentage change)	4.7	5.6	5.4	3.7
Employment (annual percentage change)	4.5	2.9	2.8	5.7
Real wages per employed person (annual percentage change)[a]	n.a.	3.3	1.0	-1.5
External sector				
Trade balance of goods and services (% of GDP)	-2.2	-5.4	-1.5	-2.6
Total trade in goods and services (% of GDP)	67.8	75.3	88.1	93.9
Exports of goods and services (annual percentage change)	8.8	9.2	14.8	4.3
Non-traditional exports (% of exports of goods)[c]	46.0	64.1	76.9	86.8
Imports of goods and services (annual percentage change)	11.7	9.9	9.2	9.1
Imports of intermediate and capital goods (% of imports of goods)	78.3	78.0	79.4	89.2
Gross private capital inflows (% of GDP)[b]	6.4	5.3	8.7	9.8
Net foreign direct investment (% of GDP)[b]	2.0	2.7	3.6	3.2
Nominal exchange rate (index, 1995 = 100)	36.3	72.1	129.4	214.3
Real exchange rate (index, 1995 = 100)	106.0	106.9	102.6	108.2
Public finances				
Tax revenues (% of GDP)	13.8	9.1	12.2	13.0
Total expenditures (% of GDP)	17.7	14.7	15.2	15.8
Fiscal deficit (% of GDP)	2.7	2.9	3.1	2.8
Domestic financing (% of fiscal deficit)	56.3	99.4	91.3	69.7
Domestic financing (% of GDP)[b]	1.8	2.7	3.0	1.9
External financing (% of fiscal deficit)	43.7	0.5	8.7	30.7
External financing (% of GDP)[d]	0.1	0.0	0.0	0.9
Domestic debt of non-financial public sector (% of GDP)[b]	11.3	13.6	24.3	27.7
External public debt (% of GDP)[b]	64.1	38.1	22.4	20.2

Source: Based on data from the Central Bank of Costa Rica, except for gross private capital inflows and foreign direct investment for which data come from the World Bank's World Development Indicators, and for real average wage growth which was estimated based on data from the National Institute of Statistics and Census (INEC).

[a] Real average monthly wage in July. Starting in 2001, it refers to the real average monthly wage of the main occupation of workers. The change in measure is due to methodological adjustments to the household surveys.

[b] Data for the last sub-period are for 2000-2004.

[c] Includes export processing zones known as 'perfeccionamiento activo' and 'zona franca'.

[d] Data for the first sub-period refer to 1988-1999.

n.a.: Data not available.

widened continuously as a percentage of GDP between 1995 and 1999. Despite some improvement in the 2000-05 period, the large deficit formed a constraint to pursuing the MDGs.[3] Domestic public sector debt has ballooned in order to finance the widening fiscal deficit. Government debt expanded at onerous terms, since the government has had to issue bonds at very high interest rates to attract private savings, affecting private investment negatively. The servicing of domestic debt has become increasingly costly and has become itself a main source of the deficit increases and this has crowded out resources available for public investment. These problems led the government to seek more external financing. In addition, given the low tax burden—an average of 13 per cent of GDP in the 2000-05 period—various tax reform measures came under consideration to enhance tax revenue. Measures to improve tax collection were implemented with visible positive outcomes from 2005.[4]

The economic reforms did contribute to changes in the structure of the economy during 1985-2005. The share of agriculture in total output fell, while that of industry kept its significance. Service sectors linked to international trade, finance and tourism have become the main source of value added generation in the economy since the beginning of the 1990s. This structural change was accompanied by significant growth in overall output, employment and real wages (see Table 7.1). The economy grew by 5.5 per cent per year in the 1990s, slowing thereafter on the back of weaker export performance, the finalization of the construction of INTEL's installations and the rise in oil prices. During the first five years of the new millennium, the economy grew by 3.7 per cent per year on average, even though growth accelerated to 6 per cent per annum between 2003 and 2005.[5] Employment increased by almost 3 per cent per year during the 1990s, much less than output as a result of productivity growth. The increase in labour productivity can be associated with the impact of the economic reforms and the use of more skill-intensive technologies in production and increased use of imported capital goods (Sanchez, 2004). Rising productivity allowed for real wage increases, especially in the early 1990s. The decline in production during the 2000-02 downturn was accompanied by a substantial rise in the level of employment that actually reflected a cyclical increase in informal services jobs. Average real wages fell by 1.5 per cent per year between 2000 and 2005 as a result of the years of downturn and did not recover at the same pace as production thereafter.

Social policy and progress towards the MDGs

Social progress has gone hand in hand with economic development in Costa Rica. Since the beginning of the previous century, institutions of governance and the legal framework of the country have given high importance to social policy development.[6] Irrespective of changes in the pattern of economic growth, there

has been no noticeable change in the orientation of social policies that have kept focus on the universal coverage and the promotion of social programmes.

The country's institutional framework for conducting social policy has been supported by adequate levels of government spending. From 1987 to 1999, the country dedicated an average of 15 per cent of GDP per year to public social spending and this share increased to 18.3 per cent in the 2000-04 period (see Table 7.2). Spending on education has increased since the mid 1980s, though it has not reached the level of 6 per cent of GDP required by the Constitution, since its reform of 1997.[7] A similar pattern can be seen in the areas of healthcare and social welfare since the early 1990s. Public social spending has been relatively efficient considering that, in per-capita terms, it has been associated with a relatively low incidence of poverty, something only seen elsewhere in Latin America in countries like Chile and Uruguay (Sanchez, 2007a). The results of social policies have also been reflected in visible progress towards the achievement of the MDGs.[8]

As mentioned in the introduction, the MDGs considered in this study are those related to extreme poverty reduction, primary education, child mortality, maternal mortality and coverage of drinking water and basic sanitation. Table 7.3 presents the indicators that are internationally used to evaluate progress towards the achievement of these goals. These are complemented by some national indicators.

In the Millennium Declaration, countries made a commitment to reduce by half the percentage of the population who are living on an income of less than one dollar a day, as well as halving the percentage of the population experiencing hunger and resolved to do so between 1990 and 2015 (MDG 1, targets 1 and 2). The percentage of Costa Ricans who live on less than one dollar a day was 3.4 per cent in 1990 and this share should thus be reduced to 1.7 per cent in 2015 to meet the target. The poverty incidence has indeed fallen since 1991 to as low as 1.6 per cent in 1998, thus achieving the MDG target ahead of time. The progress in poverty reduction has experienced setbacks thereafter, however, for reasons explained below.

Table 7.2   Costa Rica: public social spending by sector as a percentage of GDP, 1987-2004

	1987-1989	1990-1994	1995-1999	2000-2004
Education	3.7	4.0	4.2	5.3
Health	4.9	4.7	4.7	5.4
Social assistance	5.5	4.9	5.6	5.8
Housing	2.1	1.8	1.6	1.7
Other	0.2	0.2	0.2	0.1
Total	16.4	15.6	16.4	18.3

Source: Databases of the Technical Secretariat of the Budget Authority, Ministry of the Treasury of Costa Rica (for social spending data) and the BCCR (for GDP data).

Table 7.3   Costa Rica: progress towards the MDGs, 1990-2005 and targets for 2015

Indicator	1990	1995	2000	2002[a]	2004[b]	2015 Target
Poverty						
Percentage of the population living on less than one dollar a day at purchasing power parity (MDG 1, target 1)	3.4	2.8	1.8	2.8	n.a.	1.7
Percentage of the population below the national extreme poverty line[c]	9.1	6.2	6.1	5.7	5.6**	
Percentage of the population below the national moderate poverty line[c]	27.4	20.4	20.6	20.6	21.2**	
Primary education						
Percentage of students that begin first grade and get to fifth grade	80.3	84.8	88.9	89.4	n.a.	
Percentage of students who begin primary school and complete it (MDG 2, target 3)	76.7	80.3	83.7	84.1	n.a.	100.0
Repetition rate in primary education (%)	11.3	9.3	8.2	7.6	7.4	
Net enrolment rate in primary education (%)	98.5	99.8	99.4	99.2	98.5	
Mortality						
Under-five child mortality rate per 1,000 live births (MDG 4, target 5)	18.0	16.0	12.0	9.6	13.0	6.0
Infant mortality rate per 1,000 live births	16.0	14.0	10.0	n.a.	11.0	
Maternal mortality rates per 100,000 live births (MDG 5, target 6)	15.0	20.0	36.0	41.0	30.0**	8.3[d]
Water and sanitation						
Percentage of the population with access to potable water (MDG 9, target 10)	50.0[e]	69.0	76.0	78.4	79.5*	75.0
Percentage of the population with access to toilet connected to sewage system or septic tank (MDG 10, target 11)	75.8[e]	83.5[f]	90.6	93.4	93.5*	91.2

Source: Data on the percentage of the population with income of less than one dollar a day are from Consejo Social del Gobierno de la República de Costa Rica and Sistema de las Naciones Unidas en Costa Rica (2005), and national poverty data are from INEC. Information on education is from the Ministry of Public Education. Mortality data are from UNICEF, except for maternal mortality data which come from the Ministry of Health. Information about water is from the Costa Rican Institute of Water and Sewage (AyA) and information on sanitation comes from INEC.

