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Public Policies for the MDGs: The Case of the Dominican Republic

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Documento de Trabajo Nro. 72
Julio, 2008

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October 7, 2007

Introduction[1]

The Dominican Republic (DR) has committed itself to work towards reaching the Millennium Development Goals (MDGs) by 2015. Recent data indicate that the DR has made considerable progress on the MDGs but that an acceleration of efforts is needed for the country to reach all the goals.[2] This chapter focuses on two key questions: Will the DR achieve all of the MDGs under current policies and trends? If not, what policy changes are needed to achieve the MDGs and at what cost? The second question incorporates alternative assumptions about the sources (domestic or foreign) of required additional government financing. We address these questions using MAMS (MAquette for MDG Simulations[3]), a dynamic-recursive computable general equilibrium (CGE) model for country strategy analysis, and a micro-simulation model. Such an economywide approach is needed given that the simulated policy changes have strong effects throughout the economy.

Section 1 below provides background on the general economy and MDGs since 1990. Section 2 presents our methods and database, and Section 3 the simulations and an analysis of their results. Section 4 concludes with a summary of our main findings.

1. Economic Performance and MDG Trends

Table 1 summarizes the performance of the DR economy for 1990-2004, comparing it to the Latin American and Caribbean (LAC) Region. For the period as a whole, growth in the DR was rapid and quite even across the main sectors although strongest in services, followed by industry and lastly agriculture. These tendencies are also reflected in similar

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[2] UN (2004).

[3] Lofgren and Diaz-Bonilla (2006).

employment shifts by sector. In addition, the population became increasingly urban. Relative to GDP, private consumption declined. The share of final demand absorbed by the government increased although, relative to the LAC region as a whole, this share is still below average – in 2004, the GDP share for the sum of government consumption and investment was 13.7% for the DR and 16.1% for the LAC region. The trade deficit

Table 1. Growth and structural change in the DR and the LAC Region, 1990-2004.

	Dominican Republic			LAC		
	% of GDP		Real growth per	% of GDP		Real growth per
Item	1990	2004	year 1990-2004*	1990	2004	year 1990-2004*
GDP at market prices	100.0	100.0	4.8	100.0	100.0	2.9
Consumption	84.7	75.4	3.7	78.4	76.0	2.8
Private	80.4	66.6	3.6	66.7	61.7	2.9
Public	4.3	8.9	4.9	11.6	14.3	1.7
Investment	25.1	24.3	5.3	19.4	21.1	4.0
Fixed	24.9	24.0	5.2		15.7	
Private	19.0	19.1	5.7		13.4	
Public	5.9	4.9	4.2		2.3	
Stock change	0.2	0.3	10.9			
Exports	33.8	49.3	6.7	17.1	25.6	7.2
Imports	43.7	49.0	4.9	14.8	22.7	8.1
Trade Openness	77.5	98.2		31.9	48.4	
FDI (net)	1.9	3.5		0.8	3.0	
Transfers (net)	5.2	13.5				
Official	0.8	0.7				
Private	4.5	12.8				
Foreign Debt (US$ billion)	4.4	7.0	0.7	444.6	779.0	
% of exports	195.8	59.0		240.2	131.1	
% of GNI	64.7	40.5		42.2	40.1	
Tax revenue**	10.3	14.7		12.3		
Goods and services	2.7	6.9		5.0		
Income	2.6	4.1		3.4		
Trade	4.9	3.5		2.9		
Other	0.2	0.3		1.0		
Public spending						
Education	na	1.1				
Health**	na	2.3				
Value-added (% of total)	100.0	100.0	4.5	100.1	100.0	2.67
Agriculture	13.4	11.6	3.8	9.0	8.5	2.20
Industry	31.4	29.5	4.4	35.8	34.0	2.75
Services	55.2	58.8	5.3	55.4	57.5	2.70
Employment (% of total)**	100.0	100.0	2.6	100.0	100.0	2.7
Agriculture	20.3	14.1	0.3	18.3	17.7	2.1
Industry	22.9	22.6	1.8	25.9	21.7	1.5
Services	56.7	63.4	3.5	55.9	60.6	3.7
Household consumption p/cap (US$2000)	1420.4	1726.8	1.4	2093.2	2500.2	1.3
Population (million)	7.1	8.8	1.9	437.6	544.1	1.6
Rural (%)	44.8	34.1	-0.4	29.1	23.2	
Urban (%)	55.2	65.9	2.8	70.9	76.8	
Migrants abroad (% of population)**	1.5	1.6		0.8	0.7	

*Notes: *Real growth refers to growth in constant LCU, dollars, or physical units (not growth in the share of a total).*
***Tax revenue and health spending data: 2003; migrants abroad data: 2000; 1990 employment data: 1991.*
Source: World Bank, World Development Indicators 2006

declined (as a % of GDP) and was close to zero in 2004 as real export growth exceeded import growth over time with similar price changes (in foreign currency). The economy

became more open to trade.[4] Private transfers from abroad grew in importance. Although at a much lower level, growth in Foreign Direct Investment (FDI) was also respectable. According to standard indicators, external debt sustainability improved drastically. Trade taxes (almost exclusively on imports) became less important and domestic taxes more so.

As shown in Figure 1, other than 1990 and the temporary slowdown in 1993-1994, the 1990s saw rapid growth. This success and the overall quite positive changes during the 1990s may at least in part be attributed to a macroeconomic stabilization and structural adjustment program, which was launched in 1990 and encouraged increased openness driven by FDI in Free-Trade Zones (FTZs) and tourism (Figure 2).[5] The new millennium got off to a less shining start. Although the slow-down was induced by exogenous shocks (including the increase in oil prices and the negative impact of September 11 on tourism), it was aggravated by domestic factors. The latter included an expansion of government deficits and the monetary base (partly driven by a crisis in the banking and electricity sectors). Fiscal restraint restricted social sector spending, which is central to MDG achievements. In the wake of the 2003 crisis, policy makers were also concerned about the ability of the FTZ and tourism sectors to sustain rapid growth in the future. For the FTZs, stiff competition from world textile markets is a particular cause of concern.

Figure 1: GDP at factor cost, 1990-2004

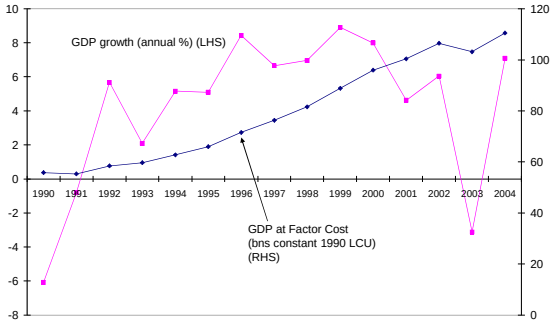
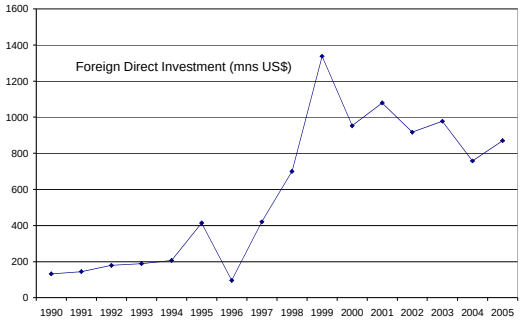


Figure 2: FDI, 1990-2004



[4] Trade openness, measured as the percent of the sum of exports and imports in GDP, has varied quite strongly on a year-to-year basis in response to variability in the exchange rate, exports, and imports. Nevertheless, for the period 1990-2005 (and 1990-2004) the trend is toward increased openness.
[5] Aristy-Escuder (1999).

Table 2 provides additional information about the structure of the DR economy in 2004. Services (dominated by the private sector) have the largest shares of value-added and employment, followed by industry and then agriculture. The FTZs represent a large share of industry, so as a result, industry exports a large share of its output. The size of the FTZs and their heavy reliance on imported industrial intermediates contribute to the fact that a large share of domestic demand for industrial commodities is satisfied via imports. Industry is therefore highly integrated with the international economy and accounts for most exports and imports, although exports are also important for private services. On the contrary, (unprocessed) agricultural products are not traded to any significant extent.

Table 2. Structure of value-added, employment and trade in the DR, 2004 (%).

	Share in				Share of	
					sector output	domestic demand met
Sector	value-added	employment	export	import	for exports	by imports
Agriculture	11.4	14.1	2.1	1.9	6.1	7.9
Industry	25.7	22.6	60.4	91.9	46.9	59.2
Services - government	5.1	16.9				
education - primary	0.5	1.6				
education - secondary	0.3	0.7				
education - tertiary	0.1	0.3				
health	0.8	2.2				
water-sanitation	0.01	0.02				
other infrastructure	0.1	0.4				
other	3.2	11.7				
Services - private	57.9	46.4	37.5	6.2	42.9	4.8
education - primary	0.6	1.6				
education - secondary	0.3	0.8				
education - tertiary	0.2	0.3				
health	2.2	3.9	1.0		19.9	
other	54.6	39.8	36.4	6.2	23.0	4.8
Total	100.0	100.0	100.0	100.0	29.8	31.5

Source: MAMS database -- SAM for 2004 and employment data.

Table 3 shows data for key MDG indicators in 1990 (MDG values for this year determine most MDG targets) and 2004 (the base year for our analysis), as well as the 2015 target values. As shown, MDG 7b has already been achieved. Assuming that past trends

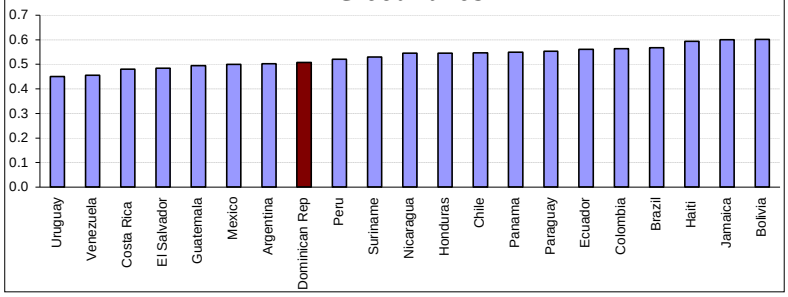
Table 3. Key MDG Indicators for the Dominican Republic.

	1990[a]	2004[a]	2015[b]
MDG 1: Poverty Rate (% of population)[c]	28.6	43.1	14.3
MDG 2: Primary School Completion Rate (% of relevant cohort)[d]	22	53	100
MDG 4: Under-five mortality rate (per 1,000 births)	58	38	19
MDG 5: Maternal mortality rate (per 100,000 live births)	229	178	57
MDG 7a: Access to safe water (% of population)	83	86	91.5
MDG 7b: Access to improved sanitation (% of population)	60	90	80

Note: a. Nearest available year if data is not available for 1990 or 2004; b. Relative to the values for 1990, the 2015 targets are: cut MDG1 by half, MDG 4 by 2/3, and MDG 5 by 3/4; cut by half the shares of the population without access to water and sanitation (MDGs 7a and 7b); and achieve 100% completion (or close to this) for MDG 2; c. The poverty rate in 1990 column is for 1998 – see text for a discussion. d. The 1990 and 2004 values correspond to the (strict) definition of the completion rate: the proportion of students of the correct age cohort (i.e., no out-of-cohort older students) that enter first grade and successfully complete on-time (i.e., without repeating) all 8 grades of primary school.

continue, MDGs 4 and 7a would be close to being achieved (by 2015) whereas, in spite of considerable progress, full achievement of MDGs 2 and 5 may be more difficult. The poverty figure in the 1990 column is the World Bank's poverty estimate for 1998 based on the cost of basic needs method (World Bank, 2001).[6] The 2004 estimate of 43.1% is based on the most recent Poverty Assessment for the DR using the same estimation method, but also correcting for income problems in the survey (World Bank and Inter-American Development Bank, 2006).[7,8] The extreme poverty rate for 2004 was estimated at 16.2%. For comparison, using instead the international $1PPP (purchasing power parity) line, the extreme poverty rate was about 3.3% in 2004. Inequality, measured by the Gini coefficient, has been stable over time. Compared to other countries in the LAC region, inequality is relatively low (see Figure 3). From a more disaggregated perspective, the achievements in rural areas are lagging for all of these indicators. For example, according to Dauhajre et al. (1994), the 1992 headcount rates were at 30% in rural areas and 11% in urban areas. The WB-IDB headcount poverty rates for 2004 (post-2003 crisis) were 57.5% in rural areas and 35% in urban areas – showing that more than half the rural population is poor (WB-IDB, 2006). Similarly, performance is weaker in rural areas in terms of rates of school completion, mortality, and access to water and sanitation (UN, 2004).

Figure 3: Gini coefficient household per capita income LAC countries



Source: SEDLAC (2006).Note: Latest available year for each country.

[6] The lack of poverty data is symptomatic of a general lack of data on the evolution of MDG indicators over time, making it difficult to evaluate policies and prioritize actions. Strengthening the institutional framework of the national statistical system is listed among the DR's challenges and priorities (UN, 2004).
[7] The cost of the basic basket of goods for the poverty and extreme poverty line were estimated using the DR's national living conditions survey (ENCOVI) for April 2004, and family incomes were estimated using a labor force survey (Encuesta de Fuerza Trabajo – ENFT) for 2000-2006 (WB-IDB, 2006).
[8] The ENFT was not designed to measure household income (underestimates it) or poverty (overestimates it). Therefore, the WB-IDB Poverty Assessment corrects problems such as missing remittances income.

The DR has eliminated inequality in school attendance disfavoring women – if the MDG for gender equality in schooling is defined with this target, then it is already achieved. In 2001/02, females were more strongly represented than males at all levels. For 6-13 year olds – the primary age cohort – the 2001/02 attendance rates are 87% for girls versus 84% for boys. For 14-17 year olds – the secondary age cohorts – the difference was even larger with female attendance at 40% and male attendance at 29% (ENDESA, 2002). However, at higher levels of education, women are overrepresented in fields where graduates earn lower salaries like secretarial studies and nursing.

MDG 1 (poverty reduction) will mainly be affected by increases in employment and labor incomes that, in turn, depend on the rate and pattern of economic growth. For the other MDGs, accelerated progress requires increased provision of sector-specific services and related investments, especially in rural areas (UN, 2004). For example, in primary education (MDG 2), improved educational quality and expanded capacity are the keys to necessary increases in entry rates and reductions in dropout and (most importantly for the DR) repetition rates.[9] Increases in the number of primary school graduates will lead to growing demand for secondary and tertiary education, requiring expansion also at these higher levels.[10] With regard to MDGs 4 and 5, the government has noted that reduced mortality rates require improvements in basic health knowledge, immunization programs, obstetric care, and in the supervision of births by health workers. Accordingly, the government has in recent years launched a series of programs aimed at reducing poverty and making progress in other MDG areas (UN, 2004).[11]

[9] Because of late entry and especially because of high repetition rates, 20.7% of students are on average 3 or more years older than the correct age cohort for primary school (UN, 2004).
[10] In the DR, primary education is eight years, followed by four years each of secondary and tertiary cycles.
[11] Recent government programs include: “Programa de Inversión Social” (February 2001), “Plan Nacional de Alimentación y Nutrición 1998-2005”, “Estrategia Nacional para la Reducción de la Pobreza” (June 2003), and “Comer es Primero” (October 2004).

