Public Policies for Human Development

Achieving the Millennium Development Goals in Latin America

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Contents

List of tables and figures

Tables

Figures

12

Peru

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Introduction

In recent years, successive Peruvian governments have given importance to achieving the Millennium Development Goals (MDGs). But the necessary conditions to reach the related targets still need to be put it place. Those conditions would include high and sustained economic growth, significant income redistribution, and better targeted social policies.

This chapter provides an assessment of the costs associated with the MDG targets for poverty reduction, primary education, health, and access to water and basic sanitation by the year 2015 in Peru. The study is based on a scenario analysis using the computable general equilibrium model called MAMS, as described in Chapter 3, and adapted to Peru's socio-economic structure and conditions. The policy simulation analysis with MAMS for Peru was combined with cost-effectiveness analyses of delivery of education, health, and water and sanitation services and with the application of a microsimulation methodology that enables assessment of outcomes for poverty reduction and income inequality (see Appendix A2.1 of Chapter 2).

This chapter is organized as follows. The next section briefly summarizes the main macroeconomic trends in Peru as well as changes in the MDG indicators between the early 1990s and 2005. The following section summarizes the results of econometric estimations that were conducted to determine the likely impact of different socio-economic and demographic determinants of progress towards the MDGs for education, health, and drinking water and sanitation and further identifies the effectiveness of relevant public policy variables in achieving the targets. The fourth section briefly explains the calibration of MAMS using Peruvian data. The fifth section discusses the main results of the policy simulations with MAMS. It first discusses the macroeconomic results and progress towards the MDGs under a baseline scenario with "business-as-usual" assumptions. These are compared with outcomes of scenarios that scale up public spending to the

level required to achieve pre-set MDG targets for education, health, and water and sanitation under alternative financing strategies. The subsequent section presents the main results obtained from the application of the microsimulation methodology, assessing how much progress would be made towards the target for reducing income poverty, while scaling up public spending for achieving the goals for education, health and basic sanitation. The main conclusions and policy recommendations are summarized in the final section.

Recent social and economic development trends in Peru

Peru's economy showed a robust performance over the past decade and a half. Economic growth averaged 4.1 per cent per year between 2000 and 2005, similar to the 4 per cent per year achieved during the 1990s and above the historic average of 3 per cent per year during 1960-2005. Since 2002, inflation stabilized at around 2.5 per cent, around the pre-set inflation target. The fiscal deficit did not surpass the ceiling of 1 per cent of GDP during 2004-05, in compliance with that stipulated by the Fiscal Transparency and Responsibility Law. The fiscal deficit stood at 0.3 per cent of GDP in 2005 and was financed by mobilizing domestic resources. Public external debt was reduced from over 40 per cent of GDP in 2000 to 35.2 per cent in 2005. The public domestic debt ratio has been relatively stable, averaging 9.4 per cent of GDP in the late 1990s to only slightly increase to 9.8 per cent in 2005. The current account deficit of the balance of payments has narrowed and shifted into a surplus of 1.3 per cent of GDP in 2005, while maintaining a managed floating exchange-rate regime.

The main financial constraint to increase social spending is the ceiling for the budget deficit imposed by the Fiscal Transparency and Responsibility Law of 2000. Peru's tax burden remains low by international standards even though it increased to 13.6 per cent of GDP in 2005, only slightly above the historic average of 13.1 per cent and well below the average for Latin America (17.5 per cent). The low tax burden is the result of several factors, including the high degree of informality in the economy, pervasive tax evasion, and legislation that provides multiple tax exemptions.

In all of the public opinion surveys, Peruvians name the lack of job opportunities as the biggest problem affecting the country. Open unemployment is not the main issue, though. The unemployment rate in the metropolitan area of Lima is at single-digit levels—ranging between 7 per cent and 9 per cent—and is practically non-existent in the rural areas of Peru. The main problem is the high degree of underemployment, affecting more than half of the economically active population. Workers are considered underemployed if they have full-time jobs with wages insufficient to cover the cost of a basic basket of consumption goods or if they involuntarily have had to take part-time jobs. Because most workers are engaged in informal sector activities, much of the adjustment in

the Peruvian takes place through prices (labour incomes) rather than through quantity (unemployment). The low and volatile income levels in the large informal segment of the labour market are clear manifestations of this. It has also been shown that the rate of open unemployment is not very sensitive to the short-term business cycle in Peru (Yamada, 2004).

During the first half of the 2000s, Peru's economy suffered few adverse shocks unlike in the past.[1] This has supported the strong overall economic performance. Public spending, however, tends to be strongly pro-cyclical. This applies in particular also to social expenditures by the government which follow the ups and downs of the economy in an amplified way. This pro-cyclical spending behaviour complicates the implementation of poverty reduction programmes. In addition, those programmes suffer from problems of inadequate targeting and inefficiencies. In order to achieve the MDGs, public policies would need to become better targeted and more predictable and to avoid pro-cyclical swings so as to ensure sustained progress towards the targets.

An earlier study about the feasibility of achieving the MDGs in Peru showed uneven paths towards the targets (Beltran and others, 2004). While some MDGs (universal access to primary education, for example) could be achieved without major changes in macroeconomic variables or in public policies, others (like greater access to water and basic sanitation) are only expected to be achieved following major policy changes. Large disparities also exist in the progress towards the MDGs across geographic regions.

Table 12.1 shows that progress in reducing moderate and extreme poverty as measured by national poverty lines has been insufficient.[2] Progress also seems insufficient to meet poverty reduction targets by international measures for moderate poverty defined as the share of the population living on less than two dollars per person per day at purchasing power parity (PPP). At given trends, only the target for reducing extreme poverty measured by the international poverty line of one dollar per day at PPP could be achieved by 2015.

