Republic of Croatia: Selected Issues

This Selected Issues paper for the Republic of Croatia was prepared by a staff team of the International Monetary Fund as background documentation for the periodic consultation with the member country. It is based on the information available at the time it was completed on April 24, 2008. The views expressed in this document are those of the staff team and do not necessarily reflect the views of the government of the Republic of Croatia or the Executive Board of the IMF.

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INTERNATIONAL MONETARY FUND

REPUBLIC OF CROATIA

Selected Issues

Prepared by Etibar Jafarov (EUR) and Anna Ilyina (PDR)

Approved by the European Department

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PREFACE

This document contains two selected issues papers. With one paper assessing external stability in Croatia and the other taking a cross-country perspective on analyzing inefficiencies in Croatian public spending, the papers are integral to the analysis for the 2008 Article IV consultation. In addition, the latter paper also served as input into a technical assistance mission on short-term expenditure rationalization, which the Fund's Fiscal Affairs Department undertook in collaboration with the World Bank in January–February 2008.

The first paper focuses on external stability, an important issue in view of Croatia's external imbalances and the requirements of the IMF's 2007 Decision on Bilateral Surveillance. The paper concludes that the real exchange rate is broadly in line with economic fundamentals, and that external debt dynamics are sustainable over the medium-term, as long as macroeconomic policies remain strong. However, there are risks to external stability, largely related to financial account vulnerabilities that arise from the possibility of increases in the cost of foreign borrowing and/or a significant slowdown in capital inflows. This underscores the importance of policies to reduce Croatia's external imbalances, not only through strong macroeconomic policies, but also through structural reforms. It also underscores the importance of the authorities having contingency measures at the ready.

The second paper finds evidence of significant inefficiencies in Croatia's social spending. This implies there is room to reduce government spending without unduly sacrificing the quality of social services. The paper discusses a number of reform measures to reduce inefficiencies in public spending and generate budgetary savings, with a view to reducing the size of the general government deficit.

I. ASSESSING CROATIA'S EXTERNAL STABILITY[1]

A. Introduction

1.   **The deteriorating global economy and ongoing re-pricing of credit risks warrant a closer look at countries with high current account deficits and large external financing requirements**.[2] In view of the magnitude of Croatia's external imbalances, as well as the requirements of the IMF's 2007 Decision on Bilateral Surveillance,[3] external stability is a key focus of this Article IV consultation.

2.   **External stability is defined as "a balance of payments position that does not, and is not likely to, give rise to disruptive adjustments in exchange rates."[4]** This requires that: (i) the *underlying current account* (i.e., the current account stripped of temporary factors*,* such as cyclical fluctuations, temporary shocks, and adjustment lags) is broadly in equilibrium—a situation in which the country's net external asset position is evolving consistently with the economy's structure and fundamentals; and (ii) the *capital and financial account* does not create risks of abrupt shifts in capital flows.

3.   **This Chapter asks three main questions**:

- What are the key drivers of Croatia's current account dynamics?

- Is Croatia's current account position sustainable?

- Do financial account and external debt positions pose any risks to external stability?

4.   **The main conclusion is that external stability risks relate largely to financial account vulnerabilities rather than exchange rate misalignment.** There is no compelling evidence that the widening current account deficit reflects competitiveness problems stemming from real exchange appreciation; rather the lackluster merchandise export performance seems to be largely due to structural factors. Under the baseline medium-term scenario, which assumes a limited impact of global slowdown on Croatia and a continuation of strong macroeconomic policies, the *underlying current account balance* is broadly in line

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[1] Prepared by Anna Ilyina.

[2] See, e.g., "Emerging Europe's Current Account Deficits: Mind the Gap!" by FitchRatings, January 31, 2008.

[3] In particular, the 2007 Decision on Bilateral Surveillance clarifies that the objective of the IMF's surveillance is to foster stability of the international monetary system by encouraging national policies that do not disrupt or compromise the members' own "external stability."

[4] *Decision on Bilateral Surveillance,* http://www.imf.org/external/np/pp/2007/eng/062107.htm

with Croatia's economic fundamentals, and external debt dynamics are sustainable. However, the sustainability of Croatia's external debt and financial account position may be at risk from possible increase in the cost of foreign borrowing and/or a significant slowdown in capital inflows. These event risks are non-trivial in the environment of lower global growth, heightened concerns about inflation, on-going repricing of credit risks, and lingering uncertainties about the full ramifications of the subprime crisis.

5.	**The chapter is structured as follows.** Section B examines the key drivers of the current account dynamics and competitiveness indicators for Croatia and its regional peers. It also assesses whether Croatia's real exchange rate and current account dynamics might be considered "normal", given the country's structural and macroeconomic characteristics. Section C examines the composition of external financing and assesses the sustainability of Croatia's international investment position and external debt dynamics, reviews Croatia's external liquidity indicators and discusses associated risks. Section D concludes.

B. Current Account Sustainability

What are the key drivers of the current account dynamics?

6.	**Large current account deficits in Eastern Europe were (mostly and until recently) seen as part of a "normal" convergence process, and not so much as a cause for concern.** Indeed, theory suggests that an increase in goods and financial market integration implies that countries with lower per capita income levels and higher expected rates of return should experience faster investment and consumption growth, financed (in many cases), by foreign capital inflows and accompanied (in some cases) by a decline in domestic saving. All of these factors should contribute to a deterioration in current account balances.

Figure I.1. Income Catch-up and Current Account Deficits in Eastern Europe

GDP per capita at PPP (relative to the EU27 average)

	1997	2000	2003	2006	2007
EU (27)	100	100	100	100	100
Slovenia	76	79	83	88	92
Czech Republic	73	69	74	79	82
Estonia	41	45	55	69	72
Slovakia	52	50	56	64	68
Hungary	52	56	64	65	65
Lithuania	38	39	49	56	62
Latvia	35	37	44	54	61
Poland	47	48	49	52	55
Croatia	**43**	**43**	**48**	**52**	**52**
Romania	…	26	32	39	39
Bulgaria	27	28	33	37	39
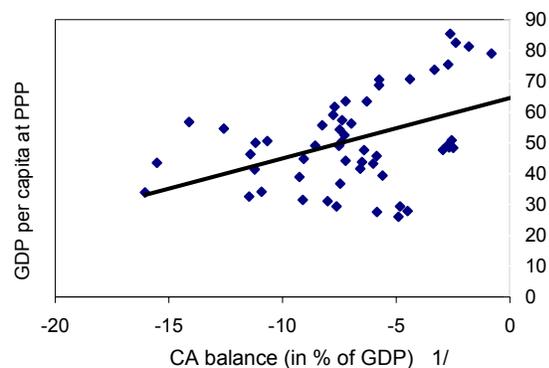
Sources: Eurostat, World Economic Outlook and Fund staff calculations.
1/ Three-year average current account balances of the countries included in the Table are plotted against their levels of GDP per capita at PPP, relative to the EU27 benchmark, at the beginning of each three-year period; 2000–07 is the period under consideration.

7.   **In terms of the speed of convergence and the magnitude of the current account deterioration, Croatia seems to hold the middle-ground among transition economies**. Croatia started with a higher level of relative income than several other EU accession countries (e.g., Bulgaria, Romania and the Baltic states, Figure I.1), and its average annual GDP growth (Figure I.2) and speed of income convergence have been slower. In comparison with other transition economies, the deterioration in Croatia's current account deficit throughout 2000–07 was fairly modest, with the deficit remaining within the range of 3–9 percent of GDP. Also, in the case of Croatia, the deterioration in the saving-investment balance reflected a rising investment-to-GDP ratio, while the ratio of national savings-to-GDP remained stable. Croatia's domestic stock of credit-to-GDP, which was already fairly high in 2000 by regional standards, rose by over 30 percentage points by end-2006, faster than in Poland, Czech Republic and Hungary, but less rapidly than in the Baltic states (Figure I.*2*).

Figure I.2. Croatia and Selected European Countries: Saving-Investment Balances, Credit and Real GDP Growth
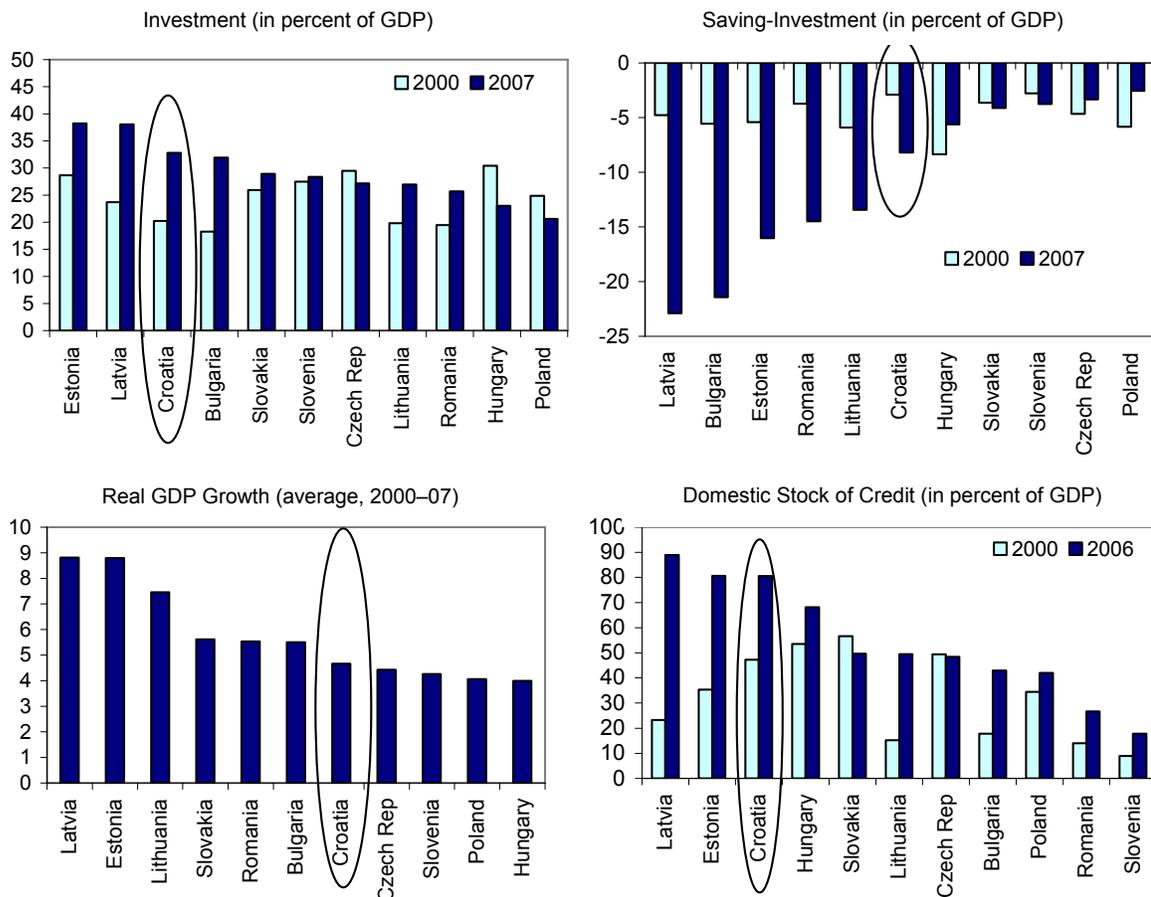
Sources: World Economic Outlook; International Financial Statistics; and Fund staff calculations.

Do the current account dynamics reflect deteriorating competitiveness?

8.   **Real exchange rate appreciation is often part of the convergence story.** In theory, growing economic and financial integration of lower-income countries should lead to faster productivity growth in the tradable sector compared to the non-tradable sector, pushing up wages in both sectors and raising the relative prices of non-tradables as well as the overall price level (the Balassa-Samuelson effect). Thus, for transition countries with stable nominal exchange rates (as in the case of Croatia), the observed inflation differentials with the euro area should be attributable, at least in part, to productivity growth differentials. While most standard real effective exchange rate measures for Croatia (i.e., the CPI-, PPI- and ULCM-based[5] REER) indicate appreciation on the order of 1–2 percent per year during 2000–07 (Figure I.3), the empirical evidence on the magnitude and significance of the Balassa-Samuelson effect for Croatia is mixed.[6]

9.   **The worsening of Croatia's current account position does not seem to be due to an exchange-rate induced erosion of competitiveness.** The current account deteriorated during 2000–07, notwithstanding a temporary improvement in 2003–04. The deterioration was driven mainly by higher goods imports; the goods export-to-GDP ratio remained broadly stable and the non-financial services balance improved, supported by strong tourism revenues (Figure I.6). Apart from a rising share of energy imports, the structure of goods imports has been remarkably stable (Figure I.6), with the share of intermediate and capital goods at 60–64 percent. While the broad structure of exports has been stable as well (Figure I.6), there are some indications of changing patterns of specialization.[7] In sum, there does not seem to be compelling evidence that the trend real exchange rate appreciation has been fueling consumer goods imports, nor that it has been the key factor behind lackluster goods exports.

10.   **Weak merchandise export performance could be explained by structural factors.** The average annual growth rates of Croatia's merchandise exports to both the EU and non-EU markets have been positive, but below the peer group average throughout 2000–07

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[5] ULCM stands for "unit labor cost in manufacturing."

[6] The results seem to be sensitive to the choice of the time period, data frequency and the definitions of the tradable and non-tradable sectors. See Mihaljek and Klau (2003), Egert (2005), and Funda et al. (2007) for more details. For example, Funda et. Al. (2007) found no statistically significant Balassa-Samuelson effect, but using a simple accounting framework, they assess the contribution of the Balassa-Samuelson effect to annual inflation over a period of 1999–2006 to be a maximum of 0.64 percentage points.

[7] For example, Croatia's export share in world imports of chemicals remained stable since 2001, but the composition has been changing, with the share of "chemical elements and compounds" and "plastic materials" declining and the share of "pharmaceutical products" and "perfume materials, etc." increasing (based on COMTRADE data), indicating possible shifts towards higher value-added goods.

Figure I.3. Croatia: Price and Cost Competitiveness Indicators, 1996–2007

REER, NEER and CPI (seasonally adjusted, 2000=100)

Real Effective Exchange Rate Indices (2000 = 100)

Relative CPI and ULCM 1/
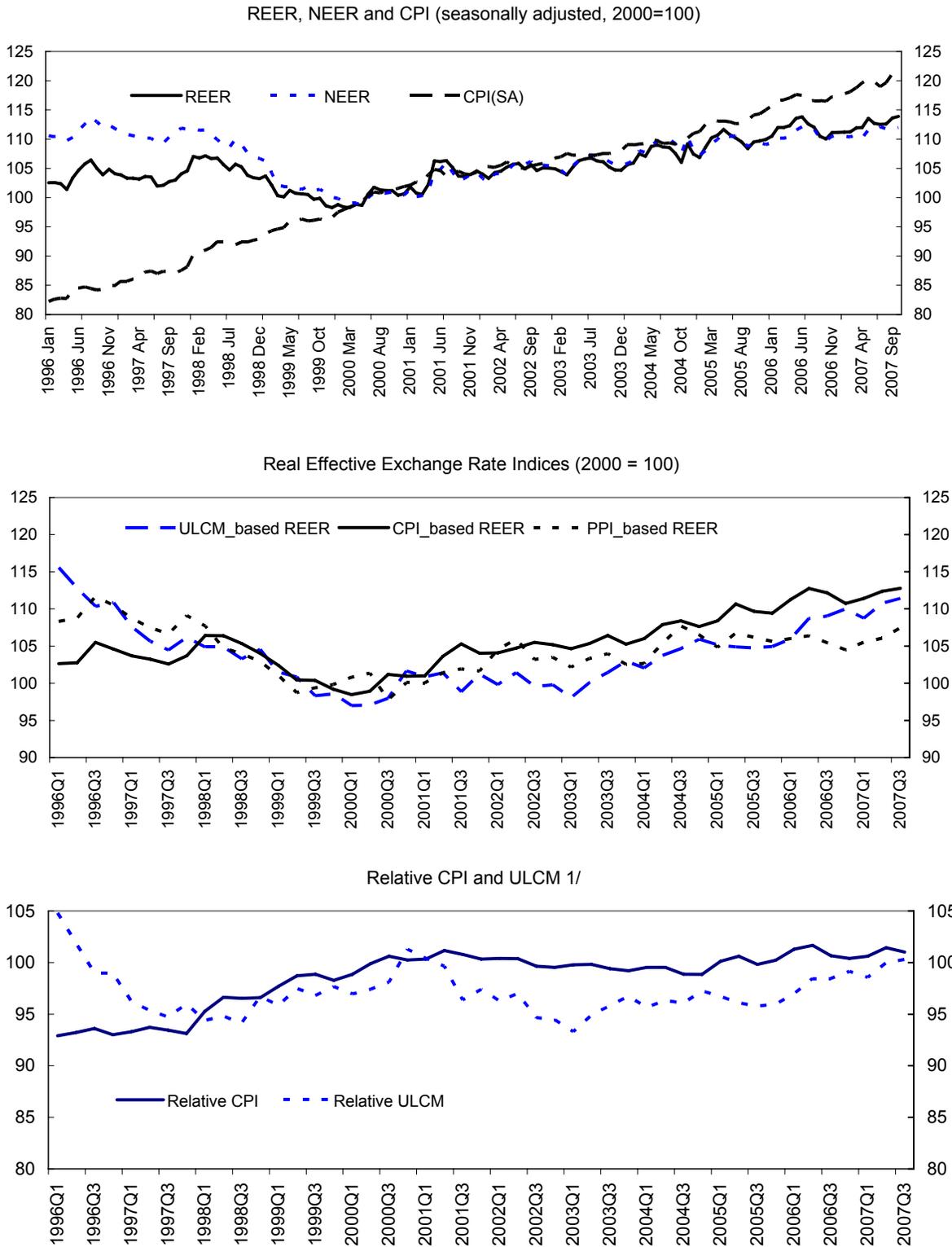
Sources: IMF's Information Notice System, IFS, World Economic Outlook, and Fund staff calculations.
1/ ULCM-based REER and relative ULCM are computed using quarterly data; shown as 3Q moving averages.

Figure I.4. Croatia: Current Account Components, 1997–2007

Current Account Balance
(by component, in percent of GDP)

Merchandise Trade Balance
(by component, in percent of GDP)
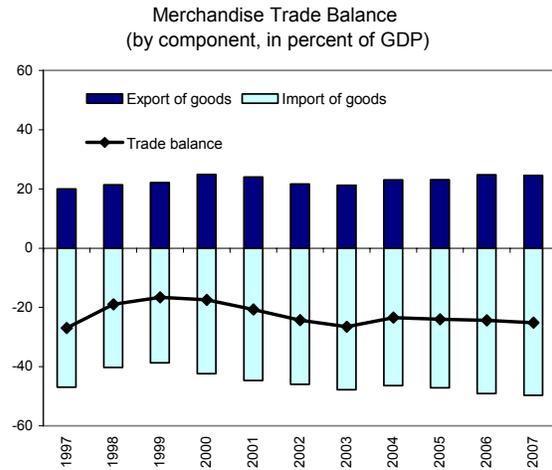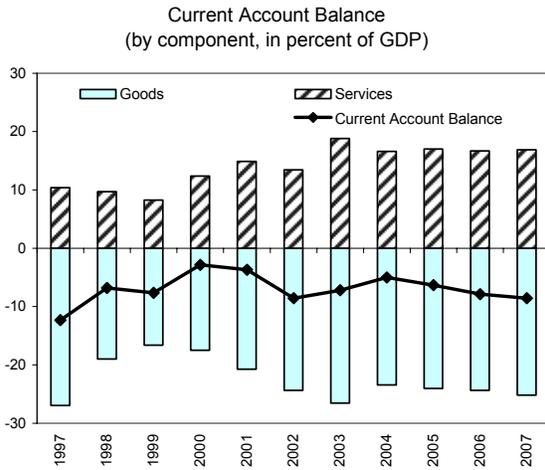
Merchandise Trade (in percent of the total) - MIG Classification   1/

Export

Import
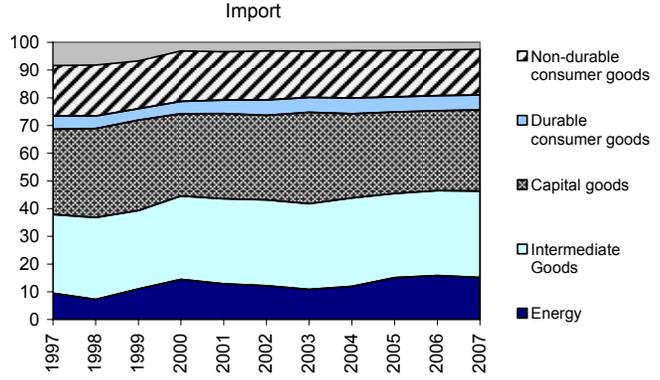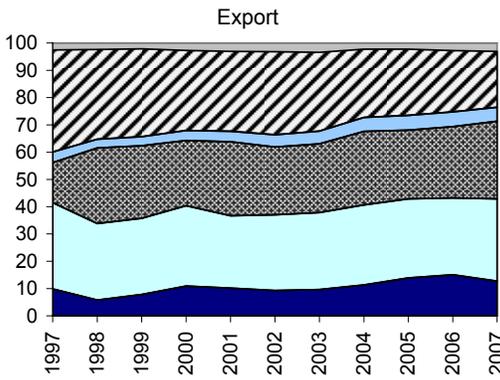
Merchandise Trade (in percent of the total) - SITC Classification   2/

Export

Import
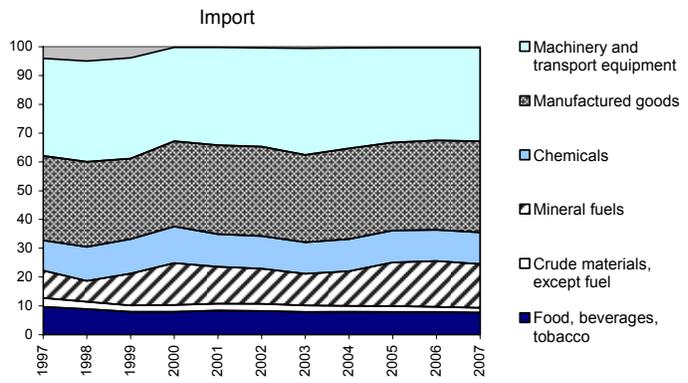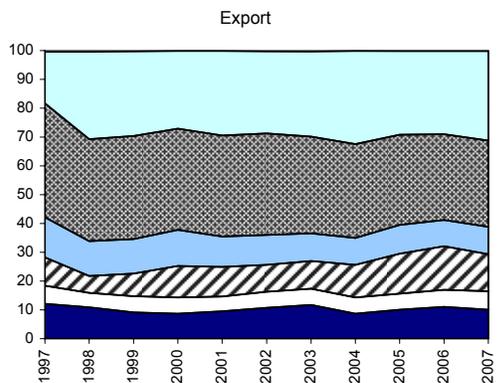
Sources: Croatian National Bank; Central Bureau of Statistics; and Fund staff calculations.
1/ MIG stands for Main Industrial Groupings.
2/ SITC stands for Standard International Trade Classification.

