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Energy Sector Quasi-Fiscal Activities in the Countries of the Former Soviet Union

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Abstract

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A decade into the transition, many of the successor states of the former Soviet Union (FSU) continue to use energy sector quasi-fiscal activities (QFAs), especially low energy prices and the toleration of payment arrears, to provide large implicit and untargeted subsidies. These activities disguise the overall size of the government, cause overconsumption and waste, and contribute to macroeconomic imbalances. This paper analyses such activities in FSU countries, with particular emphasis on two case studies (Azerbaijan and Ukraine). The paper's policy conclusions point to the need to increase energy prices, combined with a strengthening of safety nets to protect the poor, better enforcement of payment discipline, and more efforts to achieve fiscal transparency.

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I. INTRODUCTION

A decade into the transition, many of the successor states of the former Soviet Union (FSU) still struggle with adapting their energy sectors to the market economy model that they have embraced. Across the FSU, energy sectors are still characterized by a high degree of government ownership, strong vertical integration within the energy sector, low and administratively set energy prices, cross-subsidization, and excessive operational losses. International and domestic barter trade can still be found in energy sector operations, and in many FSU countries, energy companies continue to function as quasi-fiscal institutions and social safety nets, providing large implicit subsidies to households and (state-owned) enterprises through low energy prices, preferential tariffs or free provision of services to privileged groups, the toleration of payment arrears, and noncash arrangements.² For example, currently only Armenia, Georgia, and Moldova seem to charge electricity tariffs that are high enough to recover economic costs (i.e., including investment). As a result, energy sector operations across the FSU continue to give rise to large distortions and inefficiencies that hamper structural change and growth, while complicating fiscal policy and posing substantial risks to macroeconomic stability.

This paper seeks to analyze quasi-fiscal activities (QFAs) in the energy sectors of the countries of the FSU, especially those arising from low energy prices (mispricing) and the toleration of payment arrears. It does so by analyzing two case studies—one focusing on a net energy importer (Ukraine) and the other on an energy-rich country (Azerbaijan). These analyses are complemented by available information and data from other FSU countries. The paper is organized as follows. The next section discusses conceptual and methodological issues related to QFAs in general and those in the energy sector in the FSU in particular. Sections III and IV present the two case studies. In Section V, the paper draws some conclusions for further analytical work and policy reforms.

II. QUASI-FISCAL ACTIVITIES (QFAs): CONCEPTUAL ISSUES

Public sector organizations and the central bank can play an important role as agents of fiscal policy through the use of QFAs, thus disguising the overall size of the government as conventionally measured (e.g., ratio of government spending to GDP) and the true extent of taxation. While the general notion of these activities is well acknowledged and central bank QFAs and their amalgamation with budget deficits have been the subject of substantial debate and several analyses, especially related to Latin America, other types of QFAs have been less

² Two key principles of energy pricing under the Soviet system were that: (i) prices should be set and/or adjusted such that all producers remain viable; and (ii) consumer/retail prices should be left low and stable. For details on these principles and further background on the role of the energy sector in the Soviet economy see IMF et al. (1991). See EBRD (2001) for a comprehensive analysis of energy sector developments and reforms during the first decade of the the transition.

well researched, especially in transition countries.³ This is somewhat surprising considering the importance of QFAs in many countries, but can probably be explained by the unavailability of data and complexity of undertaking quantitative analyses.

In many countries, the central bank or non-budgetary public sector entities undertake activities that have a fiscal character. A broad definition would suggest that QFAs include all operations that “could in principle be duplicated by specific budgetary measures in the form of an explicit tax, subsidy, or other direct expenditure” (Mackenzie and Stella 1996). In line with this definition, QFAs include multiple exchange rate regimes, exchange rate guarantees, non-tariff trade barriers, credit rationing and directed lending at below-market rates, and below-market prices or cost recovery.

This paper analyzes QFAs in the energy sectors of the FSU which have, in several of these countries, become a source of large public sector financial imbalances and macroeconomic instability. From an analytical point of view, our paper broadens the scope of the more “traditional” studies which have focused primarily on QFAs that operate through multiple exchange rate regimes, central bank lending, and other financial sector mechanisms. It appears that, through energy sector operations, QFAs in the FSU have taken on new, important shapes, reaching large proportions with substantial macroeconomic implications.

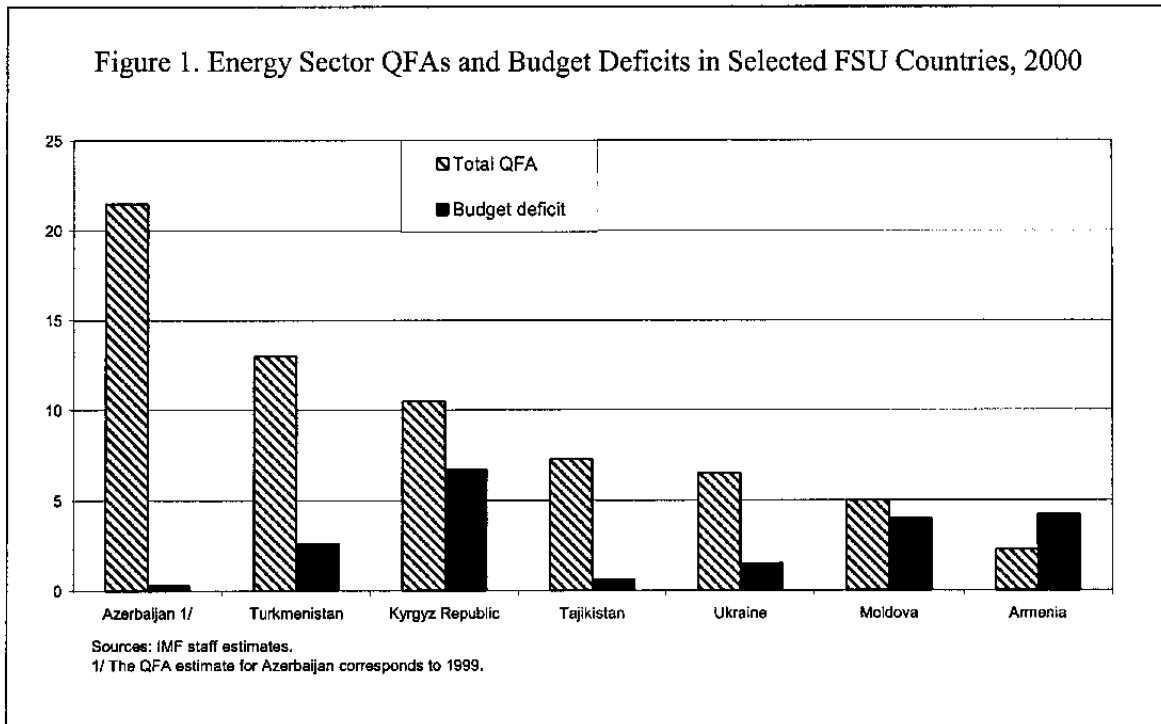
Energy sector QFAs in the FSU appear to be related primarily to mispricing and the toleration of arrears. Among the FSU countries, Azerbaijan clearly stands out with by far the largest energy QFAs, estimated at over 20 percent of GDP in recent years (see the case study below for details). Energy QFAs are also large in Turkmenistan (above 10 percent of GDP), while they tend to range around 5 percent of GDP in most of the other FSU countries (Figure 1). Additional channels of energy QFAs—barter and offset arrangements—have also proven pervasive in many of the less reformed FSU countries. Within the FSU, countries continue to trade with each other, at least to some extent, on barter terms (e.g., gas trade between Russia and Ukraine). Also, offset operations continue to play a certain role in the domestic economy of these countries, often involving state-owned energy companies and local and central government agencies.

The survey data presented in Appendix II also suggest that resource-rich FSU countries tend to have significantly larger energy QFAs because of the abundance of resources and the subsequently larger leeway to tolerate nonpayments and below-market prices.⁴ Another factor

³ For a general discussion of QFAs, primarily related to financial sector and exchange rate transmission channels, see Mackenzie and Stella (1996). Robinson and Stella (1988) present a number of case studies from Latin America. Tanzi (1993) provides an early, general overview of QFAs in transition countries. For one of the few empirical analyses for transition countries see IMF (1998) and Rosenberg and de Zeeuw (2000), analyzing QFAs related to the foreign exchange regime in Uzbekistan.

⁴ This is a common feature in resource-rich countries. For example, energy QFAs also tend to be large in the petroleum producing countries in the Middle East and elsewhere. See, for example, on Iran, Taube (2001).

that contributes to the QFAs in these countries is the lack of transparency created by strong vested interests seeking to appropriate the economic rents from oil and gas wealth.