2. Methodology and data

Our quantitative analysis is based on MAMS, a dynamic-recursive computable general equilibrium (CGE) model, and a microsimulation model. The simulations are done for the period 2004-2015. MAMS integrates a relatively standard dynamic-recursive computable general equilibrium (CGE) model with an additional MDG module that links MDG indicators to a set of determinants. To be able to make this link, MAMS has a relatively detailed treatment of (a) government activities and private sector activities in health and education; and (b) MDG outcomes as a function of relevant services (provided by the government and private sectors) and other determinants. We follow the sequential "top-down" approach suggested by Robilliard et al. (2001) in order to link MAMS with the microsimulation model. For a detailed description of MAMS and the microsimulation model, see Chapters ?? and ??, respectively, in this volume. We will here only describe the DR-specific database for both models.

The Dominican Republic MAMS is based on a 2004 disaggregated Social Accounting Matrix (SAM) (estimated for this project), and other supplementary data (explained below). Table 4 shows the accounts in the SAM, which in this and other applications of MAMS determine the disaggregation of the model. The government is disaggregated into seven activities: three types of education (primary, secondary, and tertiary cycles), health, water-sanitation, (other) infrastructure, and other government services. Because of our focus on MDG issues, the private service sector is disaggregated into three education activities (also split along the primary,

Table 4: Accounts in the DR 2004 Social Accounting Matrix

Activities/Commodities (14)	**Institutions (3)**	**Investment Accounts**
Private (7)	Household	*Private (1)*
Agriculture	Government	*Government (7)*
Industry	Rest of World	Primary Education
Private Services*		Secondary Education
Primary Education		Tertiary Education
Secondary Education	**Savings Accounts (3)**	Health
Tertiary Education	Household	Water and Sanitation
Health	Government	Other Public Infrastructure
Government (7)	Rest of World	Other Government Services
Primary Education		
Secondary Education	**Capital Accounts (3)**	**Other Accounts (2)**
Tertiary Education	Household	Domestic Interest Payments
Health	Government	Foreign Interest Payments
Water and Sanitation	Rest of World	
Other Public Infrastructure		
Other Government Services		
Factors of Production (5)	**Tax Accounts (4)**	
Unskilled Labor	Direct taxes	
Semi-skilled Labor	Export taxes	
Skilled Labor	Import taxes	
Land	Other indirect taxes	
Private Capital		

**Non-education, non-health*

secondary, and tertiary cycles) and a private health activity. This is especially important in the DR and most other Latin American countries, where private provision of education and health are important components of the total level of services. The rest of the economy is disaggregated into agriculture, industry, and private non-education non-health services. For these sectors, output is exported and sold domestically, competing with imports.

Among the factors of production, there are three types of labor: those with less than completed secondary education (unskilled), with completed secondary education but incomplete tertiary (semi-skilled), and with complete tertiary (skilled). Each of these labor types is therefore linked directly to the education sectors/cycles, and thus the growth in the labor force will in part depend on the functioning of the education system in the model. The remaining factors include public capital stocks by government activity, a private capital stock, and land.

The institutions include the government, a household (the private domestic institution that represents both households and domestic enterprises), and the rest of the world. Each institution has its own savings and capital accounts. Taxes have been disaggregated into direct, import, export, and other indirect taxes. There is one private investment account and seven public investment accounts (for each government sector). Lastly, the model includes accounts for domestic and foreign interest payments.

The 2004 disaggregated micro SAM for the DR was created in several steps. First, a macro SAM for the country was created using the national accounts, balance of payments accounts, and government fiscal data for 2004 (see Table A.1)[12]. These data sources were reconciled and the macro SAM balanced. Second, the capital accounts for the government and the balance of payments were used to disaggregate the savings-investment account of the macro SAM. The income and expenditure fiscal accounts, supplemented by data from a 2004 Public Expenditure Review (World Bank, 2004a),

[12] Data sources include the World Development Indicators, World Bank; Banco Central de la República Dominicana; Oficina Nacional de Presupuesto, República Dominicana; and Departamento Internacional, Subdirección de Balanza de Pagos, República Dominicana.

provided the information to split the government into the different sectors of interest for our MDG analysis. A Supply and Use Table for 2001/2002 provided data for the Input-Output table, as well as taxes and overall value-added (Oficina Nacional de Estadísticas – ONE, 2002). Census data and labor force surveys were used to generate information on value added by labor type and sector (ONE, 2002 and 2004). Finally, the SAM was balanced using cross-entropy estimation techniques.

Apart from the SAM, the MAMS database includes data related to the different MDGs, the labor market, and various elasticities. Most importantly, the first two data types include levels of service delivery required to meet the different MDGs, stocks of students at different educational levels, stocks of labor by skill (educational achievement), and student behavioral patterns in terms of graduation rates and other indicators. The elasticities include those in production, trade, consumption, and in the different MDG functions (see Table A.2). The elasticities for the MDG functions are informed by a study done for the DR by the Centro de Estudios Distributivos, Laborales y Sociales (CEDLAS) at the Universidad Nacional de La Plata.[13] Reflecting these results, Table 5 shows the determinants in the MAMS functions that define MDG outcomes and the corresponding full elasticities used in the model.

Table 5. Elasticities for the determinants of non-poverty MDGs.

MDG	Service Delivery	Per-Capita Household Consumption	Wage Incentives	Public Infrastructure	Other MDGs
2 Primary Education					
First Grade Entry Rate	0.221	0.074	0.007	0.074	-0.066 (mdg4)
Passing Rates	0.228	0.076	0.076	0.076	-0.053 (mdg4)
Continuation Rates	6.64	16.60	9.96	16.60	-6.64 (mdg4)
4 Under-5 Mortality	-0.789	-0.079		-0.079	-0.158 (mdg7a,b)
5 Maternal Mortality	-1.210	-0.121		-0.121	-0.121 (mdg7a,b)
7a Access to Safe Water	0.091	0.018		0.009	
7b Access to Basic Sanitation	0.023	0.002		0.005	

Note: MAMS has a two-level system to estimate MDG outcomes (see Chapter 3 in this volume for details). The "full" elasticities reported in this table represent the multiplication of the lower and upper level elasticities: i.e., the elasticity of the final MDG value with respect to the intermediate MDG value, times the elasticity of the intermediate MDG value with respect to the determinant listed in the columns above. In addition, the elasticities are location specific (in this case computed at the base year), therefore the closer the base year value of the MDG is to its target, the smaller the elasticity becomes.

[13] Cicowiez and Tornarolli (2006). The probit regression results from this study are available on request. Rather than use the exact point estimates from the econometric partial equilibrium analysis, we use the relative importance of the determinants in choosing the (general equilibrium) elasticities in Table 5. Given we require general equilibrium elasticities, we also take into account several research reports that highlight the importance of certain determinants for the DR's strategy (UN, 2004; WB, 2004a; and WB-IDB, 2006). Sensitivity analysis for the elasticities (for a range of values in line with these various reports) shows that the overall qualitative results and messages do not change.

The determinants include the delivery of relevant services (in education, health, and water-sanitation) and other indicators, also allowing for the presence of synergies between MDGs, i.e. the fact that achievements in terms of one MDG can have an impact on other MDGs. Outside education, service delivery for other MDGs is expressed relative to the size of the population. For MDG 2 the treatment is slightly more complex. The arguments in Table 5 determine the shares of children that enter primary school (out of the cohort of six-year olds), and successfully complete their current grade (out of those enrolled). The shares that repeat their current grade or drop out from it are determined residually. The service level is measured per enrolled student, an indicator of educational quality. MDG 4 is included as a proxy for the health status of those enrolled. Wage incentives, an indicator of payoffs from continued education, are expressed as the ratio between the wages for labor at the next higher and the current levels of education.

MDG 2 is defined as the net (or on-time) completion rate. Given that primary school in the DR is eight years, the MDG target for 2015 requires that all (or very close to all) in the relevant cohort enter school by 2008 and successfully pass their current grade each year from 2008-2015. In other words, the MDG 2 indicator for 2015 is defined as the product of the 2008 grade 1 entry rate and the passing rates for 2008-2015. For the secondary and tertiary cycles, the same set of arguments enter functions that determine the shares of enrolled students that pass as well as the shares of graduates from the previous cycle that enter the first grade of these two cycles. The only difference is that the arguments for services (per enrolled student) and wage incentives are redefined to be relevant to these higher cycles. Across the board, the functions for education and the other MDGs have been calibrated to assure that, under base-year conditions, base-year performance is replicated and that, under a set of other conditions identified by sector studies, the target is fully achieved.[14]

[14] The Dominican Republic's National Planning Office utilized the Needs Assessment tool developed by the Millennium Project to cost the MDGs. (Secretariado Técnico de la Presidencia, ONAPLAN, Modelo de Costos US$ Objetivo del Milenio.) The sectoral costing information for education, health, water-sanitation, and infrastructure provided the initial conditions for the calibration. All other determinants momentarily

The microsimulation model was applied to data from the ENFT – the main household survey in the DR. This survey has been conducted since 1991 by the Banco Central de la República Dominicana. It is nationally representative with a sample size of more than 20,000 inhabitants.

3. Simulations and Results

This section presents the simulations and analyzes the results for both MAMS and the microsimulation model. The first simulation (BASE) addresses the question of whether the DR will achieve all of the MDGs under current policies and trends (Section 4a). The rest of the simulations (Section 4b) focus on the second question: Given that, as we will see, most MDGs are not achieved under a business-as-usual scenario, what policy changes are needed to achieve the MDGs and what are the costs and economywide effects of trying to achieve the MDGs? These simulations focus on one MDG at a time and then on all MDGs together. Each will be run under alternative assumptions about the source of any additional financing that is needed: foreign grants (fg), foreign borrowing (fb), domestic taxes (tax), or domestic borrowing (db) (see Table 6 for the definitions).

Table 6. Definition of MDG simulations

Name	Targeted MDGs	Financing
mdg2-fg	MDG2	foreign grants
mdg2-tax	MDG2	domestic taxes
mdg2-fb	MDG2	foreign borrowing
mdg2-db	MDG2	domestic borrowing
mdg45-fg	MDGs 4 and 5	foreign grants
mdg45-tax	MDGs 4 and 5	domestic taxes
mdg45-fb	MDGs 4 and 5	foreign borrowing
mdg45-db	MDGs 4 and 5	domestic borrowing
mdg7-fg	MDGs 7a and 7b	foreign grants
mdg7-tax	MDGs 7a and 7b	domestic taxes
mdg7-fb	MDGs 7a and 7b	foreign borrowing
mdg7-db	MDGs 7a and 7b	domestic borrowing
mdg-fg	all MDGs	foreign grants
mdg-tax	all MDGs	domestic taxes
mdg-fb	all MDGs	foreign borrowing
mdg-db	all MDGs	domestic borrowing

4a. Base Scenario

The BASE simulation is a business-as-usual scenario. Specific MDG targets are not pursued, and existing policies are left in place. For this simulation, the exogenous part of TFP growth is adjusted to generate an annual growth rate of 5.6% for real GDP at factor

had elasticities of zero, therefore the calibration only depends on service delivery as in the MP costing exercise. For model solutions post-calibration, the other determinants are again allowed to have an effect.

cost, the annual trend growth rate for the period 1970-2004.[15] External factors will have a large impact on whether this growth rate can be realized. According to an analysis by the UNDP (2006), the external factors that may be particularly important are the overall rate of growth in the global economy, the evolution of oil prices, the role played by China in the world textile market (which has a strong bearing on the competitiveness of the FTZs), and the repercussions of the DR-CAFTA Free Trade Agreement.[16] In the BASE scenario, government consumption grows at an exogenous rate of close to 5% per year, i.e., at a rate that is slightly lower than that of real GDP at factor cost. The only exception is education, for which we assume that government consumption is adjusted to assure that educational quality (measured by cycle-specific education services per student) will increase by 50% by 2015 for each cycle. These assumptions are compatible with studies that point to the need to raise educational quality in the DR (UN, 2004, p. 30).

Under the BASE scenario, FDI grows at a higher rate in 2005 and 2006 (drawing on recent data), with an overall growth rate for the period of about 5.6% in foreign currency – i.e., its share of GDP (measured in domestic currency) will only go up (down) if the exchange rate of the DR depreciates (appreciates). Similarly, transfers from the rest of the world to the government and to the private sector are set to grow exogenously at 3% in foreign currency. All remaining transfers between the government and households grow exogenously at the same rate as real GDP. Indirect tax rates are fixed over time. Foreign and domestic borrowing is assumed to increase exogenously over time with the overall economy (with foreign borrowing converting from a net negative to a net positive value).

At the macro level, the model has three balances. For the government, direct taxes are adjusted endogenously to keep the government fiscal account balanced. Private investment is determined endogenously to maintain balance between total savings (from

[15] This estimate, which is courtesy of the UNDP office in the DR, is based on the Central Bank GDP series at constant 1970 prices. The years 1984, 1990, and 2003 were excluded since they were years of severe crisis and not considered representative of the trajectory of the DR economy.
[16] To test the sensitivity of our results to the rate of growth in the BASE scenario, we re-run the different simulations with an alternative BASE in which GDP grows at 4% instead of 5.6%. See the Summary for some comparisons of the results.

different sources) and total investment. The real exchange rate is flexible, assuring equality between total inflows and outflows of foreign exchange. The rule for keeping the government account in balance will change across the MDG simulations. As noted, the government will rely on four alternatives: foreign borrowing, domestic borrowing, direct taxes (the alternative used for BASE), and an endogenous component of transfers from the rest of the world to the government referred to as foreign grants.

In the factor markets, stocks are driven by investment (for private capital) or a combination of demographic factors and the functioning of the educational system (for the different labor types). For factors, flexible rents clear the markets. For the different labor types, the model replicates observed unemployment rates in the BASE year. In other years, the unemployment rate and the wage will typically both change – declines in the unemployment rate will be combined with wage increases and vice versa – unless unemployment is at the minimum level (set at 5%), at which point wage movements will clear the labor market in question. The CPI is the model numéraire – nominal income and price changes should be interpreted in the context of a fixed CPI.

Table 7 summarizes the results for BASE. Figures 4-8 display business-as-usual time paths for several variables. Tables 8 and 9 provide results for sectoral growth and unemployment, respectively, for BASE as well as for all the remaining simulations. Appendix Tables A.3-A.6 provide more detailed information about the evolution of selected variables. As noted above, the annual growth rate is 5.6% for GDP at market price (and also at factor cost). For other macro aggregates, the annual growth rates are approximately 5-6%, relatively high for private demands and imports and relatively low for government demands and exports. Government consumption growth is influenced by the need for gradual improvements in educational quality. The real exchange rate appreciates moderately, by 0.3% per year (from an indexed value of 100 in 2005 to 96.4 in 2015).

At a more disaggregated level, GDP at factor cost grows at around 5-6% for most sectors, on average slightly more rapidly for the private sector than government sectors (Table 8). The main exception is government education where growth is rapid at the tertiary level

but slow at the primary level, primarily due to a gradual decline in out-of-cohort entrants to the first grade and relatively slow growth in the number of six-year olds (the cohort entering first grade). Among the private production sectors, growth is most rapid (around 6% per year) for services, both social (health and education) and other. Growth in agriculture and industry is 4.8% and 4.6%, respectively. The industrial sector is disadvantaged by exchange rate appreciation.