Figure I.5. Croatia and Selected European Countries: Merchandise Exports—Regional Comparisons

Export Growth (5-year average of annual changes, in percent)

EU market   (in deviations from group average)

	99-03	00-04	01-05	02-06	03-07 1/		99-03	00-04	01-05	02-06	03-07 1/
Croatia	8	10	8	9	10	Croatia	-5	-5	-5	-5	-6
Slovenia	6	7	10	12	16	Slovenia	-7	-8	-3	-2	0
Hungary	14	14	10	11	12	Hungary	1	-1	-3	-3	-4
Bulgaria	15	19	14	16	17	Bulgaria	2	4	2	2	1
Czech Republic	14	17	15	15	17	Czech Republic	1	2	2	1	1
Slovak Republic	14	15	14	18	22	Slovak Republic	1	0	2	4	7
Romania	18	20	14	14	14	Romania	5	5	1	0	-1
Poland	15	18	15	17	18	Poland	2	3	3	3	2
Group average	13	15	13	14	16						

Non-EU market   (in deviations from group average)

	99-03	00-04	01-05	02-06	03-07 1/		99-03	00-04	01-05	02-06	03-07 1/
Croatia	4	11	15	13	15	Croatia	-8	-6	-2	-5	-5
Slovenia	11	12	14	15	15	Slovenia	-1	-5	-3	-4	-5
Hungary	12	15	15	19	22	Hungary	0	-2	-2	0	2
Bulgaria	15	19	14	16	17	Bulgaria	3	2	-2	-3	-2
Czech Republic	11	19	16	18	19	Czech Republic	-1	1	0	-1	0
Slovak Republic	19	23	21	27	29	Slovak Republic	7	6	4	9	10
Romania	13	18	18	21	17	Romania	2	1	1	2	-2
Poland	11	21	20	20	22	Poland	-1	4	3	2	2
Group average	12	17	16	19	20						

Export Market Shares (5-year average of annual changes, in percent)

Non-EU market   **EU market**

	99-03	00-04	01-05	02-06	03-07 1/		99-03	00-04	01-05	02-06	03-07 1/
Croatia	-2	4	11	6	6	Croatia	1	3	3	2	2
Slovenia	4	5	10	7	6	Slovenia	-1	0	5	5	7
Hungary	4	7	10	11	12	Hungary	6	6	6	4	4
Bulgaria	2	8	7	10	10	Bulgaria	7	11	10	9	9
Czech Republic	3	10	12	10	10	Czech Republic	7	10	10	8	9
Slovak Republic	12	16	17	20	20	Slovak Republic	6	8	10	11	14
Romania	5	10	13	13	8	Romania	10	12	9	7	6
Poland	4	12	15	12	12	Poland	7	10	10	9	9

Source: Direction of Trade Statistics; and Fund staff calculations.
1/ Data for 2007 are estimates.

Figure I.6. Croatia and Selected European Countries: Competitiveness Indicators—Regional Comparisons

CPI-based REER (5-year average of annual changes, in percent)

	99-03	00-04	01-05	02-06	03-07 1/			*(in deviations from group average)*				
								99-03	00-04	01-05	02-06	03-07 1/
Croatia	0	1	2	2	1		Croatia	-2	-2	-2	-2	-2
Slovenia	1	0	1	1	1		Slovenia	-2	-3	-3	-2	-3
Hungary	5	6	6	4	4		Hungary	2	2	2	0	0
Bulgaria	4	4	4	4	4		Bulgaria	2	1	0	0	0
Slovak Republic	5	8	6	7	9		Slovak Republic	3	4	3	4	5
Czech Republic	3	4	5	5	3		Czech Republic	1	0	1	1	-1
Romania	-1	3	4	5	7		Romania	-3	-1	0	2	3
Poland	1	1	2	0	1		Poland	-1	-2	-2	-3	-2
Group average	2	3	4	3	4							

ULCM-based REER (5-year average of annual changes, in percent)

	99-03	00-04	01-05	02-06	03-07 1/			*(in deviations from group average)*				
								99-03	00-04	01-05	02-06	03-07 1/
Croatia	0	1	1	2	3		Croatia	0	-1	-1	0	0
Slovenia	-1	-1	0	0	0		Slovenia	-1	-3	-2	-2	-2
Hungary	3	5	4	0	0		Hungary	3	3	1	-1	-2
Bulgaria	-1	0	2	1	2		Bulgaria	-1	-2	0	0	-1
Slovak Republic	2	5	0	2	1		Slovak Republic	2	2	-2	0	-1
Czech Republic	3	6	5	3	1		Czech Republic	3	3	3	1	-1
Romania	0	8	10	10	14		Romania	0	5	8	8	11
Poland	-6	-5	-5	-5	-2		Poland	-6	-8	-7	-7	-4
Group average	0	2	2	1	2							

Source: Direction of Trade Statistics; and Fund staff calculations.
1/ Data for 2007 are estimates.

Monthly Labor Cost in Industry, excluding construction (annual average, in euros)
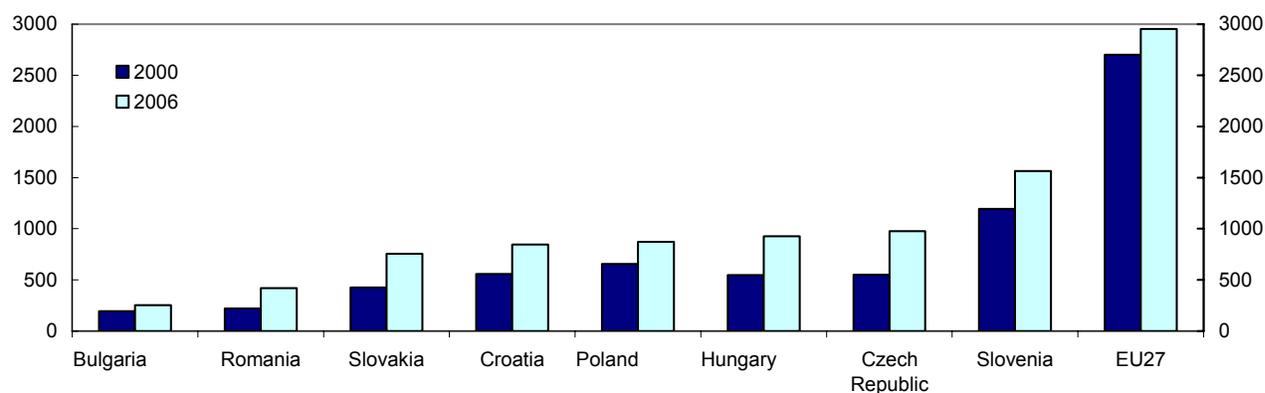
Sources: World Bank; European Commission; IMF's Information Notice System; and Fund staff calculations.

Figure I.7. Croatia and Selected European Countries: Structural Indicators

Structural Competitiveness Indicators

World Bank, 2008 Doing Business (179 countries)

Country	Value
Slovakia	32
Hungary	45
Bulgaria	46
Romania	48
Slovenia	55
Czech Rep.	56
Poland	74
Croatia	97

World Economic Forum, 2007 Global Competitiveness (131 countries)

Country	Value
Czech Rep.	33
Slovenia	39
Slovakia	41
Hungary	47
Poland	51
Croatia	57
Romania	74
Bulgaria	79
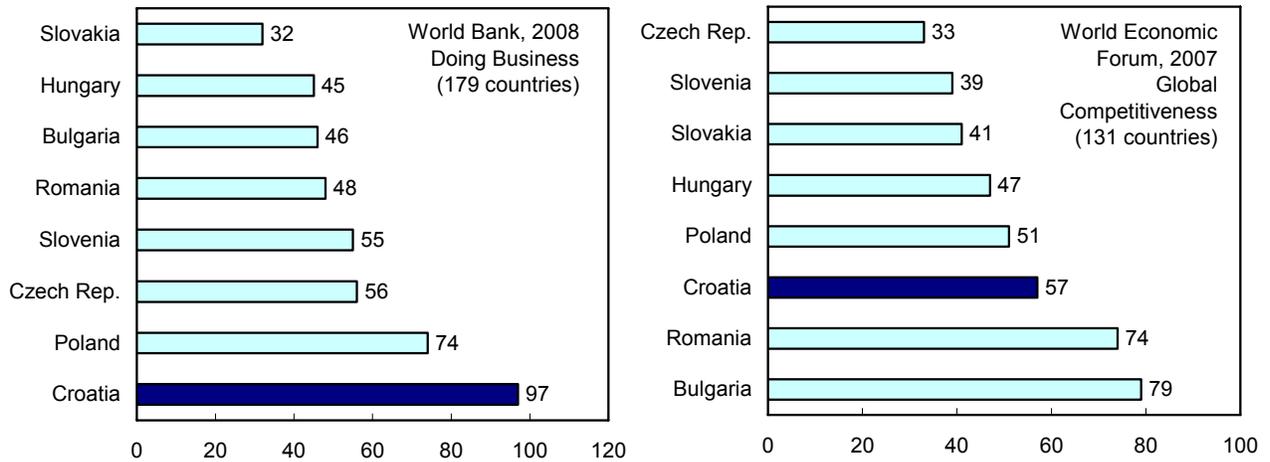
Inward FDI Stock by Sector (NACE classification, in percent of total, as of end-2007) 1/

Sector	
Financials, except insurance and pension funds	~35
Manufacture of chemicals and chemical products	~12
Post and telecommunications	~10
Wholesale trade and commission trade	~5
Extraction of crude petroleum and natural gas	~4
Manufacture of coke, refined petroleum products	~4
Real estate activities	~3
Manufacture of other non-metallic mineral products	~3
Retail trade, except of motor vehicles and motorcy	~3
Manufacture of food products and beverages	~2
Hotels and restaurants	~1

Sources: World Bank; World Economic Forum; Croatian National Bank; and Fund staff calculations.
1/ NACE is Statistical Classification of Economic Activities in the EU.

(Figure I.5). As a result, Croatia's market share, especially in the EU market, expanded at a much slower pace than that of other Eastern European countries. Comparing price and cost competitiveness measures across the region does not reveal a strong link between the extent of REER appreciation (depreciation) and merchandise export under (over)performance vis-à-vis the regional average. For example, Croatia has consistently underperformed, while Slovakia and the Czech Republic have outperformed despite much stronger REER appreciation than in Croatia on both the CPI and the ULCM basis (Figures I.5 and I.6). Wage developments (in industry) across these countries do not fully explain the differences in export performance either, which suggests that other factors may be at work, including patterns of specialization, lack of FDI in the tradable sector, or other structural features of the economy.

11. **Structural indicators paint a relatively unfavorable picture of Croatia's competitiveness** (Figure I.7). In particular, poor protection of property rights, inefficient public administration and judicial system, corruption, and heavy state regulation are often listed as Croatia's main competitive disadvantages, which could, in part, explain why it has been less successful in attracting FDI than other countries in the region. Most FDI in Croatia went into the non-tradable sector (Figure I.7), with some exceptions (e.g., chemicals was one of the sectors that attracted significant foreign investment, accounting for around 15 percent of the total FDI stock at end-2006). Hence, any marked improvements in export performance are unlikely to materialize without structural reforms.[8] The question remains as to whether current account deficits of the magnitude recently experienced by Croatia are sustainable over the medium-term under the baseline assumptions about policies and fundamentals (discussed in the accompanying staff report).

Is the current account deficit sustainable?

12. **Current account sustainability is typically assessed on the basis that a country's current account balance should evolve in a manner consistent with the external and internal balance of the economy**. The sustainability of the current account balance can be gauged from the estimated degree of real exchange rate "misalignment," i.e., a deviation of the prevailing exchange rate from its "equilibrium" level, defined as the level consistent with an underlying current account being in equilibrium. The *equilibrium current account balance* (also referred to as the *current account norm)* is a country's savings-investment balance determined by its medium-term economic fundamentals. The *underlying current account* is the prevailing current account stripped of temporary factors*,* such as cyclical fluctuations, temporary shocks, and adjustment lags. This section presents the application of the

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[8] See Moore and Vamvakidis (2008) for more details.

macroeconomic balance and **external sustainability approaches**, and also discusses some alternative assessments.[9]

The macroeconomic balance approach

13.   **The macroeconomic balance approach estimates the degree of real exchange rate misalignment in three steps**: (i) the *current account norm (CA norm)* is computed as a function of the country's medium-term economic fundamentals; (ii) the *underlying current account balance* is estimated assuming that the country's and its trading partners' output gaps are closed and all temporary factors, including lagged effects of exchange rate changes, are taken into account; and (iii) the *exchange rate adjustment* required to close the gap between the underlying current account balance and the current account norm is obtained using elasticities of the current account with respect to the real exchange rate. Each step is discussed in more detail below.

14.   **The *CA norms* are typically obtained using panel regression estimation**. For the purpose of this analysis, we use the CGER panel regression coefficients that were obtained using a sufficiently large sample of countries to achieve a reasonable degree of accuracy in the estimation of the equilibrium relationship between current account balances and economic fundamentals. The explanatory variables used by the CGER are the ones that were found to be fairly robust current account determinants in a number of empirical studies[10]:

Fiscal balance: a higher government budget balance contributes to higher national savings, thereby raising the current account balance (in the absence of full Ricardian equivalence).

Demographics: a higher share of economically inactive population reduces national savings, thereby decreasing the current account balance.

Commodity terms of trade: an improvement in the terms of trade leads to a higher current account balance (e.g., higher oil prices increase the current account balance of oil exporters and reduce the current account balance of oil importers).

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[9] Both the macroeconomic balance and external sustainability approaches are used by the IMF's internal Consultative Group on Exchange Rate Issues (CGER), which provides multilaterally consistent exchange rate assessments for a number of advanced and emerging market countries. While Croatia is included in the sample used in the panel regression estimation of the current account norms, it is not on the list of countries for which the CGER group provides regular assessments of real exchange rate misalignment. The results reported in this section, however, are largely based on the CGER methodology (*Methodology for CGER Exchange Rate Assessments* (2006)).

[10] See Isard (2007) for an overview and discussion of the equilibrium exchange rate assessment methodologies.

The stage of economic development: a country that has a lower income level or stronger economic growth relative to its trading partners tends to have a lower current account balance.

Initial external position: either an initial Net Foreign Assets (NFA) position[11] or a lagged current account balance is included in some regression specifications as well. The presumption is that if a country has been borrowing steadily in the past (i.e., had negative

Table I.1. Real Exchange Rate Assessment Using Macroeconomic Balance Approach

	Norm _CA	Norm_NFA1	Norm_NFA2
Current account norm (in percent of GDP) 1/	-3.8	-4.2	-3.4
Underlying current account balance (in percent of GDP) 2/	-4.9	-4.9	-4.9
Current account elasticity to REER 3/	-0.39	-0.39	-0.39
Implied REER adjustment (in percent, "+" appreciation)	**-2.8**	**-1.8**	**-4.0**
Contributions of the current account determinants to the estimated current account norms:			
Fiscal balance	0.2	0.2	0.2
Old-age dependency	0.0	0.0	0.0
Population growth	0.4	0.5	0.5
Lagged current account	-2.5	…	…
Initial NFA	…	-2.7	-1.9
Oil balance	-0.3	-0.4	-0.4
Output growth	-0.3	-0.3	-0.3
Relative income	-1.2	-1.5	-1.5
Constant	-0.3	0.0	0.0
Total	**-3.8**	**-4.2**	**-3.4**

Sources: World Economic Outlook, Croatian National Bank; and Fund staff calculations.
1/ The CA norm corresponds to a current account level that is consistent with a specific set of economic fundamentals; "Norm_CA" and "Norm_NFA" are computed using the panel regression estimates for two model specifications, with lagged current account balance and initial NFA position, respectively (see Appendix I for details); "Norm_NFA1" is based on the official IIP data that reflects adjustments in market values, "Norm_NFA2" is based on the official IIP data with the exception of the inward FDI position, which is estimated as cumulative FDI flows from 1998 onward (this will be discussed in more details in Section C); All data (historical and medium-term projections) used in the computations come from the April 2008 WEO.
2/ Underlying current account balance assumes that both domestic and foreign output gaps are closed and is adjusted for the projected REER movement during 2008–13.
3/ The current account elasticity to REER is computed using the standard long-run exchange rate elasticities for imports (0.92) and exports (-0.71), as well as exports and imports of goods and services (in percent of GDP) over a period of 2003–07.

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[11] NFA is the difference between a country's total foreign assets and total foreign liabilities.

NFA), it must have some characteristics that are attractive to foreign investors and, hence, is likely to continue attracting capital inflows.[12] On the other hand, if a country has had a high (positive) NFA, it should benefit from higher net foreign income flow. Hence, one would expect a positive association between the initial NFA and current account balance.

15. **The application of the macroeconomic balance approach suggests that the real exchange rate is broadly in line with Croatia's economic fundamentals projected over the medium-term under baseline policies**. Table I.1 presents several estimates of the *CA norm*, using the CGER panel regression coefficients and the values of the medium-term current account determinants for Croatia and its trading partners. Based on the estimates in Table I.1, the average *CA norm* for Croatia is around -4 percent of GDP. The biggest negative contributions come from the initial NFA position or the lagged current account balance, Croatia's relative income vis-à-vis its trading partners, and its status as net oil importer. In comparison, the average CA norm for the CEE countries is estimated at -4.4 percent of GDP.[13] Given the estimated underlying current account balance of -4.9 percent of GDP, the implied degree of real exchange rate overvaluation in Croatia is 2–4 percent (which cannot be considered significantly different from zero at conventional confidence levels, given the forecast standard errors in the CA norm regressions).

The external sustainability approach

16. **The external sustainability approach is based on the notion that the present value of future trade surpluses must be sufficient to service the country's external liabilities**. The extent of misalignment can then be assessed by (i) computing the difference between the *underlying CA balance* and the current account balance that would stabilize the *net foreign asset* (NFA) position of the country at some benchmark level; and (ii) translating this difference into an exchange rate adjustment that would be required to bring the CA balance in line with its NFA-stabilizing level (in a way similar to the macroeconomic balance approach). The simplified way of computing the *NFA-stabilizing current account balance* (which abstracts from the structure of foreign assets and liabilities, as well as differences between the rates of return on different instruments) is as follows:

$$\text{NFA stabilizing CAB/GDP} = \frac{g + \pi}{(1+g)(1+\pi)} * (\text{benchmark NFA/GDP})$$

, where g is the long-run real GDP growth rate and π is the rate of inflation.

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[12] See Blanchard and Giavazzi (2002).