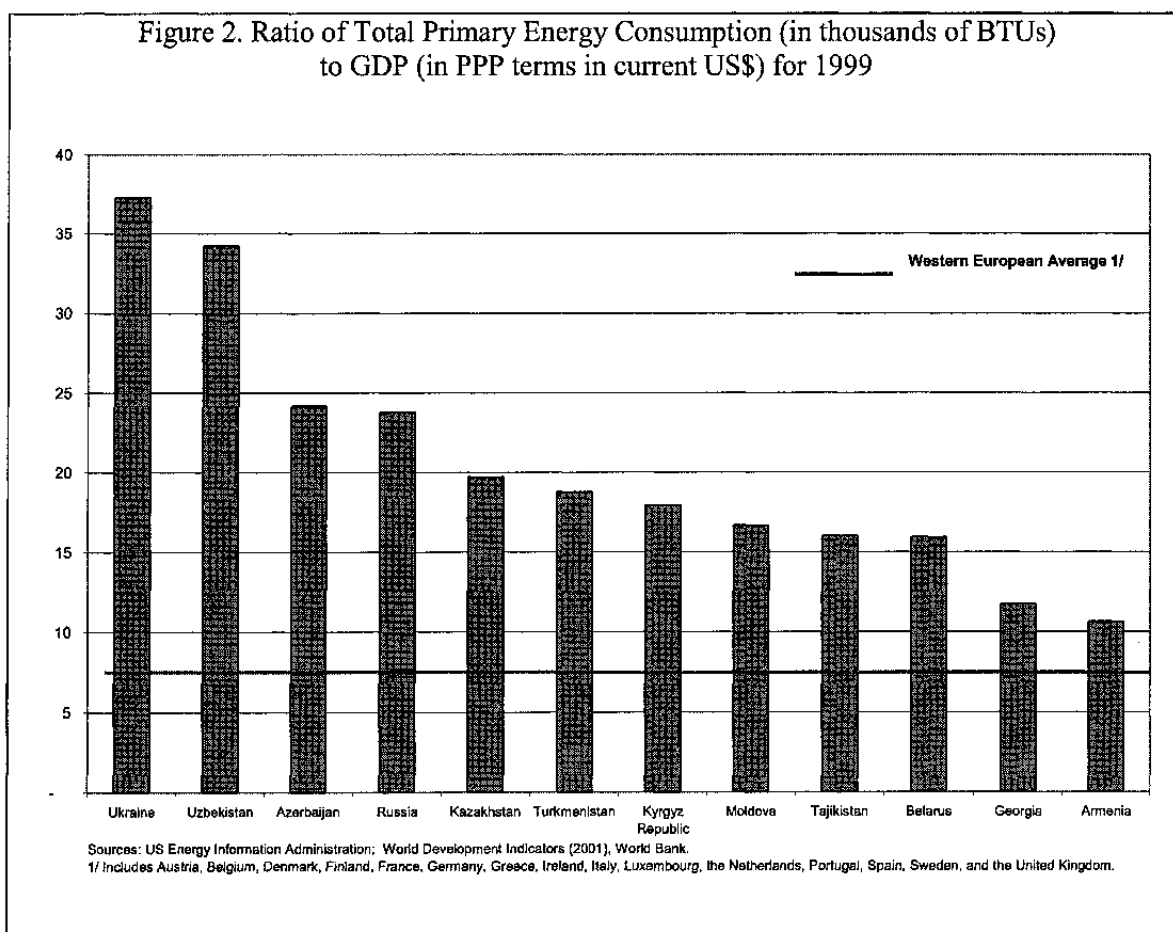
A. Why Do (Energy) QFAs Matter?

QFAs can have a number of adverse economic effects, including the misallocation of resources because of inappropriate price signals and administrative restrictions that prevent more efficient market solutions.⁵ In the case of energy QFAs, below-market or cost recovery energy prices and the failure to enforce payments (i.e., arrears) can distort the allocation of resources, resulting in overconsumption, insufficient investment, production inefficiencies, and crowding out of the private sector. The implicit subsidies provided through QFAs tend to be untargeted and assist all users of energy regardless of their relative needs and profitability, thereby also helping enterprises to avoid necessary restructuring. Inappropriately low energy prices can also be viewed as an implicit tax that transfers resources from the producers to the consumers of energy. Also, if energy tariffs are set below cost recovery levels, profits of energy companies are lower than they would otherwise be, which can result in underinvestment and a depletion of the capital stock. These, in turn, have tended to cause blackouts and disruptions in energy deliveries, as observed in recent years for example in Azerbaijan (despite all its energy abundance) and Georgia. Lack of maintenance and failure to replace worn out machinery can

⁵ We are not aware of a case where QFAs were intended to correct market failures.

also be dangerous for the population and the environment, especially in the case of nuclear plants and gas or oil pipelines.

Low energy prices and wasteful consumption were a key feature of the central planning system of the Soviet Union. After the breakup of the Soviet Union, its successor countries initially raised domestic energy prices substantially. However, these increases have in recent years often remained below what would be required to bring them in line with international prices or cost recovery levels. Moreover, de facto energy prices have been even lower as arrears have been tolerated. As a result, energy consumption, albeit falling in absolute terms, has generally declined by less than GDP, suggesting a deterioration of energy efficiency. In many FSU countries, per-capita energy consumption has remained at stunningly high levels by international standards, especially if seen relative to per capita income levels (Figure 2), indicating that energy prices are “not right.”



As far as the fiscal sector is concerned, QFAs can disguise the size of government involvement in the economy, affect the fiscal stance, and create intransparency. When measuring the fiscal (budgetary) stance, QFAs are usually not taken into consideration, which can result in a

misleading interpretation of fiscal policy. For example, the government's intention to reduce the budget deficit by cutting subsidies to enterprises could be (more than) offset by the central bank stepping up directed lending to the very same enterprises. Similarly, sizable budgetary adjustment can be undermined if QFAs increase at the same time, resulting perhaps even in a deterioration in the underlying fiscal stance. Alternatively, if the change in the budget balance is only minimal while at the same time energy prices are adjusted substantially, the conventionally measured budget balance would disguise the true extent of the underlying fiscal adjustment.

Since QFAs, or the provision of implicit subsidies, are not discussed and decided upon by parliament, they create intransparency and limit the power of the legislative in economic policymaking and the annual budget process. In addition, QFAs can increase the vulnerability of the government budget, for example if contingent liabilities are created through the provision of government guarantees on domestic and foreign-currency denominated borrowing by state-owned enterprises. Once called, these contingent liabilities, and the associated foreign exchange risk, can derail the intended fiscal policy stance.

Energy QFAs can contribute to the emergence of macroeconomic crises through a variety of channels. For example, if arrears to energy companies accumulate, and these enterprises in turn do the same vis-à-vis their suppliers and the budget (e.g., tax arrears), the central bank and/or the budget may be forced to extend large credits to the energy enterprises, which could fuel inflation. In addition, such bailout practices, even if they take place only once ("one-off arrears clearance"), condone the nonpayment culture and create moral hazard. Alternatively, arrears could be cleared through offsets which tends to trigger further arrears, barter, and offsetting arrangements.⁶ This could ultimately result in the government being unable to pay wages or interest because most of the revenue is noncash.

B. Methodological and Measurement Issues

Estimating energy sector QFAs generally depends very much on the quality of available data, which in many FSU countries remains a problem. In most cases, the main channel for QFAs are government-owned enterprises, and the data on such activities is often unavailable because the companies involved claim that the data are commercially sensitive. In some cases, the lack of data transparency may be motivated by rent seeking. Moreover, available data could be inaccurate because companies lack technical expertise. Verification of the quality of available data is further complicated by the fact that only a few energy companies undergo audits by independent companies and most of them do not use generally accepted accounting principles (GAAP).

Methodologically, energy sector QFAs related to arrears are relatively easy to estimate if payment data for enterprises and other end-users are available. Arrears to state-owned energy companies can conceptually be considered a QFA because their toleration is equivalent to an

⁶ For detailed analyses of the nonpayment system in Russia and the electricity sectors in transition countries see Pinto et al. (2000) and Krishnaswamy (1999), respectively.

implicit subsidy provided to energy consumers; arrears are effectively lost revenue for the energy enterprise and, through foregone profit transfers or tax arrears, also lost revenue for the government. In the case of private energy companies, arrears by end-users could also be considered as quasi-fiscal activities if the government does not allow the energy companies to enforce payments. The quasi-fiscal activity would then be related to the implicit tax that firms face by being forced to provide services.

QFAs on account of mispricing are considerably more difficult to estimate as it requires determining a relevant benchmark price. In the case of petroleum products, or coal, this is relatively easy because these products are traded internationally at reasonably well defined and comparable prices. For natural gas and electricity, however, there are not always obvious market-based prices that could be used as benchmarks. Even in market-based economies, prices for these products are often determined by cost recovery considerations because of limited tradability and the existence of natural monopolies. As a result, in the case of natural gas and electricity estimating, mispricing is necessarily subject to greater uncertainty and judgment, as any quantitative analysis is based on hypothetical benchmark prices. The results of such analyses tend to be quite sensitive to changes in these benchmarks, or demand elasticities. In this regard, it would appear important to use conservative assumptions, especially on the benchmark prices, and undertake sensitivity analyses with different assumptions to provide indication of the range of results.

Energy QFAs related to excessive losses or theft, noncash payments, and government guaranteed borrowing are even more difficult to estimate. Inefficiencies on account of poor management and state ownership can be considered a QFA because under a more market-friendly environment these enterprises would reduce or eliminate the losses, as they cannot be passed on to the government through reduced profit transfers and/or tax arrears. While it is difficult to estimate the extent of excessive losses or theft quantitatively, some estimates have become available, using reference values from other countries with more competitive environments (see the case study Azerbaijan). Estimating QFAs on account of noncash payments and government-guaranteed borrowing to energy companies is methodologically challenging and requires data which are difficult to obtain. No attempt has been made in the case studies for their quantification.