Table 7. Summary of Base Simulation Results

Main Macroeconomic Aggregates*	2004 Values	Units	Annual growth 2004-2015 (%)
GDP at market prices	787	bn LCU	5.6
Total Absorption	780	bn LCU	6.3
Household consumption	574	bn LCU	6.4
Government consumption (total)	44	bn LCU	4.7
Gross capital formation (investment)	163	bn LCU	6.3
- Private	135	bn LCU	6.5
- Public	27	bn LCU	5.3
Exports	381	bn LCU	4.8
Imports	374	bn LCU	6.3
Real exchange rate (index) **	100.0	index	96.4
Labour Market Outcomes			**Annual grw (%)**
Employment	3,210	'000s	3.3
Workers with < completed secondary education	1,773	'000s	2.8
Workers with completed secondary education	990	'000s	3.4
Workers with completed tertiary education	447	'000s	4.8
Real wage***	74,356	LCU	2.1
Workers with < completed secondary education	53,075	LCU	2.6
Workers with completed secondary education	94,623	LCU	2.0
Workers with completed tertiary education	113,888	LCU	0.8
MDG Outcomes			**Value in 2015**
MDG 1: headcount poverty (official poverty line)	43.1	%	26.7
MDG 1: headcount poverty ($1PPP)	7.6	%	3.7
MDG 2: primary school completion****	53.1	%	87.5
MDG 4: under-5 mortality (share of live births)	3.8	per 1,000	2.5
MDG 5: maternal mortality (share of live births)	17.8	per 100,000	9.2
MDG 7a: acess to safe drinking water	86.0	%	91.4
MDG 7b:acess to safe sanitation	90.0	%	91.5
Inequality			**Value in 2015**
Labor income	0.486	Gini coeff	0.472
Per-capita household income	0.532	Gini coeff	0.491

Notes:

*The different macro aggregates are in real terms (at constant base-year LCU)

** Real exchange rate with respect to the CPI in a setting with constant CPI.

*** Wages are real in a setting with constant CPI.

**** Strict definition of completion rate: the share of the age cohort that enter first grade and successfully pass (without repeating) through all eight years of primary school.

Table 8. Growth in real GDP at factor cost by simulation and activity (%)

	Simulation								
Activity	base	mdg2-fg	mdg2-tax	mdg2-fb	mdg2-db	mdg45-fg	mdg45-tax	mdg45-fb	mdg45-db
Agriculture	4.8	4.7	4.7	4.7	4.5	4.5	4.4	4.5	4.0
Industry	4.6	4.6	4.5	4.6	4.3	3.8	4.1	3.8	3.5
Services - government									
education - primary	0.7	1.6	1.6	1.6	1.9	0.7	1.3	0.7	1.3
education - secondary	4.7	5.4	5.5	5.4	5.7	4.9	5.7	4.9	5.6
education - tertiary	8.1	10.1	10.1	10.1	10.3	9.9	10.7	9.9	10.6
health	5.0	5.0	5.0	5.0	5.0	20.9	21.5	20.9	21.4
water-sanitation	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
other infrastructure	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
other	4.8	4.9	4.9	4.9	5.0	4.9	5.0	4.9	4.9
Services - private									
education - primary	5.8	5.9	5.8	5.9	5.6	5.6	5.1	5.6	5.1
education - secondary	6.4	6.4	6.4	6.4	6.2	6.0	5.3	6.0	5.5
education - tertiary	6.5	6.5	6.5	6.5	6.2	6.2	5.6	6.2	5.6
health	6.0	6.1	6.0	6.1	5.8	5.7	5.2	5.7	5.3
other	6.3	6.3	6.2	6.3	5.9	6.2	5.8	6.2	5.0
Total	5.6	5.6	5.6	5.6	5.3	5.6	5.5	5.6	4.8
All government	4.6	4.9	4.9	4.9	4.9	9.2	9.6	9.2	9.6
All private	5.7	5.6	5.6	5.6	5.3	5.4	5.2	5.4	4.5

	Simulation								
Activity	base	mdg7-fg	mdg7-tax	mdg7-fb	mdg7-db	mdg-fg	mdg-tax	mdg-fb	mdg-db
Agriculture	4.8	4.8	4.8	4.8	4.8	4.4	4.3	4.4	3.7
Industry	4.6	4.6	4.6	4.6	4.6	3.8	4.0	3.8	3.1
Services - government									
education - primary	0.7	0.7	0.7	0.7	0.7	1.3	1.9	1.3	2.1
education - secondary	4.7	4.7	4.7	4.7	4.7	5.5	6.4	5.5	6.5
education - tertiary	8.1	8.1	8.1	8.1	8.1	11.6	12.5	11.6	12.7
health	5.0	5.0	5.0	5.0	5.0	20.8	21.5	20.8	21.7
water-sanitation	5.0	5.1	5.1	5.1	5.1	5.1	5.2	5.1	5.3
other infrastructure	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
other	4.8	4.8	4.8	4.8	4.8	5.0	5.0	5.0	5.1
Services - private									
education - primary	5.8	5.8	5.8	5.8	5.8	5.7	5.1	5.7	4.9
education - secondary	6.4	6.4	6.4	6.4	6.4	6.1	5.3	6.1	5.2
education - tertiary	6.5	6.5	6.5	6.5	6.5	6.3	5.5	6.3	5.4
health	6.0	6.0	6.0	6.0	6.0	5.7	5.2	5.7	5.0
other	6.3	6.3	6.3	6.3	6.3	6.1	5.7	6.1	4.5
Total	5.6	5.6	5.6	5.6	5.6	5.6	5.4	5.6	4.5
All government	4.6	4.6	4.6	4.6	4.6	9.3	9.8	9.3	9.9
All private	5.7	5.7	5.7	5.7	5.6	5.3	5.1	5.3	4.1

Table 9: Unemployment rate by labor type and simulation (%)

Year or	**Labor type**			
simulation*	Unskilled	Semiskilled	Skilled	All
2004**	19.0	24.0	14.0	20.0
base	5.6	12.5	11.6	8.9
mdg2-fg	5.0	13.3	12.1	9.0
mdg2-tax	5.0	13.5	12.1	9.1
mdg2-fb	5.0	13.3	12.1	9.0
mdg2-db	5.6	14.2	12.5	9.7
mdg45-fg	5.0	9.0	7.9	6.8
mdg45-tax	5.1	9.3	7.7	6.9
mdg45-fb	5.0	9.0	7.9	6.8
mdg45-db	6.9	10.9	8.6	8.5
mdg7-fg	5.6	12.5	11.6	8.9
mdg7-tax	5.6	12.5	11.6	8.9
mdg7-fb	5.6	12.5	11.6	8.9
mdg7-db	5.6	12.5	11.6	8.9
mdg-fg	5.0	9.8	8.5	7.2
mdg-tax	5.0	10.2	8.2	7.3
mdg-fb	5.0	9.8	8.5	7.2
mdg-db	7.1	12.7	9.5	9.4

*The values for simulations are for 2015.

**2004 values: Banco Central de la Republica Dominicana

For the three labor types, employment growth is in the range of 2.8-4.8% (Table 7) whereas labor force growth is slower at 1.4-2.6%. The growth rates are higher the higher the skill level. Employment growth exceeds labor force growth due to a decline in unemployment, which at the aggregate level decreases from 20% to 9% while the decline at a more disaggregated level is strongest for the lowest skilled (Table 9).

Wage growth rates range between 0.8% and 2.6% with a reversal in order between the three labor types: those with the lowest employment growth enjoy the highest rates of wage growth.

Figure 4: Employment
Baseline simulation

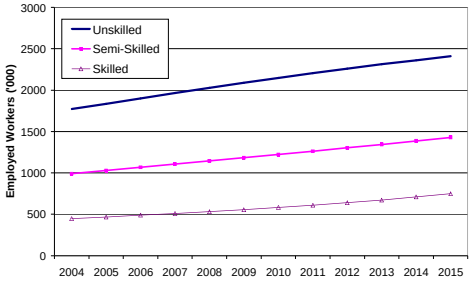
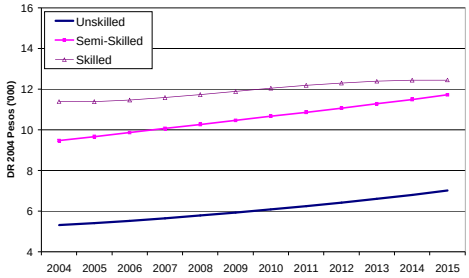
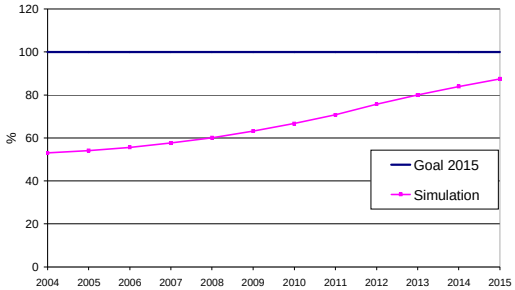


Figure 5: Labor Wages
Baseline simulation



In terms of the MDG targets, the baseline does not achieve any of the MDG targets except sanitation, which had been achieved prior to 2004.[17] However, for all targets, significant improvements are realized between 2005 and 2015. Figures 6-8 show the 2015 targets and the paths over time for MDG 2 (primary completion rate), MDG 4 (the under-five mortality rate; the results for MDG 5 are similar), and MDG 7a (access to safe drinking water). According to the microsimulation results, the poverty rate based on the official poverty line decreases

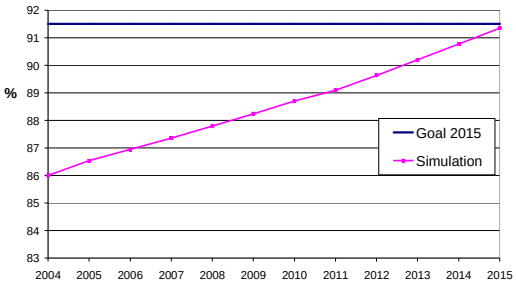
Figure 6: MDG 2: Net Primary Completion Rate.
Target year value and Baseline simulation



[17] According to data estimated by the Panamerican Health Organization/World Health Organization-UNICEF, access to better sanitation increased from 60% in 1990 to 90% in 2000 (UN, 2004). The 60% figure in 1990 implies a target of 80% for 2015.

Figure 7: MDG 4: Under-5 Mortality Rate. Target year value and Baseline simulation

Figure 8: MDG 7a: Access to Safe Drinking Water. Target year value and Baseline simulation



from 43.1% in 2005 to 26.7% in 2015, a strong decline although falling short of the 14% MDG target. Under the $1PPP poverty line, extreme poverty is cut by more than 50% compared to the 2004 rate, and almost reaches its MDG target of 1.3% (which is based on the 1997 $1PPP poverty rate of 2.6%).[18] Thus, it seems to be the case that, as asserted by the government, if historical growth rates continue in the future, the poverty target is within reach. Inequality, measured by the Gini coefficients for labor and household per-capita incomes, also declines-- for the latter from 0.53 in 2004 to 0.49 in 2015. The declines in the poverty rates - for different poverty lines - are primarily due to the decline in the unemployment rate, the decrease in wage gaps due to education differences, and increases in the average wage. The households in the poorest deciles of income distribution in the DR have the highest unemployment rates, therefore they stand to gain the most from decreases in these rates. For this reason, the extreme poor are benefiting the most as can be seen by the larger decrease in extreme poverty versus moderate poverty. For inequality, the main reason behind its decline is the decrease in unemployment rates. However, the decrease in wage gaps by skill level also contributes (see Tables A.7-A.8).

4b. MDG Simulations

The rest of the simulations target the full achievement of one or more of the MDGs. The simulations are divided into four subsets: the first targets MDG 2 (universal primary

[18] Note that there is no information regarding the $1PPP poverty rate in 1990.

education), the second MDGs 4 and 5 (reducing the under-five and maternal mortality rates, respectively), the third MDG 7a (improved access to water; the sanitation target, MDG 7b, has already been reached), and the fourth all of these together. Throughout, MDG 1, the poverty headcount, is not targeted but monitored. Each of the four simulation subsets are carried out with the four alternative sources of marginal government financing that were mentioned in the previous section (foreign grants, domestic taxes, foreign borrowing, and domestic borrowing). The different MDGs are targeted via endogenous variations in government demand (consumption) of the relevant services – primary education services for MDG 2, health for MDGs 4 and 5, and water-sanitation for MDG 7a. The resulting growth in government service production will lead to government investment sufficient to maintain the same growth in government capital stocks (i.e., a Leontief relationship links government service production to government capital demand and stock growth). This is the key difference between these simulations and the BASE simulation, under which government demand growth was exogenous or set to generate a certain improvement in educational quality. This simulation design allows us to assess the effects and costs of achieving each MDG separately as well as of the strength of synergies in the form of lower resource needs and costs when the targets are all pursued together. For the MDG simulations, aggregate GDP growth may deviate from the rates under the BASE scenario due to different growth rates for TFP and factor stocks, as well as changes in labor unemployment rates.

Targeting MDG 2 – Universal Primary Education

The simulation results are summarized in Table 10. Tables 8-9 and Figure 9 provide information on disaggregated sector growth, unemployment, and government spending. (See also Tables A.5-A.6 for information by subperiod on government spending, employment, and wages.[19]) For the first subset of simulations, the GDP share for recurrent and capital spending on primary education expands rapidly during the first half

[19] Since the results are similar for both foreign financing scenarios, and since in terms of domestic financing the results are stronger under the domestic borrowing rather than tax simulations, the results by subperiods focus only on the foreign and domestic borrowing scenarios.