While the net enrolment rate for primary education is close to 90 per cent, the rate of completion of primary school at the normative age was only 56.8 per cent in 2004, as a consequence of many children entering school late and high rates of grade repetition and dropout. The poor quality of education in Peru is also well documented.[3] Real per capita social spending began to recover in the 1990s after significant declines during the period of hyperinflation. The share of spending on education in total social spending declined, however, in favour of more spending on social protection, especially food and nutritional support programmes which serve mainly as a palliative measure to counteract the lack of progress made towards reducing income poverty (Yamada and Castro, 2007). The gender gap in primary and secondary education has narrowed since 1990 and the country will most likely achieve full parity in access to education for boys and girls in the next years (see Table 12.1).

Table 12.1 Peru: Indicators for evaluating the MDGs (1991 and 2004) and targets for 2015

MDG and associated indicator	1991	2004[a]	Target for 2015
MDG 1: Poverty incidence–1dollar a day line at PPP (% of population)	6.6	3.7	3.3
MDG 1: Poverty incidence–2 dollar a day line at PPP (% of population)	26.1	17.4	13.0
MDG 1: Incidence of moderate poverty–national line (% of population)	54.5	53.6	27.3
MDG 1: Incidence of extreme poverty–national line (% of population)	23.0	26.8	11.5
MDG 2: Primary school completion rate (% of students between 11and 17 years who completed 6th grade of primary school)	75.1	89.5	100.0
MDG 2: Rate for completion of primary school at normative age (% of students who completed primary school at 12 years of age)	22.7	56.8	71.4[b]
MDG 3: Gender equality in primary education (proportion of girls to boys enrolled in education system in per cent)	98.5	95.0	100.0
MDG 3: Gender equality in secondary education (proportion of girls to boys enrolled in education system in per cent)	94.5	92.0	100.0
MDG 4: Under-five mortality rate (per 1.000 live births)	81.0	34.0[c]	27.0
MDG 7a: Sustainable access to drinking water (% of population)	63.0	75.0	88.0
MDG 7b: Access to basic sanitation services (% of population)	54.0	56.0	78.0

Source: 2004 National Household Survey (ENAHO), 1991 National Household Living Standards Survey (ENNIV), and 2000 Demographic and Health Survey (ENDES).

[a] Corresponds to the base year of scenarios simulated through the general equilibrium model.

[b] As explained in the text, this is considered to be the feasible target given the "natural" rate of school grade repetition.

[c] Data are for 2000.

The child mortality rate dropped significantly during the 1990s, reaching 34 deaths per 1,000 live births in the early 2000s, down from 81 in 1990. The priority given to public spending on preventative and primary health care during the 1990s likely was an important factor in achieving this progress (Cotlear, 2006). With continued trends one could be moderately optimistic about achieving the MDG target for reducing child mortality in 2015 (see Table 12.1). However, national averages mask the critical situation of much higher probability of mortality of children born to parents belonging to low-income groups, possessing low levels of education, and living in rural areas. For example, in the period between 1986 and 1996, the under-five mortality rate averaged 114 per 1,000 live

births among children born to mothers without education and 100 among those born in rural areas.

Coverage of drinking water and basic sanitation services is low in Peru. This is of great concern as international comparative studies as well as evidence for Peru suggest that access to better water sources and basic sanitation services has a positive impact on progress towards other goals in the areas of health, nutrition, and possibly also education (Beltran and others, 2004). Access to drinking water increased from 63 per cent around 1990 to 75 per cent in 2004, but this is not sufficient for achieving the pre-set MDG target by 2015 (see Table 12.1). Moreover, progress stagnated during the 2000s. The situation regarding access to basic sanitation services is even more worrisome as coverage increased only slightly from 54 per cent to 56 per cent during this same time period, putting Peru well off track towards the target set for 2015. The Government of Alan Garcia is giving priority to improving access to drinking water. It was a key issue in his presidential election campaign during which he promised to implement a "Water for All" plan. The plan targets to provide at least one million Peruvians living in poor urban areas with access to drinking water over a number of years.

Determinants of MDG progress: A partial equilibrium analysis

The elasticities of the determinants of progress towards the MDGs were estimated using microeconometric techniques. Determinants included socio-economic characteristics of individuals, household income and expenditures, and public spending on different services.

Available information only permits the estimation of microeconomic models for probabilities associated with determinants of education (MDG 2) and for under-five child mortality (MDG 4). Data on maternal mortality are deficient. Only national aggregates are available, but there are no consistent time series and neither is there information to link maternal mortality with detailed information at the household level in order to study its determinants.[4] Because of these limitations, MDG 5 was not included in the macro and micro modelling analysis presented in this study. Moreover, the lack of information about spending on infrastructure for water and sanitation at the local level impedes full estimation of a behavioural model of the demand for these two services. In this case, point elasticities that quantify the impact of changes in the determinants of access to drinking water supply and sanitation on actual access were derived from past trends in coverage for these services and per-capita public investment spending on water and sanitation during 1999-2004.[5]

Table A12.1 (Appendix A12) shows the estimated values of all relevant elasticities used in the MDG module of MAMS. Most estimated elasticity values for the determinants of progress towards the MDGs turned out

to be statistically significant. A detailed description of the estimation procedures used, as well as a detailed analysis and presentation of the results can be found in Castro and Yamada (2006).

Calibration of MAMS to Peruvian data

MAMS was calibrated using parameter values that adequately define the main behavioural relationships of the Peruvian economy and impose a number of constraints required for obtaining a feasible model solution. Three basic data inputs were required: a Social Accounting Matrix (SAM) that defines the structure of the economy and provides accounting consistency for the flows of incomes and payments between different sectors and institutions in the base year; elasticities that characterize the behavioural relationship determining demand and supply at the level of production sectors and commodities, spending and saving decisions, and MDG achievement; and projected growth rates and levels of exogenous variables between the base year and 2015. It was also necessary to define the type of closure rules that determine adjustment towards equilibrium in factor markets and those determining macroeconomic adjustment (see also Chapter 3).

