Ukraine — Impact of Gas Price Increase

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Summary

Our analysis of the impact of the recent gas price increases on the Ukrainian economy indicates that, though significant, it will not be as damaging as initially projected by different experts. In particular:

• In 2006, GDP growth is expected to remain at a rate similar to the 2005 rate of 2.5%; this rate is about 2-3 percentage points less than what was initially forecasted.

• Year-end inflation in 2006 will be at about 13-14%, 3-4 percentage points higher than initially forecasted.

• The foreign trade balance will deteriorate but the current account will show only a slight deficit of about 1% of GDP, which will be partly covered by capital inflows.

• Although pressures on the exchange rate will emerge, it will only slightly depreciate to about 5.2 UAH/USD.

• Although the fiscal budget deficit may increase, the government will have enough tools to keep it under 3% of GDP, a threshold considered sustainable by most international experts.

• Although the gas price shock will result in a decrease of companies' profit, most of them (with the exception of the most marginal enterprises) can absorb this increase.

• The planned introduction of new energy-saving technologies should significantly decrease companies' costs and increase their efficiency.

• In the medium term, the overall economy will be boosted by increased

investments in energy-saving technologies and faster adjustment of tariffs to cost-recovery levels.

New terms of gas imports

Ukraine inherited a very energy-intensive industrial sector from the Soviet period. Being one of the largest consumers of natural gas in the world, Ukraine did very little to reduce its gas consumption since independence. Although Ukraine has its own gas resources, domestic gas production accounts for about 25% of demand. The remainder is imported from Russia and Turkmenistan (about 30% and 45%, respectively). According to a barter arrangement with Russia, Ukraine received about 25 billion cubic meters (m^3) of gas in 2005 at a price of USD 50 per 1000 as payment for the transit through Ukraine of about 130 billion m^3 of Russian gas to Europe.[1] The transit fee was set at USD 1.09 per 1000 m^3 per 100 km.

According to the new 5-year agreement signed between Ukraine and Russia on 4 January 2006, Ukraine will obtain 34 billion m^3 of gas of different origin (primarily Turkmenistan) in 2006

at USD 95 per 1000 m^3 for the first half of the year at the Russian-Ukrainian border[2] from the company "RosUkrEnergo". At the same time, the transit fee for Russian gas through the territory of Ukraine was increased to USD 1.6 per 1000 m^3 per 100 km.

To balance the demand, which is estimated at 76 billion m^3, Ukraine plans to get about 22 billion m^3 of Turkmen gas under a separate contract. According to state officials, the price of this Turkmen gas will be USD 50 per 1,000 m^3 in the first half of 2006 and USD 60 per 1,000 m^3 in the second half of the year at the Turkmen-Russian border.

In 2005, Ukraine consumed about 36 million m^3 of gas from Turkmenistan at an average price of about USD 47 per 1,000 m^3.[3] At the same time, Ukraine paid in kind 37.5% of the total amount of transported Turkmen gas as a payment for transit through the territory of Russia. Hence, the real cost of the Turkmen gas in 2005 was close to USD 65 per 1,000 m^3 and the increase in 2006 in the average price of total imported gas will only be 42% (for the calculations see Annex 1) at the Russian-Ukrainian border. This increase is significantly lower than the reported increase of 90% (from about USD 50 to USD 95 per 1,000 m^3.)

Macroeconomic implications of the gas price increase

Effect on GDP. The gas price increase will have both a direct impact and an indirect impact (through the "multiplier" effect) on GDP.

The direct impact of the gas bill increase on GDP can be estimated using the simple calculations based on the change of gas prices, the ratio of net gas imports to GDP and the price elasticity of demand for gas, according to the following relation:

$$\% \text{ change in GDP} =$$
$$= (\% \text{ change in gas price})*$$
$$*(\text{the share of imports of gas in GDP})*$$
$$*(1 - \text{gas price elasticity of}$$
$$\text{demand*price ratio[4]})$$

If the demand for gas were to be independent of gas prices (zero elasticity of demand for gas), the value of net imports of gas will change by as much as the change in price of gas. However, although the short run gas price elasticities of demand tend to be very low in many countries, they rarely equal zero. Taking into account international experience, the change in gas prices will reduce gas demand and lower the

value of net imports, thus resulting in a smaller decline in GDP.