[a] Base year of the modelling methodology used in the study.

[b] Data with one asterisk are for 2003 and those with two asterisks are for 2005.

[c] Calculated using the INEC national poverty or extreme poverty line as applicable.

[d] Target defined using the 1991 maternal mortality rate (33 per 100,000 live births).

[e] Data for the two indicators related to water and sanitation are for 1991 and 1989, respectively.

[f] Data for 1994.

n.a.: Data not available.

Costa Rica aspires to meet the same target of halving poverty as measured on the basis of national poverty lines defined by INEC.[9] In 1990, 9.1 per cent of households were living in extreme poverty by the nationally set threshold. In order to be on track towards the 2015 target, the poverty incidence would need to decline at a rate of 2.7 per cent per year, implying that by 2005 the extreme poverty incidence according to the national measure would need to have reached 6.1 per cent or less. Despite the fluctuations in the economy, the measure had fallen in fact to 5.6 per cent in 2005, suggesting Costa Rica is on track to meet the target. The total poverty incidence as measured through the moderate national poverty line, which next to food also covers non-food basic needs, affected about 27.4 per cent of the population in 1990. This poverty rate fell in the early 1990s, but the reduction could not been sustained from the mid-1990s and there was a temporary increase in poverty after 2003, which was reversed no sooner than in 2006.

Effective social policies have contributed to poverty reduction, especially during the period prior to the end of the 1990s. Improvements in the quality of new jobs also contributed, as reflected in particular in an increase in formal sector jobs (Sánchez and Sauma, 2006). Trade reforms and keeping the exchange rate competitive also exercised a positive influence in the early 1990s, as shown by Sánchez (2004, 2005). Sánchez further indicates that foreign direct investment and enhanced foreign-exchange earnings facilitated technological change which stimulated productivity and real wage growth during the 1990s by employing the country's relatively large pool of skilled labour.

The decline in total poverty could not be sustained after the mid 1990s because of the volatility in output growth, the related decline in real wages and the rise in income inequality. The share of the poorest quintile in national income has fallen steadily since 1996 and has stayed below 5 per cent since. The Gini coefficient of the per capita household income distribution increased from 0.37 in 1990 to 0.43 in 2002. This increase in inequality is consistent with the observed trend showing that the poorest of the poor have become poorer. As indicated, the share of the population living on less than one dollar a day increased after 1998. Therefore, reaching the goal of reducing this incidence to only 1.7 per cent by 2015 will thus not only depend on the level and stability of economic growth, but also on trends in the income distribution.

Recent data from INEC show that there was a significant reduction in total poverty between 2006 and 2007, as it fell from 20.2 per cent to 16.7 per cent, to reach the lowest level recorded in three decades. This reduction is due to the acceleration of economic growth referred to earlier and to lower inflation and government subsidy programmes, rather than to any visible reduction in income inequality. It remains to be seen whether this recent trend towards poverty reduction can be sustained. In considerable degree, this will also depend on whether or not adverse external factors will affect economic growth.

MDG 2 (target 3) aims to ensure that all children in the appropriate age group will be able to finish the complete cycle of primary education by the year 2015. The net enrolment rate for primary school in Costa Rica is one of the highest in Latin America and the Caribbean, averaging nearly 99 per cent between 1999 and 2004. The number of children that started school but failed to finish the entire cycle of primary education has been systematically reduced since 1990. Only about 15.9 per cent of the children fell in this category in 2002. Higher numbers of students starting first grade and getting to fifth grade, and lower repetition rates reflect this progress. In order to raise completion rates further, however, drop-out rates must be reduced and classroom performance must be improved. Regional gaps in school performance should be closed by prioritizing the areas that are lagging the farthest behind. Equally important for lowering the school drop-out rates will be the continuation of government support programmes like the voucher system, scholarships and transportation subsidies for those who truly need it.[10] Increasing public social spending on education to 6 per cent of GDP, as required by the Constitution, would likely contribute to putting the country on track towards meeting the primary education target by 2015.

Another goal is to eliminate gender inequalities in primary and secondary education, preferably by the year 2005, and for all levels of education before the end of the year 2015 (MDG 3, target 4). At present, gender inequality is no longer a serious problem in Costa Rica's education. If anything, the net enrolment rates for female students have surpassed—though only slightly—those of males between 1990 and 2004, especially at the highest levels of education.

In health, the targets are to reduce by two thirds the under-five child mortality rate between 1990 and 2015 (MDG 4, target 5) and to reduce maternal mortality by three quarters during the same period (MDG 5, target 6). The under-five mortality rate was 18 per 1,000 live births in 1990 to fall steadily to one of the lowest rates in Latin America and the Caribbean by 2003.[11] Using a linear projection, however, the child mortality rate should have fallen to 9.7 by 2004 in order to be on track for achieving the 2015 target of 6 deaths per 1,000 live births, but in practice 13 deaths per 1,000 live births were recorded in that year. In order to achieve the target, the under-five mortality rate would have to be reduced further by little more than 50 per cent between 2004 and 2015, which at the relatively low rate achieved could pose a challenge.

Death in infancy is the most common cause of child mortality (see Table 7.3). The problem has been reduced primarily because of advances in the medical field, but also because of the expansion of preventative healthcare treating infectious diseases and parasites, including improved coverage of vaccination programmes. The National Immunizations Programme and food assistance programmes have also been vital. Social welfare programmes have also had an effect, especially those related to housing and poverty reduction. Even so, resource constraints could limit the scope for further reductions in infant

mortality, as neonatal mortality (death within the first 28 days after birth) has become the principal cause of death (more than two thirds of the cases in 2000-03). The neonatal death rate has decreased more slowly than that of post-neonatal mortality since 1993; and it has to do primarily with premature births, low birth weight and congenital deformations. Dealing with problems like congenital deformations, for example, requires technological resources and facilities that hardly exist in developing countries and are not available in Costa Rica. Furthermore, even if serious problems could be detected in the foetal stage, current laws do not permit therapeutic abortions. Minimally, public spending must be increased further to strengthen the National System for the Analysis of Infant Mortality (SINAMI) and the National Plan for the Prevention of Infant Mortality, and to ensure full coverage of vaccination programmes. Resources must be targeted at the primary care level, especially in the areas with the least access to child health services.

Maternal mortality is also relatively low with 15 recorded deaths per 100,000 live births in 1990. Data limitations hamper the analysis of trends in maternal mortality. In 1991, for instance, the rate jumped to 33 deaths per 100,000 live births after improvements in the data collection. Available statistics show fluctuating trends over time. Over the period from 1991 to 2005, the rate fell only modestly (from 33 to 30), according to these data. The main causes of maternal death suggest that making further progress towards the MDG target will be costly, as these include complications before and during birth, post-partum haemorrhaging, pregnancy-induced hypertension, miscarriages and post-partum complications. Non-compliance with maternal and perinatal healthcare standards and the lack of risk classifications for pregnant women should also be added to the list (Ministerio de Salud, 2001). In addition, currently, pregnant women who are not insured by the Costa Rican Social Security Fund (CCSS) can obtain only one free professional medical consultation during pregnancy.

Because maternal death records have improved, the most sensible base year for measuring progress towards the target for MDG 5 is 1991. Even so, the target remains overly ambitious. To go from 33 to 8.3 maternal deaths per 100,000 live births between 1991 and 2015 would require lowering the maternal mortality rate by 5.6 per cent per year. The government set a more realistic national target of 20 maternal deaths per 100,000 live births (Consejo Social del Gobierno de la República de Costa Rica and Sistema de las Naciones Unidas en Costa Rica, 2005). The prospects of achieving this adjusted target are still challenging but not too poor either, considering that a high percentage of maternal deaths could have been prevented by providing better care to pregnant women. Therefore, greater prevention should be a social policy priority.[12] This will require better training for general practitioners and nurses so that they can classify and appropriately care for women with high-risk pregnancies and it will mean that more gynaecologists and obstetricians must be hired in the CCSS system.

Progress made in recording and assessing maternal mortality should also have an influence on the improved design of policies and strategies for alleviating the problem. Public health services should also be required to provide care to all pregnant women in labour, whether they are insured or not.