A new SAM was constructed for the present study using data for 2004, the base year chosen for the calibration and simulation exercise of the model. The SAM distinguishes 3 institutions, 16 types of production sectors and commodities, and 5 production factors. A detailed description of the compilation of the 2004 SAM for Peru can be found in Castro and Yamada (2006).

As in the case of the elasticities of the MDG determinants, an effort was made to also estimate all other elasticities econometrically. Due to data limitations, however, plausible estimates were obtained only for those associated with the behavioural functions for demand, supply (in particular, decisions relating to selling on domestic and world markets), and savings. In general, elasticities were derived from multivariate time-series regression models specifying behavioural relationships as also captured in MAMS and following procedures suggested by Sánchez (2004). Elasticities that could not be estimated econometrically were derived as point elasticities using data from the Ministry of Economy and Finance (MEF) (2004). Table A12.2 (Appendix A12) presents the values of the key elasticities as applied to solve MAMS with Peruvian data. Further details on how these were estimated and which data sources were used can be found in Castro and Yamada (2006).

Analysis of simulated scenarios

After calibrating MAMS the model was solved for a baseline scenario for the 2004-15 period. The baseline assumes continued trends for key exogenous variables and continuation of existing policies, including fixed growth of government

spending at a rate similar to that observed in years prior to 2004. In other words, the baseline may be seen to represent "business as usual". This scenario is used as the reference to assess various MDG scenarios under which public expenditures are scaled up to the level required to achieve the MDG targets for education, child mortality, and water and sanitation by the year 2015. The model uses these scenarios to facilitate the analysis of how higher public spending would affect the rest of the economy under different assumptions about how the increase in government spending is financed.

Baseline scenario

GDP increases at an annual average rate of 4.8 per cent in the baseline scenario (Table 12.2). This rate is somewhat above the performance of the 1990s and early 2000s, though 0.5 percentage points below the official projection of the Multi-annual Macroeconomic Framework for 2007-09 (MEF, 2006). It would not be prudent to assume a much more optimistic scenario for economic growth, given the likely unrealistic assumption of continued favourable international economic conditions for the whole simulation period.

The level of external savings would increase slightly in the baseline, reaching 0.32 per cent of GDP towards the end of the projected period and averaging 0.30 per cent per year during the entire period (see Table 12.2). Most of the increase in foreign savings is to make up for a slight drop in private savings in financing private sector investment. The fiscal deficit remains more or less stable in the baseline at around 1 per cent.

Table 12.2 Peru: Real GDP, primary components of spending and savings-investment gaps in the baseline scenario, 2004-2015

	Initial value (2004)	**Average value (2004-2015)**
	Billions of new soles	*Growth rate*
GDP	230.34	4.83
Consumption	160.60	4.89
Investment	42.61	4.60
Government spending	20.65	2.68
Exports	49.72	5.13
Imports	43.24	4.21
	Percentage of GDP	*Percentage of GDP*
Private savings	16.77	16.57
Private investment	15.79	15.78
Private gap	0.97	0.79
Government savings	1.69	1.09
Government investment	2.71	2.19
Fiscal deficit	-1.01	-1.10
External savings	0.01	0.30

Source: MAMS for Peru.

Government final consumption spending—including that on goods and services related to education, health, and sanitation—is assumed to grow on average at 2.68 per cent per year, while public investment increases at an annual pace of 2.81 per cent. This rate of expansion of government services is insufficient to make adequate progress towards the four non-poverty MDG targets analyzed in this study (see Figure 12.1). For instance, between 2004 and 2015, the percentage of children who complete primary education on time would increase from 56.8 per cent to 65.6 per cent, well short of the target of 100 per cent. Most of this increase would be on account of increased school enrolment of children in primary school age. The percentage of children graduating, however, would remain practically unchanged (at around 94 per cent) throughout the simulation period.[6]

The 100 per cent target for primary school completion (that is, ensuring that all children enter the schooling system at the mandated age and that no child repeats a grade in any of the six years of the primary school cycle), is extremely challenging for Peru. Once enrolled, the probability of completing primary school was already quite high in the base year (93.5 per cent) and the elasticity of this indicator with respect to the provision of educational goods and services is too low to expect much improvement can be achieved through supply-side measures. The interpretation of these results is based on the premise that, while scaling up the public spending aimed at improving access to and quality of primary education can ensure that most families decide to enrol their children in school, further measures need to be considered should repetition be reduced.[7] This premise is taken into account in the analysis of the remaining scenarios.

Consequently, for the present analysis, the decision was made to work with the following two targets for MDG 2: (1) primary school completion on time, using the contemporaneous probability of a child (of six) enrolling in the first grade of primary school and that of a child (of six to twelve years old) completing a grade of primary, as shown in Figure 12.1; and (2) primary school completion one year after what is established as the normative year (at 13 years of age), also using the contemporaneous values of the two previously mentioned probabilities ("MDG2, 13 years" in Figure 12.1).[8] In this sense, the results reported in Figure 12.1 allow us to reach two conclusions. First, using the contemporaneous values mentioned has only a marginal effect on the percentage of children who finish primary school on time. Second, nearly 93 per cent of the children would be able to complete primary school by the year 2015, without any specific policy measures being taken, under the assumption that each one might repeat one of the six grades of primary school. These considerations lead to adjusting the target for MDG 2 to 71.4 per cent, as indicated in Table 12.1.