We limit the analysis of the gas price increase to its impact on GDP during 2006 and 2007. Based on international results,[5] the gas price elasticity of demand is estimated at 0.06 for year 1 and 0.25 for year 2. These elasticities mean that as gas prices increase, the changes in the amount of gas consumed will be quite small in the first year (only about 6% of gas consumption) due to technological and time constraints but will increase in the second year to 25%.

We also show the gross and net effects of the gas price increase. The change in imported gas prices is estimated to be 42.5% and 41% if corrected for the changes in transportation fees and gas export revenues (see Annex 1 for more details).

The ratio of gas imports to GDP[6] was 4.85% in 2005. But this ratio would be 2.7% of GDP if one considers the change in the transit fees and the value of exports from Ukraine.[7]

Our estimates show that the direct impact of the higher gas prices will be a 1.0-1.9 percentage point reduction from the initially forecasted GDP growth in 2006 and 0.7-1.3 percentage points in 2007. Considering the fact that before

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[1] Since the terms of the contracts and other data regarding gas imports are not officially disclosed, the analysis in this paper is based on the information of news agencies and state officials' statements.

[2] Although according to the agreement the price of USD 95 per 1,000 m^3 was guaranteed just for the first half of 2006, for the purposes of this analysis we assume that the price will be unchanged during 2006-2007.

[3] Ukraine had an arrangement with Turkmenistan, securing the price of USD 50 per 1,000 m^3 with half of the purchased amount to be paid in kind. However, in the middle of 2005, Ukraine negotiated the price of USD 44 per 1,000 m^3 to be paid in cash.

[4] The ratio of new gas price to the previous price.

[5] See for instance, Tarr D. and P. Thomson, "The Merits of Dual Pricing of Russian Natural Gas", 2003. — The World Bank.

[6] The GDP in 2005 is estimated at USD 81.7 billion.

[7] It also has to be noted that the share of gas imports to GDP is very sensitive to fluctuations of the exchange rate. While the prices for imported and exported gas are defined by bilateral (trilateral) agreements, GDP is calculated in national currency. Although adjustment by exchange rate fluctuation we leave beyond this note, for more extended analysis we use both the "gross" and "net" share of gas imports to GDP, thus presenting the range of GDP impact.

the gas dispute, international and domestic organizations forecasted GDP growth at 5% yoy in 2006 and 5-5.5% year-over-year (yoy) in 2007, the adjusted growth will be in the range of 3–4% yoy in 2006 and 3.5-4.5% yoy in 2007.

In addition to the direct effect of the gas price increase on GDP, there will be indirect impacts on GDP through a number of other channels. In particular, the above analysis does not incorporate the "multiplier" effect of gas price increases on consumption. In fact, it is well-known that an initial change in an autonomous GDP expenditures item can have a much greater impact on equilibrium national income (GDP) since any changes in aggregate demand represent injections (exemptions) into the circular flow of income, which affect further rounds of consumption spending. Other channels through which higher gas prices may affect the economy include a possible reduction in exports of high energy-intensive industrial enterprises. For instance, a 1% decline in real exports would "cost" about a 0.5 percentage point reduction in GDP since exports account for more than half of it[8] (for more details see microeconomic implications of the gas price increase below).

Taking into account direct and indirect effects of the impact of increased gas prices on the economy, our analysis suggests that GDP growth in 2006 will be negatively affected by 2–3 percentage points from the originally expected rate of 5% yoy. Therefore, GDP growth of about 2-3% yoy in 2006 seems to be a realistic scenario.

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[8] A decline in exports by 1% yoy in real terms would actually mean an increase in nominal exports by about 14% yoy.

