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Ecuador: Diversification and Sustainable Growth In an Oil-Dependent Country

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Poverty Reduction and Economic Management
Andean Country Management Unit
Latin America and the Caribbean Region

REPUBLIC OF ECUADOR FISCAL YEAR
January 1 to December 31

CURRENCY EQUIVALENTS
(as of March 31, 2010)

Currency unit	=	U.S. dollar (USD)
1 U.S. dollar	=	US$1.00

WEIGHTS AND MEASURES
Metric System

Abbreviations

API	American Petroleum Institute
ATPA	Andean Trade Preference Act
ATPDEA	Andean Trade Promotion and Drug Eradication Act
BCE	Central Bank of Ecuador (Banco Central de Ecuador)
CAN	Andean Community
CEPAL	Comisión Económica para América Latina y el Caribe
CEPE	Corporación Estatal Petrolera Ecuatoriana
CEREPS	Special Account for Social and Productive Investment, Scientific Development, and Fiscal Stabilization
CPI	consumer price index
FAC	Fund for Savings and Contingencies
FD	foreign direct investment
FEIREP	Fund for Stabilization, Investment, and Public Debt Reduction
FEISEH	Energy and Hydrocarbon Investment Fund
FEP	Oil Stabilization Fund (Fondo de Estatización Petrolera)
FOB	free on board
FOPEDEUPO	Fondo Permanente de Desarrollo Universitario y Politécnico
FRTL	Fiscal Responsibility Law, with versions I and II
FTSRL	Law on Fiscal Transparency, Stabilization, and Responsibility
GDP	gross domestic product
ICE	special consumption tax
ICSID	International Center for Settlement of Investment Disputes
IMF	International Monetary Fund
kWh	kilowatt-hour
LAC	Latin America and the Caribbean
MERCOSUR	Mercado Común del Cono Sur
NAFTA	North American Free Trade Agreement
NFPS	Non Financial Public Sector
OCP	Oleoducto de Crudos Pesados
SOTE	Sistema de Oleoducto Transecuatoriano
VAT	Value added tax
WTI	West Texas intermediate

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Preface

Diversification is important to sustainable economic growth and economic development in an oil-dependent country like Ecuador because it allows the country to be less vulnerable to external shocks. An analysis of diversification in the Ecuadorian economy is needed at this time because (a) the growth has been sluggish despite favorable terms of trade in recent years, and (b) external and fiscal balances are highly vulnerable to shocks in oil prices. This study focuses on the general concept of diversification, including diversification of public revenues, trading partners, and production. It seeks to understand the linkages between the oil and non-oil sectors and offer recommendations on how Ecuador could frame public policy to achieve diversification.

The current study on Ecuador is structured in four chapters.

Chapter 1 presents an overview of the Ecuadorian economy and the linkages between the oil and non-oil tradable sectors, setting the stage for an in-depth analysis of each subsector in subsequent chapters.

Chapter 2 provides an overview of oil sector activities, describing trends for oil production, the legal and regulatory environment, direct linkages to other economic activities, and fiscal matters related to the sector.

Chapter 3 provides an overview of non-oil activities in the tradable sector, describing trends for non-oil production and growth, fiscal matters for the sector, constraints on growth, trade agreements, and industrial policy affecting development of the non-oil sector. It also examines the prospects for growth of Ecuador's economy under various policy or external-shock scenarios in the oil and non-oil sectors.

Chapter 4 looks at the experiences of other countries that have succeeded in diversifying away from dependence on commodities and export products, seeking lessons for Ecuador.

The report was prepared for internal discussions. The study will be useful for the CMU and for dialogue with the public and private sector as the opportunity arise.

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EXECUTIVE SUMMARY

There is a general perception among academics and politicians that Ecuador's economy has performed below its potential in recent decades. The country has made less progress than it could have in creating jobs and improving the standard of living of its citizens, despite the high priority placed by several administrations on social improvement. This underperformance causes: Ecuador's excessive dependence on revenues from oil exports, pro-cyclical fiscal policies, limited growth of non-oil exports, and recurring economic and political instability.

Sustaining faster growth in a small open economy such as Ecuador's will require both taking better advantage of the country's oil resources and accelerating the ongoing diversification of the economy. Growth in a more diversified economy would have a stronger social impact in terms of employment and income distribution, since the oil sector is capital-intensive, generates few jobs directly, and has few linkages to other economic activities. Also, diversification will help to reduce macroeconomic volatility and reduce the government's vulnerability to changing world oil prices.

Ecuador could readily improve its economic performance. The country has a great many natural, cultural, and human assets that it can use to achieve better economic and social outcomes. While there is more political stability, as President Correa has remained in power since 2007, in contrast to the presidential frequent turnovers earlier in the decade there is still high uncertainty in the business climate that hinders the participation of the private sector.

Overview of Economic Growth

The Ecuadoran economy depends primarily on natural resources, but the composition of its exports and the number of export markets has gradually diversified since the early 1990s. The tradable sectors represent about 33 percent of GDP. Ecuador's main exports are primary goods, with oil the most important (on average, 44 percent of total exports).[1] Despite oil's continued dominance, other exports have more than doubled from 1993 to 2008, while the volume of oil exports has only increased 60 percent. Agriculture continues to be the largest sector of the economy, representing about 10% of GDP and 30% of employment (see table 1.2a), although its importance has declined as low productivity has led to migration from the countryside in search of better job opportunities. Manufacturing has grown in recent years, and now represents about 10 percent of GDP.

Economic growth during the 2003-2008 oil price boom averaged about 5 percent per year, lower than other natural resource-dependent countries in the region such as Colombia (5.3 percent), Trinidad and Tobago (8.2 percent), Peru (7.1 percent), and Venezuela (7.4 percent). Ecuador's economic performance is well below what could have

[1] Over the 1993-2008 period.

been expected considering the magnitude of the country's terms of trade gains during the period.[2] Compared to other natural resource dependent countries such as Chile, Colombia, Mexico, Trinidad and Tobago, and the United Arab Emirates, Ecuador had the highest terms of trade gain but the lowest rate of economic growth during 2005-2007 period. In other words, the country has done relatively poorly in utilizing its energy resources to generate broader economic growth.

While the oil sector is critically important to Ecuador's fiscal and external accounts, it appears to have few direct spillover impacts on the rest of the economy. The oil industry accounts for only about 0.25 percent of all jobs in the country, and buys few outputs from other sectors of the economy. Econometric analysis finds no evidence that growth in the oil sector negatively impacts the performance of other economic sectors, the so-called "Dutch disease." The main transmission mechanism from the oil industry to the rest of the economy is through the government's fiscal accounts, which highlights the importance of well-managed fiscal policy for Ecuador's growth prospects.

The experiences of other countries in Latin America and the Caribbean and Persian Gulf with high oil dependency suggests that Ecuador should follow a two-pronged strategy of maximizing its oil industry while at the same time promoting greater economic diversification. Growth of the resource sector is not a problem in itself. Revenues from minerals can potentially overcome many other constraints on growth. Chile, Trinidad, and the Persian Gulf states have found mechanisms that allow private investment to efficiently develop the industry, while channeling resources for the benefit of the entire nation. At the same time, encouraging the diversification of Ecuador's economy would provide more employment opportunities to the population and mitigate the volatility caused by oil price fluctuations.

Oil Sector

The oil sector has grown in importance to the Ecuadoran economy over time, but oil production has fallen in recent years. In 1993, oil accounted for 41 percent of total exports, 6.8 percent of GDP and less than half of public sector revenue. But in 2008, oil accounted for about two-thirds of total exports, 18 percent of GDP and half of public sector revenue. Ecuador's crude oil output fell to 486,067 barrels per day (bpd) in 2009 from 504,721 bpd in 2008. This represents a 4 percent decline with respect to 2008. Petroecuador's output rose nearly 5.6 percent to 281,556 bpd, but the output of the foreign and private oil companies decreased 14.4 percent to 204,511 bpd. Oil's real growth all occurred in the early 1990s, when private oil companies were expanding, and in 2003-2004, when the private sector constructed the OCP pipeline.

The oil sector has significant growth potential, but is constrained by underinvestment. Ecuador has one of the lowest ratios of production to reserves (4.4 percent in 2007) among oil-producing countries with broadly similar reserve levels, including the United Kingdom (16.6 percent), Colombia (13.7 percent), Norway (11.4

[2] Terms of trade increased 33 percent during the 2003-2008 period.

percent), and Argentina (9.8 percent). Moreover, the ratio of production to reserves in Ecuador is much higher for private companies (11.4 percent) than for Petroecuador (1.9 percent), suggesting that additional investment could increase substantially Petroecuador's current production. Projections estimate that investments of approximately US$8.6 billion over the next 10 years in overhauling Petroecuador's current oil fields would yield oil sector growth of 66 percent (an additional 122 million barrels per year).

Prior to 2005, oil production of the state-run company Petroecuador has declined steadily, while the production of private companies rose from 2.6 million barrels to 123 million barrels per year. In 2006 when the government terminated an oil contract with Occidental Petroleum and renegotiated other contracts, Petroecuador's sales increased, but as a result, private companies have postponed or reduced investment plans. Foreign investment in the oil sector actually turned negative in 2006 in and 2007 as companies began liquidating assets in Ecuador, although oil sector FDI recovered from –US$122 million in 2007 to US$161 million in 2008. A more transparent and stable contract and regulatory environment for private companies would attract greater investment to the sector, boost production, and increase revenue for the country.

Petroecuador has performed poorly, hampered by obsolete technologies, limited resources for investment, and weak corporate governance. Much of Petroecuador's technology dates from the early 1990s, which is inefficient, costly and less environmentally responsible than the more modern equipment of private companies. Low investment in the company is due to financial constraints imposed by the government and to poor management. Petroecuador had 18 CEOs in 1998-2008, and from 2007 to early 2010 was managed by naval officers. The company urgently requires further reforms to overhaul management practices, increase technical expertise for investment and production, and strengthen transparency and accountability.

Oil Revenues and Fiscal Policy

Like all countries reliant on commodity exports, Ecuador's fiscal revenues are vulnerable to sudden changes in international prices. The strongly pro-cyclical fiscal policies have amplified the boom-and-bust cycles in the economy. During 2005-2008, for example, government spending increased 162 percent in dollar terms and rose from 23 percent of GDP to 41 percent of GDP, an extraordinarily expansive fiscal stance in boom years. Ecuador experimented with various oil revenue stabilization funds since 2000, in order to reduce pro-cyclical fiscal policy and build up cushions for economic downturns. However, these funds fell victim to political pressures to spend the extra oil revenue, and all were eliminated in early 2008.

The sudden fall of oil prices during the second half of 2008, accompanied by a high level of public expenditures, highlight the need for some mechanism to stabilize the use of oil revenues over the medium term. Oil revenues fell from about 5 percent of GDP collected in the second quarter to 2.4 percent of GDP collected in the fourth quarter, while expenditures were kept above 11 percent of GDP during the second semester of

2008. The country could employ a market-based hedging mechanism to stabilize the minimum level of oil revenues without eliminating the benefits of higher prices like Mexico. Alternatively, Ecuador could reinstate an oil fund with much simpler rules for income sources, investments, and earmarking expenditure than the ones used until 2007. Chile's fund for copper revenues, governed by a participatory process centered on an independent committee that includes experts from diverse ideological and technical perspectives, could be a useful template for Ecuador.

Universal fuel subsidies for consumption, transportation and electricity generation are costly and mainly benefit the non-poor. Fuel subsidies have risen from about 3 percent of GDP in 2003 to over 8 percent of GDP in 2008 (US$4.5 billion). This compares to a combined budget for health and education in 2008 of about 4 percent of GDP. Ecuador is heavily dependent on thermal electricity that burn oil fuels. The subsidies for electric generation reached US$253 million dollars in 2008. Although electric generation is subsidized, Ecuadorians still pay among the highest electrical tariffs in Latin America. Also, the fuel price subsidies overwhelmingly benefit the non-poor: the richest quintile of the population consumes 43 percent of Ecuador's fuel, while the poorest quintile consumes only 7 percent. Ecuador can greatly improve the equity of its fiscal policy by replacing universal energy subsidies with targeted mechanisms to help those most in need.

Non-Oil Tradable Sector

Ecuador's non-oil tradable sector has gradually diversified since the 1990s, supported by international market opportunities. The bulk of non-oil exports are primary products such as bananas, cacao, fish, and shrimp. Non-traditional primary exports such as flowers and processed agricultural products have grown steadily in recent years. Manufacturing represents about 10 percent of exports by value, with recent growth in the machinery, furniture and minerals sub-sectors. Overall, non-oil exports have continued to grow since 2002, providing evidence that the oil price boom has not had a "Dutch disease" effect.

Diversification is evident in the declining concentration of both export products and export markets. The number of products representing three-quarters of total non-oil exports increased from 5 in 1990 to 23 in 2008. Growth has come mainly from non-traditional agricultural exports such as flowers, broccoli, heart of palm, tropical fruits, and vegetable oils. The number of export markets has followed a similar pattern. The number of markets representing three-quarters of total non-oil exports increased from 4 in 1990 to 11 in 2008.

Ecuador has not successfully used trade policy to further diversify its export markets and create more job opportunities. A review of trade protection mechanisms and sectoral performance reveals that protection policies have not led to strong export growth for the most protected products. The fastest-growing export sectors tend to have relatively low effective levels of protection, and their success has generally resulted from favorable international market conditions and agile private sector strategies, not

government sectoral policies. At the same time, Ecuador has not signed free-trade agreements with many of its major trading partners, and the preferences it has obtained in trade negotiations have been for almost non-existent export goods, such as industrial manufactures.

Products making up Ecuador's non-oil export basket are still largely based on low wages and have few links to other goods, meaning their capacity to promote broader economic growth is weak. This is particularly true of traditional primary agricultural products, although newer non-traditional exports have greater developmental potential. The key for Ecuador is to increasing the importance of the non-oil tradable sector—including both exports and industries that efficiently substitute for imports. The current government is taking an active role in attempting to reshape the country's productive structure toward activities with dynamic comparative advantages and greater employment opportunities through the implementation of a new industrial policy. While the policy's goals are laudable, its all-encompassing nature suggests a lack of clear strategic priorities. Further, it runs the risk of repeating past mistakes in trying to pick winners, which is subject to discretion and lobbying.

A less risky approach to promoting greater economic diversification in the non-energy tradable sector would be with policies to improve the overall business climate. As the experiences of Chile, the Persian Gulf states and, to a lesser extent, Mexico and Trinidad and Tobago suggest, this means building the credibility that investors need by sustaining policies over time—as Ecuador has already done with dollarization. Ecuador will benefit from increased certainty of its regulatory and macroeconomic policies, especially related to trade, fiscal policy and the business climate. These issues are discussed in more detail below.

Policies to Promote Diversification and Sustained Growth

Ecuador could foster export growth and diversification by negotiating trade agreements with large regions with which Ecuador has trade complementarities, such as East Asia, the European Union, Canada and the US. Exports to countries granting Ecuador trade preferences grew at an average of 13.2 percent, while exports to countries without trade agreements only grew by 10.9 percent. This suggests that free trade agreements generate somewhat more export growth. In addition, the positive effect of free trade on exports growth and sector growth depend on the size of the market granting Ecuador trade preferences. Ecuador should focus on securing trade preferences with the largest economies in the world that offer trade complementarities.

Dollarization has brought both benefits and drawbacks to Ecuador, but on balance the stability it has provided suggests that leaving it in place would be advantageous. On the positive side, inflation has been brought under control, and monetary stability has led to greater confidence for savers and investors. GDP growth averaged 2.6 percent a year from 1993 to 1998 while investment remained at roughly 21 percent of GDP. Adopting the US dollar as the country's currency brought confidence to Ecuador's economy. As a result, growth increased from 2.8 percent in 2000 to 5.3 percent in 2001.

Investment rose from 20 percent of GDP in 2000 to 24 percent in 2001. The decline in inflation after dollarization was remarkable—from 91 percent in 2000 to about 20 percent in 2001. Since dollarization, the economy has grown at an average of 5 percent, and inflation has averaged 7 percent. Dollarization does have drawbacks—namely loss of the use of the nominal exchange rate policy and independent monetary policy to help cushion external shocks and economic cycles. In particular, in an oil dependent country when there are changes in the commodity price it cannot use the exchange rate to adjust for the change in the relative prices. Prudent fiscal management is necessary due to this limitation. Considering dollarization's positive role in promoting non-traditional exports and the risk and cost of reintroducing a national currency, however, maintaining dollarization appears to be the best policy course for Ecuador.

Keeping fiscal balances sustainable is essential to economic growth. Incentives to invest in the non-oil sector—the essence of diversification—depend on expectations of stability in overall demand and macroeconomic policy. During the run-up of oil prices from 2002 to 2008, Ecuador acted as if the windfall were permanent. Budgeted public spending increased significantly at the pace of oil revenues. All categories of spending, except interest, grew in absolute dollar terms and as a share of GDP during the 2005-2008 boom. There was no apparent effort to mitigate the procyclical pattern of fiscal stimulus or to assure fiscal sustainability when revenues declined. This pro-cyclical fiscal policy has not contributed to positive expectations to invest in the non-oil sector. Chile, Trinidad and the Gulf states have done relatively well in maintaining fiscal balances and stabilization funds, while Mexico ran surpluses in a more ad hoc way but paid off debt during the recent boom, strengthening its access to credit markets. Keeping prudent fiscal policy has allowed these countries to attract investment.

Ecuador can use fiscal policy more strategically to promote economic diversification by reorienting spending priorities. In other resource-dependent countries in Latin America and the Caribbean and the Persian Gulf, mineral sector revenues have an important role in public spending, and the governments recognize the need to build up human and physical capital to take the place of depleting mineral reserves. Putting oil earnings into public investments rather than private consumption—most of it typically by upper income groups—is critical but politically difficult. To improve its prospects for future growth, Ecuador should increase the quality and amount of spending on public education and on transport and communications infrastructure, which are low in Ecuador (under 3 percent and 1 percent of GDP, respectively) compared to other Latin American countries and dynamic East Asian exporters. Funding for this, as well as for increased oil-sector investment, could come from eliminating subsidies for gasoline.

Sustained reforms are needed to improve the regulatory environment for opening and operating businesses in Ecuador. Chile has been a world leader in business regulation, and its experiences can offer Ecuador useful examples for designing and implementing reforms. Mexico and Trinidad and Tobago have done less well, although both have improved significantly in the past two decades. While laws and regulations can change quickly on paper, it takes longer to alter the behavior and expectations of both government officials and businessmen. In all the countries, sustained effort has been

needed to establish credibility and build political support for a more efficient regulatory regime that promotes business growth and job creation, while maintaining appropriate public oversight. In Ecuador the government has helped local businesses by sustaining the dollarization for a decade, and it could do more for them with international trade agreements, simpler registration rules with less corrupt enforcement, and revised financial sector regulation to make it more attractive for banks to lend to local firms.

1. OVERVIEW OF THE ECUADORIAN ECONOMY

Ecuador's growth has been sluggish over the past few years. Oil has been one of the main drivers of the Ecuadorian economy. Despite the recent favorable terms of trade, Ecuador, on average, has grown at about 5 percent during 2003-2008 period while other oil rich countries such as Venezuela and the United Arab Emirates have grown at 7.4 percent and 8.8 percent, respectively. For instance, among resource rich countries that experienced similar gains in terms of trade during 2005-2007 period, Ecuador had the highest terms of trade gains and yet experienced the lowest economic growth rate during this period. There are several possibilities on why Ecuador has not been growing as other natural resource dependent countries. One of these reasons is that the country has fallen into one of the main pitfalls of natural resource dependence: i) Macroeconomic volatility and Populist Macroeconomic Management, [3] ii) Clientelistic Institutional Development and Political Economy, [4] and iii) "Dutch Disease" [5] (See Ahren 2006).

This chapter looks at two of the main pitfalls of natural resource dependence, macroeconomic volatility and "Dutch Disease," while presenting an overview of the Ecuadorian economy, including its history, its key components and its intersectoral dynamics. Section 1.1 looks at the country's commodity booms over the past century and notes how they have affected politics—and how politics has influenced the way Ecuador handled the commodity booms. Section 1.2 gives a cross-sectional overview since the early 1990s, showing how sectors differ in their importance for GDP, employment, and exports. Section 1.3 presents econometric evidence on interactions between oil and non-oil activities and assesses whether the oil sector's development led to Dutch disease and

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[3]. Crises in emerging market economies are commonly caused by large terms of trade shocks arising from a sharp fall in the prices of countries main export commodities, and resource-based economies are particularly exposed to this kind of risk, with a smaller margin of error than economies that are more diversified. Good macroeconomic management becomes a necessary condition for any attempt to reduce the vulnerability of resource based economies to external shocks, and thus for successful economic development.

[4]. The allocation of talent in natural resources economies may be biased in favor of the resource sectors, as highly capable individuals focus on securing rents rather than building successful businesses in other sectors. Also, countries with resource-based economies are more likely to experience large-scale rebellions and civil wars- a likely consequence of extreme rent seeking behavior. Resource based economies are associated with more corruption and therefore are associated with slower long- term growth. And finally, a higher natural resource share in the economy is associated by greater inequality of income, which also affects growth negatively.

[5]. A "Dutch Disease" becomes a problem when the weight of an existing resource sector in exports increases relatively fast. The increased resource wealth tends to raise the equilibrium real exchange rate and /or general wage levels, thereby putting pressure on the competitiveness of the other tradable sectors in the economy. To be able to continue exporting the non-resource based tradable sectors must increase productivity sufficiently fast in order to maintain their international competitiveness. A potential problem is that the strong pressure from the appreciated exchange rate on the non-resource tradable sectors may affect equilibrium employment levels. Therefore, if resource-based currency strength leads to a more capital and less labor intensive production pattern in other industrial sectors,, it risks contributing to reductions in industrial employment. This might not be a problem if growth in non-resource based activities is sufficiently strong to create the necessary jobs.

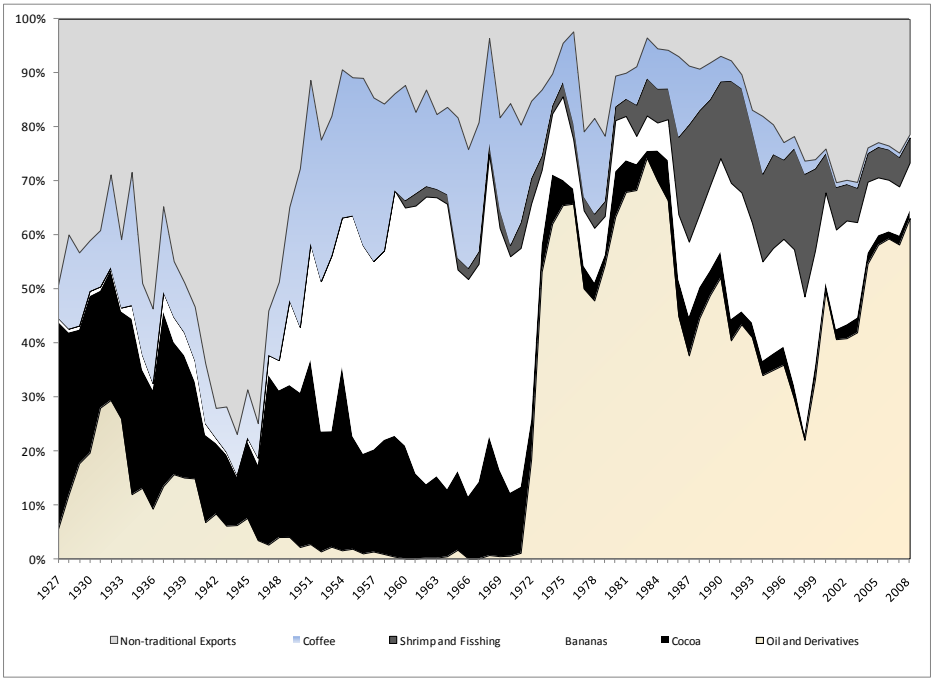
retarded the long-term growth of non-oil sector. Section 1.4 examines the relationship between export concentration and macroeconomic volatility.

1.1 History of Ecuador's commodity booms, busts, and political instability

Since gaining independence in 1830, Ecuador has had three periods of dependence on a key product—cacao (1860–1920), bananas (1948–66), and oil (since 1973). Each boom was driven by strong external demand and high world prices (see figures 1.1–1.2). In the intervals when the economy did not depend on a single commodity, traditional and nontraditional products had roughly the same share of Ecuador's total exports, reflecting the diminished importance of the previously dynamic leading product (Acosta 2006). During these intervals, exports became more diversified and less volatile. Commodity booms reversed the diversification—but not by slowing growth in most of the other export sectors that drive long-term diversification. They continued to grow at least as fast as they did before, just not as fast as the booming sector. In other words, the economy grew faster on average when it depended on a single commodity but export concentration has led to higher macroeconomic volatility.

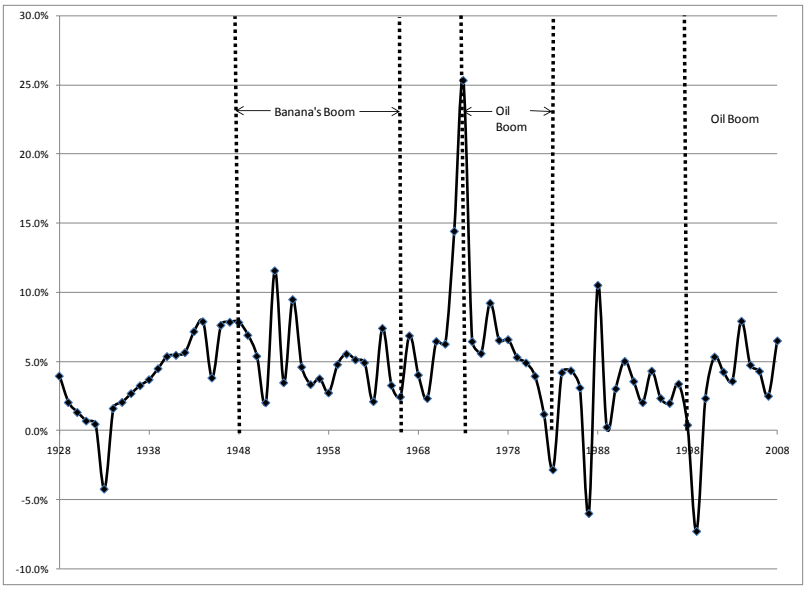
When leading exports declined, Ecuador's economy faced major contractions, which translated into political and social instability and further hampered sustainable growth. For instance, cacao was the dominant export for six decades after 1860. Its boom ended when price collapsed in 1920. The subsequent economic crisis, combined with corruption and other social and political maladies, played a role in the political instability of the next 28 years. From 1920 to 1948, Ecuador had 35 presidents, with an average term of less than 10 months. These governments included eight dictatorships, 12 transitional regimes, and four administrations designated by Constitutional Assemblies. A military revolt overthrew the government in 1925. In 1925-48, only three Presidents gained their offices through direct elections—and the elections were fraudulent (Hurtado 2007). Similar instability occurred in 1963–73, after a terms-of-trade shock brought a decline in banana exports (Acosta 2006).

Figure 1.1. Shares of Exports, 1927–2008



Source: Banco Central de Ecuador.

Figure 1.2. Real GDP growth, by decades



Source: Banco Central de Ecuador.

Ecuador began oil extraction and refinery operations in the early 20th century, with the discovery of oil on the Santa Elena peninsula. The country became a medium-sized producer with the discovery of significant oil fields in the Amazon region in the 1960s and early 1970s. The first oil boom started in 1972 and expanded through 1973 as the Arab oil embargo pushed up world oil prices (Acosta 2006). At this time oil became Ecuador's main export.

Ecuador benefited from favorable oil prices for the next decade, leading to a period of strong growth. In real terms, the economy expanded an average of 9 percent in the 1970s, including spurts of 14 percent in 1972 and 25 percent in 1973. GDP per capita increased more than 66 percent. The growth reflected the oil sector's development as well as major infrastructure projects financed by oil revenues.

From 1972 to 1979, military regimes implemented economic policies aimed at fostering import substitution, the development of local production to replace goods bought overseas. The policy mix included direct and indirect subsidies, freezes on tariffs and prices of basic goods, and tax exemptions (Acosta 2006). Oil sector development benefitted from a surge in foreign direct investment, which went from US$571 million in 1973 to US$807 million in 1978. In addition, increasing international liquidity led to increased public and private borrowing, boosting current spending, large investment projects, military purchases, and debt service.

This era of high economic growth came to an end with the fall of international oil prices in 1982. Declining oil revenue, coupled with the El Niño climatic phenomenon that severely affected most of Ecuador's primary exports in 1982-83, reduced real economic growth to an average of 2.4 percent a year in the 1980s. In 1983, the country defaulted on its debt, and the economy contracted 2.8 percent. President Hurtado's government implemented stabilization measures, including devaluation of the currency and increases in local fuel prices. The economy recovered, growing by 4.2 percent in 1984 and 4.3 percent in 1985. However, another drop on oil prices in 1986 reduced growth to 3.1 percent. In 1987, an earthquake destroyed the oil pipeline (SOTE), stopping oil exports for almost the entire year and leading to recession and another debt default.

Ecuador's economy floundered in the 1990s, another decade of low oil prices. At mid-decade, President Durán Ballén's administration established an exchange rate policy aimed at curbing inflation, boosted trade liberalization and promoted privatization of some state companies. However, the policies were paralyzed by war with Peru in 1995 and corruption charges against the vice president. The rest of the decade was market by political instability and economic setbacks. The El Niño phenomenon struck again in 1998, collapsing production in the coastal region. The same year, Ecuador signed a peace treaty with Peru, but 1999 brought another financial crisis, which led to a surge in inflation, exchange rate depreciation, and default on foreign debt. President Mahuad adopted the US dollar as the country's currency, but his administration was soon overthrown.

Taking office in 2000, President Noboa moved ahead with dollarization and negotiated new terms with external creditors. As part of establishing the monetary regime, the government adopted a series of fiscal responsibility laws, including creation of the first oil stabilization fund. One of President Gutierrez's first decisions after taking office in 2003 was to increase domestic fuel prices, which had remained frozen for some time. A series of political missteps led to large popular protests in 2005, resulting in the fall of President Gutierrez. Vice President Palacios completed that term.

President Correa took office in January 2007. His main political project was a Constitutional Assembly that started meeting in November 2007. The new Constitution—aimed at enhancing the State role in the economy and introducing new social and economic rights for the citizens—was adopted in September 2008. Throughout 2007-08, Correa's administration benefited from extraordinarily high oil prices, which supported significantly higher public spending, especially for salaries, infrastructure, fuel subsidies, and social transfers. In 2009, Correa was re-elected but under the new Constitution it is considered his first term.

1.2 Recent Trends In GDP, Employment, and Exports

Four factors explain much of the economy's behavior from 1993 to 2008.[6] First, trade liberalization policies, instituted during the 1990s, facilitated the development of new exports.[7] Second, the structure of Ecuador's financial sector changed in the wake of a major crisis in 1999, caused by the combined effects of domestic political turmoil, the El Niño phenomenon, and the Brazilian debt crisis.[8] Third, Ecuador emerged from the crisis with a decision to adopt the dollar as its official currency in 2000, a measure taken as a last resort to restore confidence and halt inflation. It fostered the development of nontraditional primary exports. Fourth, international prices for several of Ecuador's export commodities, especially oil, rose from 2002 to 2008.

GDP growth—before and after the crisis and dollarization

GDP growth averaged 2.6 percent a year from 1993 to 1998 (see Table 1.1). Investment remained at roughly 21 percent of GDP. During the 1999 crisis, the economy contracted 6.3 percent, investment plummeted from 21.7 percent to 14.7 percent of GDP, and inflation soared from 30 percent to 61 percent. Adopting the US dollar as the country's currency brought confidence to Ecuador's economy. As a result, growth increased from 2.8 percent in 2000 to 5.3 percent in 2001. Investment rose from 20 percent of GDP in 2000 to 24 percent in 2001. The decline in inflation after dollarization was remarkable—from 91 percent in 2000 to about 20 percent in 2001. Since dollarization, the economy has grown an average of 5 percent, but the behavior of commodity prices and political uncertainty brought considerable fluctuations. Inflation declined from 2001 until 2008, when it increased because of higher food prices.

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[6] Due to methodological issues regarding base-year changes, real sector GDP data before 1993 is not comparable with later years. Thus, this analysis is constrained to 1993-2008.

[7] Ecuador gained Andean Community free trade preferences in 1992-93; the United States granted ATPA trade preferences (now ATPDEA) in 1992; and trade negotiations with other countries started in the decade—for example, an FTA with Chile was signed in 1994.

[8] The first hints of the financial crisis came with Banco Continental's bankruptcy in 1996. The causes were weak financial supervision, risky bank policies, macroeconomic difficulties, and governance issues. The crisis worsened in late 1998, when the government took over Filanbanco, which had received several emergency central bank loans. A full-blown crisis erupted in 1999 as three more large banks closed, intervention reached almost 70 percent of the financial system, and the government declared a deposit freeze. These events eroded people's confidence on the government and the currency.

Table 1.1. Key Economic Indicators, 1993-2008

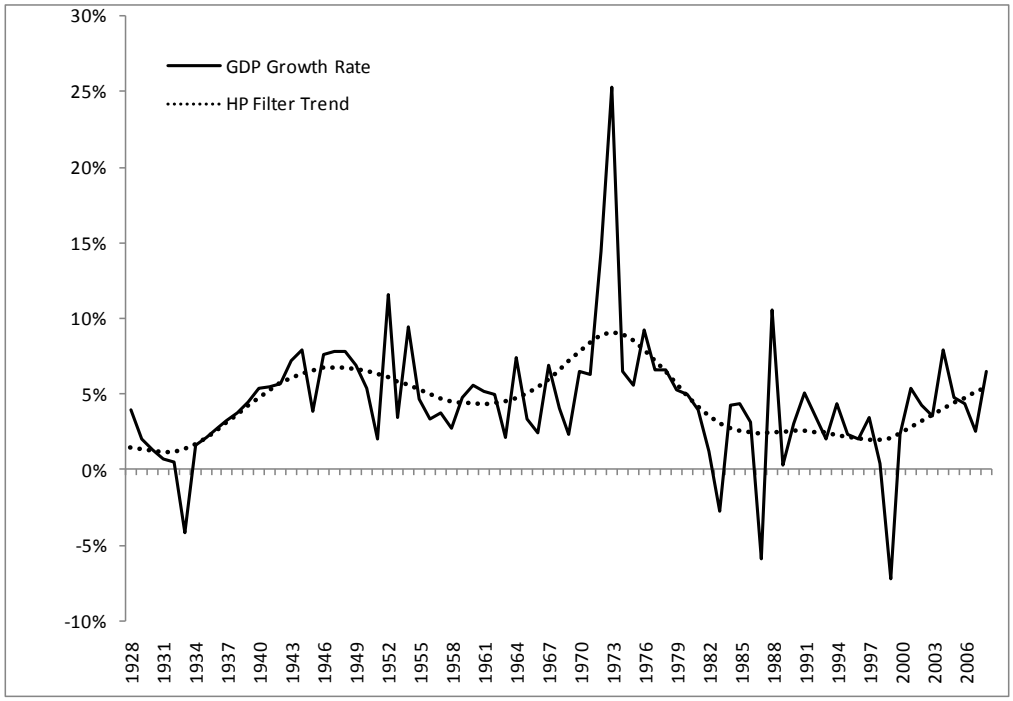
	Average 93-98	1999	2000	2001	Average 02-05	2006	2007	2008
Real GDP Growth (%)	**2.6**	**-6.3**	**2.8**	**5.3**	**5.5**	**3.9**	**2.5**	**6.5**
CPI (end of year, %)	**29.9**	**60.7**	**91.0**	**22.4**	**5.1**	**2.9**	**3.3**	**8.8**
Exports (% of GDP)	**24.8**	**31.5**	**37.1**	**26.7**	**27.2**	**34.0**	**35.1**	**37.8**
As share of Total Exports								
Oil	32.9	33.2	49.6	40.6	48.9	59.3	58.2	63.1
Non oil	67.1	66.8	50.4	59.4	51.1	40.7	41.8	36.9
Bananas	21.2	*21.4*	*16.7*	*18.5*	*15.2*	*9.5*	*9.1*	*8.9*
Coffee	4.7	*1.8*	*0.9*	*0.9*	*1.0*	*0.8*	*0.9*	*0.7*
Shrimp	15.9	*13.6*	*5.8*	*6.0*	*4.7*	*4.6*	*4.3*	*3.6*
Cacao	2.6	*2.4*	*1.6*	*1.9*	*2.3*	*1.3*	*1.7*	*1.4*
Tuna & other fish	1.9	*1.6*	*1.5*	*1.9*	*1.4*	*1.0*	*1.2*	*1.0*
Non traditional	20.8	*26.0*	*24.0*	*30.2*	*26.6*	*23.4*	*24.8*	*21.3*
Consumption(% of GDP)	**80.0**	**78.7**	**73.8**	**80.1**	**79.2**	**75.5**	**75.0**	**71.7**
Public	12.2	12.5	9.8	10.3	11.2	11.0	11.3	10.9
Private	67.9	66.2	64.0	69.8	68.0	64.4	63.6	60.8
Investment (% of GDP) *	**21.7**	**14.7**	**20.1**	**24.3**	**23.8**	**23.4**	**24.1**	**28.2**
Public			4.9	5.5	5.0	4.5	6.9	13.6
Private			15.2	18.8	18.8	18.9	17.2	14.7
Imports (% of GDP)	**26.6**	**25.0**	**31.0**	**31.1**	**30.1**	**32.9**	**34.2**	**37.7**

* Includes Changes in stocks.

Source: Banco Central de Ecuador.

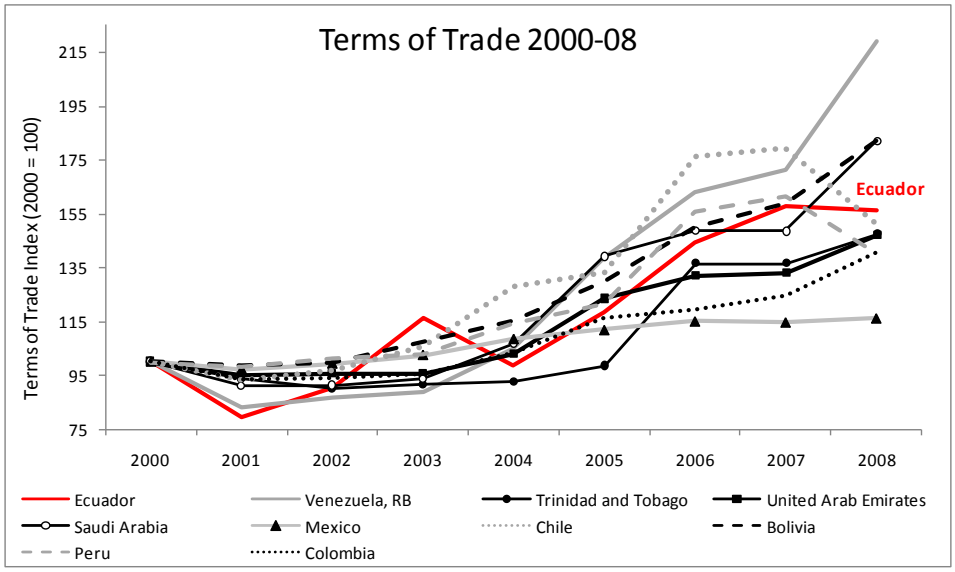
The second oil boom (2003-2008) hasn't ignited growth in Ecuador. The country's GDP increased an average of 5.1 percent a year, significantly below fuel exporter countries (6.9 percent) and OPEC countries (7.3 percent). Figure 1.3 shows that Ecuador's growth rate has been below its trend from 2005-2007, which implies that despite having favorable terms of trade the economy was growing below its potential. Although, Ecuador's average growth rate is higher than the average in Latin America (4.2 percent) over this period, it is significantly below such natural resource dependent countries such as Colombia (5.3 percent), Trinidad and Tobago (8.2 percent), Peru (7.1 percent) and Venezuela (7.4 percent). Moreover, five rich-resource countries experienced terms of trade gains similar to Ecuador's in 2005-2007—Colombia, Trinidad and Tobago, Mexico, Saudi Arabia, Chile and United Arab Emirates. Among these countries, Ecuador had the highest terms of trade gains and yet the lowest economic growth rate during 2005-2007 (See Figures 1.4, 1.5 and 1.6). Also, Ecuador ranks 11th in the word in natural wealth per capita (World Bank, 2006a) but has a GDP per capita of US$3,041.85, while a country like Finland ranked 9th in natural wealth per capita and has a GDP per capita of US$39,855.93. This suggests that Ecuador has not exploited its natural bounty to create considerable overall wealth.

Figure 1.3. GDP growth and its trend, 1928-2008



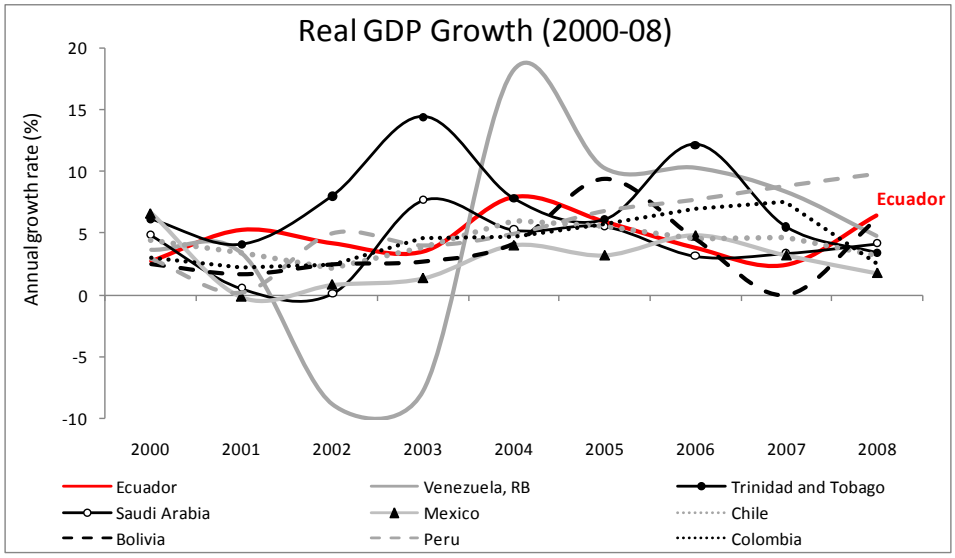
Source: WB staff preparation based on data from Banco Central de Ecuador.

Figure 1.4. Terms of Trade, 2000-2008



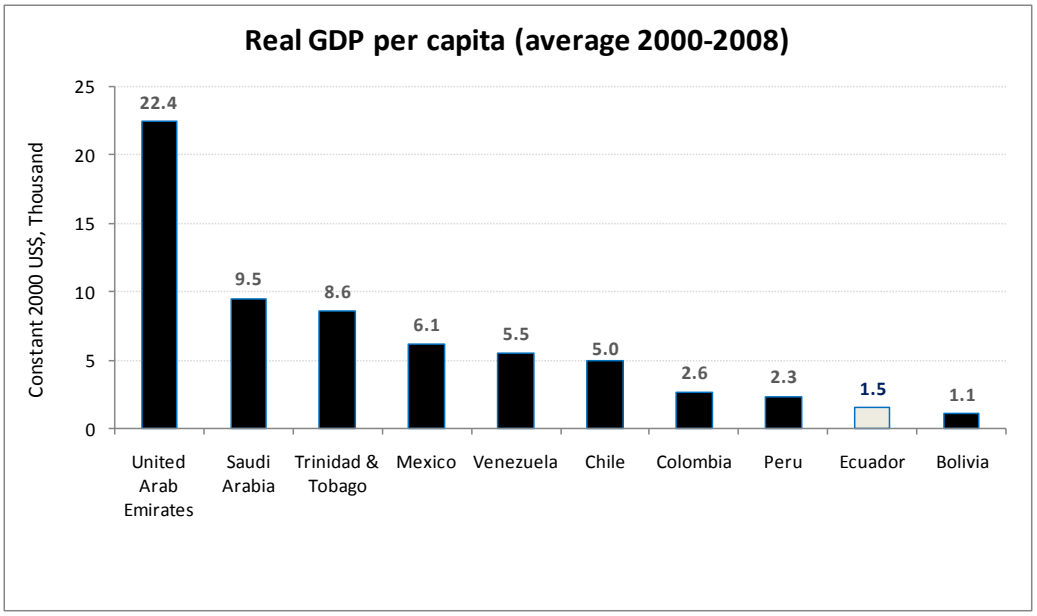
Source: WB staff preparation based on data from WDI.

Figure 1.5. Growth Rate of Selected Countries



Source: WB staff preparation based on data from WEO.

Figure 1.6. Average GDP per capita (2000-2008)



Source: WB staff preparation based on data from WDI.

Sector averages and trends of GDP shares since 1993

Over the past decade and a half, swings in oil prices have affected the petroleum sector's contribution to the economy and exports. Production of oil and derivatives increased from 6.8 percent of nominal GDP in 1993 to 18.3 percent in 2008, averaging 9.8 percent over the 15 years. In real terms, however, the industry declined from 14.7 percent of GDP in 1993 to 10 percent in 2008. As a share of export revenues, oil first declined from 41 percent in 1993 to 19 percent in 1998, but it has moved upward since 1999, reaching 63

percent in 2008. In value it has follow the same pattern, oil declined from US$1.15 billion in 1993 to US$786 million in 1998, but it has moved upward since then reaching US$10.6 billion in 2008.

The non-oil tradable sector declined from 32.8 percent of nominal GDP in 1993 to 15 percent in 2008, averaging 23 percent during the period. In real terms, the sector has increased slightly from 22.7 percent to 24.7 percent of GDP. Due to movements in oil prices, the non-oil tradable sector as share of export revenues fluctuated between 36.9 percent and 78 percent of export revenues.

Despite the continued importance of oil, other Ecuadorian exports have grown considerably in the past two decades, diversifying both the economy's productive activities and exporters' markets. The volume of non-oil exports as a share of total exports has increased from 30 percent in 1993 to 36 percent in 2008. The volume of non-oil exports has more than doubled during this period, while the volume of oil exports has grown only 60 percent.

The composition of Ecuador's exports becomes more diverse.[9] In 1990, 75 percent of total export revenues came from three products, including oil.[10] The number rose to eight in 1999 as falling prices curtailed oil revenues.[11] More recently, higher prices boosted the oil's share of exports, and five products made up 75 percent of exports in 2008.[12] The number of products representing three-quarters of total non-oil exports increased from five in 1990 to 23 in 2008. The growth of non-oil sectors since the 1990s has come mainly from non-traditional agricultural exports, such as flowers, broccoli, heart of palm, tropical fruits, and vegetable oils. The development of these sectors has been due to a combination of natural comparative advantage, trade openness, entrepreneurship, the dollarization, and favorable international markets.

The number of markets that Ecuador exports to has also risen. In 1990, 75 percent of total exports were sent to six countries.[13] The number rose to 11 in 1999, then returned to six markets in 2008.[14] The number of markets representing three-quarters of total non-oil exports increased from four in 1990 to 11 in 2008.[15]

Among nontradable sectors, construction and real estate have significantly increased their share of GDP in 1993-2008 (see Table 1.2a). Other sectors have ebbed. Commerce has lowered its contribution to GDP from about 13.4 percent in 1993 to about 11.7 percent in

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[9] In contrast, Hausmann and Klinger (2009) find that the export basket's composition changed little from 2000 to 2007. They find that the shares don't change much across export sectors during the period. However, the number of products being exported actually increased significantly. In terms of export volumes, the non-oil tradable sector had the fastest growth rate.

[10] Bananas, Shrimp and Oil.

[11] Oil, Bananas, Shrimp, Cacao, Roses, Tuna, Fuel and other fishing products.

[12] Oil, Bananas, Fuel, Petroleum products and roses.

[13] United States, Puerto Rico, Peru, Netherlands, Panama and Germany.

[14] United States, Chile, Peru, Colombia, Panama and Venezuela.

[15] United States, Venezuela, Colombia, Rusia, Italy, Panama, Spain, Germanyu, Netherlands, Peru and Belgium.

2008. Finally, the public sector's contribution to GDP has remained broadly stable at around 5.7 percent since 1993.

Sector-specific figures for real growth reveal the following (see Table 1.2b):

- During 1994–2008, the tradable sectors (including oil) and the nontradable sectors grew at about the same pace—an average of 3 percent a year in real terms.

Table 1.2a. Sectors as a share of GDP, 1993–2008 (%)

	Average 1993-1997	1998 Pre-Crisis	1999 Crisis	Average 2000-2008	Average 1993-2008
GDP	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Tradable Sector	**37.6**	**29.9**	**33.8**	**30.7**	**33.0**
Agriculture	**12.9**	9.9	9.9	6.7	9.1
Fishing	**3.7**	3.9	1.8	0.9	2.0
Manufacturing	**14.1**	12.5	14.1	10.0	11.7
Oil	**6.9**	3.6	7.9	13.1	10.2
Nontradable Sector	**62.4**	**70.1**	**66.2**	**69.3**	**67.0**
Construction	**3.5**	5.5	5.4	8.3	6.5
Commerce	**13.3**	14.3	14.2	13.1	13.3
Transportation	**7.6**	8.3	9.3	8.0	8.0
Water and Electricity	**1.2**	1.4	1.4	1.6	1.5
Financial Services	**3.6**	3.1	1.5	2.2	2.7
Public Sector	**6.0**	6.6	7.0	5.2	5.7
Other Services	**21.7**	23.6	20.2	24.1	23.1
Other	**5.4**	7.3	7.3	6.7	6.4

Source: Banco Central de Ecuador.