With these methodological remarks and caveats in mind, we have experimented with two different methodologies to compute energy sector QFAs in the two case studies as presented in the following two sections. In the Ukraine case study, dictated by the more limited availability of data, we used a relatively simple methodology that relies on relevant energy consumer prices or cost recovery prices as benchmarks, together with data on collection rates and consumption volumes (“End-Product Approach”). In the case of Azerbaijan more detailed data are available that allowed the estimation of energy QFAs on the basis of the consolidated financial accounts of enterprises involved in petroleum, electricity, and gas operations. As explained in detail in the Box below, the methodology allows the computation of QFAs related to the subsidized sale of petroleum products as an input into energy production, and the calculation of QFAs related to the subsidized sale of energy (electricity and gas) to end-users. The results of these calculations are then used to adjust the revenue and expenditure data from the financial accounts of the enterprises (“Financial Balance Approach”).

Box. Two Methodologies to Estimate Energy QFAs

End-Product Approach

Let: V be the quantity of energy product sold
 P(m) be the benchmark or cost-recovery output price
 P(a) be the actual price
 c be the collection ratio

- (1) Arrears at actual prices = $V * P(a) * (1-c)$
 = Value at actual prices minus collections
- (2) Mispricing of output = $V * (P(m) - P(a))$
 = Value at market prices minus value at actual prices
- (3) Total quasi-fiscal activities = $V * P(a) * (1-c) + V * (P(m) - P(a))$
 = Arrears at actual prices + mispricing of products
 = $V * P(m) - V * P(a) * c$
 = Value at market prices minus actual collections

Financial Balance Approach

Let: V' be the quantity of energy used as an input (e.g., petroleum)
 P'(m) be the market or cost-recovery input price
 P'(a) be the actual input price
 P(c) be the cost recovery output price at actual costs (e.g., electricity)
 Rev be actual revenues
 Cost be the actual costs of the company
 Under be underinvestment
 Arrears' be arrears on inputs and taxes

For cost recovery to hold, the actual revenues of a company plus the mispricing of the output and its arrears have to equal its actual costs plus the mispricing of inputs plus the underinvestment plus arrears on inputs and taxes:

- (4) $V * P(c)$ = $V * P(a) * c + V * (P(c) - P(a)) + V * P(a) * (1-c)$
 Total revenues = actual revenues + mispricing of output + arrears on collections =
- Total costs = $Cost + V' * (P'(m) - P'(a)) + Under + Arrears'$
 = actual costs + mispricing of inputs + underinvestment + arrears on inputs and taxes
- (5) Total QFA = $V * P(a) * (1-c) + V * (P(c) - P(a))$
 = mispricing of output + arrears on collections
- = $Cost + V' * (P'(m) - P'(a)) + Under + Arrears' - V * P(a) * c$
 = actual costs + input mispricing + underinvestment + arrears on inputs and taxes - actual revenues

Note that the financial balance approach implicitly includes excessive losses as part of the QFAs because the actual costs are equal to the sum of normal costs and excessive losses. By contrast, under the end-product approach excessive losses would need to be added to QFAs in equation (3).

C. Quasi-Fiscal Activities Versus Quasi-Fiscal Deficit

Energy QFAs can be financed through various channels, which are fundamentally different in countries that are net energy importers or exporters. In the former, energy QFAs are mostly financed by reducing cash outlays through incurring domestic suppliers' arrears, external suppliers' arrears, tax arrears, or spending less on maintenance and investment than would be necessary under more market-related conditions. QFAs can also be financed through bank or nonbank borrowing, if energy companies experience cash deficits in their operations.⁷

In energy-exporting countries, it is easier to finance energy QFAs, which tend to waste and dissipate economic rents. In this case, it is also important to distinguish between quasi-fiscal *activities* and quasi-fiscal *deficits*. For example, an oil-producing country that sells oil domestically at prices which are below the export parity price but at a level sufficiently high to cover domestic costs would not incur a quasi-fiscal deficit. However, it would incur QFAs equivalent to the difference between the hypothetical value of domestically sold oil valued at the export parity price and the actually collected domestic revenue from these sales. This country would provide an implicit quasi-fiscal subsidy to its population equal to this difference, which represents the wasted economic rent. If domestic prices are set at a level below cost recovery, then the country incurs a quasi-fiscal deficit equal to the difference between the level of revenue necessary to reach cost recovery and the actual level of revenue from domestic oil sales. The quasi-fiscal activity in this case is larger, equal to the difference between the hypothetical sales value (sales volume valued at export parity price) and the actual sales value. It follows that QFAs tend to be larger than the quasi-fiscal deficits in countries that are net energy exporters.

Theoretically, there may also be a situation in which QFAs offset each other, so that net QFAs are smaller than gross QFAs. This is the case if there is cross subsidization. In Ukraine, for example, electricity is sold at above-cost recovery prices to industrial consumers and at below-cost recovery prices to households. In this case there is a quasi-fiscal tax on industrial customers which helps to finance part of the implicit quasi-fiscal subsidy to households. Only the net QFA would contribute to the quasi-fiscal deficit in this case (see below).

III. CASE STUDY: UKRAINE

A. Background

Ukraine's economic performance during the first decade of transition has been mixed. Following the hyperinflation episode in the early 1990s, inflation has been brought under control in recent years (e.g., consumer prices rose by 6 percent in 2001). However, the sharp output decline could not be arrested before 1999/2000, and strong real growth materialized for the first time only in 2000 and reached 9 percent in 2001. Ukraine was severely affected by the August 1998 crisis in

⁷ Energy companies can also finance QFAs through tax exemptions. In the methodology used here this would not be considered a QFA because a tax exemption is a direct fiscal measure in the form of a tax expenditure.

Russia, which caused a sharp depreciation of the currency and a drop in export demand. The budget position has improved in recent years, with cash deficits of less than 2 percent of GDP in 2000 and 2001.

Ukraine has a large energy sector that accounts for about 25 percent of industrial output (including power generation). Since the sector has experienced a decline in output somewhat below that of overall GDP, its relative importance in the economy has increased during the 1990s. Energy consumption on a per capita basis has remained very high—only slightly less than in Russia, and twice as high than in Poland and about five times the average of Western European economies (Figure 2). Energy products comprise about 40 percent of imports. The energy sector has contributed importantly to the build-up of external debt, mostly because of gas imports financed through external payment arrears to Gazprom.⁸ By January 2001, these arrears reached US\$1.5 billion, equivalent to 15 percent of Ukraine's total external debt.⁹

B. Energy QFAs

Energy QFAs are concentrated in the gas and electricity sectors. The market for petroleum products is fairly liberalized and hence offers little scope for QFAs.¹⁰ In the coal sector, QFAs could be large, although in the absence of data and empirical analyses this claim is difficult to verify. The government subsidizes the coal sector explicitly through the budget since average coal prices cover only about one-third of costs and coal miners are politically important.¹¹ However, the government provides some tax exemptions and tolerates the nonpayment of taxes by coal mines, which also accumulate arrears towards state-owned enterprises. In addition, there are below-market price sales to privileged consumer groups, and energy generation companies are forced to buy from inefficient mines at above market price.

We follow the end-product approach (see Box above) to estimate energy QFAs in Ukraine, primarily for the year 2000, related to mispricing and arrears. The analysis is based on publicly available data (e.g., arrears data for different consumer groups as published by the Ministry of Energy) and data made available to Fund staff by the Ukrainian authorities. To arrive at estimates of mispricing, we compare the actual prices paid by different consumer groups with an approximate market price for gas and estimated cost recovery price for electricity. The third type

⁸ Ukraine is the world's third largest importer of natural gas (after the U.S. and Germany), and sixth largest consumer of natural gas. Annual consumption fell from a peak of 115 billion cubic meters in 1990 to around 80 billion cubic meters in 1999–2000. For background on the gas sector in the early years of the transition, see Bisat (1996).

⁹ Note, however, that the Ukrainian government does not recognize these arrears as government debt.

¹⁰ In the past, some regions have tried to impose administered, below-market prices for petroleum products. However, due to competition among suppliers there has been a tendency to ignore price controls, while shortages have appeared temporarily in areas with better enforcement. For an overview of Ukraine's oil sector see U.S. Department of State (2000).

¹¹ See Oxford Analytica (2001) and World Bank (1998).

of QFAs—excessive losses, including through theft—are difficult to measure and we lack sufficient data to include it in the analysis. Activities such as theft may be potentially important, especially taking into account the level of corruption and extent of the shadow economy in Ukraine. For example, according to some sources, transit gas with a value of US\$1 billion (equivalent to about 3 percent of Ukraine's 2000 GDP) had been stolen by May 2000.¹²

C. Gas Sector QFAs

Naftogaz Ukrainy dominates the Ukrainian gas market. It is a state joint-stock company, almost fully owned by the government, and is structured as a holding company consisting of three specialized firms: wholesaler to the domestic consumers (Trading House Gas Ukrainy), gas exploration and extraction company (UkrGazVydobuvannya), and gas transportation and storage company (Ukrtransgaz). Domestic extraction covers only about 20 percent of the annual consumption, and the remainder is imported from Russia and Turkmenistan on commercial terms. In addition, Naftogaz receives a transit fee paid in gas (about 30 billion cubic meters annually) that the Russian gas company Gazprom pays for using Ukrainian pipelines to export gas to Western Europe. Itera International, a private company with close links to Gazprom, handles the sales and transportation of Turkmen natural gas to Ukraine, supplying 20–30 billion cubic meters of gas per year on behalf of Naftogaz. In this study we estimate the QFA arising from the operations of Naftogaz.