Finally, the MDG targets of reducing the percentage of the population without access to drinking water in half (MDG 7, target 10) and improving access to basic sanitation (MDG 7, target 11) have been achieved ahead of time (Table 7.3).[13] In the case of sanitation, in particular, the level of progress is explained primarily by achievements made in enhancing coverage in rural areas.[14] Costa Rica must continue increasing public spending on water and sanitation at a rate high enough to provide the service to the growing population and at least maintain the existing rate of coverage. At the same time, new resources must be allocated to address negative environmental externalities associated with sanitation systems. The collection and evacuation of wastewater through a sanitary sewage system does not mean that the water is being treated adequately as it is disposed. In the case of septic tanks, businesses empty their waste directly into the rivers without any prior treatment and they are not required to have their own treatment plant. This means that contamination produced in dwellings is transmitted to water sources, implying that the country could actually be moving backwards in terms of sustainable development. Furthermore, the use of septic tanks should be reduced in densely populated areas.

Modelling approach

As indicated, MAMS—explained in Chapter 3—was used to simulate various scenarios. The base-year accounting framework for the model is provided by a Social Accounting Matrix (SAM) built for 2002. A salient feature of MAMS is the specification of functional relationships for the MDG indicators and their main determinants. Through MAMS, a baseline scenario and alternative scenarios for achieving the MDGs are simulated for the 2002-15 period. Ideally, the baseline scenario should fully replicate observed economic trends between 2002 and 2007, the most recent year for which observed data were available when conducting this study. Unfortunately, this is not exactly the case due to limitations of the model, including its inability to account for some key policy changes, the fact that certain parameters are assumed to be fixed, and the existence of a number of restrictive assumptions about the closure rules for factor markets and macroeconomic balances. In the baseline scenario, final consumption of the government is assumed to grow at a fixed rate, but based on observed trends between 2000 and 2005. The baseline scenario serves as the reference for assessing alternative scenarios under which public spending is adjusted to the levels needed to achieve one or more MDGs. The alternative scenarios assess the implications of scaling up public spending under different

financing options: through foreign aid, increased income taxes, domestic borrowing or external borrowing.

The model distinguishes three types of workers: those who have not completed secondary education (unskilled), those with at least completed secondary education (semi-skilled) and those who have completed some degree in tertiary education (skilled). In all of the scenarios, if the unemployment rate by type of worker exceeds a minimum unemployment rate, the real wage (with respect to the consumer price index) is equivalent to a "reservation wage" such that the market reaches equilibrium through adjustments in the unemployment rate (or, by the same token, through changes in the level of employment). Alternatively, if the unemployment is at the minimum rate, the labour market reaches equilibrium through adjustments in the real wage. Meanwhile, the capital market reaches equilibrium through adjustments in the price of capital under the assumption of full capital utilization.

The macroeconomic closure rules in the base scenario are as follows. Government investment spending, which depends on the demand for capital in the public services sector, is covered through current savings and fixed levels of borrowing (domestic and external) and foreign aid. The government is assumed to cover any remaining imbalances by adjusting income tax rates. This may be a good representation of the government's actual behaviour between 1990 and 2005, when tax revenue increased as a percentage of government spending (see Table 7.1). Capital flows from abroad are assumed fixed, such that the real exchange rate adjusts to clear the current account of the balance of payments. This external closure rule does not adequately capture the regime of mini-devaluations, and this has some implications for the interpretation of the baseline results as discussed further below. The third macroeconomic closure rule assumes that, once the level of government investment has been determined, private investment adjusts such that total investment equals total savings. The closure rule for the fiscal balance changes for the MDG scenarios that allow increased spending to be financed through either domestic borrowing, foreign aid or external borrowing. In these cases, the relevant financing mechanism is made flexible, while the income tax rates become fixed.

As is usually the case in most general equilibrium models, MAMS only defines the distribution of mean incomes across representative groups of workers and households, but not that within those groups. Thus, it is not possible to obtain results for shifts in the full income distribution, as needed to assess the implications of the scenario analysis on poverty. This limitation is overcome by using the microsimulations methodology described in Appendix A2 of Chapter 2. With this methodology, the changes in the labour market structure in each scenario simulated in MAMS are imposed on a database representative for all households.[15] A randomized process of movements of workers between labour-market segments and occupational condition (for example, being employed or

unemployed) is assumed—including the imputation of labour incomes for new labour market entrants, but by repeating the random reallocation of workers sufficient times, confidence intervals of 95 per cent are constructed for the indices of poverty and inequality.

In order to calibrate MAMS, the 2002 SAM for Costa Rica documented in Sánchez (2006b) was adapted, as described in Annex 1 of Sánchez (2006a). Insufficient data were available to estimate all key elasticities for the MDG determinants. Parametric and non-parametric estimates could only be produced for MDG 4 (target 5) and MDG 7 (targets 10 and 11).[16] These estimations were combined with a sensitivity analysis that allowed the identification of feasibility ranges (upper and lower bounds) within which the values of the elasticities of MDG determinants would need to fall in order to enable a feasible solution of MAMS for Costa Rica.

The parametric estimates were calculated using the Quasi-Maximum Likelihood Estimation suggested by Papke and Wooldridge (1996) and they are all presented in Sanchez (2008, Appendix A9, Table A9.1). These estimation results suggest that child mortality is inversely correlated with per capita household consumption, public infrastructure (other than that in education, health, and water and sanitation; hereafter, "other public infrastructure") and the coverage of the population with access to basic sanitation services. All related coefficients were found to be statistically significant and hence these were used to define the corresponding elasticities of MAMS. Other determinants, including public spending on health services and access of the population to drinking water, were not found to be statistically significant and, moreover, the related parameters had the wrong sign, possibly owing to deficiencies in the data. Econometric estimates also indicated that, as expected, access to adequate water and basic sanitation services (MDG 7, targets 10 and 11) is positively correlated with public spending on water and sanitation, per capita household consumption and "other public infrastructure". The level of statistical confidence was found to be below 95 per cent for a few regression coefficients only. The derived elasticities for the determinants of MDG 7 turned out to be rather high, though, probably because of omitted variables in the functional relationship and the way in which the data were transformed for the estimation procedure.[17] The value of these elasticities consequently exceeded the upper limit of the range that would enable solving MAMS, and were not used in the model for that reason.

The econometric analysis was complemented by the estimation of point elasticities of the MDG determinants which are also presented in Sanchez (2008, Appendix A7, Table A7.1). These elasticities had the expected sign and were found to be low for most determinants. In the case of the determinants of progress towards MDG 7, the computed point elasticities are much lower than those estimated through the parametric model. The non-parametric estimates produced elasticities that fell within the feasibility ranges of MAMS.

Some additional assumptions were made to complete the set of MDG elasticities. The elasticity of the degree of achievement on MDG 7 (for targets 10 and 11) with respect to the level of public spending on water and sanitation was assumed to be less than 1. Determinants of maternal mortality were assumed to be closely associated with those of infant mortality the occurrence of which, as indicated earlier, essentially explains under-five child mortality. Consequently, elasticities for MDG-5 determinants are assumed to be identical to those for MDG 4. Further, the effect of improvements in access to drinking water on the outcome for the health indicators related to MDGs 4 and 5 is assumed to be the same as that of progress towards the target for access to basic sanitation. Generally, the elasticities of the analysed determinants of child and maternal mortality are low, because some of the main causes of death are not captured in MAMS. Given the high degree of progress already made towards the education target, elasticities for the determinants of MDG 2 were assigned a value near the lower limit of the feasibility ranges for MAMS. The assumed elasticity values were validated after checking whether the MDG indicators showed plausible trends in the baseline scenario of MAMS. All elasticity values used for MAMS are presented in Table A7.1 of Annex A7.

Another important set of elasticities of MAMS relate to the degree of substitution in production and consumption with respect to changes in relative prices and changes in income. For these, the values estimated for Costa Rica by Sánchez (2004) were adopted. Because of the high level of sectoral disaggregation of the elasticities available in this study, and in order to adapt them to the relatively more aggregated structure of MAMS, the values were reweighed using information from the SAM presented in the same study (as reported in Sánchez, 2006a). In general terms, those elasticities suggest that relatively low degrees of substitution in production and consumption prevail in Costa Rica. As for the income-expenditure elasticity, these are relatively low for education and health, as evidence households consider these services to be part of their basic consumption basket.