[13] See *Regional Economic Outlook* (2008), Box 9, which presents the CEE CA norms estimated using a variant of the macroeconomic balance approach.

17.   **A range of NFA-stabilizing current account balances, computed using the external sustainability approach, does not indicate a significant misalignment.** Table I.2 presents NFA estimates for different GDP growth assumptions, showing that for a given NFA benchmark, a country that grows faster in the long-term can afford to run a larger current account deficit. Or, alternatively, for a given GDP growth assumption, a country that needs to stabilize its NFA at a lower level would have to run a larger current account balance (Table I.2). For example, if Croatia chooses to stabilize its NFA position at the emerging-market countries' average level of -34 percent of GDP, its underlying current account balance would have to narrow to -2.4 percent of GDP from an estimated -4.9 percent of GDP (which would imply a more significant REER adjustment, though still within the range that would be considered consistent with fundamentals).

Table I.2. The NFA-Stabilizing Current Account Balances
(In percent of GDP)

	Real GDP Growth Assumptions			
Baseline 1/	**5.8**	**4.8**	**3.8**	**2.8**
NFA benchmarks				
-69 percent of GDP (end-2007)	-5.7	-5.1	-4.5	-3.9
-60 percent of GDP (2003-07 average)	-4.8	-4.3	-3.8	-3.3
-34 percent of GDP (EM average)	-2.7	-2.4	-2.1	-1.8

Sources: Croatian National Bank; and Fund staff calculations.
1/ the baseline scenario assumes a long-run real GDP growth rate of 4.8 percent and an inflation rate of 3 percent; both end-2007 and 2003–07 NFA benchmarks are based on the official IIP data with the exception of the inward FDI position, which is estimated as cumulative FDI flows from 1998 onward. All nominal variables are in euros.

18.   **Other approaches yield similar results.** The reduced-form equilibrium real exchange rate (ERER) approach can be used to estimate the equilibrium real exchange rate directly as a function of the medium-term fundamentals, such as the NFA position, productivity growth in the tradable and non-tradable sectors, and the terms of trade. An application of this approach to Croatia yields broadly similar results, although the estimates cannot be considered very reliable given the short time series. Interestingly, the results do not appear to be sensitive to alternative definitions of the tradable and non-tradable sectors.[14]

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[14] The ERER estimation was performed using two sets of productivity data from Funda et al. (2007), one with "hotels and restaurants" included in the tradable sector (in view of the importance of tourism revenues for Croatia's current account position) and the other with "hotels and restaurants" included in the non-tradable sector. The results are not significantly different. For more details on the ERER approach, see *Methodology for CGER Exchange Rate Assessments* (2006).

The recent estimation of the Blanchard-Giavazzi style regional income convergence model also suggests that Croatia's current account balance is broadly justified by fundamentals.[15]

C. Financial Account and External Debt Sustainability

How is the current account deficit financed?

19.   **Croatia's current account deficits have so far been comfortably financed by a combination of FDI and foreign borrowing** (Figure I.8). If anything, capital inflows have been fairly strong, putting upward pressure on the kuna. Inward FDI flows, excluding privatization-related inflows, ranged between 3 and 6 percent of GDP, with reinvested earnings accounting for an increasing share of total FDI inflows in recent years. Total gross external debt rose from 61 to 88 percent of GDP between 2000 and 2007, with private sector external debt gradually increasing to 70 percent of GDP, short-term debt (by original maturity) to 12 percent of GDP and variable-rate debt to 58 percent of GDP by end-2007 (Figure I.8).[16]

International Investment Position

20.   **Croatia's net international investment position (IIP) has turned increasingly negative in recent years, reflecting the relatively faster build-up in both equity and debt foreign liabilities compared to foreign assets**. The net IIP is estimated to have reached -106 percent of GDP by end-2007, with net debt (the sum of debt assets and official reserves minus debt liabilities) at -32 percent and net equity (the sum of portfolio equity and FDI assets minus portfolio equity and FDI liabilities) at -74 percent of GDP.[17] A sharp increase in the value of the inward FDI stock during 2006–07 partly reflects a rapid rise of the Crobex stock market index used for valuation adjustments. Figure I. 9 also shows the evolution of the NFA position net of such adjustments, with the inward FDI stock computed as cumulative FDI flows. While, in general, there are good reasons for marking-to-market, one has to be cautious in interpreting market-based valuations in countries like Croatia, where free float is

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[15] See, *Regional Economic Outlook* (2008), Box 9, Chapter 3. This approach involves computing the difference between the actual current account balance and the predicted current account balance based on the estimated regression of the current account deficit on the level of income per capita relative to the peer group average, and a number of other control variables (see Blanchard and Giavazzi (2002) for details).

[16] All numbers are calculated from underlying data in euro terms.

[17] Note that the concept of "net debt" used in this Chapter is different from that used in the staff report. All ratios are calculated from underlying data in euro terms.

Figure I.8. Croatia: Financial Account and External Debt Developments

Financial Account
(by component, percent of GDP)

Inward FDI
(by component, percent of GDP)

External Debt (percent of GDP)

by type of borrower

by type of creditor

by original maturity

by interest rate
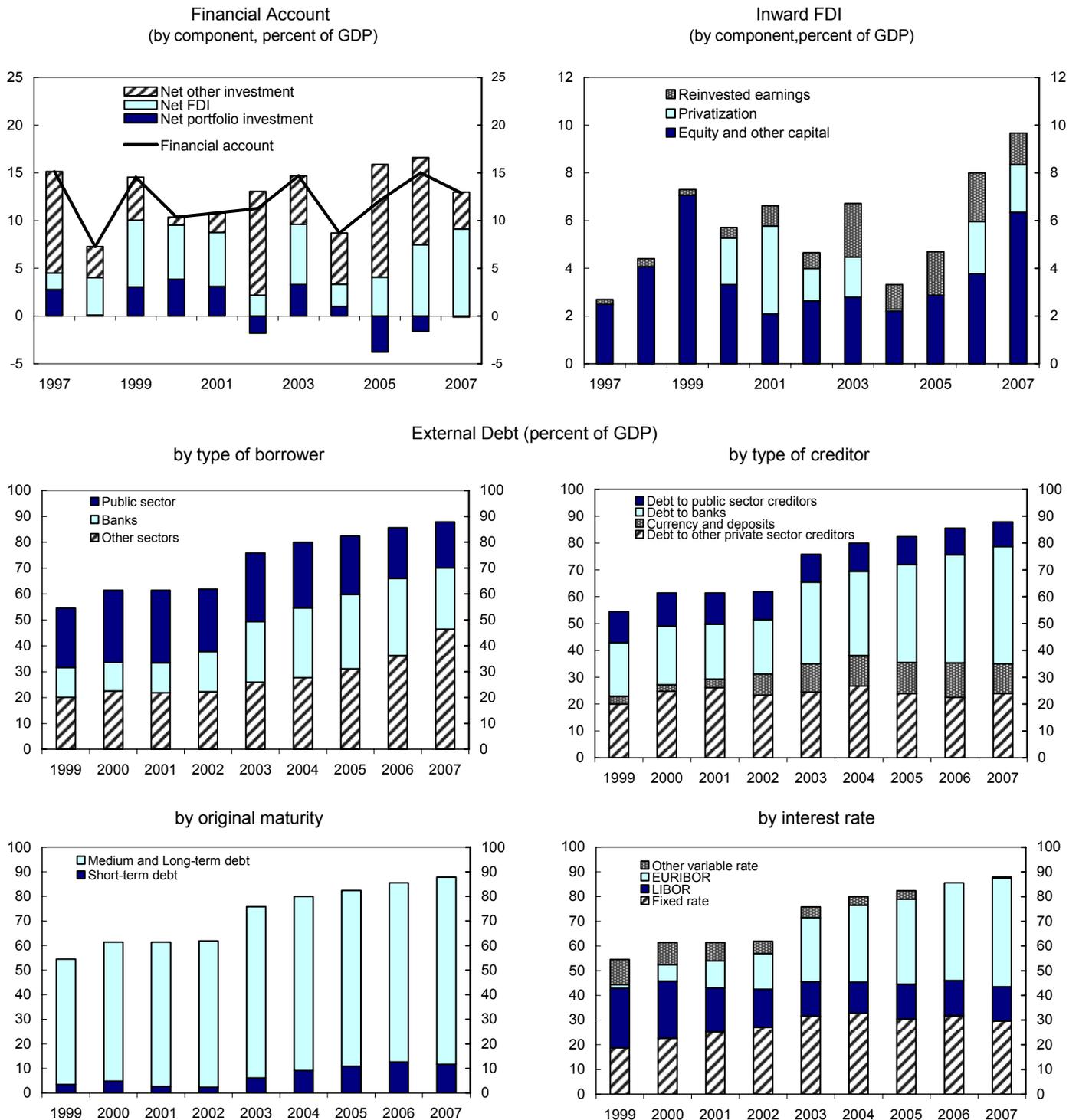
Sources: Croatian National Bank and Fund staff calculations.
1/ Privatization-related FDI are staff estimates.

low, price volatility is high, and market values may not always accurately reflect the price that investors might reasonably expect to get for these assets.[18] This suggests that the "true" value of FDI lies somewhere between its "market" and "book" values.

Figure I.9. International Investment Position (In percent of GDP)
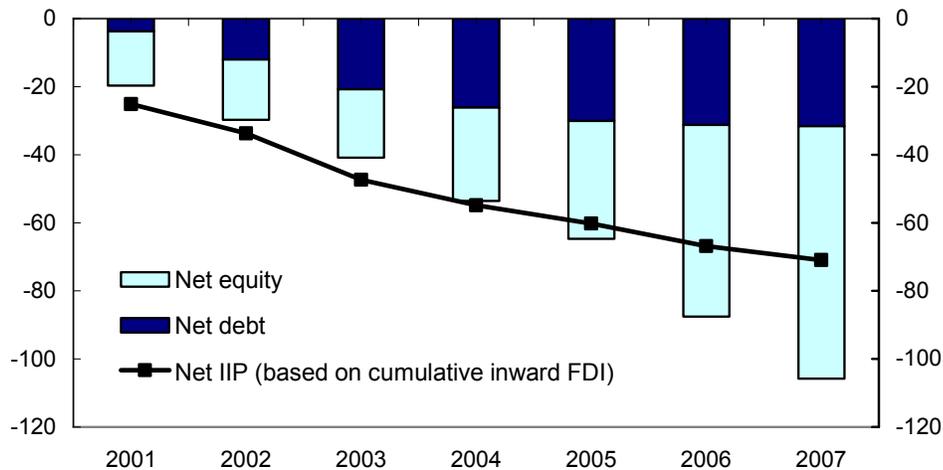
Sources: Croatian National Bank and Fund staff calculations.

21.   **The extended external sustainability approach can be used to determine the level of non-income current account balance that would stabilize the IIP at a given level (net) and structure** (See Appendix I.II for details). The *non-income current account balance* (NICA) includes the goods and services trade balance, compensation of employees, current transfers and capital transfers.[19] Assuming that the objective is to stabilize the net IIP at its level and structure prevailing at end-2007, Croatia would have to run a NICA surplus of 0.8 percent of GDP over the medium-term, given the baseline assumptions about rates of GDP growth and returns on foreign assets and liabilities. Given the actual NICA balance of -4.1 percent of GDP in 2007, achieving such an adjustment would require a much stronger-than-baseline export performance, even if capital transfers were to increase ahead of EU accession. Table I.3 also illustrates the sensitivity of the net IIP-stabilizing NICA to two downside risks: *lower global growth* and a *higher spread* between the real rates of return on debt liabilities and debt assets. In both scenarios, a larger NICA surplus would be required to sustain the same IIP. If Croatia were to raise its potential growth, smaller surpluses would be sufficient to sustain a given IIP under baseline and downside scenarios.

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[18] After having increased by 60 percent annually in 2006–07, stock prices fell by 30 percent during the first three months of 2008 (see *Financial System Stability Assessment Update* (2008) for more details on the stock market developments).

[19] This concept is also referred to as "trade balance inclusive of services and transfers" (IMF (2006), page 19).

Table I.3. Stabilizing the Net IIP

I. NICA Balance (In percent of GDP)

| | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | Baseline Projections | | | | | |
								2008	2009	2010	2011	2012	2013
a. Goods and services	-5.8	-10.9	-7.8	-6.8	-7.0	-7.7	-8.3	-8.2	-7.6	-6.6	-5.7	-5.0	-4.4
b. Compensation of employees	0.6	0.7	0.7	0.8	0.8	1.1	1.3	1.1	1.1	1.1	1.1	1.1	1.1
c. Current transfers	5.0	4.7	4.7	4.2	3.8	3.2	2.8	2.6	2.5	2.4	2.3	2.2	2.1
d. Capital transfers	0.7	2.1	0.4	0.1	0.2	-0.4	0.1	0.3	0.3	0.3	0.3	0.2	0.2
NICA balance (a+b+c+d)	0.5	-3.4	-1.9	-1.7	-2.2	-3.8	-4.1	-4.2	-3.8	-2.9	-2.1	-1.5	-1.0

II. The NICA Balances Stabilizing the End-2007 IIP (In percent of GDP)

Croatia's MT Real GDP Growth Assumptions	4.8	5.8	6.8
Baseline 1/	0.8	0.6	0.4
Lower growth 2/	1.1	0.9	0.7
Higher spread 3/	1.5	1.3	1.1

Sources: World Economic Outlook, Croatian National Bank; and Fund staff calculations.
1/ In the baseline scenario, the real rate of return on outward FDI/equity investment is equal to the world's medium term growth rate (4.7 percent) + 100 basis points, the rate of return on Croatia's FDI/equity liabilities is equal to its medium-term growth rate (4.8 percent) + 100 basis points; the rate of return on debt assets is equal to 2.5 percent in real terms and the spread on debt liabilities is equal to 100 basis points over the rate paid on debt assets (these assumptions are similar to Lane and Milesi-Ferretti (2006), except that the spread between the returns on debt assets and debt liabilities is assumed to be smaller, given the historical average borrowing rates of Croatian banks' and nonfinancial firms; see Figure I.11).
2/ The lower growth scenario is based on the assumption that real GDP growth rates are reduced by 1 percent compared to baseline for both the world and Croatia.
3/ The higher spread scenario assumes that the interest rate spread between debt liabilities and debt assets widens by 100 basis points. All scenarios use the IIP, where the inward FDI stock is estimated as cumulative FDI flows from 1998 onward.

22.   **In the case of Croatia, the conclusions drawn from this type of analysis should not be taken at face value.** The extended external sustainability approach implicitly assumes that the ratios among different foreign assets and liabilities remain constant at the levels prevailing in the "benchmark" IIP. This assumption may not be appropriate for transition countries. In the case of Croatia, in particular, the structure of foreign liabilities is likely to continue shifting towards a higher share of equity, as the country is likely to attract more FDI ahead of EU accession, while also possibly reducing its reliance on debt financing. Moreover, a constant IIP structure may be inconsistent with allowing FDI earnings to be automatically reinvested, which one would expect to happen in "normal times."

23.   **Assuming that returns on inward FDIs are automatically reinvested, smaller NICA balances may be sufficient to stabilize a given IIP.** In the case of Croatia, the average annual inflow of reinvested earnings during 2001–07 was 1.4 percent of GDP, which covers about half of the gap between the estimated net IIP-stabilizing NICA balance (+0.8 percent of GDP, under the baseline assumptions) and the average NICA balance over 2001–07 (-2.4 percent of GDP). The next section focuses on external debt dynamics, taking the projected evolution of the FDI stock as given.

External Debt

24.   **The debt sustainability approach (DSA) can be used to determine the level of the non-income current account balance that stabilizes the gross external debt-to-GDP ratio at a given benchmark level**. Using the IMF's standard DSA, Table I.4 presents the values of debt stabilizing NICA balances for different external debt-to-GDP benchmarks and real GDP growth rates, assuming that all net non-debt inflows are zero (i.e., the numbers in the table reflects only "automatic debt dynamics", see Appendix I.II for details). The logic is similar to that of the NFA-stabilizing exercise, i.e., if a country wishes to stabilize its external debt-to-GDP at a lower level, it has to run a larger NICA balance; for faster growing countries, smaller NICA balances may be sufficient to stabilize external debt at a given level. For example, if the objective is to stabilize external debt at 84 percent of GDP (baseline projection for 2013), Croatia would have to run a NICA deficit of -1.2 percent of GDP in the long-run, which is close to the 2013 baseline projection.

Table I.4. External Debt-Stabilizing NICA Balance

(In percent of GDP)

	Real GDP Growth Assumptions			
Baseline 1/	5.8	4.8	3.8	2.8
Gross External Debt benchmarks				
88 percent of GDP (end-2007)	-2.1	-1.2	-0.4	0.5
84 percent of GDP (baseline projection for 2013)	-2.0	-1.2	-0.3	0.5
35 percent of GDP	-0.8	-0.5	-0.1	0.2

Sources: Croatian National Bank; and Fund staff calculations.

1/ the baseline scenario assumes a long-run real GDP growth rate of 4.8 percent and an inflation rate of 3 percent and nominal interest rate on foreign debt equal to 6.5 percent, consistent with the assumption in Table 4; other scenarios have the same inflation and interest rate, but different growth assumptions. All nominal variables are in euros.

25.   **Higher FDI inflows could help to bring down Croatia's external debt.** *First,* for a given long-run level of NICA balance, larger non-debt creating flows (like FDI) would allow the debt-to-GDP ratio to stabilize external at a lower level. For example, if Croatia could count on an annual non-debt creating inflow of 3 percent of GDP, it could then run a NICA balance of -4.2 percent of GDP, while still being able to stabilize debt at 84 percent of GDP. *Second*, higher FDI inflows would lead to gradual substitution of debt for equity in Croatia's external liability structure. *Third*, higher FDI in export oriented sectors would improve export performance and eventually help to narrow the trade deficit.

26.   **What could be considered a "safe" level of external debt for a country like Croatia?** The now-conventional wisdom derived from the experience of other emerging

market countries suggests that a "safe" level of external debt is somewhere around 35 percent of GDP.[20] This threshold, however, may not be meaningful for transition countries, where the run-up in external debt has been driven (at least in part) by financial deepening and financial integration associated with convergence. That said, the overall level of private credit (in percent of GDP) in Croatia is already high, by historical and by regional standards, suggesting a limited scope for viewing any further debt accumulation as an "equilibrium" phenomenon.[21] An alternative way to determine whether an adjustment might be warranted is to test whether the projected external debt dynamics are sustainable in the face of extreme, but plausible shocks.

27.   **Stress tests suggest that the baseline external debt dynamics may not be sustainable under certain extreme, but plausible risk scenarios**. The baseline scenario envisages a gradual decline of external debt to about 84 percent of GDP by 2013 (Figure I.10). Figure I.10 also presents several downside risk scenarios, including three macro scenarios used in stress testing of the banking system in the context of the FSAP update[22]. It shows that the biggest risks to the sustainability of external debt dynamics stem from (i) the global interest rate increase; and (ii) a slowdown or reversal in capital flows that results in a significant depreciation of the kuna. The latter also represents the worst case scenario from the domestic financial stability point of view.[23] In light of the on-going repricing of credit risks in global financial markets and heightened concerns about inflation, the likelihood of these event risks is not negligible.

28.   **While some adjustment in external borrowing rates has already taken place, reflecting the recent rise in libor/euribor rates, further increases cannot be ruled out** (Figure I.11). As interest rates on variable rate obligations (accounting for 66 percent of total external debt) are reset and maturing loans are rolled over at higher rates, the projected medium-term debt service profile is likely to shift upward.[24] Moreover, further deterioration

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[20] See Reinhart, Rogoff, and Savastano (2003).

[21] Notwithstanding the improvements in methodology, possible measurement errors in both the numerator and the denominator of the external debt-to-GDP ratio are yet another reason why focusing on a particular "threshold" level may not be very practical.

[22] See "*Republic of Croatia: Financial System Stability Assessment Update*," 2008.

[23] This is because of a high level of financial euroization and significant balance-sheet exposures of the non-financial sector to exchange rate risk. See Hilaire and Ilyina (2006) for detailed discussion of Croatia's sectoral balance-sheet vulnerabilities.

[24] The average interest rate paid by Croatian banks on their external liabilities may, to some extent, reflect the parent-subsidiary relationship between Croatian banks and their foreign owners (e.g., the "quasi equity" nature of certain liabilities to parent banks).