Table 1.2b. Sector-specific growth rates in real terms, 1994–2008 (%)

	Average 1994-1997	1998	1999	Average 2000-2008	Average 1994-2008
Tradable Sector	**3.8**	**0.6**	**-2.9**	**3.4**	**2.9**
Agriculture	6.9	-5.0	13.0	4.4	5.0
Fishing	8.1	6.1	-6.7	4.8	5.0
Manufacturing	4.0	5.5	-5.2	4.2	3.6
Oil	1.8	-1.9	-8.9	2.1	1.0
Nontradable Sector	**2.8**	**4.0**	**-6.4**	**4.6**	**3.3**
Construction	2.8	-0.2	-24.9	9.6	4.8
Commerce	3.6	0.7	-11.2	4.2	2.8
Transportation	3.9	9.4	-0.3	5.2	4.8
Financial Services	11.9	-16.9	-47.3	7.1	3.1
Real Estate and Entrepreneur Activities	3.1	2.9	-6.3	5.5	3.9
Public Sector	-3.1	6.0	-5.6	4.9	2.1
Other Services	3.3	4.6	-0.6	1.7	2.2
Other	3.5	2.7	-4.5	7.6	5.4

Source: Banco Central de Ecuador.

- The nontradable sector on average has grown faster than the tradable sector. Also, the 1999 economic crisis had a sharper initial impact on nontradable activities and a faster recovery than the tradable sector, in particular oil. Nontradable sectors

contracted 6.4 percent in 1999 before growing on average 4.6 percent in the dollarization period that began in 2000. Tradable activities contracted 2.9 percent in 1999, then grew 3.4 percent in 2000-08.

- Overall, the tradable sector's real growth picked up somewhat since dollarization, but its components have taken different paths :

  a. Agriculture grew an average of 5 percent a year since 1994 but slowed moderately in to 4.4 percent in 2000-08.
  b. After being severely hit by the "Mancha Blanca" plague on shrimp in 2000, fishing has recovered, led by 15.6 percent growth in the shrimp industry in 2001-07.[16] Overall, fishing's 2001-08 growth of 8.1 percent matched the 1994-97 growth rate.
  c. Manufacturing's growth rose to 4.2 percent in 2000-08, slightly better than the entire period's 3.6 percent.
  d. The oil sector contracted in most years and only had positive average real growth due to the large jump in 2003–04, when private firms constructed a new pipeline for heavy oil.

- The service sectors grew faster than the economy overall:
  a. Commerce grew an average of 2.8 percent in 1994-2008, but it has accelerated to 4.2 percent since dollarization.
  b. Financial sector activities were greatly affected by the 1999 crisis, contracting almost 50 percent. Under dollarization, they recovered markedly, with an average growth of 7.1 percent over 2000–08.
  c. The public sector has shown procyclical trends, with a contraction until 1997, a subsequent recovery, and a strong contraction during the 1999 financial crisis. Afterwards, it recovered strongly, with an average growth rate of 4.9 percent from 2000 to 2008.

Employment

In recent years, Ecuador's labor resources have shifted gradually toward the nontradable sector, especially from agriculture. Nontradable industries now account for 51.2 percent of total employment, up from 48.8 percent in 2004 (see Table 1.3).

Agriculture remains Ecuador's single most important employer, with 37.1 percent of all jobs. In the past four years, agricultural employment has declined because the sector's low productivity led peasants to migrate to cities in search of better opportunities. Among services, commerce is the main employer, providing 17.1 percent of jobs. Other services—real estate, education, health, social security, and entrepreneurship—constitute 12 percent of total employment. The public sector represents 3.1 percent of total

[16] "Mancha Blanca," or White Stain, is a virus that affects mainly shrimp. It had its origins in Asia in the early 1990s, hitting China and Thailand severely. The virus appeared in Latin America in 1999, mainly Central America, Mexico, Ecuador, Colombia, and Peru.

employment, a larger share than such private sector activities as mining, fishing, and hotels and restaurants. Employment remains marginal in oil refining and public utilities.

Table 1.3 Employment by Sector

Industry	2004	2007
Tradable Sectors	52.7%	48.8%
Agriculture	41.3%	37.3%
Forestry	0.4%	0.4%
Fishing	1.1%	1.0%
Mining	0.3%	0.4%
Oil, natural gas	0.2%	0.2%
Manufacturing	9.4%	9.5%
Oil processing and refinery	0.0%	0.0%
Non-Tradable Sectors	47.3%	51.2%
Public utilities (water and electricity)	0.4%	0.4%
Construction	4.9%	5.9%
Commerce	16.9%	17.1%
Hotels and restaurants	3.0%	4.0%
Transportation	4.2%	4.9%
Financial Services	0.6%	0.7%
Real State and Entrepreneurship	2.1%	2.5%
Public Sector	2.9%	3.1%
Other Services	12.3%	12.6%
Total	100%	100%

Source: Encuestas de Empleo, Subempleo y Desempleo, Instituto Nacional de Estadísticas y Censos INEC. Methodological issues imply that the data from the *Encuesta de Empleo, Subempleo y Desempleo* is not comparable with that from the 2001 population Census.

Exports

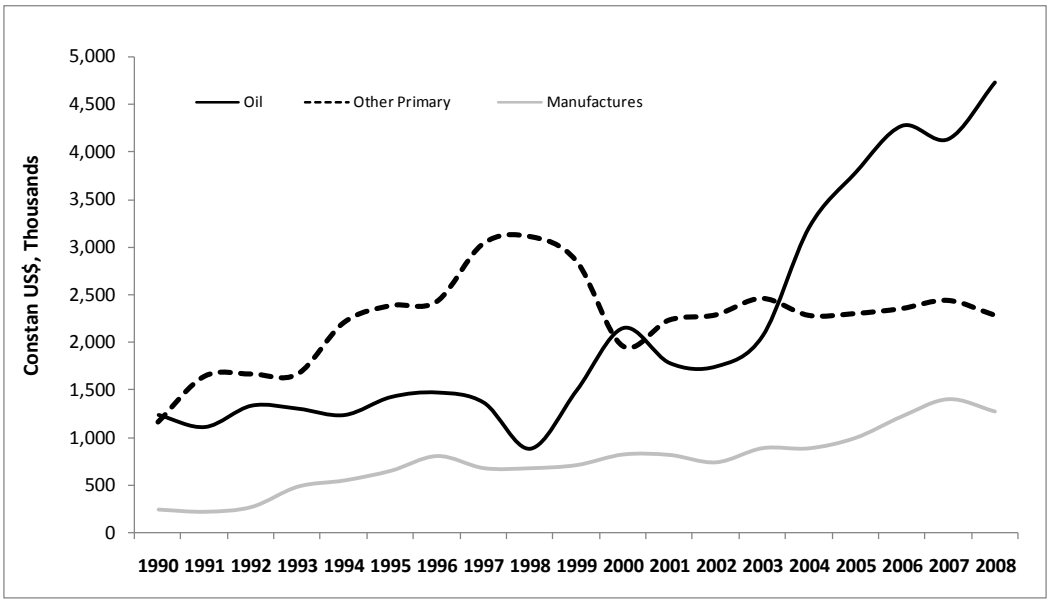
Ecuador exports mainly commodities. Oil is the single most important export, constituting about 60 percent of total exports in 2006-08. In 2009, its contribution to total exports has declined, reflecting lower international oil prices and a fairly constant export volume. Oil is discussed further in chapter 2.

Non-oil primary goods include traditional exports—bananas, cocoa, coffee, fishing, shrimp, and flowers. Other exports are unprocessed products, such as broccoli, tropical fruits, and dairy products, and processed agricultural products. As with most natural resource–based products, growth rates for most primary subsectors are highly volatile because they depend on international commodity prices and suffer when natural disasters strike. For instance, the El Niño weather in 1997–98 hurt all primary exports with the

exception of flowers and shrimp.[17] After representing more than 50 percent of total exports until 2000, primary products' importance has slipped significantly in recent years, reaching 30 percent of exports in 2006-08. The decline reflects lower prices for primary products, not the volatility of the oil market. In volume terms, primary exports have increased significantly from 2,541.45 tons in 1990 to 6,696.3 tons in 2009.

Manufacturing represents about 10 percent of total exports. Ecuador's factories expanded their export share quickly during the early 1990s; since then, they have held their share, even when the value of oil exports climbed steeply. As shown in Figure 1.7, non-oil exports—primary products and manufactures—continued to grow after 2002, presenting some evidence against Dutch disease in Ecuador. However, Ecuador's growth rate has been slower than other oil-dependent countries, suggesting the need for more sophisticated tests for Dutch disease. The following section discusses the intersectoral dynamics of the oil and non-oil sectors and provides econometric evidence on whether Ecuador might suffer from Dutch disease.

Figure 1.7. Total exports by sector, 1990–2008



Source: Banco Central de Ecuador.

1.3 INTERSECTORAL DYNAMICS FOR THE OIL AND NON-OIL SECTORS

Econometric analysis can identify links between the oil and non-oil sectors.[18] Finding these relationships would be evidence of long-term interrelationships between economic sectors, with the relevant coefficients pointing to a positive or negative link between two sector's growth rates. For example, a negative long-term linkage between the oil and industrial sectors would suggest some Dutch disease because stronger growth in the oil

[17] Flowers are grown in the Andes mountains, and they were not affected by the floods. Shrimp are grown in farms that were not affected significantly by El Niño.

[18] We are following the cointegration procedures of Johansen (1988) and Johansen and Juselius (1990, 1992).

sector would be accompanied by less dynamism in industrial activities. Table 1.4 shows the results for oil and six non-oil sectors in Ecuador. The sample is split in two due to a possible structural shock in the oil sector in 2003. Many of the linkages found for the first period (1993–2002) do not hold for the second one (2004–08). The exceptions are transportation and financial services, both important components of the oil cluster discussed in Chapter 2.

Table 1.4. Bivariate cointegration of the oil sector

	Long-term parameter (β)					
	1993q1–2002q4			2004q1–2008q3		
Cointegration relationship	**Coefficient**	**Standard error**	**z-value**	**Coefficient**	**Standard error**	**z-value**
Agriculture vs. oil	-1.8	0.4	4.5			
Electricity vs. oil	-2.7	0.3	8.4			
Transportation vs. oil	-1.1	0.2	5.0	-0.5	0.1	7.8
Financial vs. oil	5.2	1.3	-4.0	-2.6	0.3	7.7
Other services vs. oil	-1.2	0.2	6.5			
Public services vs. oil	-0.6	0.2	3.2	-0.2[a]	0.3	0.7

Note: The coefficients are presented in equation form $y = X\beta$, where X is the oil sector and y is the other sector. The table only presents the results for those sectors where there is statistical evidence of cointegration.
a. Cointegration with the public sector requires four lags. Over 2004q1–2008q3, there are not enough degrees of freedom to fully support four lags.
Source: Bank staff calculations.

The strong positive relationship between oil and finance during 1994-2002 is explained by links between the insurance and oil sectors, a finding that is consistent with the work of Fiess and Verner (2003). Chapter 2 discusses this relationship further.

The change in the bivariate relations between periods may be related to two events. First, the Oleoducto de Crudos Pesados (OCP) pipeline built in 2003 brought a sharp increase in oil production from private companies operating mainly in the heavy crude fields. The changing shares of publicly versus privately produced oil modified the channels through which oil interacts with other sectors. Second, the post-2004 period saw high oil prices as well as the 2005 termination of the production contract with US-controlled Occidental Petroleum and the transfer of related fields to Petroecuador. These factors may have altered the impact of channeling oil resources to other sectors through the public sector.

Due to the relatively short sample, we could not test for a multivariate cointegration between all sectors. Fiess and Verner (2000, 2003) analyze the growth dynamics within and between sectors in Ecuador during 1965 and 1998. They identify strong links between the oil industry, financial services, transport, and public services. They find no direct link, either positive or negative, between the oil and non-oil industrial sectors. This does not rule out indirect linkages through other sectors—in particular, the public

sector—that indirectly disseminate oil dollars to the rest of the economy through direct subsidies, subsidized loans, and various development programs (*Leyes de Fomento*). Albornoz, Cueva, and Gordillo (2006) show that further linkages between the oil and non-oil sectors stem from the use of oil and non-oil derivatives as intermediate goods in production.

Sectoral-growth comparisons are the most direct evidence of whether Dutch disease infects a country. If there were Dutch disease, rapid growth of oil export revenue would lead to a decline in the output of non-oil tradables, either in absolute terms or relative to nontradables. Manufacturing, with its relatively mobile workforce and large labor value added, should be especially sensitive to this effect. Further econometric tests confirm that manufacturing did not decline in absolute terms due to the oil–induced expansion of the service sector, although it did decline relative to the service sector when oil revenues were booming (see Appendix A).

To summarize our econometric results, we find that:

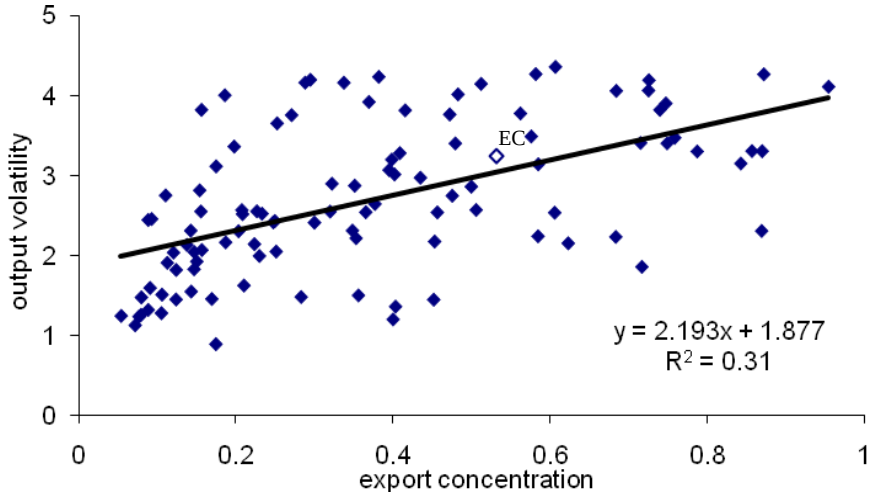
- In 1998–2003, Ecuador had only one significant long-term relationship—between oil and the financial sector. The statistical relationship is stable over time, except for the period around the 1999 financial crisis.
- We do not find convincing evidence of structural Dutch disease in Ecuador in 1993–2008.

1.4 Export concentration and Macro Volatility

Policymakers are often concerned that natural riches produce a highly concentrated structure of export revenues that, in turn, leads to economic volatility and slower growth (de Ferranti and others 2002). An early examination of the idea come from Michaely (1958), who shows that countries with lower GDP per capita tend to have more concentrated export structures. As a consequence, shocks that affect specific traded products can significantly affect exports and economic growth. Using time-series analysis for a sample of developing countries, Love (1986) provides evidence of a positive relationship between export concentration and export volatility, which indirectly affects income volatility. Sachs and Warner (1995) and Lederman and Maloney (2007) provide similar evidence from cross-sectional and panel analyses. Malik and Temple (2008) and Lederman and Xu (2009) identify a positive relationship between export concentration and a country's terms-of-trade volatility, and between terms-of-trade volatility and income volatility.

Figure 1.8 shows how output volatility increases with a high export concentrations in a cross section of countries, ignoring any dynamic effects and country heterogeneity. To complement this assessment, we investigate the relationship between export concentration and output volatility in Ecuador with a data set from 1927-2000. A single-country time-series reduces the chance that variations are due to cross-country differences.

Figure 1.8. Export concentration and output volatility—cross-country evidence, 1986-2006



Source: Bank staff calculations based on World Development Indicators and United Nations Conference on Trade and Development (UNCTAD) Handbook of Statistics. Based on 171 countries. Export concentration refers to UNCTAD export concentration index for 2006. Output volatility is calculated as the standard deviation of real GDP growth from 1986 to 2006.

We find a clear positive link between export concentration and volatility in Ecuador (see Appendix B). This relationship holds under different measures of export concentration and a series of control variables, including GDP growth, average volatility from eight Latin American countries, and dummy variables to account for periods of relatively concentrated exports.

This positive relationship between export concentration and macroeconomic volatility carries some implications for policy: Countries can either take export concentration as a given and attempt to mitigate against it by adopting a macroeconomic policy, or they can adopt economic policies that support the growth of the non-oil tradable sector. Lederman and Xu (2007) suggest that good institutions can partly offset output volatility from commodity dependency, and Malik and Temple (2008) cite the case of Uganda as an example of how improved macroeconomic management can overcome the adverse effects of export concentration. Chile's structural balance rules, which isolate fiscal policy from cycles in copper prices, is another example of successful macroeconomic mitigation against macroeconomic volatility induced by commodity dependence.

Industrial policy geared at actively promoting export diversification carries the caveat that such policies can reduce welfare, particularly if export diversification is achieved by artificially keeping uncompetitive industries alive or by suboptimal trade agreements that foster trade diversion. Active industrial policy also requires the government to pick the right industries—a very difficult task, politically and economically.

1.5 SUMMARY AND CONCLUSIONS

The Ecuadorian economy depends primarily on natural resources, but the composition of exports and the number of export markets has been gradually diversified. The tradable sector represents about 33 percent of GDP. Ecuador's main exports are primary goods, with oil the most important. Since the mid-1970s, oil's share of total exports has fluctuated from 22 percent to 63 percent, a level reached in 2008. In volume terms, however, oil production and exports have stagnated in the past five years. Therefore, the increase of oil as a share of export revenues has been due to higher oil prices. Despite oil's continued dominance, other Ecuadorian exports have grown substantially in the past two decades, diversifying both the economy's productive activities and exporters' markets. The volume of non-oil exports has more than doubled during the 1993-2008 period, while the volume of oil exports has only increased 60 percent. Also, the number of markets representing 75 percent of total non-oil exports increased from 4 in 1990 to 11 in 2008.

Ecuador's growth has been sluggish over the past few years. Oil has been one of the main drivers of the Ecuadorian economy. Despite the recent favorable terms of trade, Ecuador grew slower than other natural resource dependent countries and than its potential. The literature cites that countries may not growth as others if the country has fallen into one of the main pitfalls of natural resource dependence: i) Macroeconomic volatility and Populist Macroeconomic Management, ii) Institutional Development and Political Economy, and iii) "Dutch Disease" (See Ahren 2006). This chapter explores two of these pitfalls and we didn't find any evidence that Ecuador suffers from "Dutch disease"- one of the pitfalls- but we find that it suffers from macroeconomic volatility when the country has a high degree of export concentration. This implies that Ecuador can either take export concentration as a given and attempt to mitigate against it by adopting appropriate macroeconomic policy, or they can adopt economic policies that support the growth of the non-oil tradable sector.

A weak relationship between the oil and non-oil sectors helps explain why we find no convincing evidence of long-run Dutch disease in Ecuador. Employment in the oil sector remains marginal and highly specialized, and so oil and other primary sectors do not compete for labor. Faster growth in the oil sector has had a limited impact on industrial sector activity but could boost services, especially for some closely related sectors, such as transportation, construction, or finance, especially insurance. [19] Thus, while there may be some short term relationships between oil and other sectors, the evidence is lacking for a long-term negative relationship that would suggest a "Dutch disease." These questions will be discussed more fully in Chapters 2 and 3.

[19] As a result of cointegration analysis, there appears to be positive long-term and broadly stable relationship between the oil and financial sectors.

2. THE OIL SECTOR

Oil is the country's single most important export in the past four decades, however Ecuador's economy is gradually diversifying. This chapter explores Ecuador's oil sector. How has it contributed to overall economic growth? Has the legal and regulatory environment helped or hindered development of the sector's potential? How has the country made use of the large fiscal revenues flowing from this important commodity?

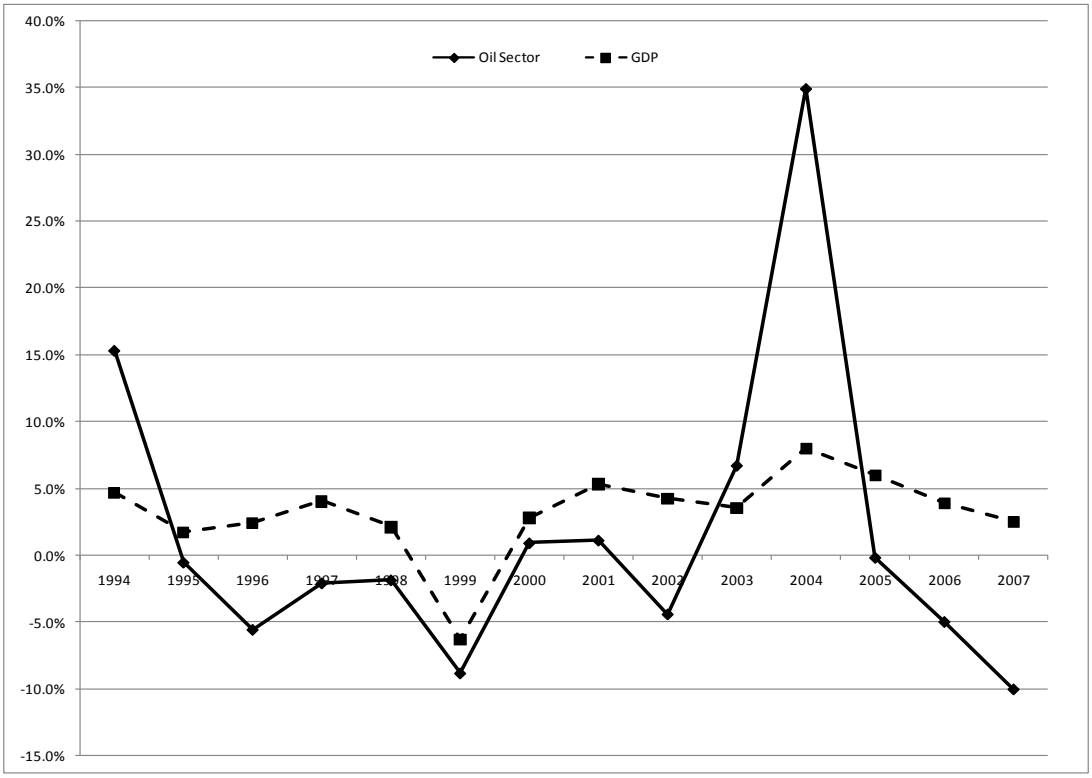
To help answer these questions, this chapter provides an overview of oil sector activities. Section 2.1 describes trends for oil production and growth. Section 2.2 looks at the sector's legal and regulatory environment. Section 2.3 examines the sector's direct linkages to other economic activities. Section 2.4 covers fiscal matters relating to the sector. Section 2.5 considers the growth potential for Ecuador's oil sector. Section 2.6 offers some conclusions and policy recommendations.

2.1 OIL SECTOR OVERVIEW

The oil sector's share of nominal GDP increased from 7 percent in 1995 to 18 percent in 2008. The expansion allowed oil to contribute a growing share of public sector revenues, which financed spending in diverse economic sectors, such as public services and construction. However, the oil sector's real growth was slower than the non-oil tradable and non-tradable sectors and GDP (1 percent vs. 3.3 percent). Oil's real growth all occurred in the early 1990s, when private oil companies were expanding, and in 2003-2004, when the private sector constructed the Oleoducto de Crudos Pesados (OCP). This pipeline, designed to carry heavy oil, was the only large investment in the oil sector after the 1970s. In addition, the increase in the oil sector's share of nominal GDP since 2005 was because of higher oil prices.

Despite Ecuador's diversification, oil still has a significant bearing on GDP. The years of high and low real growth coincide for the oil sector and GDP. Indeed, large oil sector investments that led to higher production had direct positive impacts on the overall economy. Most notable, the economy's 8 percent real growth in 2004 was largely fueled by the oil sector's 35 percent real growth from the new pipeline (see Figure 2.1).

Figure 2.1. Annual Growth of real GDP and of oil output, 1994–2007



Source: Banco Central de Ecuador.

Structure

The producing, importing, and selling of oil and its derivatives in Ecuador is controlled entirely by Petroecuador, a state company. The Petroproducción division is charged with oil industry exploration, production, and commercialization. Some private companies pump crude oil, operating in the smaller fields that produce heavy crude oil. Petroecuador controls the largest oil fields, which produce the easier to refine light sweet crude oil.

Ecuador's oil is produced mainly in the Amazon region, although some fields are in Santa Elena province and in the Gulf of Guayaquil in the Pacific Ocean. Most of Petroecuador's technology dates from the early 1990s; its fields are producing less, and its operations are not up to current environmental standards. Private companies employ more modern technology and obtain increasing returns from their fields, with lower environmental impact. The country's oil reserves are relatively unexplored, suggesting a clear potential to expand production, a point made by Espinasa (2007).[20]

[20] The Ecuadorian society presents a social fragmentation between some social groups (mestizos vs. indigenous and afro Ecuadorians), and between geographical regions (Costa vs. Sierra and Quito vs. Guayaquil), which is especially reflected between urban and rural areas. For instance, poverty levels in rural areas—in general, with a much larger proportion of indigenous population--almost double the corresponding levels in urban areas (about 40%). Such differences must be considered when analyzing the oil sector, as indigenous communities in the Amazon region, which includes some of the poorest areas in

Two major pipelines move the oil to market. The state-owned Sistema de Oleoducto Transecuatoriano (SOTE), built in the 1970s, has a capacity of 400,000 barrels per day, manual operation, and antiquated mechanical technology. The privately owned OCP, built in 2003, has a capacity of 450,000 barrels per day, automatic operation, and current technology.

Ecuador's main refinery and export facilities are in the Esmeraldas province on the northern coast. The three refineries lack modern processing technology and are not able to satisfy the country's demand for oil derivatives, especially fuels and household gas.

Production

The volume of Ecuador's oil production has increased slowly in recent years, despite reserve levels high enough to support more production. The sluggish growth reflects a combination of underinvestment, technological limitations, governance issues at Petroecuador, and unstable contract relations with private oil companies. Meanwhile, oil export revenues have mainly reflected international price fluctuations, and oil derivatives have represented a growing share of imports. Nonetheless, Ecuador has remained a net oil exporter.

From 1993 to 2008, total oil production increased 47 percent, going from 125 to 184 million barrels—but output has stagnated in recent years (see Figure 2.2). In 2007, production was 520,000 barrels per day (b/d)—but other oil-producing countries broadly similar to Ecuador in reserves have larger production volumes. The United Kingdom produced 1,636,000 b/d, Argentina 698,000 b/d, and Oman 718,000 b/d. Colombia, which has a partly state-owned oil company and slightly lower reserves than Ecuador, produced 561,000 b/d in 2007. Ecuador's stagnation of crude oil production in recent years reflects insufficient investment to maintain Petroecuador's existing oil fields, drill new fields, and explore for reserves. Exploration for new reserves has not taken place for almost 10 years.

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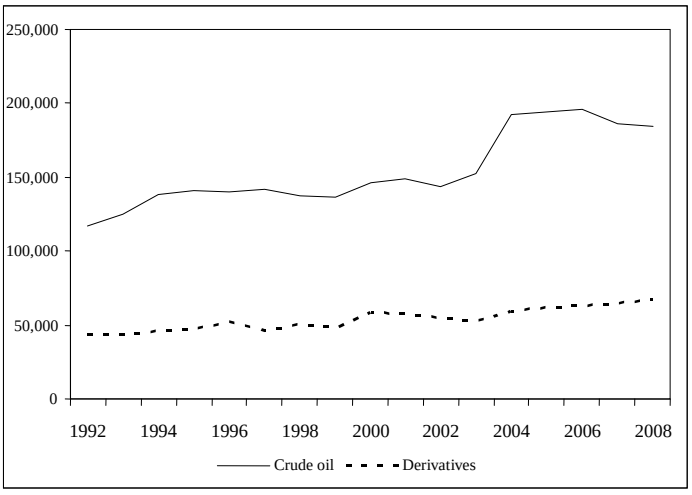
the country, look after specific compensation from oil companies to allow them to operate in the area, mostly in terms of public services development (roads or infrastructure) in order to fulfill the limited service provision by the State.

Figure 2.2. Oil sector production, 1992–2008
(thousands of barrels)



Source: Banco Central de Ecuador.

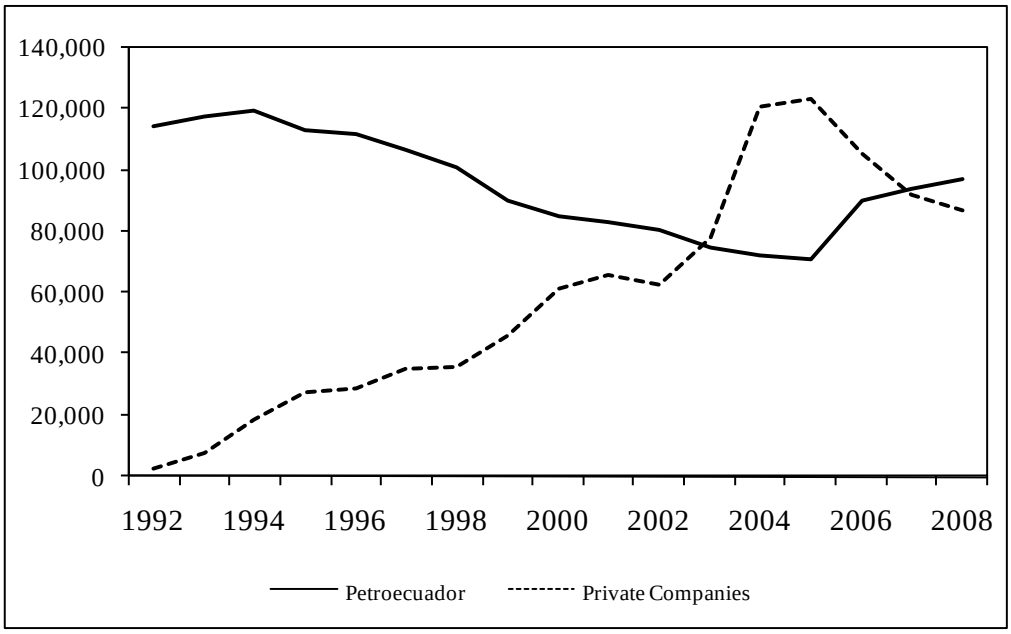
From 1992 to 2008, state production fell while private production rose (Figure 2.3). From 2003 to 2007, private companies produced the majority of Ecuador's crude oil. Meanwhile, fuel-oil exports averaged 12.8 million barrels during 1992–2008, with average annual growth of 5.0 percent.

Petroecuador's production fell from 144.6 million barrels in 1992 to 98.0 million barrels in 2008, reaching its low point in 2005 at 71.0 million barrels. The jump of about 19 million barrels in Petroecuador's production in 2005–06 reflected the Ecuadorian government's termination of an oil production contract with US-controlled Occidental Petroleum and the transfer of its oil fields to Petroecuador. In fact, Figure 2.3 shows that private production fell by almost the same amount as Petroecaudor's increase in output. These new fields allowed Petroecuador's production to increase slightly in 2007-08.

Private companies' production increased from 2.6 million barrels in 1992 to an all-time high of 123.2 million barrels in 2005. It declined since 2006 as a result of the termination of the Occidental Petroleum contract and subsequent contract renegotiations with other oil companies, which led to reductions or postponements of investment plans. Private output was 87.1 million barrels in 2008, less than Petroecuador's production for the first time since 2003.

Figure 2.3. Crude oil production, by type of company, 1992–2008

(thousands of barrels)



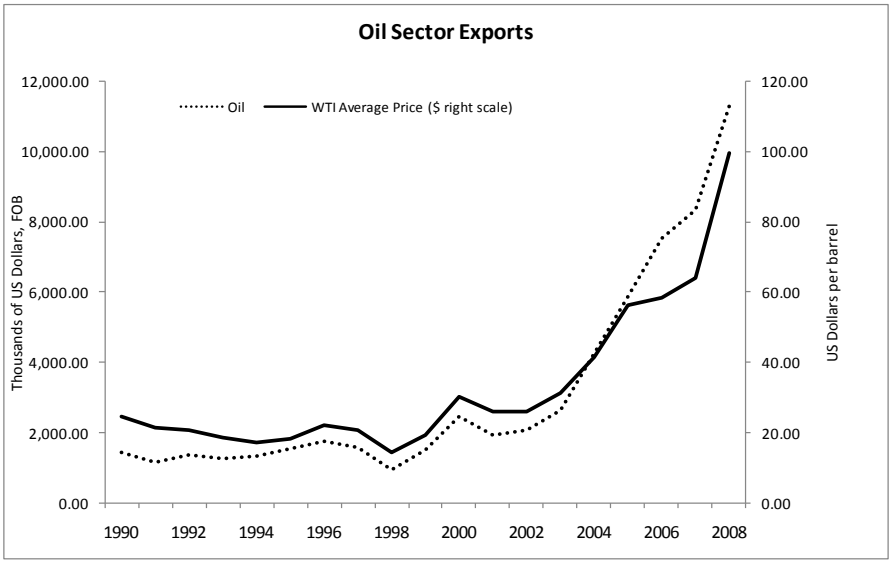
Source: Banco Central de Ecuador.

Ecuador's output of oil derivatives is growing, going from 43.3 million barrels in 1992 to 67.6 million barrels in 2008, a growth rate of 55.9 percent. The production of oil derivatives depends on imports of high-octane gasoline to mix with the domestic inputs, which lowers the aggregate value added of this subsector.

Oil exports

Oil exports represented about 20 percent of GDP in 2008. Measured in free on board (FOB) prices, the dollar value of Ecuador's oil exports grew from US$ 2.4 billion in 2003 to US$10.6 billion in 2008, following the trend of West Texas Intermediate (WTI) prices (see Figure 2.4). The volume of oil increased significantly in 2004 due to the OCP, but it has remained almost flat since then. Therefore, the increase in exports' value can be attributed to rising oil prices and the jump in private companies' production s from 2003 to 2004. The OCP allowed the companies to transport more heavy oil, the production of which was formerly constrained by transport capacity.

Figure 2.4. Oil sector export values and world prices, 1990–2008



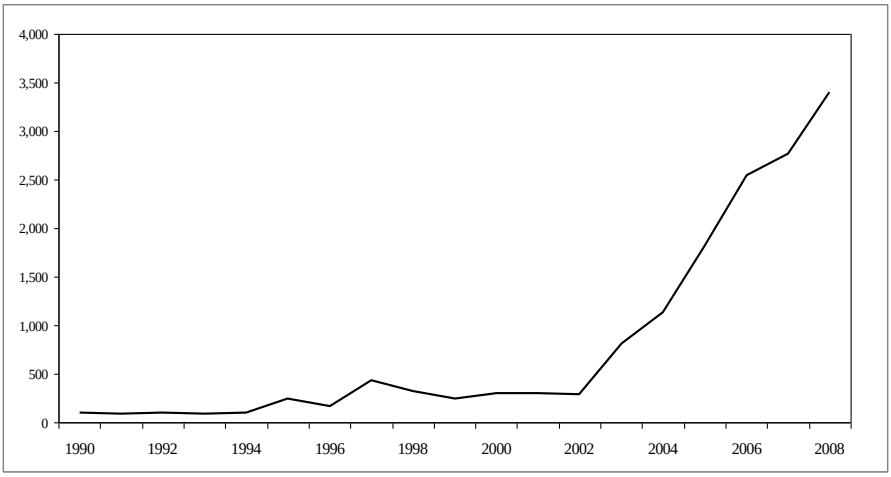
Source: Banco Central de Ecuador.

Oil derivative imports

Oil derivative imports, which consist mainly of high-octane gasoline and lubricants, rose from an average of US$213 million a year in 1990–2002 to US$2.1 billion in 2003–08 (see Figure 2.5). The share of oil derivatives in total imports increased from an average of 5 percent in 1990–2002 to 17 percent in 2003–08.

The rise in the value of oil derivative imports is due mainly to increases in oil prices since 2003 and Ecuador's policy of subsidizing local fuel prices. Keeping local prices substantially below international prices has boosted demand for fuel for many uses—including generation of electricity and smuggling to neighboring countries. Fuel subsidies represent on average 4.4 percent of GDP, almost double what Ecuador spends in education.

Figure 2.5. Imports of oil derivatives, 1990–2008
(millions of US$, including cost, insurance, and freight)



Source: Banco Central de Ecuador.

Petroecuador

Several factors contribute to Petroecuador's poor performance in discovering new fields and exploiting existing ones—technology, availability of investment funds, and corporate governance. Obsolete technology has been a major constraint on production. Most of the company's technology dates from the early 1990s, when Texaco operated Petroecuador's oil fields. Production relies on vertical oil wells spaced throughout the fields, requiring a series of access roads and secondary pipes to link wells with a central station and the main pipelines. In contrast, private companies generally use more modern technology, such as horizontally drilled wells that are capable of covering a whole field from a single location, where the oil can be pumped into the main pipeline. Such technology is more efficient, less costly, and more environmentally responsible than Petroecuador's methods (Albornoz, Cueva, and Gordillo 2006).

When Texaco started production in the late 1970s and 1980s, the technology in use relied on high underground water pressure to push oil up the wells. As water pressure declined over time, each well's yield decreased. Today's third-generation technology for oil recovery could restore the Petroecuador fields' production volumes—but it would require large new investments.

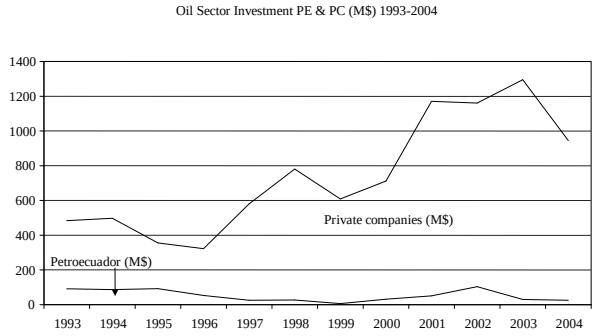
Petroecuador's low investment levels result partly from financing constraints -including the need to subsidize imports of derivatives- and partly from weak corporate governance. Ecuador's ongoing political instability has brought abrupt changes in Petroecuador's management—not surprising, perhaps, given the oil sector's importance in generating fiscal revenues. In 1998–2008, Petroecuador has had 18 CEOs, including two navy officers in the past two years. From November 2007 to early 2010, President Correa put the Navy in charge of Petroecuador, with the objective to reduce corruption and enhance the company's efficiency. The instability over the past ten years has had a negative effect on continuity, including investment policies. It has allowed certain interests—among

them, suppliers, a cartel that buys crude oil and sells derivatives, and unions—to exert excessive influence over the company's decision-making process, fueling rent-seeking behavior. All of these issues translate into lack of transparency and weak accountability. The Ministry of Mines and Petroleum now recognizes that Petroecuador's inefficiencies have brought the company to the brink of collapse.[21]

Private firms

In the past two decades, private companies have done most of the investment in Ecuador's oil sector (see Figure 2.6). In 1994–2004, private companies' investment was eight times Petroecuador's annual average of US$100 million. The investment gap helps explain why private production grew consistently while Petroecuador's output declined from 1994 to 2005, when the government terminated Occidental Petroleum's contract.

Figure 2.6. Oil sector investment, 1993–2004

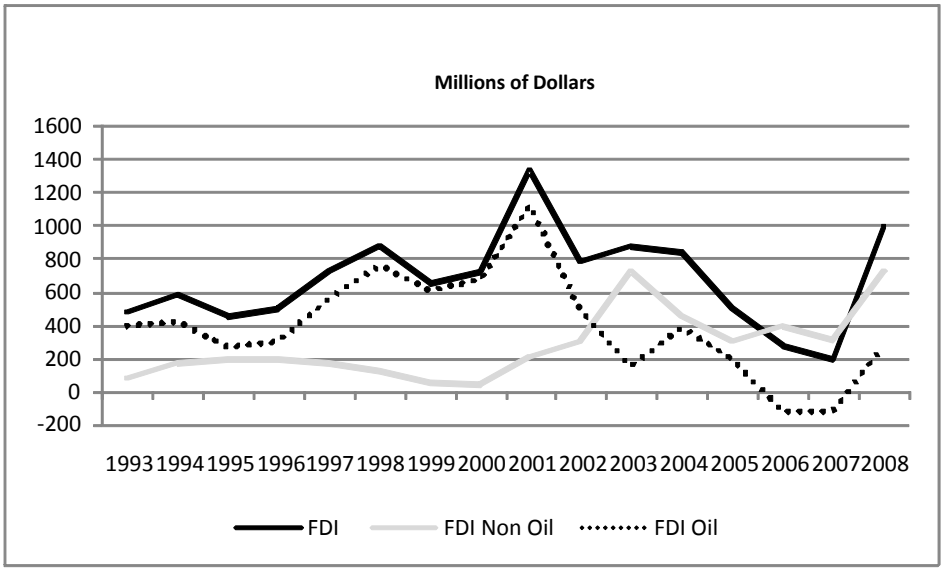


Source: Espinasa 2007.

On average, the oil sector represented 67 percent of total foreign direct investment (FDI) in Ecuador until 2005. Oil as a share of FDI increased to 95 percent in 2000; afterward, it declined to 46 percent in 2004. The decline in oil FDI registered during the 2001-2003 period was related to a local subsidiary's decision to finance investment with credits with its foreign headquarters. As a result, total investment in the oil sector increased during this period, while oil FDI declined. Since 2005, however, legal and contract instability severely limited oil sector FDI, which even turned negative in 2006 (-US$116 million) and 2007 (-US$122 million) as foreign companies started to liquidate their assets in Ecuador. In 2008, the oil sector's FDI recovered to US$161 million, equivalent to 28 percent of total FDI, which coincides with the entrance of some Chinese oil companies (see Figure 2.7).

[21] Ministerio de Minas y Petróleos de Ecuador (2008).

Figure 2.7. Foreign direct investment, 1993–2007



Source: Banco Central de Ecuador.

2.2 REGULATIONS AND CONTRACTS FOR OIL ACTIVITIES

The way the government has worked with private contractors and organized Petroecuador's activities has contributed to the stagnation of oil production. Laws have been written and contracts have been negotiated to regulate oil exploration, development, and production and to define the payment of taxes and royalties to the government. A key aspect of the process has been the relationship between the Ecuadorian state and foreign oil companies.

Until 1973, the oil sector had been treated as part of the general mining sector and followed rules established in the *Ley de Minas*. Oil production in the new Amazon fields started just before a period of high prices in the 1970s and early 1980s, and foreign investment in exploration and extraction accounted for almost all oil-output growth. The oil sector's sudden importance prompted the first sector-specific law—the *Ley de Hidrocarburos* (1973). It created a state company dedicated to the oil sector, the Corporación Estatal Petrolera Ecuatoriana (CEPE), which subsequently became Petroecuador. The company had two main objectives: to manage the relationship of the state with the foreign oil companies and to explore, develop, produce, and sell oil and its derivatives. After 1973, oil contracts have been signed by Petroecuador, not by the Ecuadorian government. Since 2008, the government has been trying to reform the law to allow the government to sign contracts directly and to make Petroecuador like any other company.

Originally, the *Ley de Hidrocarburos* defined two types of contracts with foreign companies—association contracts and mixed-economy companies. Subsequent reforms have created other types of arrangements.

Association contracts. CEPE provided the oil fields and the company covered all necessary investments. The company accepted all of the exploration risks, and CEPE and the company shared price and production risks in proportions established in the contract. This is a common and effective arrangement in many countries. In Ecuador, this was the most popular type of contract during the 1970s. Currently, there are no association contracts because the government disapproves of them.

Mixed-economy companies. CEPE was authorized to form new companies for the exploration, development, and production of oil fields in partnership with foreign entities that have legal representation in Ecuador. This type of incorporated joint venture is common and effective in many countries. Since 1993, when the contract with Texaco expired, there have been no mixed-economy contracts in Ecuador.

Service-provider contracts. During the 1970s, market conditions made the original types of contracts unattractive to foreign firms. A 1982 reform changed the law to include service-provider contracts, under which CEPE owned the entire production after covering production costs and a private company profit margin not linked to oil prices. On one hand, CEPE took all price risk, upside and downside. On the other hand, the private company carried all of the exploration risks; that is, it covered all exploration expenses, even if the field turned out to be commercially viable. CEPE determined whether a field was commercially viable, which allowed the government to pursue expropriation without compensation.

With service contracts, CEPE allocated some oil fields to foreign companies during the 1980s and the early 1990s. Investors found these contracts attractive because they eliminated the risk from low oil prices. However, this period's low oil prices meant CEPE's revenues were low. In 1993, the government eliminated the state's exposure to price and other risks, passing them to the private firms. The government found this attractive but investors did not. They have to take the risk of oil exploration and accept a fixed price at a time when market prices have been high. Currently, only one company (AGIP) has this type of contract.

Production-sharing contracts. When Texaco's mixed-economy company contract expired in 1993, CEPE became Petroecuador and took control of the US-based company's operating fields. In the same year, reform of the *Ley de Hidrocarburos* included production-sharing contracts that assign almost all risks to private companies, which pay all the costs of exploration, determine the viability of the field's production, decide whether to develop and produce the field, and cover the costs of development and production. Since 1993, most contracts have been of this type.

Petroecuador receives a share of the revenues, determined by the volume of production, the quality of the oil, provisions of the *Ley de Hidrocarburos* and contracts with each company. According to the law, Petroecuador's shares range from 12.5 percent of expenses for 0 to 30,000 b/d to 14.5 percent for 30,000 to 60,000 b/d and 18.5 percent for more than 60,000 b/d. Petroecuador's share grows with the oil's American Petroleum Institute (API) degree of density. The private company receives a larger share of compensation when the quality of oil is lower on the API scale.

Marginal field contracts. In 1993, a special contract form was established for marginal fields, defined as those with production of less than 1 percent of the national total. These fields are generally located away from existing pipelines and other fields. Typically, they are already in production, and Petroecuador looks for a private company to take over, bring in new technology, and increase production. Petroecuador and the company agree on baseline production without new investment. Up to the baseline, the arrangement works as a service-provider contract. When production exceeds the baseline, the contract converts to a production-sharing deal.

Under these contracts, Petroecuador allocated oil fields to private companies, which increased their production from 7.5 million barrels in 1993 to 46.0 million barrels in 1999. By then, it became evident that the capacity of SOTE, the state-owned and operated pipeline, was restricting private production's growth. Mixing high-quality and low-quality oil for transport reduced overall revenues. Since Petroecuador was producing the highest quality oil, it demanded compensation. This led to the construction of the OCP, a conduit for low-quality heavy oil built entirely by the private companies. The OCP started operating by end-2003, which enabled private production to rise from 78.0 million barrels in 2003 to 120.4 million barrels in 2004.

In 2003, as international prices for oil started to rise, the Ecuadorian government felt that it was not getting all the revenues it deserved from oil, especially from private companies with pre-1999 contracts that did not adjust Petroecuador's share according to changes in international prices. In 2005, the government tried to renegotiate these contracts but no agreement was reached. In May 2006, the government passed Law 42 (*Ley 42*), which declared that Petroecuador should receive at least 50 percent of the income from the difference between current oil prices and the reference prices on the day the contract was signed.[22] In July 2007, Executive Decree 662 modified this share, declaring that Pertroecuador should get 99 percent of these revenues. This change led to threats of legal action on behalf of the oil companies, and the share was established as a tax and reduced to 70 percent in the *Ley Reformatoria para la Equidad Tributaria en el Ecuador*, approved by the Constitutional Assembly in December 2007. Under this law, new negotiations started between Petroecuador and private companies. By April 2008, agreements had been reached with almost all companies to reform the contracts. The following are the most important changes:

- Adoption of the 70–30 percent rule for extraordinary income related to the difference between current and reference oil prices.[23] This increases the government's share.

[22] Law 42 sets a floor of 50 percent of the extra income for Petroecuador. The actual share is defined by executive decree.

[23] According to the *Ley Reformatoria para la Equidad Tributaria*, 70 percent of extraordinary income due to the difference between current and reference prices goes to the government as a tax, while the company keeps the remaining 30 percent.

- The reference price would no longer be the level in effect when the contract was signed. The new reference price varies by company, depending on the characteristics of the extracted oil. This measure effectively adjusts the government's share back down, partly counteracting the 70-30 rule.
- For resolving conflicts, the competent tribunal changed from the World Bank–based International Center for Settlement of Investment Disputes (ICSID) to Latin American–based organizations, such as the Arbitrage Panel of Comisión Económica para América Latina y el Caribe (CEPAL) in Santiago, Chile.
- Contracts were extended through 2017–18, depending on the company.
- A new clause signaled the commitment to move from production-sharing contracts back to service-provider contracts.

When oil prices are at their reference levels, the government receives a share of production as a royalty. Petroecuador also receives a share of the revenues, which is dependent on the volume of production and the quality of the oil. The *Ley de Hidrocarburos* sets a floor on the amount of being transferred to the state but individual contracts specify the state's total share (see Table 2.1). According to the law, Petroecuador's share ranges from 12.5 percent to 18.5 percent of expenses, but the state's share according to the individual contracts ranges from 22 percent to 63.7 percent.[24]

Table 2.1 Contract type by company

Company	Contract	State's Share*
Petrobell	Marginal	51%
Petróleos Sudamericanos	Marginal	57%
Petróleos Sudamericanos	Marginal	45%
Tecpecuador	Marginal	63.4%
AEC Ecuador	Production-sharing	30%
AEC Ecuador	Production-sharing	21%
Ecuadortlc 18	Production-sharing	50.5%
Occidental**	Production-sharing	63.7%
Occidental**	Production-sharing	35%
Perenco	Production-sharing	30%
Repsol YPF	Production-sharing	22%

* The share includes the mandatory share defined by the Law.
** Occidental's contract was terminated in 2006.
Source: Albornoz, Cueva and Gordillo (2006)

[24] Appendix D lists the most important laws and regulations pertaining to the oil sector in Ecuador from 1973 through 2008. New discussions between the government and the private oil firms have been taking place since December 2008.