Analysis of simulation results

A summary of main simulation results is presented in Annex A7 (Tables A7.2-A7.3) and complementary to these are the more detailed results —of scenarios in which only the primary education goals or the mortality goals are achieved by 2015—that can be found in Sánchez (2008, Annex A9, Tables A9.3-A9.4). The discussion in this section focuses on the main findings. The results of the scenarios of financing MDG-related expenditures through foreign aid are not analysed here, as Costa Rica, being a middle-income country, has little access to this source of financing. The results of simulations aiming at achieving more ambitious targets for increasing access to water and sanitation are also

not presented either, as, in line with the discussion above, it would seem that greater priority should be given to reversing the negative environmental externalities of existing sanitation systems. Finally, since the target of reducing the maternal mortality rate to 8.3 per 100,000 live births by 2015 is considered unrealistically ambitious, the resource requirements of reaching the national target of 20 are analysed instead.[18]

Baseline scenario

The baseline or 'business-as-usual' scenario broadly reproduces observed trends in key macroeconomic indicators during 2002-05, though with a few notable discrepancies. As the external closure of the model does not consider the mechanism of mini-devaluations, the real exchange rate appreciates gradually in the baseline. Consequently, the model underestimates the observed real export growth and overestimates the need for foreign savings as a larger-than-observed trade deficit is projected. As a result, real GDP (at market prices) increases by 5 per cent per year in the baseline—0.5 percentage points below the trend rate of the early 2000s. The real exchange-rate appreciation induces higher imports and an expansion of non-tradable goods production, as well as an increase of private consumption as a share of GDP. Final government consumption decreases with respect to GDP in the baseline but, on average, it increases by 1.1 per cent per year between 2002 and 2015 after correcting for inflation—following the observed trend of 2002-05. Investment increases slightly as a percentage of GDP.

Government savings is -4 per cent of GDP in the base year, but the government's current account deficit narrows gradually until turning into a surplus at the end of the simulation period on account of a strong rise in revenue from direct and consumption taxes. In addition, data from the BCCR indicate that government domestic borrowing was 2.9 per cent of GDP while the level of external borrowing was 1 per cent of GDP in 2002. The model overestimates domestic borrowing needs and underestimates demand for foreign financing in the base year, as a consequence of adjustments in the model calibration needed to reach initial equilibrium. In subsequent years, though, observed trends are reproduced by MAMS for Costa Rica reaching on average 3 per cent and 1.4 per cent of GDP per year for domestic and external borrowing, respectively, for the 2002-05 period. As the government deficit falls, domestic borrowing requirements are also less, but these are added the outstanding domestic public debt which ultimately increases over time. The level of external debt in local currency falls as a result of the real exchange rate appreciation.

Employment growth in the baseline is stronger for skilled workers (4.8 per cent on average per year) than for semi-skilled (3.3 per cent) and unskilled workers (0.6 per cent). Total employment increases by 1.8 per cent per year, given the smaller share of skilled workers in the total. According to INEC data,

observed employment growth was 2.9 per cent per year in 2002-05, compared with 2.4 per cent in the baseline during those years. The difference is explained by the increase in school enrolment in the model, which reduces the participation rate for less skilled workers.

In the baseline scenario, the average real wage rate increases by 2.8 per cent per year. In contrast to employment growth, labour income growth favours unskilled workers more than semi-skilled and skilled workers: these groups would see their wages increase by 4.6 per cent, 1.2 per cent, and -1.2 per cent per year, respectively.

These changes in the labour market translate into a drop in the percentage of the population with income of less than one dollar a day, but the target for MDG 1 would not be reached under the assumptions of the baseline scenario (see Figure 7.1). The higher real wages for unskilled workers do not have a strong enough effect to lift the poorest out of extreme poverty. The shifts in employment and real wages have more or less offsetting effects on income distribution and, consequently, the Gini coefficient only shows a very marginal decline in inequality around 2010 (see Table A7.3). However, the national targets of reducing moderate and extreme poverty (using national poverty lines) to, respectively, 13.7 per cent and 4.6 per cent by 2015, would be easily met.

Public social spending grows at the same pace as that observed in 2002-05 throughout the baseline. Even at this relatively low rate of increase, substantial progress is made towards the MDGs (see Figure 7.2). Other factors also contribute to this outcome, though, including the rise in household consumption spending on MDG-related services, the expansion of "other public infrastructure",
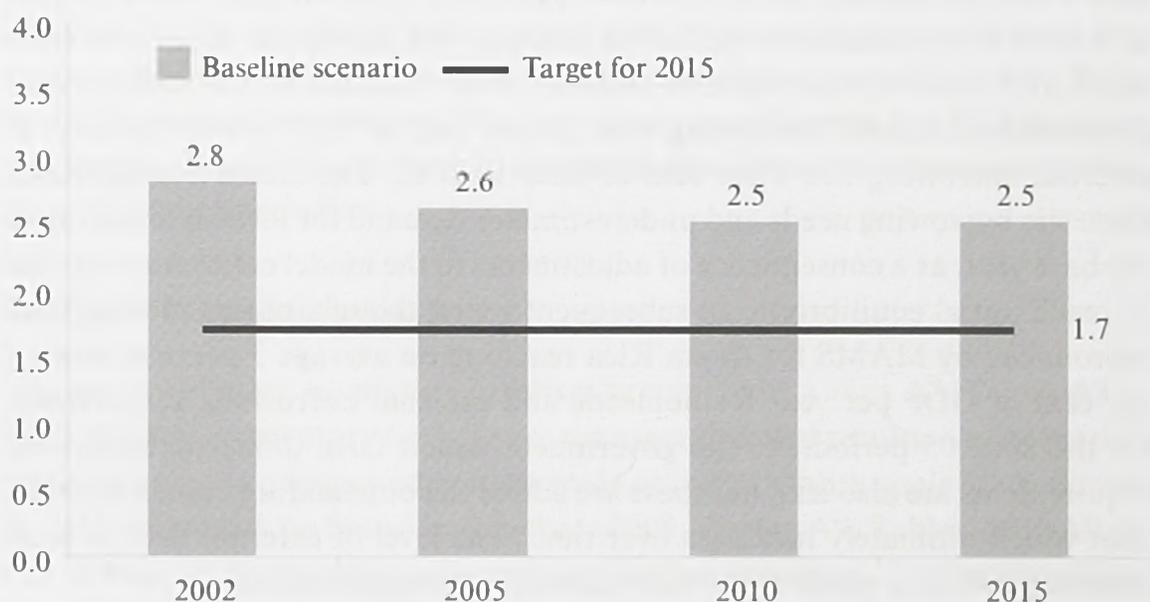
Figure 7.1 Costa Rica: Percentage of the population that live on less than one dollar a day, 2002-2015

Source: MAMS for Costa Rica and microsimulations based on the 2002 household survey (EHPM) of INEC.
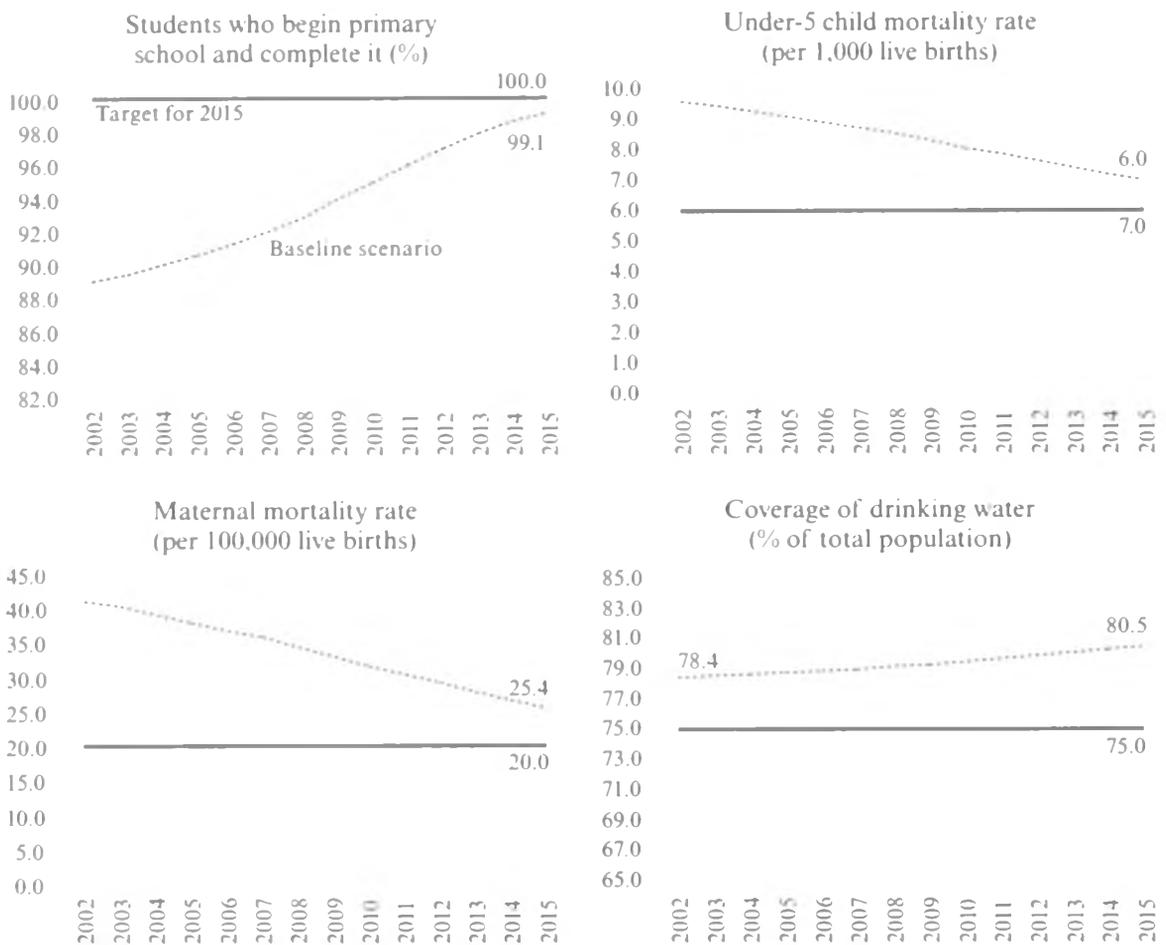
Figure 7.2 Costa Rica: Evolution of MDG indicators in the baseline scenario of MAMS, 2002-2015

Source: MAMS model for Costa Rica.

the positive influence of the "wage premium" to education in school enrolment, and the expansion of water and sanitation coverage, which helps to decrease child mortality.