Mispricing

During 1999 and 2000, three types of prices were used in the Ukrainian gas sector: (i) auction prices; (ii) contract prices; and (iii) prices set by the government. Auctions were introduced to reduce arrears and replace barter with cash transactions. Even though auctions covered only a very small part of transactions, they proved useful for the domestic extraction companies that received much needed cash. Contract prices form the broadest category; they vary based on the terms, volumes, and forms of payment. Prices set by the government include retail gas prices for residential consumers (who consume about 15–18 billion cubic meters) and budget organizations (1 billion cubic meters). The prices for residential consumers and budget organizations were set by the National Electricity Regulatory Commission (NERC) at around HRV 190 or US\$35 per thousand cubic meters, and these have remained unchanged since April 1999, despite considerable domestic inflation and increases in international energy prices.

In the case of gas, cost recovery pricing is not appropriate for the calculation of QFAs if there are economic rents involved in the production of low-cost gas. Therefore, even if the costs of production were known, these would not be a good estimate of market value. Moreover, production costs include exploration, extraction, and transportation, with the latter being a very large part of the cost. Thus gas sold close to the Russian border would have a different cost than gas sold elsewhere (and data on transportation costs are not available). For the same reason, it would not be obvious what international price to use as a benchmark. The price at the border

¹² See Oxford Analytica (2001).

with Russia may be very different from the price at the border with Poland due to transportation and storage costs. These two factors cause the price of gas to vary more in time and space than is the case for other energy products. However, the price that could be considered the most relevant is the one that Itera charges on imported gas, which is about US\$70 per thousand cubic meters at the border with Ukraine.¹³

To estimate the impact of mispriced gas supplied by Naftogaz, we chose prices for two reference groups as relevant benchmarks: self-financing communal service enterprises (hence “communal enterprises”) and independent traders. The operations of both groups are broadly in line with market principles and relatively free from government interference. The price paid by communal enterprises is probably closest to a “market” value, and comparable to the price charged by Itera.

Using the price charged by Naftogaz for supplies to communal enterprises as a benchmark, QFAs from gas mispricing are estimated at 3.3 percent of GDP for 2000, up from 1.5 percent of GDP in 1999, reflecting an increase in the reference price in line with those of international prices, while government-controlled gas prices remained essentially unchanged (Appendix II). Using the price that traders pay as a benchmark reduces gas sector QFAs on account of mispricing to 1.3 percent of GDP in 2000, up from 0.2 percent of GDP in the previous year. Regardless of which benchmark price is chosen, the results show that the bulk of the mispricing problem is related to regional administrations, which deliver gas to households who therefore benefit the most from the implicit subsidy provided through inappropriately low gas tariffs.

Arrears

In addition to low prices, implicit subsidies are provided through the toleration of payment arrears. In 1999, average collection rates were low (40 percent on average), resulting in large arrears (4.1 percent of GDP). Collection rates improved dramatically in 2000 (to 80 percent on average), reducing payment arrears to about 1 percent of GDP (Appendix II).¹⁴ While in 1999 the regional administrations and the Ministry of Energy were the largest contributors to arrears, in the following year regional administrations and traders were the major culprits. This suggests that private households (the largest consumer group), through the regional administrations, have not only benefited through large implicit subsidies provided through low gas tariffs but also from additional implicit subsidies provided through payment arrears. The regional administrations provide gas to households and district heating plants, and with households as the ultimate customers, their payment record is linked to the payment performance of individual households.

In the gas sector, QFAs on account of arrears and mispricing are estimated at 5.6 percent of GDP in 1999 and 4.4 percent of GDP in 2000, based on the higher reference price (paid by communal

¹³ See Oxford Analytica (1999). Cost recovery would be an appropriate reference price for imported gas, but prices were likely set higher than market value in the past due to the nonpayment history of Naftogaz. For example, in 2000 the contract price for Naftogaz was US\$80 per 1000 cubic meters. See Oxford Analytica (2000). The gas market has become more competitive since 2001, and import prices could be used for comparison for that year.

¹⁴ Note, however, that the increase in cash payments is not known.

enterprises); they are somewhat lower if the price paid by independent traders is used as a benchmark (Table 1). Arrears were the main component of energy QFAs in 1999, accounting for 73 percent of the total. Reflecting sharply improved collection ratios in 2000, new arrears accounted for only 1.1 percent of GDP. However, since the reference prices for gas rose in line with international energy prices, while government-controlled prices remained essentially unchanged, QFAs on account of mispricing gained in importance. In 2001, payments discipline improved further (to 87 percent), while reference prices declined moderately. As a result, quasi-fiscal activities likely declined further in 2001.

Table 1. Ukraine: Gas Sector QFAs, 1999–2000
(In percent of GDP)

	1999	2000
Arrears	4.1	1.1
Under-pricing	1.5 (0.2) 1/	3.3 (1.3)
Other, including theft	+	+
Total quasi-fiscal operations	5.6 (4.3)	4.4 (2.4)

Sources: Naftogaz Ukrainy; and authors' calculations.

1/ Figures in parentheses use traders as the reference price.

D. Electricity Sector QFAs

In 2000, Ukraine generated around 171 TWh of electricity, making it the sixteenth largest producer in the world. As indicated above, Ukraine's energy intensity is high by international standards, with wasteful consumption being a major contributor to high electricity usage.¹⁵ In 1996, the electricity sector was restructured by separating generation, transmission, and distribution, and creation of a wholesale market for electricity (*Energorynok*). Under the new framework, the National Electricity Regulatory Commission (NERC) serves as the regulator, while generating companies supply energy and consumers bid for electricity, and regional distribution companies (*oblenerg*) and independent operators supply electricity to the end-users.¹⁶ Industrial enterprises have remained the main consumer, accounting for 50 percent of total electricity use in 2000, with the metallurgy and coal industry being the largest consumers within the industrial sector (Table 2). Households consume 20 percent of the electricity, about the same share as budgetary organizations and communal services.

¹⁵ Electricity usage remains unusually high even when taking into account that Ukraine's shadow economy could be as large as 50 percent of officially measured GDP, as estimated by Johnson et al. (1997). Power generation is the fourth largest sector in the economy, accounting for 13 percent of industrial output. Ukraine has four thermal and two hydro-electric generating companies, five nuclear power stations, and a well-developed network of high- and low-voltage transmission lines.

¹⁶ For further details on electricity sector developments in the Ukraine, see World Bank (1997).

Mispricing

Electricity retail prices are regulated by the government, and are adjusted infrequently. A major raise in tariffs took place during 1994–96, when the average retail price tripled in U.S. dollar terms. Following that, however, there has been no further significant adjustment in electricity tariffs, with the exception of a 20 percent increase in the price of electricity retail (low-voltage) tariffs due to the imposition of the VAT in the year 2000.¹⁷ However, reflecting substantial currency depreciation and increases in world energy prices, Ukraine's average electricity tariffs have remained well below cost recovery levels, and a large proportion of the population continues to benefit from preferential tariffs.

For the purpose of this study, we have used cost recovery estimates for two different consumer groups: (i) *industrial users* (industrial enterprises, railroads, and agriculture); and (ii) *retail users* (communal services, budgetary organizations, and households). The transmission costs for the first group are relatively low because they mostly use the more efficient high-voltage grid. Cost recovery estimates by the World Bank for such consumers in other countries (e.g., Russia) are about US\$20 per MWh, which is the benchmark price we used for the calculations presented here because precise estimates for Ukraine are not available. The second group consumes energy through more expensive low-voltage lines, where the cost-recovery tariff has been estimated at US\$39 per MWh.¹⁸ In 2000, prices charged to industrial users were above cost recovery, implying an implicit tax of 1 percent of GDP and cross-subsidization of retail users, who received a quasi-fiscal subsidy of 1.4 percent of GDP. On a net basis, the QFA related to mispricing of electricity (0.4 percent of GDP) was thus relatively small (Table 2).

Arrears

According to one estimate, electricity sector arrears amounted to almost 5 percent of GDP in 1999. They were substantially smaller in 2000 (0.7 percent of GDP), reflecting improved collection rates and, to a minor extent, the collection of previously incurred arrears, helped by stronger enforcements of cut-off policies (Table 3). However, only a relatively small part of collections was in cash. In 2000, most of the arrears were incurred by the coal and metallurgy industries, the agricultural sector, and households (excluding those with privileged tariffs). Reflecting the collection of arrears accrued previously, collection rates for some user groups were actually above 100 percent in 2000, increasing from 49 percent in 2000 to 65 percent in 2001. Together with some tariff increases, this suggests a further reduction in quasi-fiscal activities in 2001.

¹⁷ In 2001, electricity tariffs were increased in the context of privatization of six regional electricity distribution companies (oblenergog).

¹⁸ See World Bank (2001) and Lovei (1998).

Table 2. Ukraine: Mispricing in the Electricity Sector, 2000

	Tariff	Cost Recovery	Cost Recovery	Mispricing
	(In US dollars per MWh)		(In millions of HRV)	
Industry, of which:	25.4	20.0	5,140	-1,386
Coal	39.9	20.0	645	-641
Metallurgy	20.2	20.0	2,4976	-30
Railroad	26.5	20.0	553	-179
Agriculture	28.0	20.0	496	-199
Total for users with tariffs above cost recovery (implicit tax)				-1,763 (1 percent of GDP)
Communal Services	32.90	39.00	1,964	307
State budget organizations	32.04	39.00	589	105
Local budget organizations	32.67	39.00	497	81
Households (excl. those with privileged tariffs)	19.67	39.00	3,778	1,873
Total for users with tariffs below cost recovery (implicit subsidy)				2,365 (1.4 percent of GDP)
Net QFA in electricity sector				602 (0.4 percent of GDP)

Sources: Own calculations; Ministry of Economy of Ukraine.