Table 10. Summary of Simulation Results

	2004		BASE & SIMULATION RESULTS FOR THE PERIOD 2004-2015								
			BASE	MDG2				MDG45			
	Values	Units		mdg2-fg	mdg2-tax	mdg2-fb	mdg2-db	mdg45-fg	mdg45-tax	mdg45-fb	mdg45-db
Main Macroeconomic Aggregates*				Annual growth 2004-2015 (%)							
GDP at market prices	787	bn LCU	5.6	5.6	5.5	5.6	5.3	5.5	5.4	5.5	4.8
Total Absorption	780	bn LCU	6.3	6.3	6.3	6.3	6.0	6.7	6.2	6.7	5.6
Household consumption	574	bn LCU	6.4	6.4	6.4	6.4	6.2	6.5	5.9	6.5	5.9
Government consumption (total)	44	bn LCU	4.7	4.9	4.9	4.9	4.9	9.3	9.7	9.3	9.7
Gross capital formation (investment)	163	bn LCU	6.3	6.2	6.2	6.2	5.6	6.6	6.1	6.6	2.6
- Private	135	bn LCU	6.5	6.5	6.4	6.5	5.8	6.5	5.8	6.5	1.3
- Public	27	bn LCU	5.3	4.9	4.9	4.9	4.9	7.1	7.4	7.1	7.5
Exports	381	bn LCU	4.8	4.8	4.7	4.8	4.4	3.9	4.3	3.9	3.6
Imports	374	bn LCU	6.3	6.3	6.3	6.3	6.0	6.6	5.9	6.6	5.3
MDG and other Public Spending				Value in 2015							
Final consumption in education	1.22	% GDP	0.96	1.08	1.09	1.08	1.16	1.03	1.12	1.03	1.18
- Primary	0.68	% GDP	0.40	0.44	0.45	0.44	0.47	0.41	0.44	0.41	0.46
- Secondary	0.36	% GDP	0.33	0.36	0.36	0.36	0.38	0.34	0.38	0.34	0.39
- Terciary	0.18	% GDP	0.23	0.28	0.29	0.28	0.30	0.28	0.31	0.28	0.33
Final consumption in health	0.87	% GDP	0.82	0.82	0.82	0.82	0.85	3.88	4.16	3.88	4.41
Final consumption in water & sanitation	0.0124	% GDP	0.0117	0.0117	0.0117	0.0117	0.0121	0.0117	0.0119	0.0117	0.0127
Final consumption in other public infrastructure	0.12	% GDP	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.12
Final consumption in other govt services	3.31	% GDP	3.11	3.11	3.13	3.11	3.22	3.13	3.17	3.13	3.38
Investment in education	0.10	% GDP	0.03	0.007	0.006	0.007	0.008	0.032	0.046	0.032	0.051
- Primary	0.05	% GDP	0.00	0.000	0.000	0.000	0.000	0.003	0.008	0.003	0.010
- Secondary	0.03	% GDP	0.02	0.003	0.002	0.003	0.003	0.024	0.033	0.024	0.035
- Terciary	0.01	% GDP	0.00	0.004	0.004	0.004	0.004	0.005	0.006	0.005	0.006
Investment in health	0.07	% GDP	0.06	0.06	0.06	0.06	0.07	0.75	0.83	0.75	0.89
Investment in water & sanitation	0.97	% GDP	0.96	0.96	0.97	0.96	1.00	0.97	0.98	0.97	1.05
Investment in other public infrastructure	0.65	% GDP	0.64	0.64	0.64	0.64	0.66	0.64	0.65	0.64	0.69
Investment in other government services	1.63	% GDP	1.60	1.49	1.50	1.49	1.55	1.64	1.70	1.64	1.81
Financing of MDG Strategy				Value in 2015							
Income tax revenue	2.6	% GDP	1.2	1.2	1.3	1.2	1.2	1.2	6.9	1.2	1.2
Government savings	4.1	% GDP	2.0	1.9	1.9	1.6	1.3	-2.2	2.9	-2.9	-4.0
Foreign savings	-7.5	% GDP	3.6	3.6	3.7	3.9	3.8	8.8	3.7	9.6	3.9
Government domestic borrowing (flow)	1.0	% GDP	1.0	1.0	1.0	1.0	1.7	1.0	1.0	1.0	8.2
Government foreign borrowing (flow)	-1.6	% GDP	0.3	0.3	0.3	0.5	0.3	0.2	0.3	5.8	0.3
Additional foreign grants to the govt (flow)	0.0	% GDP	0.0	0.0	0.0	0.0	0.0	4.9	0.0	0.0	0.0
Government domestic debt (stock)	18.1	% GDP	18.0	18.0	18.1	18.0	27.2	17.8	18.2	17.8	40.2
Government external debt (stock)	34.1	% GDP	19.5	19.5	19.6	26.8	20.2	19.3	19.7	37.6	21.0
Real exchange rate (index) **	100.0	index	96.4	96.4	96.4	96.4	96.3	93.6	96.2	93.6	96.1
Labour Market Outcomes				Annual growth 2004-2015 (%)							
Employment	3,210	'000s	3.3	3.3	3.3	3.3	3.2	3.5	3.5	3.5	3.3
Workers with < completed secondary education	1,773	'000s	2.8	2.5	2.5	2.5	2.5	2.8	2.8	2.8	2.6
Workers with completed secondary education	990	'000s	3.4	3.6	3.6	3.6	3.5	3.7	3.6	3.7	3.5
Workers with completed tertiary education	447	'000s	4.8	5.1	5.1	5.1	5.0	5.5	5.5	5.5	5.4
Real wage***	74,356	LCU	2.1	2.2	2.2	2.2	2.0	2.8	2.8	2.8	2.5
Workers with < completed secondary education	53,075	LCU	2.6	2.8	2.7	2.8	2.6	2.8	2.7	2.8	2.4
Workers with completed secondary education	94,623	LCU	2.0	1.8	1.8	1.8	1.7	2.6	2.5	2.6	2.3
Workers with completed tertiary education	113,888	LCU	0.8	0.7	0.6	0.7	0.5	2.1	2.1	2.1	1.8
MDG Outcomes				Value in 2015							
MDG 1: headcount poverty (official poverty line)	43.1	%	26.7	25.9	26.0	25.8	26.9	24.2	24.7	23.7	26.1
MDG 1: headcount poverty ($1PPP)	3.3	%	1.5	1.4	1.4	1.4	1.5	1.4	1.4	1.2	1.5
MDG 2: primary school completion****	53.1	%	87.5	99.1	99.1	99.1	99.1	89.0	88.9	89.0	88.9
MDG 4: under-5 mortality (share of live births)	3.8	per 1,000	2.5	2.5	2.5	2.5	2.6	1.9	1.9	1.9	1.9
MDG 5: maternal mortality (share of live births)	17.8	per 100,000	9.2	9.1	9.2	9.1	9.3	5.7	5.7	5.7	5.7
MDG 7a: acess to safe drinking water	86.0	%	91.4	91.4	91.3	91.4	91.3	91.4	91.2	91.4	91.2
MDG 7b:acess to safe sanitation	90.0	%	91.5	91.5	91.5	91.5	91.4	91.5	91.4	91.5	91.4
Inequality				Value in 2015							
Labor income	0.486	Gini coeff	0.472	0.469	0.470	0.471	0.470	0.480	0.480	0.480	0.481
Per-capita household income	0.532	Gini coeff	0.491	0.488	0.488	0.488	0.490	0.495	0.497	0.493	0.498

Notes:

*The different macro aggregates (absorption, consumption, investment, exports, imports, and GDP) are all in real terms (at constant base-year LCU)

** Real exchange rate with respect to the CPI in a setting with constant CPI.

*** Wages are real in a setting with constant CPI.

**** Strict definition of completion rate: the share of the age cohort that enter first grade and successfully pass (without repeating) through all eight years of primary school.

Table 10 -- cont. Summary of Simulation Results

	2004		BASE & SIMULATION RESULTS FOR THE PERIOD 2004-2015								
			BASE	MDG7				All MDGs			
	Values	Units		mdg7-fg	mdg7-tax	mdg7-fb	mdg7-db	mdg-fg	mdg-tax	mdg-fb	mdg-db
Main Macroeconomic Aggregates*				Annual growth 2004-2015 (%)							
GDP at market prices	787	bn LCU	5.6	5.6	5.6	5.6	5.6	5.5	5.4	5.5	4.4
Total Absorption	780	bn LCU	6.3	6.0	6.3	6.3	6.3	6.7	6.1	6.7	5.2
Household consumption	574	bn LCU	6.4	6.4	6.4	6.4	6.4	6.5	5.8	6.5	5.6
Government consumption (total)	44	bn LCU	4.7	4.7	4.7	4.7	4.7	9.4	9.8	9.4	10.0
Gross capital formation (investment)	163	bn LCU	6.3	6.3	6.3	6.3	6.3	6.6	6.0	6.6	1.6
- Private	135	bn LCU	6.5	6.5	6.5	6.5	6.4	6.5	5.7	6.5	-0.1
- Public	27	bn LCU	5.3	5.2	5.2	5.2	5.2	6.8	7.2	6.8	7.3
Exports	381	bn LCU	4.8	4.8	4.8	4.8	4.8	3.9	4.2	3.9	3.1
Imports	374	bn LCU	6.3	6.3	6.3	6.3	6.3	6.5	5.9	6.5	4.9
MDG and other Public Spending				Value in 2015							
Final consumption in education	1.22	% GDP	0.96	0.96	0.96	0.96	0.96	1.12	1.24	1.12	1.40
- Primary	0.68	% GDP	0.40	0.40	0.40	0.40	0.40	0.43	0.47	0.43	0.53
- Secundary	0.36	% GDP	0.33	0.33	0.33	0.33	0.33	0.36	0.40	0.36	0.45
- Terciary	0.18	% GDP	0.23	0.23	0.23	0.23	0.23	0.33	0.37	0.33	0.42
Final consumption in health	0.87	% GDP	0.82	0.82	0.82	0.82	0.82	3.87	4.20	3.87	4.72
Final consumption in water & sanitation	0.0124	% GDP	0.0117	0.0118	0.0118	0.0118	0.0118	0.01	0.01	0.01	0.01
Final consumption in other public infrastructure	0.12	% GDP	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.12
Final consumption in other govt services	3.31	% GDP	3.11	3.11	3.11	3.11	3.11	3.13	3.19	3.13	3.52
Investment in education	0.10	% GDP	0.03	0.029	0.029	0.029	0.029	0.009	0.017	0.009	0.022
- Primary	0.05	% GDP	0.00	0.002	0.002	0.002	0.002	0.000	0.000	0.000	0.000
- Secundary	0.03	% GDP	0.02	0.023	0.023	0.023	0.023	0.004	0.011	0.004	0.016
- Terciary	0.01	% GDP	0.00	0.004	0.004	0.004	0.004	0.005	0.006	0.005	0.007
Investment in health	0.07	% GDP	0.06	0.06	0.06	0.06	0.06	0.75	0.83	0.75	0.95
Investment in water & sanitation	0.97	% GDP	0.96	0.95	0.95	0.95	0.95	0.96	1.03	0.96	1.16
Investment in other public infrastructure	0.65	% GDP	0.64	0.64	0.64	0.64	0.64	0.64	0.65	0.64	0.72
Investment in other government services	1.63	% GDP	1.60	1.60	1.60	1.60	1.60	1.53	1.59	1.53	1.77
Financing of MDG Strategy				Value in 2015							
Income tax revenue	2.6	% GDP	1.2	1.2	1.2	1.2	1.2	1.2	7.0	1.2	1.2
Government savings	4.1	% GDP	2.0	2.0	2.0	2.0	2.0	-2.3	2.8	-3.2	-5.1
Foreign savings	-7.5	% GDP	3.6	3.6	3.6	3.6	3.6	8.8	3.7	9.8	4.1
Government domestic borrowing (flow)	1.0	% GDP	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	9.4
Government foreign borrowing (flow)	-1.6	% GDP	0.3	0.3	0.3	0.3	0.3	0.2	0.3	6.0	0.3
Additional foreign grants to the govt (flow)	0.0	% GDP	0.0	0.0	0.0	0.0	0.0	4.8	0.0	0.0	0.0
Government domestic debt (stock)	18.1	% GDP	18.0	18.0	18.0	18.0	18.3	17.8	18.3	17.8	51.9
Government external debt (stock)	34.1	% GDP	19.5	19.5	19.5	19.8	19.5	19.4	19.8	44.7	21.9
Real exchange rate (index) **	100.0	index	96.4	96.4	96.4	96.4	96.4	93.6	96.2	93.6	96.0
Labour Market Outcomes				Annual growth 2004-2015 (%)							
Employment	3,210	'000s	3.3	3.3	3.3	3.3	3.3	3.4	3.4	3.4	3.2
Workers with < completed secondary education	1,773	'000s	2.8	2.8	2.8	2.8	2.8	2.5	2.5	2.5	2.3
Workers with completed secondary education	990	'000s	3.4	3.4	3.4	3.4	3.4	3.8	3.8	3.8	3.5
Workers with completed tertiary education	447	'000s	4.8	4.8	4.8	4.8	4.8	5.8	5.8	5.8	5.6
Real wage***	74,356	LCU	2.1	2.1	2.1	2.1	2.1	2.9	2.8	2.9	2.4
Workers with < completed secondary education	53,075	LCU	2.6	2.6	2.6	2.6	2.6	3.1	2.9	3.1	2.3
Workers with completed secondary education	94,623	LCU	2.0	2.0	2.0	2.0	2.0	2.4	2.4	2.4	2.0
Workers with completed tertiary education	113,888	LCU	0.8	0.8	0.8	0.8	0.8	1.9	1.9	1.9	1.5
MDG Outcomes				Value in 2015							
MDG 1: headcount poverty (official poverty line)	43.1	%	26.7	26.5	26.6	26.6	26.8	23.6	24.0	23.6	26.5
MDG 1: headcount poverty ($1PPP)	3.3	%	1.5	1.4	1.4	1.5	1.4	1.3	1.3	1.2	1.6
MDG 2: primary school completion****	53.1	%	87.5	87.5	87.5	87.5	87.5	99.0	99.0	99.0	99.0
MDG 4: under-5 mortality (share of live births)	3.8	per 1,000	2.5	2.5	2.5	2.5	2.5	1.9	1.9	1.9	1.9
MDG 5: maternal mortality (share of live births)	17.8	per 100,000	9.2	9.2	9.2	9.2	9.2	5.7	5.7	5.7	5.7
MDG 7a: acess to safe drinking water	86.0	%	91.4	91.5	91.5	91.5	91.5	91.5	91.5	91.5	91.5
MDG 7b:acess to safe sanitation	90.0	%	91.5	91.5	91.5	91.5	91.5	91.5	91.5	91.5	91.5
Inequality				Value in 2015							
Labor income	0.486	Gini coeff	0.472	0.473	0.472	0.473	0.474	0.476	0.480	0.477	0.482
Per-capita household income	0.532	Gini coeff	0.491	0.491	0.492	0.491	0.492	0.492	0.493	0.492	0.501

Notes:

*The different macro aggregates (absorption, consumption, investment, exports, imports, and GDP) are all in real terms (at constant base-year LCU)

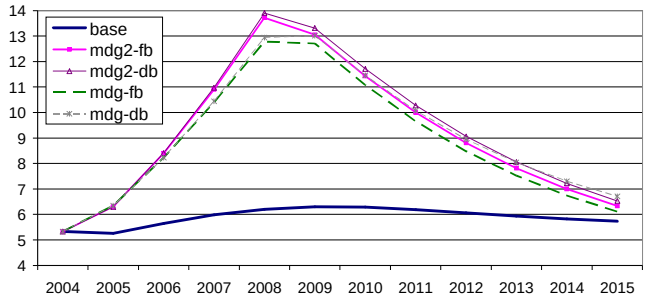
** Real exchange rate with respect to the CPI in a setting with constant CPI.

*** Wages are real in a setting with constant CPI.

**** Strict definition of completion rate: the share of the age cohort that enter first grade and successfully pass (without repeating) through all eight years of primary school.

of the simulation period. This reflects that in order to achieve the target of a 100% primary completion rate by 2015 all students of the correct age cohort must enter first grade by 2008 and successfully pass through the eight years of the primary cycle.[20] Due to more rapid growth in the number of primary school graduates and the policy of improving quality (service level per student) in secondary and tertiary education, government spending on these two cycles must also expand.

Figure 9: Government Expenditure on Primary Education (bn DR Pesos)
Baseline and MDG Simulations



Note: "mdg2" targets only educ; "mdg" targets all MDGs; fb = foreign borrowing; db = domestic borrowing

More specifically, for the period 2005-2010, government expenditure on primary education under the MDG2-db scenario is 50% larger than in the base year (1.1% versus 0.7% of GDP in 2004; see Table A.5). The required government investment increases from 0.06% of GDP in 2004 to 0.17% of GDP on average for the period 2005-2010. As a share of GDP, spending is lower during the final five-year period, 2010-15, in part due to a declining inflow of out-of-cohort students into first grade (as primary schools become increasingly successful in getting students to enter in the right year) and relatively lower projections for population growth rates of primary school age children. For secondary and tertiary education, the spending expansion takes place during the final period, when the number of students that have graduated from primary has started to increase significantly. Because of this decline toward the end for primary education, there is little difference between the MDG 2 scenarios and BASE or across different MDG 2 scenarios when the comparison is based only on the level of flow variables in 2015.

[20] The MDG 2 value that we consider in this model is a very strict definition of the primary school completion rate: all students of the correct age cohort must not only enter first grade and successfully pass through all eight years, but they must do so on time (i.e., without repeating). This is the reason why an entry rate into first grade of 94% and a passing rate at 93-94% as an average for each of the 8 years of the cycle generate an MDG 2 starting value of 54% in the model.