Overall, Ecuador has revised oil regulations and renegotiated contracts between the state and private companies frequently. Most contracts did not have clauses to adjust for potential changes in the sector's environment and relevant prices, and political decisions came in response to changes in national and international attitudes. Such volatility has discouraged investment by foreign companies and reduced the country's ability to develop and expand its oil-production capacities.

2.3 THE OIL SECTOR'S LINKAGES TO OTHER ECONOMIC ACTIVITIES

The oil sector is capital intensive, providing only a limited number of jobs. Its share of total employment was only about 0.25 percent in 2004–07. Since most of their capital inputs are imported, oil producers make only small purchases from other sectors. To analyze the direct linkages between the oil and non-oil sectors, we use the input-output matrixes of Ecuador's national accounts.[25]

Main providers of the oil sector's intermediate consumption

The oil industry's intermediate inputs come mainly from the two oil subsectors. As a share of the oil sector's intermediate consumption in 2000-07, crude oil averaged 50 percent and oil derivatives 20 percent (see Figure 2.8). Other inputs are mainly nontraded: services provided to businesses (5.5 percent), insurance (2.3 percent), construction (2.1 percent), and transportation and storage (1.4 percent). The only tradable inputs are chemical products (3.0 percent) and transportation equipment, including vehicles (1.8 percent).

The oil sector is an important buyer for only a few subsectors of the economy in 2000–07. The oil sector's intermediate consumption as a share of the total domestic production is significant for only five sectors: insurance services (50 percent), crude oil (35 percent), chemical products (36 percent), oil derivatives (29 percent), and services provided to businesses (18 percent). Insurance services high share reflects the large risks and scale of oil activities. By law, Petroecuador must contract insurance services from local companies, which generally reinsure with foreign companies.[26] Other sectors with

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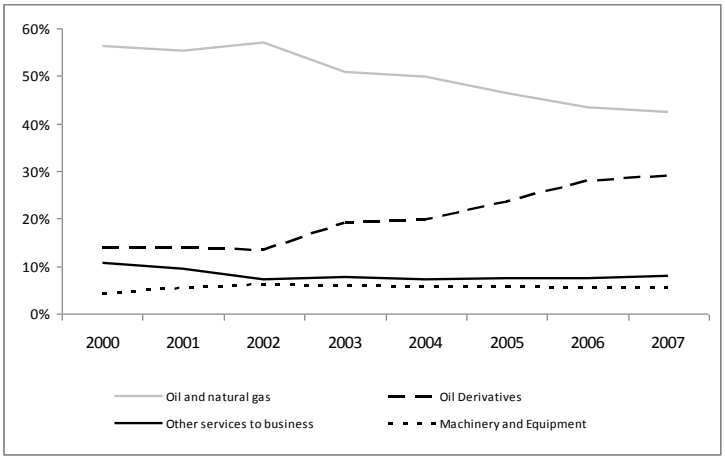
[25]. This non-econometric approximation reveals direct linkages between the sectors, but fails to consider spillover effects, which are discussed in Chapter 1 using econometric techniques. We use the input-output matrixes from 2000 to 2007, measured at 2000 prices, to highlight trends regarding the intermediate consumption of the oil sector as well as the intermediate consumption of oil products by other sectors. The matrixes consider 48 productive subsectors (output or "industries," as they are called in the matrixes) and 61 input categories ("products"). Two of the 48 productive subsectors correspond to the oil sector: oil extraction and oil refining. Other oil-related activities, such as commercialization and transportation, are included in other subsectors and are not separable with the available data. Two of the 61 inputs correspond to the oil sector: crude oil and oil derivatives. Crude oil is produced locally, while oil derivatives are basically refined and mostly imported oils, although it is not possible to distinguish the products' origin in the national accounts. We use the input-output matrixes over 2000–07, measured at 2000 prices, to highlight trends regarding the intermediate consumption of the oil sector as well as the intermediate consumption of oil products by other sectors.

[26]. According to Albornoz, Cueva, and Gordillo (2006), Petroecuador had 17 insurance contracts in 2006, covering five areas: oil production assets (US$3.8 billion); civil responsibility damages, including

consumption from the oil sector of at least 4 percent of overall supply are: machinery and equipment (7 percent), domestic gas and water (6 percent), metal manufactures (5 percent), leather products (5 percent), rubber products (5 percent), plastic products (4 percent), and mail service (5 percent). (See also appendix E).

Figure 2.8. Intermediate consumption of the oil sector, 2000–07



Source: Banco Central de Ecuador.
Note: Machinery and Equipment products represented about 10% of the oil sector's intermediate consumption in 2007.

Main users of oil-sector production

About 30 percent of Ecuador's crude oil production goes to Petroecuador's oil refinery, and the other 70 percent is exported. Refined products and oil derivatives are used by other sectors. Their shares of intermediate inputs were 60 percent in the transportation sector, 40 percent in the fishing sector, and 36 percent in the mining sector. The transportation sector uses more than 30 percent of total motor fuel production and imports. Other important users of oil derivatives are households, public utilities, nonmetal manufacturers, and the public sector. Since 2003, Ecuador has frozen the final consumer price of most oil derivatives, resulting in a minimal pass-through of international price fluctuations to these sectors. The government through Petroecuador covers the subsidies.

environmental risks (US$50 million); vehicles and offices (US$186 million); health and life insurance (US$90 million); and airplanes (US$14 million).

Table 2.2. Intersectoral linkages of the oil sector

Upstream	Downstream
Sectors for which more than 10% of total domestic production is used by the oil sector	
Chemical products	Insurance
Services provided to businesses	
Sectors for which 4-10% of total domestic production is used by the oil sector	
Insurance	Machinery and Equipment
	Domestic gas and water
	Metallic manufactures
	Leather productions
	Rubber products
	Plastic products

On one hand, the oil sector in Ecuador has strong intersectoral linkages with a small cluster of three industries through its upstream and downstream activities (see Table 2.1). For only three sectors, the oil sector uses more than 10 percent of their total domestic supply. For six additional sectors, the oil sector consumption is between 4 and 10 percent of the sector´s total domestic production. Thus, oil sector activities, in terms of buying output from other sectors, resemble an enclave. Thus, faster growth in the oil sector has a limited impact on industrial growth but could boost growth in services, especially insurance activities. On the other hand, the sector's direct contribution to employment is marginal and its labor is highly specialized, limiting labor mobility from the oil sector to other activities and vice versa. This implies weak linkages between the oil sector and the rest of the economy in terms of competing for production factors. As a result, oil activities interact with other areas largely through the fiscal arena, via spending.

2.4 FISCAL POLICY AND THE ENERGY SECTOR

Oil has been an important component of Ecuador's fiscal revenues since the early 1970. Fluctuations in the international price of oil have been critical drivers of public spending, and oil revenues have had major impacts on Ecuador's overall fiscal trends, their pro-cyclicality, oil-related subsidies, and the allocation and quality of public expenditures. This section will discuss the dimensions that are particular to the energy sector, including oil, and the next chapter will cover the issues that pertain more to overall public finances. Data availability limits this section to 1990-2008. In this period, high oil prices have fueled public spending, providing a lift to public services and construction.

Oil Revenue

Ecuador's oil revenues grew slower than GDP in the late 1990s and early in this decade; from 2003 to 2008, it grew rapidly (see Table 2.3). Revenue increases since 2005 were all due to rising prices; actual quantities of oil production declined.

Table 2.3. Non-Financial Public sector revenue in Ecuador, 1990–2008

(US$ and % of GDP)

	1990-94	1995-99	2000-01	2002-03	2004-05	2006	2007	2008
Total revenue (US$)	3,366	4,348	4,540	6,636	8,661	11,263	13,451	20,781
Total expenditure (US$)	3,379	4,978	4,418	6,374	8,186	9,928	12,554	21,458
Overall Balance— US$	-13	-630	122	262	475	1,335	897	-677
Non- Oil Overall Balance	-1,602	-2,164	-1,458	-1,398	-1,830	-1,588	-3,017	-10,323
Total revenue –% GDP	25.0	20.7	24.6	24.9	24.8	27.0	29.5	39.5
Oil revenue	11.8	7.3	8.5	6.2	6.6	7.0	8.5	17.6
Exports	6.8	3.2	6.3	3.9	5.4	7.7	7.2	16.9
Sale of products	2.2	2.7	1.5	1.8	0.8	0.0	0.0	0.0
Public enterp. Surplus (PetroEcuador)	2.8	1.4	0.7	0.5	0.4	-0.7	1.3	0.7
Non oil revenue	13.2	13.4	16.1	18.7	18.2	20.0	20.9	21.9

Source: Banco Central de Ecuador.

Most oil revenue comes from Petroecuador's exports and from arrangements specified in individual contracts with firms developing Ecuador's fields discussed above. About 25 fields are currently producing, 20 of which were explored and are now being exploited by private firms with contracts that give the state a share of gross production via Petroecuador.

All companies have to pay income tax on their profits, which for exploration and production firms in the oil sector means the proceeds from the sale of oil minus costs of production. The corporate income tax standard rate is 25 percent; the top personal income tax rate was raised in 2007 from 25 percent to 35 percent. Companies are also required to distribute 15 percent of their annual net income to their workers.[27]

Contract terms determine the incentive effects of tax and contract arrangements. These terms are set in one-on-one bargaining—not in competitive auctions—so we cannot determine whether they favor oil over other sectors in Ecuador. The 2006 change in the law probably discouraged the private sector's expansion in response to price increases—by raising the state's share and by showing that the state might unilaterally change contracts to take advantage of windfalls.

Off-budget subsidies and the linkage between oil and electricity

Petroecuador has had a monopoly on domestic sales of refined oil products at various times, including now. It has controlled prices. The company has some refining capacity, but not enough to meet domestic demand, so it imports a growing share of refined products. Until 2005, Petroecuador sold its own production and booked a profit that was counted in government revenues (see Table 2.2). Government data did not report either the opportunity cost of not selling oil at world market prices or the cost of using its own crude oil to supply the refinery instead of exporting it at international prices.

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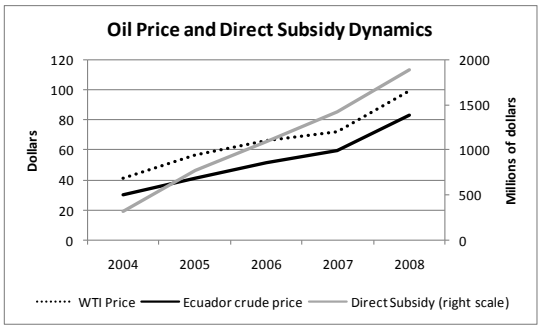
[27]. *Ley Reformatoria para la Equidad Tributaria del Ecuador,* Article 96, Registro Oficial no. 242, December 29, 2007. Besides the corporate income tax, firms have to pay 15 percent of profits into workers pension funds, as discussed in Chapter 3. This payment, like the royalties, is not creditable for US firms against their US tax obligation.

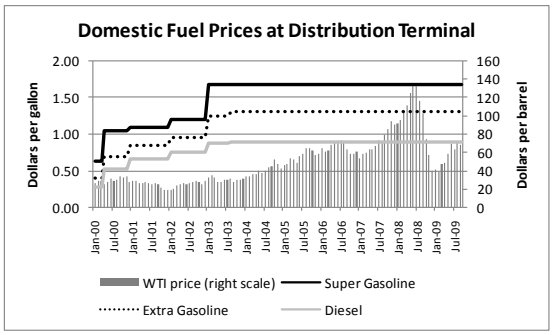
Box 2.1. International oil prices, local derivative prices, and subsidies

In 2004-08, international oil prices trended upwards on strong global growth and rising demand for natural resources, especially from Asian countries. Ecuador benefited, its average crude oil price rising from US$30 per gallon in 2004 to US$83.30 per gallon in 2008 (see chart at left).

Due to the lower quality of its crude, Ecuador sells at a discount compared to the WTI price. According to BCE data, the price differential between Ecuador's oil and the WTI averaged US$5.20 per barrel in1998-2004. The differential has seen some very large changes in short periods of time, which seem hard to explain in the absence of sudden and large changes in the quality of Ecuador's crude oil or the other relevant factors.

International oil derivative prices grew in parallel with oil crude prices, pushing up subsidies because domestic fuel prices have remained frozen since mid-2003 (see chart at right). This policy and its related incentives has boosted the demand for oil derivatives, particularly from high-income families (through increased gas and LPG consumption for recreational activities), industries (that have migrated to subsidized energy for several needs), and smuggling activities to neighbor countries. The additional demand for oil derivatives has led to a faster growth of the overall oil subsidy than that of oil prices.





Source: BCE

Starting in 2003, Petroecuador had to subsidize the international purchase of products for domestic sale, including private consumption, transportation, and electric generation. In 2004, fuel subsidies were about 2.9 percent of GDP, and they jumped to about 6.6 percent in 2007 and about 8.3 percent in 2008 (See Table 2.4). By the oil price boom's peak, these subsidies for imported products were costing about half of the fiscal revenue from crude oil export. This subsidy does not appear directly in the budget; nevertheless, it is a drain of resources that could have been used for new exploration or construction of refining capacity.

Table 2.4. Fuel Subsidies, 2001–08

Susidy	2001	2002	2003	2004	2005	2006	2007	2008 (P)
Fuel Subsidies (US$ Million)	650	387	500	962	1,868	2,602	3,036	4,522
Fuel Subsidies (% of GDP)	3.1%	1.6%	1.7%	2.9%	5.0%	6.2%	6.6%	8.3%

Source: IMF, Hurtado (2009)

Hurtado, Felipe, 2009, *30 años de subsidios*, Carta Económica, CORDES 10

Ecuador is heavily dependent on thermal electricity generation plants that burn oil fuels. Oil derivatives, mainly diesel, represent about 20 percent of all inputs used to generate electricity. Table 2.5 presents an approximate calculation of diesel subsidies for electricity generation. In dollar terms, they rose markedly with the high international oil prices in 2007-08. However, electricity generation has represented a declining share of

the total diesel subsidy partly because of the growing use of diesel for other purposes, such as transportation, since 2004. At the same time, thermal electricity's share of electricity generation declined due to favorable weather conditions and some investments that increased hydroelectric capacity—for example, a new hydroelectric plant in San Francisco.

Table 2.5 Impact of Diesel Consumption for Electric Generation on Total Diesel Subsidy

Year	Diesel (barrel)	Subsidy for Electric Generation (in millions of dollars)	Total Diesel Subsidy (in millions of dollars)	% Of Total Diesel Subsidy
2004	2,197,610	28.5	71.8	40%
2005	2,872,300	112.6	318.3	35%
2006	3,873,311	171.0	499.9	34%
2007	3,933,244	201.7	607.3	33%
2008	3,007,377	252.7	937.5	27%

Source: CONELEC, BCE, authors' calculations

The subsidies do not mean bargain electricity for Ecuadorians. As a result of inefficiencies, Ecuador's electricity tariffs remain high for Latin America (see Table 2.6).

Table 2.6 Electric Tariffs in Latin America – 2006

	US$ cent/kWh		
Country	Residential	Commercial	Industrial
Brazil	19.06	16.64	12.37
Nicaragua	17.13	21.42	16.61
Uruguay	15.61	10.44	6.49
El Salvador	14.34	14.54	14.00
Chile	13.06	13.98	8.53
Panama	12.71	12.43	10.36
Ecuador	**12.50**	**11.00**	**9.56**
Peru	12.40	10.02	7.31
Guatemala	11.79	11.57	11.21
Argentina	9.72	6.30	6.40
Colombia	9.12	10.95	8.40
Costa Rica	8.06	10.46	8.41
Honduras	7.76	12.84	10.40
Mexico	7.65	19.50	10.06
Bolivia	6.72	10.14	4.68
Paraguay	6.17	8.58	4.14
Venezuela	4.50	4.02	3.17
Average	12.62	13.21	10.41

Source: OLADE

In June 2007, the government established a cross-subsidy in which households with high electricity usage subsidize households with monthly consumption below 100 kilowatt-hours (kWh) in the highlands or 130 kWh in the coastlands. Subsidized families pay US$0.04 per kWh. In July 2008, the Constitutional Assembly replaced an incremental marginal cost scheme in the wholesale tariff regime with a system of an average flat tariff of US$0.0838 per kWh. The aim was to lower electricity costs for the industrial, commercial and residential sectors. However, this could worsen the utility companies' existing debt with electricity generation firms, and the generating companies' debt with Petroecuador. At the same time, this policy promotes a more intensive use of electricity from generation utilities with high marginal costs (thermoelectric production). The main problem of inefficiencies and distorted prices sending the wrong incentives has not been fixed. A more structural solution would imply developing more hydroelectric generation projects involving lower marginal costs. The current administration has taken some steps in this direction: a new hydroelectric plant started operations in 2007, another one is expected to start operations as soon as its reservoir fills up, and the government is looking for financing for three additional plants.

Subsidies' persistence

From an equity perspective, the subsidies are problematic because the rich consume a large share of fuels and liquefied petroleum gas (LPG). SIISE-STFS (2003) and World Bank-IADB (2004) show that 85 percent of the gasoline subsidy benefits the richest quintile of the population. The LPG subsidy's benefit is five times higher for the richest quintile than the poorest quintile. More recently, Hurtado (2008) showed that the richest quintile consumed 43 percent of Ecuador's fuel in 2007, while the poorest quintile used only 7 percent. In monetary terms, the benefit for an average family in the richest quintile was US$1,053 in 2007; a family in the poorest quintile only received US$173. Given these inequities, maintaining the subsidies does not appear to be justified. In 2008, government health and education expenditures represented about 4 percent of GDP, while the fuel subsidies amounted to 8.3 percent of GDP. Thus, eliminating or improving the targeting of fuel subsidies could free up fiscal resources to increase expenditure in areas with higher social impact while maintaining fiscal stability.

On several occasions, previous governments have attempted to partly lift or better target fuel subsidies, which would imply significant price increases. Not surprisingly, the issue is politically sensitive because the vocal middle classes benefit from a large share of fuel subsidies. In addition, designing well-targeted subsidies to compensate part of the population for a potential lifting of fuel subsidies is a complex task.

Lifting oil subsidies would imply confronting the issue of indirect subsidies to thermal electricity generation, an industry backed by a strong lobby with regional interests. Several local electricity distributors suffer from weak governance, excess personnel, and weak collection processes. These problems have translated into growing debts to the generation companies, estimated at US$1.5 billion in 2006. In turn, the generators owe about US$500 million to Petroecuador for diesel purchases. From a political economy perspective, groups benefiting from local utilities' weak governance have added their voice to those rejecting any move on fuel subsidies.

The arguments for lifting non-targeted subsidies for efficiency and equity considerations have not been able to overcome the political power of diverse coalitions that either benefit from the status quo or think they do. Attempts to reduce or eliminate subsidies face opposition and protests from the transportation sector, the electricity generation and distribution sector, and the middle and low-income classes—with de facto support from other groups, such as those engaged in large scale smuggling to neighbor countries.

Stabilization funds for oil revenues

Like many commodity exporters, Ecuador has tried a variety of stabilization funds over the 2000-2006 period (see Table 2.7). After the 1998-99 crisis, the country started to recover in 2000. Oil prices also started to increase in 2000, translating into higher fiscal revenues. Cueva (2008) argues that improved fiscal conditions were one of several factors that explain the emergence of the political will to establish these funds. The others were constraints on access to market financing, limits to fiscal financing related to dollarization, and some awareness of fiscal responsibility's importance after the crisis.

Table 2.7. Oil-related stabilization funds in Ecuador in place until 2007

Stabilization Fund (date of establishment)	Source of stabilization funds	Use of stabilization funds
FEP (2000): Oil Stabilization Fund	Originally (until 2002), 45 percent of oil revenues above those in the annual budget	Cover fluctuations in net oil revenue; in 2007–08, covered the subsidy for imported oil derivatives
CEREPS (2005): Special Account for Social and Productive Investment, Scientific Development and Fiscal Stabilization (formerly FEIREP, 2002–05)	State revenue from heavy crude oil production and 45 percent of oil revenues above those in the annual budget, and after earmarks for regional projects	Low-interest credit lines, old debt to social security, debt buybacks, infrastructure projects, social investment, research and development, roads, environment, stabilization of oil revenues, and emergencies
FAC (2005): Fund for Savings and Contingencies	Unused funds from CEREPS	Cover shortfalls in oil revenues; emergency spending
FEISEH (2006): Energy and Hydrocarbon Investment Fund	All net oil revenues from the Bloque 15 field, formerly operated by Occidental Petroleum	27 percent to CEREPS; reimbursement of Petroecuador costs for Bloque 15, US$145 million for the budget, electricity, hydrocarbon investments, and others

Source: Cueva 2008.

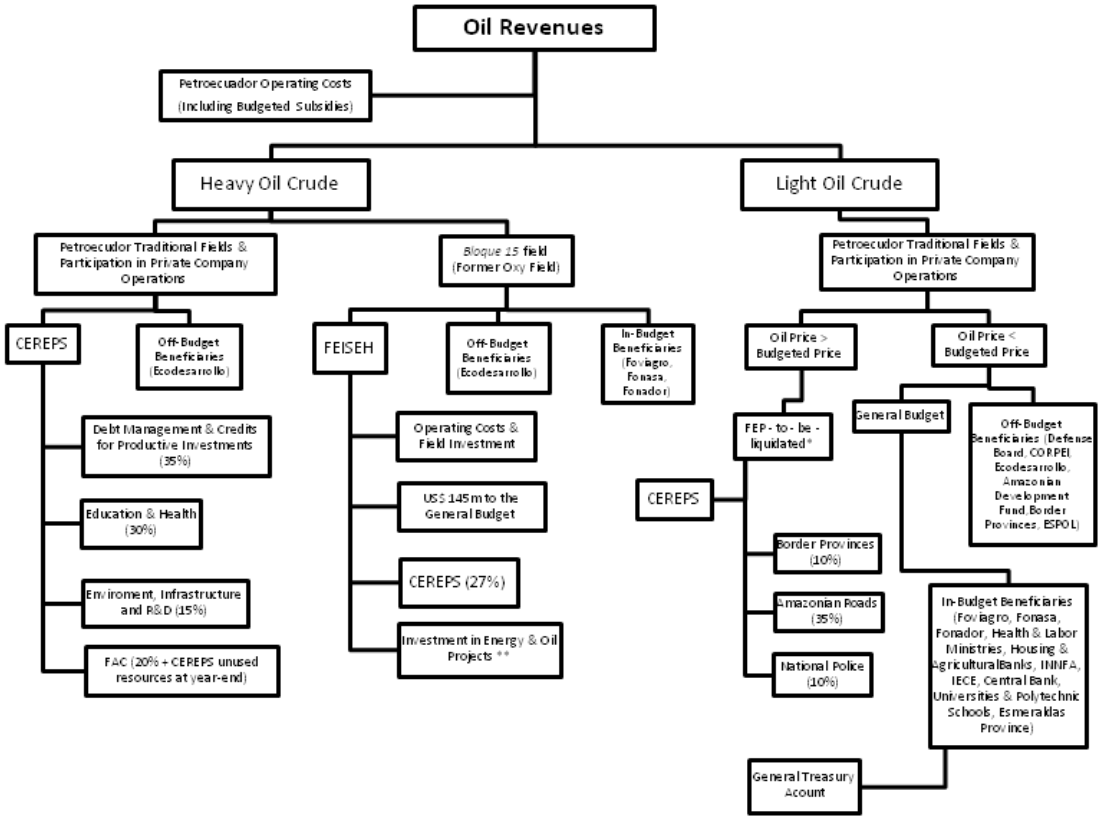
The most recent stabilization vehicle was the Fund for Savings and Contingencies (FAC), set up in 2005 and managed by the central bank. FAC had an accumulation ceiling of 2.4 percent of GDP (Cueva 2008). Its resources could only be used for revenue stabilization and emergency spending. Oil-revenue earmarks from both oil funds and the regular budget included resources for subnational governments. For instance, the first oil fund, the Oil Stabilization Fund (2000-2007), allocated revenues to road building in the Amazon region and development projects in border provinces. According to Cueva (2008), US$0.005 per barrel from service-provision contracts was allocated to Esmeraldas, Napo, and Sucumbíos provinces, and 2.6 percent of oil revenues from traditional Petroecuador's fields was allocated to Esmeraldas province.

In April 2008, the oil funds and almost all other oil-revenue earmarks were eliminated through the *Ley Orgánica para la Recuperación del Uso de los Recursos Petroleros del Estado y Racionalización Administrativa de los Procesos de Endeudamiento*. Only the earmarks for the Amazon Development Fund were maintained, tapping services provided to Petroecuador at the equivalent of 2.5 percent for national companies and 4.5 percent for foreign firms.

This law was approved five months before the referendum for the approval of a new Constitution in a period of extraordinary high oil revenues. In its preamble, the law mentions the need for flexibility in the use of oil resources to carry out an efficient economic policy and to promote development. In this context, public expenditure increased at a 30 percent rate from the first to second quarter of 2008. The bill transferred all current and future resources from the oil funds to the general budget and replaced all existing fiscal rules with the sole stipulation that current spending cannot be financed with revenues arising from public debt operations or oil exports. An important political consideration was that some funds were initially presented as saving oil resources and prioritizing them for debt reduction. The message that eliminating the funds would reduce resources previously earmarked for paying foreign debt and use them to pay the "historic social debt" proved politically savvy.

Figure 2.9 shows the complexity of the flow of funds existing in Ecuador's oil sector until 2007. Since then, the flows are much more straightforward. Most of them go directly to the general treasury, with the exception of the marginal earmarks for the Amazon Development Fund.

Figure 2.9. Oil sector flow of funds



Source: Cueva 2008.

Even though the current administration suppressed the oil funds, the sudden fall of oil prices during the second half of 2008, accompanied by a high level of public expenditures, highlight the need for some mechanism to stabilize the flow of oil revenues over the medium-term. The country could, for example, employ some market-based mechanism (hedging) to smooth out the oil price fluctuations, thus stabilizing its revenue flow. If the country chooses this instrument, it would successfully stabilize the minimum level of oil revenues the country would receive without eliminating the benefits of higher prices. However, there are some disadvantages in employing these mechanisms, such as: i) the money required to purchase the instrument, which is difficult to justify to Congress and explain to the people and could be politically unpopular, ii) flexibility of action, which may be legally hampered, and finally iii) a system of check and controls that may

not be available for a state company with weak corporate governance (See Mexico's experience in Chapter 4). Alternatively, some kind of oil fund could be reinstated, with a much simpler stipulations for income sources, investments, and earmarking expenditure than the ones used until 2007. Chile has developed useful experience with respect to copper revenues (see Box 2.2). In particular, Chile shows how Ecuador could build a participatory process centered on an independent committee, which could include experts from diverse ideological and technical perspectives. The committee could help generate support for a scheme to smooth the volatility of oil-related revenues and ensure a more stable financing for social expenditure in the medium-term, while bringing a wider social acceptance to an oil stabilization fund scheme.

Box 2.2. Chile sovereign wealth funds

Since 2006, Chile has had two sovereign wealth funds fueled by copper revenues: the Pension Reserve Fund (PRF) and the Economic and Social Stabilization Fund (ESSF). Annual expenditures come from government surpluses, with the aim of reducing vulnerability to short-term fluctuations of copper prices or export volumes. Chile has a structural fiscal surplus target—0.5 percent of GDP in 2008—and all revenues above that are directed to the two funds. This provides an automatic adjustment mechanism that allows the public sector to save during income upswings and draw resources from the ESSF to avoid drastic restraint on expenditures during downturns (see Ministerio de Finanzas de Chile 2009a, b and c).

Clear rules allocate fiscal revenues to feed the funds. In any year with an excess fiscal surplus, the PRF receives a capital contribution equivalent to 0.2 to 0.5 percent of GDP. Additional flows up to 0.5 percent of GDP go to capitalize the central bank. All remaining funds go to the ESSF. The PRF can only be used to complement financing of pension and social security liabilities. The ESSF may be used to finance fiscal deficits and pay public debt.

To estimate structural income, the government relies on two separate advisory committees: the *Comité Consultivo del PIB* and the *Comité Consultivo del Precio del Cobre*. The members of these committees are private experts in their fields, with diverse ideological positions. The *Comité Consultivo del PIB* provides an estimation of the trend value of next year's GDP, excluding the impact of exogenous shocks. The *Comité Consultivo del Precio del Cobre* defines copper's reference price for the following year, taking into account the expertise of its members and their expectations for the following year. The Ministry of Finance uses these two inputs to calculate the government's structural income for following year's budget.

Finally, a Financial Committee—made up of independent professionals with vast experience in economic and financial issues—provides advice to the Finance Minister on the funds' long-term investment policies, acceptable assets and investments, and the funds' management and custody.

These committees increase social control over the stabilization funds' management and its inflows and outflows as well as helping provide transparency and accountability

2.5. GROWTH POTENTIAL OF THE OIL SECTOR

Even though no new major reserves have been found in the past 18 years, current reserves will support current production levels for approximately 23 years (see Table 2.8). Furthermore, Ecuador's oil sector has the potential to grow. Espinasa (2007) points out that Ecuador has one of the lowest ratios of production to reserves (4.4 percent in 2007) among oil-producing countries with broadly similar reserve levels, including the United Kingdom (16.6 percent), Colombia (13.7 percent), Norway (11.4 percent),

Argentina (9.8 percent), and Oman (4.7 percent). Moreover, the ratio of production to reserves in Ecuador is much higher for private companies (11.4 percent) than for Petroecuador (1.9 percent), suggesting additional investment could increase substantially Petroecuador's current production. Oil transport does not represent a binding constraint on growth. Both SOTE and OCP are not operating at full capacity: currently, production is close to 520,000 barrels per day, while the pipelines can carry up to 850,000 barrels per day, not counting the potential connection to Colombia's pipelines.

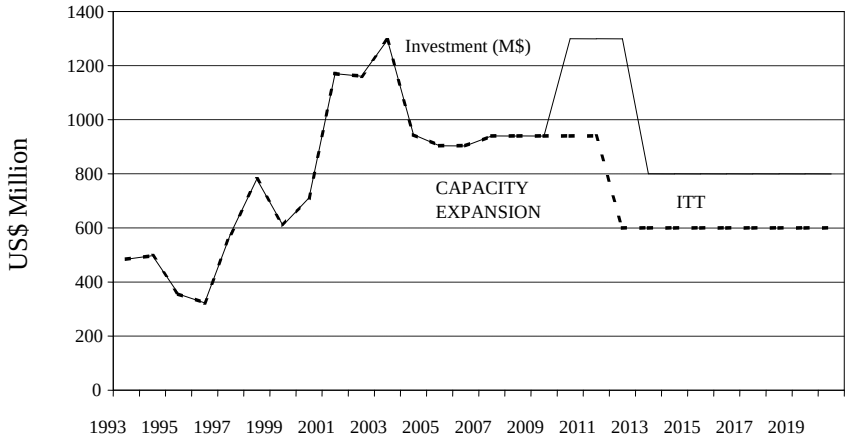
Table 2.8. Estimates of Ecuador oil reserves

Source	Reserves (million barrels)	Year of estimation
BP Statistical Review of World Energy	4,300	2007
BP Statistical Review of World Energy	4,500	2006
CIA Fact Book	4,517	2008
OPEC Annual Report	4,664	2006

In view of the potential for increased production, some new investments could be directed to overhauling Petroecuador's current oil fields, with total investments adding up to approximately US$8.6 billion for 2009–20. This alternative has the potential to generate oil sector growth of 66 percent, which would translate in GDP growth (see Figure 2.10). New investments of approximately US$11.4 billion for 2009–20 could go toward developing the ITT oil field (Espinasa, 2007).[28] The project would be more expensive than overhauling existing fields because new infrastructure would be needed to develop the field and connect it to existing pipelines and storage facilities. This alternative has the potential to generate oil sector growth of 22 percent.

[28]. ITT is a large heavy oil field located in the Yasuní National Park, one of the world's biodiversity hotspots. Currently, the Ecuadorian government is campaigning to collect international funds to compensate Ecuador for a decision to keep the field's oil in the ground.

Figure 2.10. Oil sector investment, 1993–2019



Source: Espinasa 2007.

2.6 CONCLUSIONS AND POLICY RECOMMENDATIONS

Oil activities remain a key sector for Ecuador's economy—by the size of its related fiscal revenues, export proceeds, and contribution to GDP. However, potential development of the sector has been hindered by:

- A long-standing tendency to underinvest in the oil sector, coupled with weaknesses in Petroecuador's governance, a lack of longer-term planning, and outdated technology—all of which hurt Ecuador's ability to exploit its large oil reserves.
- A growing dependence on imported oil products for domestic sale, which has been heightened by the presence of large and untargeted subsidies to consumption of oil derivatives.
- Volatile relations with private companies, characterized by repeated changes in the legal and regulatory environment and contract renegotiations, have hurt the country´s ability to develop and expand its production capacities or attract foreign direct investment.
- A marked dependence on oil and vulnerability to fluctuations in international oil prices, which leads to volatility in oil revenues and weakens public finances while making them more procyclical.
- The lack mechanisms for fiscal stabilization over the medium term and the tendency to introduce highly complex and hard-to-track earmarking mechanisms for oil-related revenues.
- A coalition of diverse interest groups benefiting one way or another from inefficient and highly-regressive oil-related subsidies, constraining the governments' ability to reform.

Because of these factors, Ecuador's oil sector has failed to realize its potential to support sustainable output growth and public revenue. To strengthen the oil sector's contribution and reduce the country's vulnerability to external and fiscal shocks, we offer the following recommendations:

- Improve the decision-making processes for oil sector investing, introduce technical criteria and priorities, and enhance Petroecuador's transparency and accountability. Petroecuador's extractive activities require more investment. To make such investments effective would require the government to restructure the company, to enhance its general management, to increase the transparency of its decision making processes, and to bring more technical expertise to adequately channel the company's investment towards the goal of increasing production.
- Clearly differentiate between the two roles devoted to Petroecuador since its creation, e.g. managing the relationship of the state with private oil-producing companies while being a producing company itself. International experience suggests the need to separate these tasks to avoid conflicts of interest. The current government has taken some steps in this direction, as it seeks to strengthen the regulatory faculties of the *Dirección Nacional de Hidrocarburos* and as Petroecuador transforms into an oil producing company.
- Design oil contracts that take into account potential variations in prices and the market environment, with the aim of protecting the public sector interests while ensuring a longer-term duration of contracts. Recent examples of contracts involving natural resources with rules-based taxation clauses capturing part of the windfall for the government include the recent laws in Chile (for copper producing companies) and in Trinidad and Tobago (for oil and gas activities)..
- Replace the existing oil-derivative subsidies with a more focused and well-designed mechanism, aimed at protecting vulnerable populations while freeing up more resources to maintain social spending. Achieving this goal will require a careful unwinding the subsidies to minimize opposition by a coalition of interests.
- Design a fiscal stabilization mechanism to provide a cushion against external shocks or volatility. A key issue would be to ensure a long-lasting scheme, resistant to abrupt political changes.

3. THE NON-OIL TRADABLE SECTOR

The previous chapters showed that Ecuador's public sector depends heavily on the oil sector for its revenue and that the main linkages between the country's oil and non-oil sectors operate through the public sector, especially fuel subsidies and other government spending. They also showed that Ecuador's economic growth will depend upon the performance of both the oil and non-oil sectors. Chapter 2 focused on the former. This chapter looks at the latter. How has the non-oil sector contributed to Ecuador's economic growth? Has fiscal and trade policy helped or hindered the sector's potential? Does the non-oil sector have potential to grow on its own—that is, are the appropriate investment climate and market conditions in place?

To address these questions, this chapter analyzes Ecuador's economy outside the oil-industry. Section 3.1 provides an overview of non-oil tradable sector's activities, describing trends for non-oil production and growth. Section 3.2 considers fiscal policy's influences on the non-oil sector. Section 3.3 takes up trade agreements, and industrial policies affecting the development of the non-oil sector. Section 3.4 offers some conclusions and policy recommendations.

3.1 RECENT EXPERIENCE OF EXPORT GROWTH IN THE NON-OIL SECTOR

Ecuador has three main categories of exports: oil, other primary products (mainly from agriculture and fishing), and manufacturing. This chapter discusses the latter.

Non-oil primary products

The primary sector can be divided into three main categories: (1) traditional export products, such as bananas, cocoa, coffee, fish, and shrimp; (2) nontraditional unprocessed products, such as flowers, broccoli, tropical fruits, and dairy items; and (3) processed agricultural products, such as cooked and frozen vegetables, heart of palm, fruit pulp, and vegetable oils.[29] One of Ecuador's comparative advantages stems from its geographic location and weather—many agricultural products can be produced throughout the year.

The revenues from most primary subsectors are volatile, dependent on international commodity prices and subject to natural disasters.[30] Except for flowers and shrimp, all primary sectors were hit hard by the El Niño phenomenon in 1997–98. Unlike oil, these export sectors are almost entirely private sector, with little direct connection to public revenues, except through general taxation of economic activity and income.

Several primary products—such as roses and other flowers, shrimp, broccoli, heart of palm, and asparagus—benefited from trade liberalization policies and favorable

[29]. Because it involves industrial processing, this subsector is a hybrid of the primary and industrial sectors. It is listed within the primary sector because its competitive advantage relies on the richness of Ecuador's natural resources.
[30]. See Appendix F for annual real growth and trends for specific primary products.

international prices in the 1990s. All of these products make use of Ecuador's natural comparative advantages and require limited industrial processing.

After constituting more than 50 percent of total exports in the 1990s, primary products have seen their export share fall significantly in recent years. An important factor was prices rising more slowly for primary exports than for oil. Most primary products have had positive but declining real growth rates since the 1990s. Trends in average annual growth rates from the 1990s to the 2000s were 11 percent to 6 percent for bananas; 11 percent to 8 percent for fish and shrimp; 19 percent to -3 percent for coffee; 34 percent to 13 percent for flowers; 20 percent to 15 percent for processed agricultural products; and 55 percent to 11 percent for other agricultural products. An exception is cacao, which saw its average growth rate increase from 9 percent in the 1990s to 12 percent in the 2000s, reflecting growing demand for a high-quality niche product.

Bananas and shrimp are Ecuador's main primary exports. Bananas have seen their average share of primary exports fall from 39 percent to 36 percent in the 2000s (see Figure 3.1). Shrimp declined from 38 percent to 31 percent.[31] Other traditional commodity exports also declined; coffee's share became marginal due to increased competition from Colombia and Brazil, even though Ecuador is one of the few countries that still grows both Robusta and Arabica varieties of coffee. Cacao's share dropped in the 1990s but stabilized in the 2000s, with an average share of 5 percent, thanks to rising demand for high-quality Ecuadorian cacao. Three-quarter of cacao exports are used for high-quality chocolate.

New products have gained importance. The share of flowers in total exports increased from an average of 4 percent in the 1990s to 11 percent in the 2000s. This trend has flattened in recent years. Benefiting from the same favorable natural and international price conditions, other agricultural products also increased their relative contribution, though more slowly, going from an average share of 2 percent in 1990s to about 4 percent in the 2000s. With a more stable growth rate, processed agricultural products, which require few industrial inputs, increased their share of total primary exports from an average of 6 percent in the 1990s to 13 percent in the 2000s.

In general, the most dynamic new export commodities, such as flowers, broccoli, and processed agricultural products, benefit from a mixture of natural comparative advantages, trade openness, and opportunistic behavior in exploiting favorable international markets (see Boxes 3.1 to 3.4). The government's role in the development of these products has been limited, except in trade negotiations.

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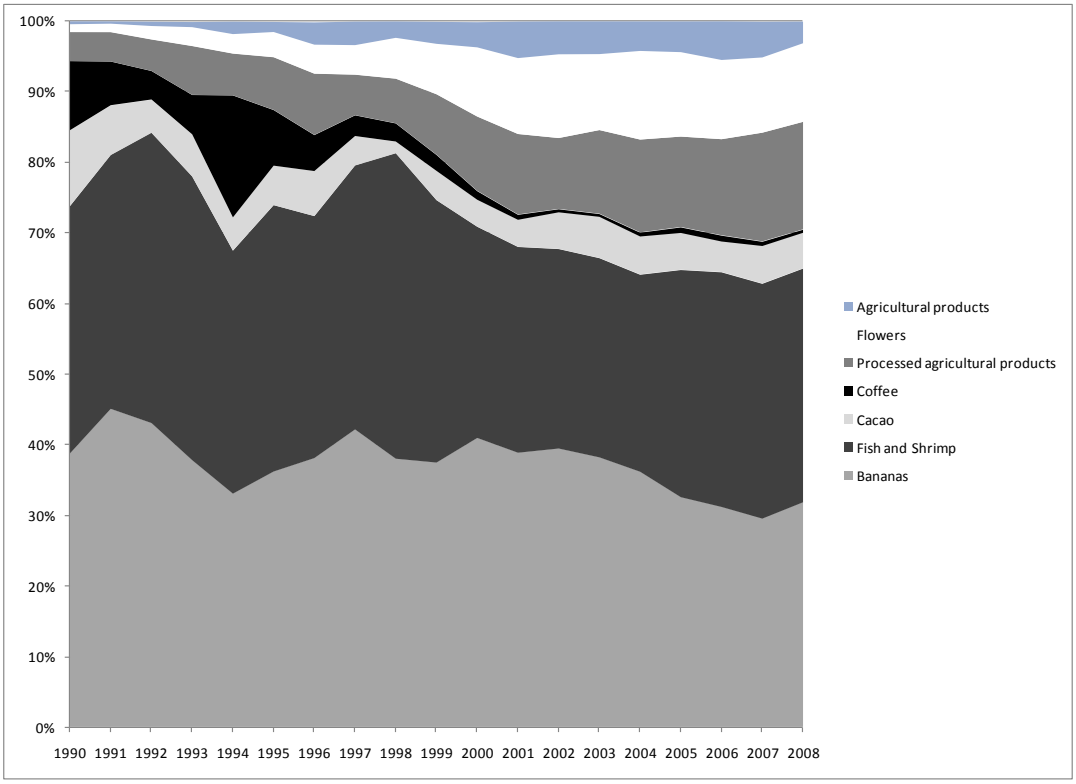
[31] Ecuador is the world's largest producer and exporter of bananas. The industry covers 131,000 hectares and is the country's main employer, providing jobs for 16 percent of the population. After oil, bananas were the second source of gross export revenues until 2005, then they fell to third place in 2006–08. Fish and shrimp had increased their gross revenues, benefiting from the country's geographic location and the Humboldt's cold ocean current. Shrimp production takes place in offshore farms to control for diseases and achieve better quality.

Figure 3.1. Share of total primary exports, by product, 1990–2008



Source: Banco Central de Ecuador.

Box 3.1. The boom in flower exports: Trade liberalization and comparative advantages

The growth of flower exports started in the late 1980s, following trade liberalization policies and increasing difficulties for Colombian flower exporters confronted by security problems. The elimination of US tariffs for Andean flowers further boosted Ecuadorian exports, which grew 60 percent in 1992. In the early 1990s, new markets opened in Eastern Europe after the fall of the Soviet Union.

These favorable conditions were hindered at the end of the 1990s by internal factors, including volcanic eruptions and financial and economic instability. Nonetheless, the sector grew 11.7 percent in 1999 and 8.0 percent in 2000. The growth rate in 2007 and 2008 remained close to 10 percent, although the current international economic crisis could hamper further expansion.

Compared to other agricultural products, land used to grow flowers is very productive; relatively small farms can produce high yields. This labor-intensive sector has become a major employer for rural communities near the plantations, raising household incomes and discouraging migration to urban areas. However, the intensive use of pesticides and fertilizers raises environmental and health-related issues.

Three factors could hinder the sector's continuous growth. First, the international demand for flowers, a luxury commodity, could be volatile in periods of global economic crisis, while the sustainability of some plantations depends on minimum volumes. Second, no global marketplace for flowers has emerged. Miami and Amsterdam, the two major hubs for flower marketing, have limited transparency in the negotiation process, preventing a more efficient allocation of Ecuadorian flowers despite the country's natural advantages. Third, increasing international attention to the use of chemicals in the plantations could imply a switch toward international demand for organic products, which could potentially hit Ecuadorian producers. Some companies are already addressing this issue, but some government policies and technical assistance could help the sector to take advantage of shifts in demand.

Source: Sawers (2005), BCE

Box 3.2. Broccoli exports:
Favorable trade conditions among growing worldwide demand

Broccoli illustrates the dynamic growth of new agricultural products. CORPEI points out that in the early 1990s, new medical studies stressed broccoli's benefits as a significant source of vitamins, minerals, antioxidants, and nutrients that help prevent heart disease and cancer. These finding motivated a change in food habits in industrial countries, particularly in Europe, boosting demand for broccoli.

Ecuador's natural conditions, especially in the Sierra, allowed private entrepreneurs to develop this crop. Changes in trade preferences, such as the European Union zero-tariff policy for Ecuadorian broccoli, have also had a favorable impact on exports.

International demand boosted export revenues and production. For instance, exports to Germany rose from US$0.3 million in 1990 to US$10.1 million in 1999, although they subsequently declined to US$5.7 million in 2000, as new nontariff barriers hurt exports. Trade preferences have also sustained exports to the US, which grew from US$0.7 million annually in the 1990s to US$11.3 million in the 2000s, making the US the largest importer of Ecuadorian broccoli.

Source: Centro de Inteligencia e Información CORPEI, BCE

Box 3.3. Heart of palm exports:
Self-discovery and seizing opportunity

Commercial plantations of heart of palm started in 1987. Even with the subsequent development of canning and packing facilities, exports remained marginal in the early 1990s, averaging US$0.8 million in 1990–94. France, the world's largest consumer of heart of palm, had largely relied on Brazilian supplies from 1983 to 1994. In 1994, France increased its standards for quality and health and blocked the sale of wild heart of palm due to environmental concerns. These regulations almost halved Brazilian heart of palm exports, providing an opportunity for Ecuadorian exports, which grew 589 percent in 1995.

A subsequent boom in worldwide production created excess supply and brought price declines in 1998–2001. Some Ecuadorian producers switched to other crops, but the volume of exports has grown, with the exception of a sharp fall in volume and prices in 2002, reflecting Argentina's economic crisis. Ecuador's exports grew 159 percent in 2003–08, although the trend changed in 2008 with the global financial crisis.

Heart of palm exports benefit from trade preferences from the European Union and the US. For instance, the US granted zero-tariff entrance to Ecuadorian heart of palm beginning in 1992, although Ecuador's US sales did not accelerate until the product's US popularity rose in the 2000s. Argentina has been the second largest market for Ecuadorian heart of palm since the early 1990s, even though the product has only benefited from a bilateral free trade agreement since 2004.

The success of this product reflects private entrepreneurship, which took advantage of favorable international conditions and successfully coped with several periods of adverse external shocks.

Source: Centro de Inteligencia e Información CORPEI, BCE I

Box 3.4. Palm oil exports:
World demand and environmental issues

Commercial palm plantations started in Ecuador in the mid-1950s, with small levels of production mainly because the product was used for the local oils and soaps industry. Export volumes remained marginal through the end of the century, averaging US$7.6 million in the 1990s.

Three main factors supported the growth in worldwide palm oil demand in the 2000s: (a) its growing use in the production of margarines and other processed fats, reflecting medical studies that highlighted better health properties for palm oil compared to other hydrogenated oils; (b) the growing demand for vegetable oils resulting from economic growth in China and India; and (c) the higher demand for biofuels—including palm oil—in the context of a global call to reduce carbon emissions.

Responding to growing demand, Ecuador boosted the amount of land devoted to palm oil production, raising exports to an average of US$58.0 million in the 2000s, including a startling US$129.3 million in 2007. The industry's prospects depend on international demand for biofuels and the outcome of discussions over the net impact on carbon emissions. New palm plantations, especially in Indonesia and Malaysia, are destroying primary tropical forests, threatening biodiversity, and increasing short-term carbon emissions. The crop's medium-term future could be bolstered by government policies supporting "greener" options, including certifications for Ecuadorian crops and limits on destruction of tropical forests.

Source: Fundación de Fomento de Exportaciones de Aceite de Palma y sus Derivados de Origen Nacional

Manufactured products

Manufacturing exports have gradually expanded, particularly in the early 1990s, constituting between 9 percent and 11 percent of total exports since 1993,[32] but have been volatile. The fastest growing sectors during in 1993-2008 were machinery, furniture, and minerals. Growth has slowed in most subsectors, particularly rubber and plastic, ceramics, and chemicals (see Table 3.1). The general slowdown in the industrial subsectors reflects the lack of further progress regarding trade openness since the early 1990s (see Box 3.5).

[32]. Ecuador's main manufacturing products include machinery (machinery and equipment, clocks, watches, stationery, pens); furniture (medical, bedroom); minerals (salt, iron and steel and their manufactures, wood pulp and paper); textiles (cotton fibers, wool fabrics, synthetic fibers, carpets, down); clothes (clothes, shoes, hats including leather manufactures); chemicals (pesticides, fertilizers, soaps, inks, tints, pharmaceuticals); ceramics (manufactures of gypsum, ceramic [bathroom fixtures], and glass); and rubber and plastic manufactures. See Appendix C for annual real growth and trends for specific subsectors.

Table 3.1. Manufacturing subsector's average exports growth rate, 1990s and 2000s

(%)

	Average growth rate	
Subsector	**1990s**	**2000s**
Machinery	31	35
Furniture	38	35
Minerals	33	24
Processed woods	17	11
Textiles	16	9
Clothes	19	11
Chemicals	26	10
Ceramics	25	9
Rubber and plastic	51	10

Source: Banco Central de Ecuador.