E. Summary

The preceding analysis has shown that energy sector QFAs in the Ukraine over the past few years were sizable, and primarily caused by mispricing, especially in the gas sector (Table 4). Since no data for the coal subsector are available and with detailed calculations for electricity sector QFAs only for the year 2000, it is difficult to judge if overall energy sector QFAs declined or not over the past few years. However, it is clear that energy sector QFAs have remained sizable in 2000 (6.5 percent of GDP), even though significant progress was achieved in reducing arrears. With some progress on the arrears front for both gas and electricity, the main contributing factor for energy QFAs was mispricing, especially in the gas sector where QFAs on account of mispricing rose to 3.3 percent of GDP, up from 1.5 percent of GDP in 1999, if measured at the higher benchmark gas price. This reflects the fact that domestic prices remained essentially unchanged while world energy prices increased.

Table 3. Ukraine: Electricity Sector Payment Arrears, 2000

Consumers	Tariff in HRV per MWh	Collection Rate in Percent	Arrears in millions of HRV	Arrears as a Percent of Total
Industry, of which	137.1	88.6	746	67.1
Coal	215.5	65.6	442	39.8
Metallurgy	109.3	86.1	351	31.6
Agriculture	151.4	80.5	135	12.2
Population (excl. those with privileged tariffs)	106.2	78.0	418	37.6
Subtotal			1,299	116.9
Railroad	142.9	102.9	-20	-1.8
Communal services	177.6	102.0	-32	-2.9
State budget organizations	173.0	124.5	-118	-10.6
Local budget organizations	176.4	104.3	-18	-1.6
Total			1,111 (0.7 percent of GDP)	100.0

Sources: Ministry of Fuel and Energy of Ukraine, Ministry of Economy of Ukraine.

Table 4. Ukraine: Quasi-fiscal Activities in the Energy Sector
(In percent of GDP)

	1999	2000
Arrears	...	1.8
Gas	4.1	1.1
Electricity	...	0.7
Mispricing	...	4.7
Gas	1.5	3.3
Electricity (gross)	...	1.4
Gross quasi-fiscal activities	...	6.5

Sources: Tables 1-3 and Appendix II.

The largest source of financing for energy sector QFAs in Ukraine has been the use of the in-kind transit gas that Naftogaz sells to domestic consumers.¹⁹ The second form of financing are the gas payment arrears to Russia which have resulted in a build-up of significant contingent liabilities for the government since Naftogaz is a state-owned company. As it appears unlikely that the Ukrainian consumers will pay for these arrears, Ukraine will need to settle the claims one way or another, for example, through special bilateral debt deals and/or by accepting a lower price upon privatization.²⁰ The third source of financing is the non-payment of taxes by energy sector companies. Naftogaz, for example, is one of Ukraine's largest tax debtors, and several electricity companies are also not current on their tax payments. The fourth most important source of financing is under-investment and inadequate maintenance of the capital stock in the sector. However, after several years of neglect, this source of financing is becoming more limited and also more dangerous.

Some of the gross QFAs in the electricity subsector are financed through cross-subsidization, as explained above. Financing through the dissipation of economic rents is probably relatively small due to the limited domestic production of oil and gas. The last source of financing of QFAs is the incurrence of arrears to suppliers. This source of financing is also limited because independent suppliers would probably stop deliveries if they were not paid. Most of the sources of financing in Ukraine are declining and therefore the need to eliminate energy QFAs is becoming more urgent. Since economic rents are limited in Ukraine, the estimate of QFAs is approximately equal to the quasi-fiscal deficit, which will affect government finances eventually.

IV. CASE STUDY: AZERBAIJAN

A. Background

Following the “transitional recession” in the early 1990s, which was exacerbated by the adverse impact of the war with Armenia, Azerbaijan has been able to stabilize its economy and achieve strong GDP growth. The country has been successful in bringing down inflation; and current account deficits, while still high by international standards, have been much-reduced from extraordinarily high levels.²¹ In recent years, high GDP growth has been achieved mainly because of high oil prices and large foreign investments in the petroleum sector. Growth has thus been quite “unbalanced,” with the oil sector expanding annually by around 20 percent in real

¹⁹ If Naftogaz transferred the proceeds to the budget as required by law, it would have to raise its tariffs or increase collections substantially.

²⁰ Ukraine has never recognized Naftogaz' debt to Gazprom as public debt, but Ukraine's public sector wealth is reduced by the accumulation of this debt. In October 2001, both countries agreed to a restructuring of Naftogaz' gas debt accumulated through July 1, 2000 into eurobonds which are issued by Naftogaz and passed on to Russia's Gasprom. However, the total amount of debt covered under this arrangement was still to be determined, and it remained unclear what would happen with gas debts accumulated since July 1, 2000.

²¹ In large part, high current account deficits in Azerbaijan reflect imports for oil investment projects, financed by foreign direct investment inflows in the capital account.

terms in 1998 and 1999, while the rest of the economy has grown by about 6 percent in real terms. Moreover, the benefits of oil wealth and GDP growth have accrued to Azerbaijan's population in a highly uneven manner, as both the incidence of poverty and income inequality have increased in recent years.

Azerbaijan's domestic energy sector remains characterized by a high degree of vertical integration and government control. The major energy companies—the State Oil Company of Azerbaijan (SOCAR), the power company (Azerenergy), and the gas distribution enterprise (Azerigaz)—are still government-owned and used as instruments of government policy. Oil output has risen substantially in the second half of the 1990s, from around 65 million barrels per year during 1994–98 to 100 million barrels in 2000. About half of the output (55 million barrels in 2000) is consumed domestically.²² Although a number of Production Sharing Agreements (PSAs) with major international oil companies have been signed, oil sector operations remain dominated by SOCAR.

SOCAR is also Azerbaijan's major producer of gas. To a much smaller extent, gas is also produced by the Azerbaijan International Operating Company (AIOC), a British Petroleum (BP) led consortium. During 1993–1999, SOCAR produced around 6 billion cubic meters of gas annually, most of which was consumed domestically. Recently Azerbaijan started importing gas to substitute for crude that had previously been refined into fuel oil for electricity generation but is now exported. The state-owned company Azerigaz dominates natural gas transmission, distribution, and retail sale. It purchases gas from SOCAR at a very low price (see below). At the retail level, gas is sold to consumers at an even lower price (US\$8 per tcm in 2000). The largest consumers of gas are households (40 percent), the electricity company Azerenergy (30 percent), and other public utilities and budget organizations (20 percent).

The electricity sector has remained almost completely government-owned and is dominated by Azerenergy, which owns the thermal and hydroelectric generating companies, the transmission network, and almost all of the distribution network.²³ Around 16 GWh of electricity are produced annually. The thermal generating stations use heavy fuel (mazut) and natural gas which is supplied mostly free of charge by SOCAR. The largest consumers of electricity are households (40 percent), wholesalers, including the regional joint stock distribution companies (30 percent), and industry (16 percent).

B. Energy QFAs

Since Azerbaijan's energy sector still resembles the centralized and government-owned complex of the Soviet era, with economic relations between the energy companies being dominated by special arrangements and public policy considerations, it appears appropriate to consider all three

²² The country has estimated recoverable crude and condensate reserves of 10 billion barrels, equivalent to about 100 years of production, concentrated in 61 fields targeted for commercial development.

²³ However, in 2001, the Baku electricity distribution network was formally separated from Azerenergy and a long-term contract was signed with a foreign private company to manage it.

energy subsectors jointly.²⁴ Using consolidated financial data (i.e., revenue, expenditure, and profit/loss accounts) for the major energy sector companies, it is possible to adjust actual data by revaluing input purchases, intra-sectoral volume transactions, and sales to end-users with appropriate benchmark prices to compute QFAs related to mispricing, arrears, and excessive losses.²⁵

Mispricing

Most of the energy in Azerbaijan is purchased and sold at inappropriately low prices. In addition to generally low domestic energy prices, the government provides additional implicit subsidies through preferential tariffs or exemptions on energy products for a significant share of the population (estimated at 20 percent in 1999). Households pay lower tariffs than enterprises, giving rise to cross-subsidization. Although privileges for major groups (e.g., teachers) have been eliminated, other special groups (e.g., war veterans, refugees, and single elderly) still remain either exempt from paying for electricity or receive a 50 percent discount on the already low tariffs.²⁶

Within the energy sector, SOCAR supplies gas (to Azerigaz), heavy fuel (to Azerenergy), and oil and oil products (to end-consumers) at prices that are significantly below market-related prices. The total quasi-fiscal subsidy provided through SOCAR's domestic sales to other energy companies amounted to manat 2,400 billion (US\$550 million), equivalent to at least 14 percent of GDP in 1999. Specifically, SOCAR supplied 4.8 billion cubic meters of gas to Azerigaz at approximately US\$15 per tcm. For comparison, the import parity price for gas on the border with Azerbaijan for that period was around US\$58 per tcm. At unchanged sales volumes, the difference between the export parity and the actual domestic price results in foregone revenue of manat 915 billion (US\$200 million US\$), or 5.5 percent of GDP.²⁷ SOCAR also sold close to two million tons of heavy fuel, mostly to the power-generating companies of Azerenergy, at US\$52 per ton, while the comparable export parity price was around US\$150 per ton. As a result, SOCAR lost around manat 850 billion (US\$200 million), or 5 percent of GDP, in potential export revenue.²⁸ Finally, SOCAR provided 29 million barrels of petroleum products to domestic consumers at a price significantly below export parity, with a potential revenue loss of about manat 640 billion (US\$150 million), or 4 percent of GDP.