The main difference between the different MDG 2 simulations is that growth in GDP is slower when additional financing comes from domestic borrowing (5.3% annual GDP growth for MDG2-db vs. 5.6% for BASE), reflecting that less financing is available for private investment (for which growth declines strongly), with a negative impact on growth in the private capital stock. Even if a lot of investment comes from foreign companies (given the importance of FTZs in the DR), on the margin, financing for private investment is still affected by government borrowing. Private consumption growth also declines. Government demand is protected since it is driven by policy. On the production side, GDP growth accelerates for government education services at the expense of private sectors across the board.

Except for the domestic borrowing scenario, the results for the other MDG 2 simulations are all quite similar to each other. Given that higher growth in household consumption has a positive impact on education outcomes (see Table 5 for determinants of MDG 2 outcomes), growth in government spending on primary education is slightly lower than for the domestic borrowing scenario (MDG2-db). Growth in exports and imports is similar to BASE, i.e. the decline observed for MDG2-db is not repeated since growth in GDP and domestic demand does not slow down for these scenarios. The changes in the real exchange rate are similar to BASE for all four simulations. The negative impact on private sector production is much smaller given that GDP growth does not decline.

The above comments apply to the full period. For the period 2005-2010, the scenarios with foreign financing (MDG2-fg and MDG2-fb) generate stronger real exchange rate appreciation and import growth whereas export growth slows down (see Table A.4). The cumulative burden of reaching MDG 2 is indicated by the increase in the 2015 foreign and domestic debt stock relative to GDP by 7-9 percentage points for MDG2-fb and MDG2-db, respectively (larger for MDG2-db because of slower GDP growth).

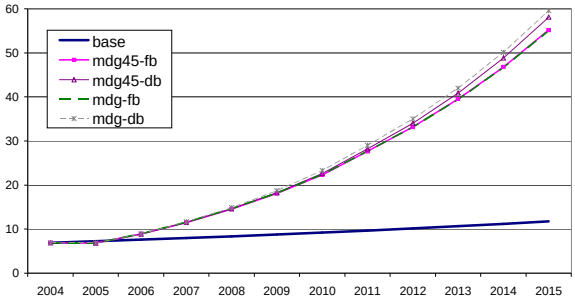
Compared to BASE, all four MDG2 simulations lead to lower employment growth for unskilled workers but higher growth for semi-skilled and skilled workers. This reflects that, rather than entering the labor force, more and more students remain in school, decreasing the supply of unskilled workers. On the other hand, as more students graduate

from secondary and tertiary, the supplies of semi-skilled and skilled workers increase. At the same time, demand for semi-skilled and skilled workers increases as the education sector expands. For wages, the situation is reversed: when stock growth increases, wage growth slows down and vice versa. In response to wage changes, moderate changes in unemployment (declining for the unskilled and increasing for the semi-skilled and skilled) mitigate the repercussions of these stock changes. For the simulation that relies on domestic borrowing, the stronger negative effect on the overall growth rate of the economy translates into a growth rate for unskilled wages that is similar to BASE. For the MDG 2 simulations, poverty rates and inequality decline slightly more strongly than for BASE, mainly as a result of a relative increase in unskilled wages combined (in all MDG2 scenarios except MDG2-db) with a higher average wage (see Tables A.6-A.8).

Targeting MDGs 4 and 5 – Reduced Under-Five and Maternal Mortality Rates

The next subset of simulations focuses on achieving the health MDGs under each of the four financing mechanisms (MDG45-fg, MDG45-tax, MDG45-fb, and MDG45-db).

Figure 10: Government Expenditure on Health
Baseline and MDG Simulations (bns DR Pesos)



Note: "mdg2" targets only educ; "mdg" targets all MDGs; fb = foreign borrowing; db = domestic borrowing

Compared to BASE, the required annual growth rate of government demand for health services increases drastically (see Figure 10). The spending increase needed to achieve the health targets is much larger than the one needed for education (or water and sanitation). Government recurrent spending on health reaches 3.9-4.4% of GDP in 2015 as compared to 0.9% of GDP in 2004. Government investment in health also increases quite strongly, from 0.1% of GDP in 2004 to 0.8-0.9% in 2015, reflecting that the expansion of production in the sector also requires an expanded capital stock.

Therefore, total health spending (the sum of recurrent and investment spending) jumps strongly relative to 2004, reaching 5.3% of GDP at its peak. Relative to other countries in the LAC region this GDP share is high but not out of the existing range – in 2003, the

GDP spending shares on health in Colombia and Costa Rica were higher, at 6.4% and 5.8%, respectively (Table 11). On the other hand, given budgetary constraints, it may be difficult to implement such a strong spending increase during this short time period. Efficiency in the health sector would perhaps also suffer, for example if there exist constraints in terms of labor with specialized skills or experience, or if there is a need for institutional or organizational changes.

Table 11: Health Expenditures, Public (% GDP, 2003)

Country	2003	Country	2003
Colombia	6.39	Bahamas, The	3.04
Cuba	6.34	Chile	2.98
Costa Rica	5.75	Mexico	2.88
Panama	5.05	Haiti	2.86
Grenada	4.93	Jamaica	2.68
Barbados	4.79	Uruguay	2.67
Dominica	4.49	Dominican Rep	2.32
Argentina	4.33	Paraguay	2.3
Bolivia	4.29	Guatemala	2.14
Honduras	4.01	Peru	2.13
El Salvador	3.73	Venezuela, RB	1.99
Nicaragua	3.73	Ecuador	1.97
Brazil	3.44	Trinidad&Tobago	1.47

Source: World Development Indicators (WDI), World Bank

The impact on the rest of the economy from reaching the health MDGs depends strongly on the financing mechanism. If marginal financing comes from domestic sources (taxes or domestic borrowing), growth in private consumption and private investment declines strongly. The decline is especially strong for the domestic borrowing scenario (MDG45-db) since the government demand increase is combined with a decline in GDP growth to 4.8% from 5.6% per year for BASE. For the case of tax financing, the decline in GDP growth is more moderate (to 5.4% per year). GDP growth declines because of lower growth in private savings and private investment, driven by a combination of lower private income growth (for both scenarios), higher taxes (only for MDG45-tax), and higher government borrowing that reduces funding available for private investment (only for MDG45-db). Given unchanged foreign aid, lower GDP growth reduces the level of total domestic final demand (or absorption). As in the case of the MDG2 simulations, other things being equal, government services and related spending (here health-related) must grow more rapidly when growth in private consumption slows down. Due to lower growth in GDP and domestic demand, both exports and imports grow more slowly than for BASE (losing 0.4-1.2% in annual growth) without much impact on the real exchange rate.

On the other hand, when marginal financing comes from foreign sources (in the form of grants or borrowing), the negative impact from increased domestic resource mobilization on private investment is absent. At the macro level, GDP growth declines slightly due to a reallocation of resources to government service sectors that have lower TFP growth (although GDP measured at factor cost is practically the same). The inflow of foreign resources gives rise to a larger trade deficit with slower export growth (3.9% per year versus 4.8% for BASE) and faster import growth (6.6% versus 6.3% for BASE), both induced by more rapid appreciation of the real exchange rate.

Due to very rapid growth in the production of government health services (by around 21% per year), the annual growth rate for total government service production is approximately doubled, from 4.6% under BASE to 9.2-9.6%, with the higher increases applying to scenarios with domestic financing, which squeezes growth in household consumption (see Table 8). More government production reduces the resources available for the private sector, so that GDP growth for private activities declines 0.3-0.5% when overall GDP growth is roughly unchanged and by as much as 1.2% when overall GDP growth declines due to a squeeze on private investment.

Compared to BASE, more rapid growth in the relatively skill-intensive health sector results in higher wage and employment growth for skilled workers across all four health simulations. The employment increase is primarily due to a decline in unemployment (more people are enticed to work because of higher wages) as opposed to more rapid growth in the labor force. Semi-skilled employment also grows by more than for BASE, while unskilled employment growth is about the same or decreases very slightly. Wage growth for all labor types is also more rapid than for BASE. The only exception occurs when domestic borrowing is the financing mechanism: the strong negative effect on GDP leads to a decline in the growth rate for unskilled wages, which falls below the rate for the BASE simulation (or any of the previous simulations).

The health MDG targets are by construction reached under these four simulations. As explained earlier, drawing on the econometric literature[21] we incorporate a positive link between better health outcomes and better education outcomes (see the determinants in Table 5). Accordingly, the more positive outcome for health indicators results in a more positive outcome for MDG 2 than under BASE. Poverty falls lower than for BASE, especially for the simulations based on foreign financing. For these, the headcount rate based on the official poverty line declines to around 24% as opposed to 26.7% for BASE, mainly as a result of the decrease in unemployment combined with the increase in the average wage (see Tables 9 and A.6-A.7). Inequality in terms of both labor and per-capita household income, as measured by the Gini coefficients, decreases by less over time than for BASE.

Targeting MDG 7a – Increased Access to Water

The next four simulations instead focus on achieving the water MDG target. The policy changes and effects of achieving this target are very small given the relatively small size of the sector and the fact that the BASE simulation is close to achieving the target. Therefore, both recurrent government expenditure and investment are practically the same as in BASE, as is aggregate recurrent government spending given the small share of recurrent spending in total water and sanitation expenditure. The other results – including macro aggregates, employment and wages – are also all very similar to BASE.

Targeting all MDGs Simultaneously

Under the final four simulations (MDG-fg, MDG-tax, MDG-fb, and MDG-db), all of the MDGs (MDGs 2, 4, 5, and 7a) are targeted at the same time. Figures 11-14 show the evolution of selected indicators.

[21] See the literature review in the MAMS chapter and the DR results in Cicowiez and Tornarolli (2006).

Figure 11: Real GDP at Market Price
Baseline and MDG Simulations (bns 2004 DR Pesos)

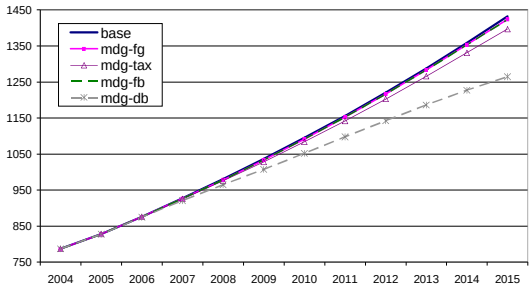
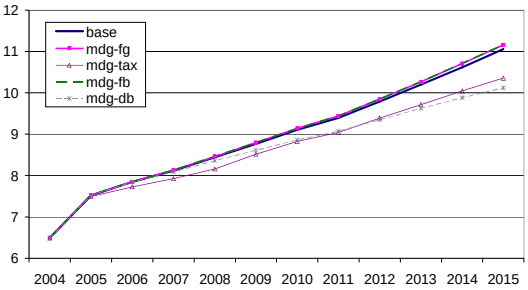


Figure 12: Household Per Cap Consumption
Baseline and MDG Simulations (2004 DR$ per capita)



At the macro level, the combined impact of government expansion in different areas results in government consumption and investment growth of 6.8-10% annually as opposed to 4.7-5.3% for BASE. The size of the financing that is needed is indicated by the fact that, for the scenario with financing from domestic borrowing (MDG-db), the government debt in 2015 has increased by 34% of GDP compared to the BASE scenario, reaching close to 52% in 2015. Under the domestic financing scenarios, GDP growth suffers, falling from 5.6% for BASE to 5.4% for MDG-tax and 4.4% for MDG-db. Like before, this is due to some combination of (i) lower private capital accumulation (caused by lower private post-tax incomes and savings and, for MDG-db, the fact that the government diverts a larger part of savings to its own investments); and (ii) reallocation of resources to sectors (government services) with lower TFP growth. Given this slow-down in GDP growth, unchanged access to foreign resources, and higher tax rates or increased domestic borrowing, growth slows down also for private consumption (from 6.4% per year for BASE to 5.5 and 5.8% per year for MDG-db and MDG-tax, respectively), and investment (from 6.5% for BASE to 5.7% for MDG-tax and –0.1% for MDG-db).

For the scenarios with foreign financing, the macro outcomes are quite different. The inflow of foreign resources makes it possible to expand government consumption and investment without additional taxes and domestic borrowing. GDP growth is very close to the BASE rate (especially for GDP at factor cost). Due to positive spillover effects from the inflow of foreign resources (reducing the costs of imports and permitting the labor force to become better educated and more productive), private consumption and

investment grow slightly more rapidly than under BASE. As a share of GDP, the debt in this case expands by less (some 25% of GDP in 2015) -- a result of more rapid GDP growth and, to a lesser extent, exchange rate appreciation.

Relative to the domestic financing scenarios, more rapid private consumption growth reduces the required growth in both government consumption and investment by 0.4-0.6 percentage points. If measured relative to GDP, the decline in government expenditure is even stronger given more rapid GDP growth (especially compared to the domestic borrowing scenario). Across all simulations with full MDG achievement, the need for MDG service expansion is mitigated by synergies: improvements in water and sanitation (although these are very small) reduce the need for service expansion in health while improvements in health reduce the need for service expansion in primary education.

At a more disaggregated level, government expenditures follow patterns that are similar to what we observed for the simulations that targeted each MDG individually: spending in education is front-loaded due to the 2008 target, spending in health grows steadily over time (becoming higher in the second half of the simulation), and investment is more important than recurrent spending for the water and sanitation sector (see Figures 10-12).

Growth in the private sector declines for all full MDG scenarios (see Table 8), especially for the domestic borrowing scenario since this scenario combines a decline in total GDP growth and an increase in government production (since private demand for and production of health and education services suffers).

In the labor market, wages grow more rapidly compared to the BASE for all full MDG scenarios except the scenario where extra financing comes from increased domestic borrowing (in which case overall wages increase by more than BASE only for skilled labor). The latter scenario also registers less of a decrease in overall unemployment by 2015 as compared to BASE (only skilled labor has comparatively lower unemployment rates in 2015; see Table 9). For all full MDG scenarios, wage gaps between different skill levels decline due to the expansion in primary education, which reduces the supply of unskilled labor. The same effects occur in the subset of equations where MDG 2 is

targeted on its own: more students stay in school instead of entering the unskilled labor force. In addition, the MDG-related public sectors that expand rapidly when all the MDGs are targeted require even less unskilled and more semi-skilled and skilled labor (see Figure 13).

Figure 13: Employment
Baseline and MDG Simulations ('000 Workers)

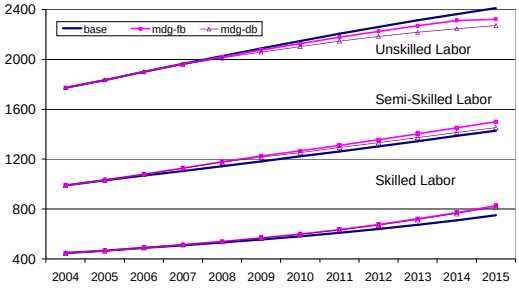
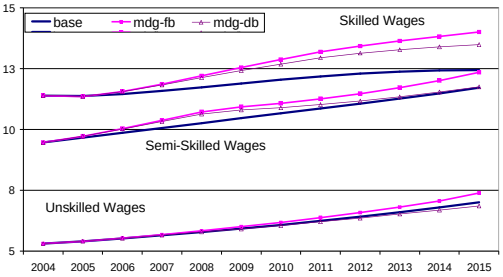


Figure 14: Labor Wages
Baseline and MDG Simulations ('000 DR Pesos)



By assumption, all non-poverty MDGs reach their targets. For poverty (MDG 1), the simulations with foreign financing cut the 2004 rates by close to half, returning to pre-2003-crisis poverty levels. Poverty declines relative to BASE for all scenarios. Compared to non-BASE scenarios, the reduction is stronger (although by a small margin compared to the MDG health scenarios), once again with the exception of the domestic borrowing scenario. However, it still falls short of the target of cutting the headcount poverty rate by half. On the other hand, the headcount extreme poverty rate using the $1PPP value does reach the 2015 target for all but the domestic borrowing scenario. Inequality is roughly unchanged compared to BASE.