In terms of under-five child mortality, while the indicator is relatively close to its goal in the base year, the baseline scenario predicts a drop of only 2 units (from 34 to 32 deaths per 1,000 live births), possibly due to strongly decreasing

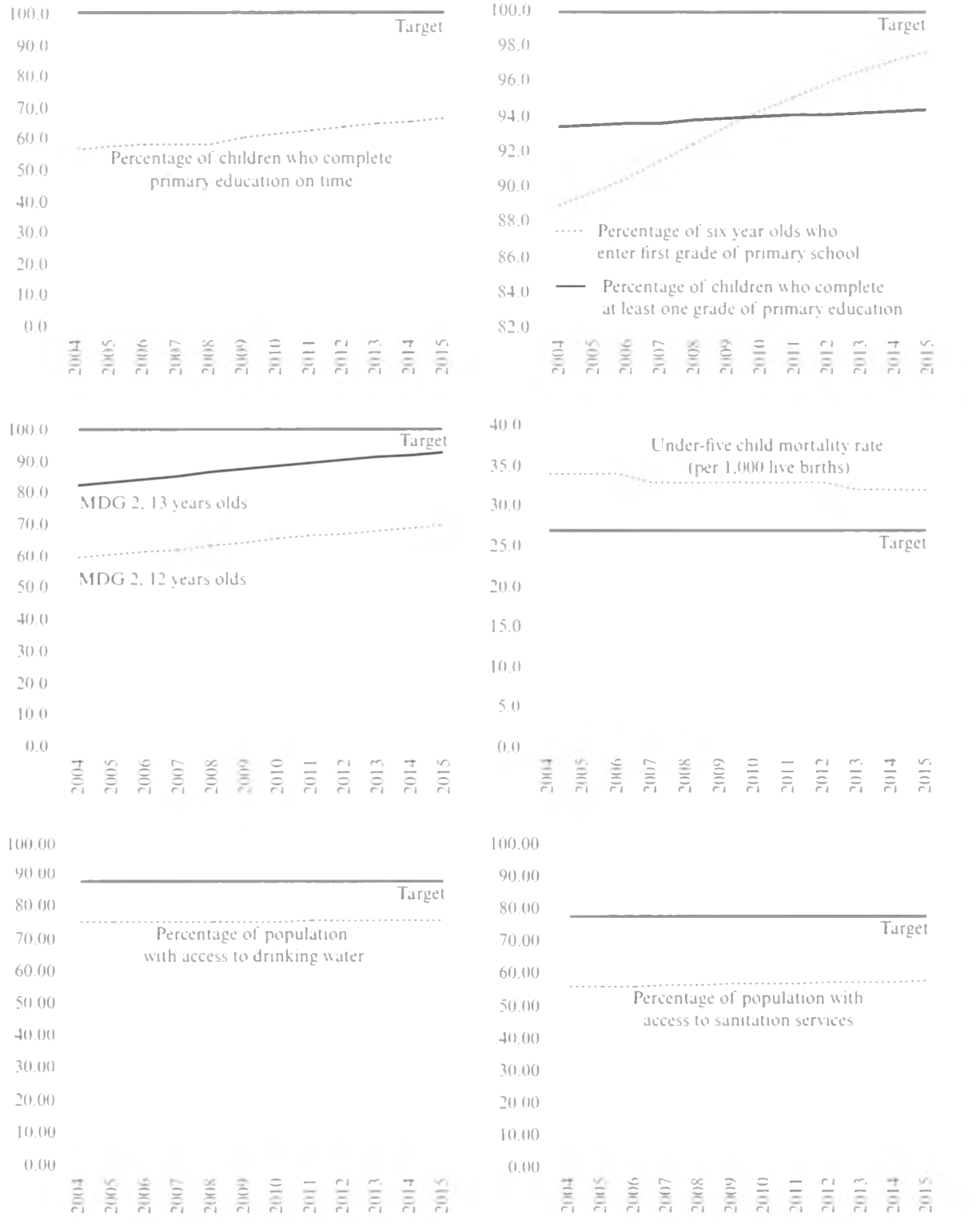

Figure 12.1 Peru: Progress towards MDG-related indicators in the baseline scenario, 2004-2015

Source: MAMS for Peru.

marginal returns from policy interventions in this area. Finally, and in line with the insignificant improvements observed in the baseline scenario, the percentage of households with access to adequate water and sanitation services (75 per cent and 56 per cent, respectively) remains practically unchanged during the entire period in projection.

MDG scenarios

Table 12.3 summarizes the results of the simulated progress towards the MDGs in the baseline scenario and in the scenarios in which MDGs 2, 4, and 7a/b are targeted separately. Public spending in each MDG scenario is assumed to be financed through increased taxation. In the scenario where only the primary education goal is met, the percentage of children who complete primary education at the normative age increases more than in the baseline scenario, but the target of 100 per cent is far from achieved and only the adjusted target of 71.4 per cent is approximated.

In terms of the additional public spending required to reach one or two of the goals separately, the goal for primary education is the one that demands the

Table 12.3 Peru: MDG indicators in baseline scenarios and scenarios targeting one or two MDGs at a time only, 2004-2015[a]

			Simulated values in 2015 by scenario:			
MDG and related indicator	**2004**	**Target for 2015**	**Baseline**	**MDG2**	**MDG4**	**MDGs 7a and 7b**
MDG 2: Proportion of children who complete primary school on time (%)	56,80	100,00	65,64	70,68	66,63	67,44
MDG 2: Proportion of children of 6 years of age enrolled in first grade of primary school (%)	89,00	--	97,82	99,41	97,44	98,01
MDG 2: Proportion of children who passed at least one grade of primary education (%)	93,50	--	94,48	95,00	94,79	94,90
MDG 2, 12 years[b]	59,46	--	69,56	73,09	70,70	71,59
MDG 2, 13 years[c]	82,66	--	92,61	95,01	92,79	93,50
MDG 4: Under-five child mortality rate (per 1,000 live births)	34,00	27,00	32,00	32,05	26,91	29,03
MDG 7a: Share of population with access to drinking water (%)	75,00	88,00	75,84	75,84	75,84	88,00
MDG 7b: Share of population with access to basic sanitation (%)	56,00	78,00	57,77	57,77	57,77	78,00

Source: MAMS for Peru.