Box 3.5. Industrial manufacturing exports and trade agreements

The main markets for Ecuador's industrial manufacturing exports are Colombia, Peru, Venezuela, and the US, highlighting the importance of the Andean Free Trade Zone. Growth since 2003 mostly reflects exports of cars to Colombia, rubber and plastic to Colombia, Venezuela, and Peru, and more recently minerals and furniture to Venezuela and the US.

Textiles and clothes, industries dating back to colonial times, now include cotton as well as polyester, wool, nylon, acrylic, and silk fabrics. While production has traditionally been oriented to the local market, exports have become the main driver of the sector's growth, thanks to the Andean Free Trade Zone and the US Andean Trade Promotion and Drug Eradication Act. Clothes exports grew from US$2.7 million in 1990 to US$63.7 million in 2008, although strong Chinese competition has hurt exports to the US and the European Union and heightened competition in the market, both for clothes and fabrics.

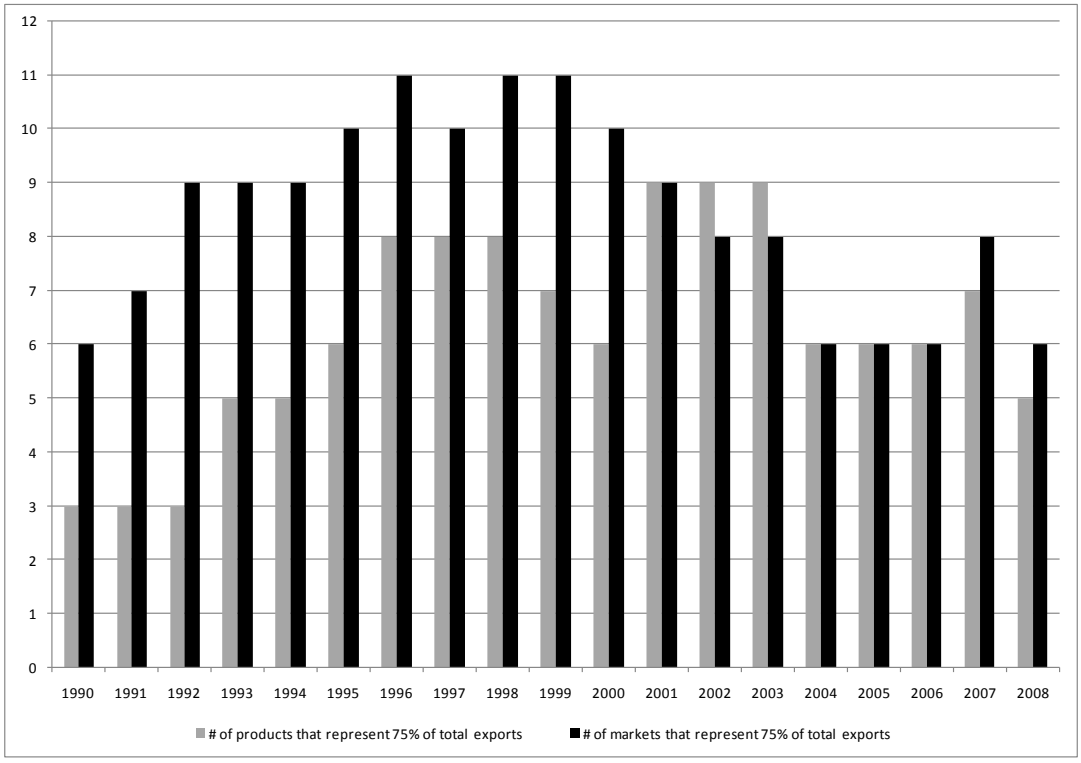
The manufacturing subsectors—including such resource-intensive sectors as wood processing—have seen their shares of total exports decline.

Source: Centro de Inteligencia e Información CORPEI, BCE, Asociación de Industriales Textiles del Ecuador

Export Diversification

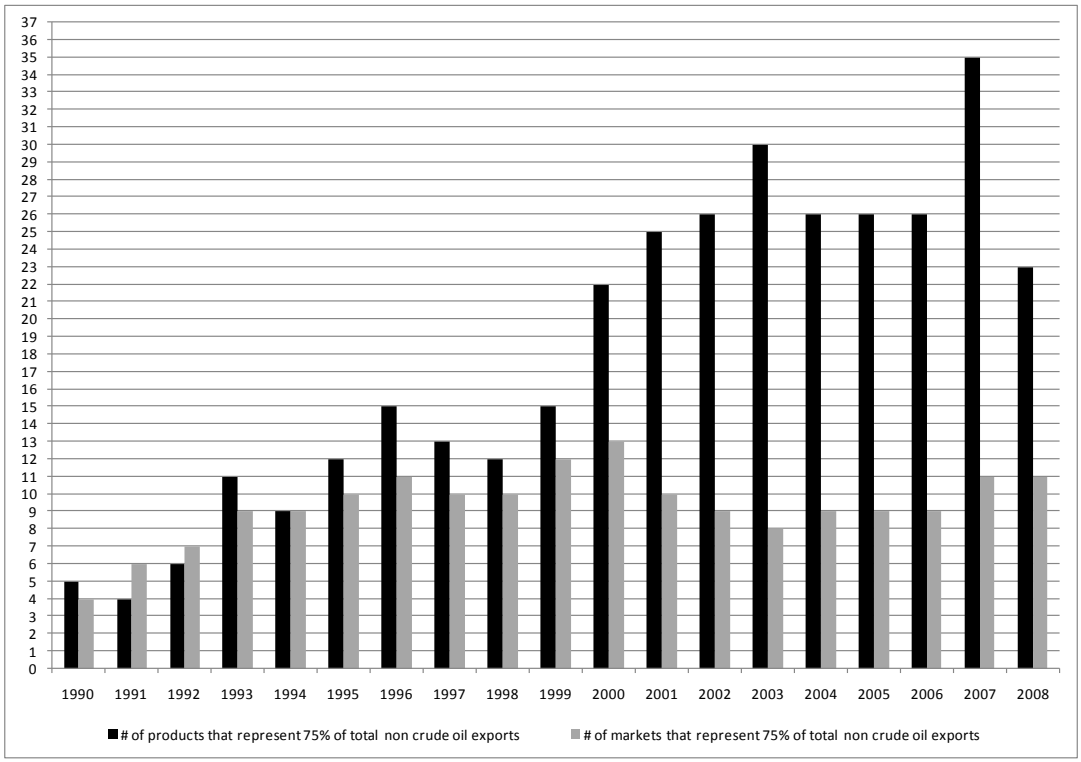
Ecuador's export basket has diversified in terms of number of export products and the number of export markets, especially in the 1990s. One measure of diversification involves tracking over time the number of products and markets that add up to 75 percent of exports. We consider both total exports, including crude oil, and non-oil exports to separate the impact of oil prices that were generally lower during the 1990s and higher during the 2000s. When including oil, an average of five products and nine markets added up to 75 percent of total exports during the 1990s; in the next decade, it was seven 7 products and seven markets (see Figure 3.2). Excluding oil, an average of 10 products and nine markets added up to 75 percent of non-oil exports during the 1990s. The averages rose to 26 products and 10 markets during the 2000s (see Figure 3.3), signaling a gradual move towards diversification.

Figure 3.2. Export Diversification – Total Exports



Source: Banco Central de Ecuador.

Figure 3.3. Export Diversification – Non Oil Exports



Source: Banco Central de Ecuador.

While those measures point to a gradual diversification of Ecuador's non-oil exports, they do not provide any insight about the exports' quality and degree of sophistication or about possibilities for developing new export products. Haussmann and Klinger (2009) explore these issues and suggest the following findings (See Box 3.6):

- Ecuador's non-oil exports generally have unit prices that are close to the highest for similar products in world trade, suggesting that the current export basket does not have much room to continue growing through quality improvements—that is, by moving towards higher prices for the same products through better quality;
- The current non-oil export basket has a low level of sophistication in the sense that most of its products are goods and services generally exported by countries with lower GDP per capita than Ecuador. As a result, those products call for labor input with relatively low wages;
- Ecuador's traditional exports—primary products such as oil, bananas, cacao, and coffee—occupy a very peripheral part of the "product space," with few connections to other goods.[33] Exports Ecuador has developed more recently—such as shrimp, fishing, flowers, and processed agricultural product—are less peripheral in the product space, implying that they could favor the development of similar new products.

[33] The "product space" provides a mapping that represents connections among different goods and services and the distance between all pairs of products. A country will find it easier to start producing goods and services that lay close to those it already produces because similar products require similar input specializations or productive skills. Close connections between products already exported and new products that might be developed for overseas sales will make it easier for a country to diversify toward the new products and gradually move up to more sophisticated products. It helps if the closely connected new product is growing rapidly in world trade.

Box 3.6. Structural Transformation in Ecuador, by Haussman and Klinger

Haussmann and Klinger consider that a product that a country exports has, depending on its quality and characteristics, a strategic value that helps promoting slower or faster growth. From that perspective, for a country whose current export products have a relatively low strategic value (generally primary or extractive goods), new products that could be easily incorporated to the exports basket (in the sense that they require similar inputs or technology than the existing products) will probably have a low strategic value too. On the other hand, products with high strategic value would likely require more specialized inputs, making it harder for a country to start producing and exporting them. Thus, the development of strategies aimed at producing similar products than those already exported should be easier to implement but may only bring limited impacts in terms of growth. Meanwhile, starting to produce more sophisticated products may provide stronger growth opportunities but would require more complex policies, as new products would typically require fairly different production factors and technologies than the existing ones.

Haussmann and Klinger apply this analysis to the list of priority sectors for Ecuador's development, defined by the Ministry's for the Coordination of Production, Competitiveness, and Commercialization and conclude the following:

1. Some products of Ecuador's current export basket (including flowers, fish & aquiculture, bio-fuels, and fruits & vegetables) have a relatively low strategic value, but it should be relatively easy to develop new products from these sectors;

2. The country's exports also include products (such as forestry, textiles, and appliances) with a higher strategic value, though developing all the necessary inputs and production capabilities to produce these goods may require more aggressive policies;

3. Finally, some specific products (i.e., the metal-mechanic and automotive sectors) hold an even higher strategic value, but jump-starting larger production in those sectors would require large investments and more complex technologies than those available locally. In other words, these sectors are more typical of countries with radically different productive structures that Ecuador.

Source: Haussman, R., Klinger, B. (2009). "Structural Transformation in Ecuador". IADB

Thus, the increased diversification of Ecuador's exports still falls short of ensuring a growing sophistication of the exported products, as the country continues exporting rather simple goods with a limited potential, in their view, to promote economic growth. Haussman and Klinger conclude that the country should consider more active policies to start producing different goods, which should be chosen by looking at the revealed sophistication or "strategic value" of potential product candidates. Ultimately, this strategy implies "picking winners" through a more sophisticated manner, which carries the risk of favoring some sectors that become dependent losers, rather than winners. An alternative approach would be to implement policies that address the constraints to growth, such as improving Ecuador´s business climate for all non oil sectors. However, the government is leaning in the direction of a "picking winners" approach, as discussed below.

The Government's Industrial Policy Plans

Ecuador's government launched a new industrial policy plan in 2008. It aims to change Ecuador's productive structure towards activities with more dynamic comparative advantage and create better employment opportunities. Specific objectives include increasing productivity; changing the extraction-based production model; contributing to "food and economic sovereignty"; increasing local value added in production; reducing asymmetries in regional development; encouraging technological innovation; and

promoting development of the industrial sector. Table 3.2 summarizes some mechanisms envisioned under such strategy.

The government's view is that the industrial sector is sluggish and requires stimulus from the state for several reasons: (a) industrial GDP has remained stable at around 13 percent of GDP since the mid-1990s; (b) industrial production and exports are concentrated in activities with low technological development and limited sophistication; and (c) the industrial sector generated only about 11 percent of total employment over the past decade. The plan establishes nine general policies to obtain the proposed objectives (see Table 3.2). Initially, the government set an implementation phase of four years. International funding would likely be needed to continue implementation, and Ecuador's contentious relationship with the international community has limited the funds available.

Some parts of the plan appear to address some growth constraints—such as financing availability, technologies, or human capital. Others confront some coordination and signaling issues, including certification programs, environmentally friendly products, or technological externalities. The plan remains vague and encompasses almost every sector, however, making it hard to develop focused priorities. The rationale for choosing the sectors to be supported remains unclear, although the plan mentions some such as the railroad, cement and steel industries, and this strategy has the risk of becoming subject to discretion and lobbying (see Nabli and others, 2006).

Table 3.2. The government's main industrial policy objectives

Policy objective	Explanation
Promote subsectors that generate more value added	The government proposes to establish incentives to attract investment, to enhance local capacity, to increase the production of high value added goods, and to promote nontraditional activities with high multiplier effects. Although the government document does not make clear how it would decide which sectors to promote, the government's program mentions several of its top priorities, including the cement industry, oil refining, the steel industry, railroads and transportation, and fertilizers (urea).
Promote scale economies through local production chains	This policy potentially includes all industrial subsectors. The government does not indicate how it would achieve scale economies and whether it would target specific growth constraints.
Develop micro, small, and medium companies	This policy aims to increase credit lines with preferential conditions for these companies, support productivity, promote entrepreneurship, and address financial constraints for industrial development.
Improve human capital	This policy seeks to raise the level of technical and administrative knowledge of people working in the industrial sector through government loans, grants, or scholarships. The aim is to lift a major constraint to industrial growth over the medium term and to generate positive externalities (such as boosting entrepreneurship) to promote growth.
Promote the production of quality goods and services	The proposed mechanism would involve enrolling businesses in a government certification program.
Add new technologies to existing productive processes	This policy seeks to promote scientific research and technological transfers to the industrial sector, aiming to generate positive externalities, scale economies, and high-quality goods.
Promote clean production processes	This policy focuses on improving the management of industrial waste, encouraging recycling, and reducing the use of products that are harmful to the environment. It would seek to help generate additional comparative advantages, raise export prices, and expand markets for environmentally friendly products.
Reduce transaction costs	This policy aims to improve distribution chains and storage facilities and to develop stronger public institutions. It could help removing information asymmetries within distribution chains, which would lead to better prices for small producers and to increased industrial output, especially for processed agricultural products.
Extend the supply of industrial products for both the local market and exports	This policy seeks to open new international markets for Ecuadorian products, although no clear details are provided on how trade negotiations and priorities would be set.

Source: Government of Ecuador, "*Política Industrial del Ecuador*", February 2009.

3.2 POLICIES THAT AFFECT THE GROWTH OF THE NON OIL SECTOR

Sustainable growth in a small open economy like Ecuador's will not depend solely upon growth in the oil sector or solely on growth of the non-oil sectors. A probabilistic

simulation compares some alternative combinations (see Appendix G). Boosting oil production by addressing some of the sector's weaknesses and boosting the industrial and non-oil primary production to diversify the economy would have similar effects on long-term growth. Accelerating oil production would be slightly better for overall growth in the short run, but diversified export production would be better in the long run. This would occur because oil production has only a small effect on industrial growth but it stimulates growth in services. Economic diversification has a slightly stronger long-run impact due to stronger intersectoral linkages between the non-oil tradable sectors and the rest of the economy. In terms of employment and income distribution, economic diversification would be better in the long run.

Through several policies to improve the overall business climate, the government could increase the growth of the non oil tradable sectors (see Box 3.7 on how labor and wage regulations affect the non-oil tradable sector). This section focuses on three policy areas that historically had an impact in Ecuador: (i) **dollarization** that could have an impact on the development opportunities of non oil products if it tends to appreciate the real exchange rate and lower the competitiveness of non-oil sectors; (ii) **fiscal policy** that could affect the business environment, as they may change economic incentives, particularly for small and medium size companies (in the 2010 Doing Business report, Ecuador ranks 77 out of 183 countries regarding the impact taxes have on the general business climate); and (iii) **trade policies**, which can impulse or hamper the development of non oil sector, including tariffs, quotas and trade agreements (in the 2010 Doing Business report, Ecuador ranks 125 out of 183 countries regarding the effect trade conditions have on general business climate).

Box 3.7. Labor and Wage Policies and the Non-oil tradable sector

Labor and wage policies may have an impact on the non oil sector's competitiveness and growth. On the one hand, wage determination is critical to determine the competitive position of non oil exports. Albornoz (1999) highlights through econometric tests the importance of real exchange rate depreciation—specifically, the bilateral real exchange rate with the US—as a key factor in stimulating non-oil primary exports, although with a long (six years) lag. As a dollarized economy, Ecuador cannot devaluate its nominal currency to grant a short-term competitive advantage to its exports. In this scenario, policies for determining wage increases that are not based on productivity gains can translate into higher inflation and thus into a real exchange rate appreciation.

In Ecuador, the minimum wage is set in two meetings conducted by the *Consejo Nacional de Salarios* (CONADE), which includes representatives of the main labor unions, the employers (Production and Commerce chambers) and the Ministry of Labor. In case a consensus cannot be reached during the meetings, the Minister of Labor has the final decision regarding the wage increase, considering inflation projections for the following year and other aspects.

Year	Minimum Wage	Wage Increase	Annual Inflation
2006	160		3.3%
2007	170	6.3%	2.3%
2008	200	17.6%	8.4%
2009	218	9.0%	5.2%

Source: BCE

The Table above shows that the minimum wage increases for 2006-09 have largely surpassed inflation

rates. Such wage increases have not considered labor productivity trends, thus increasing the relative production costs for the non oil sector, especially labor-intensive agricultural activities requiring non specialized labor and paying low wages close to the minimum wage levels. As a result, wage increases can hurt export competitiveness as well as formal employment.

Ecuador's labor regulations are rigid and may not facilitate job creation. In March 2008, the Constitutional Assembly prohibited labor intermediation and hourly work agreements, with the aim of addressing a perceived abusive usage of such alternatives. Meanwhile, this decision reduced the flexibility of companies to boost temporary or seasonal hiring. As a result, labor costs have increased as workers previously hired through intermediary companies must now be included in their formal workforce, which includes the social and pecuniary benefits set by the Labor Code. Such higher costs led some medium and small companies to reduce their formal workforce.

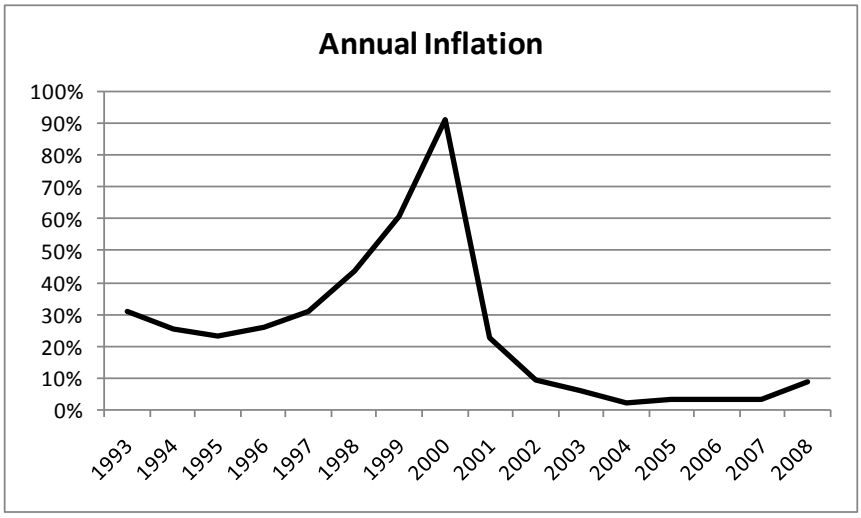
Dollarization and Growth

Dollarization brought important changes positive and negative to the Ecuadorian economy since 2001. The adoption of the dollar as national currency almost a decade ago transformed the relations between the different sectors, including modifying the time horizon for economic agents. It also implied a drastic change in the scope for public policy, because the country could no longer issue new money or rely on autonomous monetary and exchange rate policies.

Highlights of the positive side are:

- Dollarization brought stability to the economy, particularly regarding inflation and the exchange rate. Before dollarization, inflation had an explosive upward trend, with a 34.2 percent average annual rate in the 1990s that culminated in 90 percent by 2000 (see Figure 3.4). Subsequently, inflation decreased dramatically, the intended result under an exchange rate nominal anchor. In 2001-08, inflation averaged 7.3 percent. Price stability has translated into strengthened budgeting and planning for both the private and the public sectors and allowed many businesses to focus on their core activities rather than short-term financial considerations and liquidity management, thus strengthening long-term growth.

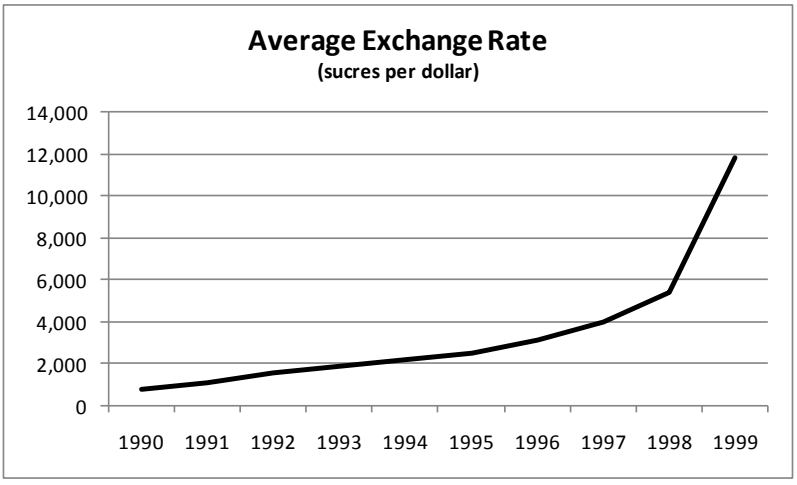
Figure 3.4. Inflation



Source: Banco Central de Ecuador.

- The nominal exchange rate also exhibited an explosive trend in the 1990s, particularly since 1996, with repeated cycles of inflation and nominal depreciation (see Figure 3.5). In the mid 90s, Ecuador financial system already had significant shares of dollarized deposits and credits. As the local currency (the Sucre) depreciated rapidly, many debtors with incomes in local currency but debts in dollars faced growing challenges to honor their commitments, which led to growing non-performing loans. The related perception of increased financial system risk further translated into higher financial dollarization and a faster depreciation of the Sucre. Dollarization helped to address these issues, lowering financial costs for the private sector.

Figure 3.5. Annual Exchange Rate



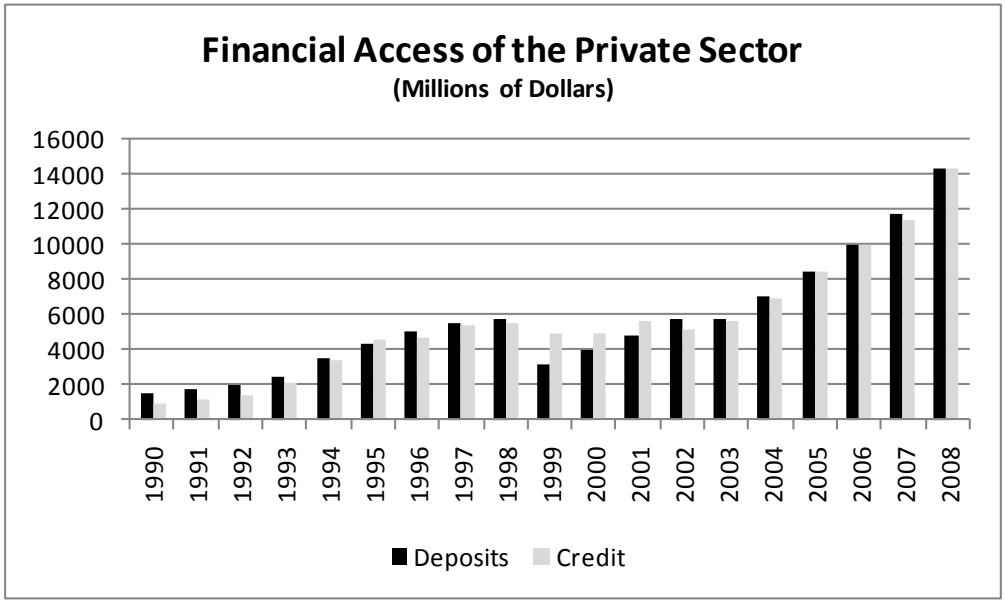
Source: Banco Central de Ecuador.

- With more stability, people increased their (dollar) deposits in the financial system and extended deposit maturities, allowing banks to increase lending, even though dollarization tightly the central bank's ability to grant emergency liquidity

loans, as it cannot issue its own currency. Bank deposits averaged US$3,522 million in the 1990s, with a slightly increasing trend until 1998. They fell drastically in 1999, when the weakening conditions of several large financial institutions became obvious. With dollarization, bank deposits have averaged US$8,013 million in the 2000s, with a growing and stable trend.

- Bank credits have followed similar trends. Annual average credit to the private sector was US$3,424 million during the 1990s. It increased to US$8,053 million after dollarization, helping to overcome one of the constraints to growth in Ecuador's non-oil sectors. Moreover, bank deposits and credits have remained stable despite episodes of political instability, including several unexpected changes of administrations. Thus, dollarization has helped isolate economic and financial trends from political instability.

Figure 3.6. Financial Access of the Private Sector



Source: Banco Central de Ecuador.

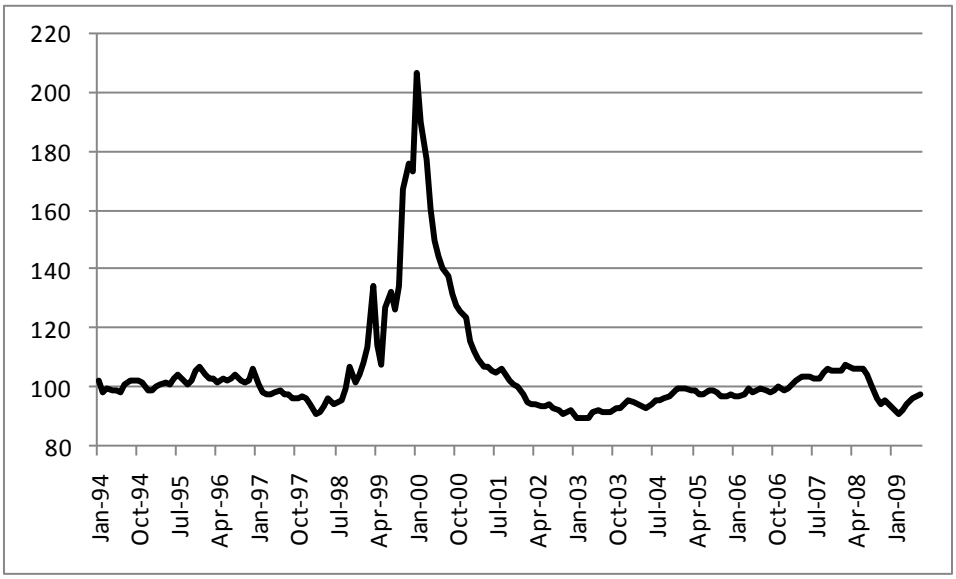
In theory, the negative impact of dollarization for growth would be related to external sector considerations, including the constraints it poses on export competitiveness and on countercyclical policy responses in the face of volatile exchange rates or growth fluctuations.

Important considerations on the negative side are:

- Dollarization has meant the loss of the nominal exchange rate as a policy instrument to cushion external shocks, such as the global financial crisis of 2009. If (non-dollar) trade partner countries devaluate against the U.S. dollar it hurts Ecuador's competitiveness. At certain times, Ecuador's bilateral real exchange rate appreciated with Colombia (November 2001 to March 2005), Peru (September 2001 to December 2007 and again since May 2008) and Ecuador's main European trade partners (for Germany, October 2000 to October 2004 and

April 2005 to January 2007). Overall, Ecuador's effective real rate index appreciated gradually from January 2002 to January 2007- as it should have with rising oil export prices, and it also depreciated as oil prices fell in late 2008 (see Figure 3.7).

Figure 3.7. Real Effective Exchange Rate.



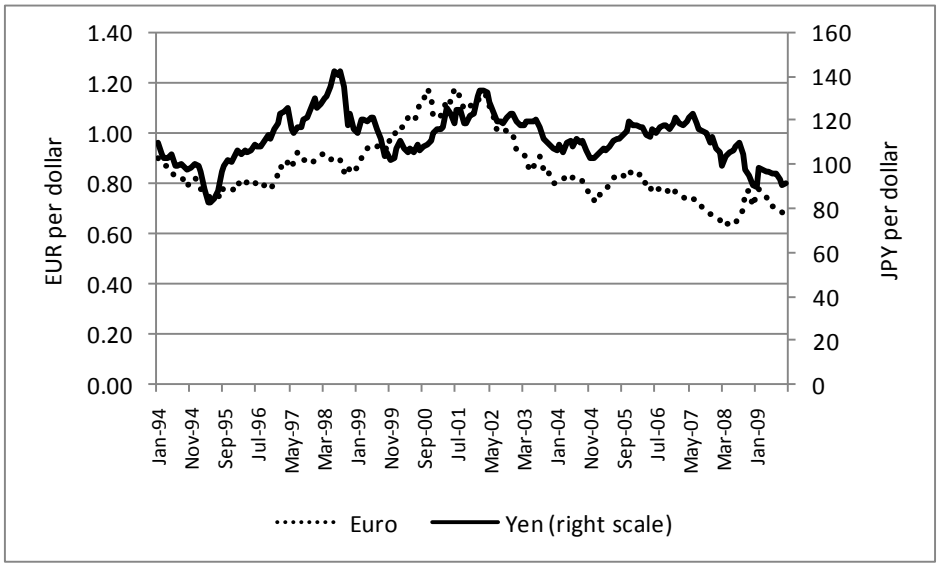
Source: Banco Central de Ecuador.

Note: A depreciation is represented as an increase in the RER index.

- Dollarization has also implied the loss of an independent monetary policy to cushion external shocks and economic fluctuations. The factors driving the US monetary policy are not necessarily correlated with Ecuador's economic environment. This could result in adverse conditions for growth or the financial system if, for example, the US monetary authorities were to raise interest rates in a period when Ecuador was experiencing a recession. The dollar has become relatively weaker against other major currencies, thus limiting the risks of real exchange appreciation (see Figure 3.8). Indeed, except from April 2008 to April 2009,[34] there is no evidence suggesting any substantial appreciation in real terms since dollarization. In addition, international interest rates have remained at moderate levels, including a sharp decline with the recent international financial crisis. Until mid-2008, moreover, growing world demand for natural resources boosted export prices of several Ecuadorian commodities to record levels. Despite their decline since mid-2008, oil prices have remained relatively high, supporting Ecuador's balance of payments.

[34] In this period of time the US dollar appreciated against other major currencies and also Ecuador's major trading partners currencies depreciated lead to an appreciation of the real exchange rate.

Figure 3.8. Evolution of US dollar against other major currencies.



Source: Banco Central de Ecuador.

Given the important growth of nontraditional exports in the 2000s, and considering the relatively benign external environment since dollarization, one could conclude that the favorable growth impacts have exceeded the negative consequences over dollarization's first decade in Ecuador. Up to now, dollarization has promoted favorable conditions for long term decision making for businesses and has sheltered the economy from the country´s political instability. Thus, dollarization can be seen as a factor that has promoted growth of the non oil sectors. In addition, as witnessed by the Argentinean experience of exiting convertibility (a somewhat more soft regime than dollarization), exit costs from dollarization could be extremely high, as lifting the regime would likely result in a severe depreciation of the new currency and may need to be accompanied by some compulsory measures to induce the population to accept the new currency. All in all, it has become even more important to implement adequate policies that ensure the sustainability of the dollarization regime.

Fiscal Policy and Growth

Diversifying Ecuador's economy does not mean shrinking the oil sector or even hindering its efficient growth; it does mean faster growth and increasing shares of GDP for the non-oil tradable sectors—both those that export and those that substitute efficiently for imports. Diversification also means broadening the government's sources of revenue, which have become more dependent than the economy as a whole on oil. The public sector has received 26 percent (2006) to 47 percent (2000) of its revenues from the oil sector, depending on oil price fluctuations. The following discussion focuses on how fiscal policy affects the allocation of resources between the nontraded and tradable non-oil sectors.

Some of the effects are direct: hiring more workers in the public sector (nontraded) leaves fewer for employment in producing private goods and services, both nontraded and tradable, but in Ecuador this effect is relatively small. More govenment borrowing may

crowd Ecuador's entrepreneurs and investors out of local capital markets. Other indirect effects may be positive, but do not particularly favor traded versus non-traded sectors. Good public provision of transportation and communication services, efficient customs service, good police, a well-educated workforce, and good regulation could make private production in all sectors more efficient and more attractive for investors.

Ecuador's public sector revenues grew modestly in the 1990s—an important achievement in a time of declining oil prices. Government revenues grew rapidly after 2000 at first because of macroeconomic stabilization and dollarization and after 2004 because of rising oil prices (see Table 3.3). The higher oil prices boosted oil-export revenues fourfold and had other important fiscal effects. For example, net revenue from domestic sales of petroleum derivatives disappeared and turned into a large deficit for Petroecuador, reflecting off-budget subsidies for consumption of increasingly expensive imports of derivatives.[35] This reduced substantially—by 8.3 % of GDP in 2008—the surplus that Petroecuador was able to pay to the government, compared to what it could have paid without the burden of the subsidy. All tax revenues rose—especially value added tax and income tax—due in part to higher aggregate incomes and spending based on the public sector distribution of oil revenues. Non-oil tax revenue as a share of GDP also rose, which suggests that the greater wealth of the public sector from oil did not dampen the efforts of tax collectors, as it did in other countries.

Table 3.3. Non Financial Public sector (NFPS) revenue in Ecuador, 1990–2008
(US$ and % of GDP)

	1990-94	1995-99	2000-01	2002-03	2004-05	2006	2007	2008
Total revenue (US$)	3,366	4,348	4,540	6,636	8,661	11,263	13,451	20,781
Total expenditure (US$)	3,379	4,978	4,418	6,374	8,186	9,928	12,554	21,458
Overall Balance— US$	-13	-630	122	262	475	1,335	897	-677
Non- Oil Overall Balance	-1,602	-2,164	-1,458	-1,398	-1,830	-1,588	-3,017	-10,323
Total revenue --% GDP	25.0	20.7	24.6	24.9	24.8	27.0	29.5	39.5
Oil revenue	11.8	7.3	8.5	6.2	6.6	7.0	8.5	17.6
Exports	6.8	3.2	6.3	3.9	5.4	7.7	7.2	16.9
Sale of products	2.2	2.7	1.5	1.8	0.8	0.0	0.0	0.0
Public enterp. Surplus (PetroEcuador)	2.8	1.4	0.7	0.5	0.4	-0.7	1.3	0.7
Non oil revenue	13.2	13.4	16.1	18.7	18.2	20.0	20.9	21.9
VAT	3.0	3.3	6.2	6.4	5.8	5.9	6.0	5.9
Excise taxes	0.7	0.5	0.6	0.9	0.8	0.8	0.8	0.9
Income tax	1.4	1.4	2.3	2.5	2.9	3.5	3.7	4.4
Capital flows tax	0.0	0.4	0.5	0.0	0.0	0.0	0.0	0.0
Customs	1.7	1.8	1.5	1.6	1.5	1.5	1.5	1.6
Other Taxes	0.5	0.3	0.1	0.0	0.0	0.0	0.0	0.0
Social security contr.	2.6	2.0	1.8	3.1	3.1	3.7	3.9	4.0
Other	3.3	3.7	3.1	4.2	4.1	4.5	5.0	5.1

Source: Banco Central de Ecuador.

[35] "Sale of products" includes revenues from the domestic sale of fuels and other derivatives. Since the local consumer prices were frozen as international prices rose in recent years, the government started subsidizing them on a net basis rather than receiving revenues from the sales. Thus, the corresponding revenue is null since 2006, with the remainder of the subsidy being discounted in "other incomes." The 2010 budget discloses revenues from oil derivative sales and spending in oil derivative subsidies in a more transparent way. Petroecuador profits are recorded under "public enterprises surplus."

Government spending grew strongly during the oil boom—162 percent in dollar terms from 2005 to 2008 and from 23.4 percent to 40.8 percent of GDP (see Table 3.2). This corresponded to a big increase in the nontraded sector, and it crowded out the tradable non-oil sectors as a share of non-oil GDP, although the absolute level of non-oil exports continued to grow slowly in real terms during these years.

During the run-up of oil prices from 2002 to 2008, Ecuador acted as if the windfall were permanent. Budgeted public spending increased at the same pace as revenues. In 2000–06, budgeted spending as a share of GDP stayed around 24 percent, where it had remained since the mid-1990s. Then public spending jumped to 27 percent in 2007 and then to 41 (see table 3.4) percent of GDP in 2008. For 2007, the absolute GDP increase was bigger than the increase in budgeted spending. For 2008, however, the absolute increase in public spending was larger than the GPD increase and there was a fiscal deficit —an extraordinarily expansive fiscal policy in boom times. Given that spending is harder to cut than to increase, the fiscal stance could prove unsustainable if oil revenues decline.

Incentives to invest in the non-oil sector—the essence of diversification—depend on expectations of stability in overall demand and macroeconomic policy. The procyclical aggregate fiscal policy in recent years has not contributed to this goal.

Although overall public spending should be countercyclical to stabilize aggregate demand, the composition of public spending also matters for fiscal sustainability. During the cycle's boom phase, a government should increase its saving and limit spending increases to areas where outlays will be relatively easy to reduce when the cycle turns. These considerations imply that most of any temporary increase in public spending should go to investment, a form of saving if the projects are worthwhile. When revenues start to falter, expenditures should be adjusted. The Correa administration increased investment during the cycle's boom, but when revenues started to falter expenditures were not adjusted.

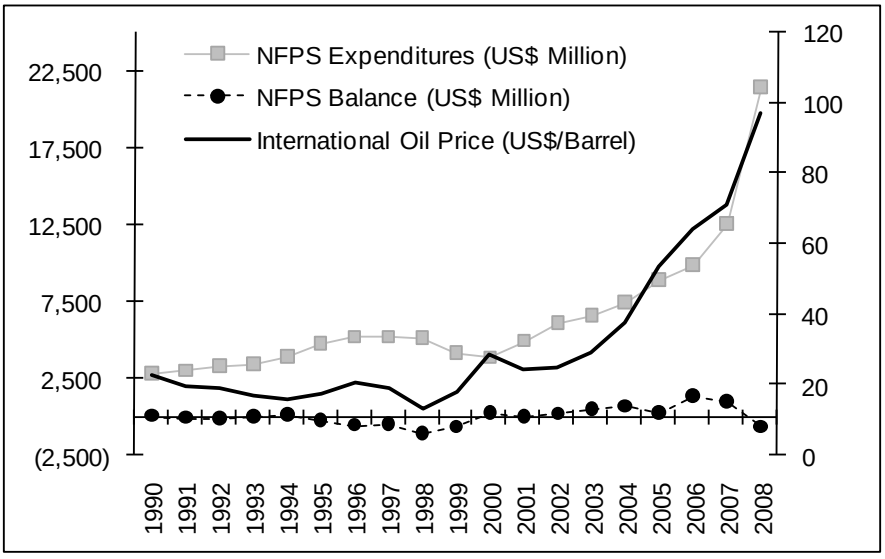
In Ecuador, government spending has increased significantly. All categories of spending, except interest, grew in absolute dollar terms and as a share of GDP during the 2005-2008 boom (see Table 3.4). There was no apparent effort to mitigate the procyclical pattern of fiscal stimulus or to assure fiscal sustainability when revenues declined. Public investment more than doubled as a share of GDP, which raises questions as to whether they managed efficiently the investment increase. Within current spending, purchases of goods and services—a relatively flexible category—stayed about constant as a share of GDP. The category showing the biggest increase was other current spending (including some social transfers), which rose from 3.5 percent of GDP in 2002–03 to 12.5 percent in 2008. Salaries' share of GDP rose from 8.0 percent in 2002–05 to 9.3 percent in 2008; it will rise further if GDP declines and the wages do not (World Bank 2004a: 49) (see Figures 3.9 to 3.11).

Table 3.4. Non-Financial Public Sector (NFPS) Spending trends, 1990–2008

	1990-94	1995-99	2000-01	2002-03	2004-05	2006	2007	2008
Total revenue (US$)	3,366	4,348	4,540	6,636	8,661	11,263	13,451	20,781
Total expenditure (US$)	3,379	4,978	4,418	6,374	8,186	9,928	12,554	21,458
Overall Balance— US$	-13	-630	122	262	475	1,335	897	-677
Total expenditure, % GDP	25.1	23.7	23.9	23.8	23.4	23.7	27.4	40.8
Current expenditure	18.3	17.8	18.1	18.1	18.5	19.1	20.0	27.1
Interest	5.0	4.7	5.6	3.1	2.3	2.1	1.9	1.4
External	4.5	3.6	4.5	2.4	1.8	1.8	1.7	1.3
Domestic	0.5	1.1	1.1	0.7	0.5	0.3	0.2	0.1
Salaries	7.1	6.8	5.6	8.0	7.9	7.6	8.1	9.3
Goods & services	2.7	2.3	2.7	3.5	3.1	3.6	3.4	4.0
Other	3.5	4.0	4.2	3.5	5.2	5.8	6.6	12.5
Capital expenditure	6.8	5.9	5.8	5.7	4.9	4.6	7.4	13.7
Investment	6.4	5.5	5.2	5.2	4.7	4.5	6.9	13.6
Central government	1.0	2.4	2.8	2.4	2.2	2.0	3.7	8.2
Public enterprises	2.7	1.8	0.6	0.8	0.7	0.8	1.2	2.4
Local governments	0.7	1.0	1.5	1.8	1.7	1.6	1.8	2.4
Other	2.0	0.3	0.2	0.2	0.1	0.2	0.3	0.6
Other capital exp.	0.4	0.4	0.6	0.5	0.2	0.1	0.5	0.1
Overall balance	-0.1	-3.0	0.8	1.2	1.4	3.3	2.1	-1.3
Non- Oil Overall Balance	-11.9	-10.3	-7.7	-5.0	-5.2	-3.7	-6.4	-18.9

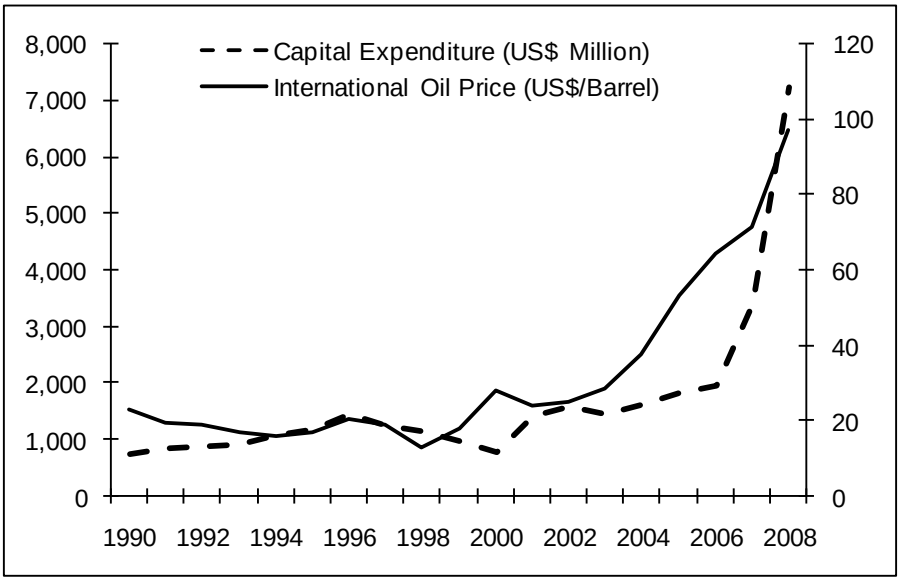
Source: Banco Central de Ecuador.

Figure 3.9. Non-Financial Public Sector (NFPS) expenditures (excluding subsidies), NFPS balance, and oil prices, 1990–2008



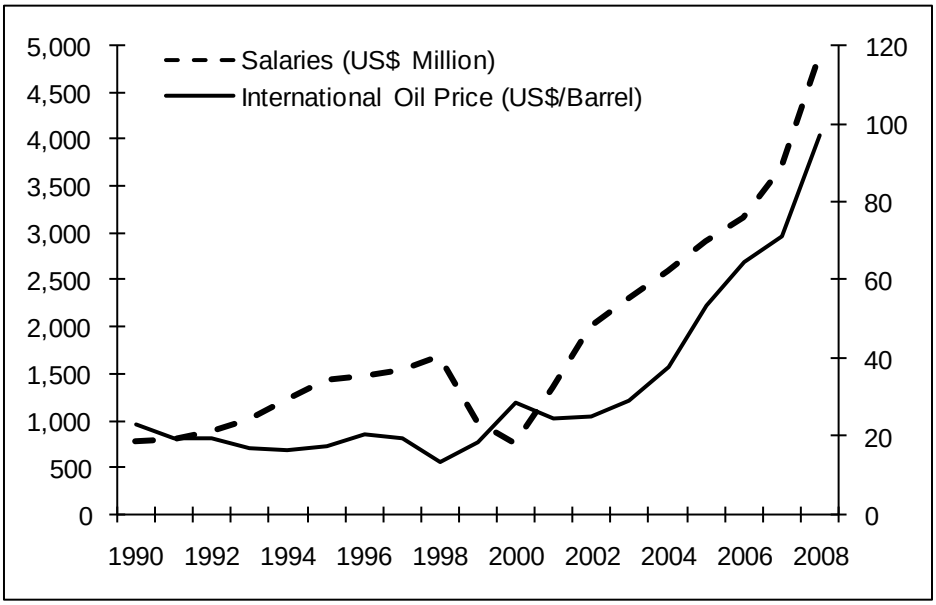
Source: Banco Central de Ecuador.

Figure 3.10. NFPS capital expenditures and oil prices, 1990–2008



Source: Banco Central de Ecuador.

Figure 3.11. NFPS payroll and oil prices, 1990–2008



Source: Banco Central de Ecuador.

In terms of sectoral distribution, the public spending itself expands the non-traded sector as a direct effect, but one can also look for secondary effects in improving the business climate, which supports both the tradable and nontraded sectors. About 4 percent of GDP goes to public spending goes to these areas, including education and transport & communications (see Table 3.5). Ecuador's spending for education and transport is low compared to the rest of Latin American and the dynamic exporters of East Asia (see

Table 3.6). Data for 2007-09, when available, may reveal some new trends. The steep rise of overall public investment in 2007-08 (Figure 3.20 and Table 3. 4) suggests a positive development impact, if the investment was well chosen and implemented. Of course, the large off-budget spending for subsidizing fuel imports in recent years did not help with economic development, traded or non-traded.

Table 3.5. The Functional Classification of Public Expenditures, 1995–2006

(Central government, % of GDP)

	1995-99	1998-2000	2001-03	2004	2005	2006
Education	2.55	2.23	2.49	2.63	2.54	2.63
Agriculture	0.83	0.63	0.74	0.34	0.44	0.29
Natural Resources	0.30	0.35	0.07	0.05	0.06	0.05
Industry and Trade	0.03	0.02	0.07	0.04	0.04	0.03
Tourism	0.00	0.00	0.02	0.01	0.01	0.02
Transport and Communications	0.87	0.77	0.91	1.05	0.93	0.87
General Administration	1.57	1.13	4.76	4.07	4.10	4.73
Environment	0.02	0.01	0.05	0.04	0.08	0.05
Internal Affairs	1.27	0.96	1.24	1.30	1.33	1.26
Defense	2.11	1.94	2.14	2.18	1.78	1.67
External Affairs	0.20	0.23	0.20	0.18	0.15	0.14
Public Finance	0.65	1.72	0.76	0.62	0.07	0.08
Social Welfare	0.34	0.31	0.42	0.27	0.71	0.70
Labor	0.04	0.03	0.03	0.02	0.03	0.03
Health	0.82	0.70	1.00	1.14	1.14	1.22
Urban Development & Housing	0.20	0.13	0.35	0.23	0.23	0.20
Sectoral Development	0.62	1.43	0.00	0.00	0.00	0.00
Other	0.09	0.06	0.09	0.15	0.05	0.13
TOTAL (without debt service)	**14.09**	**13.79**	**20.10**	**18.38**	**17.78**	**18.82**
Debt Service	**8.98**	**9.58**	**7.84**	**8.13**	**7.60**	**9.14**
TOTAL (with debt service)	**23.07**	**23.37**	**27.94**	**26.51**	**25.38**	**27.96**

Note: General administration includes national treasury, global spending and planning.
Source: Prepared from data of the Ministry of Finance of Ecuador and Central Bank of Ecuador.

Table 3.6. Spending in Education and Transport in Latin America and East Asia

Country	Public Education Spending [2/]	Transport Spending [1/]		
		Total	Public	Private
LAC:				
Argentina	3.8	0.3	0.2	0.2
Bolivia	6.4	2.8	2.6	0.2
Brazil	4.5	0.1	0.0	0.1
Colombia	4.9	0.9	0.7	0.2
Chile	3.2	2.0	1.0	1.0
Ecuador [3/]	2.6	0.8	0.8	…
Mexico	5.5	0.4	0.1	0.3
Peru	2.5	0.3	0.1	0.1
East Asia:				
Cambodia	1.6	1.0	1.0	…
China	…	3.6	3.6	…
Indonesia	3.5	1.0	1.0	…
Lao PDR	3.2	1.3	1.3	…
Mongolia	5.1	1.5	1.5	…
Philippines	2.5	0.8	0.8	…
Thailand	4.3	1.0	1.0	…
Vietnam	…	4.9	4.9	…

1. For LAC, transport spending refers to investment in roads and railways (average for 1996–2001). For Ecuador, it also includes telecommunication spending. For East Asia, transport spending refers to 2003.
2. Latest year available.
3. For Ecuador, data come from Ministry of Finance and Central Bank of Ecuador.
… Not Available.
Source: Based on World Development Indicators, Calderon and Serven 2004; Fay and Morrison 2005; ADB, World Bank, and Japan Bank for International Cooperation 2005; Ministry of Finance of Ecuador, and Central Bank of Ecuador.