MDG scenarios

The additional public spending (with respect to the baseline scenario) required to achieve only the goal of primary education is around one half of a percentage point of GDP per year (see Table 7.4). This spending would need to be frontloaded in the beginning of the simulation period, in order to ensure all students of the relevant cohort are enrolled and can graduate timely so as to meet the MDG 2 target by 2015. The frontloading of spending creates macroeconomic trade-offs, which may explain why the cost estimate may be higher than those obtain by partial-equilibrium analyses or sector studies. Towards the end of the simulation period additional education spending may taper off. The study by ECLAC and UNESCO (2005), for example, estimates that to make primary education universal in Costa Rica, public spending on primary education would gradually drop from 2.05 per cent of GDP in 2000 to 1.9 per cent in 2005, 1.8 per cent in 2010, and 1.7 per cent in 2015, under the

Table 7.4   Costa Rica: public spending on MDG-related services in the baseline and MDG scenarios, 2002-2015 (Percentage of GDP)

	2002 Base year	BS	Additional public spending with respect to the baseline scenario (2002-2015)					
			TF	EB	DB	TF	EB	DB
			Scenario for MDG 2			Scenario for MDGs 4 and 5		
Primary education	2.6	2.0	0.4	0.4	0.4	0.0	0.0	0.0
Current	2.5	2.0	0.3	0.3	0.3	0.0	0.0	0.0
Investment	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.0
Health	5.4	4.1	0.0	0.0	0.0	0.8	0.8	0.9
Current	4.9	3.9	0.0	0.0	0.0	0.6	0.6	0.7
Investment	0.5	0.2	0.0	0.0	0.0	0.2	0.2	0.2
Water and sanitation	1.6	1.1	0.0	0.0	0.0	0.0	0.0	0.0
Current	1.4	1.1	0.0	0.0	0.0	0.0	0.0	0.0
Investment	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	9.6	7.3	0.4	0.4	0.5	0.8	0.8	0.9
			Scenario for MDG 7			Scenario for MDGs 2, 4-5 and 7		
Primary education	2.6	2.0	0.0	0.0	0.0	0.3	0.3	0.3
Current	2.5	2.0	0.0	0.0	0.0	0.2	0.2	0.2
Investment	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.1
Health	5.4	4.1	0.0	0.0	0.0	0.9	0.8	0.9
Current	4.9	3.9	0.0	0.0	0.0	0.7	0.6	0.7
Investment	0.5	0.2	0.0	0.0	0.0	0.2	0.2	0.2
Water and sanitation	1.6	1.1	0.1	0.1	0.1	0.1	0.1	0.1
Current	1.4	1.1	0.0	0.0	0.0	0.1	0.0	0.1
Investment	0.3	0.0	0.1	0.1	0.1	0.1	0.1	0.1
Total	9.6	7.3	0.1	0.1	0.1	1.4	1.1	1.4

Source: MAMS for Costa Rica.

Abbreviations: BS: Baseline scenario; TF: tax financing; EB: External borrowing; DB: Domestic borrowing;

assumption of an average annual GDP growth rate of 2.6 per cent, the same as that observed during 1990-2002. According to MAMS for Costa Rica in a scenario of an annual rate of 5 per cent economic growth, in contrast, total public spending on primary education needed to achieve MDG 2 would need to be slightly over 3 per cent of GDP in 2005, 2.5 per cent in 2010 and 1 per cent in 2015.

The spending needed to achieve the MDG 2 target should be financed, preferably, through higher income taxes. The additional tax burden would be no more than 0.6 percentage points of GDP per year with respect to the baseline scenario and it tends to decrease when nearing 2015 (see Sanchez, 2008, Table A9.3). In this financing scenario, government savings increase slightly and the public debt

burden remains unchanged. In contrast, in the other two financing scenarios, either the external or internal debt ratio rises to, respectively, 24.5 per cent or 48.6 per cent of GDP in 2015, up from 19.5 per cent or 28.7 per cent of GDP in 2002. Domestic borrowing also "crowds out" private investment, which would be negligible in the case of the tax-financing scenario. Borrowing from the private sector in order to finance the additional public spending on primary education, generates a larger budget deficit and real GDP grows 0.2 percentage points less than in the baseline. Raising income taxes causes a decline in disposable private income, affecting final consumption and savings, but these adjustments do not affect overall growth because of the rise in public spending.

Achieving the goal for primary education has little to no impact on the other goals during the simulation period. In fact, the general equilibrium effects would cause a slight increase in extreme poverty compared with the baseline scenario, as inequality rises somewhat around 2010 as a consequence of a small decline in employment of semi-skilled and skilled workers in the export sectors (see Sánchez, 2008, Tables A9.3 and A9.4).

Owing to a slight appreciation of the real exchange rate with respect to the baseline, the profitability of some export sectors falls, affecting employment for some workers. This effect is also present, and stronger, in the other scenarios analysed below. In those cases, required public spending in social services is higher leading to a stronger increase in the supply of these services. As the government needs new inputs and workers (doctors, teachers and others) the supply of which is limited, the prices for inputs and wages of workers tend to increase, pushing up government production costs. As a result, the price of MDG-related services, which are considered "non-tradables", increases with respect to that of "tradable goods", which is reflected in the appreciation of the real exchange rate. This effect becomes much more pronounced if the government decides to finance the MDG strategy through external borrowing.

The additional public spending required to achieve the two targets for reducing child and maternal mortality is practically double that needed for achieving the primary education goal (see Table 7.3). The main part of that new spending would be needed to cover the increased wage bill in the public health sector. More than 70 per cent of the new public spending in health would be allocated to primary care and to medical consultations, which is consistent with findings from health sector studies that point at the need to correct the deficiencies in preventative care in order to reduce infant and maternal mortality rates.

The composition of GDP spending in this scenario changes in the same way as in the MDG 2 scenario, but the adjustments are stronger (see Sánchez, 2008, Table A9.3). With domestic borrowing—leading to a stronger "crowding out" effect on private investment—GDP growth would drop by 0.2 percentage from the baseline to 4.8 per cent per year—whereas external borrowing would not affect growth.

According to the model, reaching the targets for reducing child and maternal mortality seems affordable (see Sánchez, 2008, Table A9.3). Tax financing, again, would appear to be the most convenient option since government savings grow 0.2 percentage points of GDP with respect to the baseline scenario. Annual income tax revenues would increase by around 1.6 percentage point of GDP per year, growing from 2.8 per cent of GDP in 2002 to 4.4 per cent of GDP in 2015. Increased public borrowing would be less desirable because of its repercussions on the public debt burden. Financing achievement of MDGs 4 and 5 through domestic borrowing would lead to a reduction in government savings by 1.6 percentage points of GDP on average during the simulation period compared with the baseline. The domestic public debt ratio would increase to 51.2 per cent of GDP in 2015, up from 28.7 per cent in 2002. Debt sustainability is less endangered in the external borrowing scenario. In this case, government savings as a share of GDP fall on average by 0.7 percentage points with respect to the baseline during 2002-15, while the external debt ratio would increase 7.8 percentage points of GDP on average to reach 27.3 per cent of GDP in 2015, up from 19.5 per cent in 2002.

Reaching the health goals generates positive synergy effects easing the achievement of the goal for primary education. In addition, more skilled workers are hired, with small positive effects on productivity and average real wages. As a result, poverty decreases, but the impact is only very small. The scenario with domestic borrowing does not yield this outcome, however, as employment levels for unskilled and semi-skilled workers in industrial sectors fall due to the "crowding-out" effect on private investment. This leads to a slight decrease in the average real wage per worker, causing poverty to increase, also when measured using the national poverty lines. In general, no matter the chosen financing option, inequality in the distribution of per capita income rises as a result of these labour-market shifts, which—next to the adverse effect of the currency appreciation on employment in export sectors—prevents any significant reduction in poverty from taking place.