4. Summary and Concluding Remarks

This chapter has addressed two main questions: Will the DR achieve its MDGs under current policies and investment levels? If not, what changes in development strategy are needed to achieve the MDGs and what is the cost? With regard to the first question, the results for our business-as-usual scenario indicate that, in spite of considerable progress across the board, the answer is negative. The only exception is the sanitation target, which was already achieved by 2004. However, with regard to MDG 1 it should be noted that the assumed target is set relative to the rate in 1998. Because of the high GDP and

household consumption growth throughout the 1990s, the poverty rate was most likely higher in 1990. Given this, it is not impossible that the simulated rate achieved in 2015 is actually less than half the 1990 rate, or close to this target.

The simulations designed to answer the second question indicate that it would be very difficult to achieve all MDGs, especially in health and, to a lesser extent, in primary education. For health, real government services would need to increase very rapidly up to 2015 (by around 20% per year). For primary education, the difficulty lies less in the required service increase but more in the strong frontloading that would be needed to assure that by 2008 (very close to) all students of the correct age cohort enter first grade and successfully make it through primary school without repeating or dropping out. If this objective is not attained, then it is not possible for everyone to complete a full, eight-year primary cycle on a timely basis by 2015. On the other hand, compared to other countries' governments in Latin America, the DR government allocates a very small share of GDP to social sectors. From this angle, expanded spending seems reasonable.

However, the effects of a large expansion in government services very much depend on the financing mechanism. Our results indicate that if marginal financing needs are met by grant aid or foreign borrowing (at base-year interest rates) then there is no trade-off between, on the one hand, poverty reduction and growth promotion and, on the other hand, the achievement of non-poverty MDGs. However, the DR is not a likely candidate for sufficient amounts of grant aid and is unlikely to further raise its foreign debt and debt-servicing burden. Moreover, unless managed wisely, increased inflows of foreign exchange can generate undesirable byproducts in the form of Dutch Disease effects that change the production structure away from tradables; such a change may be unsustainable if the inflows of foreign exchange then decline. Reduced openness to trade with the rest of the world (perhaps most importantly due to less exports) may also have a long-run negative impact on productivity growth.

Another clear finding of our analysis is that, if marginal financing is raised from domestic sources, then it is important to make sure that the government does not crowd out private investment to such an extent that growth suffers. In practice, a feasible strategy would

have to explore tax schemes that minimize negative effects on incentives to save and invest, as was assumed in the subset of our simulations where effective direct tax rates were raised. At any rate, consideration of financing issues adds to the difficulty of achieving the MDGs in a timely manner.

Finally, although growth analysis is not our focus, it is important to be aware that rapid growth is crucial for the achievement of the MDGs in the DR and elsewhere. In order to test the sensitivity of our results to the rate of growth in the BASE scenario, we re-ran the different simulations with an alternative BASE in which GDP grew at 4% instead of 5.6%. Under such scenarios, it is much more difficult to achieve both poverty and non-poverty MDGs since slower growth in household incomes leads to higher poverty rates. For this alternative BASE scenario, the 2015 headcount rate under the official poverty line was 33.3%, considerably above the 26.7% figure under the BASE scenario with more rapid GDP growth. Moreover, in a situation with slower growth in private consumption of health and education services, more rapid growth in government services is required. Relative to levels of GDP that in this setting are lower, such service expansion seems infeasible.

In light of this, the best way forward for the DR government may be to opt for a combination of gradual expansion of targeted social (health and education) services (although this may imply that it takes longer to achieve the education target), as well as measures to raise government efficiency and reallocate spending to high-priority areas, if needed financed with domestic taxes. It is also crucial to identify and expand growth-promoting programs and policies, especially if they can be designed to assume that the poor capture most of the payoffs.

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Appendix

Table A.1. Macro SAM for the Dominican Republic, 2004 (bn of Pesos)

	act	com	fac	hhd	gov	row	tax-dir	tax-imp	tax-exp	tax-oind	int-dom	int-row	sav-inv	total
act		726.4												726.4
com				572.9	43.0	390.4							162.3	1168.7
fac	695.8					13.3								709.1
hhd			645.7		39.1	107.0					2.9			794.7
gov				3.2		7.1	26.6	35.3	1.9	53.5				127.6
row		382.2	57.2	7.2	0.1							12.2		458.9
tax-dir			6.2	20.4										26.6
tax-imp		35.3												35.3
tax-exp		1.9												1.9
tax-oind	30.6	22.9												53.5
int-dom					2.9									2.9
int-row				1.4	10.8									12.2
sav-inv				189.5	31.7	-58.9								162.3
total	726.4	1168.7	709.1	794.7	127.6	458.9	26.6	35.3	1.9	53.5	2.9	12.2	162.3	

Full account names: Activities, Commodities, Factors, Households, Government, Rest of World, Direct Taxes, Import Taxes, Export Taxes, Other Indirect Taxes, Domestic Interest Payments, Interest Payments due to the Rest of the World, Savings-Investment, and Total.

Table A.2. Model Elasticities

	*Elasticity**				
Activity/Commodity	Armington	CET	CES	CES-2	LES
Agriculture	1.1	1.5	1.3	0.8	1.0
Industry	1.5	1.5	1.3	0.8	1.0
Private Services	0.7	1.5	1.3	0.8	1.0
Public Services			1.3	0.8	

Note: (*) Armington = elasticity of substitution between imports & domestic output in domestic demand.
CET = elasticity of transformation for domestic marketed output between exports and domestic supplies.
CES = elasticity of substitution between factors - bottom of technology nest.
CES-2 = elasticity of substitution between aggregate factors and intermediates - top of technology nest.
LES = expenditure elasticity of market demand by commodity.

Source: Estimates for Armington and CET taken from values in Aristy-Escuder, 1999.

Table A.3. Real GDP by simulation

	2004	Average growth rate			
	(bn LCU)	2004-2005	2005-2010	2010-2015	2004-2015
Base	787	5.18	5.76	5.52	5.59
mdg2-fg	787	5.16	5.73	5.55	5.59
mdg2-tax	787	5.18	5.63	5.53	5.54
mdg2-fb	787	5.16	5.73	5.55	5.59
mdg2-db	787	5.17	5.21	5.32	5.26
mdg45-fg	787	5.19	5.72	5.43	5.54
mdg45-tax	787	5.19	5.67	5.2	5.41
mdg45-fb	787	5.19	5.72	5.43	5.54
mdg45-db	787	5.19	5.44	4.08	4.8
mdg7-fg	787	5.19	5.76	5.52	5.59
mdg7-tax	787	5.18	5.75	5.51	5.59
mdg7-fb	787	5.19	5.76	5.52	5.59
mdg7-db	787	5.18	5.75	5.5	5.58
mdg-fg	787	5.17	5.69	5.45	5.54
mdg-tax	787	5.18	5.54	5.2	5.35
mdg-fb	787	5.17	5.69	5.45	5.54
mdg-db	787	5.18	4.91	3.75	4.41

LCU: Dominican Republic Pesos

Table A.4. Exchange Rate (indices for 2004 and 2015; averages for subperiods)

	2004	2004-2005	2005-2010	2010-2015	2004-2015	2015
Base	100.0	97.2	94.9	95.8	95.8	96.2
mdg2-fg	100.0	97.0	93.9	95.5	95.2	96.1
mdg2-tax	100.0	97.2	94.8	95.8	95.7	96.2
mdg2-fb	100.0	97.0	93.9	95.5	95.2	96.1
mdg2-db	100.0	97.2	94.8	95.7	95.6	96.1
mdg45-fg	100.0	97.3	94.3	93.0	94.1	91.3
mdg45-tax	100.0	97.2	94.9	95.6	95.6	95.8
mdg45-fb	100.0	97.3	94.3	93.0	94.1	91.3
mdg45-db	100.0	97.2	94.9	95.6	95.6	95.7
mdg7-fg	100.0	97.2	94.8	95.6	95.6	96.0
mdg7-tax	100.0	97.2	94.9	95.8	95.8	96.2
mdg7-fb	100.0	97.2	94.8	95.6	95.6	96.0
mdg7-db	100.0	97.2	94.9	95.8	95.8	96.2
mdg-fg	100.0	97.0	93.2	92.5	93.4	91.1
mdg-tax	100.0	97.2	94.8	95.6	95.6	95.7
mdg-fb	100.0	97.0	93.2	92.5	93.4	91.1
mdg-db	100.0	97.2	94.8	95.3	95.5	95.5

Table A.5. Government Real Recurrent and Capital Expenditure by Sector and Simulation.

		2004	% of GDP					
		(bn LCU)	2004	2004-2005	2005-2010	2010-2015	2004-2015	2015
Base	Education expenditure	9.6	1.22	1.128	1.02	0.98	1.01	0.96
	- Primary	5.3	0.68	0.653	0.62	0.48	0.54	0.40
	- Secondary	2.9	0.36	0.317	0.28	0.33	0.31	0.33
	- Tertiary	1.4	0.18	0.158	0.12	0.17	0.15	0.23
	Health expenditure	6.9	0.87	0.872	0.85	0.83	0.84	0.82
	Water and Sanitation expenditure	0.1	0.01	0.012	0.01	0.01	0.01	0.01
	Other public infrastructure expenditure	0.9	0.12	0.116	0.11	0.11	0.11	0.11
	Other government services expenditure	26.0	3.31	3.307	3.24	3.14	3.19	3.11
	Fixed investment in education	0.8	0.10	0.047	0.06	0.04	0.05	0.03
	- Primary	0.4	0.05	0.027	0.03	0.00	0.02	0.00
	- Secondary	0.3	0.03	0.017	0.03	0.04	0.03	0.02
	- Tertiary	0.1	0.01	0.004	0.00	0.00	0.00	0.00
	Fixed investment in health	0.6	0.07	0.070	0.07	0.06	0.06	0.06
	Fixed investment in water and	7.6	0.97	0.996	1.00	0.97	0.99	0.96
	Fixed investment in other public	5.1	0.65	0.662	0.66	0.65	0.65	0.64
	Fixed investment in other government	12.8	1.63	1.495	1.63	1.62	1.62	1.60
mdg2-fb	Education expenditure	9.6	1.22	1.216	1.59	1.30	1.39	1.08
	- Primary	5.3	0.68	0.741	1.11	0.68	0.84	0.44
	- Secondary	2.9	0.36	0.317	0.35	0.40	0.37	0.36
	- Tertiary	1.4	0.18	0.158	0.12	0.22	0.18	0.28
	Health expenditure	6.9	0.87	0.872	0.86	0.83	0.84	0.82
	Water and Sanitation expenditure	0.1	0.01	0.012	0.01	0.01	0.01	0.01
	Other public infrastructure expenditure	0.9	0.12	0.116	0.11	0.11	0.11	0.11
	Other government services expenditure	26.0	3.31	3.307	3.25	3.16	3.21	3.13
	Fixed investment in education	0.8	0.10	0.138	0.23	0.03	0.12	0.01
	- Primary	0.4	0.05	0.118	0.17	0.00	0.08	0.00
	- Secondary	0.3	0.03	0.017	0.06	0.03	0.04	0.00
	- Tertiary	0.1	0.01	0.004	0.00	0.00	0.00	0.00
	Fixed investment in health	0.6	0.07	0.070	0.07	0.06	0.07	0.06
	Fixed investment in water and	7.6	0.97	0.996	1.01	0.98	0.99	0.97
	Fixed investment in other public	5.1	0.65	0.662	0.67	0.65	0.66	0.64
	Fixed investment in other government	12.8	1.63	1.679	1.91	1.46	1.67	1.50
mdg2-db	Education expenditure	9.6	1.22	1.222	1.62	1.38	1.45	1.16
	- Primary	5.3	0.68	0.745	1.14	0.72	0.87	0.47
	- Secondary	2.9	0.36	0.318	0.36	0.42	0.39	0.38
	- Tertiary	1.4	0.18	0.159	0.13	0.23	0.19	0.30
	Health expenditure	6.9	0.87	0.872	0.86	0.86	0.86	0.85
	Water and Sanitation expenditure	0.1	0.01	0.012	0.01	0.01	0.01	0.01
	Other public infrastructure expenditure	0.9	0.12	0.116	0.11	0.11	0.11	0.11
	Other government services expenditure	26.0	3.31	3.307	3.24	3.15	3.20	3.11
	Fixed investment in education	0.8	0.10	0.143	0.22	0.03	0.12	0.01
	- Primary	0.4	0.05	0.122	0.16	0.00	0.08	0.00
	- Secondary	0.3	0.03	0.017	0.06	0.03	0.04	0.00
	- Tertiary	0.1	0.01	0.004	0.00	0.00	0.00	0.00
	Fixed investment in health	0.6	0.07	0.070	0.07	0.06	0.06	0.06
	Fixed investment in water and	7.6	0.97	0.996	1.00	0.97	0.99	0.96
	Fixed investment in other public	5.1	0.65	0.662	0.67	0.65	0.65	0.64
	Fixed investment in other government	12.8	1.63	1.694	1.89	1.46	1.67	1.49
mdg45-fb	Education expenditure	9.6	1.22	1.128	1.03	1.02	1.04	1.03
	- Primary	5.3	0.68	0.653	0.62	0.48	0.55	0.41
	- Secondary	2.9	0.36	0.317	0.28	0.34	0.32	0.34
	- Tertiary	1.4	0.18	0.158	0.12	0.20	0.17	0.28
	Health expenditure	6.9	0.87	0.858	1.43	2.99	2.25	3.88
	Water and Sanitation expenditure	0.1	0.01	0.012	0.01	0.01	0.01	0.01
	Other public infrastructure expenditure	0.9	0.12	0.116	0.11	0.11	0.11	0.11
	Other government services expenditure	26.0	3.31	3.307	3.24	3.16	3.20	3.13
	Fixed investment in education	0.8	0.10	0.047	0.06	0.04	0.05	0.03
	- Primary	0.4	0.05	0.027	0.03	0.00	0.02	0.00
	- Secondary	0.3	0.03	0.017	0.03	0.04	0.03	0.02
	- Tertiary	0.1	0.01	0.004	0.00	0.00	0.00	0.00
	Fixed investment in health	0.6	0.07	0.054	0.34	0.62	0.48	0.75
	Fixed investment in water and	7.6	0.97	0.996	1.00	0.98	0.99	0.97
	Fixed investment in other public	5.1	0.65	0.662	0.67	0.65	0.65	0.64
	Fixed investment in other government	12.8	1.63	1.495	1.64	1.65	1.64	1.64
mdg45-db	Education expenditure	9.6	1.22	1.128	1.04	1.11	1.09	1.18
	- Primary	5.3	0.68	0.652	0.63	0.52	0.57	0.46
	- Secondary	2.9	0.36	0.317	0.29	0.37	0.33	0.39
	- Tertiary	1.4	0.18	0.158	0.12	0.22	0.18	0.33
	Health expenditure	6.9	0.87	0.857	1.45	3.23	2.37	4.41
	Water and Sanitation expenditure	0.1	0.01	0.012	0.01	0.01	0.01	0.01
	Other public infrastructure expenditure	0.9	0.12	0.116	0.11	0.12	0.12	0.12
	Other government services expenditure	26.0	3.31	3.307	3.26	3.29	3.28	3.38
	Fixed investment in education	0.8	0.10	0.047	0.06	0.06	0.06	0.05
	- Primary	0.4	0.05	0.027	0.03	0.01	0.02	0.01
	- Secondary	0.3	0.03	0.017	0.03	0.05	0.04	0.04
	- Tertiary	0.1	0.01	0.004	0.00	0.00	0.00	0.01
	Fixed investment in health	0.6	0.07	0.053	0.34	0.70	0.51	0.89
	Fixed investment in water and	7.6	0.97	0.996	1.01	1.02	1.01	1.05
	Fixed investment in other public	5.1	0.65	0.662	0.67	0.68	0.67	0.69
	Fixed investment in other government	12.8	1.63	1.494	1.65	1.75	1.70	1.81