²⁴ Such consolidation is commonly applied when calculating financial results of large corporations.

²⁵ Our methodology and data draw on previous studies of energy QFAs in Azerbaijan. See Mamedov and Huseynov (2000), Nell (2001a), and Nell (2001b).

²⁶ Preferential tariffs have reportedly been eliminated as of January 2002.

²⁷ Azerigas, in turn, sold gas to households at an even lower domestic price (US\$8 per tcm), raising the quasi-fiscal subsidy from domestic gas sales even further, to about 6.5 percent of GDP.

²⁸ Unlike gas, heavy fuel can be exported rather easily as no pipeline capacity or capital-intensive gas liquefaction trains are required.

In 2000, the quasi-fiscal subsidy on account of mispricing for these type of transactions rose, conservatively estimated, to over 20 percent of GDP, primarily reflecting mainly that domestic prices were not raised in line with international prices.²⁹ As discussed in Section II, these results depend crucially on key assumptions regarding demand elasticities and benchmark prices. However, the magnitude of the results suggest that, regardless of which benchmark price or demand elasticity assumption is chosen, energy QFAs on account of mispricing have reached very large proportions in recent years.

Arrears

Even at low actual prices Azerbaijan's energy companies do not get paid fully, and timely, by end-consumers. Collection rates of Azerigaz dropped from 50 percent in 1995 to around 35 percent during 1996–99, before plunging to 13 percent in 2000. Those of Azerenergy fell from 35 percent in 1998 to 13 percent in 2000.³⁰ The most important nonpayer for Azerigaz has been Azerenergy, while for Azerenergy the main nonpayers have been households that on average pay only 10 percent of their bills. After subtracting intra-sectoral arrears, the quasi-fiscal subsidy provided to end-users on account of arrears amounted to 7 percent of GDP in 1999 (Table 5). This is likely to be an underestimate of the total quasi-fiscal subsidy provided to consumers of energy on account of nonpayments as arrears to SOCAR for the sale of oil products, for example to the agricultural sector during planting and harvesting seasons, are not captured in our analysis owing to the lack of data.

Table 5. Azerbaijan: Energy QFAs Due to Arrears, 1998-99 1/

	1998 (In billions of manat)	1999	1998 (In percent of GDP)	1999
Arrears of end-consumers to Azerenergy and Azerigaz	1,500	1,400	9.0	8.5
Minus arrears of Azerenergy to Azerigaz	170	220	1.0	1.3
Quasi-fiscal activity due to arrears	1,330	1,180	8.0	7.2

Sources: Nell, 2001a and 2001b, World Bank, and IMF staff estimates.

1/ New arrears accrued during the period.

²⁹ For details on the estimates for the year 2000 see Nell (2001a and 2001b).

³⁰ No distinction is made between cash and non-cash collections due to the unavailability of data. Collection rates for 2000 are for the first nine months of the year.

Excessive losses

The third component of energy sector QFAs in Azerbaijan are excessive losses related to theft, fraud, the lack of metering, and technical problems in transmission and distribution. As these phenomena are tolerated by the government (the owner), they can also be considered a QFA provided to energy sector companies. In principle, these costs would not be incurred if the energy sector were privately owned or run on a fully commercial basis with a hard budget constraint. The production and distribution costs for energy products in Azerbaijan are substantially higher than what would normally be expected, even after adjusting for location-specific equipment quality and maintenance needs.³¹ Excessive losses are difficult to estimate, but it appears that they are considerably smaller than the QFAs related to mispricing and arrears. According to one World Bank estimate, for example, in 1999 unnecessary losses in the energy sector amounted to manat 150 billion (US\$34 million), or 1 percent of GDP.

Tax arrears

Mispricing and payment arrears on outputs in the energy sector have in turn triggered tax arrears and noncash settlement of tax liabilities by the energy sector companies. For example, in both 1998 and 1999 energy sector companies amassed tax and social contribution arrears of around 5 percent of GDP, with SOCAR as largest contributor (Table 6). SOCAR's stock of tax arrears rose to 23 percent of GDP at end-1999 (IMF 2000). In part because of tax arrears from energy companies, total tax arrears in Azerbaijan have increased sharply in recent years, which has complicated budgetary management. If large taxpayers such as SOCAR are allowed to run tax arrears, other taxpayers also have an incentive for noncompliance. At the same time, however, budgetary organizations are running arrears on energy payments to SOCAR and other energy companies as explained above, thereby contributing to the proliferation of arrears.

Table 6. Azerbaijan: Tax and Social Contribution Arrears
of Energy Companies, 1998–99
(In billions of manat, unless stated otherwise)

	1998	1999
SOCAR	600	825
Azerigaz	151	77
Azerenergy	54	36
Total	805	939
Total (In percent of GDP)	5.0	5.5

Source: Nell 2001a and 2001b.

³¹ Excessive losses can be computed as the difference between the reported losses and acceptable losses as defined in accordance with international standards and adjusted for the equipment used in Azerbaijan. Note that calculations of energy sector expenditure are sensitive to accounting conventions used; this is particularly relevant for the measurement of capital depreciation.

C. Summary

Based on the calculations presented above, it is possible to recalculate the income statement of Azerbaijan's energy sector by adjusting actually received revenues for the mispricing of output and arrears, and expenditures for the mispricing and nonpayment of inputs, assuming cost recovery (Table 7). For 1999, such recalculations suggest that energy sector revenues would have been higher by 27 percent of GDP (manat 4,500 billion) if implicit subsidies on account of mispricing and arrears on sales of outputs (i.e., electricity and gas) had been taken into account. As explained above, mispricing is the most important implicit subsidy element, accounting for almost 75 percent of total energy QFAs.

Table 7. Azerbaijan: Adjusted Financial Balance of the Consolidated Energy Sector, 1999 1/
(In billions of manat, unless stated otherwise)

	1999	
Total costs (adjusted)	5,248	
Actual costs (cash basis) 2/		1,909
QFAs due to mispricing of inputs (e.g., oil)		2,400
Tax arrears		939
Arrears on other inputs		...
Underinvestment		...
Total revenue (adjusted)	5,248	
Actual revenue from sales of outputs (cash basis)		725
QFAs due to arrears on output sales		1,180
QFAs due to mispricing of outputs (residual) 2/		3,343
Total QFAs	4,523	
Mispricing of outputs		3,343
Mispricing without excessive losses		3,193
Excessive losses		150
Arrears on output sales		1,180
Total QFAs (in percent of GDP)	26.7	

Sources: World Bank; and own calculations.

1/ Follows the financial balance methodology described above, consolidating the domestic financial results of SOCAR, Azerigaz, and Azerenergy and intra-sectoral arrears and mispricing. Non-fuel costs of energy enterprises remain unadjusted.

2/ Including manat 150 billion on account of excessive losses.

These results suggest that implicit subsidies provided through low prices and arrears in the energy sector were significantly larger than explicitly measured budgetary expenditures, which totaled 21 percent of GDP in 2000.³² Large energy QFAs thus obfuscate the overall extent as well as the relative focus of the government's involvement in the economy, as, for example, the implicit and untargeted energy subsidies to households and enterprises are more than ten times higher than what the government spends on health through the budget. While the government has provided large and untargeted implicit energy subsidies to the whole population, explicit budgetary spending on social sectors has remained inadequate and characterized by major inefficiencies, causing a deterioration in the quality of social sector service provision, especially for the poor.³³ Against the background of substantial oil wealth and revenues, the government's policies appear to have been highly ineffective with regard to social objectives, since poverty, income inequality, and unemployment have increased in the second half of the 1990s.³⁴

V. CONCLUSIONS

In the preceding sections, we have analyzed the extent, causes, and implications of energy sector QFAs through two case studies in which we have experimented with two methodologies. Taken together with the findings of a survey of other FSU countries (Appendix I), the key results of our analysis are as follows. First, in most of the former Soviet Union countries QFAs in the energy sector have been large and pervasive in recent years, often accounting for 5 percent of GDP or more. In recent years, these activities have declined in some of the energy-importing countries (e.g., Armenia, Kyrgyz Republic, and Ukraine), but have risen in energy-rich countries (e.g., Azerbaijan, Russia, and Turkmenistan), largely on account of higher international prices. Azerbaijan appears to have the largest energy sector QFAs among the FSU countries, estimated at more than 20 percent of GDP in 1999 and 2000. Second, the primary sources of energy sector QFAs in these countries are mispricing and the toleration of arrears. Other QFAs, such as excessive losses due to neglect and theft, are quantitatively much less important, although they clearly have adverse implications for future energy sector operations as they lead to capital stock depletion. Third, energy sector payment arrears are key in triggering tax and other payment arrears by energy companies, and in perpetuating the vicious circle that involves arrears, offsets, netting operations, and noncash payments. Fourth, in addition to quantifiable energy sector QFAs like those related to mispricing and the toleration of arrears, there are others which are more difficult to estimate and integrate into the analysis. These comprise excessive losses, noncash operations, and government guarantees on domestic and external borrowing by energy

³² Adjusting nominal GDP upwards (roughly estimated, by about 20 percent) to take account of energy mispricing would result in somewhat lower, but still large energy sector QFAs relative to GDP.