The results of scenarios that simulate the joint achievement of the primary education and health goals by and large magnify the outcomes described above. The cost of achieving the primary education goal are somewhat less, however, as achieving the under-five mortality goal generates positive synergy effects, as mentioned. Current government spending on education needs to be on average 0.1 percentage points of GDP less as compared with the scenario that only targets MDG 2 (see Table 7.4). The total additional public spending required for achieving both the goals for education and health would be, respectively, 1.4 per cent, 1.1 per cent, and 1.4 per cent of GDP per year on average during 2002-15, depending on whether it is financed through higher income taxes, external borrowing, or domestic borrowing.

The mobilization of domestic resources tends to make the strategy more costly in terms of the required extra public spending. As a result of the decline

in investment and private consumption in sectors linked to the MDGs, the government must spend relatively more on MDG-oriented interventions in order to meet the given targets. In the scenario with domestic borrowing, the economy grows 0.5 percentage points less than in the base scenario. In the scenario with higher direct taxes, on the other hand, the injection of public spending makes it possible to maintain an annual growth rate similar to that of the baseline scenario. Achieving the goals by using the external borrowing option allows the economy to grow at an average of 5.1 per cent per year—only 0.1 percentage points more than in the baseline.

Even though the additional public spending required in order to achieve the three MDGs simultaneously is relatively less when financed with external resources, it would be more feasible from a macroeconomic point of view to use income taxes in the case of Costa Rica, for the same reasons outlined above. When spending is financed by raising income taxes, tax revenue needs to increase by 1.6 percentage points of GDP more than in the baseline scenario, which on balance improves public finances (see Table A7.2). When recurring to more public indebtedness, government savings would fall markedly with respect to the baseline scenario. External borrowing would raise the external debt ratio on average by 7.8 percentage points of GDP compared with the baseline scenario and would reach 33 per cent of GDP in 2015. This level of borrowing could be manageable for a country like Costa Rica where, in 1993, for example, external debt was 32.8 per cent of GDP, having declined gradually from 71.1 per cent of GDP in 1984. According to the model-based analysis, the option of domestic borrowing would seem least advisable as the level of domestic public debt would increase by 13.6 percentage points of GDP on average with respect to the baseline and reach 66.9 per cent of GDP in 2015. This level of indebtedness is well above historical levels, as over the past quarter century the domestic debt burden never was higher than 40 per cent of GDP.

The degree of real exchange-rate appreciation is more pronounced in the scenario when all three MDGs are targeted simultaneously as the required increase in public spending is larger (see Table A7.2). The resource allocation to non-traded goods production drives economic growth in the MDG scenarios. In this case, around 2010 the drop in employment (primarily of skilled workers) and real wages (primarily of semi-skilled and skilled workers) in export sectors is such that aggregate labour-market outcomes deteriorate with respect to those of the baseline scenario. As a consequence, there is a slight increase in moderate and extreme poverty compared with the baseline in 2010 (see Table A7.3). This also happens in 2015 when the additional public spending is financed through internal borrowing because of the "crowding-out" effect on private investment, which has a marked adverse effect on exports and real wages paid in export sectors. While national poverty targets continue to be met no matter the source of financing, the share of the population that lives on less

than one dollar a day does not fall sufficiently to meet the established target of 1.7 per cent by 2015, primarily because the MDG strategy does not induce the required income redistribution and employment is affected by the reduction in competitiveness of export sectors. In the case of the domestic borrowing scenario, private investment, and with it economic growth, is affected in addition to the just mentioned adverse effects.

Conclusions and policy recommendations

Since 1990, robust economic performance and effective social policies have supported notable progress in most social areas critical to the achievement of the MDGs in Costa Rica. The targets for improving coverage of water and sanitation were reached ahead of schedule, and the target for reducing extreme poverty was achieved temporarily in 1998. Paradoxically, because of the amount of progress already made, the country faces a major challenge of further reducing child and maternal mortality rates that are already at low levels.

According to the model-based analysis, continuing the economic trajectory that Costa Rica has followed since 2002—with growth of around 5 per cent per year and public social spending increasing by 1.1 per cent per year in real terms—would generate a reduction in poverty and significant progress towards the targets for improving primary education completion rates and reducing child and maternal mortality. Poverty reduction would be insufficient to meet the MDG target for halving extreme poverty, though nationally defined poverty targets would be reached by 2015. The scenarios in which the targets for education and health are met, suggest that the cost of doing so would be quite modest in terms of additional public spending. Specifically, the cost would be 1.4 per cent, 1.1 per cent, or 1.4 per cent of GDP per year, respectively, depending on whether the extra public spending is financed through increased income taxes, external borrowing, or domestic borrowing. Most of the additional expenditures would be needed for the health sector. The spending requirements could be less if efficiency in the delivery of services can be improved.

In the case of education, spending should be targeted at addressing the known problems of high drop-out and repetition rates, as well as towards expanding coverage of school infrastructure in rural areas. Sufficient allocation of resources could be ensured without delay if public spending in education were to increase to at least 6 per cent of GDP as stipulated by law. The targets for reducing child and maternal mortality in turn could be achieved by enhancing preventative health care inter alia by increasing the coverage of vaccination programmes and providing adequate care for pregnant women in order to prevent complications before and during childbirth, among other measures. The largest share of additional public spending in health should be aimed at training for maternity and obstetric personnel. To the extent progress is made

towards reducing mortality rates, positive synergy effects are triggered that support advancement towards the primary education goal.

According to the simulated scenarios, financing the required public spending through direct taxes or external borrowing will be viable. Raising income taxes for this purpose would be recommended as the more desirable option because of the country's urgent need to put its public finances on sound footing, even though it implies that the direct tax burden would practically need to be doubled as a percentage of GDP with some "frontloading" required before 2010. In the alternative of financing through public borrowing, the simulations suggest that the fiscal deficit would increase beyond the impact induced by the immediate additional public spending requirements in education and health. External borrowing remains a possible option, though, as it does not lead to an explosive rise in public indebtedness as was found for the domestic borrowing scenario. The latter scenario would generate an additional trade-off by substantially crowding out funds available for private investment.

Possibly, the most convenient option would be to combine financing sources in such a way that the scaling up of public spending for the MDGs would sustain an economic growth rate of around 5 per cent per year on average. It will be important that the fiscal reform needed to mobilize the additional public resources be implemented in such a way that it will also help to contribute to a more equal income distribution. At the same time, continued efforts should be made to enhance the efficiency of the existing tax collection system and allocating public spending more effectively on the basis of social development priorities. Resolving these fiscal problems should help reduce dependence on borrowing and enhance government's creditworthiness internationally.

Finally, the model simulations indicate that real wages could increase and inequality could fall with the progress made towards the education and health goals. This would translate into a reduction in poverty, but insufficiently to also achieve the MDG for reducing extreme poverty. The achievement of this goal will depend, not only on how strong and stable economic growth is, but also on how well it is distributed. Further, poverty reduction would also help accelerate progress towards the other development goals.

Appendix A7

Table A7.1 Costa Rica: Elasticities of determinants of progress towards the MDGs as specified in MAMS

a) MDG Goals	Determinants					
	PSW	OPI	IMT10	IMT11	PHC	PHS
MDG 4 (Target 5)		-0.96[a]	-0.09[a]	-0.09[a]	-0.49[a]	-0.94[b]
MDG 5 (Target 6)		-0.96[a]	-0.09[a]	-0.09[a]	-0.49[a]	-0.94[b]
MDG 7 (Target 10)	0.65[d]	0.21[b]			0.46[b]	
MDG 7 (Target 11)	0.65[d]	0.24[b]			0.11[b]	

b) Educational Behaviour/ by cycle	IM5	OPI	WPS	WPT	PHC	QE
Percentage of students at the age for entering primary school who enrol in the cycle	0.05[c]	-0.06[c]	0.12[c]	0.06[c]		0.08[c]
Percentage of students who passed their grade in primary school.	0.05[c]	-0.02[c]	0.09[c]	0.04[c]		0.08[c]
Percentage of students who passed their grade in secondary school	0.05[c]	-0.02[c]	0.21[c]	0.04[c]		0.10[c]
Percentage of students who passed their grade in tertiary education.	0.05[c]	-0.01[c]	0.47[c]		0.08[c]	0.10[c]
Percentage of primary school graduates who go on to secondary education.	0.05[c]	-0.01[c]	0.21[c]	0.04[c]		0.09[c]
Percentage of secondary school graduates who go on to tertiary education.	0.05[c]	0.00[c]	0.47[c]		0.09[c]	0.10[c]

Source: Author's estimates and imputations.

Abbreviations: PSW: Public spending on water and sanitation; OPI: "Other public infrastructure"; IMT10: Indicator for MDG 7 (Target 10); IMT11: Indicator for MDG 7 (Target 11); PHC: Per capita household consumption; PHS: Per capita health spending; IM5: Indicator for MDG 5; WPS: Wage premium: Secondary vs no education; WPT: Wage premium: Tertiary vs Secondary; QE: Quality of education.