Table A.5 -- cont. Government Real Recurrent and Capital Expenditure by Sector and Simulation

		2004	% of GDP					
		(bn LCU)	2004	2004-2005	2005-2010	2010-2015	2004-2015	2015
mdg7-fb	Education expenditure	9.6	1.22	1.128	1.02	0.98	1.01	0.96
	- Primary	5.3	0.68	0.653	0.62	0.48	0.54	0.40
	- Secondary	2.9	0.36	0.317	0.28	0.33	0.31	0.33
	- Tertiary	1.4	0.18	0.158	0.12	0.17	0.15	0.23
	Health expenditure	6.9	0.87	0.872	0.85	0.83	0.84	0.82
	Water and Sanitation expenditure	0.1	0.01	0.012	0.01	0.01	0.01	0.01
	Other public infrastructure expenditure	0.9	0.12	0.116	0.11	0.11	0.11	0.11
	Other government services expenditure	26.0	3.31	3.307	3.24	3.15	3.19	3.11
	Fixed investment in education	0.8	0.10	0.047	0.06	0.04	0.05	0.03
	- Primary	0.4	0.05	0.027	0.03	0.00	0.02	0.00
	- Secondary	0.3	0.03	0.017	0.03	0.04	0.03	0.02
	- Tertiary	0.1	0.01	0.004	0.00	0.00	0.00	0.00
	Fixed investment in health	0.6	0.07	0.070	0.07	0.06	0.06	0.06
	Fixed investment in water and	7.6	0.97	1.056	1.03	1.00	1.01	0.95
	Fixed investment in other public	5.1	0.65	0.662	0.66	0.65	0.65	0.64
	Fixed investment in other government	12.8	1.63	1.495	1.63	1.62	1.62	1.60
mdg7-db	Education expenditure	9.6	1.22	1.129	1.02	0.98	1.01	0.96
	- Primary	5.3	0.68	0.653	0.62	0.48	0.55	0.40
	- Secondary	2.9	0.36	0.318	0.28	0.33	0.31	0.33
	- Tertiary	1.4	0.18	0.158	0.12	0.17	0.15	0.23
	Health expenditure	6.9	0.87	0.872	0.85	0.83	0.84	0.82
	Water and Sanitation expenditure	0.1	0.01	0.012	0.01	0.01	0.01	0.01
	Other public infrastructure expenditure	0.9	0.12	0.116	0.11	0.11	0.11	0.11
	Other government services expenditure	26.0	3.31	3.307	3.24	3.15	3.19	3.11
	Fixed investment in education	0.8	0.10	0.047	0.06	0.04	0.05	0.03
	- Primary	0.4	0.05	0.027	0.03	0.00	0.02	0.00
	- Secondary	0.3	0.03	0.017	0.03	0.04	0.03	0.02
	- Tertiary	0.1	0.01	0.004	0.00	0.00	0.00	0.00
	Fixed investment in health	0.6	0.07	0.070	0.07	0.06	0.06	0.06
	Fixed investment in water and	7.6	0.97	1.057	1.03	1.00	1.01	0.95
	Fixed investment in other public	5.1	0.65	0.662	0.66	0.65	0.65	0.64
	Fixed investment in other government	12.8	1.63	1.496	1.63	1.62	1.62	1.60
mdg-fb	Education expenditure	9.6	1.22	1.217	1.551	1.312	1.388	1.123
	- Primary	5.3	0.68	0.742	1.074	0.659	0.814	0.429
	- Secondary	2.9	0.36	0.317	0.349	0.403	0.375	0.362
	- Tertiary	1.4	0.18	0.158	0.129	0.250	0.200	0.332
	Health expenditure	6.9	0.87	0.858	1.439	2.985	2.251	3.869
	Water and Sanitation expenditure	0.1	0.01	0.012	0.012	0.012	0.012	0.012
	Other public infrastructure expenditure	0.9	0.12	0.116	0.114	0.111	0.113	0.110
	Other government services expenditure	26.0	3.31	3.307	3.245	3.158	3.202	3.130
	Fixed investment in education	0.8	0.10	0.139	0.211	0.032	0.112	0.009
	- Primary	0.4	0.05	0.119	0.150	0.000	0.070	0.000
	- Secondary	0.3	0.03	0.017	0.059	0.027	0.038	0.004
	- Tertiary	0.1	0.01	0.004	0.001	0.004	0.003	0.005
	Fixed investment in health	0.6	0.07	0.054	0.338	0.621	0.474	0.752
	Fixed investment in water and	7.6	0.97	1.055	1.028	1.004	1.009	0.956
	Fixed investment in other public	5.1	0.65	0.662	0.666	0.648	0.655	0.642
	Fixed investment in other government	12.8	1.63	1.683	1.885	1.487	1.677	1.528
mdg-db	Education expenditure	9.6	1.22	1.224	1.598	1.510	1.515	1.399
	- Primary	5.3	0.68	0.746	1.106	0.754	0.881	0.531
	- Secondary	2.9	0.36	0.319	0.359	0.465	0.411	0.453
	- Tertiary	1.4	0.18	0.159	0.134	0.291	0.222	0.416
	Health expenditure	6.9	0.87	0.869	1.491	3.430	2.485	4.715
	Water and Sanitation expenditure	0.1	0.01	0.012	0.012	0.013	0.013	0.014
	Other public infrastructure expenditure	0.9	0.12	0.116	0.116	0.120	0.118	0.124
	Other government services expenditure	26.0	3.31	3.307	3.294	3.407	3.357	3.523
	Fixed investment in education	0.8	0.10	0.144	0.223	0.044	0.126	0.022
	- Primary	0.4	0.05	0.124	0.158	0.000	0.076	0.000
	- Secondary	0.3	0.03	0.017	0.064	0.039	0.047	0.016
	- Tertiary	0.1	0.01	0.004	0.001	0.005	0.004	0.007
	Fixed investment in health	0.6	0.07	0.066	0.362	0.740	0.542	0.953
	Fixed investment in water and	7.6	0.97	1.062	1.052	1.137	1.090	1.162
	Fixed investment in other public	5.1	0.65	0.662	0.676	0.699	0.687	0.723
	Fixed investment in other government	12.8	1.63	1.697	1.936	1.645	1.788	1.772

LCU:

* The percent of GDP in each subperiod corresponds to an average.

Table A.6. Employment and Wages by Labor Type and by Simulation.

	Employed ('000)		Employment growth rates				Real wages ('000 LCU)*		Wage growth rates			
	2004	2015	2004-05	2005-10	2010-15	2004-15	2004	2015	2004-05	2005-10	2010-15	2004-15
base												
Unskilled	1,773	2,409	3.5	3.2	2.3	2.8	53.1	70.1	1.8	2.4	2.9	2.6
Semi-Skilled	990	1,429	4.0	3.5	3.2	3.4	94.6	117.2	2.1	2.0	1.9	2.0
Skilled	447	750	4.5	4.5	5.2	4.8	113.9	124.4	-0.1	1.1	0.7	0.8
Total	3,210	4,588	3.8	3.5	3.0	3.3	74.4	93.7	1.6	2.1	2.3	2.1
mdg2-fb												
Unskilled	1,773	2,336	3.5	3.0	1.9	2.5	53.1	71.9	1.8	2.6	3.2	2.8
Semi-Skilled	990	1,460	4.4	3.9	3.1	3.6	94.6	115.6	2.8	2.2	1.3	1.8
Skilled	447	771	4.5	4.7	5.6	5.1	113.9	122.4	-0.1	1.4	0.1	0.7
Total	3,210	4,567	3.9	3.5	2.9	3.3	74.4	94.4	1.9	2.4	2.1	2.2
mdg2-db												
Unskilled	1,773	2,323	3.5	2.8	2.0	2.5	53.1	70.2	1.8	2.3	3.0	2.6
Semi-Skilled	990	1,445	4.4	3.8	3.0	3.5	94.6	113.8	2.7	2.0	1.2	1.7
Skilled	447	764	4.5	4.6	5.5	5.0	113.9	120.5	-0.1	1.1	0.0	0.5
Total	3,210	4,533	3.9	3.4	2.9	3.2	74.4	92.6	1.9	2.1	1.9	2.0
mdg45-fb												
Unskilled	1,773	2,404	3.5	3.2	2.3	2.8	53.1	71.9	1.8	2.5	3.3	2.8
Semi-Skilled	990	1,472	3.9	3.7	3.6	3.7	94.6	125.2	2.1	2.4	2.8	2.6
Skilled	447	807	4.4	5.0	6.2	5.5	113.9	142.8	-0.3	2.3	2.3	2.1
Total	3,210	4,683	3.7	3.6	3.3	3.5	74.4	100.9	1.5	2.6	3.3	2.8
mdg45-db												
Unskilled	1,773	2,355	3.5	3.1	1.9	2.6	53.1	68.7	1.8	2.4	2.5	2.4
Semi-Skilled	990	1,442	3.9	3.7	3.2	3.5	94.6	121.0	2.1	2.3	2.3	2.3
Skilled	447	800	4.4	5.0	6.1	5.4	113.9	139.1	-0.3	2.2	1.9	1.8
Total	3,210	4,597	3.7	3.6	3.0	3.3	74.4	97.4	1.5	2.5	2.7	2.5
mdg7-fb												
Unskilled	1,773	2,409	3.5	3.2	2.3	2.8	53.1	70.1	1.8	2.4	2.9	2.6
Semi-Skilled	990	1,429	4.0	3.5	3.2	3.4	94.6	117.2	2.1	2.0	1.9	2.0
Skilled	447	750	4.5	4.5	5.2	4.8	113.9	124.4	-0.1	1.1	0.7	0.8
Total	3,210	4,588	3.8	3.5	3.0	3.3	74.4	93.6	1.6	2.1	2.3	2.1
mdg7-db												
Unskilled	1,773	2,409	3.5	3.2	2.3	2.8	53.1	70.1	1.8	2.4	2.9	2.6
Semi-Skilled	990	1,429	4.0	3.5	3.2	3.4	94.6	117.1	2.1	2.0	1.9	2.0
Skilled	447	750	4.5	4.5	5.2	4.8	113.9	124.4	-0.1	1.1	0.7	0.8
Total	3,210	4,587	3.8	3.5	3.0	3.3	74.4	93.6	1.6	2.1	2.3	2.1
mdg-fb												
Unskilled	1,773	2,321	3.5	3.0	1.8	2.5	53.1	73.9	1.8	2.7	3.6	3.1
Semi-Skilled	990	1,499	4.4	4.1	3.4	3.8	94.6	123.5	2.7	2.6	2.2	2.4
Skilled	447	828	4.4	5.2	6.7	5.8	113.9	140.1	-0.3	2.5	1.7	1.9
Total	3,210	4,648	3.9	3.7	3.1	3.4	74.4	101.7	1.9	2.9	3.1	2.9
mdg-db												
Unskilled	1,773	2,270	3.5	2.8	1.5	2.3	53.1	68.5	1.8	2.3	2.5	2.3
Semi-Skilled	990	1,453	4.3	3.9	3.0	3.5	94.6	117.5	2.7	2.3	1.5	2.0
Skilled	447	817	4.4	5.1	6.5	5.6	113.9	134.9	-0.3	2.2	1.2	1.5
Total	3,210	4,541	3.9	3.5	2.8	3.2	74.4	96.1	1.8	2.6	2.3	2.4

* Real values with respect to the CPI. LCU: Dominican Republic Pesos

Table A.7. Results from microsimulations.

Scenario	Effect	Poverty rate Official moderate poverty line				Gini coefficient Hosehold per capita income			
		2004	2005	2010	2015	2004	2005	2010	2015
BASE	U	43.1	42.7	39.3	35.5	0.532	0.530	0.518	0.505
	U + S	43.1	42.6	39.4	35.8	0.532	0.530	0.519	0.505
	U + S + W1	43.1	42.5	38.6	34.2	0.532	0.528	0.512	0.491
	U + S + W1 + W2	43.1	42.0	34.1	27.0	0.532	0.528	0.511	0.489
	U + S + W1 + W2 + M	43.1	42.0	33.8	26.7	0.532	0.528	0.511	0.491
MDG2-DB	U	43.1	42.6	39.4	35.8	0.532	0.530	0.519	0.504
	U + S	43.1	42.7	39.4	36.1	0.532	0.530	0.519	0.505
	U + S + W1	43.1	42.6	38.8	34.3	0.532	0.528	0.513	0.491
	U + S + W1 + W2	43.1	42.1	34.4	27.2	0.532	0.528	0.512	0.488
	U + S + W1 + W2 + M	43.1	42.0	34.3	26.9	0.532	0.528	0.513	0.490
MDG2-FB	U	43.1	42.7	38.7	35.6	0.532	0.530	0.517	0.505
	U + S	43.1	42.7	38.8	35.7	0.532	0.530	0.517	0.506
	U + S + W1	43.1	42.6	38.0	33.6	0.532	0.528	0.510	0.488
	U + S + W1 + W2	43.1	42.0	33.3	25.9	0.532	0.528	0.509	0.486
	U + S + W1 + W2 + M	43.1	42.0	33.1	25.8	0.532	0.529	0.510	0.488
MDG2-FG	U	43.1	42.6	38.8	35.4	0.532	0.530	0.517	0.504
	U + S	43.1	42.6	39.0	35.7	0.532	0.530	0.518	0.505
	U + S + W1	43.1	42.5	38.2	33.9	0.532	0.528	0.511	0.489
	U + S + W1 + W2	43.1	42.0	33.5	26.3	0.532	0.528	0.510	0.487
	U + S + W1 + W2 + M	43.1	42.0	33.5	25.9	0.532	0.528	0.511	0.488
MDG2-TAX	U	43.1	42.6	38.8	35.2	0.532	0.530	0.516	0.503
	U + S	43.1	42.5	38.9	35.5	0.532	0.529	0.517	0.504
	U + S + W1	43.1	42.5	38.3	33.8	0.532	0.528	0.511	0.489
	U + S + W1 + W2	43.1	42.0	33.5	26.5	0.532	0.528	0.510	0.486
	U + S + W1 + W2 + M	43.1	42.0	33.1	26.0	0.532	0.528	0.510	0.488
MDG45-DB	U	43.1	42.8	38.9	35.4	0.532	0.530	0.518	0.507
	U + S	43.1	42.9	39.0	35.4	0.532	0.530	0.518	0.505
	U + S + W1	43.1	42.8	38.9	34.8	0.532	0.529	0.516	0.498
	U + S + W1 + W2	43.1	42.3	34.1	26.7	0.532	0.529	0.515	0.496
	U + S + W1 + W2 + M	43.2	42.3	33.9	26.1	0.532	0.528	0.516	0.498
MDG45-FB	U	43.1	42.7	38.7	34.3	0.532	0.531	0.518	0.503
	U + S	43.1	42.7	38.7	34.3	0.532	0.530	0.517	0.502
	U + S + W1	43.1	42.7	38.4	33.5	0.532	0.529	0.514	0.494
	U + S + W1 + W2	43.1	42.3	33.5	24.4	0.532	0.529	0.513	0.491
	U + S + W1 + W2 + M	43.1	42.2	33.2	23.7	0.532	0.529	0.514	0.493
MDG45-FG	U	43.1	42.7	38.7	34.3	0.532	0.530	0.517	0.503
	U + S	43.1	42.7	38.8	34.4	0.532	0.530	0.516	0.502
	U + S + W1	43.1	42.7	38.4	33.4	0.532	0.528	0.514	0.495
	U + S + W1 + W2	43.1	42.1	33.5	24.5	0.532	0.528	0.513	0.493
	U + S + W1 + W2 + M	43.1	42.1	33.2	24.2	0.532	0.528	0.513	0.495
MDG45-TAX	U	43.1	42.7	38.9	34.4	0.532	0.530	0.518	0.504
	U + S	43.1	42.8	38.9	34.5	0.532	0.530	0.518	0.503
	U + S + W1	43.1	42.7	38.3	33.8	0.532	0.529	0.514	0.497
	U + S + W1 + W2	43.1	42.2	33.5	25.0	0.532	0.529	0.513	0.495
	U + S + W1 + W2	43.1	42.2	33.3	24.7	0.532	0.529	0.514	0.497

Note: U=unemployment effect; S=sector effect; W1=relative wages effect; W2=average wage effect; M=skill effect.