[a] In the MDG scenarios, public spending is scaled up as required to meet the corresponding target and the spending increase is assume to be financed through increased direct taxes.

[b] Probability that a child enrols in primary education at age six and passes at least one grade until reaching age twelve.

[c] Probability that a child graduates from primary school one year after the mandated age of twelve (that is, at age 13).

most fiscal effort to achieve. With respect to the baseline scenario, additional public spending required for reaching just the primary education goal is, on average, around 0.5 per cent of GDP per year.[9] Additional public spending in the scenarios for the under-five child mortality goals and two goals of water and sanitation is about 0.46 per cent and 0.33 per cent of GDP respectively. Because of synergies between better access to water and sanitation and health, on the one hand, and between health and education outcomes, on the other, the sum of these additional expenditures surpasses the additional public spending shown in the scenario in which all of the goals are achieved simultaneously, but primarily because of the impact that the achievement of the water and sanitation goals has on the reducing under-five child mortality. If the required increase in public spending is financed through direct taxes, for example, the savings resulting from these synergies would be about 0.38 per cent of GDP per year.

Table 12.4 provides some detail on the required additional public spending to reach the goals for education, health, and water and sanitation simultaneously.

Table 12.4 Peru: Required public spending to achieve the MDGs under alternative financing scenarios, 2004-2015 (percentage of GDP)

	Public spending per year		**Annual average additional spending per year (2004-2015)[a] in scenarios where MDGs are financed through:**			
	Base year (2004)	**Baseline scenario (2004-2015)**	**direct taxes**	**foreign aid**	**external borrowing**	**domestic borrowing**
Total spending	2.18	2.03	0.95	0.88	0.88	0.93
Current spending						
Primary education	0.56	0.50	0.49	0.43	0.43	0.47
Secondary education	0.48	0.43	0.00	0.00	0.00	0.00
Tertiary education	0.30	0.27	0.00	0.00	0.00	0.00
Primary healthcare	0.30	0.27	0.05	0.05	0.05	0.05
Higher levels of healthcare	0.22	0.20	0.03	0.03	0.03	0.03
Water and sanitation	0.06	0.05	0.11	0.10	0.10	0.11
Capital spending						
Primary education	0.02	0.02	0.03	0.02	0.02	0.03
Secondary education	0.04	0.06	0.00	0.00	0.00	0.00
Tertiary education	0.09	0.10	0.00	0.00	0.00	0.00
Primary healthcare	0.05	0.05	0.01	0.01	0.01	0.01
Higher levels of healthcare	0.01	0.01	0.00	0.00	0.00	0.00
Water and sanitation	0.05	0.07	0.23	0.23	0.23	0.23

Source: MAMS for Peru.

[a] With respect to baseline scenario.

Meeting the target for education would demand the most resources and current spending would have to increase the most. In line with what was found in other country cases, the costs of achieving the MDGs tend to be higher when these are covered through the mobilization of domestic resources (ranging between 0.93 per cent and 0.95 per cent of GDP per year) as compared with financing through external resources (0.88 per cent of GDP per year). Financing through increasing direct taxes would be the most onerous option for Peru in terms of the required additional public spending to achieve the MDGs.

In the scenario where all of the goals are achieved simultaneously and the government uses tax revenues to finance the new spending, the direct tax burden should increase to 5.6 per cent of GDP in 2015—2.4 percentage points more than in the baseline scenario. The fiscal deficit would be kept at around 1 per cent of GDP. As a result, private savings and investment fall moderately as a percentage of GDP and growth in real GDP falls to a rate slightly below the baseline (see Table 12.5).

For Peru to be able to finance the new public spending through foreign grants, the required aid transfers would need to be 2.7 per cent of GDP or 248 soles per person in 2015—2 percentage points of GDP and 233 soles per person more than in the baseline scenario. In the MDG scenario with external borrowing, the flow of foreign loans would need to increase from 0.01 per cent of GDP in the baseline scenario to 2.6 per cent of GDP by 2015. The external debt-to-GDP ratio would increase in this scenario to 34.2 per cent of GDP in 2015, up from 23.2 per cent in the baseline. Finally, under the domestic borrowing scenario, the government would need to mobilize 4.2 per cent of GDP from domestic capital markets by 2015, up from 1 per cent of GDP in the baseline scenario. The domestic public debt would increase to 27.6 per cent of GDP by 2015 in this scenario, as compared with 14.5 per cent of GDP in the baseline. As Table 12.5 shows, the fiscal deficit would increase substantially in these three alternative financing scenarios.

Two additional comments must be made with respect to the fiscal deficit. First, the injection of public spending that is allocated to non-tradable sectors of the economy exercises pressure on the exchange rate, which tends to appreciate in all scenarios. This effect tends to intensify when external resources are used to finance the additional public spending and, consequently, export sectors are also affected more strongly.[10] As a further result, export-tax revenue and taxes levied on export production are lower than in the scenarios with domestic financing. Nonetheless, the fiscal deficit (as a share of GDP) is larger under the scenario where domestic borrowing is used, as can be seen in Table 12.5. This outcome is caused by the "crowding-out" effect on private investment of this source of funding. Private investment drops by around 3 percentage points of GDP towards the end of the projected period with consequences in the form of a lower rate of output growth and less overall tax revenue as compared with the baseline and the other financing scenarios.