[a] Parametric estimates.

[b] Non-parametric estimates.

[c] Value near the lower limit of the feasibility range of MAMS for the elasticity in question.

[d] Value imputed by author on the basis that it falls within the feasibility range of MAMS as determined through sensitivity analysis of the baseline scenario.

Table A7.2 Costa Rica: Key macroeconomic results in selected scenarios simulated with MAMS, 2002-2015

| | Base year 2002 | Baseline scenario | | Scenario for primary education and mortality goals with: | | | | | |
| | | | | direct taxes | | domestic borrowing | | external borrowing | |
		2015	2002-2015	2015	2002-2015	2015	2002-2015	2015	2002-2015
Macroeconomic indicators									
Exchange rate (2002 index = 100)	100.0	96.5	98.2	96.4	98.1	96.0	97.9	96.4	97.8
Growth rate of real GDP (%)		5.6	5.0	5.5	5.0	4.8	4.5	5.6	5.1
Private final consumption spending (% GDP)	67.7	78.9	73.7	78.7	72.7	82.7	75.2	78.9	73.7
Govt. final consumption spending (% GDP)	14.9	9.8	12.4	10.2	13.4	10.8	13.6	10.0	13.2
Gross formation of fixed private capital (% GDP)	19.5	20.9	20.1	20.8	19.8	16.9	17.3	20.9	20.1
Gross formation of fixed public capital (% GDP)	3.1	3.3	3.3	3.4	3.7	3.4	3.6	3.4	3.7
Exports of goods and services (% GDP)	42.3	38.8	40.2	38.7	39.8	37.4	39.2	38.7	39.2
Imports of goods and services (% GDP)	47.5	51.7	49.7	51.8	49.4	51.2	49.0	51.9	50.0
Foreign savings (% GDP)	5.3	10.9	8.4	10.9	8.4	11.5	8.6	11.8	10.0
Government savings (% GDP)	-4.0	0.6	0.3	0.8	0.7	-4.3	-2.6	-0.1	-0.9
Income taxes (% GDP)	2.8	3.1	5.0	3.7	6.6	3.2	5.1	3.1	5.0
Domestic government borrowing (% GDP)	6.9	1.7	2.1	1.7	2.1	6.7	5.3	1.7	2.1
External government borrowing (% GDP)	0.4	0.9	0.9	0.9	0.9	1.0	0.9	1.8	2.5
Domestic government debt (% GDP)	28.7	33.7	34.1	33.9	34.1	66.9	47.7	33.5	33.9
External government debt (% GDP)	19.5	18.1	18.9	18.2	18.9	19.1	19.3	33.0	26.7
Labour market									
Employment[a]	1,586,491	1.9	1.8	1.9	1.7	1.9	1.8	1.9	1.8
Unskilled workers	1,025,519	0.5	0.6	0.5	0.6	0.5	0.6	0.5	0.6
Semi-skilled workers	420,096	3.5	3.3	3.5	3.3	3.5	3.3	3.5	3.3
Skilled workers	140,877	5.1	4.8	4.7	4.8	4.4	4.6	4.8	4.8

Table A7.2   (cont'd)

	Base year 2002	Baseline scenario		Scenario for primary education and mortality goals with:						
				direct taxes		domestic borrowing		external borrowing		
		2015	2002–2015	2015	2002–2015	2015	2002–2015	2015	2002–2015	
Real wage per worker[b]	115,254	3.4	2.8	3.1	2.8	2.4	2.3	3.2	2.8	
Unskilled workers	78,782	5.4	4.6	5.5	4.6	4.5	4.1	5.5	4.7	
Semi-skilled workers	145,530	1.7	1.2	1.2	1.1	0.5	0.6	1.3	1.1	
Skilled workers	290,465	-0.7	-1.2	-1.1	-1.2	-1.3	-1.4	-1.1	-1.3	

Source: MAMS for Costa Rica.

[a] Number employed in base year and growth rate in scenarios.

[b] *Colones* in base year and rate of growth in scenarios.

Table A7.3   Costa Rica: Poverty and inequality results of microsimulations for selected scenarios simulated with MAMS, 2002-2015[a]

	Moderate poverty (% of population)				Extreme poverty (% of population)			
	2002	2005	2010	2015	2002	2005	2010	2015
Baseline scenario								
U	20.6	19.7	19.7	19.6	5.7	5.3	5.4	5.6
U+S	20.6	19.9	19.4	20.0	5.7	5.5	5.2	5.6
U+S+W1	20.6	19.9	18.6	18.7	5.7	5.5	5.0	5.3
U+S+W1+W2	20.6	19.9	14.6	12.2	5.7	5.5	4.0	3.7
U+S+W1+W2+M	20.6	19.9	14.6	12.8	5.7	5.5	4.2	4.3
Scenario for MDGs 2, 4 and 5 with tax financing								
U	20.6	20.5	20.5	19.6	5.7	5.6	5.6	5.6
U+S	20.6	20.3	20.6	20.0	5.7	5.6	5.8	5.6
U+S+W1	20.6	20.3	20.1	18.7	5.7	5.6	5.6	5.3
U+S+W1+W2	20.6	20.3	16.2	12.2	5.7	5.6	4.5	3.7
U+S+W1+W2+M	20.6	20.4	16.0	12.8	5.7	5.7	4.6	4.3
Scenario for MDGs 2, 4 and 5 with domestic borrowing								
U	20.6	19.6	19.7	20.0	5.7	5.3	5.2	5.6
U+S	20.6	19.7	19.8	20.2	5.7	5.3	5.3	5.8
U+S+W1	20.6	19.7	20.0	19.4	5.7	5.3	5.4	5.6
U+S+W1+W2	20.6	19.7	15.8	13.8	5.7	5.3	4.3	4.2
U+S+W1+W2+M	20.6	19.7	16.0	14.1	5.7	5.3	4.7	4.7
Scenario for MDGs 2, 4 and 5 with external borrowing								
U	20.6	19.4	19.6	19.6	5.7	5.3	5.4	5.3
U+S	20.6	19.5	19.8	19.9	5.7	5.4	5.5	5.5
U+S+W1	20.6	19.3	19.3	18.6	5.7	5.4	5.4	5.3
U+S+W1+W2	20.6	19.3	15.4	12.1	5.7	5.4	4.3	3.7
U+S+W1+W2+M	20.6	19.5	15.4	12.5	5.7	5.5	4.7	4.1

Table A7.3 (cont'd)

	Population living on less than 1 dollar a day (%)				Gini coefficient of per capita household income			
	2002	2005	2010	2015	2002	2005	2010	2015
Baseline scenario								
U	2.8	2.5	2.7	2.8	0.43	0.43	0.42	0.42
U+S	2.8	2.5	2.7	2.8	0.43	0.43	0.42	0.42
U+S+W1	2.8	2.5	2.5	2.8	0.43	0.43	0.41	0.41
U+S+W1+W2	2.8	2.5	2.1	2.0	0.43	0.43	0.41	0.41
U+S+W1+W2+ M	2.8	2.6	2.5	2.5	0.43	0.43	0.41	0.41
Scenario for MDGs 2, 4 and 5 with tax financing								
U	2.8	2.7	2.7	2.8	0.43	0.43	0.43	0.42
U+S	2.8	2.8	2.9	2.8	0.43	0.43	0.43	0.42
U+S+W1	2.8	2.8	2.9	2.8	0.43	0.43	0.42	0.41
U+S+W1+W2	2.8	2.8	2.4	2.0	0.43	0.43	0.42	0.41
U+S+W1+W2+ M	2.8	2.8	2.6	2.5	0.43	0.43	0.43	0.41
Scenario for MDGs 2, 4 and 5 with domestic borrowing								
U	2.8	2.5	2.6	2.9	0.43	0.43	0.42	0.42
U+S	2.8	2.5	2.6	3.1	0.43	0.43	0.42	0.42
U+S+W1	2.8	2.5	2.6	3.0	0.43	0.43	0.42	0.41
U+S+W1+W2	2.8	2.5	2.1	2.3	0.43	0.43	0.42	0.41
U+S+W1+W2+ M	2.8	2.6	2.6	2.9	0.43	0.43	0.42	0.42
Scenario for MDGs 2, 4 and 5 with external borrowing								
U	2.8	2.4	2.7	2.6	0.43	0.42	0.42	0.42
U+S	2.8	2.5	2.9	2.8	0.43	0.42	0.42	0.42
U+S+W1	2.8	2.5	2.9	2.8	0.43	0.42	0.41	0.40
U+S+W1+W2	2.8	2.5	2.4	1.9	0.43	0.42	0.41	0.40
U+S+W1+W2+ M	2.8	2.6	2.8	2.5	0.43	0.42	0.42	0.41

Source: MAMS for Costa Rica and microsimulations based on the 2002 EHPM of INEC.