Figure I.10. External Debt (in percent of GDP): Baseline and Downside Risk Scenarios
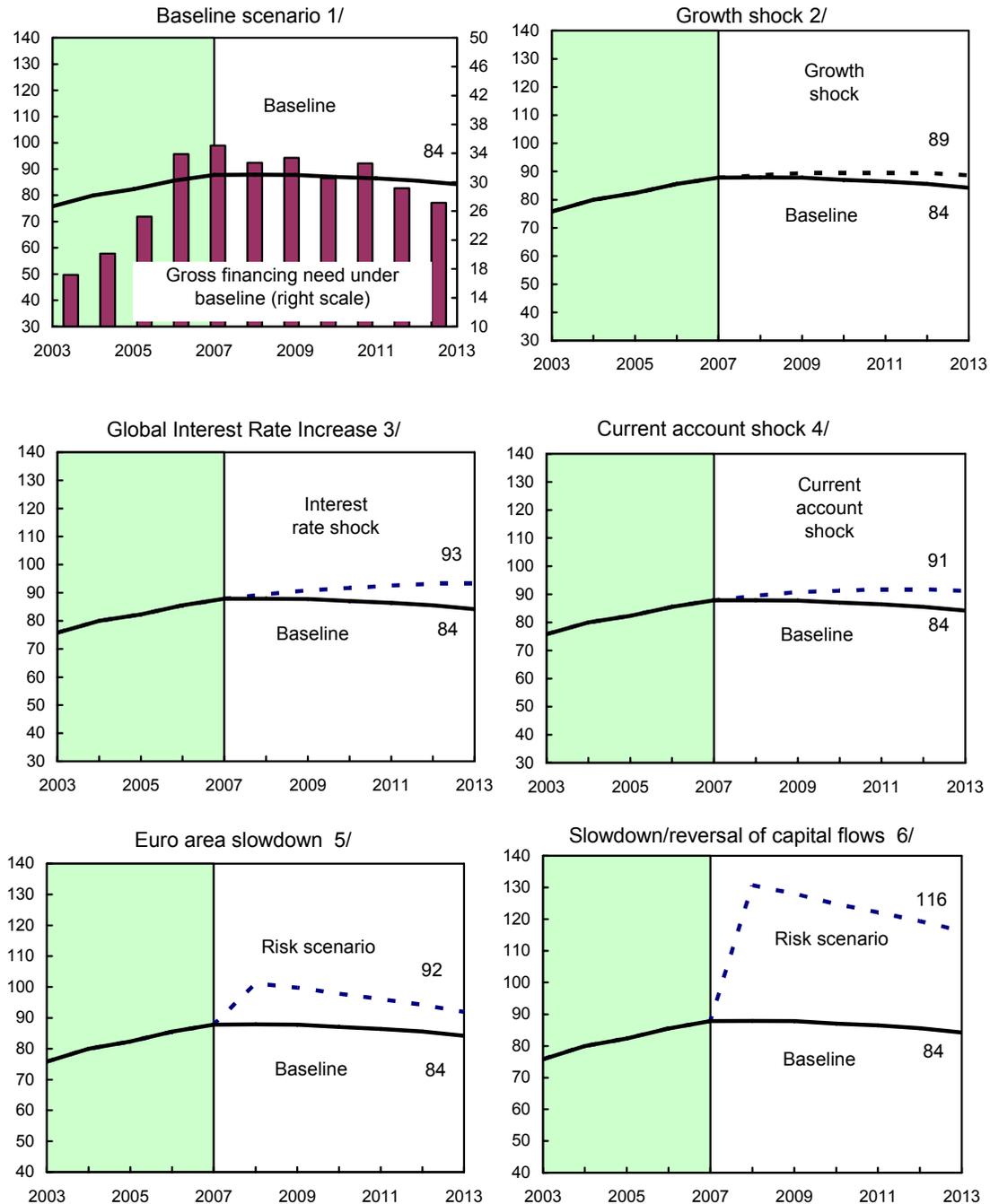
Sources: IMF, Croatian authorities, and staff estimates.

1/ Shaded areas represent actual data. Figures in the boxes represent projections for the respective variables in the baseline and scenario being presented. All standard deviations are computed using historical data for the past ten years.

2/ A permanent half of a standard deviation reduction in real GDP growth rate.

3/ Increase of euro interest rates by 200 bps (**Macro 3** scenario in the FSSA report).

4/ A widening of current account deficit by one standard deviation in 2008, with the size of the shock decaying at the rate of 10 percent annually thereafter.

5/ One-time depreciation of the kuna by 10 percent, decrease of euro interest rates by 50 bp (**Macro 1** scenario in the FSSA report).

6/ One-time real depreciation of the kuna by 30 percent (**Macro 2** scenario in the FSSA report).

in credit market conditions may cause an upward revision of credit risk premia across a broad spectrum of borrowers, both banks and nonfinancial firms, while the Eurozone rates may not come down for some time due to inflation concerns.

Figure I.11. Croatia: Average Nominal Foreign Interest Rates by Domestic Sector
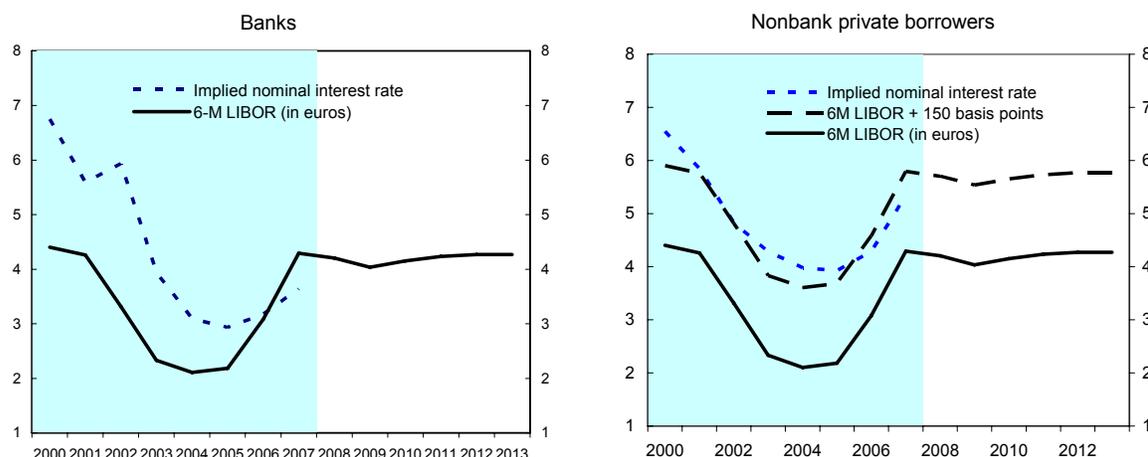
Sources: Croatian National Bank; World Economic Outlook and Fund staff estimates.
1/ The average nominal borrowing rates are imputed from the total interest payments in the current period and the stock of external debt at the end-of-previous period; shaded areas represent actual data.

29.   **Based on a number of standard indicators, Croatia's external liquidity position does not seem overly strong**. While the *external liquidity ratio* is estimated to have recently improved to over 120 percent at end-2007, the *reserve cover* remained below 80 percent and the *external debt service ratio* increased to around 38 percent in 2007 (Figure I.12).[25] Each of these indicators provides some information regarding the ability of a country to withstand the balance of payments pressures associated with significant slowdown or reversal of capital flows. While there are well known rules of thumb to determine the "comfortable" level of foreign exchange reserves (e.g., the Guidotti rule that says that reserves should fully cover total external debt by remaining maturity), the meaningful thresholds for the external liquidity indicators can only be determined within a framework that takes into account the relevant country circumstances that either provide additional buffers (e.g., in Croatia, short-term external debt includes a high proportion of bank borrowing from foreign parents, akin to "quasi-equity") or could make the impact of negative shocks more damaging.[26] Moreover,

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[25] The *external liquidity ratio* is defined as liquid external assets (net official reserves plus banks' gross external assets) divided by liquid external liabilities (short-term external debt on the remaining maturity basis). The *reserve cover* is the ratio of official reserve to the sum of current account deficit and short-term external debt by remaining maturity. The *external debt service ratio* is the ratio of debt service to current external receipts.

[26] For example, an adjusted external liquidity ratio (which adds foreign currency deposits in domestic banks to external liabilities) is sometimes used to gauge the adequate level of external liquidity in the context of high financial dollarization/euroization (see, e.g., FitchRatings (March 2007)). This is because the adjusted external liquidity indicator also takes into account the amount of foreign exchange that banks would need to raise in an

(continued…)

Figure I.12. External Liquidity Indicators, 2001–07 1/
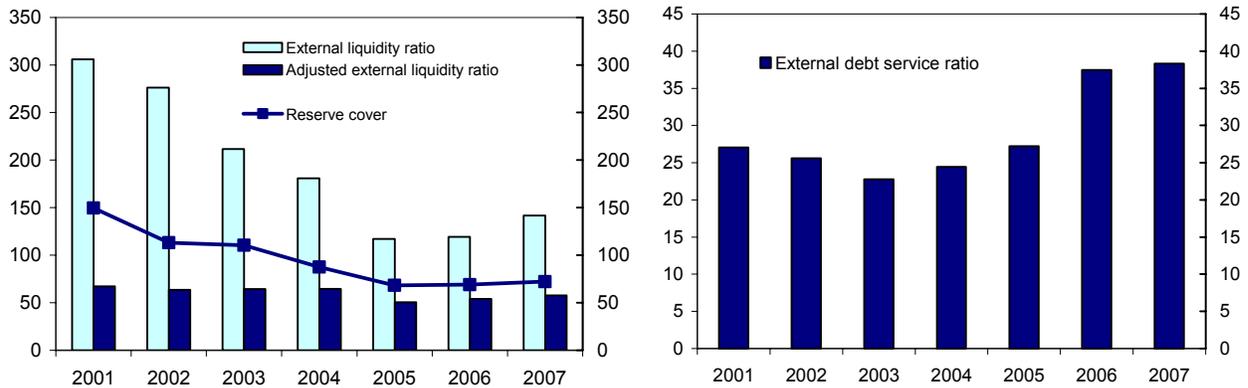
Sources: Croatian National Bank; and Fund staff estimates.
1/ The external liquidity ratio is defined as liquid external assets (net official reserves + banks' gross external assets) divided by liquid external liabilities (short-term external debt on the remaining maturity basis). The adjusted external liquidity ratio is defined as liquid external assets divided by liquid external liabilities including all foreign currency deposits in the domestic banking system. The reserve cover is the ratio of official reserve to the sum of current account deficit and short-term external debt by remaining maturity. The external debt service ratio is the ratio of debt service to current external receipts.

what seems to matter most is a combination of liquidity indicators and other macroeconomic variables.

30.   **Weak external liquidity indicators tend to increase the risk of a significant slowdown or reversal in capital flows, especially against the backdrop of a deteriorating global environment**. Empirical research has long tried to identify variables (and their thresholds) that would provide significant leading information regarding the likelihood of capital flow reversals. In particular, a recent empirical study that applies the Binary Classification Tree methodology for predicting the capital flow reversals suggests that a combination of (i) reserve cover of less than 81 percent, (ii) external debt higher than 24 percent of GDP; and (iii) external debt not falling by at least 3 percent of GDP per year, can significantly increase the likelihood of capital flows reversal in the following year (Figure I.13); unfavorable global cyclical conditions can contribute as well (Figure I.14).[27] While these thresholds should only be interpreted as suggestive, they provide useful

extreme event of withdrawal of all foreign currency deposits from the banking system. In the case of Croatia, this indicator stood at around 58 percent at end-2007, reflecting the historically high level of financial euroization as well as the size of Croatia's banking system. However, this indicator should be interpreted with caution: in particular, if one were to draw policy implications taking into account the level of euroization, it would be essential to make realistic assumption with regard to the share of foreign currency deposits that might be withdrawn in an extreme scenario, taking into account historical experience.

[27] See Chamon, Manasse and Prati (2007) for more details. The main advantage of this approach is that it considers a large number of variables and complex interactions between these variables without imposing any specific functional forms on these interactions.

information regarding the circumstances that could render a country more or less vulnerable to capital flow reversals.

31.   **Finally, capital flow reversals often have an important contagion component**. This is particularly relevant for Croatia given the high share of foreign ownership of the banking sector and high reliance on relatively concentrated sources of external funding—mainly Italian and Austrian banks. These exposures render Croatia vulnerable to shocks unrelated to Croatia's fundamentals, such as one of the parent banks' experiencing problems due to the developments elsewhere in the region (the contagion risks are analyzed in greater detail in the accompanying FSSA report).

D. Concluding Remarks

32.   **In all, the analysis presented in this chapter suggests that there are reasons to be concerned about Croatia's external position**. While Croatia's real exchange rate is broadly in line with economic fundamentals, this conclusion rests on strong macroeconomic policies. Moreover, the sustainability of Croatia's external debt and financial account position could be at risk in the event of foreign interest rate shocks and/or a significant slowdown in capital inflows. Thus, external stability considerations suggest the following policy implications:

- Macro-prudential indicators (external liquidity indicators, as well as banking sector capital adequacy and liquidity indicators) should continue to be monitored closely for any signs of emerging pressures in order to determine whether further tightening of prudential standards might be warranted.

- Continued fiscal consolidation would be beneficial, including by reducing aggregate demand pressures and contributing to more favorable current account and external debt dynamics.

- Structural measures to improve the business environment and thus competitiveness should be central to the reform agenda. Such measures remain critical for Croatia to become a more attractive destination for export-oriented FDI. In addition, such measures would help Croatia prepare for EU accession, raise confidence that accession will take place on a timely basis, and thereby contribute further to maintaining stability.

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Appendix I.I: Macroeconomic Balance Approach

Data and variable definitions:

The sample includes 54 economies (both industrial and emerging market countries, including Croatia) and the euro area, for the period from 1973–2004 (see the CGER note for a complete list of countries).

The following variables are calculated as deviations from the averages for trading partners:
- **Fiscal balance** is measured as the ratio of the general government balance to GDP.
- **Old-age dependency ratio** is measured as the ratio of the population above 65 to the population between 30 and 64.
- **Population growth** is the annual population growth rate.
- **Output growth** is growth rate of real per-capita GDP.

Other variables are as follows:
- **Initial NFA** is measured as the ratio of NFA to GDP prevailing at the beginning of each 4-year period.
- **Oil balance** is measured as a ratio to GDP
- **Relative income** is measured as the ratio of per-capital PPP income to the US level, both in constant 2000 dollars.

Estimation of the current account norms:

CGER Estimates: Pooled Regression Coefficients		
	Norm _CA	Norm_NFA
Fiscal balance	0.19 ***	0.19 ***
Old-age dependency	-0.12 **	-0.14 **
Population growth	-1.03 ***	-1.22 ***
Lagged current account	0.37 ***	...
Initial NFA	...	0.02 ***
Oil balance	0.17 ***	0.23 ***
Output growth	-0.16 **	-0.21 **
Relative income	0.02 *	0.02 *
Constant	-0.003	0.000
Adjusted R-squared	0.52	0.52

Note: *, **, ***, indicate significance at the 10, 5, and 1 percent levels,
based on standard errors robust to serial correlation.

Appendix I.II: Stabilizing Net IIP/GDP and External Debt/GDP

Using a simple accounting framework, the net IIP of a country can be decomposed as follows:

$$b_t - b_{t-1} \equiv nica_t + \left(\frac{i_t^{EQA} - n_t}{1 + n_t} a_{t-1}^{EQA} + \frac{i_t^{DA} - n_t}{1 + n_t} a_{t-1}^{DA} \right) - \left(\frac{i_t^{EQL} - n_t}{1 + n_t} l_{t-1}^{EQL} + \frac{i_t^{DL} - n_t}{1 + n_t} l_{t-1}^{DL} \right) + \varepsilon_t \quad (1)$$

where b_t is the net IIP of a country (expressed in percent of GDP); a_t and l_t denote gross asset and liability positions, respectively (expressed in percent of GDP); $nica_t$ is the non-income CA balance (in percent of GDP); n_t is the growth rate of nominal GDP; i_t^{EQA} is the nominal rate of return on portfolio equity and FDI assets (outward FDI); i_t^{DA} is the nominal rate of return on holdings of foreign debt instruments; i_t^{EQL} is the nominal rate of return on portfolio equity and FDI liabilities (inward FDI); i_t^{DL} is the nominal rate of return on liabilities consisting of foreign debt instruments; and ε_t includes changes in the valuation of assets and liabilities, as well as errors and omissions.

Focusing on the stock of external debt, (1) can alternatively be rewritten as follows:

$$l_{t-1}^{DL} - l_t^{DL} = nica_t - \left[\underbrace{\left(\frac{i_t^{DL} - n_t}{1 + n_t} l_{t-1}^{DL} \right)}_{\text{Automatic Debt Dynamics}} - F + A \right] + \varepsilon_t \quad (2)$$

where $A = \left(a_t^A - a_{t-1}^A \right) - \left(\frac{i_t^A - n_t}{1 + n_t} a_{t-1}^A \right)$ is the change in gross foreign assets net of interest earned on the foreign asset holdings; $F = \left(l_t^{EQL} - l_{t-1}^{EQL} \right) - \left(\frac{i_t^{EQL} - n_t}{1 + n_t} l_{t-1}^{EQL} \right)$ is the change in gross equity liabilities net of income paid to foreign direct/equity investors. The first term in the square brackets corresponds to the "automatic debt dynamics" from the IMF's standard external Debt Sustainability Analysis.

Appendix I.III: Application of the Binary Classification Tree for Predicting the Capital Flow Reversals

Figure I.A.1. Binary Classification Tree Based on 1994–2005 Sample and Crisis Episodes

```
                              ┌─────────────────────────────┐
                              │          Sample             │
                              │  554 obs. o/w 6.1% crisis   │
                              └─────────────────────────────┘
                   Reserve cover ≤81%              Reserve cover >81%
          ┌──────────────────────────┐        ┌──────────────────────────┐
          │  164 obs. o/w 14% crisis │        │  390 obs o/w 2.8% crisis │
          └──────────────────────────┘        └──────────────────────────┘
   External Debt/GDP ≤24%  External Debt/GDP >24%   WEO Forecasted Real    WEO Forecasted Real
                                                    GDP Growth ≤3%         GDP Growth >3%
  ┌────────────────────┐ ┌─────────────────────────┐ ┌──────────────────┐ ┌──────────────────┐
  │ 30 obs. o/w 0%     │ │ 134 obs. o/w 17.2%      │ │ 54 obs. o/w 13%  │ │ 336 obs. o/w 1.2%│
  │ crisis             │ │ crisis                  │ │ crisis           │ │ crisis           │
  └────────────────────┘ └─────────────────────────┘ │                  │ │                  │
                                                      │ Colombia 2002    │ │ Israel 1997, 2002│
                 Change in External  Change in External│ Venezuela 1994,  │ │ Malaysia 1997    │
                 Debt/GDP ≤3.3%      Debt/GDP >3.3%    │  2001            │ │ Czech Rep. 1997  │
                                                      │ Lebanon 2001     │ └──────────────────┘
  ┌────────────────────┐ ┌─────────────────────────┐ │ Bulgaria 1994    │
  │ 26 obs. o/w 0%     │ │ 108 obs. o/w 21.3% crisis│ │ Ukraine 1994     │
  │ crisis             │ │                          │ │ Hungary 1996     │
  └────────────────────┘ │ Algeria 1994  Mexico 1994│ └──────────────────┘
                         │ Argentina 1995, 2001     │
                         │              Pakistan 1998│
                         │ Brazil 1996, 2002        │
                         │              Philippines 1997
                         │ Colombia 1999 Romania 1999│
                         │ Dominican Rep. 2003       │
                         │              Russia 1998  │
                         │ Ecuador 1999 South Africa 2001
                         │ Indonesia 1997 Thailand 1997
                         │ Jamaica 2003 Turkey 1994, 2001
                         │ Korea 1997   Ukraine 1998 │
                         │ Lithuania 1999 Uruguay 2002│
                         └─────────────────────────┘
```

Notes: All variables used are lagged, corresponding to the value in the previous year. Reserve cover is the ratio of gross international reserves to the sum of the short-term external debt and the current accounts deficit (zero if it indicates a surplus).

Source: Chamon, Manasse and Prati (2007)

Figure I. A.2. Binary Classification Tree Based on 1994–2005, Including Contemporaneous Global Demand Variables

Sample

554 obs. o/w 6.1% crisis

Reserve cover ≤81%

164 obs. o/w 14% crisis

Reserve cover >81%

390 obs o/w 2.8% crisis

Deviation of Commodity Export Prices from Past Average≤ -14%

93 obs. o/w 22.6% crisis

Deviation of Commodity Export Prices from Past Average> -14%

71 obs. o/w 2.8% crisis

Dominican Rep. 2003
Korea 1997

WEO Forecasted Real GDP Growth ≤3%

54 obs o/w 13% crisis.