³³ Budgetary outlays on education and health barely cover wages and salaries, with little resources left for supplies and maintenance. In addition, informal user charges have surged and thus made education and health care less accessible to the poor. For further details see World Bank (1997) and IMF (2000).

³⁴ According to Azerbaijan's Poverty Reduction Strategy Paper (PRSP), 61 percent of the population lived below the poverty line in 1999. The Gini coefficient for the adult population rose to 0.35 in 1999, and the unemployment rate went up from 10 percent in 1994 to 14 percent in 1999. In 1999, wages in the oil and gas sector were on average 10 times higher than in agriculture.

companies. With these findings in mind, the following conclusions can be drawn with regard to further analytical work and the thrust of policy reforms.

A. Further Analytical Work

So far, only a few empirical studies of energy sector QFAs in the FSU, and elsewhere, have been undertaken, reflecting, in part, problems with data access as well as methodological difficulties. However, such analyses are possible, as demonstrated through the case studies on Ukraine and Azerbaijan, in which we have experimented with two different methodologies, in part dictated by the availability of data. Both methodologies have clear advantages and disadvantages. The financial balance approach, as used in the Azerbaijan case study, is based on market-related input prices which are used to determine more realistic market or cost recovery prices for energy outputs (e.g., electricity). This analysis requires a large amount of financial data from individual energy sector enterprises, which in the case of Azerbaijan have been made available by the country authorities to World Bank and Fund staff. The end-product approach, applied in the Ukraine case study, uses aggregate consumption data for end-consumers. While admittedly less precise than the other methodology, it is simpler to apply as it is based on a relatively small number of variables and consumption data, which are generally more easily available than enterprise-level financial data.

Important for both methodologies is the choice of the hypothetical market-related, import, export, or cost recovery price as a benchmark to judge the extent of mispricing. The choice of the benchmark price can have a significant impact on the results of the calculations. However, this issue can be addressed by undertaking sensitivity analyses with alternative prices, as demonstrated in the Ukraine case study. While such benchmark prices are relatively easily available for oil products, they are more difficult to determine for gas products and electricity. One of the conclusions of the work presented here is therefore that more research is required in determining appropriate, country-specific gas prices and cost-recovery levels for electricity companies, and to make such data available on a regular basis to the public for further analytical work by interested parties.

There appears scope for refining the analytical frameworks used here to estimate the extent of energy sector QFAs as far as noncash payments and netting or offset operations are concerned.³⁵ In particular, it would be useful analytically to distinguish between cash and noncash payments. In the two case studies, these have been treated alike, in large part dictated by lack of data that distinguishes between cash and noncash collections. Conceptually, it would be relatively easy to introduce a discount factor for noncash collections into the analytical framework for both methodologies as presented in above, but practically it would be difficult to determine the size of the discount factor, which is unlikely to be constant over time, across countries, and perhaps even from one transaction to another.³⁶

³⁵ For an attempt to analyze implicit subsidies involved in offset operations in Russia see Pinto et al. (2000).

³⁶ Analytically, it may also be interesting to pursue the treatment of energy-sector specific tax exemptions as QFAs, which in this paper have not been considered as such.

Looking beyond the FSU, it appears that energy QFAs are by now of much lesser importance in many of the more advanced transition countries (e.g., the Baltics, Hungary, and Poland). However, they do appear to have remained large in other transition countries, especially those in South-Eastern Europe (e.g., the Balkans). Against this background, it would seem useful to undertake more case studies and comparative analyses of country experiences with energy sector QFAs. For both FSU and non-FSU countries, one could examine energy QFAs related to the production and consumption of coal.

Regarding other sectors in the FSU, it would also appear useful to expand the analysis of QFAs related to the overusage of water as a result of inappropriately low water tariffs. In particular, the implicit subsidization of the use of irrigation water in large-scale agriculture (e.g., cotton cultivation) would appear to cause significant economic distortions, as well as environmental problems (e.g., the drying-up of the Aral Sea), in a number of Central Asian and Caucasian countries, including Uzbekistan, Turkmenistan, and Azerbaijan.

B. Policy Reforms

Since mispricing and the toleration of payment arrears have been identified as the main energy sector QFAs with all the associated adverse economic and fiscal implications, future policy reforms should first of all focus on these issues. Because of inappropriately low energy tariffs and the toleration of payment arrears, energy consumption and waste has remained high across the FSU even after ten years of transition, particularly in the energy-rich countries where resource rents are dissipated to provide untargeted subsidies to the population as well as (state-owned) enterprises. To reduce or eliminate QFAs in FSU countries, energy prices should be raised, often substantially so, and preferential tariffs or free provision of services for specific consumer groups eliminated as much as possible. These reforms should be combined with the provision of explicit and better-targeted cash transfers to needy population groups. Implicit subsidies to (state-owned) enterprises in the industrial, agricultural, and other sectors should be reduced or eliminated, and, if deemed necessary, replaced by explicit subsidies from the budget, with the objective to reduce them over time. Raising energy tariffs will not only improve the efficiency of the energy companies themselves and make them more attractive for privatization, but it will also trigger restructuring in enterprises that are still benefiting from cheap energy. As such restructuring will lead to retrenchment of workers, it will be important to strengthen existing or put in place new safety nets to mitigate the adjustment costs.

Energy price increases should be combined with better enforcement efforts to reduce arrears and improve payments discipline, including through better use of metering for residential and commercial users. In this context, governments need to improve budget planning and management to ensure full payment of utility bills by budgetary organizations, while allowing energy companies to cut off supplies, with the possible exception of high-priority users (e.g., hospitals and schools). In addition, underlying problems related to government ownership, regulation, and lack of competition in the energy sector need to be addressed through sector reforms focusing on enterprise restructuring and privatization—areas in which the World Bank, the EBRD, the AsDB, and other donors provide technical advice and financial assistance.

As far as fiscal policy is concerned, greater efforts are required in capturing energy sector QFAs as part of the fiscal landscape, through more data dissemination, analysis, and policy reforms focusing on fiscal transparency and accountability. In many FSU countries, there appears to be a need for closer monitoring and public dissemination of data on the financial situation of individual energy sector enterprises, and the financial flows between the energy sector and other sectors of the economy. A good example in this regard is Armenia, where under the current IMF supported program quarterly cash flows of energy sector enterprises are monitored closely. Also, in Azerbaijan, Moldova, the Kyrgyz Republic, and Ukraine audits of the large energy companies have been performed, which is another important avenue for further reforms.

To improve fiscal transparency, (energy) QFAs could be included in standard fiscal analysis and reporting by the country authorities and IFIs. For example, it may be useful to augment conventional measures of the government budget deficit to reflect (energy) QFAs. Alternatively, the financial performance of energy enterprises, banking credit to these enterprises, and energy QFAs could be subjected to closer regular scrutiny separately of the budget, as is being done in Armenia. In either case, considering that energy sector operations do not fall in the purview of the IMF, there appears to be a need for more intensive cooperation with the World Bank or other donors in such endeavors.

Energy and other QFAs could also be addressed within the context of fiscal Reports on the Observance of Standards and Codes (ROSCs). Such reports have contributed to greater fiscal transparency and improved the general awareness of fiscal data quality and coverage issues, including in some cases on QFAs.³⁷ It would appear useful to regularly update these reports (e.g., in the context of the Article IV consultations) and broaden, if necessary, their scope to include energy and other QFAs.

In Azerbaijan, the government has begun to address energy sector QFAs in the context of an IMF supported program through reforms focusing on energy sector financial discipline and fiscal transparency. For instance, some of the energy sector QFAs that have previously been provided by SOCAR to Azerenergy and Azerigaz are now included in quarterly reports on budget implementation, with SOCAR receiving tax credits for the value of these subsidies. Also, more realistic provisions of utility payments have been included in the 2002 budget, disconnection policies have been strengthened, and preferential tariffs for utility and transport services have been discontinued. Azerbaijan's reform progress is also interesting because the government has chosen to implement a sequence of reforms that emphasizes gradualism and focuses first on improving payments discipline and establishing greater transparency while tackling the mispricing of domestic energy products only gradually over the medium term.

³⁷ Fiscal ROSCs have been prepared for Azerbaijan and Ukraine. These have been published on the IMF's website (<http://www.imf.org>). Such reports are also under preparation for Armenia, the Kyrgyz Republic, and Russia.