Table 12.5 Peru: Summary of macroeconomic results in selected simulated scenarios

		Scenario where MDGs are financed through:			
	Baseline scenario	**direct taxes**	**foreign assistance**	**external borrowing**	**internal borrowing**
Government revenue (% GDP, 2015)					
Direct tax revenue	3.20	5.60	3.20	3.20	3.20
Total tax revenue	11.90	14.30	11.90	11.90	11.90
Transfers from the rest of the world	0.70	0.70	2.70	0.60	0.70
Domestic borrowing	1.00	1.00	1.00	1.00	4.20
External borrowing	0.01	0.01	0.01	2.61	0.01
Savings and investment (% GDP, 2015)					
Private savings	16.57	16.25	16.64	16.64	16.76
Private investment	15.78	15.45	15.84	15.84	12.90
Public savings	1.08	1.74	-0.28	-0.79	-1.26
Public investment	2.19	2.86	2.83	2.83	2.93
Fiscal deficit	-1.10	-1.12	-3.12	-3.62	-4.19
External savings	0.30	0.31	2.26	2.75	0.32
Foreign aid (soles per person)	14.51	14.51	248.22	14.51	14.51
Annual average growth rate (%, 2004 – 2015)					
GDP	4.83	4.65	4.72	4.72	4.39
Consumption	4.89	4.50	4.82	4.82	4.53
Investment	4.60	4.59	4.85	4.85	2.99
Government spending	2.68	4.05	3.90	3.90	4.03
Exports	5.13	4.84	4.11	4.11	4.56
Imports	4.21	3.92	4.14	4.14	3.64

Source: MAMS for Peru.

Given the restrictions on public finances imposed by the Fiscal Transparency and Responsibility Law and the macroeconomic trade-offs generated by the alternative financing scenarios, increasing tax revenue would seem the preferred financing strategy for achieving the MDGs, despite the fact that in this case the required additional public spending would be slightly higher as a share of GDP than in the case of the other financing options. This finding is consistent with the Multi-annual Macroeconomic Framework (2007-09), as defined prior to the 2008 global economic crisis. The Framework specifies measures aimed at expanding the tax base and envisages the possibility of increasing the tax burden to near 14 per cent of GDP. This tax burden is, in fact, quite close to what is required for the year 2015 in the tax-financed MDG scenario (see Table 12.5).

Microsimulations

Like most computable general equilibrium models, MAMS does not measure intra-household income distribution. The SAM for Peru only has one representative household and even with more groups the model would still not provide enough detail about changes in the income distribution in order to be able to to estimate the implications for poverty with any precision. To overcome this limitation, the microsimulation methodology described in Appendix A2.1 of Chapter 2 was applied to study the changes in income poverty for each of the scenarios discussed in the previous section. Using this methodology, the labour market outcomes of each scenario simulated with MAMS were linked to household survey data with information about the complete income distribution. The survey used was the 2004 ENAHO.[11]

The main results for the tax-financed MDG scenarios are shown in Table 12.[12] Poverty as measured through the one-dollar-per-day poverty line (at PPP) would fall from 3.98 per cent in 2004 to 3.33 per cent in 2015. Consequently, the target for MDG 1 would be achievable. Extreme poverty as measured through the international poverty line was 6.6 per cent in 1990, leading to a target of 3.3 per cent for 2015. The target for halving poverty as measured by the line of two dollars per person per day (at PPP) would also be achieved. In this case, the indicator would fall from 26.1 per cent around 1990 to about 11.6 per cent in 2015 under the tax-financed MDG scenario. However, indicators for moderate and extreme poverty, as measured by national poverty lines (which would be more relevant for national discussion), fall by less than 50 per cent between 1990 and 2015, as shown in Table 12.6.

The decomposition of the microsimulation results by sequential effects of the simulated changes in the labour market helps to provide more insight into which effect has the largest impact on poverty and inequality. The MDG strategy would lead to a change in the employment structure by sector (the S effect) towards non-tradable activities including those with lower average labour incomes. Taken in isolation, this effect would lead to an increase in poverty. Changes in the relative labour income across sectors (the W1 effect) enhance this impact, especially as average earnings of unskilled and semi-skilled workers fall relative to the mean (Table 12.6). This is so because the supply of these two types of worker increases faster than that of skilled workers during the simulation period.13 Furthermore, the demand grows faster than the supply for skilled workers as more teachers and medical personnel are being hired for the implementation of the MDG strategy.

In contrast, growth of average real labour income (at 2.6 per cent per year) and per capita household income (at 4.3 per cent per year) help reduce poverty. The rate of real wage growth (W2 effect) is similar to that of GDP in the tax-financed MDG scenario (4.65 per cent per year) and higher than growth of the

Table 12.6 Peru: Summary of microsimulation results in base year and tax-financed MDG scenarios

Indicator	Base year (2004)	Sum of sequential effects (2015)[a]			
		S	S+W1	S+W1+W2	S+W1+W2+M
Poverty incidence (% of population):					
1 dollar a day poverty line (at PPP)	3.98	5.53	6.03	2.91	3.33
2 dollars a day poverty line (at PPP)	17.38	19.00	20.66	11.13	11.60
National moderate poverty line	53.63	54.17	56.11	37.05	37.59
National extreme poverty line	26.79	28.29	30.37	16.81	17.31
Gini coefficient					
Per capita household income	0.51	0.52	0.54	0.54	0.54
Labour income	0.56	0.56	0.57	0.57	0.57
Average income (new soles)					
Per capita household income	331	328	328	537	525
Labour income per worker	1,385	1,376	1,376	1,869	1,839

Source: MAMS for Peru and microsimulations based on 2004 ENAHO data.

[a] Sequential effects in the structure of employment by sector (S), the structure of remunerations by sector (W1), average labour income (W2), and the employment structure by skill level (M). The last step of the sequence of cumulative effects measures the final impact on the quantification of poverty and inequality.

total labour force (about 2 per cent per year). As indicated above, the change in the composition of the labour force by skill level (M effect) would have a mild poverty-increasing effect, but on balance the poverty incidence would fall between 2004 and 2015 owing to the real wage increase.