WEO Forecasted Real GDP Growth >3%

336 obs. o/w 1.2% crisis

Czech Rep. 1997
Israel 1997, 2002
Malaysia 1997

External Debt/GDP ≤24%

16 obs. o/w 0% crisis

External Debt/GDP >24%

77 obs. o/w 27.3% crisis

Algeria 1994	Pakistan 1998
Argentina 1995, 2001	Philippines 1997
Brazil 1996, 2002	Romania 1999
Colombia 1999	Russia 1998
Ecuador 1999	South Africa 2001
Indonesia 1997	Thailand 1997
Jamaica 2003	Turkey 1994, 2001
Lithuania 1999	Ukraine 1998
Mexico 1994	Uruguay 2002

Change in Import Demand by Trading Partners ≤6.4%

13 obs. o/w 46.2% crisis

Colombia 2002
Venezuela 2001
Lebanon 2001
Bulgaria 1994
Ukraine 1994
Hungary 1996

Change in Import Demand by Trading Partners >6.4%

41 obs. o/w 2.4% crisis

Venezuela 1994

Notes: All variables used are lagged, corresponding to the value in the previous year. Reserve cover is the ratio of gross international reserves to the sum of the short-term external debt and the current accounts deficit (zero if it indicates a surplus).

Source: Chamon, Manasse and Prati (2007)

II. EFFICIENCY OF GOVERNMENT SOCIAL SPENDING IN CROATIA[1]

A. Introduction

1.   **The benefits of a further and significant reduction in the fiscal deficit in Croatia are well recognized.** Moreover, fiscal adjustment will need to be led by rationalizing regular spending programs because the tax burden in Croatia is already one of the highest in the region, and Croatia's aspirations toward European Union (EU) membership suggest future spending pressures.[2] Expenditure-led fiscal adjustment will help to address Croatia's large current account deficit, and maintain strong economic growth on a sustainable basis. At the same time, rationalizing spending is key for enhancing the flexibility of fiscal policy, a necessary ingredient for coping with shocks in the context of tightly managing the exchange rate. Indeed, in its latest *Economic and Fiscal Policy Guidelines*, the Ministry of Finance (MoF) projects a decline in general government spending of almost 6 percentage points of GDP, just from 2007 to 2010.[3]

2.   **A key policy issue for this Article IV consultation is how to reduce the government-spending-to-GDP ratio, including by containing the cost of social services without undue sacrifices in quality.** After all, social services constitute the largest share of total general government spending (more than half in 2005, the latest year for which data is available). Moreover, while Croatia's performance on health indicators has been better than most EU-10 countries, it is well behind most EU-15 countries, as discussed later in the paper, and Croatia's education outcomes are lagging behind most EU-10 and EU-15 countries.[4] Improving social indicators while containing costs requires greater efficiency of social spending.

3.   **With this in mind, and to help identify areas for reform, this chapter analyzes the relative efficiency of social spending in Croatia.** It does so by comparing social

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[1] Prepared by Etibar Jafarov (EUR) and Victoria Gunnarsson (FAD).

[2] This pressure is related to the use of EU structural funds, contributions to the EU budget, and an upgrading of environmental standards. Funck (2003) suggested that implementing National Programs for the Adoption of the Acquis of the new member states was going to have entailed additional annual spending of (on average) about 3½ percent of GDP for these countries. Cucilić, Faulend, and Šošic (2004) estimated net fiscal costs (netting out transfers from the EU) of Croatia's EU accession for 2007, the year the authors had expected accession to take place at the time of writing, at 1.1 percent of GDP.

[3] The projection does not include spending related to the use of EU structural funds.

[4] EU-10 countries are new EU members and comprise the Czech Republic, Estonia, Latvia, Hungary, Lithuania, Poland, Slovakia, Slovenia, Bulgaria, and Romania. EU-15 countries comprise Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, and the United Kingdom.

spending and key social (outcome) indicators in Croatia to those of comparator countries.[5] Relative efficiency is defined as the distance of a country's observed input-output combination from an efficiency frontier. This frontier is estimated using so-called Data Envelopment Analysis (DEA, see Appendix) and represents the maximum attainable social outcome for a given input (spending or intermediate output such as the number of hospital beds, the density of physicians, etc.) level. The efficiency of social spending in Croatia is evaluated against frontiers estimated for the EU-15, the EU-10, Cyprus, Malta, and OECD countries.

4.   **The analysis finds evidence of significant inefficiencies in Croatia's social spending and therefore significant potential to reduce government expenditure.** As discussed later, this potential could be realized by: (i) containing demand for social services by introducing (or increasing the existing) fees for users of these services; (ii) reforming finance mechanisms for social spending; (iii) introducing greater competition in the provision of social services; (iv) improving the administration of social spending; and (v) better targeting benefits.

5.   **The rest of the paper is organized as follows.** Section B compares social spending and performance indicators in Croatia with those in other countries. Section C assesses efficiency scores of key social spending categories, outlines possible explanatory factors for understanding cross-country differences in efficiency, and discusses potential reforms to enhance efficiency. Section D concludes.

B. International Comparisons of Social Spending and Performance

6.   The focus of this section is on three key areas, namely health care, education, and social protection (excluding pensions). Box II.1 summarizes the performance indicators that are used.

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[5] Old-age pensions will not be a subject of this study, since this component of social spending does not lend itself to analysis of efficiency in the same way as the other components that are analyzed.

Box II.1. Performance Indicators

As in Verhoeven et al. (2007), performance indicators are divided into desired *outcome* and intermediate *output* indicators. Outcomes correspond to the underlying objectives sought by policy makers. Intermediate outputs are thought to be related to desired outcomes but can be more closely associated with current spending. The following indicators are used:

• Health care: The intermediate output indicators considered are the density of physicians, pharmacists, and healthcare workers; the number of hospital beds; and the number of immunization vaccines. The key outcome variables include infant-, child-, and maternal mortality rates; the standardized death rate from all causes per 1,000 people, as defined by the World Health Organization (WHO); incidences of tuberculosis; and healthy average life expectancy (as defined by the WHO).

• Education: The key intermediate output indicators are primary pupil-teacher ratios, enrollment rates, rates of progression to secondary education, and graduation (completion) rates. The main outcome indicator is the average score on an international standardized test (PISA 2006) in mathematics (secondary education).

• Social protection: The key outcome indicator is poverty rates published by the OECD (data for Croatia are from the Croatian Central Bureau of Statistics, and may not be fully comparable to OECD data).

Health Care

7.   **Health care in Croatia is mainly financed (around 90 percent) by the Croatian Health Insurance Institute (HZZO)**. Only a small share of the funding comes from other sources such as co-payments, informal patient payments and payments from other insurance companies. Payroll contributions are set at 15 percent of the gross wage. In addition, enterprises pay another ½ percent of wages for work-related injury insurance.

8.   **In terms of health outcomes, Croatia has performed better than most countries with similar income levels.** For example, in terms of healthy average life expectancy (HALE), Croatia has better results than all EU-10 countries (Table II.1) except for Slovenia and the Czech Republic. Furthermore, Croatia's performance is better than the average for EU-10 countries in terms of all the other available indicators: standardized death rates; incidence of tuberculosis; maternal, infant and child mortality rates.[6]

9.   **Unlike many other former socialist countries, Croatia does not have an acute overcapacity problem in terms of intermediate output indicators.** Croatia's ratios of hospital beds and physicians per 1,000 inhabitants and the health worker density index (6, 2, and 8, respectively) are at or lower than the averages for EU-15 countries (6, 3, and 13,

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[6] Results for the EU-10 are heavily influenced by the results for Bulgaria and Romania, which have significantly worse results than the other new EU members. But Croatia's performance is still slightly better than the averages for the other EU-10 countries.

respectively), and are lower than the averages for EU-10 (7, 3, and 10, respectively) and OECD countries (6, 3, 13, respectively). Moreover, Croatia's ratio of in-patient admission per 100 is also below the averages for EU-10, EU-15, and OECD countries (Table II.2).

10.   **However, significant challenges remain.** First, the health care system is not financially sustainable and runs persistent deficits: at end-2006, the stock of health sector arrears was 1.1 percent of GDP. While part of these arrears was repaid in 2007, reform measures have been insufficient to harden budget constraints. Second, Croatia's public spending on health care in proportion to GDP is one of the highest in the region, so Croatia's good performance in comparison to the EU-10 comes at a high cost. In particular, Croatia spends about 8 percent of its GDP on health care, which is higher than any of the EU-10 countries except Slovenia (Table II.1). Moreover, about 84 percent of health care spending comes from public sources. For comparison, while EU-15 countries, on average, spend more on health care than Croatia, much larger shares of their spending are privately financed (Figure II.1). Thus, in terms of public health care spending, Croatia's expenditure in percent of GDP is among the highest in Europe. Third, population aging is likely to exert further upward pressure on public finances, including through spending on health care. Fourth, compared with the averages for EU-15 countries, Croatia performed worse in terms of all the available outcome indicators. Gaps with EU-15 countries are large especially in terms of standardized mortality rates for non-communicable diseases (cardio-vascular diseases, cancer, injuries, chronic respiratory diseases, diabetes, etc.).

11.   **High and increasing public health spending reflects both strong demand and supply inefficiencies:**

● The old-age dependency ratio (ratio of population aged 65 and older, which require more health care than younger generations, to population aged 17–64) in Croatia is one of the highest in the region. Moreover, this ratio is projected to increase from 26 percent in 2006 to 48 percent in 2051.

Share of Population Aged 65 and Older in Total Population, 2006
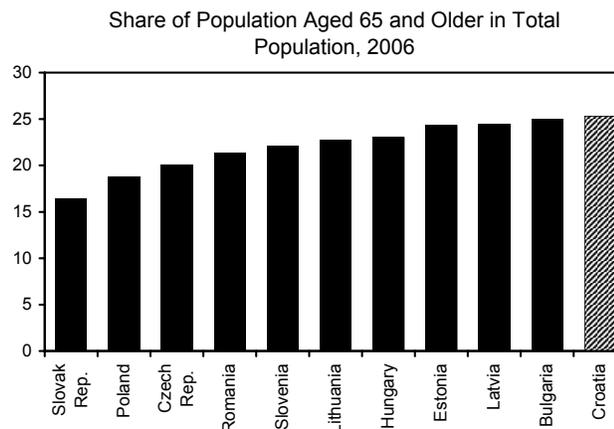
Source: Eurostat; and Central Bureau of Staistics of Croatia.

Table II.1. Croatia: Health Expenditure and Outcomes 1/

	Total Expenditure on Health (in percent of GDP)	Public Expenditure on Health (in percent of GDP)	Healthy Life Expectancy (years)	Standardized Death Rates (per 100,000 people)	Infant Mortality Rate (per 1,000 live births)	Child Mortality Rate (per 1,000 live births)	Maternal Mortality Rate (per 100,000 live births)	Incidence of Tuberculosis (per 100,000 people)
Croatia	7.9	6.6	66.6	886.9	6.0	7.0	10.0	40.6
Bulgaria	7.7	4.3	64.6	1,056.4	12.0	15.0	32.0	39.0
Czech Republic	7.2	6.6	68.4	837.6	3.0	4.0	9.0	10.4
Estonia	5.2	4.0	64.1	993.6	6.0	7.0	38.0	42.7
Hungary	7.9	5.6	64.9	1,015.5	7.0	8.0	11.0	21.7
Latvia	6.5	3.4	62.8	1,107.2	9.0	11.0	61.0	62.6
Lithuania	6.5	4.8	63.3	1,081.6	7.0	9.0	19.0	62.5
Poland	6.3	4.5	65.8	872.0	6.0	7.0	10.0	26.1
Romania	5.7	3.5	63.1	1,076.4	16.0	19.0	58.0	134.2
Slovak Republic	6.1	5.4	66.2	945.0	7.0	8.0	10.0	17.0
Slovenia	8.9	6.8	69.5	729.4	3.0	4.0	17.0	14.6
EU-8 average	6.8	5.1	65.6	947.7	6.0	7.3	21.9	32.2
EU-10 average	6.8	4.9	65.3	971.5	7.6	9.2	26.5	43.1
EU-15 average	8.6	6.4	71.3	628.9	4.0	4.9	9.9	12.8
OECD average	8.7	6.3	70.7	672.2	4.3	5.3	9.5	15.4

Sources: WHO; and World Bank, *World Development Indicators* database.

1/ Spending data are averages for 2001–04, HALE data are for 2002, death rates are for the latest year available during 2001–05, infant and child mortality and incidence of tuberculosis are for 2005, and maternal mortality data are estimates for 2000.

Table II.2. Selected Real Health Resources 1/

	Hospital Beds (per 1,000)	Physicians (per 1,000)	Health Worker Density Index (per 1,000)	Pharmacists (per 100,000)	Doctors' Consultations (per capita)	Bed Occupancy Rate, Acute Care Hospitals (percent)	In-patient Care Admissions (per 100)	Average Length of Stay (all hospitals)	Immunization, Measles (percent of children ages 12-23 months)
Croatia	5.6	2.4	7.7	55.8	...	88.1	16.6	10.3	96.0
Bulgaria	6.3	3.6	8.3	12.5	...	...	21.0	8.1	96.0
Czech Republic	8.8	3.5	13.4	56.3	13.0	74.6	22.1	10.8	97.0
Estonia	6.0	3.2	9.8	62.6	...	68.4	19.2	8.0	96.0
Hungary	7.8	3.2	11.9	52.7	12.1	75.7	25.5	8.1	99.0
Latvia	7.8	3.0	8.2	...	...	...	22.1	10.0	95.0
Lithuania	8.7	4.0	12.4	70.2	...	78.6	23.8	10.2	97.0
Poland	5.6	2.5	7.7	58.1	5.9	...	17.6	6.9	98.0
Romania	6.6	1.9	6.2	4.8	...	...	24.6	8.0	97.0
Slovak Republic	7.2	3.1	10.6	49.0	12.7	68.6	18.5	8.9	98.0
Slovenia	5.0	2.3	9.4	42.5	...	70.1	17.6	7.1	94.0
EU-8 average	7.1	3.1	10.4	55.9	10.9	72.7	20.8	8.7	96.8
EU-10 average	7.0	3.0	9.8	45.4	10.9	72.7	21.2	8.6	96.7
EU-15 average	5.5	3.2	13.0	82.5	5.9	74.3	17.9	8.4	90.1
OECD average	6.1	3.0	12.5	74.4	6.9	76.2	18.6	8.4	91.6

Sources: WHO; and World Bank, *World Development Indicators* database.

1/ Data are for the latest year available except for data on doctors' consultations, which are averages over 2002–03, and data on immunizations, which are for 2005.

Figure II.1. The Share of Private Funding inTotal Health Care Spending in Croatia is One
of the Smallest in the Region, Average 2001–04
(PPP dollars per capita)
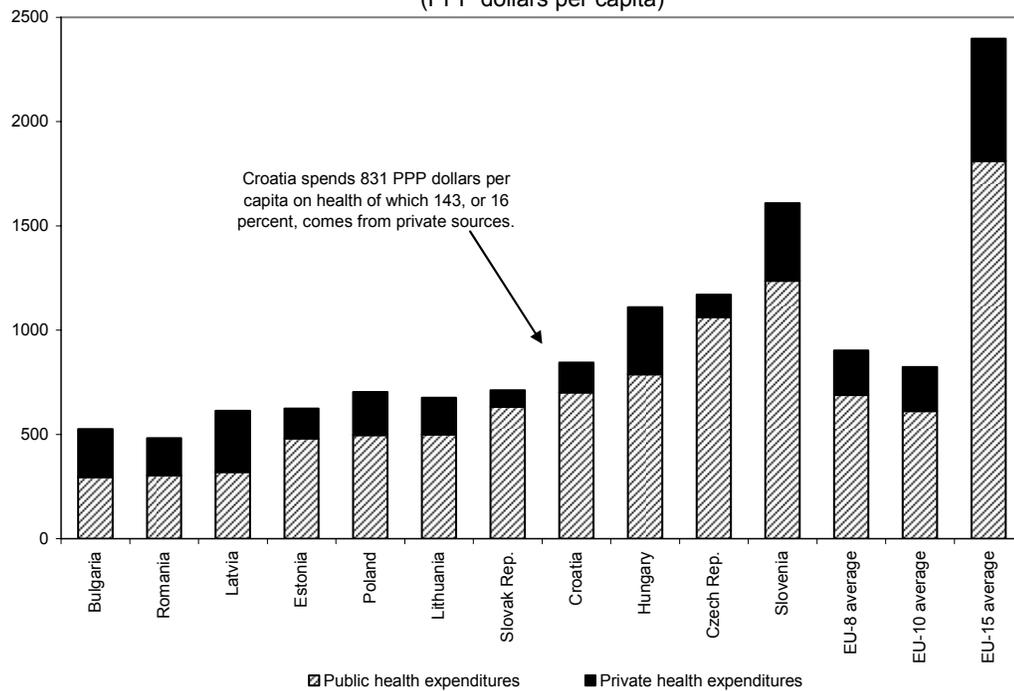
Sources: WHO; and Fund staff estimates.

● Under the existing health insurance system, low rates of co-payments in combination
with widespread exemptions from contributions have boosted the demand for health
services.[7] The coverage of the basic benefit package is very broad, while medical
services essentially become free for 600,000 people who have supplementary insurance
offered by the HZZO, as this insurance pays for co-payments. Indeed, the share of co-
payments in total health spending is less than 1 percent, compared with 7–33 percent in
Western European countries.[8] Around 1,900 types of drugs on the so-called A list are
fully paid by the HZZO, while 300 types of drugs on the so-called B list are partially paid
by the HZZO.[9] While the government introduced a flat administrative fee of 10 kuna per

[7] Twenty groups of people, including pensioners, unemployed, and students, are exempt from paying
contributions. Only around 35 percent of the population pays contribution.

[8] See *Funding Health Care* by Mossialos et al. (2002) for a description of cost sharing in Europe. Several
countries, including Australia, Canada, and Switzerland, do not allow supplementary insurance to cover co-
payments associated with services paid for by the health insurance fund.

[9] These lists were introduced in 2006. For drugs on the B list, the HZZO pays a reference price for drugs on the
A list and consumers pay the difference between the sale and reference prices. As a result of strong bargaining,

person (with a cap of 30 kuna per month) in 2005, its impact on demand for health services has been weakened by exemptions from these fees. The government has decided to abolish this fee in 2008.

● The system of capacity- and input-based payments to hospitals has encouraged hospitals to keep beds full and extend the length of patients' stay. Thus, the system does not provide needed incentives for hospital managers to cut costs. As a result, the average length of stay in (all) hospitals (ALOS) in Croatia in 2005 was about 10.3 days, one of the longest in Europe (compared with 8.6 days in EU-10 countries and 8.4 days in EU-15 countries). Although ALOS has recently fallen significantly, it is still high compared to other countries.[10]

Average Length of Stays in Hospitals (days)
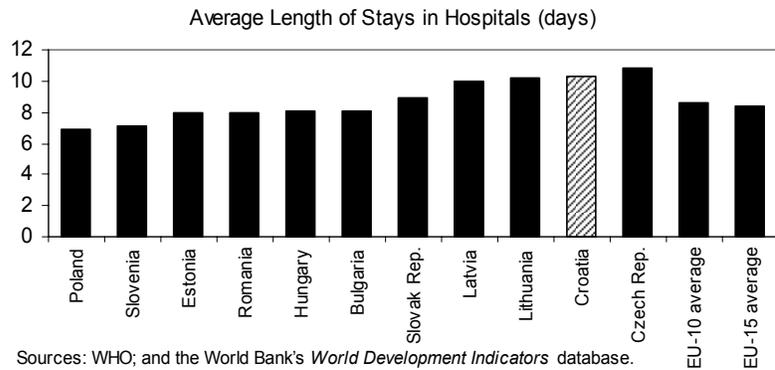
Sources: WHO; and the World Bank's *World Development Indicators* database.
1/ Data are from latest year available except for the data on doctors' consultations which are the average over 2002–03 and immunization from 2004.

● A substantial share of the care at the primary level is provided by costly specialists. This outcome is mainly due to the fact that primary-care physicians, who are supposed to play the role of "gatekeepers" of the health system, are paid on a capitation-basis (that is, physicians are paid flat fees per patient per year). This approach provides an incentive for physicians to sign up as many patients as possible and refer them to specialists instead of treating them. Seventy percent of patients at the primary health care level are referred to hospitals, but experts believe this figure could be reduced to 30 percent.

● There is little competition among health care providers. Of the 66 hospitals, only 3 were privately owned in 2006. The majority of specialists and health care workers are at the state-owned hospitals. Only 3 percent of medical doctors work in the private sector. Private institutions are largely limited to the provision of specialized medical services.

12. **In all, without reforms, health care expenditures will increase significantly.** The authorities' latest Pre-accession Economic Program envisages an increase of 4 percentage

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pharmaceutical spending was reduced by about 2 percent in 2007, despite a 6 percent increase in consumption of drugs.

[10] Over a third of total health care spending in Croatia finances hospital (in-patient) care.

points of GDP in public health spending from 2005 to 2050. This increase could be higher because, for example, of underestimating the costs of new medical technology.