Overview: Quasi-Fiscal Activities in the FSU 1/

Country	Nonpayments and Arrears	Mispricing	Others	Total
Armenia	Detailed estimates not available.	Low communal tariffs	Theft and technical losses: 15 percent of electricity generated	1999: 4.5% 2000: 2.25%
Azerbaijan (1999)	Arrears from end-consumers; intra-sectoral arrears. Total arrears: 7.2 percent.	Below-market value pricing of oil and gas; below cost recovery tariffs; privileged groups. Total mispricing: 20 percent.	Excessive losses: 0.8 percent of GDP.	Total: 26.7%.
Belarus	Domestic arrears: 0.8 percent.	Gas is supplied by Russia at the third of world price. Mispricing of imported gas – 12 percent of GDP.	Directed credits to agriculture: 1.4 percent (2000); 0.5 percent (2001).	Domestic QFA: 2.2 percent; Total: 14.2 percent.
Georgia	No information available.	No information available.	No information available	No information available.
Kazakhstan	No information available.	Oil is sold domestically at 25 percent of the world price.	Subsidies and privileges skewed towards the new capital Astana.	Estimates not available. QFAs may be very high.
Kyrgyz Republic	Collection rates for electricity increased from 70 to 87 percent in 2000.	60 percent of population is privileged; tariffs are below cost recovery; cross-subsidization from exported electricity.	Technical and commercial losses: 2.5 percent.	Agriculture: 0.4% Budget: 0.5% Population: 3.8% Others: 1.3% Total: 6%.
Moldova	Collection rates: Population – 88 percent Energy Company – 50 percent.	Implicit subsidies for privileged groups – 3.2 percent of GDP (in 1999), but since then replaced by cash compensation (1.5 percent of GDP).	No estimates available.	Total for 1999: 5 percent, but declining in 2000.
Russia	Electricity end-user arrears: 6 percent of GDP (1998).	No estimates available, but sizable QFAs due to mispricing in all energy subsectors.	No estimates available.	No estimates available.
Tajikistan	No detailed estimates available.	Tariffs are below cost recovery and market prices (electricity and natural gas).	Technical losses: 1.5 percent.	Total for electricity and natural gas: 7.3%
Ukraine	Arrears are decreasing, but still significant. Gas sector arrears: 1.1 percent (2000); 4.1 percent (1999) Electricity arrears: 0.7 percent.	Below-market pricing in the gas sector: 3.3 percent (2000); 1.5 percent (1999). Below-cost recovery for electricity: gross - 1.4 percent; net – 1.1 percent.	Excessive technical losses and theft.	Arrears: 1.8% Underpricing: 4.7% Total: 6.5%
Uzbekistan	Arrears in the electricity sector.	Below-market value sales of energy domestically.	Multiple exchange rate system with preferences for energy sector.	Estimates not available.
Turkmenistan	No information available.	Domestic oil price is 1/20 of the true economic value. Implicit petroleum sector subsidy: US\$ 300 million (6 percent of GDP). Below-market pricing of gas: US\$180 million (4 percent). Below cost-recovery pricing of electricity: US\$105 million (3 percent).	No information available.	Total: 13 percent.

Source: Survey of IMF economists.

1/ All data is for 2000 and data in percent of GDP, unless otherwise indicated.

Table 8. Ukraine: QFAs Related to Gas Mispricing, 1999
(In millions of Hrv, unless stated otherwise)

Self-financing Enterprises' Reference Price = 241.5 Traders' Reference Price = 204.1	Value at Actual Prices	Value at Self-financing Price	Mispricing at Self-financing Price	Mispricing at Traders' Price
Regional administrations	4,983	6,355	1,371	388
Self-financing communal service enterprises	107	107	0	-17
Industry	344	385	41	-18
According to resolution 1953	119	301	182	136
Traders	1,438	1,702	263	0
Ministry of Energy	1,587	1,583	-4	-249
Total	8,580	10,433	1,854	240
(In percent of GDP)			1.5	0.2

Sources: Naftogaz Ukrainy; and authors' calculation.

Table 9. Ukraine: QFAs Related to Gas Mispricing, 2000
(In millions of HRV, unless stated otherwise)

Self-financing Reference Price=378 Traders Reference Price =282	Value at Actual Prices	Value at Self- financing Price	Mispricing at Self-financing Price	Mispricing at Traders Price
Regional administrations	4,147	8,506	4,359	2,206
Self-financing communal service	21	21	0	-5
Industry	56	61	5.5	-9.9
According to resolution 340	115	152	37	-1.5
Traders	3,198	4,282	1,083	0
Direct contracts	230	318	88	7
Total	7,768	13,340	5,572	2,196
(In percent of GDP)			3.3	1.3

Sources: Naftogaz Ukrainy; and authors' calculation.

Table 10. Ukraine: Gas Consumption, Payments, and Arrears, 1999

	Consumption in Percent of Total	Price per 1000 cubic meters	Collection Ratio	Arrears in millions of Hrv	Arrears as percent of Total	Arrears as percent of GDP
Regional administrations	60.9	189.4	44.8	2,751	52.4	2.2
Self-financing communal service	1.0	241.5	46.3	58	1.1	0.0
Industry	3.7	215.6	46.6	184	3.5	0.1
According to resolution 1953	2.9	95.3	62.6	44	0.8	0.0
Traders	16.3	204.1	46.0	777	14.8	0.6
Ministry of Energy	15.2	242.1	9.5	1,437	27.4	1.1
Total	100.0	198.6	38.8	5,251	100.0	4.1

Source: Naftogaz Ukrainy; and authors' calculation.

Table 11. Ukraine: Gas Consumption, Payments, and Arrears, 2000

Consumer Group	Consumption Percent of Total	Price per 1000 Cubic Meters	Collection Ratio	Arrears in Millions of HRV	Arrears as Percent of Total	Arrears as Percent of GDP
Regional administrations	63.76	184.47	0.88	512	28.15	0.31
Self-financing communal service	0.16	378.34	1.60	-12	-0.69	-0.01
Industry	0.46	344.21	0.67	18,5	1.02	0.01
According to resolution 340 (fertilizer)	1.14	286.39	1.00	0.00	0.00	0.00
Traders	32.10	282.59	0.61	1,234	67.91	0.74
Direct contracts	2.39	274.18	0.72	65	3.61	0.04
Total	100.00	220.30	0.77	1,818	100.00	1.10

Source: Naftogaz Ukrainy.

Bibliography

- Bisat, Amer, 1996, "Ukraine's Gas Arrears: Issues and Recommendations," IMF Paper on Policy Analysis and Assessment 96/3 (Washington: International Monetary Fund).
- European Bank for Reconstruction and Development, 2001, *Transition Report 2001: Energy in Transition* (London: European Bank for Reconstruction and Development).
- International Monetary Fund, 2000, "Azerbaijan Republic: Report on the Observance of Standards and Codes (ROSC) Fiscal Transparency Module" (Washington: International Monetary Fund). Available via the Internet: <http://www.imf.org/external/np/rosc/aze/fiscal.htm>
- _____, 1998, "Republic of Uzbekistan: Recent Economic Developments," IMF Staff Country Report No. 98/116 (Washington: International Monetary Fund).
- IMF, et al., 1991, *A Study of the Soviet Economy*, Vol. 3 (Paris: Organization for Economic Cooperation and Development).
- Johnson, Simon, Daniel Kaufmann, and Andrei Shleifer, 1997, "The Unofficial Economy in Transition," *Brookings Papers on Economic Activity: 2*, Brookings Institution, pp. 159–239.
- Krishnaswamy, V., 1999, "Non-Payment in the Electricity Sector in Eastern Europe and the Former Soviet Union," World Bank Technical Paper No. 423 (Washington: World Bank).
- Lovei, Laszlo, 1998, "Electricity Reform in Ukraine—The Impact of Weak Governance and Budget Crises," *Viewpoint*, Report No. 18941 (Washington: World Bank). Available on the Internet: <http://www.worldbank.org/html/fpd/notes/168/168summary.html>
- Mackenzie, G. A., and Peter Stella, 1996, "Quasi-Fiscal Operations of Public Financial Institutions," IMF Occasional Paper No. 142 (Washington: International Monetary Fund).
- Mamedov, F., and E. Huseynov, 2000, *Azerbaijan Republic Energy Sector Quasi-Fiscal Deficit Assessment*, (unpublished; Washington: World Bank).
- Nell, Jacob, 2001a, "Fiscal Implications of Low Utility Collection Rates," (unpublished) Memorandum, Macroeconomic Policy Group.
- _____, 2001b, "SOCAR Taxation and Energy Sector Subsidies," (unpublished) Memorandum, Macroeconomic Policy Group
- Oxford Analytica, various issues.

- Pinto, Brian, Vladimir Drebensov, and Alexander Morozov, 2000, "Dismantling Russia's Nonpayments System—Creating Conditions for Growth," World Bank Technical Paper No. 471 (Washington: World Bank).
- Robinson, David J., and Peter Stella, 1993, "Amalgamating Central Bank and Fiscal Deficits," in "How to Measure the Fiscal Deficit: Analytical and Methodological Issues," ed. by Blejer and Cheasty (Washington: International Monetary Fund).
- Rosenberg, Christoph B., and Maarten de Zeeuw, 2000, "Welfare Effects of Uzbekistan's Foreign Exchange Regime," IMF Working Paper 00/61 (Washington: International Monetary Fund).
- Tanzi, Vito, 1993, "The Budget Deficit in Transition: A Cautionary Note," *Staff Papers*, International Monetary Fund, Vol. 40 (September), pp. 697–707.
- Taube, Günther, 2001, "Fiscal Policy and Quasi-Fiscal Activities in the Islamic Republic of Iran," paper presented at the conference of the Central Bank of the Islamic Republic of Iran on "Structural Reforms in the Real and Financial Sector of the Iranian Economy," Tehran, May.
- United States & Foreign Commercial Service and United States Department of State, 2000, "Oil and Gas Services in Ukraine." Available via the Internet:
<http://www.bisnis.doc.gov/bisnis/country/000203oil-ua.htm>
- World Bank, 1997, "Central and Eastern Europe: Power Sector Reform in Selected Countries," Energy Sector Management Assistance Programme Paper No. 196/97 (Washington: World Bank).
- , 1998, "Profile of Energy Sector Activities of the World Bank in Europe and Central Asia Region," World Bank Working Paper No. 16 (Washington: World Bank).
- , 2001, "Towards a New Role for State in Infrastructure and Utilities," in "Kyrgyz Republic: Fiscal Sustainability Study," World Bank Country Study (Washington: World Bank).