Yet, as analyzed in greater detail in Castro and Yamada (2006), the decline in the incidence of extreme poverty as measured by the one-dollar-per-day poverty line would be somewhat weaker in the MDG strategy than in the baseline scenario. In the baseline scenario the extreme poverty incidence would fall to 3.02 per cent (as opposed to 3.33 per cent in the tax-financed MDG scenario). This outcome is the result of the much weaker employment shift in favour of jobs in the non-tradable sector and remuneration shift in favour of skilled workers (S+W1) in the baseline.

These findings suggest that more active policies are needed to achieve MDG 1 alongside the other MDGs. One option would be to introduce measures that

would accelerate the rate of growth of the economy. A further analysis using MAMS for Peru and the microsimulation methodology suggests that the economy would need to expand by 7 per cent per year through the year 2015 in order to meet the poverty reduction targets when measuring poverty through the national income thresholds. In such a scenario of fast growth, the incidence of extreme poverty would fall to 11.83 per cent in 2015 and that for moderate poverty to 26.98 per cent. The faster growth would facilitate stronger real labour income growth which in turn would foster the indicated poverty reduction. Higher economic growth would also have a positive impact on the probability of enrolment in higher education. This would lead over time to an accelerated increase in the supply of skilled workers. At the same time, higher incomes would allow families to invest more themselves in education, which in turn reduces the fiscal effort that would be required to reach the target for primary education. As a result, the additional annual average public spending required to meet the MDGs would decrease to 0.49 per cent of GDP, almost half of the amount required in the scenarios where the economy grows at near 5 per cent per year (see Table 12.4).

Conclusions and policy recommendations

The analysis carried out in this chapter, based on the scenarios simulated through MAMS, indicates that in the case of Peru, it would be possible to achieve the MDGs of primary education, child mortality, and water and sanitation at affordable cost through further expansion of the provision of social services. In a scenario where the economy grows at a pace of 4.7 per cent per year, the additional public spending required for reaching the goals in those areas would be around 0.95 per cent of GDP per year when financed through an increase in direct taxes. This cost would be 40 per cent higher if the MDGs are not pursued simultaneously but sequentially, showing that there are important synergies between improvements in education, health, and water and sanitation.

At the same time, however, the findings also show that it would not be possible to ensure that all children begin and complete primary school on time by the year 2015, primarily because of the difficulties in introducing additional improvements to the probability of graduating from primary school, which already has quite a high level in the base year for the model (2004), and whose natural limit may be below 100 per cent. Results also show, however, that an expansion in education services would permit a considerable increase in the percentage of children who enrol in primary school at the mandatory age and that this would ensure that the percentage of children who complete primary school by 13 years of age (with a one year delay) could increase to close to 96 per cent in 2015. For all practical purposes, we consider this as a more realistic target for MDG 2 in the case of Peru.

Given the commitment of the Peruvian government to fiscal discipline and macroeconomic stability, the required increase in public spending may best be financed through an increase in the tax burden. The model simulations show that this burden would need to increase by close to 1.3 percentage points of GDP on average between 2004 and 2015. However, since the marginal returns of the interventions would diminish when getting closer to the MDG targets towards the end of the period (2015), the cost would be higher and the tax burden would need to be increased by around 2.4 percentage points of GDP.

The analysis further shows that MDG 1 would be achieved if the poverty incidence is measured through the international poverty lines of one or two dollars per day, though the degree of poverty reduction would be less than in the baseline because of the employment and remuneration shifts in favour of non-traded sectors and skilled workers under the MDG strategy. When using the national poverty lines, however, the poverty reduction target would not be met; neither in the baseline nor in the MDG scenarios. In other words, achieving the goals for education, health, water and sanitation by themselves does not contribute to poverty reduction within the given simulation period. In fact, the indicated shift in the labour market leads to higher income inequality thereby limiting the impact of overall economic growth on poverty reduction.

The economy would need to grow at an average rate of 7 per cent per year between 2004 and 2015 in order to halve both moderate and extreme poverty (measured by the national poverty lines) by 2015 (from 1990 levels). However, sustained economic growth at a pace of 7 per cent per year seems rather ambitious by historic standards. Peru's economic history has not seen any decade during which growth rates of more than 5.5 per cent on average per year could be sustained. In fact, such rates of growth were achieved only during the 1950s and 1960s.

Therefore, in addition to short-term policies of income transfers for the most vulnerable groups, Peru would have to consider more aggressive long-term policies aiming at a redistribution of incomes and assets. Accelerated progress in education at all levels for the poorer segments of the population would be one element of such policies. The results of the present analysis suggest that progress towards MDG 2 could be poverty enhancing in the short run. In the medium to long run, however, a greater supply of skilled labour will not only contribute to reducing existing wage gaps, and thereby income poverty, but would also contribute to productivity increases through increased availability and quality of human capital. This increase in human capital would, in turn, increase the capacity of families to generate wealth and underpin faster economic growth.