Ecuador's tax laws specified some direct distribution of revenue until December 2007, when the *Ley Reformatoria para la Equidad Tributaria en el Ecuador* eliminated most of the earmarks. The direct distribution had, for instance, channeled 10 percent of personal and corporate income tax revenue to the Development Fund, 11 percent to universities and technical schools, and 6 percent to the local government or municipality where the tax was collected (*Ley de Régimen Tributario Interno*, November 2004, Article 51). Regarding oil revenues, the *Ley Orgánica para la Recuperación del Uso de los Recursos Petroleros del Estado y Racionalización Administrativa de los Procesos de Endeudamiento* eliminated most earmarks and the Oil Funds in April 2008.[36] The rationale was to give the government more flexibility to reallocate resources. For intersectoral reallocation, this was perhaps a good idea; on the other hand, the

[36] Ecuador's Constitution of September 2008 only allows earmarks for decentralized regional governments, health, education, universities, and research and development.

intertemporal reallocation out of the stabilization fund (from smoother future spending to more spending now) was detrimental to macroeconomic stability.

The tax side of fiscal policy could use some reforms to improve the incentives for overall private sector investment and for the allocation between tradeable and nontradable non-oil sectors.

- ***Income taxes***. The corporate income tax is 25 percent, but companies are required to distribute an additional 15 percent of profits to their employees. Therefore, the effective corporate income tax rate should be considered 40 percent.[37] This is the biggest tax impediment to private investment. By comparison, rates are 32 percent in Colombia, 28 percent in Mexico, 27 percent in Peru, and 17 percent in Chile. Ecuador's tax regime is not overly distortive, with no special rates for certain regions or sectors, except for the oil industry. Also, the corporate income tax has a clause reducing by half the tax on retained earnings. While not directly affecting the balance between tradable and nontraded sectors, this feature constitutes a tax incentive for established firms to reinvest, compared to new firms needing to raise funds from after-tax sources of savings. This may discourage competition and innovation in the private sector because it benefits established economic interests, which typically have greater political connections. To encourage investment without discriminating against smaller and newer firms and without costing as much revenue, the government might consider other tax strategies, such as allowing firms to count at least part of increased investment outlays as expenses, thus reducing their taxable income.

- ***Value added tax (VAT)***. The VAT is Ecuador's most important source of non-oil fiscal revenue. With a rate of 12 percent, it brought in about 6 percent of GDP in 2006–08, or 30 percent of all non-oil revenues, which is typical for the LAC region. Some reforms of the VAT could give more encouragement to the tradable sectors, as well as raise more revenue. A destination-based VAT, if well implemented, should tax domestic consumption from domestic production and from imports; it should leave production untaxed, which should encourage the exportable segment of tradables, including tourism services sold to foreigners. Ecuador's VAT, however, is more complex. Like many countries in Latin America, Ecuador's zero rates apply to many items in domestic consumption, including food (processed as well as not), medicines, publications, book printing, agricultural inputs, passenger transport, utilities, public entertainment, craftsmanship, education, and health services. A shorter list of untaxed items would suffice to shield most low-income households' consumption from the VAT—so this tax structure lowers revenues and gives large tax benefits to upper-

[37] The 15 percent redistribution requirement differs from a tax in at least two ways. First, it is compensation to workers and could to some extent lower the wages the company needs to pay to attract workers. From the employer's point of view, this quasi-wage is attractive because it only has to be paid when the company is doing well; however, it is paid with after-tax income. Second, foreign companies--especially those based in the US—may find the distribution to workers less attractive than an equivalent payment in income tax. Only the income tax can be credited against tax obligations in the US.

income households. In addition, a long list of items at zero rates dilutes the VAT's incentives in favor of tradable goods. Indeed, Ecuador's zero-rate list includes a large share of nontraded goods and services, which leaves the VAT primarily on consumption of tradable goods, domestically produced or imported.[38] Another issue involves tax-rebate schemes. How well they help exporters get back the VAT paid on earlier stages of production is important for the question of incentives for tradable versus nontraded sectors. In our meetings with a small sample of industry representatives, only a few respondents from the tourism sector raised the issue of VAT rebates.

In summary, the tax system is not a major hinderance to the tradable sector in Ecuador, but some areas could be improved. First, many non-tradable goods and services have zero VAT rates, while most tradable goods face the VAT, except for exports. Second, the effective income tax rates on capital are high, and only well-established enterprises already making profits benefit from the reduced tax rate on reinvested profits. The latter puts start-up firms, which do not have profits yet, are at a relative disadvantage.

Trade agreements, trade protection, and growth

This section examines the correlation between sector growth and freer trade and whether successful sectors—those with growth of output and exports—have benefited more than unsuccessful ones from preferential trade agreements. This review includes the Andean Trade Promotion and Drug Eradication Act (ATPDEA) with the US, the free-trade component of the Andean Community (CAN) agreements, and the free-trade agreements between the CAN and *Mercado Común del Cono Sur* (MERCOSUR) and between Ecuador and Chile. They represent the main agreements with Ecuador's largest trading partners. The countries included in these agreements received an average of 60 percent of Ecuador's total exports in 1990-2008, measured either in volume or in FOB dollars (see Figure 3.12 and Table 3.7).

[38] In August 2009, President Correa recommended some tax policy changes, two of which would make the VAT more favorable to the tradable sectors—rebating the VAT to tourism firms (tradable sector) and requiring public enterprises and periodicals (mostly nontraded) to pay the VAT. These changes were still under discussion in November 2009.

Figure 3.12. Trade agreement destinations as percentage of total exports

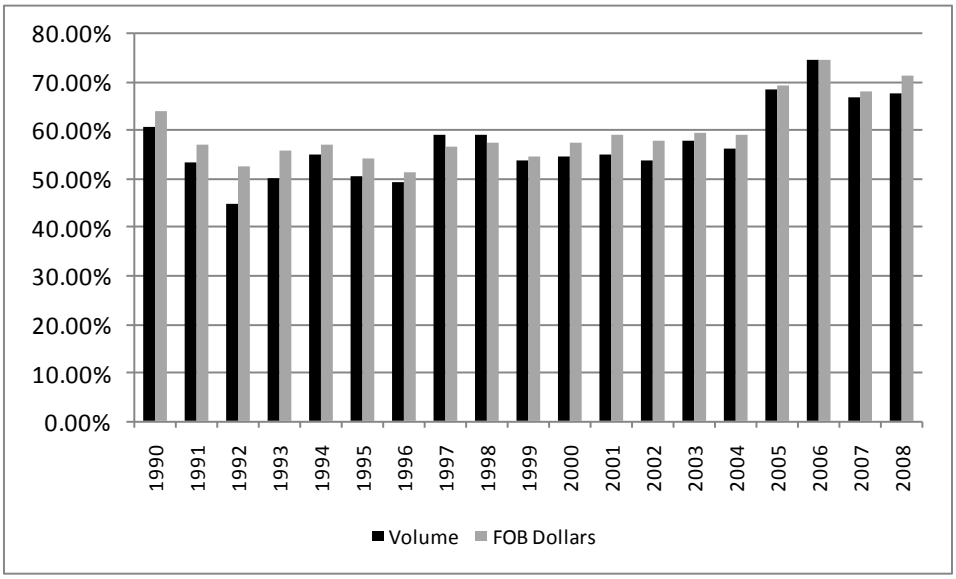


Table 3.7 Ecuador's Major Trade Partners and its Exports
(In USD millions)

Country	2008	Average Exports 1990-2008	Average Exports 1990-99	Average Exports 2000-08	Average Growth
UNITED STATES	***8,350.2***	***2,793.5***	***1,545.3***	***4,180.3***	***171%***
CAN	***3,199.3***	***941.3***	***371.7***	***1,574.1***	***323%***
PERU	1,702.4	463.0	141.6	820.1	479%
COLOMBIA	775.3	333.6	193.1	489.8	154%
VENEZUELA	700.0	138.4	33.6	254.8	658%
BOLIVIA	21.6	6.2	3.4	9.4	178%
MERCOSUR	***143.0***	***94.1***	***89.3***	***99.4***	***11%***
ARGENTINA	91.4	57.6	58.7	56.3	-4%
BRASIL	45.2	30.1	22.4	38.7	73%
URUGUAY	4.7	5.3	7.2	3.3	-55%
PARAGUAY	1.7	1.1	1.1	1.2	15%
CHILE	***1,503.4***	***275.8***	***162.3***	***402.0***	***148%***
Countries without trade agreements	***5,316.5***	***2,371.9***	***1,708.1***	***3,109.5***	***82%***

Source: Banco Central de Ecuador

ATPDEA. This agreement went into effect in 2002, replacing the decade-old Andean Trade Preference Act (ATPA). The ATPDEA grants trade preferences to Bolivia, Colombia, Ecuador, and Peru, seeking to strengthen legal industries in the Andean countries as alternatives to the production and trafficking of drugs. These unilateral preferences represent an important benefit for the Andean countries.[39]

The US has 13,613 tariff categories, 29 percent of which are currently duty free for all countries (see Table 3.8). The ATPDEA provides zero or reduced tariffs for an additional 46 percent of categories for exports from the Andean countries. Overall, Andean countries face zero or reduced tariffs for three-quarters of the total US tariff categories.

The ATPDEA and its predecessor pact have boosted Ecuador's exports to the US, especially for agricultural products (see Table 3.9). For example, flower sales grew from US$11.8 million in 1990, before any trade preference, to US$407.3 million in 2008, with steady increases over that period. The impact has been similar for other agricultural products, such as heart of palm, broccoli, and asparagus, which collectively rose from US$2.0 million in 1990 to US$46.6 million in 2008. Processed agricultural products, such as juice and pulps, also benefited from the trade preferences, particularly in the 2000s under ATPDEA. Although tariff reductions extended to industrial manufactures, their growth was slower.

[39]. In 2008, Peru left the ATPDEA after signing a full free-trade agreement with the US. In November 2008, President Bush asked Congress to remove Bolivia from the program for failure to cooperate in efforts to eradicate the cultivation and sale of narcotics.

Table 3.8 U.S. Custom Tariffs (2004)

(percentage of sector with preferences)

Sector	No Tariffs	Extra ATPDEA Preferences	Average tariff
Agriculture and Farming	21%	67%	1%
Fishing	66%	30%	4%
Oil and derivatives	39%	29%	32%
Petrochemicals	35%	65%	0%
Plastic and Rubber	23%	76%	2%
Leather products	10%	71%	19%
Wood and paper	44%	56%	0%
Textiles	6%	13%	81%
Precious Mineral	45%	55%	0%
Steel and manufactures	17%	83%	0%
Copper and manufactures	14%	87%	0%
Aluminum and manufactures	6%	94%	0%
Other metals and manufactures	28%	72%	0%
Machinery	56%	44%	0%
Vehicles and parts	48%	52%	0%
Others parts	83%	17%	0%
Other	27%	24%	49%
Total	29%	46%	25%

Source: USITC, CAN

Reading: Out of all Agriculture and Farming products imported to the U.S., 21 percent of categories have no tariffs, and 67 percent of categories benefit from additional trade preferences (no protection or reduced tariffs) under the ATPDEA. The last column shows the average tariff applied for that sector under the ATPDEA

CAN tariff agreements. In 1992, CAN member countries adopted Decision 24,[40] aimed at establishing a free-trade area by the end of 1992. Ecuador was allowed to postpone the process until December 1993. The agreement implies that all goods satisfying CAN's origin regulations will be traded free of tariffs and other restrictions. Peru did not participate in this process, but subsequently approved Decision 414, which deregulated trade with other member countries in December 2005. Andean countries are allowed to impose restrictions due to sanitary and health issues and can request authorization to impose temporary restrictions aimed at addressing balance-of-payments imbalances.

[40] CAN member countries are Bolivia, Colombia, Ecuador, Peru, and Venezuela.

Table 3.9. Nominal growth rates of major non-oil exports

	FOB Dollars		Volume	
	United States		United States	
	1990–99	2000–08	1990–99	2000–08
Fish, shrimp, and other sea products	6%	4%	3%	4%
Flowers	31%	14%	29%	10%
Bananas	3%	3%	1%	-2%
Oil derivatives	20%	32%	13%	4%
Cacao	35%	15%	57%	2%
Processed agricultural products	5%	17%	9%	14%
Minerals	80%	30%	15%	0%
Wood and paper	11%	8%	12%	4%
Agricultural products	29%	18%	38%	15%
	Colombia		Colombia	
	1990-99	2000-08	1990-99	2000-08
Manufacturing	100%	42%	162%	37%
Fish, shrimp, and other sea products	15%	15%	15%	10%
Processed agricultural products	16%	16%	21%	10%
Minerals	34%	20%	26%	6%
Clothes	579%	18%	554%	10%
Wood and paper	46%	18%	28%	16%
Rubber and plastic products	171%	10%	280%	-3%
	Peru		Peru	
	1990-99	2000-08	1990-99	2000-08
Processed agricultural products	35%	26%	180%	74%
Minerals	7%	24%	19%	16%
Manufacturing	34%	86%	93%	153%
Wood and paper	36%	19%	26%	16%
Chemical products	40%	15%	50%	24%
Rubber and plastic products	26%	10%	26%	6%
Fish, shrimp, and other sea products	112%	19%	170%	19%
Clothes	480%	18%	299%	82%
	Chile		Chile	
	1990-99	2000-08	1990-99	2000-08
Processed agricultural products	30%	29%	16%	13%
Bananas	8%	4%	8%	3%
Fish, shrimp, and other sea products	28%	7%	26%	4%
Manufacturing	78%	142%	1133%	86%
Cacao	7%	17%	10%	1%
Minerals	29%	26%	35%	23%
Flowers	59%	24%	54%	28%
Agricultural products	13%	16%	38%	27%

Source: Banco Central de Ecuador.

In general, the average growth rate of exports is lower for 2000-08 than for the 1990-99 period when the main trade agreements took place. A first explanation could reflect the potential impact of dollarization over exports growth and competitiveness but, as previously discussed, there is no evidence of significant real appreciation (except in 2008). The lower growth rates in the 2000s could simply imply the convergence of exports to a more stable pattern, following the initial boom of nontraditional primary exports in the 1990s, with initial growth rates at unsustainable levels over the medium-term.

Colombia has historically been Ecuador's second most important trading partner, but only a few sectors have gained from freer trade with Colombia. Industrial manufacturing, especially vehicles and parts, grew from US$86.8 million in 2003 to US$301.4 million in 2008. Clothes and accessories went from US$30.5 million in 1990 to US$53.4 million in 2008). Other beneficiaries have been rubber and plastic products and processed wood and paper. No other sectors have significantly increased exports to Colombia.

Oil represents 80 percent of Ecuador's exports to Peru. Non-oil exports to Peru were limited during the 1990s, partly due to border issues, which ended in 1998, opening the way to more dynamic trade in the 2000s, especially for processed agricultural products, minerals, industrial manufacturing, processed wood and paper, and fish and shrimp.

CAN-MERCOSUR free-trade agreement. The pact between MERCOSUR members Argentina, Brazil, Paraguay, and Uruguay and Andean Community members Colombia, Ecuador, and Venezuela was ratified in April 2005. It includes a gradual and automatic tariff reduction, with a specific schedule and scale by country and a pledge not to introduce new trade barriers.

Focusing on Ecuador's trade with Argentina and Brazil from 2005 to 2008, Table 3.10 presents export trends for the six most-favored items in terms of tariff preferences and the six sectors with the largest Ecuadorian exports to the two countries. For example, bananas had a 100 percent trade preference—a zero tariff—for the entire period, but exports to Argentina only began to increase after 2007. Despite having a zero tariff for crude oil, no trade took place because both countries export oil. Fish and shrimp exports grew as trade preferences increased from 2004 to 2007 but fell in 2008. Arts and antiques, flowers, and cacao remained marginal in bilateral trade, despite enjoying strong trade preferences. Some sectors, such as processed agricultural products and industrial manufacturing, increased the value of exports to Argentina, despite having more modest reductions in tariffs of 50 percent to 80 percent. This suggests that negotiated trade preferences had a limited impact on the volume of trade with MERCOSUR (see Table 3.11).

Table 3.10. Exports to Argentina: Most favored sectors, 2004–08

	2004		2005		2006		2007		2008	
	Trade Liberalization (%)*	Exports (US Thousands)	Trade Liberalization (%)*	Exports (US Thousands)	Trade Liberalization (%)*	Exports (US Thousands)	Trade Liberalization (%)*	Exports (US Thousands)	Trade Liberalization (%)*	Exports (US Thousands)
Bananas	100%	19,686	100%	18,211	100%	18,017	100%	30,733	100%	48,598
Oil	68%	0	76%	0	84%	0	92%	0	100%	0
Cacao	81%	802	88%	887	95%	473	96%	760	98%	2,478
Fish, shrimp and other sea products	84%	5,153	88%	8,976	92%	12,979	95%	19,918	98%	15,492
Art and Antiques	92%	0	93%	0	94%	0	95%	1	96%	0
Flowers	91%	223	92%	824	93%	972	94%	1,476	95%	1,483

*Percentage of completion of the process of removing trade barriers and tariffs
Source: Banco Central de Ecuador.

Table 3.11. Exports to Argentina: Sector with highest exports, 2004–08

	2004		2005		2006		2007		2008	
	Trade Liberalization (%)*	Exports (US Thousands)	Trade Liberalization (%)*	Exports (US Thousands)	Trade Liberalization (%)*	Exports (US Thousands)	Trade Liberalization (%)*	Exports (US Thousands)	Trade Liberalization (%)*	Exports (US Thousands)
Bananas	100%	19,686	100%	18,211	100%	18,017	100%	30,733	100%	48,598
Fish, shrimp and other sea products	84%	5,153	88%	8,976	92%	12,979	95%	19,918	98%	15,492
Processed agricultural products	56%	6,358	61%	8,853	66%	7,710	72%	16,005	77%	14,474
Manufacturing	51%	1,439	57%	2,018	63%	1,853	69%	4,605	75%	5,103
Cacao	81%	802	88%	887	95%	473	96%	760	98%	2,478
Flowers	91%	223	92%	824	93%	972	94%	1,476	95%	1,483

*Percentage of completion of the process of removing trade barriers and tariffs
Source: Banco Central de Ecuador.

Table 3.12. Exports to Brazil: Most favored products, 2004–08

	2004		2005		2006		2007		2008	
	Trade Liberalization (%)*	Exports (US Thousands)	Trade Liberalization (%)*	Exports (US Thousands)	Trade Liberalization (%)*	Exports (US Thousands)	Trade Liberalization (%)*	Exports (US Thousands)	Trade Liberalization (%)*	Exports (US Thousands)
Art and Antiques	100%	0	100%	0	100%	0	100%	0	100%	0
Bananas	100%	0	100%	0	100%	0	100%	0	100%	0
Oil (petroleum)	100%	52,128	100%	68,936	100%	0	100%	0	100%	0
Petroleum Derivatives	98%	31	98%	0	99%	0	99%	0	100%	0
Cacao	90%	425	92%	173	94%	0	96%	0	99%	114
Flowers	92%	3	93%	19	94%	81	95%	154	96%	85

*Percentage of completion of the process of removing trade barriers and tariffs
Source: Banco Central de Ecuador.

Table 3.13. Exports to Brazil: Sectors with highest exports, 2004–08

	2004		2005		2006		2007		2008	
	Trade Liberalization (%)*	Exports (US Thousands)	Trade Liberalization (%)*	Exports (US Thousands)	Trade Liberalization (%)	Exports (US Thousands)	Trade Liberalization (%)*	Exports (US Thousands)	Trade Liberalization (%)*	Exports (US Thousands)
Fish, shrimp and other sea products	74%	3,030	80%	3,904	86%	6,118	90%	6,735	95%	11,455
Manufacturing	52%	698	60%	649	68%	1,400	76%	11,614	82%	7,084
Wood and Paper	59%	8	67%	6	75%	26	83%	1,365	88%	3,835
Minerals	67%	106	73%	303	80%	828	86%	1,493	90%	1,892
Chemical Products	64%	11,164	71%	6,073	78%	6,271	85%	3,009	89%	2,027
Processed Agricultural Products	59%	4,527	66%	7,363	73%	6,307	81%	6,320	86%	11,703

*Percentage of completion of the process of removing trade barriers and tariffs
Source: Banco Central de Ecuador.

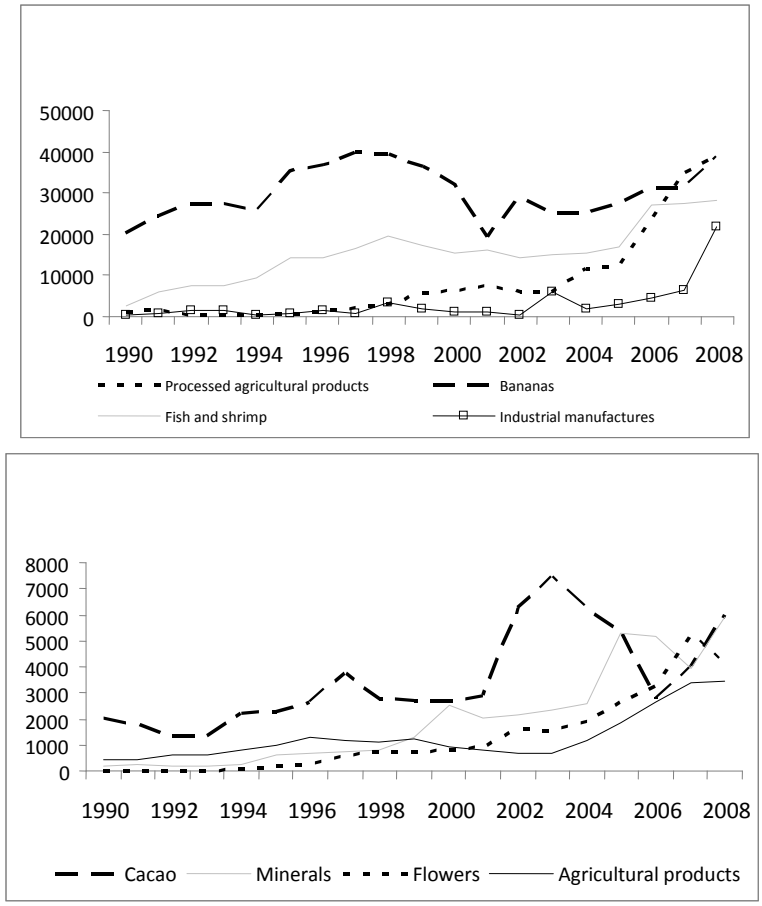
Turning to Ecuador's trade with Brazil, none of the six sectors receiving from the strongest trade preferences posted significant exports, with the exception of oil in 2004–05, which later fell to zero (see Table 3.12). The gains from all products favored under the trade agreements added up to less than 1 percent of bilateral trade over the entire period.

The six sectors with the highest export value to Brazil show a positive correlation between increasing trade preferences and export growth (see Table 3.13). This is especially important for processed agricultural products, fish and shrimp, industrial manufacturing, and processed wood products. As preferences increased from 60 percent to 75 percent, industrial manufacturing sales to Brazil increased from less than 1 percent of total exports in 2005 to 28 percent in 2007. The shares of processed agricultural products and fish and shrimp in total exports fluctuated, but the trend is clearly positive following the gradual liberalization of trade.

The Ecuador-Chile free-trade agreement. The two countries established their free-trade agreement in December 1994. After completing a schedule of gradual trade liberalization, all bilateral trade restrictions were lifted in 2000. Temporary trade restrictions for up to one year are allowed when the countries face balance-of-payments problems and when imports temporarily affect local production of similar products. Ecuador's exports grew slowly in 1995–2000, but more quickly afterward as full trade liberalization took effect. Sales of flowers, minerals, processed agricultural products, and fish and shrimp increased as trade became freer (see Figure 3.13). In contrast, trade liberalization apparently had little to no effect on other sectors, such as cacao, bananas, and oil.

Figure 3.13. Exports to Chile, 1990–2008

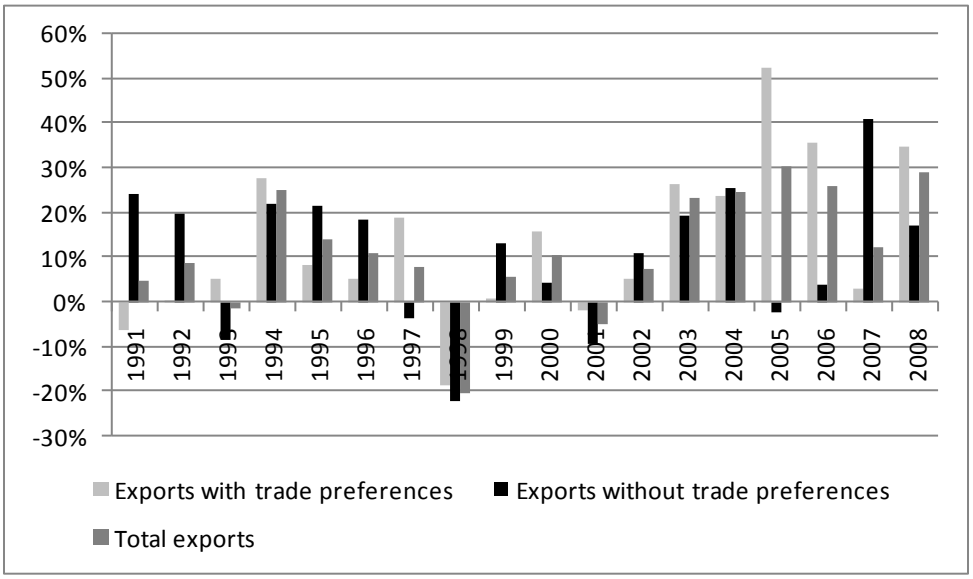
(thousands of US$)



Source: Banco Central de Ecuador.

Exports to other countries. Countries that do not grant trade preference to Ecuador are typically markets for traditional primary exports, such as bananas, oil, fishing, shrimp and flowers. The main markets without trade preferences are Panama (crude oil and derivatives), Russia (bananas and flowers), Italy (shrimp and bananas), Spain (shrimp and fish) and recently China (crude oil). In 2008, exports to these five countries represented 52 percent of all exports without trade preferences and 15 percent of total exports. In 1990-2008, Ecuador's shipments to countries it does not have trade agreements with represented an average of 40 percent of total exports (see Figure 3.14). These exports grew at an average annual rate of 10.9 percent, compared with 13.2 percent for countries granting Ecuador trade preferences. This suggests that free trade agreements do generate somewhat more export growth.

Figure 3.14. Export Growth: Free Trade Versus No Preferences



The positive effect of free trade on exports and sector growth seems to depend on the size of the market granting Ecuador trade preferences and differences in the pre-preference export mix between the two countries. Ecuador should focus on securing trade preferences with the largest economies in the world that offer trade complementarities, whether they are individual countries or groups of countries, such as the European Union. Furthermore, agreements should be negotiated with a view toward the sectors in which Ecuador has potential competitive advantages.

Tariff protection and export growth

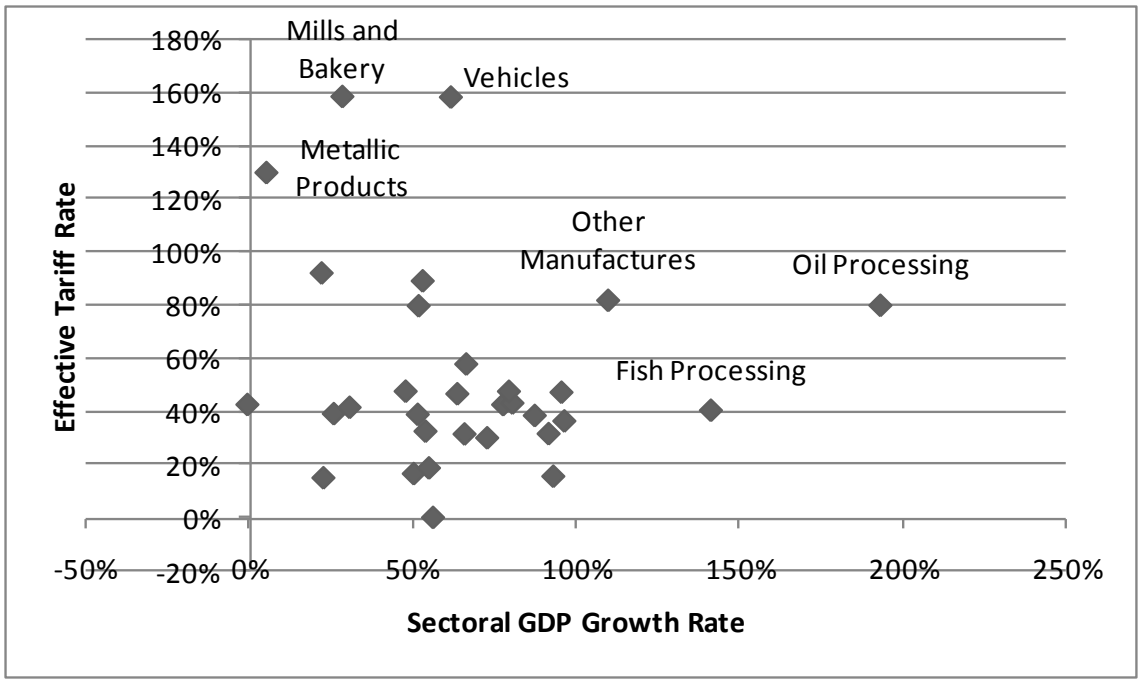
Ecuador's decisions on tariffs are partly based on industrial development theories suggesting that providing temporary tariff protection to some local sectors may give them time to grow, become more efficient, and compete with the rest of the world. These ideas have supported some of Ecuador's decisions on tariffs. However, overly protected sectors face less market competition and may be less inclined to innovate and introduce efficient processes, hurting their ability to grow and export. Given these conflicting forces, it would be useful to evaluate whether Ecuador's import barriers have contributed to the development of sectors with export potential.

Based on the country's existing tariff levels, we constructed effective protection indexes for the tradable sectors in Ecuador's national accounts. We estimated an average tariff level for final products in each sector—considered as the tariff for the final output of the sector—and then calculated an average tariff for the sector's inputs from Ecuador's real input-output matrix for 2007. The weight of each input in the total output of each sector is taken as a proxy for the proportion of each imported input used by the sector. In other words, we make the assumption that the origin is not relevant to determine the contribution of each input to the final production of each sector. With that assumption, the calculated average tariffs and effective protection indexes by sector are presented in Appendix F.

Figure 3.1 compares each sector's current effective protection and real GDP growth in 1993–2007 5.[41] As detailed in Appendix F, 18 out of 32 sectors currently enjoy effective protection levels higher than 40 percent, with levels higher than 80 percent for 6 sectors. In general, this exercise finds no clear correlation between trade barriers and growth. Indeed, several sectors with the highest effective levels of protection had below average real growth. Mills and bakery and metallic products are the clearest cases. Looking only at the period since 2000, when the crisis years of the 1990s had passed, yields similar results of no correlation between high tariffs and growth.

Thus, the evidence indicates that a higher growth did not happen in sectors with high effective protection. In other words, effective protection has not benefitted infant industries with strong growth potential but rather industries with strong political connections (some of them with a long history, such as mills). The outcome is not surprising as a tax on imports is equivalent to a tax on exports.

Figure 3.15. Effective protection and sector GDP growth, 1993–2007



Source: Bank staff estimations.

3.4 CONCLUSIONS AND POLICY RECOMMENDATIONS

The review of non-oil sectors suggests the following conclusions regarding prospects for growth:

- Export diversification has made progress in Ecuador for some primary products, such as flowers, processed agricultural products, and other agricultural products, and for a

[41] This procedure makes the implicit assumption that the country's tariff structure has not changed much since 1993. While imperfect, this assumption provides a view of the impact of tariff protection on growth.

few specific industrial products, such as cars. The most dynamic non-oil export products take advantage of the country's natural comparative advantages and have been supported by trade openness, regional trade agreements, and favorable international markets.

- Despite this export diversification, Ecuador's export basket remains largely unsophisticated, and export products are generally located far from the dynamic products in world trade involving high value added.
- The adoption of the dollar as a national currency in 2000 has had a positive effect on private business in virtually all sectors, because it encouraged policy discipline. The dollarization has given confidence to investors and hasn't hindered the growth rate of the non-oil tradable sector.
- The distribution of government spending could be improved to support the tradable sector. Ecuador's spending levels for education and infrastructure have increased in recent years, but they remain low compared to those of other Latin American countries.
- The tax side of fiscal policy is not especially problematic in Ecuador, but some reforms could improve the incentives for overall private sector investment and for the allocation between tradeable and nontradable non-oil sectors.
- In international negotiations, Ecuador has often failed to obtain trade preferences for its exports, but when it has trade agreements with large and complementary economies, they indeed helped boost exports.
- Protection policies have not led to strong export growth for the most protected products. The fastest-growing export sectors tend to have relatively low effective levels of protection, and their success has generally resulted from favorable international and market conditions and agile private sector strategies, not specific protectionist policies.
- While the government's industrial policy plans include some areas where the state could play a useful role in addressing existing weaknesses for business development, the plan is vague and picking sector winners could end up subject to lobbying.

These results suggest the following policy recommendations:

- Implement adequate policies that ensure the sustainability of the dollarization regime.
- In a challenging international environment, maintaining and expanding expenditures for social and infrastructure areas critical to expansion of traded sectors and reducing poverty will require difficult reallocations away from support for nontraded sectors. This calls for a thorough review of current spending, including generalized subsidies on oil derivatives, with the aim to open further fiscal space for more spending on basic services, such as education and health, and productive infrastructure in the transportation and energy sectors.
- The tax system is not a major hindrance to the tradable sector in Ecuador, but some areas could be improved. First, many non-tradable goods and services have zero VAT

rates, while most tradable goods face the VAT, except for exports. Second, the effective income tax rates on capital are high, and only well-established enterprises already making profits benefit from the reduced tax rate on reinvested profits. The latter puts start-up firms, which do not have profits yet, are at a relative disadvantage.

- Developing trade agreements with large regions, including Ecuador's major trading partners such as East Asia, the European Union and the U.S., could foster export growth and diversification.
- Protection policies should be revised periodically to avoid overprotecting stagnant sectors.

4. MANAGING NATURAL RESOURCES AND PROMOTING DIVERSIFICATION IN OTHER MINERAL-ABUNDANT COUNTRIES

As discussed in the preceding chapters, promoting sustainable growth in Ecuador will require both better management of the oil sector and an improved business climate for non-oil sectors. Other nations with abundant mineral resources have dealt with these issues, with varying degrees of success. This chapter looks at some of the experiences.

Section 4.1 provides an overview of diversification among Latin America and Caribbean countries. Section 4.2 looks at the natural resource management and diversification experiences of three resource-abundant LAC countries in greater detail —Chile, Mexico, and Trinidad and Tobago. These countries share three other characteristics with Ecuador—middle income level, democracy, and a large workforce that needs employment in non-oil sectors. Section 4.3 widens the perspective by examining the experiences of some Persian Gulf countries. Section 4.4 concludes with lessons for Ecuador to improve the management of its oil wealth and to lay the groundwork for further diversification

4.1 REGIONAL OVERVIEW

In terms of exports and the orientation of the overall economy, most countries in Latin America and the Caribbean (LAC) have become more diversified and more oriented toward manufacturing over the past four decades. Aside from Venezuela, the countries have expanded their range of exports. This diversification has not diminished the mineral export sectors in absolute terms, but other sectors' export shares have grown more, especially manufacturing in most countries.

Table 4.1 shows more details on exports in the major LAC countries and verifies the trend toward diversification. For all but one of the eight countries, including Ecuador, the combined export share of the top two categories declined from 1962 to 2005, often dramatically. In 1962, the top two categories' share was more than two-thirds in five of the eight countries; by 2005, it was that high in only two countries—Venezuela and Ecuador. And for Ecuador, the top two categories' share fell from 85.5 percent to 71.5 percent, suggesting some diversification in exports. There has been some stability amid the diversification: four of the eight countries had one commodity that stayed among the top two exports in all four years, and the other three had one commodity that showed up in three of the four years.

Table 4.1. Top two principal commodity exports for select countries in Latin America and the Caribbean, 1962–2005

(% of total exports)

	1962	1975	1990	2005
Argentina	Cereals 28.7 Meat and meat preparations 18.7	Cereals 37.4 Meat and meat preparations 9.7	Cereals 11.8 Feed stuff for animals 9.7	Petroleum and petroleum products 13 Feed,stuff for animals 10.1
Brazil	Coffee, tea, cocoa 57.2 Textile fibres, not manufactured 11.6	Coffee, tea, cocoa 15.1 Sugar, sugar preparations and honey 13.4	Iron and steel 11.4 Metalliferous ores and metal scrap 8.5	Iron and steel 7.7 Metalliferous ores and metal scrap 6.9
Chile	Non-ferrous metals 66.3 Metalliferous ores and metal scrap 15.5	Non-ferrous metals 61.6 Metalliferous ores and metal scrap 8.2	Non-ferrous metals 43.4 Fruit and vegetables 10.9	Non-ferrous metals 30.7 Metalliferous ores and metal scrap 24.9
Colombia	Coffee, tea, cocoa 71.6 Petroleum and petroleum products 14.7	Coffee, tea, cocoa 46.3 Petroleum and petroleum products 7	Petroleum and petroleum products 28.8 Coffee, tea, cocoa 22.2	Petroleum and petroleum products 27 Coal, coke and briquettes 12.6
Ecuador	Fruit and vegetables 53.9 Coffee, tea, cocoa 31.6	Petroleum and petroleum products 60.4 Fruit and vegetables 14.5	Petroleum and petroleum products 51.9 Fruit and vegetables 17.7	Petroleum and petroleum products 58.4 Fruit and vegetables 13.1
Mexico	Textile fibres, not manufactured 20.7 Non-ferrous metals 13.3	Petroleum and petroleum products 15.4 Non-ferrous metals 9.5	Petroleum and petroleum products 36.4 Fruit and vegetables 5.6	Petroleum and petroleum products 14.61 Fruit and vegetables 2.41
Peru	Meat and meat preparations 22 Wood, lumber and cork 19.9	Meat and meat preparations 17.9 Wood, lumber and cork 13.3	Petroleum and petroleum products 36.4 Textile fibres, not manufactured 34.5	Oil-seeds, oil nuts and oil kernels 35.9 Meat and meat preparations 15.1
Venezuela	Petroleum and petroleum products 92.1 Iron and steel 4.8	Petroleum and petroleum products 92.7 Metalliferous ores and metal scrap 3.2	Petroleum and petroleum products 79.7 Non-ferrous metals 5.2	Petroleum and petroleum products 88.2 Iron and steel 4.2

Source: Calculations are based on WITS database, SITC Rev 1 at the four-digit level.

One reason often cited for poor outcomes in resource-dependent economies is governments' dependence on revenues from mineral exports, rather than taxes on citizens who might demand accountability. Table 4.2 shows the pattern of revenue dependency in the early 2000s—before the latest boom of commodity prices, which increased the shares of fiscal revenues from mineral-industry taxes and royalties. The wide variations do not seem closely correlated with quality of governance (See Table 4.2 and Table 4.5).

Table 4.2. Dependency of fiscal revenue sources:
Commodity revenue as a share of fiscal revenues, 2000–05

Country	Commodity	% of government revenue
Argentina[a]	Agriculture commodities	17.0
Bolivia	Hydrocarbon	20.9
Colombia	Hydrocarbon	10.0
Chile	Copper	9.4
Ecuador	Hydrocarbon	26.0
Mexico	Hydrocarbon	33.3
Peru	Gold, copper, silver	3.3
Trinidad and Tobago	Hydrocarbon	41.5
Venezuela	Hydrocarbon	48.8

Source: IMF 2007.

a. Based on export taxes from World Development Indicators.

Neither mineral exports nor diversification are ends in themselves. Mineral exports can provide countries with financial resources for development investments as well as some consumption. Diversification is an intermediate outcome that may help increase employment and value added per worker. To discuss the international experience, this chapter considers four types of policies that can support production and employment growth in export sectors: promoting efficient growth in the extractive industry, maintaining fiscal balances, public spending that specifically supports export sectors, and other policies to improve the business environment for tradable sectors.

4.2 EXPERIENCES IN THREE LAC COUNTRIES

Chile, Mexico and Trinidad and Tobago offer three contrasting experiences with managing mineral resource extraction and revenue and with fostering diversification of the rest of their economies. Table 4.3 shows an overview of the shares of their main minerals in export earnings and in fiscal revenue. For Chile and Trinidad, mineral exports are a large share of the total exports—half or more in 2008—, but much less in Mexico—under 20 percent even in 2008. Fiscal revenue shares are higher in Mexico and Trinidad, but much lower in Chile. Both Chile and Trinidad substantially increased their fiscal revenue shares in 2005-08, in part because the generous tax treatment for private mineral-extraction firms expired in those years.

Table 4.3: Shares of minerals in export earnings and in fiscal revenue

	Share of Export Earnings		Share of Fiscal Revenue	
	2000	**2008**	**2000**	**2008**
Chile	37.9%	50.4%	3.1%	13.6%
Mexico	9.8%	17.4%	31.2%	36.8%
Trinidad y Tobago	65.3%	70.0%	34.3%	54.5%

Sources: Banco Central de Chile (Sintesis Estadistica de 2000 y 2008); Banco Central de Mexico (Informa Annual, 2000 y 2008); Central Bank of TT&T, Annual Economic Survey 202 and 2008.

Chile

Chile has been a major copper exporter since the mid-20th century, and before that it was a major source of nitrates. The country has not always used this mineral abundance to support balanced, poverty-reducing growth, but it has done relatively well for the past two decades.

Amid much controversy, a newly elected socialist government nationalized the copper-mining industry in early 1973. When a right-wing military government took over later that year, it retained the nationalization, but it liberalized much of the rest of the economy by the late 1970s. Many state enterprises were privatized. Excess spending and borrowing during the copper boom of the 1970s led to economic crisis in the early 1980s. After that, the government undertook a wide range of reforms, including some to improve management of financial flows from copper. The fiscal reforms have continued to deepen since 1990 under democratic left-center governments.

At first, the copper price and revenue stabilization fund was separate from the rest of public finances. But Chile has increasingly integrated institutions for stabilization within the overall public finance framework, set by the fiscal surplus rule (discussed below). Chile has a unitary government (not federal), and public finances have remained centralized, although the government has decentralized the execution of a growing number of public services. This contrasts with some other unitary but increasingly decentralized countries, such as Colombia and Peru, and even more with decentralized federations, such as Argentina, Brazil, and Mexico. As a result, the national government has had to manage almost all of the volatility in public finances arising from the fluctuating mineral prices.

The copper sector still looms large in Chile's export profile and in its public finances, particularly in times of high prices. Copper was over 60 percent of exports in the 1960s and 70s, only 30 percent in the early 2000s, but back up to 57 percent in 2006. Copper provided over 60 percent of fiscal revenues in 1989-91, dropped under 2% by 1998, and rose to 16 percent in 2005. Even so, the country has done well in diversifying its GDP and exports—especially high-value agricultural exports, an accomplishment evident in the wine and produce sections of stores in Europe and the US. As in Ecuador, factor inputs to Chile's mineral sector do not take significant resources away from other sectors. The industry relies on underground copper deposits and has minimal need for above-ground activities. Its labor force consists of a small number of internationally mobile workers in a highly mechanized sector. Capital for such a sound investment is readily available on the international market.

The government uses revenues from the copper sector to pay for investments in infrastructure and human capital, which benefit non-mineral sectors in the long term, and for social protection programs, such as a pension fund for low-income aged persons.. Chile has been a leader in implementing efficient budgeting practices, with strong programs to assure good performance. The government owns the largest copper company and runs it like a business—not a social welfare agency, cash cow, or fiefdom of union workers. Since the late 1970s, Chile has had an open regime for private investment in the sector by multinational or Chilean firms. Since the 1990s, private copper firms have grown faster than the state company, and they now produce most of the copper output and exports. The state firm still accounts for more of the state's revenue. Corporate tax rates, including the levies in the mineral sector, are modest—17 percent—but accelerated depreciation allowances made the effective rates much lower for many years. The rate is low by international standards and helped make investment in the sector attractive—perhaps more attractive than necessary, at least in retrospect.[42]

Since 2000, Chile has conducted its fiscal policy in accordance with a structural surplus rule. The rule deepened a commitment to fiscal responsibility developed in the mid-1980s by introducing a more explicit medium-term orientation. Initially, it was not enshrined in law, but this changed with the Fiscal Responsibility Law in 2006, which set the procedure

[42] The Disputada mine, owned by Exxon, exported over 5 million tons of copper from 1978 to 2002, but paid no income tax in that period (Aguilera 2004).

but not the percent that had to be set aside and also introduced new rules on the investment of accumulated assets. The executive can vary the set-aside rate, and has done so.

The structural surplus rule implies countercyclical behavior of *ex ante* government surpluses. In its original form, it stated that the central government's overall structural balance each year should equal a surplus of 1 percent of actual GDP.[43] The structural surplus target was changed to 0.5 percent of GDP, effective 2008, and in the context of the global recession target went to zero in January 2009—effectively suspending it. A positive target is expected again from 2010 onwards. The structural balance equals structural revenue plus interest on net government assets, which are positive in Chile, minus actual expenditures on goods and services. Structural revenue is determined by two independent panels of experts and reflects what tax revenue would have been if the economy had operated at potential rather than actual output and what copper revenue would have been at a long-term world reference price rather than the actual price. The rule, therefore, specifies permissible annual expenditures on goods and services as a residual, derived from the target values, structural revenues, government asset levels, interest rates, and GDP. The resulting countercyclicality of fiscal deficits isolates government expenditures on goods and services from the cycle and keeps them growing with trend output. No distinction is made between government consumption and investment expenditures because this is difficult to do in practice.

Consistent surpluses imply significant asset accumulation by government. The surplus rule was adopted with the intent of providing for future social commitments and addressing contingent liabilities. The Fiscal Responsibility Law formalized this by establishing rules for allocating the surpluses, stipulating investments in a government pension fund, gradual central bank recapitalization, and a fund for economic and social stabilization. When the surplus target was lowered during the recession, the additional resources that became available for current spending were devoted to education and other pro-poor measures. Application of the rule during the copper boom led to the accumulation of substantial savings in the two stabilization funds, which meant that the government was not credit constrained in the crisis. Hence it could announce in early 2009 that it would use US$4 billion in a large-scale fiscal stimulus to counteract the global recession's impact on Chile.

While the details of Chile's fiscal rule are important, they should not be regarded as a magic bullet. The deeper roots of success lie in the social consensus on the need to avoid disruptive fiscal policy, to respect the rules that guide fiscally responsible behavior (even before they are enshrined in law), and to follow a participatory but legally defined process for setting the fiscal regime's parameters. Extensive public and congressional discussion focuses on assumptions for copper's long-term price, long-term sustainable growth rates, and the definition of full employment. In short, success has depended a lot

[43] In the context of the global recession, Chile reduced the structural surplus target to zero in January 2009—effectively suspending it. A positive target is expected again from 2010 onwards.

on a political process of building consensus behind the technocratic mechanisms for setting fiscal policy.

Besides improving fiscal policy, Chile has for over two decades followed policies that assured a competitive and sustainable real exchange rate, relatively open international trade, and moderate business regulation. Private sector firms of all sizes have grown in this environment, and they now constitute a formidable interest group, spanning the political spectrum and making continuation of the policies more likely. The credibility of pro-growth policies had to build over time.

The Chilean experience holds four key lessons for Ecuador:

- Private firms can operate alongside a state company in the mineral sector, producing output and revenue that might be lost if the state firm had a monopoly.
- A stabilization fund can make public finances smoother and more predictable. They can assure that the government has resources to maintain social services during a price downturn and to conduct countercyclical fiscal policy.
- Trade liberalization, unilaterally and with bilateral treaties, and stable business regulation has led to growth of non-mineral tradable sectors.
- Public information and discussion of these policies has helped to build consensus behind them and to make them more credible to investors.

Mexico

For much of the 20th century, Mexico's economic growth rose and fell with world oil prices. In the oil boom of the 1970s, the government spent its receipts and more, taking advantage of easy access to credit to borrow heavily. This led to the debt crisis of 1982 and its volatile aftermath. Since the early 1990s, however, Mexico has diversified away from oil as the driver of growth and, to a lesser extent, as the main source of fiscal revenue. From 1990 to 2005—just before oil prices and GDP really jumped—Mexico's purchasing-power adjusted GDP per capita rose from US$9,176 to US$11,387.

Government revenue depends disproportionately on oil, and fiscal policy has micro-managed the sector since the 1980s, when Pemex, the national oil company, was brought inside the government budget. The company's net revenue from exports and domestic sales became part of the government's revenue. Pemex pays more than 60 percent of its revenue in royalties and taxes (Lajous in Levy and Walton 2009). This contributes a large portion of the budget of the federal government—more than 40 percent in boom years.[44] With oil prices falling in the past year, the situation has worsened. Pemex experienced a net loss of 27 billion pesos (US$1.9 billion) in the first quarter of 2009.