Education

13.   **Croatia's education system is, like most European and transition countries, mainly financed and operated by the public sector.** Recognizing discrepancies both in quality and quantity aspects, the government has since 2005 been undertaking a large reform program, detailed in the government's Strategic Development Framework 2006–13 and the Education Sector Development Plan (ESDP) 2005–10.

14.   **Croatia's total spending on education as a share of GDP is in line with EU-10 and EU-15 countries, but its educational output and outcome levels are lower.** In 2005, Croatia spent around 5.6 percent of GDP on education, similar to average spending by the EU-15 (Table II.3). Croatia's public education spending was about 4.8 percent of GDP, somewhat less than the averages for EU-10 and EU-15 countries (5 percent of GDP and 5.4 percent of GDP, respectively). Thus, Croatia's private spending (at about ¾ percent of GDP) is higher than the averages for EU-10 and EU-15 countries (at about 0.4 percent of GDP), notwithstanding Croatia's few private schools. Private spending in Croatia is mainly on pre-school and tertiary education. Regarding outcomes, Croatia's school enrollment and completion rates are lower than those in comparator countries. In tertiary education, for example, gross enrollment was about 46 percent in 2006, compared to about 53 percent in the EU-10. Furthermore, only one third of the students at the tertiary level reportedly complete their programs, with an average completion rate of 6.7 years in four-year programs (World Bank, 2007). In the 2006 PISA standardized test in mathematics, only Bulgaria and Romania in the EU-10 scored worse than Croatia: out of 57 countries, Croatia ranked 36th.[11]

2006 PISA Mathematics Scores
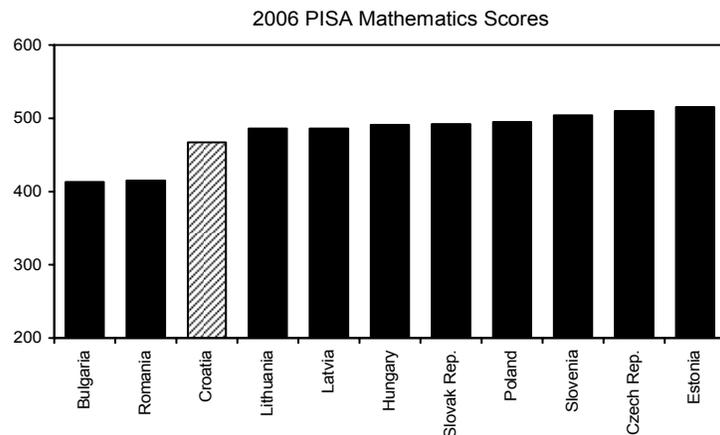
Source: The OECD Programme for International Student Assesment (PISA).

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[11] Croatia ranked 26th on the PISA science scale, ahead of some EU countries (e.g., Italy and Spain).

Table II.3. Education Expenditure, Output, and Outcomes 1/

	Public Expenditure on Education (percent of GDP)	School Enrollment, Primary (percent; net)	Primary Completion Rate (percent of relevant age group)	Progression to Secondary School (percent)	Pupil-Teacher Ratio, Primary	School Enrollment, Secondary (percent; net)	School Enrollment, Tertiary (percent; gross)	Average PISA Mathematics Test Scores
Croatia	4.5	87.3	91.4	99.9	17.7	85.0	38.7	467
Bulgaria	3.8	95.1	97.6	95.9	16.7	88.5	41.1	413
Czech Republic	4.4	…	102.8	98.0	17.9	…	43.2	510
Estonia	5.6	94.1	102.4	96.2	14.1	89.7	65.1	515
Hungary	5.4	89.1	96.0	98.8	10.5	90.7	59.6	491
Latvia	5.5	87.0 2/	95.2	98.5	13.0	91.0 2/	74.3	486
Lithuania	5.6	89.4	101.5	99.2	14.7	92.9	73.2	486
Poland	5.5	97.3	100.0	98.5	12.6	90.0	61.0	495
Romania	3.5	91.9	91.5	98.0	17.5	80.8	40.2	415
Slovak Republic	4.3	…	100.3	98.2	17.7	…	36.1	492
Slovenia	6.0	97.8	108.2	99.5	15.1	94.7	73.7	504
EU-8 average	5.3	92.4	100.8	98.4	14.4	91.5	60.8	497
EU-10 average	5.0	92.7	99.5	98.1	15.0	89.8	56.8	481
EU-15 average	5.6	98.2	97.2	99.5	13.8	91.2	62.2	498
OECD average	5.5	97.5	99.2	99.3	14.7	90.9	62.2	504

Sources: UNESCO; and World Bank, *World Development Indicators* database.
1/ Data are for the latest year available except for data on primary completion rates, which are averages over 2003–04, and data on public education spending and progression to secondary, which are averages over 2001–03.
2/ Fund staff estimates, based on gross enrollment rates.

15.   **Croatia's student-teacher ratios in primary and secondary schools have been falling and are lower than those in comparator countries**. Contributing to this, the number of students fell at all levels except for tertiary education from 1990 to 2005, reflecting declining fertility rates. Also contributing to this, during the same period, the number of full-time teachers increased at all levels of education except primary education, where the number remained stable.

16.   **School infrastructure is used intensively, but teaching hours are short.** About 65 percent of schools have double shifts, and 8 percent of schools have triple shifts (although only 10 percent and 2 percent of students, respectively, attend these schools). The government is trying to eliminate multiple-shift schools, especially those with three shifts. Regarding teaching hours, teachers with a full position are required to teach 15–21 hours per week, compared with 21–24 hours per week in OECD countries.

17.   **There are notable differences in the composition of education spending between Croatia and other countries.** Wages and salaries constitute a very large share of primary education spending in Croatia (about 90 percent of recurrent spending, compared with about 82 percent in the EU-15 and 73 percent in the EU-10). In primary and secondary education, Croatia spends a significantly larger share on investments (22 percent, compared with about 7 percent in the EU-15 and 8 percent in the EU-10) which leaves a smaller share for spending on non-wage recurrent expenditures, including spending on books for libraries and laboratory equipment. In contrast, the share of investments in tertiary education in Croatia is smaller than those in its peer countries. Recent increases in education spending have gone mainly to overheads and to a growing pre-school subsector.

18.   **Decision making and financing of education is fragmented.** For example, decisions about establishing schools are made by local governments while teachers are hired and financed by the central government. Coordination issues in decision making contributes to excess spending since local governments do not face the full costs of their decisions to build schools.

19.   **Public subsidies on education mostly benefit households with higher income.** The Household Budget Survey suggests that students from higher-income families receive the lion's share of scholarships and rewards. In particular, the amount of scholarships and rewards going to students from households in the top-income quintile (that is the top 20 percent of the income distribution) is almost 10 times higher than the amount going to students from the bottom quintile. Two observations are relevant: (i) most scholarships and rewards go to students with better academic achievements; and (ii) students in this category tend to come from families in the top-income quintile, which can spend more money to support education. Students from the top-income quintile also benefit from other subsidies, such as free books, dormitories, and transportation.

Social Protection

20.   **Croatia maintains a comprehensive and complex system of social protection.** The system serves multiple objectives and includes support to war veterans and their families, population policy measures, social assistance to low-income groups, and a large number of other social assistance programs. The administration of social benefits is highly fragmented, with insufficient coordination among different levels of government providing these services.

21.   **Overall, the system has been effective in reducing poverty.** Croatia's poverty rate is low by international standards, but is stagnant despite strong economic growth, thus requiring attention. In 2004, about 11 percent of the population was considered poor and another 10 percent was at risk of poverty (World Bank, 2007). Recent living standards assessments suggest that poverty is associated with being retired, unemployed or economically inactive, and that the incidence of poverty is the highest among the elderly.

22.   **Spending on social protection is high by regional standards, but only a small share is spent on direct poverty alleviation.** In 2007, the government spent about 4.5 percent of GDP on social assistance and social benefits (other than those covered under social-security), but only about 0.6 percent of GDP of this money is used for poverty-related social assistance programs. Most programs target specific categories such as war veterans, the disabled, and parents and children. However, some of these benefits do not necessarily target the most needy and most vulnerable and are not well-aligned with the rest of the social protection system, allowing double-dipping.

C. The Relative Efficiency of Social Spending

23.   **This section carries out the data envelopment analysis (DEA), discusses possible explanatory factors behind cross-country differences in efficiency, and highlights potential reforms to enhance efficiency.** As noted earlier, the analysis generates a best-practice frontier of input-output combinations (e.g., social spending and outcomes) that dominate the other combinations in the sample, and countries that are not on the frontier are then ranked according to the distance from the frontier. Similar to Verhoeven et al. (2007), a correlation analysis is also conducted to understand reasons for variation in efficiency across countries in the health and education sectors. Finally, in highlighting potential efficiency-enhancing reforms, the section draws on the findings in the World Bank's *Public Finance Review*. [12] Data are drawn from Eurostat, OECD, WHO, UNESCO, and the World Bank's World Development Indicators database. Spending data are adjusted into internationally comparable purchasing power parity (PPP) terms.

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[12] The sequencing of possible reforms and related political economy issues are beyond the scope of this paper.

Health Care

24.   **The results of the DEA suggest significant inefficiencies in Croatia's public health spending and, correspondingly, significant room to rationalize public spending without sacrificing, and potentially improving, health outcomes.** In terms of the efficiency scores for public spending, Croatia ranks in the 63rd percentile among 37 countries. Reflecting low private health expenditures in Croatia, it ranks in the 48th percentile for total spending on health (Table II.4). With respect to individual outcome indicators, Croatia's ranking is in the last quartile for the standardized death rates (SDR) and incidence of tuberculosis; in the third quartile for HALE, the child mortality rate, and infant mortality rate; and in the second quartile for maternal mortality rates (Figure II.2).

Table II.4. Relative Efficiency of Croatia and the EU-10 in Health
(Distribution by percentile of the ranking of efficiency scores) 1, 2/

	1-25	26-50	51-75	76-100
Public expenditures		Bulgaria Czech Republic Latvia	Croatia Estonia Poland Slovak Republic Slovenia Romania	Hungary Lithuania
Public and private expenditures	Bulgaria Czech Republic Poland	Croatia Estonia Romania Slovak Republic	Lithuania Slovenia	Hungary Latvia

Source: WHO; World Bank, *World Development Indicators* database; and Fund staff estimates.
1/ Croatia's efficiency scores for public expenditure countries ranked, on average, at the 63rd percentile of the overall ranking of efficiency scores of OECD countries, EU-10 countries, Cyprus, Malta, and Croatia. This places Croatia in the third (51-75) quartile of the sample ranking distribution. The rankings are based on the point estimate of the bias-corrected output-oriented efficiency scores.
2/ Based on a combination of outcome indicators comprising infant, child, and maternal mortality rates; standardized death rates; the incidence of tuberculosis; and healthy life expectancy.

25.   **Inefficiencies in the Croatian health care system occur mostly in the process of transforming intermediate resources into health outcomes.** In addition to estimating efficiency from health spending to outcomes (e.g., infant mortality rates) as above, we also estimate efficiency from intermediate outputs (e.g., hospital beds) to outcomes (e.g., infant mortality rates), with a view to understanding the stage at which (production) inefficiencies occur (called system efficiency hereafter; see also Appendix). As can be seen from Table II.5, system efficiency is relatively low in Croatia. This is only in part related to long stays in hospitals. As the two first columns in Table II.5 suggests, there are other inefficiencies in the system: the system efficiency using ALOS-to-outcome combinations is significantly worse than in EU-15 countries.

Table II.5. Ratio of Percentile Rank of Efficiency Scores in Health to the Average of
Percentile Ranks for OECD Countries1/

	System Efficiency 2/		Overall Efficiency 3/	
	Intermediary inputs/outputs to outcomes	Average length of stay to outcomes	Public expenditures to outcomes	Public and private expenditures to outcomes
Croatia	1.6	1.7	1.2	0.9
Bulgaria	2.0	2.2	0.5	0.5
Czech Republic	1.4	1.1	0.9	0.7
Estonia	1.9	2.1	1.5	0.7
Hungary	1.9	1.9	1.6	1.5
Latvia	2.2	2.4	1.0	1.4
Lithuania	2.1	2.2	1.7	1.2
Poland	1.7	1.8	1.1	0.5
Romania	2.2	2.4	1.4	0.6
Slovak Republic	1.8	1.8	1.2	0.5
Slovenia	1.0	1.4	1.1	1.1
EU-8 average	1.8	1.8	1.2	0.9
EU-10 average	1.8	1.9	1.2	0.9
EU-15 average	0.9	0.9	1.0	1.1

Sources: WHO; World Bank, *World Development Indicators* database; and Fund staff estimates.
1/ Ratio of bias-corrected output-oriented efficiency rankings of countries to the average ranking of OECD countries.
2/ Based on bias-corrected output-oriented efficiency rankings using, as inputs, the average of various intermediate inputs/outputs and, as production, various outcome indicators.
3/ Based on bias-corrected output-oriented efficiency rankings from Table II.4.

Figure II.2 Efficiency Frontiers for Selected Health Outcome Indicators - Croatia's efficiency scores for HALE, the child mortality rate, infant mortality rate, and incidence of tuberculosis are among the lowest in the sample.
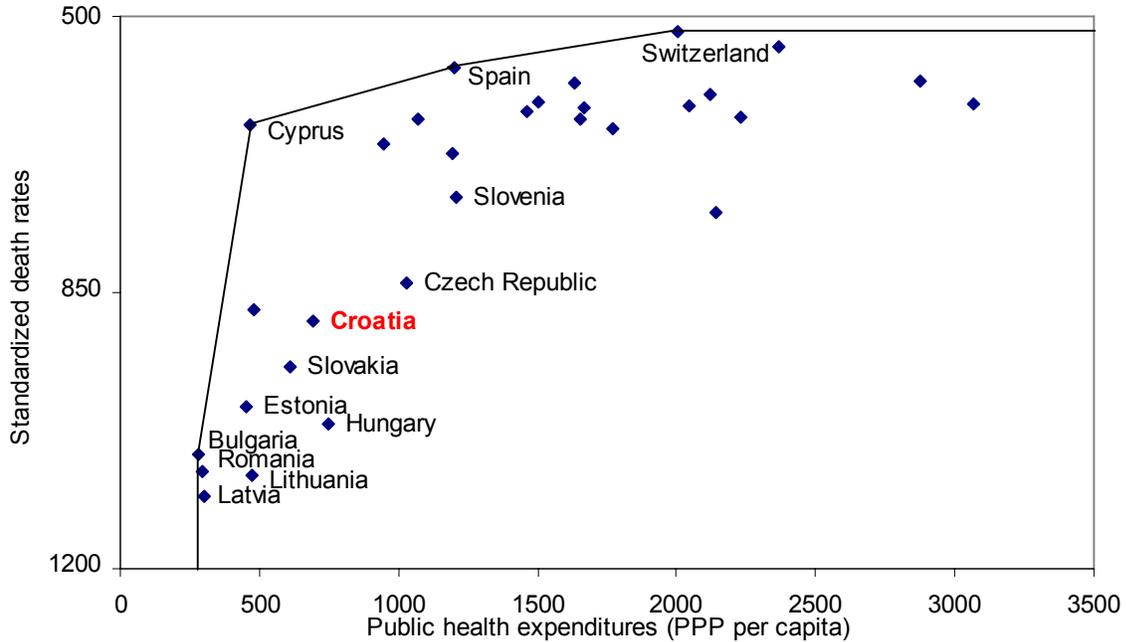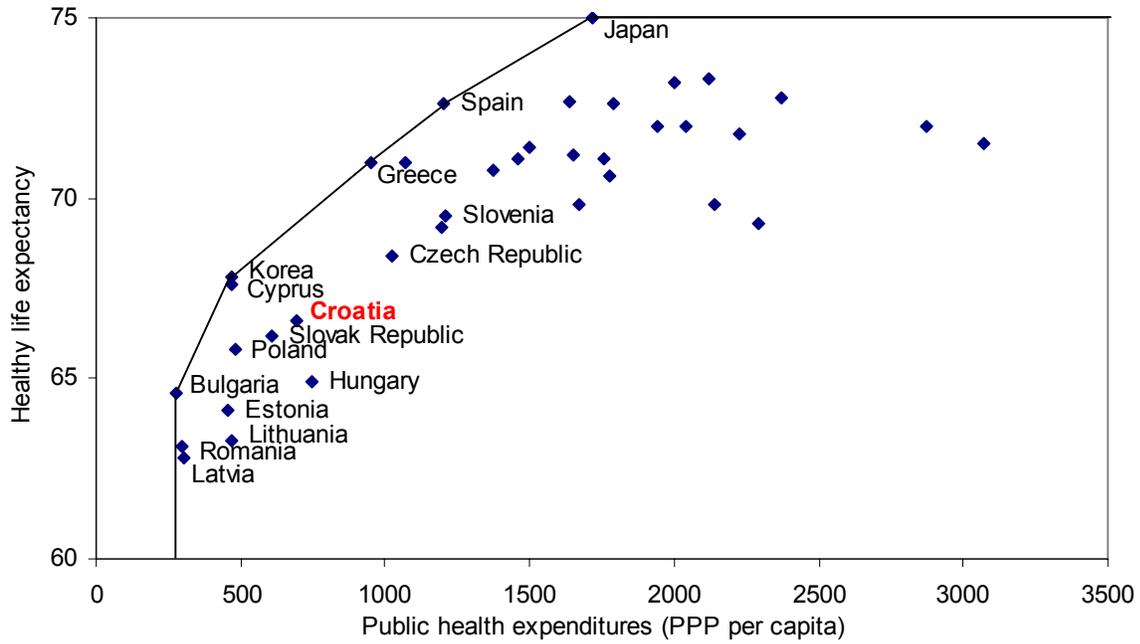
Sources: WHO; World Bank, *World Development Indicators* database; and Fund staff estimates.

Figure II.2 Efficiency Frontiers for Selected Health Outcome Indicators - Croatia's efficiency scores for HALE, the child mortality rate, infant mortality rate, and incidence of tuberculosis are among the lowest in the sample (continued).
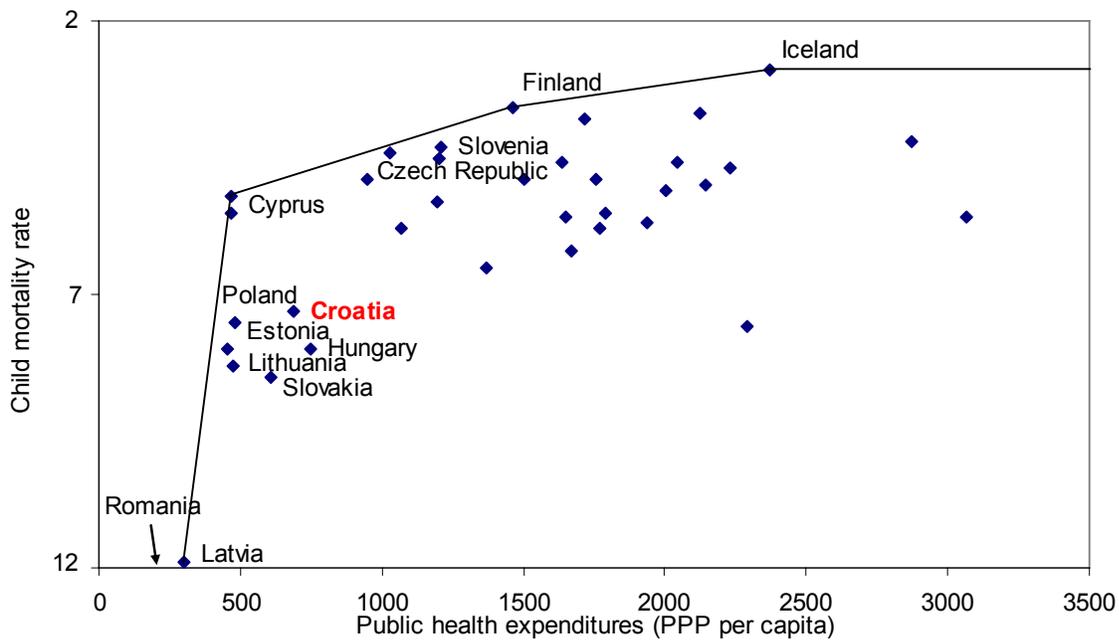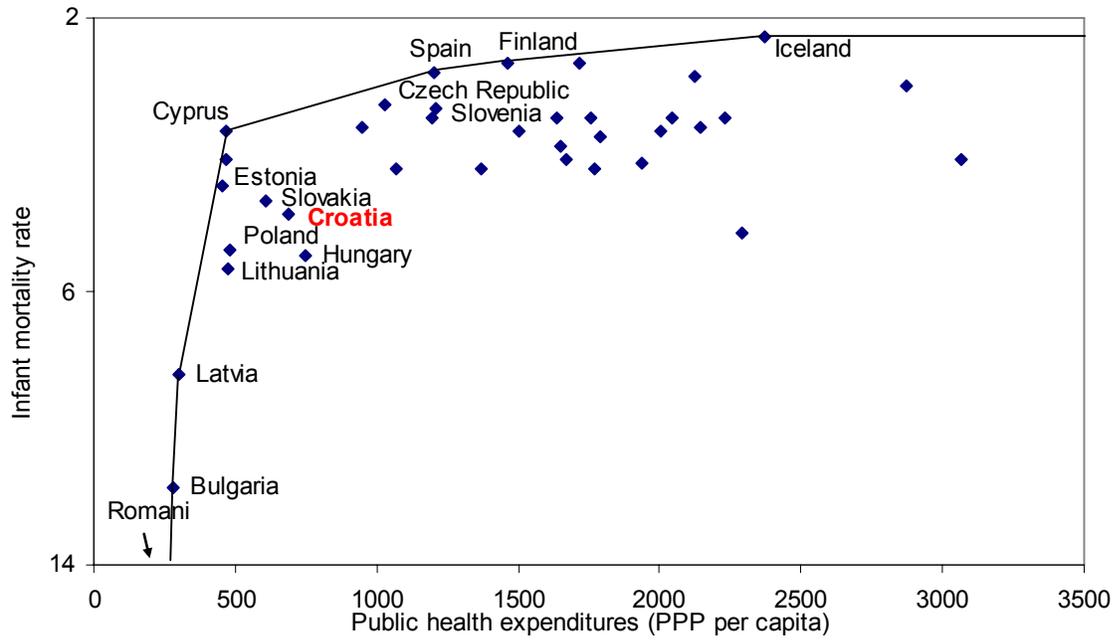
Sources: WHO; World Bank, *World Development Indicators* database; and Fund staff estimates.