Appendix A12

Table A12.1 Elasticities of MDG determinants as used in MAMS for Peru

	Determinants								
	QES[a]	WGS	WGT	MDG4	PCS	PCH	MDG 7a	MDG 7b	PCW
MDG 2: Probability that a child (6 years old) will enrol in first grade of primary school[a]	0.0661	0.0000	0.0000	0.0000	0.2211	--	0.0431	--	--
Probability of completing (passing) a grade of primary school	0.0057	0.0221	0.0000	-0.0206	0.0157	--	0.0075	0.0054	--
Probability of completing (passing) a grade of secondary school	0.0057	0.0221	0.0000	-0.0206	0.0157	--	0.0075	0.0054	--
Probability of completing (passing) a grade of higher education[a]	0.0057	0.0221	0.0000	-0.0206	0.0157	--	0.0075	0.0054	--
Probability of graduating from the last grade of primary school and continuing on to secondary school[a]	0.1399	0.0000	0.0000	0.0000	0.0000	--	--	--	--
Probability of completing the last year secondary school and continuing on to higher education.	0.0366	0.0000	0.0000	0.0000	0.8861	--	--	--	--
MDG 4: Probability of child death before reaching 5 years of age.	--	--	--	--	-0.0777	-0.1681	0.0000	-0.3219	--
MDG 7a: Percentage of the population with sustainable access to drinking water	--	--	--	--	0.0000	--	--	--	0.0030
MDG 7b: Percentage of population with access to basic sanitation services	--	--	--	--	0.0000	--	--	--	0.0086

Source: Authors' estimates.

Abbreviations: QES: Quality of education services; WGS: Wage gap: Secondary vs. no education; WGT: Wage gap: Tertiary vs. secondary; MDG4: Under-five child mortality; PCS: Per capita household spending; PCH: Per capita supply of aggregate health goods and services; PCW: Per capita supply of water and sanitation services.

Table A12.2 Elasticities of demand and supply behaviour used in MAMS for Peru

Description	Value	Source
Demand		
Armington elasticity	0.454	Econometric estimates
Supply		
Constant elasticity of transformation of supply for domestic and export markets	0.933	Econometric estimates
Output aggregation elasticity by commodity	4.000	MEF (2004)
Production functions		
Substitution between factors for each activity		
Agriculture	0.750	MEF (2004)
Mining	0.500	MEF (2004)
Manufacturing	1.000	MEF (2004)
Other activities	1.250	MEF (2004)
Substitution between value added and intermediate inputs for each activity.	0.600	MEF (2004)
Consumption and savings		
Elasticities of consumer demand with respect to total expenditures (LES)		
Minerals and manufactured products	1.000	MEF (2004)
Other private goods.	0.850	MEF (2004)
Elasticity of private savings with respect to per capita income	0.943	Econometric estimates

Sources: Authors' calculations and MEF (2004).

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Notes

1 Shocks that have affected the Peruvian economy in the past on a regular basis include the El Niño and La Niña climate phenomena, deteriorating terms of trade, international financial crises, and internal institutional and political crises.

2 This study used the database from the 2004 National Household Survey (ENAHO) made available in the first half of 2006.

3 Peru ranked next to last in Latin America on the 2001 international reading comprehension tests (PISA) with grades 20 per cent below the average for the region (Cotlear, 2006).

4 According to United Nations data, there were approximately 410 maternal deaths per 100,000 live births in Peru in the year 2000. However, there is no reliable comparable information to assess how the indicator has changed over time.

5 Data on service coverage were derived from the ENAHO surveys for 1999-2004. Access to water and sanitation services for urban households was defined as adequate where people reported having a connection to the public system inside their house. For rural households, adequate water and sanitation services was considered having access to a well (or something better) and a latrine (or better), respectively. The public investment figures for water and sanitation services are those reported by the Integrated System for Public Financial Management (SIAF-SP). The elasticities estimated for access to water and sanitation with respect to units of per capita investment in these services are 0.003 and 0.00857, respectively.

6 Given the way in which the indicator for MDG 2 (percentage of children who complete primary school on time) is conceived in the model, an increase in the probability of primary school enrolment has an impact on the percentage of children who complete primary school on time after six years (the length of the primary school cycle). At the same time, it is worth emphasizing that the final value of the indicator is particularly sensitive to changes in the probability of completing each year of primary school. In fact, this probability must be quite close to one starting in 2010 for the percentage of children who complete school on time to approach the goal of 100 per cent in 2015.

7 At high values for the probability of completing each year of primary school, it can be expected that the students' performance will be a function of a set of family characteristics that are difficult to quantify (such as the level of motivation and discipline) and which lie outside the sphere of influence of public policy. Therefore, it is not very realistic to expect that 100 per cent of the children enrolled in a particular grade of primary school will complete that grade successfully on the first try. While the drop-out rate may approach zero as a result of improvements in educational services and household income, the same is not true for the rate of grade repetition. The reduced elasticity of the probability of completing each year of primary school with respect to the provision of these services (validated through the econometric analysis) reflects this reality.

8 The use of these contemporaneous values is the equivalent of projecting the percentage of children who would complete primary school at 12 and 13 years of age, under the assumption that the probability of completion would stay constant during the next six and seven years, respectively. Given that the probability of dropping out is quite low in the base year (0.5 per cent), the probability (Pr) of completing primary school at 13 years of age (since the child enrolled on time) was approximated using the following procedure: Pr(enrolling on time) *[Pr(completing primary school in six tries) + Pr(completing primary school in seven tries, after not completing in six)].

9 Additional public spending, with respect to the baseline scenario, corresponds to the average of the four scenarios in which the sources of financing are, respectively, direct taxes, foreign assistance, public external borrowing, and public internal borrowing.

10 For more details on the exchange-rate adjustment created by public spending associated with the MDGs, see Chapter 2.

11 As explained in the Appendix to Chapter 2, MAMS simulates various changes in labour market parameters, which will impact on income inequality and poverty at the household level. Changes in the unemployment rate were not included, because, as indicated in the second section of this chapter, open unemployment is not the main source of employment problems in Peru.

12 We only assess the results for the tax-financing scenarios here since, as indicated in the previous section, raising taxes would appear to be the preferred MDG financing strategy. Nonetheless, it should be noted that the poverty and inequality outcomes of this scenario are quite similar to those of the alternative financing scenarios for the other financing options.

13 The supply of unskilled, semi-skilled and skilled labour increases, respectively, by 1.99 per cent, 2 per cent and 1.64 per cent per year, between 2004 and 2015.

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Index