Table A.7 -- cont. Results from microsimulations.

Scenario	Effect	Poverty rate Official moderate poverty line				Gini coefficient Hosehold per capita income			
		2004	2005	2010	2015	2004	2005	2010	2015
MDG7-DB	U	43.1	42.8	39.2	35.6	0.532	0.530	0.519	0.505
	U + S	43.1	42.8	39.3	35.8	0.532	0.530	0.519	0.505
	U + S + W1	43.1	42.7	38.5	34.3	0.532	0.529	0.512	0.492
	U + S + W1 + W2	43.1	42.2	34.2	27.1	0.532	0.529	0.511	0.490
	U + S + W1 + W2 + M	43.1	42.2	33.9	26.8	0.532	0.529	0.511	0.492
MDG7-FB	U	43.1	42.7	39.3	35.6	0.532	0.530	0.518	0.505
	U + S	43.1	42.7	39.3	35.8	0.532	0.530	0.519	0.506
	U + S + W1	43.1	42.6	38.6	34.1	0.532	0.529	0.512	0.492
	U + S + W1 + W2	43.1	42.2	34.1	26.9	0.532	0.529	0.511	0.489
	U + S + W1 + W2 + M	43.1	42.1	33.9	26.6	0.532	0.529	0.512	0.491
MDG7-FG	U	43.1	42.7	39.1	35.4	0.532	0.530	0.519	0.504
	U + S	43.1	42.7	39.3	35.6	0.532	0.530	0.519	0.505
	U + S + W1	43.1	42.6	38.6	33.9	0.532	0.528	0.513	0.491
	U + S + W1 + W2	43.1	42.1	34.2	26.8	0.532	0.528	0.512	0.489
	U + S + W1 + W2 + M	43.1	42.1	33.9	26.5	0.532	0.528	0.512	0.491
MDG7-TAX	U	43.1	42.7	39.4	35.4	0.532	0.530	0.519	0.504
	U + S	43.1	42.7	39.4	35.6	0.532	0.530	0.519	0.505
	U + S + W1	43.1	42.6	38.7	34.1	0.532	0.529	0.513	0.492
	U + S + W1 + W2	43.1	42.1	34.2	26.8	0.532	0.529	0.512	0.490
	U + S + W1 + W2 + M	43.1	42.0	34.1	26.6	0.532	0.529	0.513	0.492
MDG-DB	U	43.1	42.6	39.1	36.1	0.532	0.530	0.519	0.507
	U + S	43.1	42.6	39.1	36.0	0.532	0.529	0.518	0.507
	U + S + W1	43.1	42.6	38.7	35.0	0.532	0.528	0.515	0.499
	U + S + W1 + W2	43.1	42.1	34.0	27.0	0.532	0.528	0.514	0.497
	U + S + W1 + W2 + M	43.1	42.0	33.5	26.5	0.532	0.528	0.514	0.501
MDG-FB	U	43.1	42.6	38.5	34.5	0.532	0.530	0.516	0.503
	U + S	43.1	42.6	38.4	34.6	0.532	0.530	0.516	0.502
	U + S + W1	43.1	42.5	37.9	33.3	0.532	0.529	0.513	0.492
	U + S + W1 + W2	43.1	42.0	32.7	23.9	0.532	0.528	0.511	0.490
	U + S + W1 + W2 + M	43.1	41.9	32.2	23.6	0.532	0.528	0.511	0.492
MDG-FG	U	43.1	42.7	38.3	34.5	0.532	0.530	0.516	0.503
	U + S	43.1	42.7	38.3	34.6	0.532	0.529	0.515	0.502
	U + S + W1	43.1	42.6	37.9	33.3	0.532	0.528	0.512	0.491
	U + S + W1 + W2	43.1	42.0	32.7	23.9	0.532	0.528	0.511	0.489
	U + S + W1 + W2 + M	43.1	41.9	32.4	23.6	0.532	0.527	0.512	0.492
MDG-TAX	U	43.1	42.5	38.6	34.5	0.532	0.530	0.517	0.503
	U + S	43.1	42.6	38.6	34.5	0.532	0.530	0.517	0.502
	U + S + W1	43.1	42.5	38.2	33.3	0.532	0.528	0.513	0.493
	U + S + W1 + W2	43.1	42.0	33.0	24.6	0.532	0.528	0.512	0.490
	U + S + W1 + W2 + M	43.1	42.0	32.7	24.0	0.532	0.528	0.513	0.493

Note: U=unemployment effect; S=sector effect; W1=relative wages effect; W2=average wage effect; M=skill effect.

Table A.8. Decomposition of microsimulation results.

Scenario	Effect	Poverty rate Official moderate poverty line				Gini coefficient Hosehold per capita income			
		2004	2015	Total change	Marginal change	2004	2015	Total change	Marginal change
BASE	U	43.1	35.5	-7.7		0.532	0.505	-0.027	
	U + S	43.1	35.8	-7.4	0.29	0.532	0.505	-0.027	0.000
	U + S + W1	43.1	34.2	-8.9	-1.55	0.532	0.491	-0.040	-0.014
	U + S + W1 + W2	43.1	27.0	-16.1	-7.20	0.532	0.489	-0.043	-0.002
	U + S + W1 + W2 + M	43.1	26.7	-16.4	-0.30	0.532	0.491	-0.041	0.002
MDG2-DB	U	43.1	35.8	-7.4		0.532	0.504	-0.027	
	U + S	43.1	36.1	-7.1	0.30	0.532	0.505	-0.026	0.001
	U + S + W1	43.1	34.3	-8.9	-1.82	0.532	0.491	-0.041	-0.015
	U + S + W1 + W2	43.1	27.2	-15.9	-7.06	0.532	0.488	-0.043	-0.002
	U + S + W1 + W2 + M	43.1	26.9	-16.3	-0.32	0.532	0.490	-0.042	0.001
MDG2-FB	U	43.1	35.6	-7.5		0.532	0.505	-0.027	
	U + S	43.1	35.7	-7.4	0.13	0.532	0.506	-0.026	0.001
	U + S + W1	43.1	33.6	-9.5	-2.11	0.532	0.488	-0.044	-0.017
	U + S + W1 + W2	43.1	25.9	-17.2	-7.68	0.532	0.486	-0.046	-0.002
	U + S + W1 + W2 + M	43.1	25.8	-17.3	-0.15	0.532	0.488	-0.044	0.002
MDG2-FG	U	43.1	35.4	-7.7		0.532	0.504	-0.028	
	U + S	43.1	35.7	-7.4	0.30	0.532	0.505	-0.027	0.001
	U + S + W1	43.1	33.9	-9.2	-1.81	0.532	0.489	-0.043	-0.016
	U + S + W1 + W2	43.1	26.3	-16.8	-7.60	0.532	0.487	-0.045	-0.002
	U + S + W1 + W2 + M	43.1	25.9	-17.2	-0.37	0.532	0.488	-0.044	0.001
MDG2-TAX	U	43.1	35.2	-7.9		0.532	0.503	-0.029	
	U + S	43.1	35.5	-7.6	0.32	0.532	0.504	-0.028	0.000
	U + S + W1	43.1	33.8	-9.3	-1.67	0.532	0.489	-0.043	-0.015
	U + S + W1 + W2	43.1	26.5	-16.7	-7.37	0.532	0.486	-0.046	-0.002
	U + S + W1 + W2 + M	43.1	26.0	-17.1	-0.46	0.532	0.488	-0.044	0.002
MDG45-DB	U	43.1	35.4	-7.8		0.532	0.507	-0.025	
	U + S	43.1	35.4	-7.8	-0.01	0.532	0.505	-0.027	-0.002
	U + S + W1	43.1	34.8	-8.4	-0.59	0.532	0.498	-0.033	-0.007
	U + S + W1 + W2	43.1	26.7	-16.4	-8.03	0.532	0.496	-0.036	-0.002
	U + S + W1 + W2 + M	43.2	26.1	-17.1	-0.70	0.532	0.498	-0.034	0.001
MDG45-FB	U	43.1	34.3	-8.8		0.532	0.503	-0.029	
	U + S	43.1	34.3	-8.8	0.03	0.532	0.502	-0.030	-0.001
	U + S + W1	43.1	33.5	-9.7	-0.87	0.532	0.494	-0.038	-0.009
	U + S + W1 + W2	43.1	24.4	-18.8	-9.10	0.532	0.491	-0.041	-0.002
	U + S + W1 + W2 + M	43.1	23.7	-19.4	-0.65	0.532	0.493	-0.039	0.001
MDG45-FG	U	43.1	34.3	-8.8		0.532	0.503	-0.029	
	U + S	43.1	34.4	-8.7	0.09	0.532	0.502	-0.030	-0.001
	U + S + W1	43.1	33.4	-9.7	-0.95	0.532	0.495	-0.037	-0.007
	U + S + W1 + W2	43.1	24.5	-18.6	-8.94	0.532	0.493	-0.039	-0.002
	U + S + W1 + W2 + M	43.1	24.2	-18.9	-0.30	0.532	0.495	-0.037	0.002
MDG45-TAX	U	43.1	34.4	-8.7		0.532	0.504	-0.028	
	U + S	43.1	34.5	-8.6	0.09	0.532	0.503	-0.028	0.000
	U + S + W1	43.1	33.8	-9.3	-0.70	0.532	0.497	-0.035	-0.006
	U + S + W1 + W2	43.1	25.0	-18.1	-8.77	0.532	0.495	-0.037	-0.002
	U + S + W1 + W2	43.1	24.7	-18.5	-0.38	0.532	0.497	-0.035	0.002

Note: U=unemployment effect; S=sector effect; W1=relative wages effect; W2=average wage effect; M=skill effect.

Table A.8 -- cont. Decomposition of microsimulation results.

Scenario	Effect	Poverty rate Official moderate poverty line				Gini coefficient Hosehold per capita income			
		2004	2015	Total change	Marginal change	2004	2015	Total change	Marginal change
MDG7-DB	U	43.1	35.6	-7.6		0.532	0.505	-0.027	
	U + S	43.1	35.8	-7.4	0.20	0.532	0.505	-0.027	0.001
	U + S + W1	43.1	34.3	-8.9	-1.50	0.532	0.492	-0.040	-0.013
	U + S + W1 + W2	43.1	27.1	-16.1	-7.19	0.532	0.490	-0.042	-0.002
	U + S + W1 + W2 + M	43.1	26.8	-16.3	-0.27	0.532	0.492	-0.040	0.002
MDG7-FB	U	43.1	35.6	-7.5		0.532	0.505	-0.027	
	U + S	43.1	35.8	-7.3	0.20	0.532	0.506	-0.026	0.001
	U + S + W1	43.1	34.1	-9.1	-1.75	0.532	0.492	-0.040	-0.014
	U + S + W1 + W2	43.1	26.9	-16.3	-7.20	0.532	0.489	-0.043	-0.002
	U + S + W1 + W2 + M	43.1	26.6	-16.5	-0.26	0.532	0.491	-0.041	0.002
MDG7-FG	U	43.1	35.4	-7.7		0.532	0.504	-0.028	
	U + S	43.1	35.6	-7.5	0.20	0.532	0.505	-0.027	0.001
	U + S + W1	43.1	33.9	-9.2	-1.74	0.532	0.491	-0.041	-0.014
	U + S + W1 + W2	43.1	26.8	-16.4	-7.13	0.532	0.489	-0.043	-0.002
	U + S + W1 + W2 + M	43.1	26.5	-16.6	-0.28	0.532	0.491	-0.041	0.002
MDG7-TAX	U	43.1	35.4	-7.8		0.532	0.504	-0.028	
	U + S	43.1	35.6	-7.5	0.26	0.532	0.505	-0.027	0.001
	U + S + W1	43.1	34.1	-9.0	-1.50	0.532	0.492	-0.040	-0.013
	U + S + W1 + W2	43.1	26.8	-16.4	-7.36	0.532	0.490	-0.042	-0.002
	U + S + W1 + W2 + M	43.1	26.6	-16.5	-0.14	0.532	0.492	-0.040	0.002
MDG-DB	U	43.1	36.1	-7.1		0.532	0.507	-0.025	
	U + S	43.1	36.0	-7.2	-0.10	0.532	0.507	-0.025	0.000
	U + S + W1	43.1	35.0	-8.2	-1.02	0.532	0.499	-0.033	-0.008
	U + S + W1 + W2	43.1	27.0	-16.1	-7.92	0.532	0.497	-0.035	-0.002
	U + S + W1 + W2 + M	43.1	26.5	-16.6	-0.50	0.532	0.501	-0.031	0.004
MDG-FB	U	43.1	34.5	-8.6		0.532	0.503	-0.029	
	U + S	43.1	34.6	-8.6	0.04	0.532	0.502	-0.030	-0.001
	U + S + W1	43.1	33.3	-9.9	-1.31	0.532	0.492	-0.040	-0.010
	U + S + W1 + W2	43.1	23.9	-19.2	-9.37	0.532	0.490	-0.042	-0.002
	U + S + W1 + W2 + M	43.1	23.6	-19.5	-0.29	0.532	0.492	-0.040	0.002
MDG-FG	U	43.1	34.5	-8.7		0.532	0.503	-0.029	
	U + S	43.1	34.6	-8.6	0.12	0.532	0.502	-0.030	0.000
	U + S + W1	43.1	33.3	-9.8	-1.28	0.532	0.491	-0.041	-0.011
	U + S + W1 + W2	43.1	23.9	-19.3	-9.42	0.532	0.489	-0.043	-0.003
	U + S + W1 + W2 + M	43.1	23.6	-19.6	-0.33	0.532	0.492	-0.040	0.003
MDG-TAX	U	43.1	34.5	-8.7		0.532	0.503	-0.029	
	U + S	43.1	34.5	-8.7	0.01	0.532	0.502	-0.030	-0.001
	U + S + W1	43.1	33.3	-9.9	-1.19	0.532	0.493	-0.039	-0.009
	U + S + W1 + W2	43.1	24.6	-18.5	-8.69	0.532	0.490	-0.042	-0.002
	U + S + W1 + W2 + M	43.1	24.0	-19.1	-0.62	0.532	0.493	-0.039	0.003

Note: U=unemployment effect; S=sector effect; W1=relative wages effect; W2=average wage effect; M=skill effect.

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