Appropriations for Pemex investments pass through the regular budgetary process. These appropriations have usually been much lower than what sound business considerations

[44] After the fiscal reform in 2005, the rates changed, the fiscal treatment was different for exploration and production and the rest of Pemex's activities got a standard income tax regime.

would warrant. In recent years, the difficulty of getting government funding has forced the company to finance much of its investment through massive borrowing, and it now owes US$46.1 billion, including US$14.4 billion in off-balance-sheet debt. A lack of investments has prevented the addition of adequate refining capacity. Pemex also lacks the money or technical capability to tap deepwater offshore fields.

Pemex's oil output dropped 9 percent in 2008 to about 2.8 million barrels per day. More glaring, production is down from 3.8 million barrels per day in 2004. Pemex faces a constitutional ban on partnerships with foreign companies, which would entail foreign ownership of part of Mexico's oil output. The ban rules out joint-venture or production-sharing agreements, the common practices for risk sharing and attracting foreign investment. After attempts to enact constitutional changes to allow these agreements failed, the Mexican government passed an energy reform package in October 2008 that will restructure Pemex to improve efficiency and allow the company to hire international oil companies, increasing access to technological expertise (Stratford Global Intelligence, January 20, 2009). As of September 2009, Pemex had not yet reached any deals under this new arrangement.

To deal with volatility of oil prices, Pemex has been using the forward market on behalf of the Ministry of Finance. To safeguard against an unexpected drop in oil prices, the authorities hedge 70 percent of Pemex gross exports at the budgeted price of US$70 per barrel for the Mexican oil mix. The Ministry of Finance made profits from this of over a US$ 1 billion in 2008.

Mexico has not developed other major mineral extraction activities. Silver, once the source of enormous wealth, has continued to decline. Natural gas has been a missed opportunity—at least so far. Pemex lacks the technical know-how to exploit the gas from deepwater fields, and legal constraints have prevented substantial participation by multinational companies with the necessary expertise. So the country imports substantial amounts of natural gas, even though it has large proven and suspected gas reserves.

Mexico's overall macroeconomic management has improved significantly since the tequila crisis in the mid-1990s. Congress has reined in the president's discretionary spending, and federal budgets now take serious aim at multiyear targets for fiscal balance. The government has gained investment-grade status for its bonds, prepaid a lot of its expensive internal and external debt from the 1990s, and built up reserves during the oil boom. Tax reform has been implemented, despite congressional opposition that kept the government from going as far as it wanted. In addition, tax administration has been strengthened. Tax revenues have grown as a share of GDP since 2005—even though oil revenues were booming. This is a significant improvement over the past, when the tax effort increased only as needed and relaxed when oil revenues were high (World Bank 2002).

The quality of public spending has improved over the past 20 years, mainly by including low-income groups in programs for education, health, and income protection, notably conditional cash transfers (World Bank 2004b, 2006b). In the long run, this may auger well for diversification, but it probably has done little in the short and medium term to

promote export industries' growth. Educational quality—the social spending that probably provides the most benefits for export competitiveness—remains poor by international standards.

Investment in electric power, transport, and communications—key for growing export industries—has a mixed record in Mexico. By constitutional provision, electric power remains a government monopoly. Generation capacity and distribution systems have not improved much in the past 20 years; now, Mexico lags many other Latin American countries and East Asia in this area. In transport, the public sector remains dominant, except for trucking. Some components of the transport network have been improved, notably the interstate highways, railroads, and some aspects of airports and seaports. The weak points are often at the transfer points between modes—truck to rail, rail to sea, and so forth. Despite their country's proximity to the US, Mexican producers' costs of shipping to the US are often higher than their Chinese competitors (World Bank 2005a). Telecommunications in Mexico were privatized in the 1980s, and service has improved greatly—an important plus for exporters. However, the privatized system is a virtual monopoly, and services are overpriced relative to other LAC countries. This puts a damper on use of an important input to other businesses.

Mexico's exchange rate and trade policies have improved considerably since the mid-1990s. In the past, an unsustainable exchange-rate peg was maintained until it collapsed spectacularly. Mexico's currency is now allowed to float fairly freely, with interventions to dampen short-term volatility but not to prevent responses to shifts in fundamentals. For instance, the peso's value against the US dollar has fluctuated in response to the recent movement of oil prices—appreciating in 2006–08 and depreciating since late 2008. Maintaining a better fiscal balance has been crucial to accepting flexible exchange rates.

Trade policy has become much more open, notably with the North American Free Trade Agreement (NAFTA) and other bilateral agreements. This has intensified the links between the Mexican economy and the rest of North America. On average this has had benefits, but it has made Mexico more sensitive to economic fluctuation in the US. NAFTA has also strengthened the interest groups in favor of economic integration and a business-friendly regulatory environment. Business regulations are still somewhat problematic on paper and present opportunities for corruption and cronyism in practice (World Bank 2009). Nonetheless, business practices are improving through more efficient and less personalized regimes, which reduces opportunities for corruption.

Mexico has also successfully diversified into the tourism sector, which is the largest earner of foreign exchange in years of average oil prices. The government promoted this with infrastructure investment, environmental protection, improved immigration and customs administration (including reduced corruption), and investment-friendly regulation for domestic and international hotel chains.

For Mexico, the most improved policy areas for supporting non-oil exports and overall growth have been in fiscal stability and other policies, especially improved trade relations, more business-friendly regulation, and flexible exchange rates. Weak points have been the poor quality of public education, inadequate infrastructure for export

logistics, and the poor treatment of the extractive industries, especially Pemex. The national oil company faces problems with internal management, fiscal treatment, and the exclusion of foreigners that could bring needed expertise; recent legal changes may address some of these problems, but remain to be implemented.

Trinidad and Tobago

In the 1980s, Trinidad and Tobago's economy suffered serious disruption from the after-effects of overexpansion during the oil boom of the previous decade. The country made the classic mistakes—unsustainable public spending as well as subsidies and protectionist measures for inefficient nontraded and import-competing sectors (Velculescu and Rizavi 2005).

Since the 1990s, Trinidad and Tobago has made progress in several areas. The energy sector is still predominant—41 percent of GDP in 2003, two years before the 2005–08 runup in oil prices. The sector has become more diversified as it grew. Crude-oil exports, once predominant, have become relatively less important, with the growing importance of oil refining, the extraction and liquefaction of natural gas, and petrochemicals—all largely for export. Liquefied natural gas sales are mostly under long-term contracts, which provides more stability to the economy and fiscal accounts. This results mostly from a characteristic of the natural-gas industry—the need for large up-front investments in transportation infrastructure and conversion plants, both at the supplier and recipient ends. This characteristic not only leads to long-term contracts but also requires that both parties have a reputation for reliability and compliance with contract terms.

Trinidad and Tobago shows the results and some of the pitfalls of an energy-based industrial policy. The provision of heavily subsidized natural gas to the local petrochemical industry has led to strong growth but to inefficiency as well. The price paid for gas does not fully cover the opportunity cost of not exporting from existing fields or the cost of exploring new, less accessible fields. Foreign investors have been reluctant to come into the new fields without some relief from the obligation to make a substantial share of new gas production available to domestic users at the subsidized price. The political influence of these gas users has so far blocked agreements to allow more output to be sent abroad, where it has the highest market value.

In 2005, the International Monetary Fund rated Trinidad and Tobago as having the best macroeconomic performance in the English-speaking Caribbean (IMF 2005). During the recent boom, the government brought its debt down from more than 50 percent of GDP in the 1990s to 16 percent in 2007, with external debt reduced to only 6 percent. International reserves grew to more than 30 percent by 2007. Public expenditures as a share of GDP declined from 28 percent in the mid-1990s to 24 percent in 2003–04, but they rebounded to 30 percent by 2008 (World Bank 2005b; IMF 2009).

Beyond the energy sector, Trinidad and Tobago has established itself as the Anglophone Caribbean's main industrial and financial center through growth in the high-tech ferrous metal, plastics, and petrochemical industries and banking and insurance. Although it has half the population of Jamaica, Trinidad and Tobago's total GDP is larger. Its greater

macroeconomic stability makes it (along with Barbados) an attractive locale for financial firms. The private sector's diversified growth has occurred in part thanks to an "open investment climate" (U.S. State Department Web site on Trinidad and Tobago, March 2009). The World Bank (2009) gives a less favorable assessment of the de jure regulatory environment. Foreign direct investment averaged 8 percent of GDP in the 1990s and 9 percent in 2000–02; in 2008, it jumped to about 12 percent but has since dropped below 5 percent, showing this activity's volatility in a small economy.

The exchange rate has been de facto fixed since at least the 1990s. Relative to Ecuador, with its dollarization, Trinidad and Tobago shows that a hydrocarbon-exporting economy can have growth and stability with a fixed exchange rate, even in the long run. To do this, however, the country needs to develop fiscal institutions to ensure that fiscal policies can adjust with circumstances. A small economy will not likely have the fiscal space to conduct truly countercyclical fiscal policies, but by saving during boom times, as Trinidad did, it can minimize the extent to which its fiscal policy is procyclical.

Spending on education averaged 3.75 percent of GDP in 1995–2002, more than a percentage point less than the Caribbean average and also below the Latin American average of 4.0 percent (World Bank 2005b: 36). Nonetheless, education in Trinidad and Tobago seems relatively good, with 99 percent literacy and children not leaving school until after 11 years on average. The entire adult population has an average of 7.8 years of schooling, well above the 6.0 years for all of the Caribbean and 6.3 years for all of Latin America. Like the rest of the Caribbean, the labor market is very open internationally. So the quality of the labor force depends more on effective demand and improving living conditions, which are necessary conditions to attract qualified labor from the rest of the Caribbean, repatriate the Trinidad and Tobago diaspora, and retain workers from the pool of local graduates. In this, the country has done relatively well for the subregion, with strong labor reforms in the 1990s (World Bank 2005b).

Trinidad and Tobago had low public investment in the 1990s, spending only an average of 1.8 percent of GDP in 1995–2003 (World Bank 2005b). In the past decade, however, public investment grew strongly, going from 4.2 percent of GDP in 2003 to more than 10 percent by 2006 and afterward (IMF 2009). Infrastructure is adequate on average—good for the export sectors and substandard for domestic residents, especially in rural areas. The private sector is probably responsible for much of the infrastructure to support exports of minerals in raw and processed form.

Trinidad and Tobago has had considerable success in keeping the hydrocarbon export sector growing by forming joint ventures with foreign investors, in getting a good share of revenue from the boom with a price-sensitive tax regime on those investors, in using a fixed exchange rate and a rule-based stabilization fund for economic stability, and in providing an open investment climate to promote some diversification beyond the hydrocarbon sector. The policy of subsidizing hydrocarbon inputs relative to world prices for downstream processing industries has contributed to their growth—but only with a high cost to public finances and without much payoff in terms of domestic employment.

4.3 EXPERIENCES IN THE PERSIAN GULF

While the Gulf Cooperation Council (GCC) countries seem quite different from Ecuador, they share an intense interest in diversification. Qatar, Bahrain, Dubai and Oman face an end to economically extractable oil reserves in the next decade or two, while Saudi Arabia and Kuwait have massive reserves that will allow production to continue for at least two more generations (see Table 4.3).[45] Unlike Ecuador, none of them has a largely poor national population and predominately low-wage labor.

Table 4.3: GCC Oil Reserve

Estimates (billion barrels)	
Saudi Arabia	264.2
United Arab Emirates	97.8
Kuwait	101.5
Qatar	27.4
Oman	5.5
Bahrain	n/a

Source: BP Statistical Review 2007

The GCC countries are pursuing three types of diversification strategies.

- Countries have sought to develop natural gas resources to supplement oil for use in domestic power generation, as feedstock to the petrochemical industry, or as an additional source of export earnings via pipeline or liquefaction.
- Countries have attempted to move beyond the basics of crude-oil production to complex refining and industrial sectors. Some have focused on such energy-intensive industries as aluminum, petrochemicals, and plastics. Qatar has taken aim at the supply chain for liquefied natural gas exports, including ships and receiving terminals in the destination countries.
- Perhaps best corresponding to the common understanding of diversification, the countries have supported development of non-energy sectors as sources of growth and employment for nationals.

Oil abundance plays an important role in determining the relative importance of each type of diversification in each country. In Saudi Arabia and Kuwait, where crude oil reserves are large, the main priority has been adding refining capacity, developing gas as a substitute for domestic oil use, and expanding into petrochemicals. Qatar and Oman have low oil reserves and view the mainstay of their economies as natural gas, whether used for export or domestic industry. Bahrain is already a crude oil importer. The United Arab Emirates is more complex because most oil reserves belong to a single emirate—Abu Dhabi. The other emirates have by necessity looked for non-energy sources of

[45] Among the resource-rich countries in the Middle East and North Africa, only Algeria shares with Ecuador the combination of democracy and a large, mostly poor labor force. With the hydrocarbon sector accounting for 60 percent of budget revenues, 30 percent of GDP, and more than 95 percent of export earnings, Algeria does not present a successful model of diversification (World Bank 2008, MENA Region: *2008 Economic Developments and Prospects*, p. 7; *Wikipedia*: Algeria, 11 August 2009). Elsewhere, Malaysia is an oil producer comparable to Ecuador with successful diversification and democracy. The oil comes from two provinces on the island of Borneo, which is widely separated from the rest of the country on the mainland peninsula. Substantial fiscal revenue from this enclave has helped finance public spending in support of diversified agriculture and industry on the mainland, although the main impetus for industrialization has come from regulatory and tax policies that encouraged local private and foreign direct investment (Nabeshima and Yusuf 2009).

growth, while policymakers in Abu Dhabi have been concerned about being too exposed to oil-sector volatility.

GCC diversification strategies are also influenced by employment concerns. The core energy sector is highly capital-intensive and offers limited employment prospects. This is especially pertinent in light of the open but temporary immigration of low-cost labor, which has created a segmented economic structure. Most nationals work in high-salary occupations for the government, while low-cost migrant labor works in a construction and the services-dominated private sector. Since many GCC nationals show a preference for public-sector employment, they have a high reservation wage for occupations in tradable sectors.

The GCC countries have pursued the diversification objectives within similar institutional and macroeconomic policy frameworks. All countries but Kuwait maintain long-standing exchange-rate pegs to the dollar. Kuwait has a basket peg dominated by the dollar. The countries rely on a dominant national firm in the oil sector but have been open to significant foreign participation in natural gas.[46] Oil revenue is cautiously managed; budgets are typically prepared based on reference oil prices somewhat below prevailing market prices, with "windfalls" going to stabilization or future generations funds managed outside the budgetary process. As a result, public expenditure changes only slowly over the commodity price cycle, with reserve funds used to smooth spending in the face of revenue fluctuations.

A new generation of funds has emerged in tandem with the increased emphasis on diversification. These vehicles are given an objective linked to industrial strategy, diversification, or other policy goals of the government. The new funds may be capitalized from existing funds or earmarked revenues but may also take on some debt. Examples include Mubadala in Abu Dhabi, the Qatar Investment Authority, and various tourism development corporations. This illustrates an important point about economic GCC countries' diversification: with limited exceptions, the government plays a dominant role in its implementation. Diversification had not emphasized attracting the private sector; indeed, the policy environment for foreign private investors has traditionally been difficult, featuring requirements for majority local ownership and high corporate tax rates.

GCC diversification strategies have had mixed outcomes. Natural gas offers an attractive source of feedstock or power for domestic industry, permitting a higher exportable surplus of crude oil. However, countries have found that exploration and extraction costs for gas are substantial, and governments have been reluctant to bear the full risks on their own. In addition, gas may diversify away from oil but it still leaves the country exposed to energy-price swings, with the additional complication that specialized factors in gas

[46] Petroleum Development Oman is not a national oil company in the strictest sense because it has some private ownership and operates under a concession from the government. But it is majority owned by the government and dominates the upstream oil sector in Oman.

production and marketing create higher risks than oil. Nevertheless, GCC countries continue to view natural gas as a key pillar of their diversification strategies.

GCC diversification has usually emphasized energy-intensive industries. Bahrain provides a noteworthy example. It now operates one of the world's largest aluminum smelters, which runs on gas-fired power and is easily the country's largest source of non-oil exports. The underlying advantage is the ability to offer low energy prices, which can make it economical to ship raw material inputs across huge distances—for example, bauxite from West Africa or Australia. Bahrain also refines and exports crude oil it imports from Saudi Arabia.

Other GCC countries have established a substantial presence in petrochemicals, and homegrown heavy industry firms like Saudi Arabian Basic Industries (Sabic) are now among the large global players in this sector. Although these companies have successfully nurtured an elite managerial tier among nationals, their overall employment impact is small. Furthermore, the global financial crisis highlighted the cyclicality of energy-linked industries, illustrating again the challenge of achieving real diversification while remaining specialized in energy.

Finally, the Gulf countries with limited or declining hydrocarbon resources have looked for sources of growth outside the energy sector, with the most significant examples being financial services, logistics and communications services, tourism, and real estate. The general rationale has been that the energy-rich and rapidly growing GCC region offers substantial opportunities for countries well positioned to meet the associated demand for services like financial intermediation, travel, and property. Bahrain and the UAE have had the most success with this strategy, but elements of it are cited by policymakers in every GCC country.

This service-sector strategy has had some notable successes. Notwithstanding the effects of the financial crisis, Dubai has produced one of the world's largest and most efficient port operators (Dubai Ports World); Bahrain has a major presence in some important financial sector niches (like Islamic finance); and several GCC-based telecom firms have expanded beyond their bases to develop new markets, especially in Africa. In Dubai and Oman, the strategy has been implemented by majority or wholly state-owned companies. Other governments have let the private sector operate within a relatively liberalized market framework, like Bahrain's financial sector and Kuwait's telecommunications market.

The strategy has fared less well, however, as a way to reduce macroeconomic risk. As a result of diversification, several GCC countries ended up with heavy exposures to the financial sector and real estate—the sectors hit hardest by the global crisis. Furthermore, entry into these sectors has often involved the megaproject, a debt-financed large-scale property development with a planned cluster of banks, hotels or whatever was the industry of focus. These projects typically had high import content both for labor and materials, and their debt-dependent financing structure left them vulnerable to the credit crunch of the past two years. After the initial gross investment boost wears off, the long-term contribution of these projects to GDP is less clear. In many GCC countries, there

remains a "missing middle"—a high value-added non-energy sector capable of providing productive job opportunities for nationals.

The experience of the GCC countries shows how budget surpluses and fixed exchange rates can contribute to macroeconomic stability, even when there is high dependency on hydrocarbon exports. The experience also shows that even successful development of downstream hydrocarbon-processing industries does not insulate the economy from global shocks or solve the problem of employing a larger share of the nation's workers in tradable sectors.

4.4 CONCLUSIONS

Table 4.5 summarizes the international experiences that might provide some lessons to help Ecuador to lay the groundwork for further economic diversification, growth stability, and poverty reduction over the medium term:

- ***Take advantage of opportunities that arise from mineral-resources revenues***. When the revenues are temporarily high because of an upswing in international prices or because of a peak in supply for export, the challenges are to increase spending with efficiency, quality, and restraint and save enough resources in good years to sustain spending during recessions.
- ***Keep investing in the mineral industry***. Growth of the mineral sector is not a problem in itself. Revenues from minerals can potentially overcome many other constraints on growth. Chile lets its nationalized mining sector operate on a relatively commercial basis, and it has allowed private competition to grow within the sector, achieving growing output, sustainable revenue for the government, and good indicators of efficiency by international standards. In Trinidad and the Gulf states, the private foreign firms contribute capital and expertise, but always in joint venture with the national firm. This has been especially important for developing natural gas, where Ecuador has lagged. In contrast to Trinidad and the Gulf States, Mexico and Bolivia have kept out international firms and nationalized their industries. Mexico shows the danger of this: the Pemex monopoly leaves the industry bereft of much-needed expertise and investment and at the mercy of a strong union. The union and other sectoral interests defend this monopoly and the inefficiencies from which they derive rents; in return, the government does not give Pemex enough resources for investment, so oil output is dropping and gas reserves are wasted. Bolivia, like Ecuador, recently turned against the foreign firms that developed the hydrocarbon sector, and at least in the short run the national firm lacks the expertise and capital to expand or even properly run the sector.
- ***Keep fiscal balances sustainable and develop non-mineral sources of revenue***. In all countries we reviewed, mineral revenue is important to the government but volatile; to varying degrees, they have all instituted mechanisms to cushion the volatility. Chile has the best institutionalized mechanism for revenue stabilization in LAC, and it has benefited from both capacity for fiscal stimulus and improved credit ratings during the crisis. Chile has also strengthened its revenue administration over several decades. Mexico ran surpluses in a more ad hoc way but paid off debt during the

recent boom, strengthening its access to credit markets. It has also given sustained attention to tax administration in the 2000s. Trinidad and Tobago and the Gulf States have done relatively well in maintaining fiscal balances and stabilization funds. In the recent economic crisis, the three LAC countries were in a better position than they were after the 1970s commodity boom, when they ran up debt and faced the double burden of repayment and lack of access to credit when the oil bubble burst in the early 1980s.

- ***Use public spending strategically***. In three LAC countries and the GCC, mineral-sector revenues have an important role public spending, and the governments recognize the need to build up alternative assets (human and physical capital) to take the place of depleting mineral reserves (oil, gas, and copper). The new human and physical assets need to be oriented adequately but not exclusively toward the export market. Accomplishing this goal is difficult, however, because various interests compete for the mineral revenue going to and through the public sector. Sachs (2007) points out making good use of oil wealth requires countries to follow a long-term development strategy that both takes into account the volatility of oil revenues and allocates public investment to complement productive private sector investment. Putting oil earnings into public investments rather than private consumption—most of it typically by upper income groups—is critical even if politically difficult.
- ***Use other policies to support the non-oil tradable sectors***. These include exchange rate, international trade agreements, and business regulations.
    - Larger economies like Chile and Mexico have maintained floating exchange rates without letting their currencies move nearly as much as commodity prices, but other economies like Trinidad and Tobago and the Gulf States benefit from the stability provided by a fixed-rate regime. A peg requires strong fiscal discipline because most of the adjustment to a terms-of-trade shock comes through fiscal rather than monetary policy, which must dedicate itself to maintaining the exchange rate.
    - International trade agreements have been especially important for Chile and Mexico over the past 15 years, with their non-mineral sectors benefiting from improved access to the North American market.
    - In business regulations, Chile has been a world leader. Mexico and Trinidad and Tobago have done less well, although both have improved a lot in the past two decades. The Gulf States have a mixed record on regulatory reform, with the reformers doing betting in attracting investment outside of the hydrocarbon sectors. While laws and regulations can change quickly on paper, it takes longer to alter the behavior and expectations of both government officials and businessmen. In all the countries, sustained effort has been needed to establish credibility and build political support for the improved regulatory regimes, including reduced red tape.

Table 4.4 shows some indicators of institutional quality that affect the ability of a country to attract investment that would contribute to diversification.

Table 4.4: Per capita GDP and institutional quality in mineral-exporting countries (2007)

Country	PCGDP (US$PPP 2007)	Voice + account-ability	Political stability	Effective governance	Regulation burden	Rule of law	Control of graft	Aggregate index
Bolivia	4,206	0.02	-0.99	-0.83	-1.18	-0.98	-0.49	-4.45
Ecuador	7,449	-0.23	-0.91	-1.04	-1.09	-1.04	-0.87	-5.18
Azerbaijan	7,851	-1.13	-0.69	-0.66	-0.50	-0.83	-1.04	-4.85
Venezuela	12,156	-0.58	-1.23	-0.87	-1.56	-1.47	-1.04	-6.75
Botswana	13,604	0.49	0.84	0.70	0.48	0.67	0.90	4.08
Chile	13,880	0.98	0.55	1.22	1.45	1.17	1.35	6.72
Mexico	14,104	-0.02	-0.57	0.13	0.39	-0.58	-0.35	-1.00
Russia	14,690	-1.01	-0.75	-0.40	-0.44	-0.97	-0.72	-4.29
Trinidad + Tobago	23,507	0.61	0.08	0.37	0.68	-0.22	-0.19	1.33
Oman	22,225[1]	-1.03	0.76	0.38	0.63	0.73	0.82	2.29
Norway	53,433	1.53	1.28	2.12	1.44	2.00	2.09	10.46
Memo Item								
Trinidad + T. 1998	10,145.	0.83	0.44	0.01	0.79	0.36	0.15	2.58

Source: World Bank Governance Indexes (2007). Each index ranges from 2.5 to -2.5 where this indicate the standard deviation above and below the international average for that indicator and are based on several surveys in each country. Note: 1. 2006

To strengthen its mineral sector and increase its diversification—as have Chile, the Gulf States and, to a lesser extent, Mexico and Trinidad and Tobago—Ecuador will need to make policy changes suggested in the examples above—develop natural gas to supplement the oil as a domestic power source, move beyond crude-oil production into more sophisticated processing (with foreign participation, as appropriate), and improve the business environment for non-energy tradable sectors. It will also need to invest in building the credibility that investors want by sustaining these policies over time—as it has already done with dollarization. It will need to increase the certainty of its regulatory and macroeconomic policies—i.e. clarify the rules of the game and abide by them.

Table 4.5. Policies in Chile, Mexico, and Trinidad and Tobago

Policy	Chile	Mexico	Trinidad and Tobago	Gulf CC
Public spending				
Education	Good	Improved coverage but still poor quality		Good for male citizens. Less for the non-citizens.
Infrastructure	Good for copper and for nontraditional exports (agriculture)	Improved but still bottlenecks at nodes	Good investment for the export industry, which has effective priority over the domestic residents	Good for oil and tradable service sectors
Subsidies for exports	No	No		
Subsidized inputs		No, except for electricity to (large-scale) agriculture		Yes
Tax Policy	Favors investment over consumption, administration strong	General taxation weak but improved some since 2002.		
Other policies				
Exchange rate	Flexible	Flexible	Pegged to US $	Pegged to US $
Customs	Free trade agreement with US; state-of-the-art administration	Joined NAFTA; good for big firms; improved for small and medium enterprises, but still a delay		
Regulation	Predictable and low cost to business, but still protects workers and customers	Somewhat problematic on paper and presents opportunities for corruption and cronyism in practice, but the practice is improving and becoming more impersonal		Predictable and good for HC sector. Varies across countries for tradable service sectors. Governance of the countries depends on ruling personalities, which have been friendly to business in recent decades.
Mineral extraction sector				
Diversification	Yes, copper remains top, but other minerals (nitrates) are catching up, growing from 25 percent to 80 percent of the value of copper exports	No, failed to develop gas, silver and other metals faded out	Yes, strong expansion into natural gas and liquefied natural gas	Yes, strong expansion into downstream processing
Financial support		Pemex starved of investment funding since reforms of 1980s, partial fix in 2007–08		Joint ventures, with good access to financing
Downstream use of mineral resources		No, except for oil refining, oil used to generate electricity inefficiently and going to subsidize wasteful uses	Substantial development of gas-based industry (fertilizer, high-tech steel, plastics), some further processing of these materials	Substantial development – varies by country, according to extent of natural resource endowment

Source: IMF 2009; Velculescu and Rizavi 2005.

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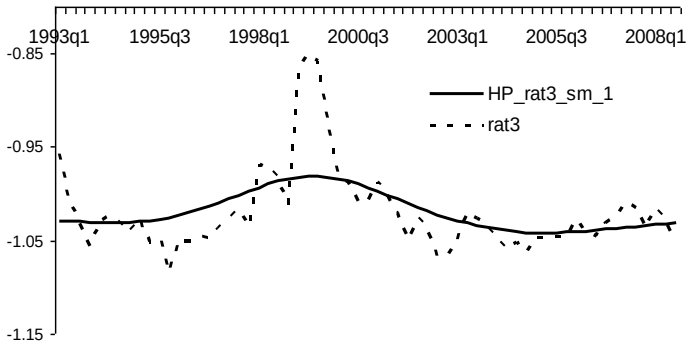
APPENDIX A. SECTORAL DYNAMICS

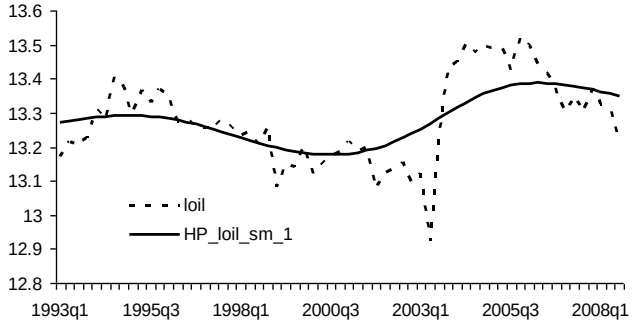
Figure A.1 displays the ratio of manufacturing GDP to services GDP in log terms from 1993 to 2008 alongside its Hodrick Prescott (HP) filtered series.[47] Figure A.2 shows price of oil for Ecuador over the same period with its HP filtered series. Figure A.3 combines the two. An increase in the ratio, which serves as a proxy for the ratio of non-oil tradable to nontradable products, implies faster growth in manufacturing relative to services. A decrease implies slower growth of manufacturing compared to services, which could be a sign of Dutch disease. While we can rule out an absolute decline in manufacturing throughout the sample, we find episodes of relative decline and an episode of convergence. These periods appear to be related to fluctuations in the price of oil, with higher oil prices associated with slower relative manufacturing growth.

Figure A.1. Ratio of manufacturing to services GDP and HP filtered ratio, 1993–2008, in log terms



Source: Bank staff calculations.

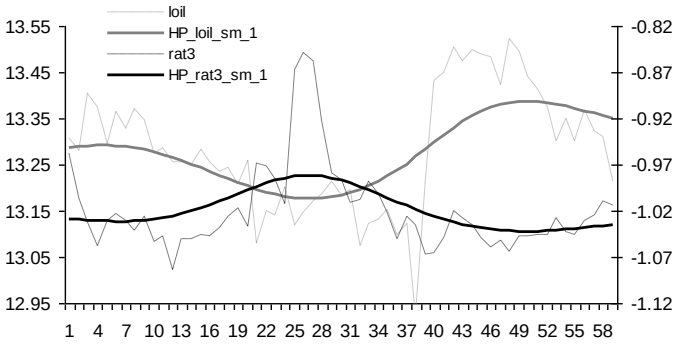
Figure A.2. Oil price and HP filtered series, 1993–2008, in log terms



Source: Bank staff calculations.

[47] The Hodrick-Prescott filter is a mathematical tool used in macroeconomics, especially in real business-cycle theory. It is used to obtain a smoothed, non-linear representation of a time series, one more sensitive to long-term rather than to short-term fluctuations. The cyclical component of extracted by the Hodrick-Prescott filter is interpreted as short-term fluctuations at business-cycle frequency.

Figure A.3. Oil prices and ratio of manufacturing to services GDP, in log terms



Source: Bank staff calculations.

Correlations are −0.47 between the raw data series and −0.96 at lag 4 between the HP filtered series. Contemporaneous correlations are −0.44 and −0.87, respectively. This indicates an increase in oil prices is associated with a decline in manufacturing output.

Table A.1. Correlation between a change in oil price and a change in sector output

Sector	Correlation
Δindustry	-0.04
Δmanufacturing	-0.03
Δelectricity	-0.04
Δservices	0.34*
Δtransports	0.06
Δconstruction	0.24*
Δcommerce	0.14
Δfinancial	0.27*
Δother services	0.46*

*Significant at 10% level.

Table A.1 shows that real growth reacts with a statistically significant coefficient to changes in oil prices in only three sectors—construction, financial services, and other services. They experience increasing output with higher oil prices. These sectors match the critical ones identified as part of the oil cluster in Chapter 2, confirming the proximity of those sectors as providers of the oil sector. Financial services includes insurance, and other services includes services to businesses.

While the industrial sector reacts negatively to higher oil prices, the effect is not statistically significant. The lack of a significant impact of oil prices on transportation and electricity may be explained by Ecuador's large fuel subsidies, which help to keep the consumer prices of oil derivatives unchanged and isolate these sectors from fluctuations in oil prices. The story may be similar in the industrial sector. In the absence of oil price subsidies, higher oil prices should lead to a reduction in output due to increasing production costs. The absence of statistical significance for the oil-industry coefficient confirms that evidence of Dutch disease over the period is weak at best.

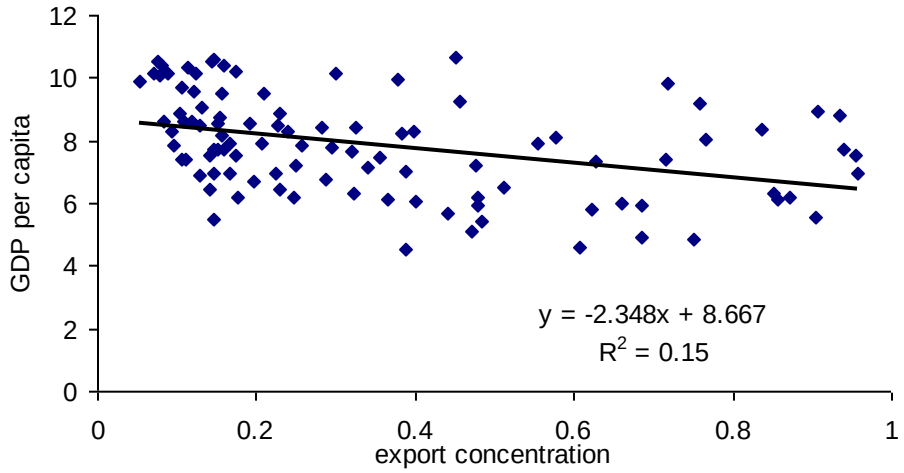
APPENDIX B. EXPORT CONCENTRATION AND MACRO VOLATILITY: A TIME-SERIES PERSPECTIVE FROM ECUADOR

A recurrent preoccupation among policymakers involves the idea that natural riches produce a highly concentrated structure of export revenues, leading to economic volatility and slower growth (de Ferranti and others, 2002). Michaely (1958) confirmed this contention by showing that countries with lower GDP per capita tend to have more concentrated export structures. As a consequence, shocks that affect specific export categories can significantly affect exports and economic growth. Using time-series analysis for a sample of developing countries, Love (1986) provides evidence of a positive relationship between export concentration and export volatility, which indirectly affects income volatility. Sachs and Warner (1995) and Lederman and Maloney (2007) provide similar evidence from cross-sectional and panel analysis. In a more recent study, Malik and Temple (2008) identify a positive relationship between export concentration and a country's terms-of-trade volatility, which they identify as a significant determinant of income volatility. Lederman and Xu (2009) reach a similar conclusion.

Export concentration is not exogenously determined. Malik and Temple (2008) show that it is explained largely by such geographic variables as coastal access, distance to markets and size, as well as by commodity dependence, particularly fuels, minerals, and plantation crops. In addition, Lederman and Xu (2009) find evidence that quality institutions can partly ameliorate the adverse impact of commodity dependency. Carrère, Strauss-Kahn, and Cadot (2007) link export concentration to the path of economic development, with diversification increasing as countries grow richer. However, export diversification starts to decrease again above a very high per capita income threshold—purchasing power parity US$24,000. The authors explain this hump-shaped pattern by the fact that new export sectors are emerging faster than old ones are vanishing in middle-income countries.

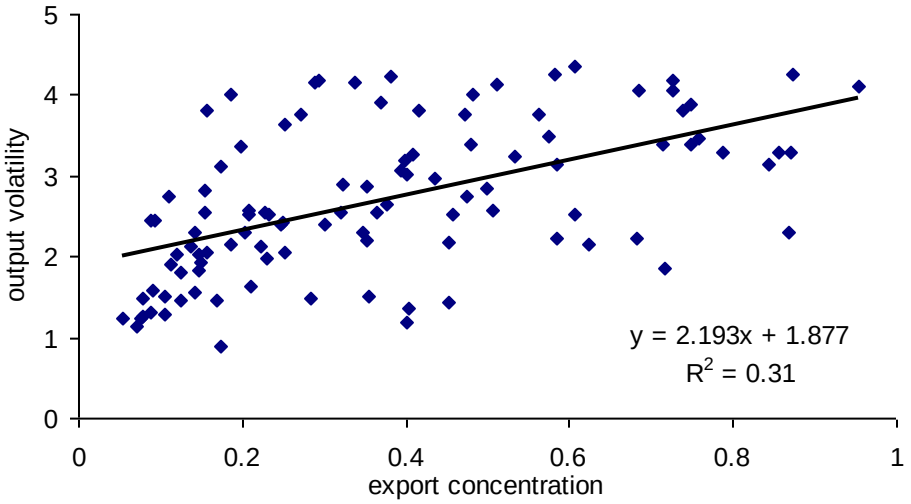
Figures B.1 to B.4 depict various cross-plots between UNCTAD export concentration indexes, GDP per capita, terms-of-trade volatility, and output volatility. The figures confirm a negative relationship between GDP per capita and export concentration and a positive relationship between export concentration and both output and terms-of-trade volatility. One finding is somewhat surprising—the relationship between terms-of-trade and output volatility appears rather weak for our sample of countries.

Figure B.1. Export concentration and GDP per capita



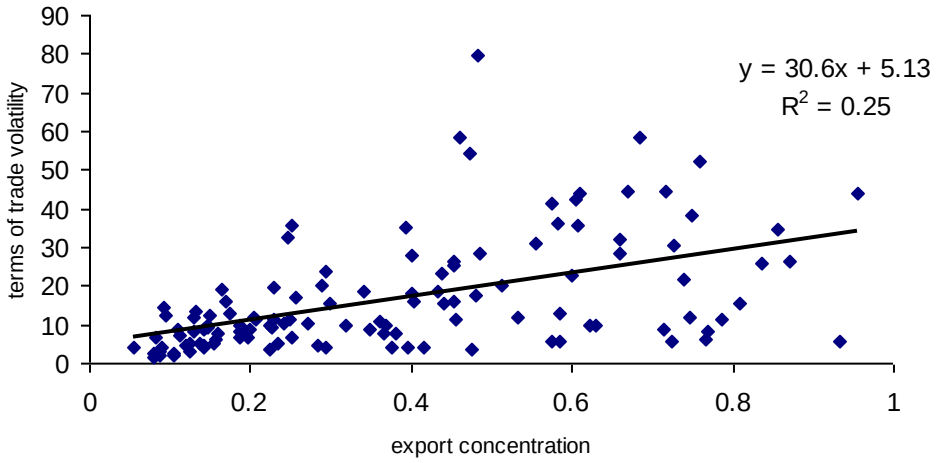
Source: Bank staff calculations based on World Development Indicators and UNCTAD Handbook of Statistics. Based on 171 countries. Export concentration refers to UNCTAD export concentration index for 2006; GDP per capita is for 2006.

Figure B.2. Export concentration and output volatility



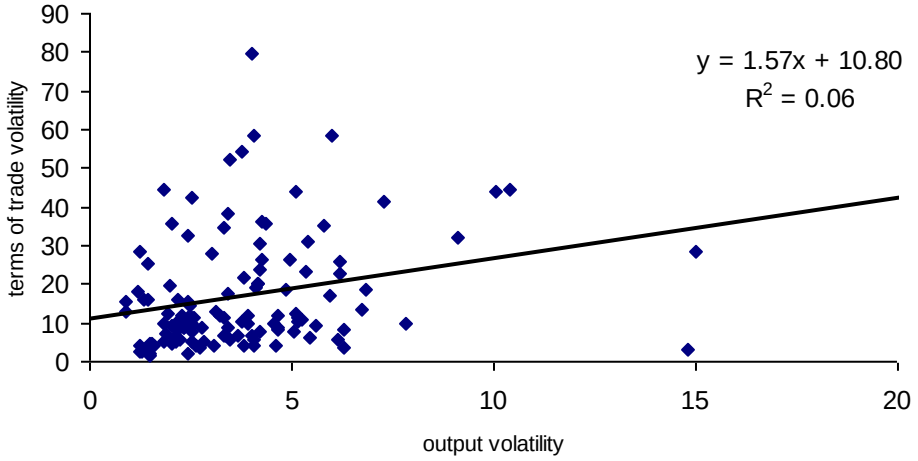
Source: Bank staff calculations based on World Development Indicators and UNCTAD Handbook of Statistics. Based on 171 countries. Export concentration refers to UNCTAD export concentration index for 2006. Output volatility is calculated as the standard deviation of real GDP growth from 1986 to 2006.

Figure B.3. Export concentration and terms-of-trade volatility



Source: Bank staff calculations based on World Development Indicators and UNCTAD Handbook of Statistics. Based on 120 countries. Export concentration refers to UNCTAD export concentration index for 2006. Terms-of-trade volatility is calculated as the standard deviation of net barter terms of trade from 1986 to 2006.

Figure B.4. Terms-of-trade volatility and output volatility



Source: Authors' own calculations based on World Development Indicators and UNCTAD Handbook of Statistics. Based on 120 countries. Terms-of-trade volatility is calculated as the standard deviation of net barter terms of trade from 1986 to 2006. Output volatility is calculated as the standard deviation of real GDP growth from 1986 to 2006.

We complement the cross-sectional analysis in Figures B.1 to B.4 by investigating the relationship between export concentration and output volatility over time. A time-series approach seems justified by the fact that export concentration in Ecuador has been fluctuating quite dramatically over the past century. This suggests that time-variant explanatory variables must also play a significant role in determining export concentration; thus, existing cross-country analyses would benefit by widening our

inquiry beyond time-invariant (for example, geography) or slow-changing determinants (for example, institutions) of export concentration.

A time-series perspective ensures that variations are due to time effects not cross-country differences. Cross-sectional regressions ignore country heterogeneity and dynamic effects. Fixed-effects panel studies allow for a certain degree of country heterogeneity, but parameter heterogeneity is restricted to level differences and slope parameters are treated as homogeneous. Fixed-effect models are also inappropriate in the presence of a unit root. A time-series study of export concentration and macroeconomic volatility gives us a way around these limitations.

Ecuador's economy has been largely dependent on successive key products since the country's independence in 1830. According to Acosta (2006), three products have been the key drivers of Ecuador's exports and growth: cacao (1860–1920), bananas (1948–66), and oil (since 1973). During transitions to different commodity cycles, traditional and nontraditional exports had roughly the same share of Ecuador's total exports, reflecting both a fall of the previously leading product and efforts to diversify trade. For example, nontraditional non-oil exports, such as balsawood and small manufactures, acquired a significant role during 1938–47. During the transition phases, the economy was more diversified in terms of exports and experienced less output volatility but not necessarily slower rates of growth.

We use intervention dummies for periods of high export concentration due to booms in bananas (1948–66) and oil (1972–86), finding that volatility was significantly higher during periods of export concentration. We don't identify significant differences in growth rates (see Table B.1).

Table B.1. Growth rates and volatility during times of export concentration

Indicator	Real GDP growth	Real per capita GDP growth	Real GDP growth volatility	Real GDP per capita volatility
Constant	0.0350643***	0.01045*	0.1142***	0.042000***
	(0.0566)	(0.0536)	(0.00590)	(0.0085)
Dum48-66	0.0171	0.0116	0.07188***	0.0410***
	(0.1000)	(0.0094)	(0.0104)	(0.0084)
Dum72-86	0.0159	0.0130	0.0860***	0.0509***
	(0.01085)	(0.0127)	(0.0113)	(0.0092)

Note: Based on an ordinary least squares regression on interventions dummies that take the value of 1 during 1948 and 1966 for Dum48_66 and during 1972 and 1986 for Dum72_86. Sample period: 1927 to 2000.
*** Significant at 1% level.
* Significant at 10% level.

We measure income volatility as the 10-year rolling coefficient of determination of real GDP. As a measure of export concentration, we apply the Herfindahl index, normalized to range between 0 and 1:

$$H = \frac{\sum_i (s_i)^2 - 1/n}{1 - 1/n},$$

where $s_i = x_i / x$ is the share of export line i in total exports and n is the number of export lines (omitting time subscripts). We only have data on eight export lines—oil, traditional agriculture, banana, coffee, shrimp, cacao, tuna, fish, and nontraditional exports—so our Herfindahl index is a rather crude measure of export concentration. To strengthen the results, we also construct a series of dummy variables that takes the value of 1 during 1938–47, 1948–71, and 1972–86 and 0 otherwise. According to Figure C.1, these are periods of relatively large export concentration.

We run the following ordinary least squares regression:

$$\sigma^2 = \alpha + \pi_t + Z_t + \varepsilon_t,$$

where volatility, σ^2, is a function of export concentration, π_t, and a vector of control variables Z_t. We include real GDP growth to account for the fact that volatility is higher during times of rapid growth. We also include different measures of the common component of Latin American countries (LAC) volatility: the simple average of eight LAC, the first principal component of eight LAC, and average LAC volatility.

The regression reveals a clear positive link between export concentration and volatility (see Table B.2). This relationship holds independent of the measure of export concentration used and is robust to a series of control variables.

Table B.2. Regression results with GDP volatility as the dependent variable

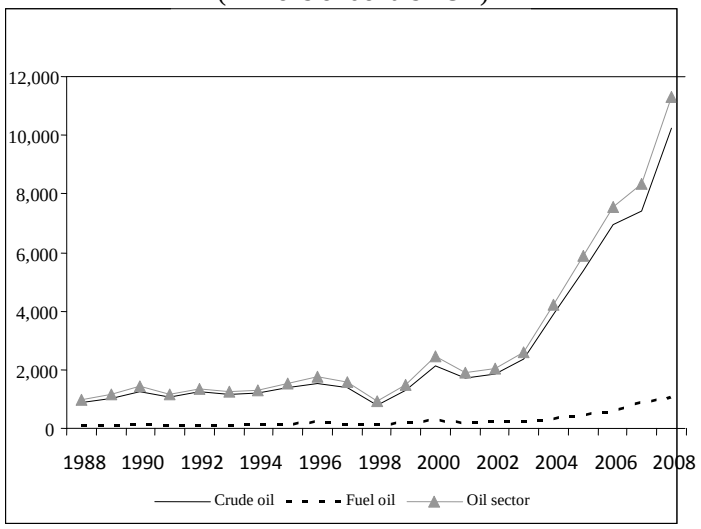
Independent variable	**(1)**	**(2)**	**(3)**
Global volatility	0.9336***	0.7648***	0.73786***
	(0.1348541)	(0.12302)	(0.1336)
Time dummies		0.01740***	
		(0.00584)	
Herfindahl index	0.0481**		
	(0.0244623)		
dum38_47			-0.00398
			(0.01006)
dum48_71			0.01507*
			(0.0083)
dum72_86			0.0368***
			(0.0069)
gdp growth	0.1410	0.1171	0.1280
	(0.0951)	(0.0909)	(0.0978)
Constant	-0.0891***	-0.0637***	-0.0606***
	(0.0198275)	(0.0160)	(0.0173)
R^2	0.48	0.49	0.57

*** Significant at 1%.
** Significant at 5%.

APPENDIX C. OIL SECTOR COMPLEMENTARY DATA

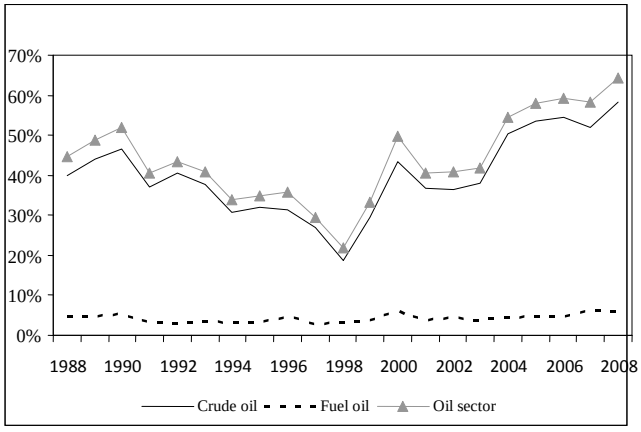
The following series of graphs and tables present auxiliary data on Ecuador's oil sector.

Figure C.1. Major components of oil sector exports, 1988–2008
(millions of dollars FOB)



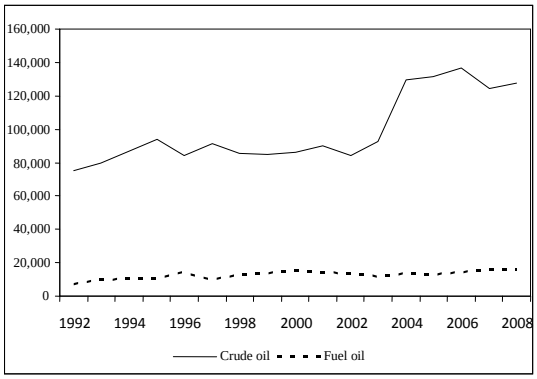
Source: Banco Central de Ecuador.

Figure C.2. Share of oil sector in total exports, 1988–2008



Source: Banco Central de Ecuador.

Figure C.3. Volume of oil exports, 1992–2008
(thousands of barrels)



Source: Banco Central de Ecuador.

Table C.1. Main hydrocarbon-related laws

Year	Law
1973	Ley de Hidrocarburos
1974	Ley de Exploración y Explotación de Asfaltos
1993	Reglamento para la Aplicación de la Ley Reformatoria a la Ley de Hidrocarburos no. 44
1995	Ley de Regulación de la Producción y Comercialización de Combustibles en el Ecuador
2001	Ley Especial de la Empresa Estatal Petróleos del Ecuador (Petroecuador) y sus Empresas Filiales
2001	Reglamento Sustitutivo al Reglamento General a la Ley Especial de la Empresa Estatal Petróleos del Ecuador (Petroecuador) y sus Empresas Filiales
2001	Reglamento para la Transferencia o Cesión de Derechos y Obligaciones de los Contratos de Hidrocarburos
2003	Reglamento del Sistema Especial de Licitación
2003	Reglamento del Contrato de Asociación Previsto en la Ley de Hidrocarburos
2006	Reglamento para la Transferencia o Cesión de Derechos y Obligaciones de los Contratos Inherentes a Las Actividades de Comercialización de Combustibles, Gas Licuado de Petróleo y Otros Productos Derivados de Hidrocarburos
2007	Reglamento de Aplicación de la Ley no. 42-2006 Reformatoria a la Ley de Hidrocarburos (Decreto 662)
2008	Constitución Política del Estado (Articles 261, 313, and 408)
2008	Ley Orgánica para la Recuperación del uso de los Recursos Petroleros del Estado y Racionalización Administrativa de los Procesos de Endeudamiento
2008	Ley Reformatoria para la Equidad Tributaria

Source: Albornoz, Cueva, and Gordillo 2006.