[a] Sequential and cumulative effects are presented for changes in: U, unemployment rate by skill level; S, employment structure by sector of activity; W1, structure of labour income per sector of activity; W2, average labour income; and, M, employment structure by skill level. For more detail on methodology, see Chapter 2 (Appendix A2.1).

Acknowledgements

Notes

1   For more detail on the main trade reforms of the last few years, see Sánchez and Sauma (2006) and Sánchez (2004, 2005, 2007b).

2   Furthermore, as Sánchez (2004) shows, eliminating subsidies for non-traditional exports in 1990 provided a disincentive to foreign sales, especially of agricultural products.

3   Part of the fiscal problem is the cost of implementing the trade reforms. Electoral cycles have also put pressure on spending. In addition, there have been repercussions from the growth of public pensions charged to the government budget as a result of generous adjustments to pension regimes made previously.

4   Since 2002, public debt declined to 45 per cent of GDP in 2007, down from an average of 47.9 per cent of GDP in the 2000-05 period, as shown in Table 7.1. The reduction is explained by economic growth during this period, which allowed tax revenues to increase, as well as by lower interest rates, which reduced the cost of government debts and by higher government savings generated as a result of higher revenues and a control on spending. In fact, the government registered a primary surplus, which was 2.17 per cent, 2.74 per cent and 3.73 per cent of GDP in 2005, 2006 and 2007, respectively. These trends would suggest the government has now more fiscal space to increase social investment. Over the medium term, however, the economy would need to grow steadily at the same pace as that of 2004-07, in order to sustain higher levels of social spending without jeopardizing fiscal sustainability.

5   According to data from the BCCR, GDP grew by 8.8 per cent and 6.9 per cent in 2006 and 2007, respectively.

6   The development of social policy has been characterized by three stages that began early in the last century and are described in detail in Sauma and Garnier (1998).

7   In 1997, production was estimated based on the productive structure of 1966, the base year of the prevailing national accounts system. In 1998, the BCCR changed the base year for calculating GDP and began using the 1991 productive structure as a base instead. The new GDP in 1998, then, was 33 per cent higher than the previous GDP. Since public funds for education were not adjusted to reflect the adjustment of GDP, it has not been possible to allocate 6 per cent of GDP to education expenditures. To correct the problem, a decree was signed on 22 June 2000 establishing a mechanism that

would allow spending to move gradually from 6 per cent of the old GDP to 6 per cent of the current GDP.

8   The rest of this section is broadly based on the First National Report on the MDGs (Social Council of the Government of Costa Rica and the United Nations System in Costa Rica, 2005).

9   The extreme poverty incidence is the measure of the percentage of individuals with an income insufficient to cover the cost of a basic food basket that would allow them to satisfy minimum nutritional needs. By this definition, the measure may also be seen as an indirect measure of the share of the population experiencing conditions of hunger or malnourishment.

10   One explicit target of the "Education for All" Action Plan of the Ministry of Public Education is to lower the percentage of students who repeat a grade in primary school to 2 per cent by 2015 (MEP, 2004).

11   According to UNICEF data, only Cuba (8) and Chile (9) had lower under-five mortality rates than Costa Rica (10) among Latin American countries in 2003.

12   According to the National System for Evaluating Maternal Mortality, about 80 per cent of maternal deaths could have been prevented in the year 2000. This represents 19 lives that could have been saved according to technical criteria (Ministerio de Salud, 2001).

13   According to AyA and OPS (2002), the country could aspire to reaching 96 per cent coverage for potable water in 2020.

14   Progress in rural areas is explained in part by including latrines as a sanitary option.

15   INEC's 2002 Household and Multipurpose Survey (EHPM) was used for this purpose.

16   The reduction in the maternal mortality rate is inversely related to its determinants in the MAMS model. This causality could not have been reproduced empirically since, as explained, the maternal mortality rate has experienced some increases. Therefore the estimates are omitted in this case.

17   Data on public spending for water and sanitation and health were disaggregated by *cantón* (geographical division similar to district) using population weights by *cantón* in each of the 7 regions as defined for the national planning process. The estimated coefficients could be biased in the sense that they might measure the distribution of the population rather than the extension of the provision of the respective services in case this is weakly correlated with population by *cantón*.

18   This national target is proposed in the First National Report of the MDGs. For more detail, see, Consejo Social del Gobierno de la República de Costa Rica and Sistema de las Naciones Unidas en Costa Rica (2005).

References

AyA, and PAHO (2004). "Situación de la tecnología de tratamiento de las aguas residuales de tipo ordinario en Costa Rica," San José: Costa Rican Institute of Water and Sewage (AyA) and Pan-American Health Organization (PAHO).

CEPAL (2005). *Objetivos de Desarrollo del Milenio. Una mirada desde América Latina y el Caribe*, Economic Commission for Latin America and the Caribbean, Santiago de Chile: United Nations (June 2005).

CEPAL, and UNESCO (2005). "Invertir mejor para invertir más. Financiamiento y gestión de la educación en América Latina y el Caribe", Economic Commission for Latin America and the Caribbean and United Nations Educational, Scientific and Cultural Organization, *Serie Seminarios y Conferencias*, No. 43, CEPAL, Santiago de Chile.

Consejo Social del Gobierno de la República de Costa Rica y Sistema de las Naciones Unidas en Costa Rica (2005). *Objetivos de Desarrollo del Milenio: Informe sobre el avance del país en su cumplimiento*, San José.

MEP (2004). *Plan de Acción de la educación para todos 2003-2015*, San José: Ministry of Public Education (MEP).

Ministerio de Salud (2001). "Memoria Anual 2000", San José: Ministry of Health of Costa Rica.

Papke, L. E., and J. M. Wooldridge (1996). "Econometric methods for fractional response variables with an application to 401(k) plan participation rates," *Journal of Applied Econometrics* 11(6): 619-32.

Sánchez, Marco V. (2004). *Rising inequality and falling poverty in Costa Rica's agriculture during trade reform. A macro-micro general equilibrium analysis,* Maastricht: Shaker.

_____ (2005). "Reformas económicas, régimen cambiario y choques externos: efectos en el desarrollo económico, la desigualdad y la pobreza en Costa Rica, El Salvador y Honduras," *Serie de Estudios y Perspectivas*, No. 36, Subregional Office of ECLAC in Mexico City, Mexico.

_____ (2006a). "Gasto público para el logro de las metas del milenio en Costa Rica: viabilidad de financiarlo y sus efectos en la asignación de los recursos, la pobreza y la desigualdad", Final report for the project *Public Policies for MDGs in Latin America and the Caribbean*, UNDP/UN-DESA/World Bank, November (mimeograph).

_____ (2006b). "Matriz de contabilidad social (MCS) 2002 de Costa Rica, y los fundamentos metodológicos de su construcción," *Serie de Estudios y Perspectivas*, No. 47, Subregional office of ECLAC in Mexico City, Mexico.

_____ (2007a). "Crecimiento exportador en Centro América: alcances y limitaciones para el bienestar social", in Ana Sojo and Andras Uthoff (editors), *Desempeño Económico y Política Social en América Latina y el Caribe: Los Retos de la Equidad, el Desarrollo y la Ciudadanía*, Mexico City: ECLAC, FLACSO, GTZ and INDESOL, pp. 257-307.

_____ (2007b). "Liberalización comercial en el marco del DR-CAFTA: efectos en el crecimiento, la pobreza y la desigualdad en Costa Rica," *Serie de Estudios y Perspectivas*, No. 80, Subregional office of ECLAC in Mexico City, Mexico.

_____ (2008). "Capítulo 9: Costa Rica," in Rob Vos, Enrique Ganuza, Hans Lofgren, Marco V. Sánchez, and Carolina Diaz-Bonilla (eds), *Políticas Públicas para el Desarrollo Humano ¿Cómo lograr los Objetivos de Desarrollo del Milenio en América Latina y el Caribe?* Santiago de Chile: Uqbar Editores y Programa de las Naciones Unidas para el Desarrollo (PNUD), pp. 313-47.

_____, and Pablo Sauma (2006). "Costa Rica - export-orientation and its effect on growth, inequality and poverty," in Rob Vos, Enrique Ganuza, Samuel Morley and Sherman Robinson (eds.), *Who Gains from Free Trade? Export-led growth, inequality and poverty in Latin America*, London, New York: Routledge, pp. 204-30.

Sauma, Pablo and Leonardo Garnier (1998). "Política Social, Política Económica, y Pobreza en Costa Rica", in Enrique Ganuza, Lance Taylor and Samual Morley (eds.), *Políticas macroeconómicas y pobreza en América Latina y el Caribe*, pp. 311-353, Madrid: Mundi-Prensa Libros S.A.