Figure II.2 Efficiency Frontiers for Selected Health Outcome Indicators - Croatia's efficiency scores for HALE, the child mortality rate, infant mortality rate, and incidence of tuberculosis are among the lowest in the sample (concluded).
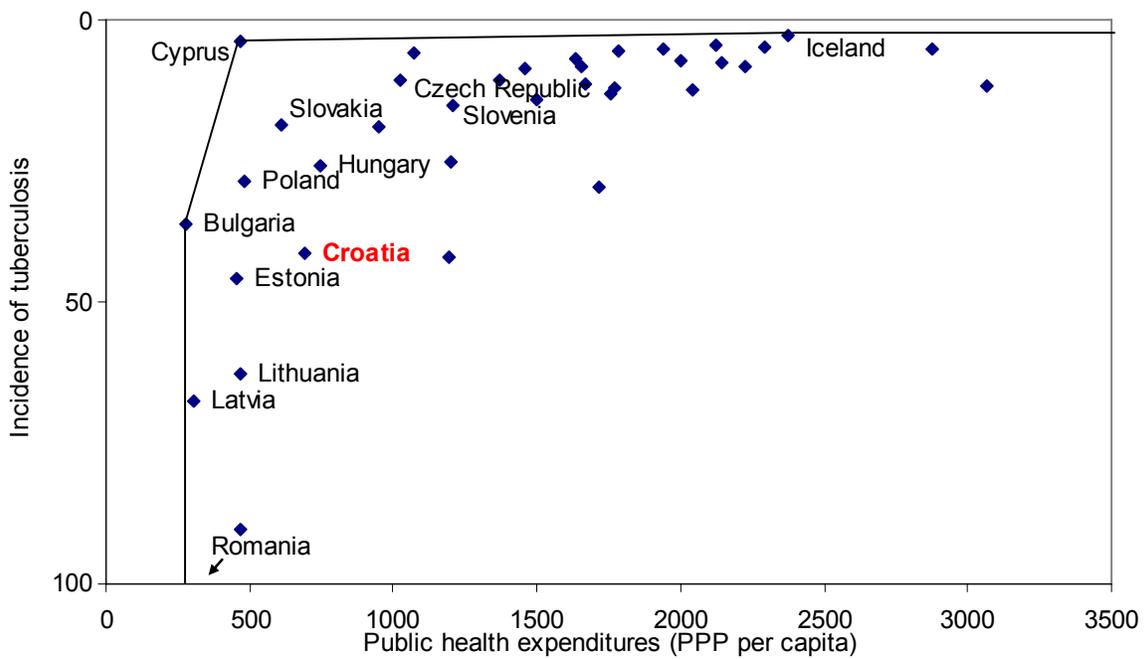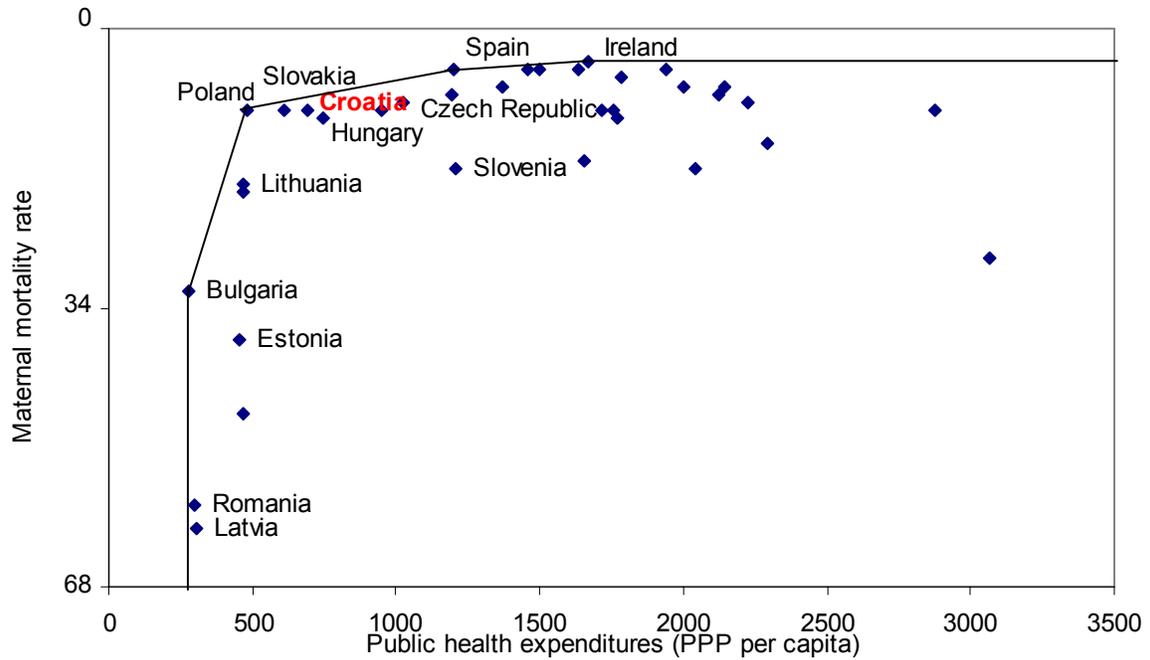
Sources: WHO; World Bank, *World Development Indicators* database; and Fund staff estimates.

26.   **The results of correlation analysis suggest that relative efficiency is associated with a wide range of factors (Table II.6).** The key correlations include adverse relationships between efficiency on the one hand, and on the other (1) exogenous and lifestyle factors such as alcohol consumption; (2) spending on collective care and administration; (3) spending on pharmaceuticals; (4) doctors' wages; (5) the number of doctor consultations, in-care admissions, and outpatient contacts; and (6) length of stays in hospitals (although only weakly).[13] [14] Moreover, out-of-pocket payment is strongly associated with increased relative efficiency in the sample. These results suggest that inefficiencies in health spending in Croatia are, in part, related to high pharmaceutical spending, long stays in hospitals, low levels of out-of pocket spending and private participation.

27.   **The above results suggest that system efficiency can be improved by containing demand for health services and changing the mix of resources spent on health care.** The following reforms, including those already underway or planned by the Croatian authorities,[15] could greatly improve the efficiency of health care spending:

- Increasing out-of-pocket spending could help contain demand for health care spending and generate significant budgetary savings. For example, if the level of private co-financing was raised to 7 percent of total health spending (one of the lowest co-payments-to-total-health-spending ratios of the Western European countries), through increases in co-payment rates and/or eliminating exemptions from co-payments, this could generate budgetary savings of 0.5 percent of GDP. Increasing the share of the

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[13] This analysis does not provide estimates of causality. It is possible that causality goes the other way around or both ways. The small sample size precludes regression analysis in the second-stage.

[14] Given the close relationship of spending and outcomes with income levels, correlations of efficiency scores and associated factors are conditional on GDP. GDP per capita is adversely related to efficiency since many of the factors that are associated with efficiency are also closely related to income level. In order to avoid attribution of factors whose effects on the variation in efficiency cannot be separated from the effect of GDP, only GDP per capita and factors that are correlated with efficiency independently of GDP per capita are considered in the second-stage analysis of this chapter. The association with efficiency of factors that are strongly correlated with GDP is assessed by regressing the efficiency score on both GDP and the associated factor.

[15] The Croatian government adopted the National Health Care Development Strategy 2006–11 to enhance and secure better-quality health care for citizens. The strategy includes both system reforms and financing reforms.

Table II.6. Correlations of Relative Efficiency in Health with Associated Factors 1/

	Healthy Life Expectancy	Standar-dized death rate	Infant mortality rate	Child mortality rate	Maternal mortality rate	Incidence of tuber-culosis
Overall efficiency: public expenditures to outcomes						
Exogenous factors						
Alcohol intake (liters per capita per year)	NN	NN			N	
Average schooling years in the population			NN	NN		
GINI Index			N	N		
Expenditure composition						
Collective care expenditure (percent of public health exp.) 3/			NN	NN		
Collective care expenditure (PPP per capita) 3/			NN	NN		
Out-of-pocket expenditure (percent of private health exp.)	P		PP	PP		
Doctors' wages (percent of GDP)			NN	NN		
Health resources						
MRIs per million capita	P		P	P		
Overall efficiency: public and private expenditures to outcomes						
Exogenous factors						
GDP per capita (PPP dollars)	NN		NN	NN	NN	
GINI Index			NN	NN		
Average schooling years in the population			NN	N		
Expenditure composition						
Pharmaceutical expenditure (PPP per capita) 3/			NN	NN		
Collective care expenditure (percent of total health exp.) 3/			NN	NN		
Collective care expenditure (PPP per capita) 3/			NN	NN		
Personal care expenditure (PPP per capita) 3/			NN	NN		
Administration and insurance (percent of total health exp.) 3/			NN	NN	N	
Administration and insurance (PPP per capita) 3/			NN	NN		
Out-of-pocket expenditure (percent of private health exp.)	PP		PP	PP		
Doctors' wages (percent of GDP)			NN	NN	N	
System efficiency: intermediate resources/services to outcomes						
Exogenous factors						
GDP per capita (PPP dollars)	PP	PP	PP	PP	P	PP
Population over 65 years (percent of total population)	P			P		
Expenditure composition						
Pharmaceutical expenditure (percent of total health exp.) 3/	NN	NN	NN	NN		NN
Administration and insurance (percent of public health exp.) 3/	NN	NN	NN	NN		NN
Health resources 2/						
Doctors' consultations per capita per year	NN	NN		N		NN
In-patient care admissions per 100 capita 4/	NN	NN	NN	NN	N	
Outpatient contacts per capita per year 4/	N	N				
Average length of stay at hospital					N	N

Sources: WHO; World Bank, *World Development Indicators*; OECD; and Fund staff estimates.

1/ Correlations are run on bias-corrected output-oriented efficiency scores. This table summarizes the results of correlations of associated factors with the level of efficiency. PP (P) indicates that the associated factor is positively correlated with level of efficiency (negatively correlated with output-oriented efficiency scores) at the 5 (10) percent significance level. NN (N) indicates that the associated factor is negatively correlated with level of efficiency (positively correlated with output-oriented efficiency scores) at the 5 (10) percent significance level. Several of the associated factors are highly correlated with GDP. Only correlations that are significant after conditioning on GDP are considered (see Appendix).

2/ Only real health resources/services not included in the DEA (hospital beds, number of physicians, health workers, pharmacists, and measles immunization rate are included in the DEA) are considered.

3/ Excludes non-OECD countries due to missing data.

4/ Excludes non-European OECD countries due to missing data.

private sector in financing sick leave and reducing the replacement rates[16] would also significantly curb demand and public spending for health services.[17] Restricting the basic benefit package provided by the HZZO would enhance the impact of this measure.[18] It should be noted, however, that co-payments could curtail access to the system for lower-income families. To prevent this possibility, means-testing could be used to grant limited exemptions (e.g., pensioners are exempt, but some of them may not need to be subsidized).

● Phasing out public supplementary insurance provided by the HZZO would reduce demand for health care services and stimulate the provision of additional insurance by private participants. The equity impact of this measure is not likely to be significant because essential services are covered by basic insurance.

● Restraining demand for pharmaceuticals by increasing the share paid by consumers and exposing producers to more competition could further reduce pharmaceutical spending. The former could be achieved through reducing the number of medicines on the A-list, while the latter could be achieved through determining the specific drugs to be subsidized for each illness by periodic competitive tenders. Strengthening incentives to prescribe/use generic substitutes would also help reduce drug spending.

● Accelerating reforms to introduce performance-based payments instead of input- or capacity-based payments would help curb excess spending. While the government has introduced case-based payments on a pilot basis, the effectiveness of this initiative has been weakened by options provided to hospitals to opt-out of the new payment system that essentially guarantees highest prices for services of hospitals. The authorities intend to introduce the so-called Diagnosis Related Groups (DRG) payment method in all hospitals treating acute diseases in late 2008. These measures would facilitate reducing the length of stays in hospitals and could generate significant budgetary savings over the medium term.

● Restructuring the system by moving more resources to more affordable outpatient care could also generate significant savings. Reforms to the payment system to strengthen incentives of general practitioners to treat patients rather than to refer them to specialists, as well as increases in co-payments for inpatient care, would serve this purpose.

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[16] The replacement rate is the ratio of benefits to (previously received) income.

[17] About 6 percent of the labor force was on sick leave in 2005; anecdotal evidence suggests that sick leave is used to deal with excess employment at the business level.

[18] Moreover, restricting the basic benefit package would stimulate private participation in the provision of additional insurance.

Administrative measures such as requesting general practitioners to explain the reasons for their referrals could also help reduce referrals to specialists.

28.   **Rationalizing the network of hospitals would allow Croatia to significantly improve the efficiency of health care spending and generate budgetary savings in the medium to long term.** This would require developing a master plan by assessing the needs of the population by type of service and geographic location and identifying potential areas for efficiency gains. The master plan should also include closing some facilities, reorienting some facilities for alternative uses such as long-term care and private sector practice, and improving the infrastructure and upgrading equipment in the remaining facilities.

29.   **The efficiency of health spending could be significantly increased by improving the management of health institutions and introducing more competition into healthcare markets**. Mihaljek (2007) notes that "virtually the entire secondary and tertiary health care sectors are managed by physicians, who often lack the adequate training in strategic management, financial planning, and other skills necessary for hospital management in a competitive market environment." Furthermore, there are coordination issues among different government agencies, leading to inefficiencies. For example, while hospitals are managed by local governments, staff hiring is done at the central government level. Accordingly, giving more independence to hospitals, imposing hard budget constraints on them, bringing in professional management expertise, and exposing them to competition could help significantly reduce inefficiencies in the health care sector. In this regard, a privatization program of hospitals should be considered in the context of the master plan.

30.   **Finally, stepping up efforts to prevent diseases (beyond immunizations which are covered in the above DEA analysis) would also help enhance efficiency and contain costs.** For example, the share of overweight people in Croatia is among the highest in the Europe, which may be one of the factors of high incidences of death from the circulatory system and from heart diseases.[19] Smoking-related death incidents are also significantly higher than in EU-15 countries, as well as in Slovenia and the Czech Republic (Table II.7), suggesting that increasing people's awareness of a healthy lifestyle could help reduce health care spending.

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[19] The share of obese people in Croatia is almost double the average of the EU-15. Mihaljek (2007) mentions an unhealthy lifestyle (high alcohol and tobacco consumption, and prevalence of physical inactivity) as the likely reason for the difference in mortality rates for non-communicable diseases between Croatia and EU-15 countries.

Table II.7. Standardized Death Rates, All Ages, 2005
(per 100,000)

	All Causes	Circulatory System	Ischemic Heart Diseases	Alcohol-Related Causes	Smoking-Related Causes	Cancer of the Cervix
Croatia	886.9	435.8	167.9	90.5	380.9	3.5
Czech Republic	837.6	419.0	177.5	81.0	359.3	5.3
Estonia	993.6	498.2	264.2	158.3	448.6	6.8
Hungary	1,015.5	502.4	261.3	129.5	490.5	6.5
Latvia	1,107.2	578.7	287.0	157.2	532.2	6.6
Lithuania	1,081.6	562.8	355.0	190.8	548.1	9.8
Poland	862.4	384.2	114.4	89.5	293.1	7.8
Slovak Republic	945.0	508.7	268.3	90.6	414.1	6.8
Slovenia	729.4	288.0	80.2	93.8	215.7	2.7
EU-8 average	946.5	467.8	226.0	123.8	412.7	6.5
EU-15 average	606.2	213.7	82.3	57.9	200.3	2.2

Source: WHO, *European Health for All* database.

Education

31.   **The analysis suggests significant inefficiencies in the education sector** (Table II.8)**.** In terms of the efficiency scores, Croatia ranks in the third quartile for primary education and secondary education (as well as in terms of PISA test scores);[20] and in the last quartile for tertiary education. For tertiary education, this inefficiency is related to low enrollment and graduation rates. For secondary education, this low ranking reflects mainly low enrollment rates and relatively low PISA scores (in mathematics), and in primary education the inefficiencies stem from low enrollment, low completion rates, and high overhead costs related to the excess number of schoolteachers, which has not matched the declining school-age population.

32.   **Similar to that in the health care sector, the main inefficiencies in the Croatian education sector lie in transforming intermediate education outputs into real outcomes.** As can be seen from Table II.9, Croatia's system efficiency from secondary enrollment to PISA scores was worse than the EU-10 average and significantly worse than the OECD average.[21] These results suggest that there is significant scope for streamlining education

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[20] Efficiency in secondary education is estimated using both a combined set of secondary intermediary outputs and outcomes, and PISA scores only.

[21] System efficiency was estimated only for the secondary education level, where PISA test scores were used as education outcome. The overall public sector efficiency (quartile) rankings in the primary and secondary levels presented in Table II.7 are for the first stage of the production process (spending to intermediary outputs), since no education outcomes such as test scores are available at these levels.

expenditures in Croatia and that the education system could be improved by relevant policy reform.

Table II.8. Relative Efficiency of Croatia and the EU-10 in Education
(Distribution by percentiles of the ranking of efficiency scores) 1/

	1-25	26-50	51-75	76-100
Primary education 2/	Romania	Bulgaria Czech Republic Lithuania Slovak Republic	Croatia Estonia Hungary Latvia Poland Slovenia	
Secondary education 3/	Bulgaria Lithuania Poland Romania	Estonia Hungary Latvia Slovak Republic Slovenia	Croatia Czech Republic	
PISA test scores	Estonia Poland Romania Slovak Republic Slovenia	Czech Republic Latvia Lithiuania	Bulgaria Croatia Hungary	
Tertiary education 4/	Latvia	Estonia Lithuania Poland Slovenia	Hungary	Bulgaria Croatia Czech Republic Romania Slovak Republic

Sources: UNESCO; World Bank, *World Development Indicators* database; and Fund staff estimates.
1/ Croatia's efficiency scores for primary education ranked, on average, at the 70th percentile of the overall ranking of efficiency scores of OECD countries, EU-10 countries, Cyprus, Malta, and Croatia. This places Croatia in the third (51-75) quartile of the sample ranking distribution. The rankings are based on the point estimate of the output-oriented efficiency scores.
2/ Based on primary expenditure efficiency in producing primary enrollment, primary pupil-teacher ratio, primary completion rates and progression to secondary education.
3/ Based on secondary expenditure efficiency in producing secondary enrollment, upper secondary graduation rates, and average PISA mathematics scores.
4/ Based on tertiary expenditure efficiency in producing tertiary enrollment.

33.   **Correlation analysis of efficiency of education spending is revealing (Table II.10).** The key findings include a positive relationship between overall efficiency on the one hand, and on the other (1) the share of current expenditure in total education; (2) classroom size; (3) parent's education; and (4) school quality and autonomy indicators such as student admissions prerequisites, student discipline and principle responsibility of hiring. Also, note that the coefficient of correlation between GDP per capita and overall efficiency has a minus sign while the coefficient of correlation between system efficiency and GDP per capita has a plus sign. This perhaps reflects the fact that rich countries spend more money on education and health—due mainly to high costs for intermediary output—but causing only marginal improvements in outcomes. However, these countries are more efficient in transforming intermediate output into outcome. There are two implications for Croatia. First,

more spending, especially capital spending, will not automatically improve education outcomes. Second, the costs of having an excess number of teachers will rise significantly as teachers' wages grow in line with income levels.