APPENDIX D. INTERMEDIATE CONSUMPTION OF EXTRACTING AND REFINING SECTORS

This appendix presents each subsector's share of intermediate consumption, share of the overall supply of other sectors' products, and share of the overall intermediate consumption of other sectors' products in the economy.

Share of intermediate consumption by sector

The intermediate consumption of oil-extraction activities is concentrated in five areas: services provided to businesses, basic chemical products, oil derivatives, construction, and transportation and storage (see figures D.1 and D.2). These subsectors represent an average of 88.6 percent of the oil-extraction sector's intermediate consumption in 2000–07. Its share was mostly stable throughout the period, with a gradual decline in the required inputs from services provided to businesses.

Other important subsectors that supply oil extraction with intermediate consumption include machinery and equipment (average intermediate consumption of 3.1 percent in 2000-07), crude oil and natural gas (the product of the subsector, with an average of 2.5 percent), insurance (1.5 percent), and transportation equipment including vehicles (1.3 percent). These nine subsectors (out of 61) add up to 97 percent of total oil-extraction intermediate consumption in the period.

Figure D.1. Intermediate consumption of the oil extraction sector, 2000–07

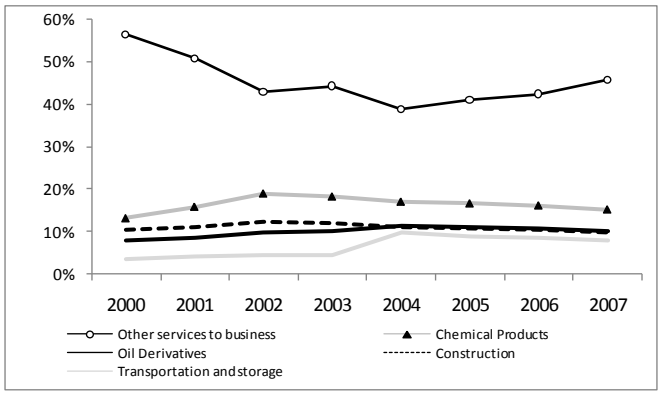
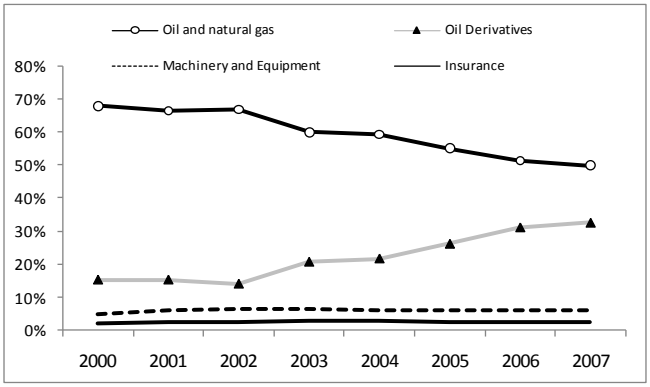


Figure D.2. Intermediate consumption of the oil refining sector, 2000–07



The intermediate consumption of the oil-refining subsector is even more concentrated than that of the oil-extraction subsector. The main component of oil refining's intermediate consumption is crude oil, with a 60 percent average share in 2000–07. However, a decline from 68.1 percent in 2000 to 49.8 percent in 2007 reflects aging refineries' increasing difficulties in efficiently processing the heavier Ecuadorian crude oil. It has created a growing need to use imported oil derivatives—mainly high-octane naphtha and related products—to improve the quality of the final products. Other intermediate products for oil refining include machinery and equipment (with average share of 6.0 percent), insurance activities (2.4 percent), and transportation equipment including vehicles (1.9 percent).

Share of the overall use of other sectors' products

Figure D.3. Total use of the products of other sectors by the oil extraction sector, 2000–07

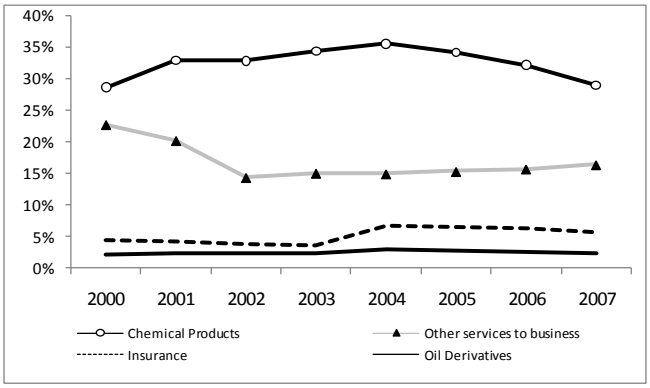
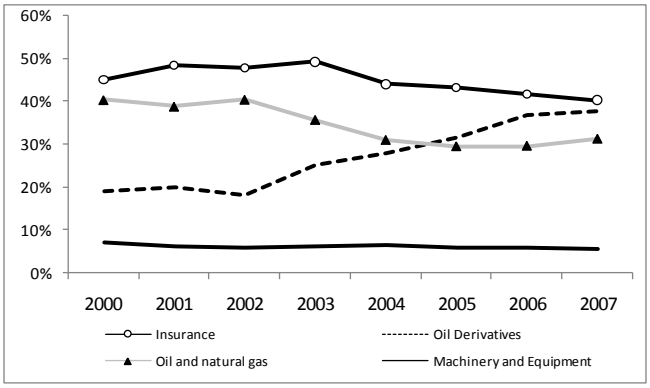


Figure D.4. Total use of the products of other sectors by the oil refinery sector, 2000–07



Share of the intermediate use of other sectors' products in the economy

Figure D.5. Intermediate use of the products of other sectors by the oil extraction sector 2000–07

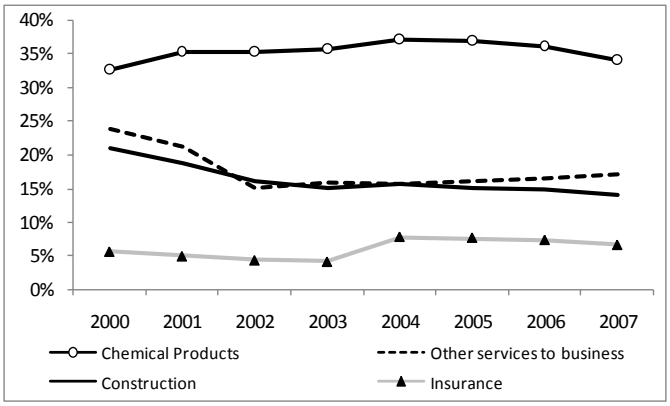
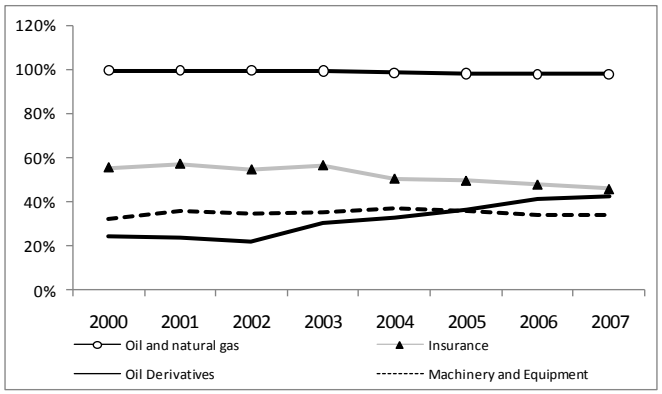


Figure D.6. Intermediate use of the products of other sectors by the oil refinery sector, 2000–07



APPENDIX E. REAL GROWTH RATES FOR ECONOMIC SECTORS AND MAIN EXPORT PRODUCTS

The following series of graphs present annual real sector GDP growth and trends for specific sectors.

Figure E.1 Annual growth of oil real GDP, 1994–2007

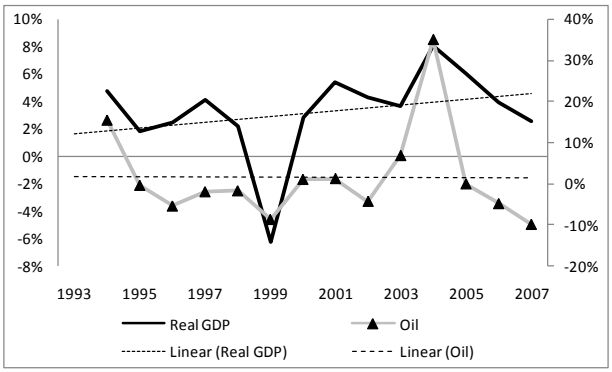


Figure E.2 Annual growth of fishing real GDP, 1994–2007

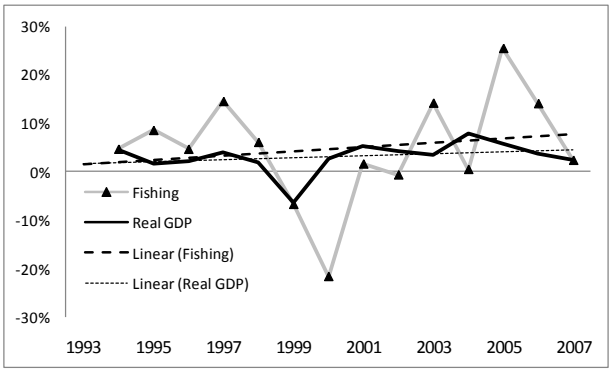


Figure E.3 Annual growth of agriculture real GDP, 1994–2007

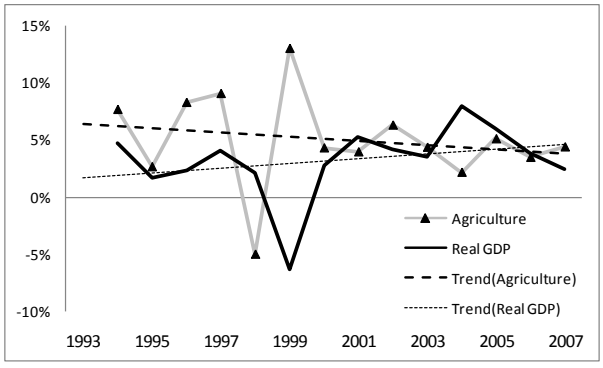


Figure E.4. Annual growth of industrial real GDP, 1994–2007

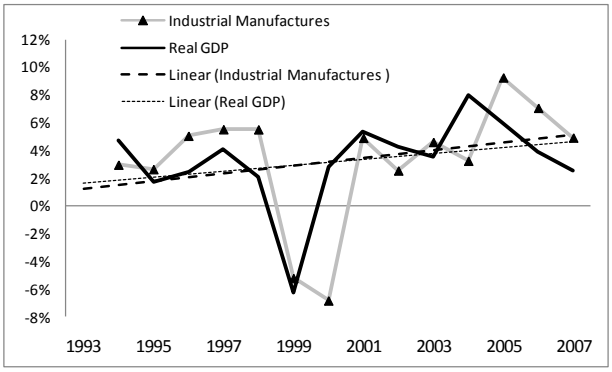


Figure E.5. Annual growth of construction real GDP, 1994–2007

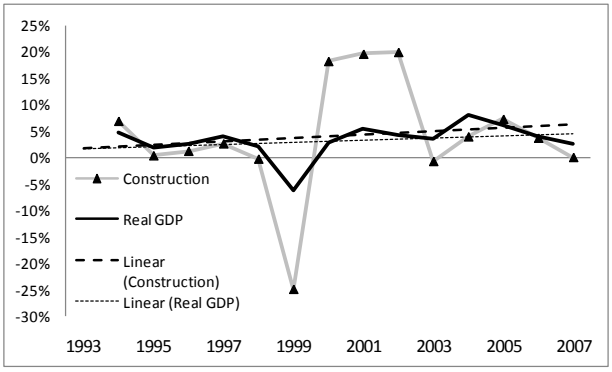


Figure E.6. Annual growth of commerce real GDP, 1994–2007

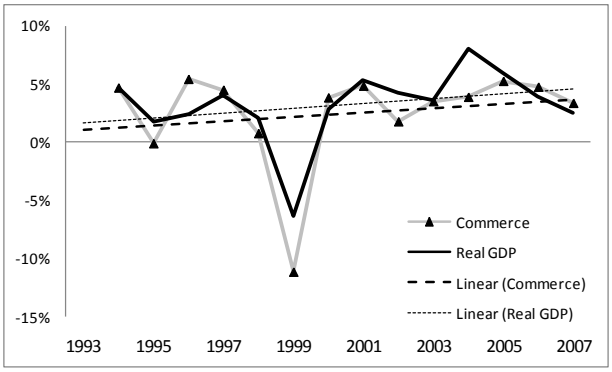


Figure E.7. Annual growth of transportation real GDP, 1994–2007

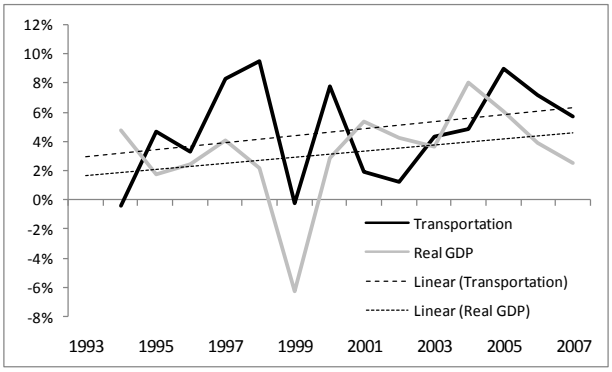


Figure E.8. Annual growth of financial services real GDP, 1994–2007

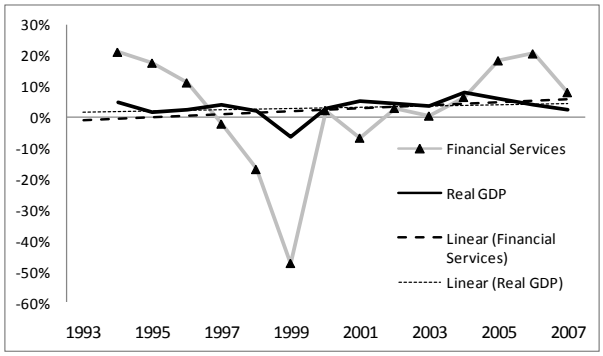


Figure E.9. Annual growth of real estate real GDP, 1994–2007

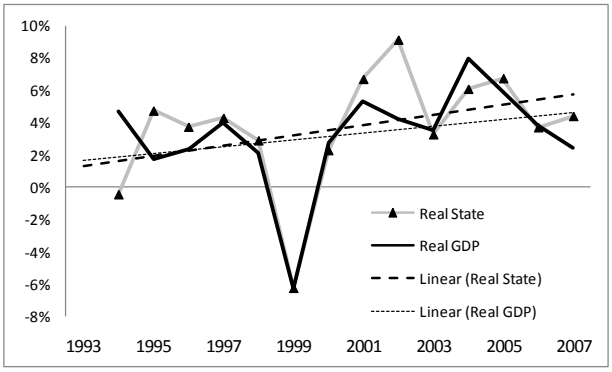


Figure E.10. Annual growth of public sector real GDP, 1994–2007

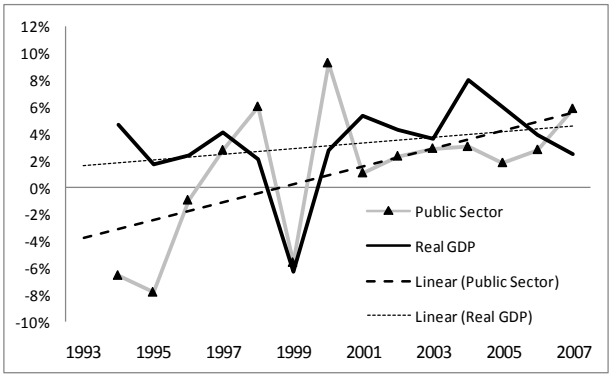
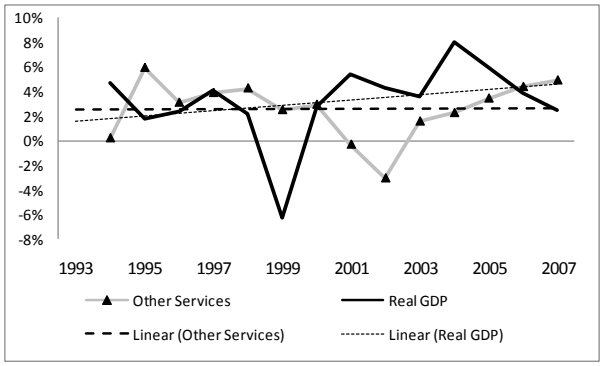


Figure E.11. Annual growth of other services real GDP, 1994–2007



Annual real export growth and trends for main export products

Figure E.12. Growth of banana exports, 1994–2007

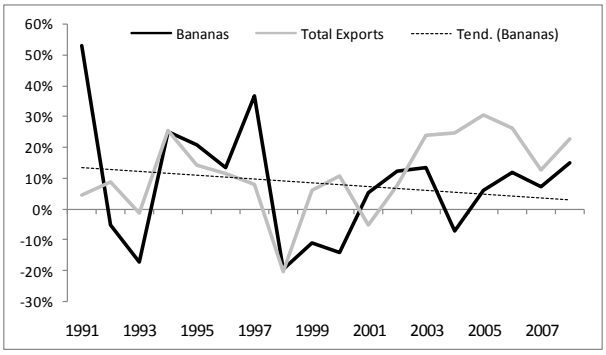


Figure E.13. Growth of fish and shrimp exports, 1994–2007

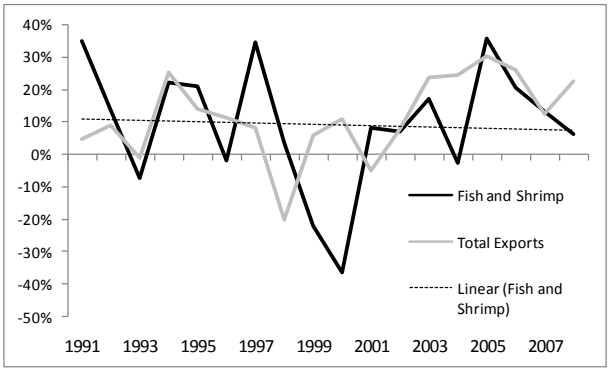


Figure E.14. Growth of flower exports, 1994–2007

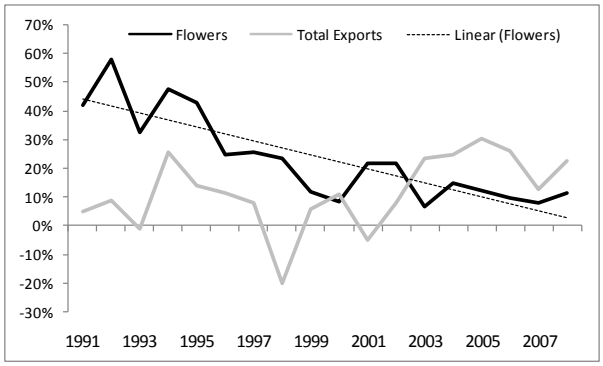


Figure E.15. Growth of processed agricultural products exports, 1994–2007

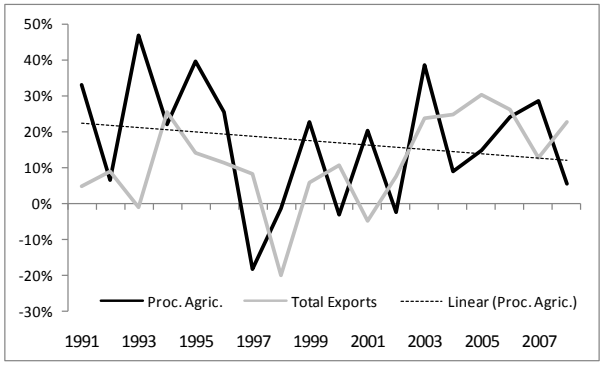


Figure E.16. Growth of other agricultural products exports, 1994–2007

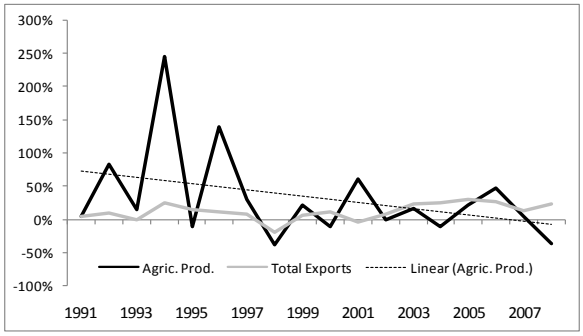


Figure E.17. Growth of cacao exports, 1994–2007

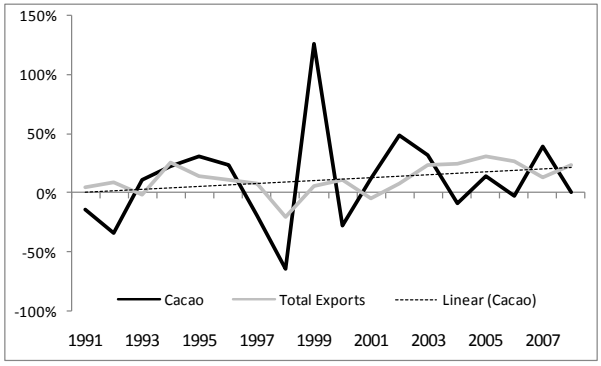
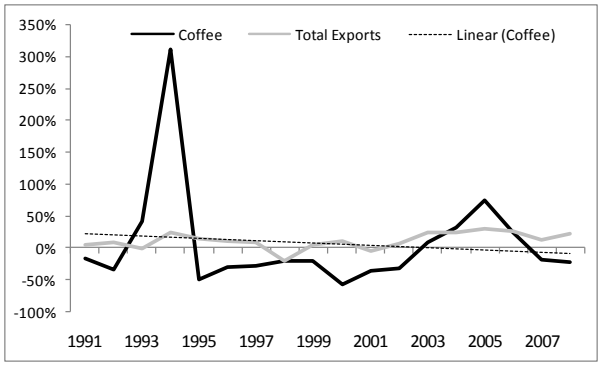


Figure E.18. Growth of coffee exports, 1994–2007



The following series of graphs show annual real export growth and trends for main manufactured industrial products:

Figure E.19. Growth of industrial exports, 1991–2008

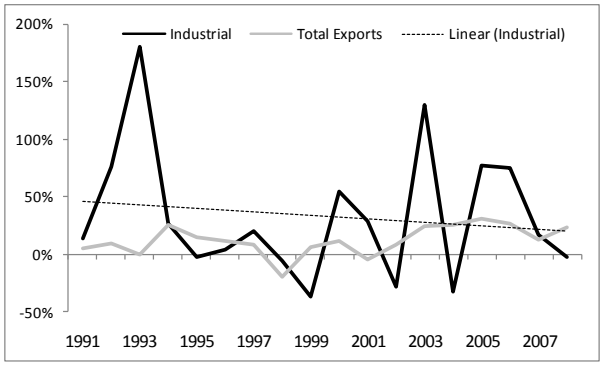


Figure E.20. Growth of furniture exports, 1991–2008

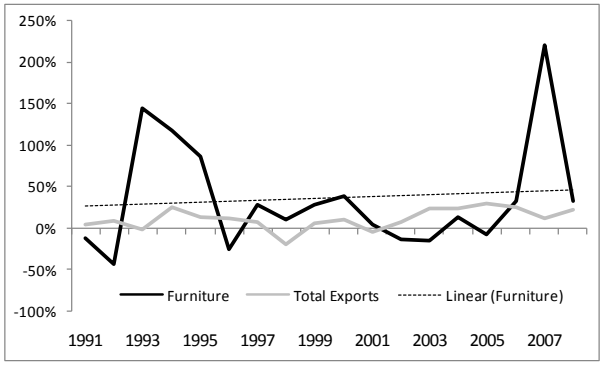


Figure E.21. Growth of mineral exports, 1991–2008

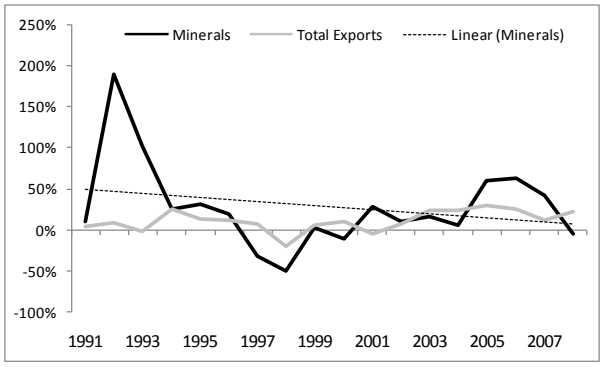


Figure E.22. Growth of processed wood exports, 1991–2008

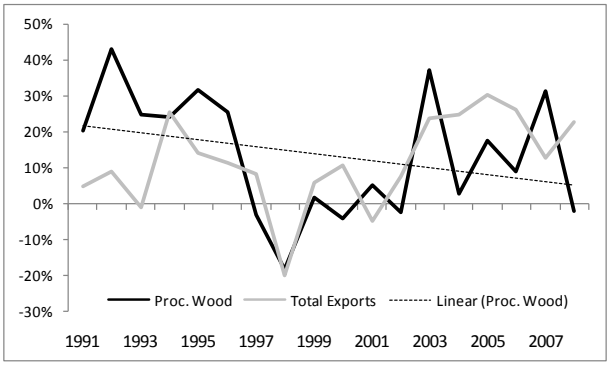


Figure E.23. Growth of textile exports, 1991–2008

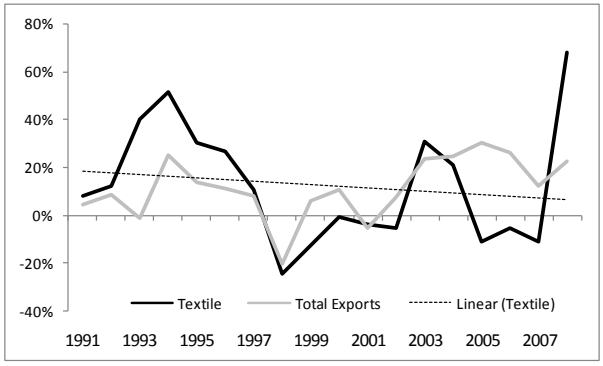


Figure E.24. Growth of clothes exports, 1991–2008

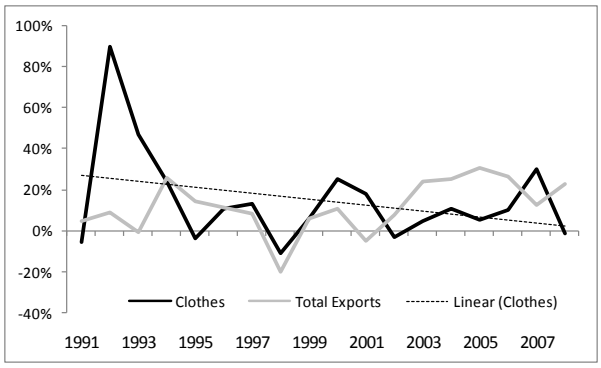


Figure E.25. Growth of chemical exports, 1991–2008

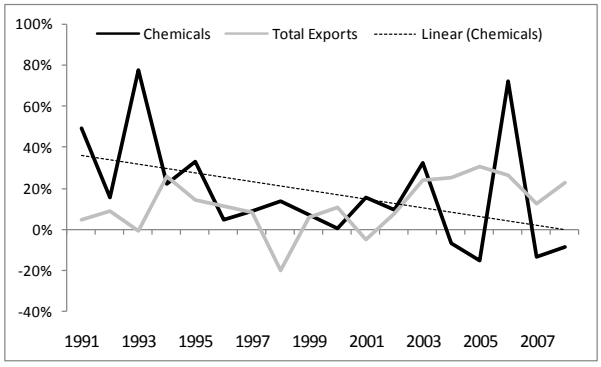


Figure E.26. Growth of ceramic exports, 1991–2008

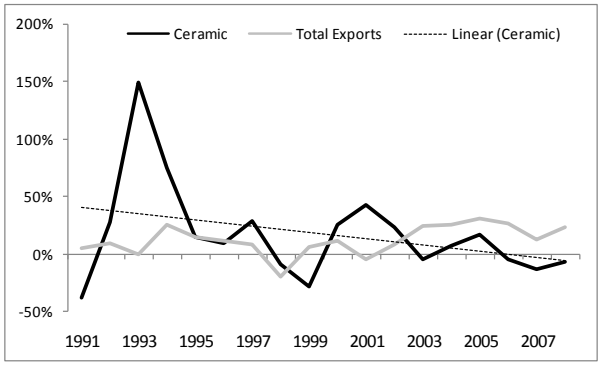


Figure E.27. Growth of rubber and plastic exports, 1991–2008

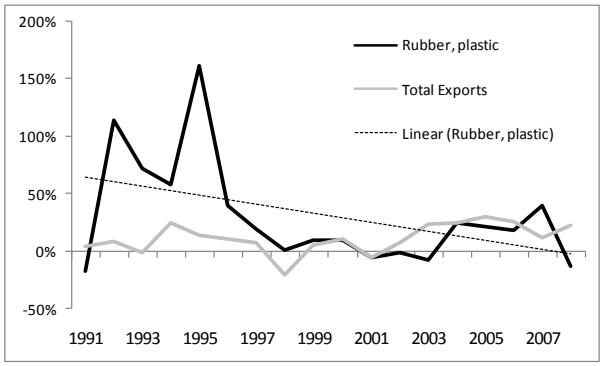


Table E.1. Intermediate consumption of the oil extraction subsector, 2000–07 (%)

Products	2000	2001	2002	2003	2004	2005	2006	2007
Other services to business	56.52%	50.76%	42.91%	44.26%	38.73%	40.85%	42.33%	45.82%
Chemical products	13.08%	15.76%	18.84%	18.14%	16.94%	16.54%	16.06%	15.13%
Oil derivatives	7.67%	8.19%	9.83%	10.09%	11.34%	11.07%	10.75%	10.13%
Construction	10.50%	11.03%	12.19%	11.74%	10.90%	10.64%	10.33%	9.73%
Transportation and storage	3.30%	3.81%	4.37%	4.32%	9.59%	8.67%	8.31%	7.72%
Machinery and equipment	1.86%	3.06%	3.72%	3.58%	3.33%	3.25%	3.15%	2.97%
Oil and natural gas	2.03%	2.07%	2.27%	2.22%	2.69%	2.68%	2.95%	2.74%
Insurance	0.95%	1.01%	1.11%	1.07%	1.97%	1.90%	1.83%	1.72%
Transportation equipment, including vehicles	1.22%	1.28%	1.42%	1.37%	1.42%	1.39%	1.35%	1.27%
Hotels and restaurants	0.44%	0.47%	0.51%	0.50%	0.50%	0.49%	0.48%	0.45%
Metallic manufactures	0.41%	0.43%	0.47%	0.46%	0.42%	0.41%	0.40%	0.38%
Other products derived from nonmetallic minerals	0.33%	0.35%	0.39%	0.38%	0.35%	0.34%	0.33%	0.31%
Rubber and plastic products	0.21%	0.22%	0.24%	0.23%	0.25%	0.24%	0.24%	0.22%
Telecommunications	0.23%	0.25%	0.27%	0.26%	0.24%	0.24%	0.23%	0.22%
Leather products	0.21%	0.22%	0.25%	0.24%	0.22%	0.22%	0.21%	0.20%
Social services	0.15%	0.16%	0.17%	0.17%	0.16%	0.15%	0.15%	0.14%
Textiles and clothes	0.13%	0.14%	0.15%	0.15%	0.16%	0.15%	0.15%	0.14%
Electricity	0.14%	0.15%	0.16%	0.16%	0.15%	0.14%	0.14%	0.13%
Nonmetallic minerals	0.14%	0.15%	0.16%	0.15%	0.14%	0.14%	0.14%	0.13%
Rubber products	0.13%	0.14%	0.16%	0.15%	0.14%	0.14%	0.13%	0.13%
Processed wood	0.09%	0.10%	0.11%	0.10%	0.10%	0.09%	0.09%	0.09%
Paper products	0.06%	0.07%	0.08%	0.07%	0.07%	0.07%	0.06%	0.06%
Domestic gas and water	0.06%	0.07%	0.07%	0.07%	0.07%	0.06%	0.06%	0.06%
Other chemical products	0.05%	0.05%	0.06%	0.06%	0.05%	0.05%	0.05%	0.05%
Mail	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%
Education	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%
Nonalcoholic beverages	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
Other manufactures	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
Other food products	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Financial services (banking)	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
TOTAL	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Source: Banco Central del Ecuador; Bank staff calculations.

Table E.2. Intermediate consumption of the oil refinery and oil pipelines subsector, 2000–07 (%)

Products	2000	2001	2002	2003	2004	2005	2006	2007
Oil and natural gas	68.06%	66.51%	66.95%	60.02%	59.41%	55.12%	51.29%	49.83%
Oil derivatives	15.19%	15.20%	13.93%	20.69%	21.70%	26.21%	31.27%	32.70%
Machinery and equipment	4.66%	5.89%	6.56%	6.34%	6.27%	6.26%	5.86%	5.88%
Insurance	2.04%	2.48%	2.57%	2.75%	2.60%	2.51%	2.32%	2.29%
Transportation equipment, including vehicles	2.00%	1.97%	1.99%	1.98%	1.95%	1.93%	1.81%	1.81%
Metallic manufactures	1.29%	1.27%	1.28%	1.28%	1.26%	1.25%	1.17%	1.17%
Rubber and plastic products	0.73%	0.72%	0.72%	0.83%	0.82%	0.81%	0.76%	0.76%
Electricity	0.79%	0.78%	0.78%	0.75%	0.74%	0.74%	0.69%	0.69%
Other services to business	0.63%	0.66%	0.66%	0.70%	0.69%	0.68%	0.62%	0.62%
Leather products	0.65%	0.64%	0.65%	0.66%	0.65%	0.64%	0.60%	0.61%
Transportation and storage	0.52%	0.52%	0.51%	0.49%	0.49%	0.48%	0.45%	0.45%
Textiles and clothes	0.39%	0.38%	0.38%	0.48%	0.47%	0.47%	0.44%	0.44%
Rubber products	0.43%	0.43%	0.43%	0.41%	0.41%	0.40%	0.38%	0.38%
Telecommunications	0.41%	0.41%	0.41%	0.40%	0.39%	0.39%	0.36%	0.36%
Chemical products	0.40%	0.40%	0.40%	0.39%	0.38%	0.38%	0.36%	0.36%
Other products derived from nonmetallic minerals	0.31%	0.30%	0.31%	0.37%	0.33%	0.33%	0.31%	0.31%
Construction	0.34%	0.31%	0.31%	0.30%	0.29%	0.29%	0.27%	0.27%
Social services	0.24%	0.23%	0.24%	0.25%	0.24%	0.24%	0.22%	0.23%
Hotels and restaurants	0.16%	0.16%	0.16%	0.16%	0.15%	0.15%	0.14%	0.14%
Paper products	0.15%	0.15%	0.15%	0.15%	0.15%	0.14%	0.14%	0.14%
Domestic gas and water	0.15%	0.15%	0.15%	0.15%	0.14%	0.12%	0.11%	0.11%
Nonmetallic minerals	0.12%	0.12%	0.12%	0.11%	0.11%	0.11%	0.10%	0.10%
Processed wood	0.08%	0.08%	0.08%	0.09%	0.09%	0.09%	0.08%	0.08%
Mail	0.08%	0.08%	0.08%	0.08%	0.07%	0.07%	0.07%	0.07%
Nonalcoholic beverages	0.06%	0.06%	0.06%	0.05%	0.05%	0.05%	0.05%	0.05%
Other chemical products	0.05%	0.04%	0.05%	0.05%	0.05%	0.05%	0.05%	0.05%
Other manufactures	0.02%	0.02%	0.02%	0.03%	0.03%	0.03%	0.03%	0.03%
Other food products	0.03%	0.03%	0.03%	0.03%	0.02%	0.02%	0.02%	0.02%
Education	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%
Financial services (banking)	0.00%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
TOTAL	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Source: Banco Central del Ecuador; Bank staff calculations.

Table E.3. Intermediate consumption of the oil sector, 2000–07 (%)

Products	2000	2001	2002	2003	2004	2005	2006	2007
Oil and natural gas	56.34%	55.23%	56.91%	50.87%	49.86%	46.27%	43.43%	42.27%
Oil derivatives	13.85%	13.97%	13.29%	19.01%	19.96%	23.66%	27.93%	29.08%
Other services to business	10.55%	9.43%	7.22%	7.59%	7.09%	7.46%	7.40%	7.87%
Machinery and equipment	4.17%	5.39%	6.12%	5.90%	5.78%	5.75%	5.42%	5.42%
Chemical products	2.65%	3.09%	3.26%	3.20%	3.17%	3.11%	2.91%	2.73%
Insurance	1.85%	2.22%	2.34%	2.49%	2.49%	2.41%	2.24%	2.20%
Construction	2.14%	2.18%	2.15%	2.11%	2.08%	2.04%	1.91%	1.79%
Transportation equipment, including vehicles	1.86%	1.85%	1.90%	1.88%	1.86%	1.84%	1.73%	1.73%
Transportation and storage	1.01%	1.09%	1.11%	1.10%	2.02%	1.86%	1.73%	1.62%
Metallic manufactures	1.13%	1.12%	1.15%	1.15%	1.12%	1.11%	1.04%	1.05%
Rubber and plastic products	0.64%	0.63%	0.65%	0.74%	0.72%	0.72%	0.67%	0.68%
Electricity	0.67%	0.67%	0.69%	0.66%	0.64%	0.64%	0.60%	0.60%
Leather products	0.57%	0.57%	0.58%	0.59%	0.58%	0.57%	0.54%	0.55%
Textiles and clothes	0.34%	0.34%	0.35%	0.43%	0.42%	0.42%	0.39%	0.39%
Telecommunications	0.38%	0.38%	0.39%	0.38%	0.37%	0.36%	0.34%	0.34%
Rubber products	0.38%	0.38%	0.39%	0.37%	0.36%	0.36%	0.34%	0.34%
Other products derived from nonmetallic minerals	0.31%	0.31%	0.32%	0.37%	0.33%	0.33%	0.31%	0.31%
Social services	0.22%	0.22%	0.23%	0.23%	0.23%	0.23%	0.21%	0.21%
Hotels and restaurants	0.21%	0.21%	0.22%	0.21%	0.21%	0.21%	0.20%	0.19%
Paper products	0.14%	0.14%	0.14%	0.14%	0.13%	0.13%	0.12%	0.12%
Nonmetallic minerals	0.12%	0.12%	0.12%	0.12%	0.12%	0.11%	0.11%	0.11%
Domestic gas and water	0.14%	0.14%	0.14%	0.13%	0.13%	0.11%	0.10%	0.10%
Processed wood	0.08%	0.08%	0.08%	0.09%	0.09%	0.09%	0.08%	0.08%
Mail	0.07%	0.07%	0.07%	0.07%	0.07%	0.07%	0.06%	0.06%
Other chemical products	0.05%	0.05%	0.05%	0.05%	0.05%	0.05%	0.05%	0.05%
Nonalcoholic beverages	0.05%	0.05%	0.05%	0.05%	0.05%	0.05%	0.04%	0.04%
Other manufactures	0.02%	0.02%	0.02%	0.03%	0.03%	0.03%	0.02%	0.02%
Education	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%
Other food products	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%
Financial services (banking)	0.00%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
TOTAL	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Source: Banco Central del Ecuador; Bank staff calculations.

Table E.4. Share of oil extraction in total input utilization, 2000–07 (%)

Products	2000	2001	2002	2003	2004	2005	2006	2007
Chemical products	28.48%	32.91%	32.80%	34.36%	35.58%	34.15%	32.09%	28.83%
Other services to business	22.64%	20.12%	14.28%	14.95%	14.87%	15.23%	15.63%	16.30%
Insurance	4.54%	4.18%	3.80%	3.61%	6.77%	6.65%	6.37%	5.77%
Oil derivatives	2.08%	2.28%	2.36%	2.32%	2.95%	2.70%	2.44%	2.22%
Construction	2.19%	1.90%	1.51%	1.56%	1.65%	1.57%	1.52%	1.45%
Transportation and storage	0.60%	0.66%	0.63%	0.64%	1.61%	1.45%	1.38%	1.24%
Machinery and equipment	0.62%	0.69%	0.61%	0.66%	0.68%	0.59%	0.58%	0.52%
Domestic gas and water	0.54%	0.56%	0.50%	0.50%	0.53%	0.52%	0.50%	0.47%
Nonmetallic minerals	0.59%	0.56%	0.53%	0.50%	0.53%	0.54%	0.49%	0.46%
Transportation equipment, including vehicles	0.68%	0.45%	0.39%	0.51%	0.59%	0.46%	0.40%	0.36%
Social services	0.33%	0.39%	0.35%	0.35%	0.37%	0.38%	0.36%	0.33%
Oil and natural gas	0.26%	0.26%	0.25%	0.25%	0.28%	0.29%	0.33%	0.33%
Hotels and restaurants	0.39%	0.38%	0.34%	0.34%	0.39%	0.37%	0.35%	0.32%
Other products derived from nonmetallic minerals	0.40%	0.37%	0.33%	0.34%	0.36%	0.35%	0.32%	0.28%
Mail	0.41%	0.40%	0.37%	0.36%	0.36%	0.36%	0.33%	0.28%
Metallic manufactures	0.41%	0.35%	0.26%	0.32%	0.34%	0.31%	0.28%	0.27%
Rubber products	0.31%	0.30%	0.30%	0.33%	0.34%	0.32%	0.29%	0.26%
Leather products	0.42%	0.35%	0.31%	0.31%	0.32%	0.31%	0.30%	0.26%
Rubber and plastic products	0.29%	0.26%	0.21%	0.20%	0.26%	0.26%	0.24%	0.22%
Telecommunications	0.22%	0.22%	0.19%	0.17%	0.16%	0.12%	0.11%	0.09%
Electricity	0.11%	0.10%	0.09%	0.09%	0.10%	0.09%	0.09%	0.08%
Processed wood	0.09%	0.09%	0.08%	0.08%	0.09%	0.08%	0.08%	0.07%
Textiles and clothes	0.06%	0.05%	0.05%	0.05%	0.06%	0.06%	0.06%	0.05%
Paper products	0.04%	0.04%	0.04%	0.04%	0.04%	0.04%	0.04%	0.03%
Nonalcoholic beverages	0.02%	0.03%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%
Education	0.01%	0.02%	0.01%	0.01%	0.02%	0.01%	0.01%	0.01%
Other chemical products	0.02%	0.02%	0.02%	0.02%	0.01%	0.01%	0.01%	0.01%
Other manufactures	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Other food products	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Financial services (banking)	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
TOTAL	1.33%	1.21%	0.99%	1.03%	1.14%	1.10%	1.08%	1.05%

Source: Banco Central del Ecuador; Bank staff calculations.

Table E.5. Share of total input use of the oil refinery subsector, 2000–07 (%)

Products	2000	2001	2002	2003	2004	2005	2006	2007
Insurance	45.01%	48.51%	47.82%	49.34%	44.00%	43.08%	41.62%	40.08%
Oil derivatives	19.13%	19.93%	18.17%	25.25%	27.95%	31.46%	36.56%	37.57%
Oil and natural gas	40.37%	38.82%	40.46%	35.72%	31.02%	29.53%	29.64%	31.30%
Machinery and equipment	7.14%	6.24%	5.85%	6.25%	6.32%	5.59%	5.56%	5.37%
Domestic gas and water	6.17%	6.03%	5.69%	5.62%	5.79%	4.69%	4.58%	4.61%
Metallic manufactures	6.04%	4.93%	3.83%	4.80%	5.02%	4.58%	4.25%	4.32%
Leather products	5.92%	4.75%	4.36%	4.56%	4.63%	4.53%	4.36%	4.13%
Rubber products	4.66%	4.29%	4.52%	4.82%	4.91%	4.71%	4.30%	4.09%
Plastic products	4.67%	4.01%	3.49%	3.91%	4.12%	4.24%	3.97%	3.94%
Mail	5.18%	4.76%	4.75%	4.47%	4.43%	4.47%	4.13%	3.80%
Chemical products	4.07%	3.91%	3.79%	3.92%	3.98%	3.86%	3.66%	3.56%
Social services	2.40%	2.72%	2.56%	2.71%	2.85%	2.92%	2.86%	2.81%
Transportation equipment, including vehicles	5.19%	3.25%	2.95%	3.92%	3.96%	3.13%	2.77%	2.69%
Electricity	2.78%	2.51%	2.46%	2.35%	2.40%	2.32%	2.25%	2.24%
Nonmetallic minerals	2.32%	2.11%	2.09%	1.94%	2.04%	2.07%	1.90%	1.91%
Other products derived from nonmetallic minerals	1.73%	1.51%	1.42%	1.76%	1.70%	1.65%	1.51%	1.46%
Other services to business	1.16%	1.24%	1.19%	1.25%	1.30%	1.25%	1.18%	1.16%
Telecommunications	1.77%	1.72%	1.53%	1.34%	1.26%	0.96%	0.88%	0.82%
Textiles and clothes	0.75%	0.68%	0.69%	0.89%	0.89%	0.87%	0.85%	0.82%
Nonalcoholic beverages	0.58%	0.61%	0.56%	0.58%	0.59%	0.59%	0.59%	0.56%
Hotels and restaurants	0.68%	0.62%	0.59%	0.57%	0.59%	0.58%	0.55%	0.55%
Paper products	0.45%	0.44%	0.43%	0.40%	0.41%	0.40%	0.39%	0.39%
Transportation and storage	0.43%	0.42%	0.40%	0.39%	0.40%	0.40%	0.38%	0.38%
Processed wood	0.35%	0.34%	0.32%	0.38%	0.39%	0.37%	0.37%	0.36%
Construction	0.33%	0.25%	0.21%	0.21%	0.22%	0.21%	0.21%	0.21%
Other food products	0.13%	0.11%	0.10%	0.09%	0.10%	0.09%	0.09%	0.09%
Education	0.09%	0.08%	0.08%	0.08%	0.08%	0.08%	0.08%	0.08%
Other manufactures	0.07%	0.06%	0.06%	0.08%	0.08%	0.08%	0.08%	0.08%
Other chemical products	0.07%	0.07%	0.06%	0.08%	0.07%	0.07%	0.07%	0.06%
Financial services (banking)	0.00%	0.03%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%
TOTAL	6.17%	5.73%	5.37%	5.48%	5.62%	5.41%	5.55%	5.49%

Source: Banco Central del Ecuador; Bank staff calculations.