Table II.9. Ratio of Percentile Rank of Efficiency Scores in Education to the Percentile Rank of the Average Efficiency Score of the OECD 1/

	System Efficiency	Overall Efficiency 2/
	Secondary enrollment rate to PISA scores	Total education expenditures to PISA scores
Croatia	1.9	1.3
Bulgaria	2.3	1.0
Czech Republic	…	0.8
Hungary	1.4	1.0
Latvia	1.7	0.5
Lithuania	1.7	0.7
Poland	2.2	0.1
Romania	2.2	0.1
Slovak Republic	…	0.4
Slovenia	1.1	0.3
EU-8 average	1.6	0.5
EU-10 average	1.8	0.5
EU-15 average	1.1	1.2

Sources: UNESCO; World Bank, *World Development Indicators* database; and Fund staff estimates.
1/ Ratio of output-oriented efficiency rankings of EU-10 and EU-15 countries to the average ranking of OECD countries.
2/ Based on output-oriented efficiency rankings from Table 8.

34.   **The following reforms, which are largely consistent with many reform measures included in the ESDP, could help improve the efficiency of education spending:**

● Rationalizing the teaching force would help contain declines in the student-teacher ratio, as well as related fiscal costs and rigidities that limit the scope for discretionary cuts in short-term education spending. This could be achieved through natural attrition and a selective hiring freeze for new teachers. If Croatia's student-teacher ratios could be increased to the levels of OECD countries, it would allow to reduce the number of teaching staff by around 11 percent at the primary level and by around 17 percent at the secondary level. In this regard, the authorities project the number of students 7–29 years of age to decline by another 358,000 or about 25 percent from 2005 to 2030. This implies a significant potential for savings, if the number of teachers and overall education spending could be reduced in line. Also, as the number of students decline, schools could consider pooling resources by sharing teachers. Otherwise, further declines in the student-teacher ratio would lead to significant inefficiencies and aggravate the fiscal burden.

● Rationalizing the school network would also help realize potential benefits from expected declines in the number of students. This could be facilitated by increases in spending on transportation and the usage of multi-grade teaching in small schools. The government's efforts to eliminate triple shifts are welcome, but attempts to eliminate double shifts need to be well planned to avoid unnecessary spending.

● Increasing teaching hours may allow for better education outcomes while containing education spending. This would provide room to contain the decline in the student-teacher ratio in the event that enrollments increase.

● Moving toward performance- and per-capita based budgeting could significantly reduce inefficiencies in the education sector. The authorities have already made good progress toward these ends by introducing a transparent system of performance evaluation of students' achievements as well as the quality of teachers. More could be done, however, to take into account the number of students, as well as selected output and outcome indicators such as graduation and drop-out rates, student-teacher ratios, scores on international standardized tests.

● Reducing rigidities related to institutional and funding mechanisms could generate savings. In particular, gradually raising local governments' control over and responsibility in delivering educational services, in line with their capacity, would allow them to internalize the full cost of their decisions and could increase the efficiency of education spending.

● Greater cost recovery should be considered in pre-school education and university tuition. In pre-school education, which is under the control of local governments, unit costs have risen faster than the other levels of education, which may reflect inefficiencies in provision of services by local governments. Regarding university tuition, education is free for about 48 per cent of students, but a study at the University of Rijeka suggests that those who pay fees complete with better grades and earlier than other students (World Bank, 2007). Introducing means-testing for programs providing free textbooks, transportation, and dormitories would help to better target the vulnerable groups and curb education spending without sacrificing education outcomes.

Table II.10. Correlations of Relative Efficiency in Education with Associated Factors 1/

	Primary			Secondary			Tertiary
	Enroll-ment rates	Comple-tion rates	Pupil-teacher ratio	Enrol-ment rates	Gradua-tion rates	PISA math scores	Enroll-ment rates
Overall efficiency: public expenditures to outputs/outcomes							
Exogenous factors							
GDP per capita (PPP dollars)		NN		NN		NN	
Healthy life expectancy (years)	PP	PP					
Mothers education ICED 3 or higher (percent students) 2/	...	...	...	PP	P	P	...
Fathers education ICED 3 or higher (percent students) 2/	...	...	...	PP		P	...
Expenditure composition							
Private education expenditure (as a share of public educ. exp.)			NN				
Total current expenditure (percent of non-tertiary educ. exp.)		P	PP	PP			...
Total capital expenditure (percent of non-tertiary educ. exp.)		N	N	N			...
Education resources							
Pupil-teacher ratio in secondary 3/	...	...	...			PP	...
Student admission record is prerequisite (percent schools) 2/	...	...	...			PP	...
Principal is responsible for hiring teachers (percent schools) 2/	...	...	...	P		PP	...
Student absenteeism hinder learning (percent schools) 2/	...	...	...			NN	...
Student skipping classes hinder learning (percent schools) 2/	...	...	...			NN	...
Student lacking respect hinder learning (percent schools) 2/	...	...	...			N	...
Students bullying hinder learning (percent schools) 2/	...	...	...	NN			...
System efficiency: secondary enrollment/PISA math scores							
Exogenous factors							
GDP per capita (PPP dollars)	...	...	...	...	...	PP	...
Infant mortality rate (per 1,000 live births)	...	...	...	...	...	NN	...
Education resources 2/							
Student admission record is prerequisite (percent schools) 2/	...	...	...	...	...	P	...
Student absenteeism hinder learning (percent schools) 2/	...	...	...	...	...	NN	...
Student skipping classes hinder learning (percent schools) 2/	...	...	...	...	...	NN	...
Student lacking respect hinder learning (percent schools) 2/	...	...	...	...	...	N	...

Sources: UNESCO; World Bank, *World Development Indicators*; OECD; and Fund staff estimates.

1/ Correlations were run on output-oriented efficiency scores. This table summarizes the results of correlations of associated factors with the level of efficiency. PP (P) indicates that the associated factor is positively correlated with level of efficiency (negatively correlated with output-oriented efficiency scores) at the 5 (10) percent significance level. NN (N) indicates that the associated factor is negatively correlated with level of efficiency (positively correlated with output-oriented efficiency scores) at the 5 (10) percent level. Several of the associated factors are highly correlated with GDP. Only correlations that are significant after conditioning on GDP are considered (see Appendix).

2/ Only covers countries that participated in the 2003 PISA test.

3/ Excludes non-OECD countries due to missing data.

35. **More generally, improving the skills base to match that demanded by the labor market will be important for ensuring that the Croatian economy competes successfully in Europe and globally.** The Lisbon Council's European Human Capital Index ranked Croatia last among 12 central and eastern European countries, mainly due to low scores on utilization of human capital, although this study ranked Croatia in the middle of the 12 countries for human capital endowment (i.e., education and training) and human capital productivity (Ederer, Schuller, and Willms, 2007). This suggests that the impact of education

spending on economic growth in Croatia could be enhanced by shifting resources to better meet demands in the labor market.

Social Protection Transfers

36.   **Croatia is on the efficiency frontier line, but this is because of low levels of social protection spending (in PPP terms) rather than large changes in poverty reduction due to social protection transfers**. This suggests problems in the future, unless the system is reformed (Figure II.3). In particular, unless efficiency of social spending is improved significantly, further increases in social spending may not lead to less poverty.

Figure II.3. Social Spending and Poverty Rate Reduction in Selected Countries
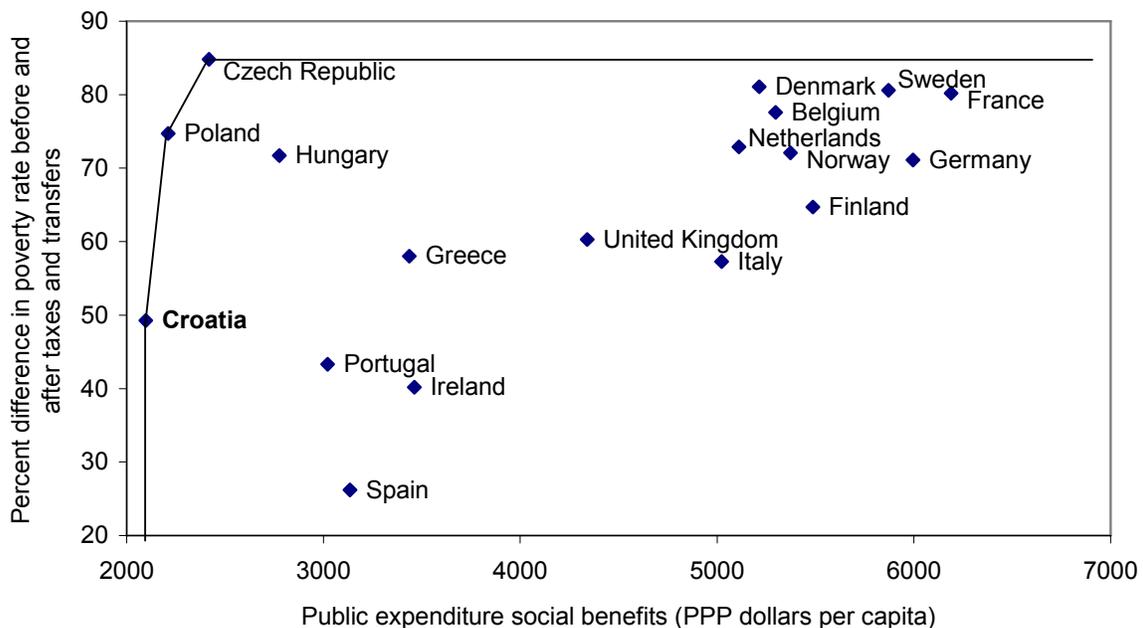
Sources: Croatian Central Bureau of Statistics; Eurostat; OECD; and Fund staff estimates.

37.   **The following reforms could help improve the efficiency of social protection spending**:

●   Improving the targeting of benefits by significantly expanding the use of means testing in providing benefits would improve the efficiency of social protection spending. The authorities' intention to introduce taxpayer identification numbers—and, more importantly, to quantify the benefits received by individuals—would facilitate the introduction of this measure.

●   Consolidating supervisory responsibility under a single agency would improve the coordination of policies and their implementation. Unifying the administration of benefits

to a single office at the local level with a view to eliminating possibilities for double-dipping could generate fiscal savings and improve efficiency.

● Changing the overall mix of total social spending by reducing the share of categorical benefits and increasing the share of well-targeted programs could help achieve better results.

38.   **Finally, any new initiatives on social spending should be designed with a view to enhancing incentives to work.** Croatia's labor market participation rate is one of the lowest in Europe, and the existing social benefits may have contributed to this outcome. Active labor market measures (employment subsidies, training, measures to promote jobs for the disabled, etc.) and easing hiring (and firing) procedures could be considered to re-connect the unemployed to the labor market, though the costs of active measures would also need to be taken into account.

D.   Concluding Remarks

39.   **The previous sections demonstrated that there are significant inefficiencies in social spending in Croatia.** In the health sector, inefficiencies are mainly related to high spending, rather than weak outcomes. In the education sector, inefficiencies are related to both poor outcomes and increasing overhead costs. Regarding social protection spending, inefficiencies are related to weaknesses in targeting. While there are caveats to the analysis, the main findings, taken together with the findings of other studies, seem quite robust. In particular, the findings of this paper, derived from simple cross-country comparisons, simple correlation analyses, and DEA,[22] are supported by studies at sectoral levels by the IMF, the World Bank, and Mihaljek (2007).

40.   **These inefficiencies suggest that there is room to improve key social indicators while containing public spending.** The paper has suggested a number of measures that can be taken to reduce inefficiencies in public spending and generate budgetary savings. These measures are summarized in Table II.11. Some of the above reforms could have disproportionate effects on the poor and other vulnerable groups. Therefore, to avoid vulnerable groups foregoing necessary services, targeted transfers to them may be needed.

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[22] See Annex I for description of caveats of DEA.

Table II.11. A Menu of Reform Measures to Increase Efficiency of Social Spending in Croatia

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Health Care

- Increase co-payments while minimizing exemptions.
- Further reduce subsidization of pharmaceuticals.
- Accelerate the introduction of the Diagnosis Related Groups (DRG) payment method.
- Restrict the basic benefits package covered by HZZO.
- Shift resources to more affordable outpatient care.
- Increase the role of the private sector in the provision of health care services.
- Strengthen incentives for General Practitioners for reducing referrals.
- Rationalize the hospital network.

Education Sector

- Rationalize the teaching and non-teaching work force and wage bill.
- Consider greater cost recovery in tertiary education by reducing budget financing to universities and means testing scholarships.
- Increase teaching hours to international norms.
- Target free textbooks, transportation, and dormitories programs only to the vulnerable.
- Rationalize the school network and expand multi-grade teaching in small schools.
- Move towards per-student or performance-based budgeting.
- Shift resources to better meet demands in the labor market.

Social Protection

- Improve targeting of benefits.
- Streamline benefits by consolidating them and reducing their number.
- Consolidate the administration of social benefits.

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Appendix. Data Envelopment Analysis (DEA)[23]

The DEA technique is a non-parametric method of estimating production possibility sets, which can be used to evaluate the efficiency in the use of inputs in producing outcomes for a sample of production units.[24] It is mostly used for estimating relative efficiency in business applications, but it has recently also been used to assess the relative efficiency of public expenditure. In the context of government expenditure efficiency, indicators of public production are typically used to measure outcomes, for example, life expectancy and infant mortality rates (in health care), youth literacy rates and test scores (in education), and the number of roads and telephone lines (in infrastructure). Inputs used to produce these outcomes are public and private expenditure on health, education, and infrastructure, as well as intermediate outputs and resources such as the number of doctors and hospital beds (in health care) and enrollment rates and student-teacher ratio (in education). The production units in this case are often countries, but could also be sub-national regions.[25]

Figure II.A1 illustrates a stylized example of DEA based on a single input and outcome indicator across countries. The efficient frontier connects countries A to D as these units dominate countries E and G in the interior. The convexity assumption allows an inefficient country (point E) to be assessed relative to a hypothetical position on the frontier (point Z) by taking a linear combination of efficient unit pairs (points A and B). In this manner, an *input-based technical efficiency* score that is bounded between zero and one can be calculated as the ratio of YZ to YE. The score corresponds to the proportional reduction in inputs that is consistent with relatively efficient production of a given output, and can be interpreted as an indicator of the cost savings that could be achieved from efficiency enhancement. Similarly, an *output-based technical efficiency* score can be calculated as the ratio of FX to EX, which reflects the improvement in outputs for given inputs that could be

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[23] This Appendix is based on Zhu (2003), Mattina and Gunnarsson (2006), and Verhoeven et al. (2007).

[24] It was developed by Farrell (1959) and popularized by Charnes, Cooper and Rhodes (1978). See Zhu (2003) for more detailed discussion of DEA.

[25] There is well-established literature using DEA to assess the relative efficiency of public expenditure. Gupta and Verhoeven (2001) studied the relative efficiency of education spending in a broad sample of African countries during the 1984-95 period. Afonso and St. Aubyn (2004) applied DEA and a related frontier-based approach on health and education spending in a sample of OECD countries. Herrera and Pang (2005) studied the relative efficiency of spending in 140 countries using DEA. Afonso, Schuknecht and Tanzi (2006) applied DEA in a sample of EU and emerging market countries. An important contribution of their work was to apply truncated regression models based on procedures developed by Simar and Wilson (2007) to control for exogenous factors that impact efficiency but that are not directly controlled by policy makers. Coelli, Lefebvre, and Pestieau (2007) applied DEA to study social protection performance in the EU.

achieved from efficiency enhancement. This paper focuses on output-based efficiency scores, since Croatia will need to improve outcomes without increasing expenditures.[26] [27]

Figure II.A1. Illustrative Example of Applying DEA
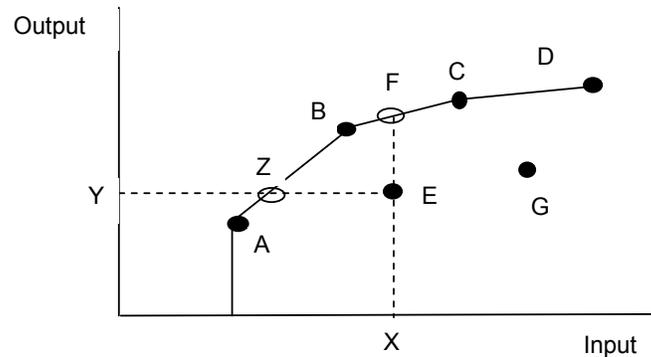
DEA is a powerful tool to assess the relative efficiency of spending, but also has important caveats. For example, it does not require an assumption about unknown functional forms for the efficiency frontier or complex distributional properties for econometric analysis. However, it is also subject to the following caveats:

- Results are highly sensitive to sample selection and measurement error. As a result, outliers exert large effects on the efficiency scores and the shape of the frontier. For this reason, proper sample selection is the key to ensuring that cross-country input-output combinations are comparable.

- Spending attributes that are difficult to quantify are not easily incorporated in the analysis, such as the quality of spending.

- The outcome indicators against which inputs are evaluated may not actually be targeted by policy makers.

- Large differences across countries in private health care or education spending could bias the efficiency scores of public spending, as the outcomes targeted by policy makers are also impacted by private spending.

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[26] An output-based efficiency score of one corresponds to a relatively efficient country operating on the frontier. Scores exceeding one imply that spending could achieve better output performance. This differs from input-based efficiency scores that range between zero and one.

[27] The input- and output-based efficiency scores are equal assuming constant returns to scale. However, the DEA models considered in this chapter permit variable returns to scale.

- Factors beyond the direct control of policy makers can also affect relative efficiency scores. For instance, a high incidence of AIDS would reduce the measured efficiency of health spending in African compared to other countries.

Moreover, simple DEA estimation produces biased estimates of the efficiency scores that need to be corrected. In particular, the best-practice frontier can move *outward,* if efficient pairs/countries are added in the sample, but cannot move inward. This one-sided error means that estimating the best-practice frontier with a finite sample is subject to bias. Since output–oriented efficiency scores are measured in relation to the frontier, the estimated scores are subject to the same finite sample downward bias (i.e., the level of efficiency is overestimated unless a correction is made for the bias). This bias stems from the fact that since we only observe a sub-sample of the possible outcomes representing all feasible combinations of spending and outcomes, we do not know the exact position of the best-practice frontier. Where appropriate, corrections are made for the estimation bias in the best-practice frontier and efficiency scores through bootstrapping, as suggested by Simar and Wilson (2000).[28]

DEA results can be disaggregated to assess at what stage of the spending process inefficiencies arise. This is done as by comparing *spending efficiency* (the overall measure of efficiency from spending to outcomes as discussed above) and *system efficiency* (the measure of efficiency from intermediate outputs to outcomes; Tables II.5 and II.9). Figure II.A2 illustrates how it is done in the analysis of efficiency of health care spending. First, cost efficiency is assessed using health care spending and intermediate output indicators such as hospital beds, immunizations, physicians, health care workers and pharmacists per capita. Second, efficiency scores are calculated, using the intermediate output index as an input and associated outcomes (infant, child, and maternal mortality rates, as well as HALE, standardized death rates and the incidence of tuberculosis). Third, the resulting system efficiency rankings are averaged, and expressed as a ratio of the average OECD ranking, and compared with similar ratios for spending efficiency.

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[28] A key issue is how quickly the estimated efficiency scores converge to their unbiased true values if the sample of observations is expanded. This convergence speed is $n^{-2/(p+q+1)}$, where p is the number of inputs and q is the number of production items. In the 1 input / 1 product examples of this Appendix, the convergence speed is $n^{-2/3}$. This is faster than the convergence speed for a standard parametric regression of $n^{-1/2}$, suggesting that reasonable estimates of efficiency scores and confidence intervals can be reached with a lower number of observations than would be needed for standard regression analysis. However, the convergence speed declines exponentially as the number of inputs and production items is increased, and already at two inputs and production items, the speed of convergence is markedly slower than for a parametric regression. This implies that an expansion in the numbers of inputs and production items comes at a significant cost in terms of the ability to draw conclusions on efficiency from a limited number of observations.

Figure II.A.2. The Efficiency Relationship Between Health Expenditures, Resources, and Outcomes

Overall efficiency

Health Expenditure	**Real Health Resources** (examples)	**Health Outcomes**
• Public health expenditure • Private health expenditure	• Hospital beds • Physicians/health workers • Immunizations • Doctors' consultations • In-patient admissions • Lengths of stay • Bed occupancy rate	• Health adjusted life expectancy • Standardized death rate • Infant mortality rate • Child mortality rate • Maternal mortality rate • Incidence of tuberculosis

Cost effectiveness

System efficiency