Table E.6. Share of the oil sector in total input use, 2000–07 (%)

Products	2000	2001	2002	2003	2004	2005	2006	2007
Insurance	49.55%	52.69%	51.62%	52.95%	50.77%	49.73%	47.99%	45.85%
Oil derivatives	21.21%	22.21%	20.53%	27.57%	30.90%	34.16%	39.00%	39.80%
Chemical products	32.56%	36.82%	36.59%	38.28%	39.56%	38.01%	35.75%	32.39%
Oil and natural gas	40.63%	39.08%	40.71%	35.97%	31.30%	29.82%	29.97%	31.63%
Other services to business	23.80%	21.36%	15.47%	16.20%	16.17%	16.48%	16.81%	17.45%
Machinery and equipment	7.76%	6.93%	6.45%	6.91%	6.99%	6.18%	6.15%	5.89%
Domestic gas and water	6.72%	6.59%	6.19%	6.12%	6.32%	5.21%	5.09%	5.08%
Metallic manufactures	6.45%	5.29%	4.09%	5.12%	5.36%	4.89%	4.54%	4.59%
Leather products	6.33%	5.10%	4.67%	4.87%	4.95%	4.84%	4.65%	4.39%
Rubber products	4.98%	4.59%	4.82%	5.15%	5.25%	5.03%	4.59%	4.34%
Rubber and plastic products	4.96%	4.27%	3.70%	4.12%	4.38%	4.50%	4.21%	4.16%
Mail	5.59%	5.16%	5.13%	4.83%	4.79%	4.83%	4.46%	4.08%
Social services	2.73%	3.11%	2.90%	3.06%	3.22%	3.30%	3.22%	3.14%
Transportation equipment, including vehicles	5.87%	3.70%	3.34%	4.43%	4.54%	3.59%	3.17%	3.05%
Nonmetallic minerals	2.91%	2.67%	2.61%	2.44%	2.57%	2.60%	2.39%	2.37%
Electricity	2.89%	2.61%	2.56%	2.44%	2.49%	2.41%	2.34%	2.32%
Other products derived from nonmetallic minerals	2.13%	1.89%	1.75%	2.10%	2.07%	1.99%	1.82%	1.74%
Construction	2.52%	2.15%	1.72%	1.77%	1.87%	1.78%	1.73%	1.66%
Transportation and storage	1.03%	1.09%	1.03%	1.03%	2.02%	1.85%	1.76%	1.62%
Telecommunications	1.99%	1.94%	1.71%	1.50%	1.42%	1.08%	0.99%	0.92%
Hotels and restaurants	1.07%	1.01%	0.93%	0.91%	0.98%	0.95%	0.90%	0.87%
Textiles and clothes	0.81%	0.73%	0.74%	0.94%	0.95%	0.92%	0.91%	0.87%
Nonalcoholic beverages	0.61%	0.64%	0.58%	0.60%	0.61%	0.62%	0.61%	0.58%
Processed wood	0.43%	0.43%	0.40%	0.46%	0.48%	0.45%	0.45%	0.43%
Paper products	0.49%	0.48%	0.46%	0.43%	0.44%	0.43%	0.42%	0.42%
Education	0.10%	0.10%	0.09%	0.09%	0.10%	0.10%	0.10%	0.09%
Other food products	0.13%	0.11%	0.10%	0.10%	0.10%	0.10%	0.09%	0.09%
Other manufactures	0.07%	0.07%	0.06%	0.09%	0.09%	0.09%	0.08%	0.08%
Other chemical products	0.09%	0.08%	0.08%	0.09%	0.09%	0.09%	0.08%	0.08%
Financial services (banking)	0.00%	0.03%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%
Total	7.50%	6.94%	6.35%	6.52%	6.76%	6.51%	6.63%	6.54%

Source: Banco Central del Ecuador; Bank staff calculations

APPENDIX F. TARIFFS AND EFFECTIVE PROTECTION INDEXES

Table F.1. Average tariff for final output of the tradable sectors of Ecuador's national accounts (%)

Sector	Average tariff for final output
Bananas, coffee, cacao	23.93
Cereals	29.50
Flowers	20.00
Other crops	24.27
Farming	17.50
Forestry	15.00
Shrimp	30.00
Fishing	29.51
Oil, natural gas	0.00
Mining	15.58
Processed meat	39.78
Processed shrimp	30.00
Processed fish	29.51
Vegetable oil and fats	21.45
Dairy products	32.30
Mills and bakery	28.46
Processed sugar	27.50
Chocolate and sweets	25.00
Other food products	27.73
Beverages	28.53
Tobacco products	30.00
Textiles	29.49
Wood processing	27.68
Paper products	29.76
Oil processing and refinery	5.00
Chemical products	9.41
Rubber and plastic products	23.50
Nonmetallic products	23.46
Metallic products	22.82
Machinery and industrial	21.68
Vehicles and parts	21.38
Other manufactures	27.31

Source: Banco Central del Ecuador, COMEXI. Authors' calculations.

Table F.2. Average tariff for the inputs defined in Ecuador's national accounts (%)

Product	Average tariff
Bananas, coffee, cacao	24.58
Cereals	4.84
Flowers	16.84
Other crops	23.44
Farming	11.14
Forestry	15.00
Shrimp	30.00
Processed shrimp	30.00
Fish	24.20
Processed fish	24.20
Other sea products	24.20
Oil and natural gas	0.00
Metallic minerals	0.07
Nonmetallic minerals	1.86
Meat processing	39.78
Vegetable oil and fats	7.66
Dairy products	32.30
Flour	21.76
Bakery	5.00
Sugars	5.00
Processed cacao	20.00
Chocolate and sweets	30.00
Other food products	19.67
Processed coffee	30.00
Alcoholic beverages	27.86
Nonalcoholic beverages	4.75
Tobacco products	30.00
Textiles	23.16
Leather products	24.66
Wood processing	24.22
Paper production	8.33
Oil derivatives	0.28
Chemical products	0.28
Other chemicals	0.28
Rubber products	3.15
Plastic products	0.05
Nonmetallic products	9.34
Other nonmetallic products	9.34
Common metallic products	7.01
Other metallic products	7.01
Machinery and industrial equipment	3.30
Vehicles and parts	4.59
Other manufactures	15.54

Source: Banco Central del Ecuador, COMEXI. Authors' calculations.

Table F.3. Effective protection indexes for Ecuador's tradable sectors (%)

Sector	Effective rate of protection	Nominal rate of protection	Sector GDP growth			Growth of exports		
			2006–07	1993–2007	2000–07	2006–07	1993–2007	2000–07
Bananas, coffee, cacao	31.53	23.93	5.10	91.52	29.38	9.87	116.19	72.68
Cereals	41.45	29.50	7.79	30.54	38.34	-6.17	1747.41	196.92
Flowers	21.63	20.00	1.00	838.84	46.29	7.62	1068.44	139.04
Other crops	29.95	24.27	4.47	72.70	36.96	10.06	2236.02	260.88
Farming	16.46	17.50	5.02	50.20	32.22	-46.64	-49.83	-0.72
Forestry	15.47	15.00	3.63	92.96	23.36	56.39	1033.59	165.28
Shrimp	36.31	30.00	7.80	96.34	169.71	0.00	0.00	0.00
Fishing	43.07	29.51	2.42	80.44	70.35	43.95	27.45	34.81
Oil, natural gas	-0.05	0.00	-4.92	56.11	27.36	7.13	544.74	246.47
Mining	18.60	15.58	-4.79	54.85	27.36	72.56	673.68	455.77
Processed meat	89.11	39.78	4.07	52.95	35.39	46.52	-47.76	-81.20
Processed shrimp	31.40	30.00	8.28	65.77	174.19	3.93	32.21	111.16
Processed fish	40.34	29.51	0.49	141.25	48.48	20.32	829.52	200.13
Vegetable oil and fats	47.13	21.45	6.24	95.47	42.97	101.21	2015.80	730.07
Dairy products	57.77	32.30	4.26	66.29	38.35	900.15	89.06	14.12
Mills and bakery	158.61	28.46	-1.93	28.33	22.00	16.25	274.99	-8.27
Sugar processing	32.46	27.50	2.05	53.79	24.16	-36.83	374.22	72.70
Chocolate and sweets	38.37	25.00	8.88	87.28	30.52	45.28	15.19	2.45
Other food products	42.47	27.73	15.47	77.58	40.14	26.77	494.39	201.70
Beverages	47.52	28.53	14.28	47.71	23.69	63.78	733.01	230.61
Tobacco products	42.51	30.00	0.11	-0.78	-3.93	1930.24	-57.11	53.50
Textiles	39.06	29.49	2.60	25.70	8.10	17.37	193.88	67.16
Processed wood	47.48	27.68	4.26	79.36	27.62	31.46	251.51	121.32
Paper products	79.72	29.76	4.29	51.71	19.42	27.00	386.73	205.63
Oil processing and refinery	79.89	5.00	2.37	193.19	40.12	47.45	761.29	201.59
Chemical products	14.89	9.41	3.28	22.52	25.54	-12.99	357.09	99.90
Rubber and plastic products	92.08	23.50	0.13	21.97	15.69	40.46	1825.21	122.89
Nonmetallic products	46.55	23.46	5.34	63.55	37.14	-13.25	293.25	72.95
Metallic products	129.93	22.82	2.31	5.05	70.35	37.87	286.45	565.50
Machinery and industrial equipment	38.79	21.68	7.58	51.42	35.11	27.57	779.37	416.95
Vehicles and parts	158.38	21.38	11.76	61.58	151.83	12.81	609.14	479.29
Other manufactures	81.78	27.31	0.81	109.77	5.55	51.02	455.20	157.27

Source: Banco Central del Ecuador, COMEXI. Authors' calculations.

APPENDIX G. SIMULATED CUMULATIVE DISTRIBUTION FUNCTION (CDF) FOR INDIVIDUAL SECTORS AND PROBABILITY OF OBSERVING THE GROWTH RATE WITHIN A RANGE

The analysis of the oil and non-oil sectors in Chapters 2 and 3 raises questions about the growth prospects of Ecuador's economy under various scenarios of interaction between the sectors. This annex explores these prospects.

The quarterly projections and simulations were carried out for the period 2008–13. Final results are consolidated for each year. This analysis uses quarterly data for sector GDP from 1993 to the third quarter 2008. All the sectors were grouped into seven large categories: oil, industrial manufactures, primary products, public sector, construction, production-related services (transportation, finance, and commerce), and other services (education, health, professional, and domestic). The simulation uses a procedure developed in Richardson and Condra (1978) and in Richardson, Klose and Grey (2000) that maintains the contemporaneous correlation among the variables in the simulated output.

The procedure consists in estimating the expected value of a variable—in this case sector GDP—using an appropriate econometric technique. We use autoregressive integrated moving-average (ARIMA) models for each sector, focused on finding the best model for prediction purposes (minimizing the mean square errors (MSE) of the predictions). Unfortunately, there are too few observations to divide the sample and carry out sample tests. The residuals for each sector's GDP are then estimated, and we calculate the contemporaneous correlations matrix of these residuals.

The next step uses factorization of the correlation matrix to translate the contemporaneous correlation to uniform standard deviate variables, one for each sector in each period we forecast. This ensures that contemporaneous correlation is maintained in the forecasts. The correlated uniform standard deviates are used to generate exogenous shocks from the distribution of the residuals (we use an empirical distribution for the residuals). The forecasts are done using the ARIMA models estimated for each sector plus the shock previously generated. For each simulated period, real GDP is approximated as the sum of each sector's GDP. The analysis focuses on the simulated annual growth rates of real GDP and the sectors and their simulated distributions.

In this appendix, we present the results of a probabilistic simulation analysis of four scenarios and their effects on sector and overall growth rates:

- ***Scenario 1: Current conditions***. This base scenario reflects historic growth trends for each sector, adjusted to reflect the global economic crisis in 2009 with a recovery in 2010 back to the historic trend. Quarterly growth, measured in percentage points, is slowed throughout 2009 to simulate the impact of the economic crisis.
- ***Scenario 2: Rise of oil prices and higher fiscal revenue***. This scenario reflects a positive external shock in oil prices from June 2010 to March 2011, similar in nature to the price increases experienced in 2007–08. After the shock, the economy is

assumed to return to its historic behavior—that is, no crisis. Quarterly growth is higher for the public sector during the price shock. The shock is transmitted to the other sectors through the historic contemporaneous correlation of the public sector with the other sectors.

- ***Scenario 3: Rise of oil production***. This scenario reflects a permanent rise in real investment in the oil sector from 2010 onward, sufficient to increase production in real terms. The oil sector's qarterly growth is higher from 2010 onward. The shock is transmitted to the other sectors thorough the historic contemporaneous correlation of the oil sector with the other sectors.
- ***Scenario 4: Diversification***. This scenario reflects a permanent increase in real investment in the industrial and primary sectors from 2010 onward. It is assumed that the investment increases both sectors' production in real terms. Quarterly growth for the industrial and primary sectors is higher from 2010 onward. Each sector receives half of the increase in quarterly growth of the oil sector in the previous scenario. The shock is transmitted to the other sectors thorough the historic contemporaneous correlation of the industrial and primary sectors with the other sectors, respectively.

We simulate each of these four scenarios and observe how the different economic sectors would react, assuming that the observed correlations between the series are maintained over time.

Table G.1 summarizes the simulated distribution results of real GDP growth rate for 2010–13 for each scenario. Due to the crisis, all scenarios are assumed to be the same in 2009, so the year is not included. The oil price shock (scenario 2) generates slightly more growth than the base scenario (scenario 1), but only in the first two years of the simulation. In 2012 and 2013, the economy converges back to the baseline. Scenarios 3 Oil sector growth (scenario 3) and diversification (scenario 4) generate more growth than the base scenario. In the first two years, scenario 3 generates slightly more growth than scenario 4. In 2012, both scenarios yield about the same growth. In 2013, scenario 4 produces more growth than scenario 3.

Table G.1. Simulation results for GDP growth rate

(%)

Year	Scenario 1 current conditions	Scenario 2 rise of oil prices	Scenario 3 rise of oil production	Scenario 4 diversification
2010	0	1	1	1
2011	2	3	6	5
2012	2	2	5	4
2013	3	3	5	5

Source: Bank staff estimations. All 90 percent confidence intervals are about +/− 3.5 percent.

The probability of negative growth under scenario 3 is small: 27 percent in 2010, 1 percent in 2011, 2 percent in 2012, and 3 percent in 2013. This is because rising real output is a tide that lifts all boats. Under scenario 4, the probability of negative growth is 32 percent in 2010, 1 percent in 2011, 2 percent in 2012, and 2 percent in 2013.

A similar effect occurs for the probability of observing a growth rate higher than 5 percent. Under scenario 3, this probability is 5 percent in 2010, 63 percent in 2011, 42 percent in 2012, and 45 percent in 2013. Under scenario 4, the probability of higher growth is 4 percent in 2010, 54 percent in 2011, 40 percent in 2012, and 56 percent in 2013. This indicates that real growth in the oil sector has a quick positive effect on the economy, although this effect diminishes as time passes. Nevertheless, real growth in the industrial and primary sector yields more growth in the economy as time passes. This implies that intersectoral linkages between the industrial and primary sectors and the rest of the economy are more developed than those between the oil sector and the rest of the economy.

The following summarizes our results:

- The most favorable scenario for the oil sector entails increased investment that raises production.
- For both the industrial sector and the non-oil primary sector, the diversification scenario is clearly the best.
- The public sector grows the most in the scenario with a positive oil-price shock. The current situation scenario and the diversification scenario do not affect the size of the public sector, and it fares worst in the scenario in which oil production rises.
- The service sector display the highest growth rates under the rising oil-production scenario.
- Finally, construction only improves under rising oil-production scenario; the other three scenarios have no effect on construction.

The results for services and industrial sectors can be interpreted as a sign of partial Dutch disease because higher growth in the oil sector implies higher growth in the service sector and no effect in the industrial sector.

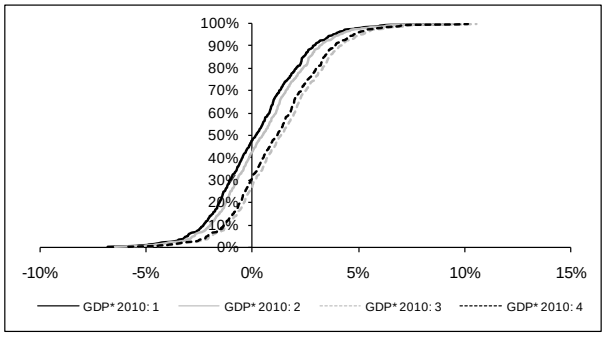
The results for the service sector and construction confirm these sectors' closer proximity to the oil sector, as discussed in Chapter 2.

One way of interpreting these results is to compare two scenarios. In one, Ecuador makes an effort to boost oil production through, for example, better governance and new investments, addressing some of the weaknesses discussed in Chapter 2. In another, is the country makes a conscious effort to diversify the economy by boosting both the industrial and primary sectors. The results indicate that both scenarios have similar long-term results—but the first is slightly better for growth in the short run and slightly worse in the long run. I

The following charts show the probability of observing a lower or equal growth rate than a selected value. In 2013, for example, the probability of observing a growth rate less than or equal to 5 percent is 40 percent under scenario 4 (green line) and approximately 80 percent under scenarios 1 and 2 (black and red lines). The farther to the right the

distribution, the better the scenario is in terms of generating higher growth at any probability level.

Figure G.1. CDF of growth rate of real GDP, 2010



The CDF graphs give the probability (vertical axis) of observing a growth rate (horizontal axis) smaller or equal than a given value. For example the probability of observing in 2010 a growth rate smaller or equal to 0 percent in scenarios 1 and 2 is close to 50 percent, while in scenarios 3 and 4 this probability is close to 30%.

Figure G.2. CDF of growth rate of real GDP, 2011

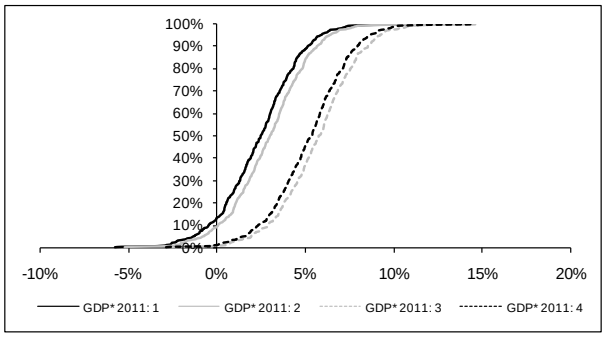


Figure G.3. CDF of growth rate of real GDP, 2012

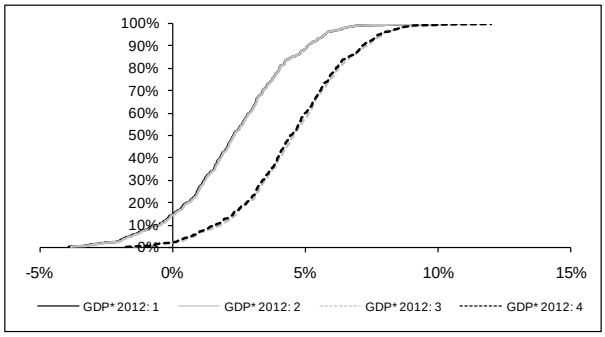


Figure G.4. CDF of growth rate of real GDP, 2013

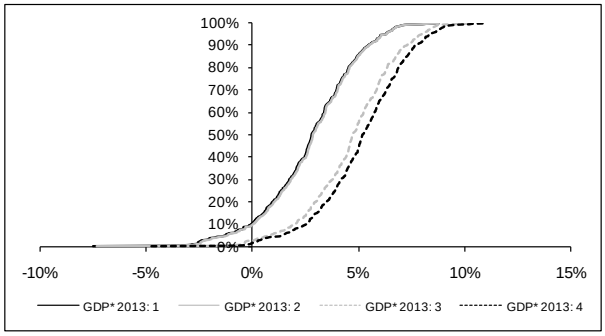


Figure G.5. Probability of observing growth rate of real GDP within a certain range, 2010

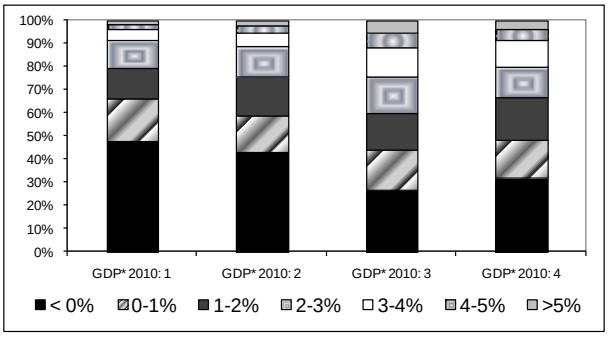


Figure G.6. Probability of observing growth rate of real GDP within a certain range, 2011

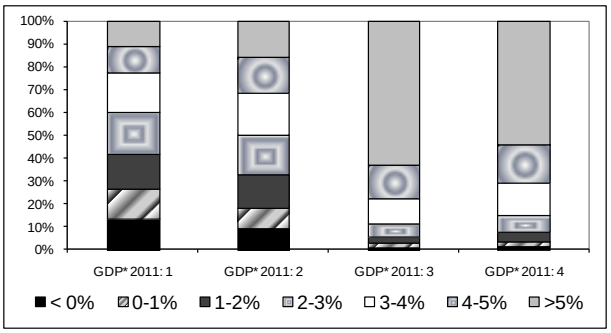


Figure G.7. Probability of observing growth rate of real GDP within a certain range, 2012

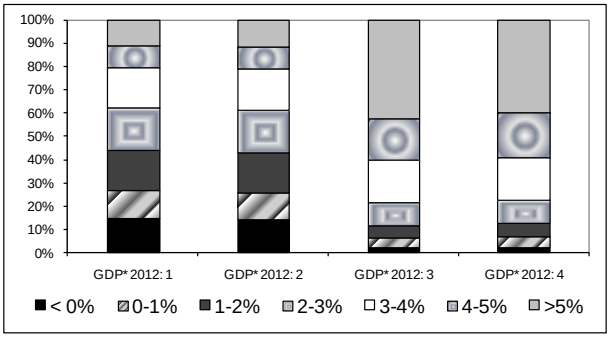


Figure G.8. Probability of observing growth rate of real GDP within a certain range, 2013

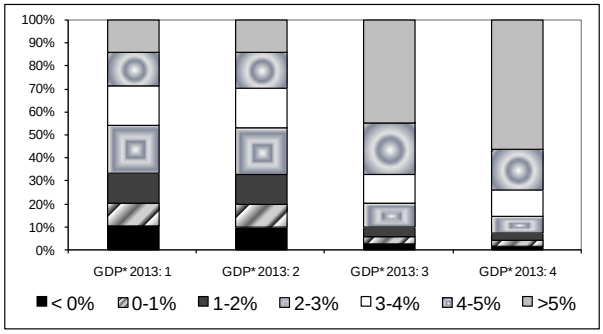


Figure G.9. CDF of growth rate of oil GDP, 2010

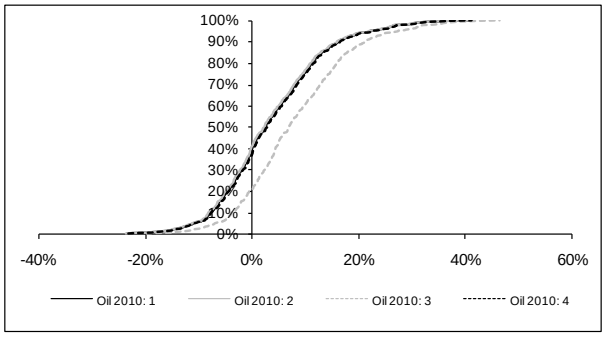


Figure G.10. CDF of growth rate of oil GDP, 2011

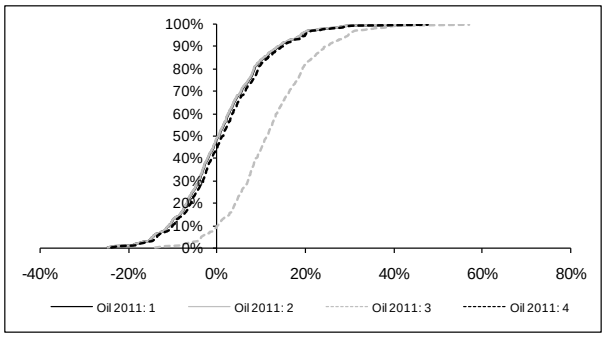


Figure G.11. CDF of growth rate of oil GDP, 2012

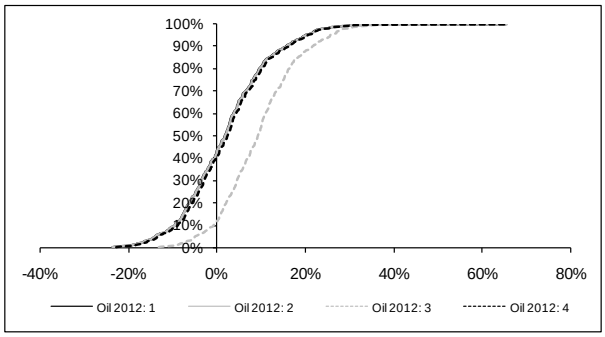


Figure G.12. CDF of growth rate of oil GDP, 2013

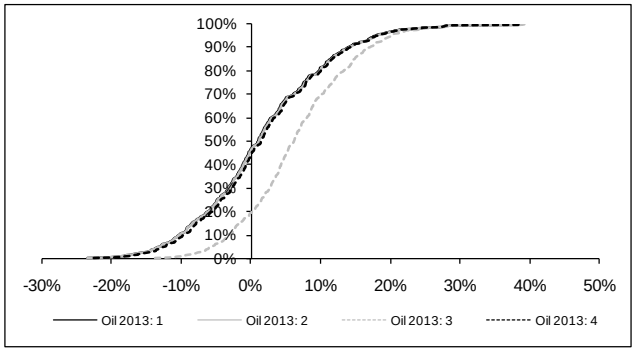


Figure G.13. Probability of observing real growth rate of oil GDP within a certain range, 2010

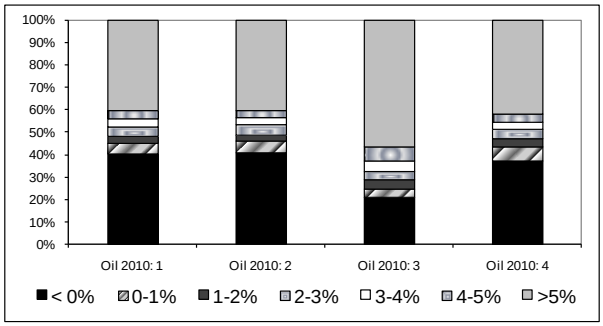


Figure G.14. Probability of observing real growth rate of oil GDP within a certain range, 2011

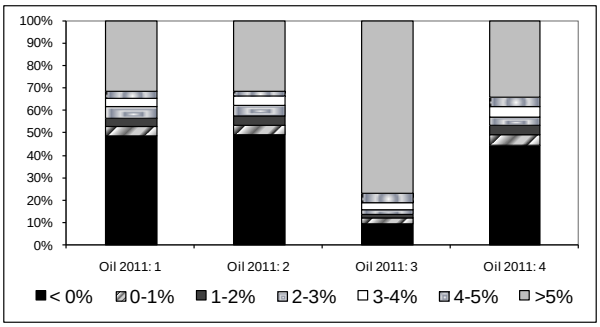


Figure G.15. Probability of observing real growth rate of oil GDP within a certain range, 2012

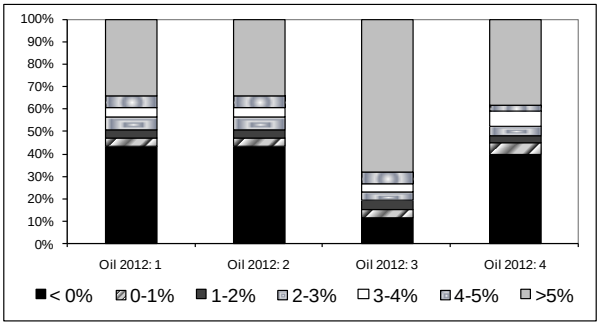


Figure G.16. Probability of observing real growth rate of oil GDP within a certain range, 2013

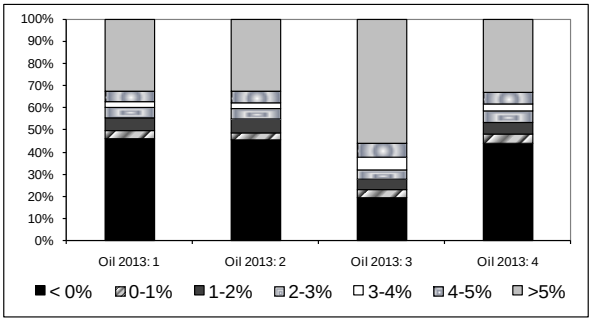


Figure G.17. CDF of growth rate of industrial sector GDP, 2010

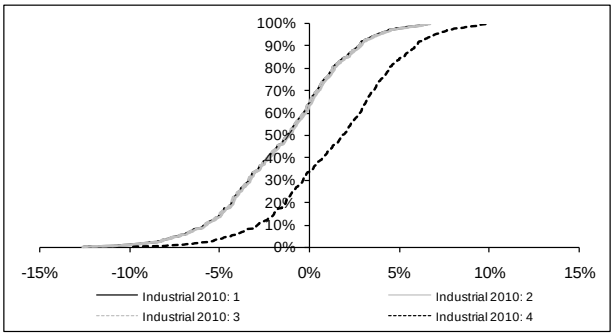


Figure G.18. CDF of growth rate of industrial sector GDP, 2011

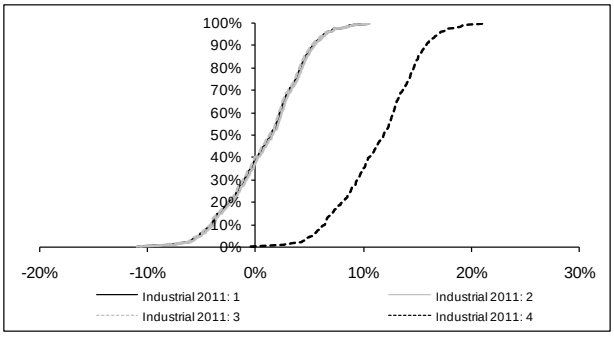


Figure G.19. CDF of growth rate of industrial sector GDP, 2012

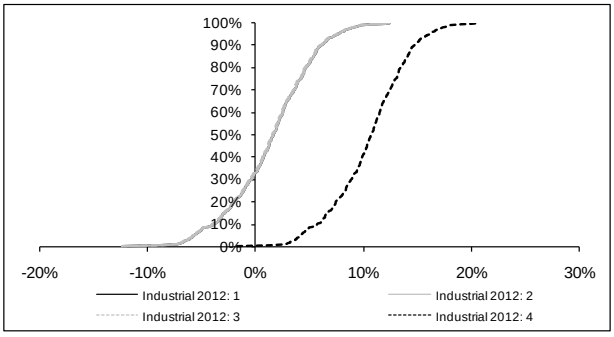


Figure G.20. CDF of growth rate of industrial sector GDP, 2013

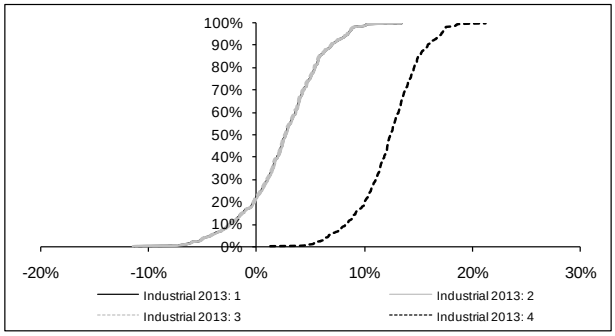


Figure G.21. Probability of observing real growth rate of industrial sector GDP within a certain range, 2010

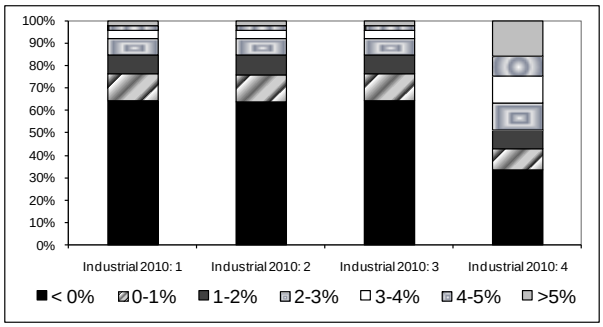


Figure G.22. Probability of observing real growth rate of industrial sector GDP within a certain range, 2011

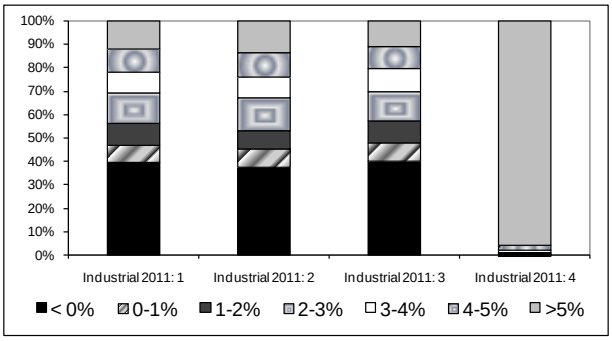


Figure G.23. Probability of observing real growth rate of industrial sector GDP within a certain range, 2012

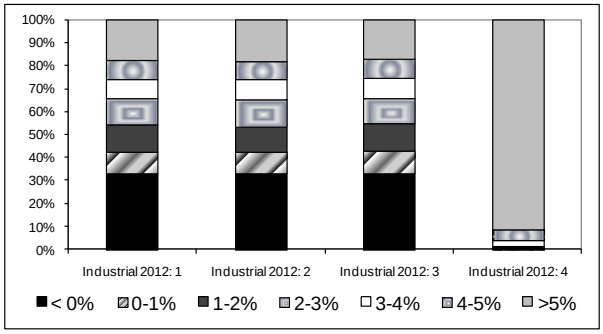


Figure G.24. Probability of observing real growth rate of industrial sector GDP within a certain range, 2013

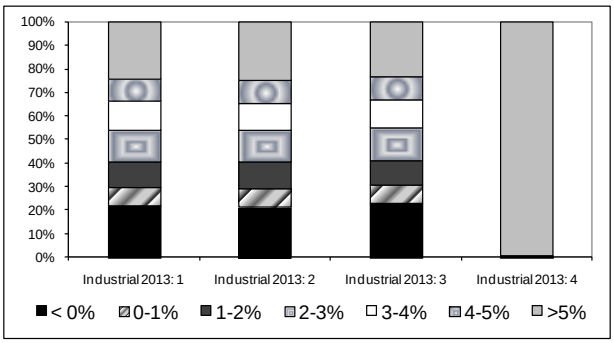


Figure G.25. CDF of growth rate of primary sector GDP, 2010

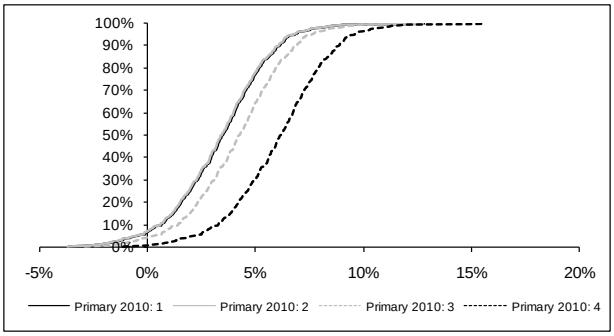


Figure G.26. CDF of growth rate of primary sector GDP, 2011

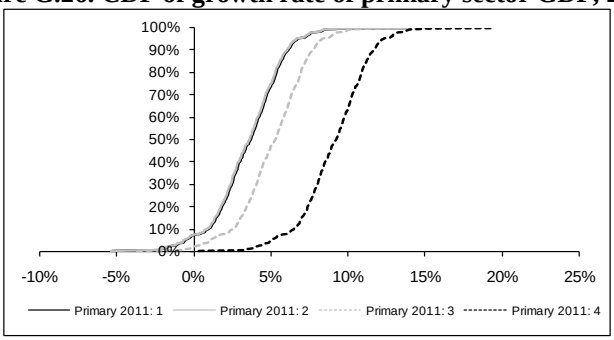


Figure G.27. CDF of growth rate of primary sector GDP, 2012

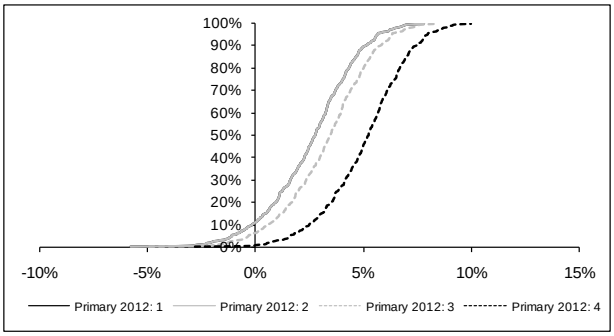


Figure G.28. CDF of growth rate of primary sector GDP, 2013

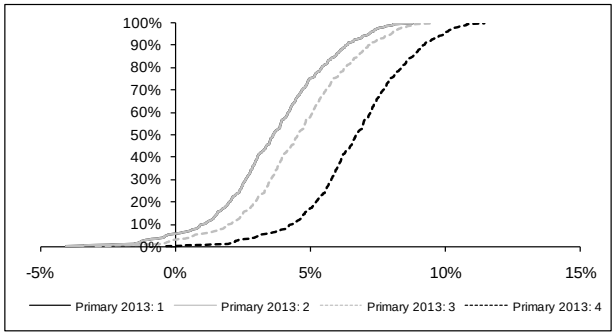


Figure G.29. Probability of observing growth rate of real primary sector within a certain range, 2010

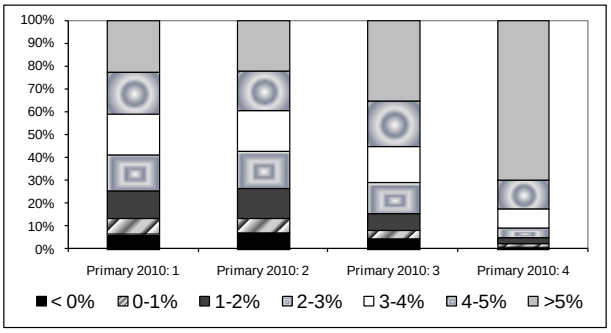


Figure G.30. Probability of observing growth rate of real primary sector within a certain range, 2011

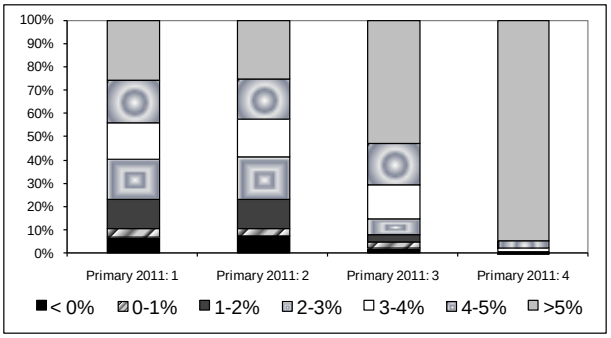


Figure G.31. Probability of observing growth rate of real primary sector within a certain range, 2012

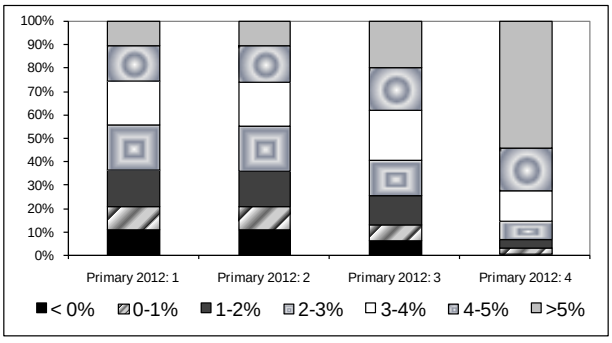


Figure G.32. Probability of observing growth rate of real primary sector within a certain range, 2013

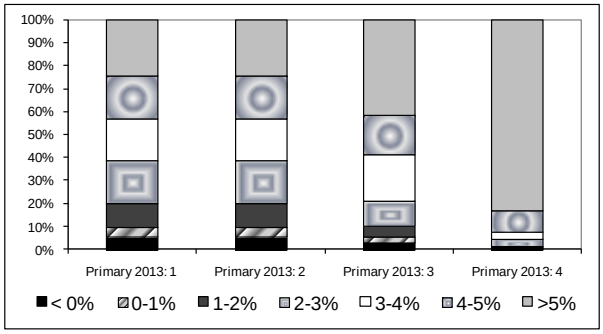


Figure G.33. CDF of growth rate of public sector GDP, 2010

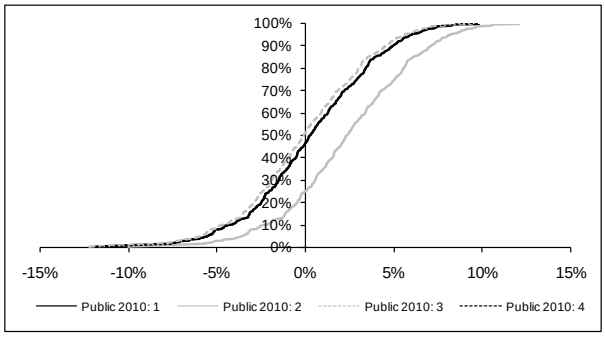


Figure G.34. CDF of growth rate of public sector GDP, 2011

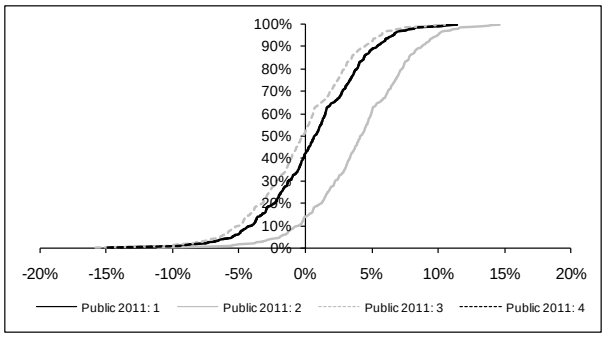


Figure G.35. CDF of growth rate of public sector GDP, 2012

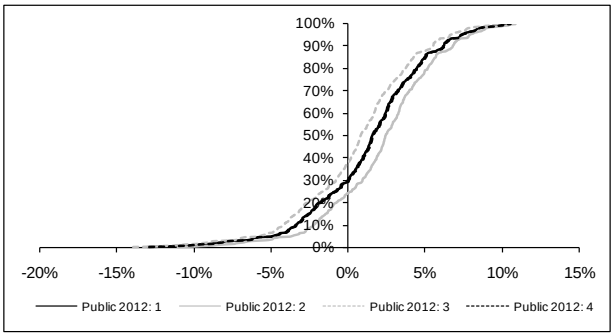


Figure G.36. CDF of growth rate of public sector GDP, 2013

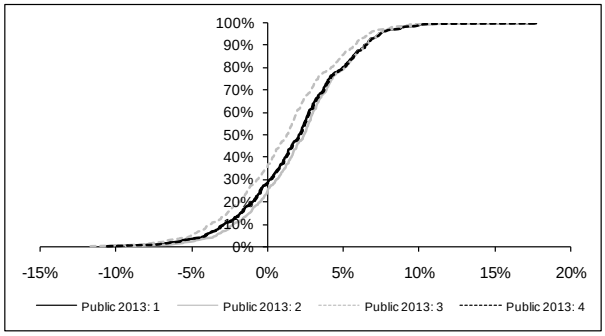


Figure G.37. CDF of growth rate of construction GDP, 2010

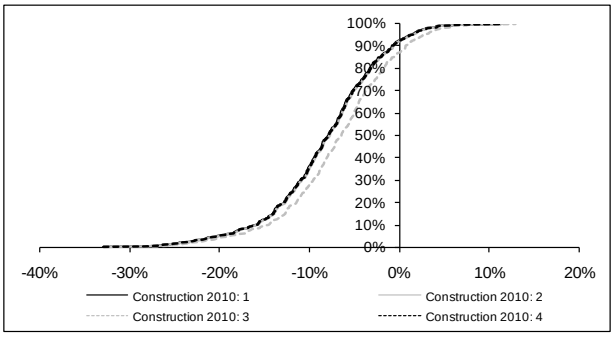


Figure G.38. CDF of growth rate of construction GDP, 2011

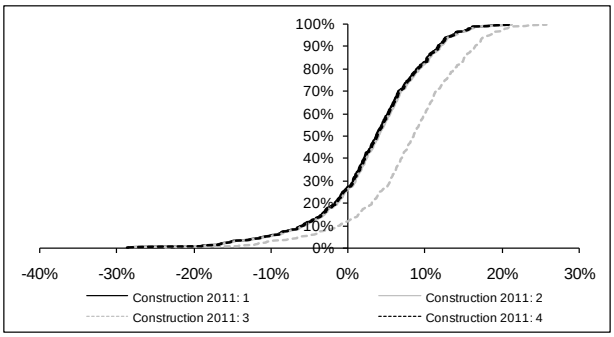


Figure G.39. CDF of growth rate of construction GDP, 2012

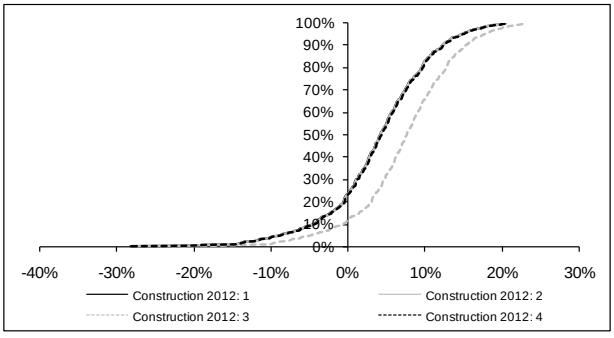


Figure G.40. CDF of growth rate of construction GDP, 2013

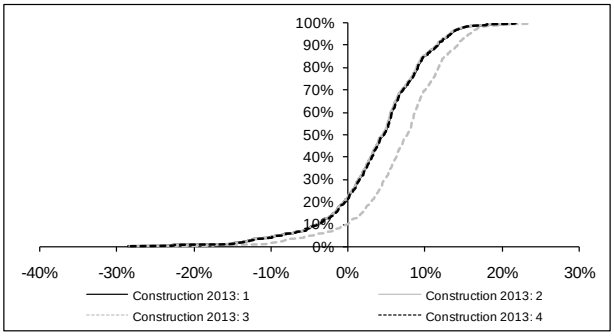


Figure G.41. CDF of growth rate of production-related services GDP, 2010

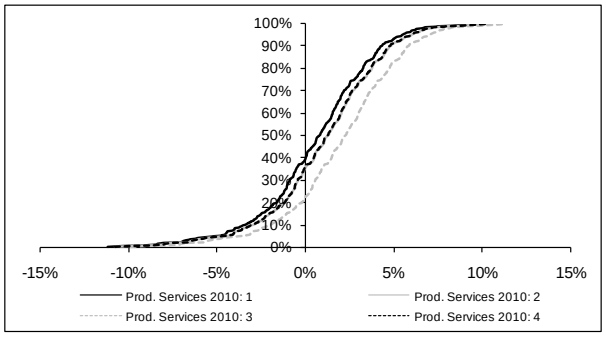


Figure G.42. CDF of growth rate of production-related services GDP, 2011

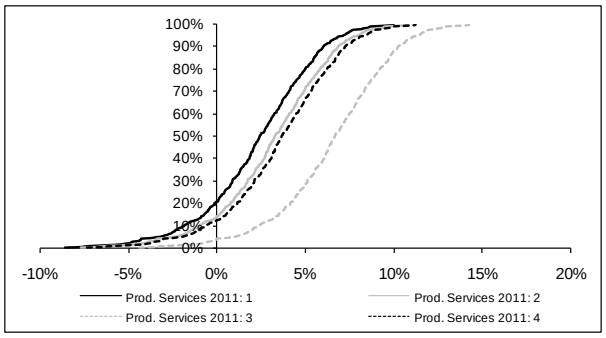


Figure G.43. CDF of growth rate of production-related services GDP, 2012

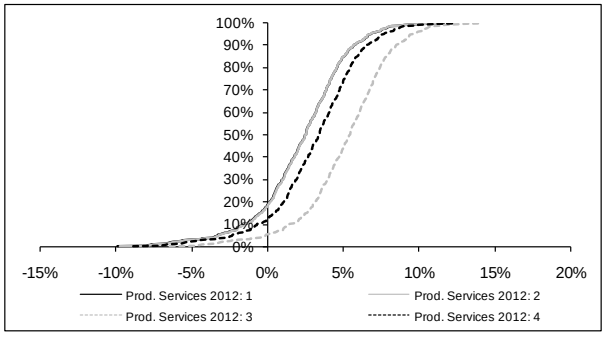


Figure G.44. CDF of growth rate of production-related services GDP, 2013

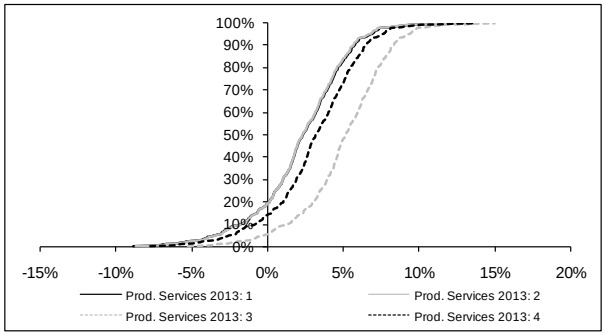


Figure G.45. CDF of growth rate of other services GDP, 2010

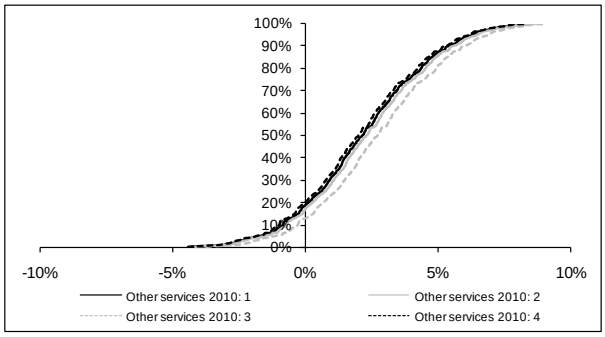


Figure G.46. CDF of growth rate of other services GDP, 2011

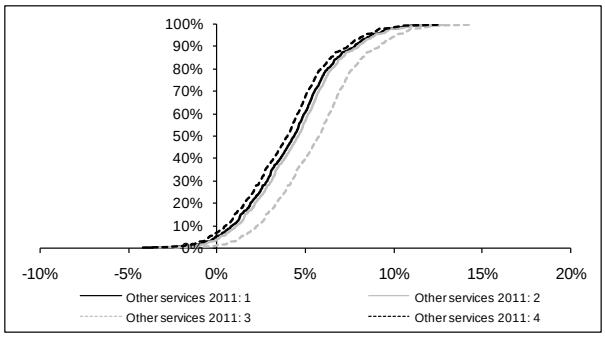


Figure G.47. CDF of growth rate of other services GDP, 2012

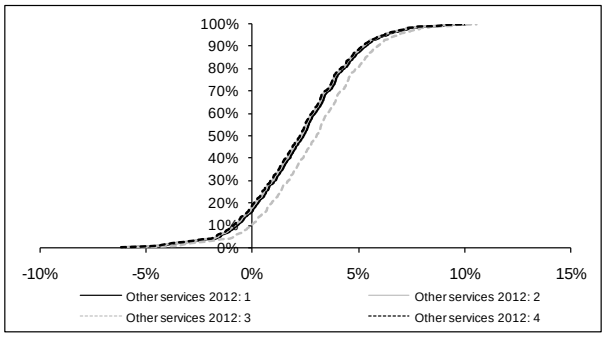


Figure G.48. CDF of growth rate of other services GDP, 2013