[9] According to the Consensus forecast as of October 2005, Economic Intelligence Unit Country Forecast for Ukraine as of November 2005, and IMF Country Report #05/415 as of November 2005.

[10] Even if the gas prices did not change, the cost of public transportation was expected to be raised after March's parliamentary elections since it has been unchanged for several years.

Foreign trade and the current account. The most significant effect of gas price increases will be felt by export-oriented industries such as metallurgy and chemicals, which together account for more than 50% of Ukraine's total export. At the same time, as noted earlier, the gas price of USD 95 per 1,000 m^3 under the Russian deal will represent an average price increase for imported gas of only 41%-42.5% yoy, instead of the widely-mentioned 90%. Although the increase in gas prices will significantly reduce the profitability of metallurgical companies and place the chemical enterprises on the edge of profitability (see Microeconomic Implications of Gas

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Price Shock in this paper for more details), an even more crucial element for export performance in these industries is development of world metal and chemical prices. On a positive note, according to international forecasts, steel prices in 2006 will remain at a relatively high level. Although steel prices declined in 2005, they are still significantly higher than the prices in effect in 2003. International prices for chemical products are forecasted to increase. Nevertheless, exports still may decline as some marginal companies may no longer be viable with the new gas prices.

On the import side, energy resources hold the largest share in total imports with natural gas representing about 12% of total imports. Thus, the increase in gas prices will negatively affect the merchandise foreign trade balance. As a result, the merchandise

trade deficit will worsen. However, the deterioration in merchandise trade will be partially covered by a larger surplus in foreign trade of services due to increased transportation tariffs. As a result, the direct impact of the gas price change on the current account balance in 2006 will be around 1.2% of GDP, resulting in a small current account deficit in 2006 of about 1.0% of GDP.

Consolidated budget. The increase in gas prices will affect the fiscal budget situation adding to the fiscal pressures already in place due to recent increases in social payments. The adopted 2006 budget was developed keeping the imported gas prices unchanged from the 2005 level. Moreover, the budget parameters were estimated based on over-optimistic GDP growth (7% yoy). Considering the lower GDP growth now envisaged, budget revenues may be lower than estimated in the budget law. Moreover, if the government decides to continue to subsidize households via low utility tariffs and support affected industries, the consolidated fiscal deficit may well exceed the 3% of GDP threshold considered sustainable by international organizations. At the same time, we believe the government has enough tools to keep the budget deficit under control. Due to consolidation of budget funds in a unified treasury account, the government may efficiently manage the fiscal balance through tight control over expenditures. We therefore anticipate that the fiscal deficit will be maintained at about 3% of GDP in 2006.

Inflation. For next year, the government forecasted inflation to decline to 8.7% yoy. However, both international and domestic experts were more cautious forecasting inflation at about 10% yoy.[9] The high oil prices in 2005 that affected transportation tariffs may continue to pressure inflation in 2006 as a spillover effect on other prices. The higher price of imported gas will also pressure transportation[10] and util-

ity tariffs. At the beginning of 2006, the government announced the rise in electricity tariffs and gas tariffs to industrial producers, heating suppliers, the budget sector and households. Although the decision to raise tariffs for households was overturned, most likely they will be raised after the parliament elections scheduled for March 2006.

If the gas price increase were to be passed on entirely to consumers, inflation would increase by 5-9 percentage points higher than initially forecasted. However, such a move is very unlikely. We estimate that utility tariffs will be increased by about 25% in 2006, which will add 1.75 percentage points to the initially forecasted inflation. Higher gas prices will be reflected in acceleration of producer prices. Although the magnitude of the producer price increase will depend on the extent to which producers try to compensate for the decline in their profit margins, higher producer prices will represent an upward pressure on consumer inflation. In addition, loose fiscal policy in 2006 will also add to inflationary pressures. Considering the above, we believe consumer inflation will be 3-4 percentage points higher than initially forecasted, in the range of 13-14% yoy at the end of 2006.

Exchange rate. During 2005, the national currency appreciated by about 4.8% against the USD from 5.3 to 5.05 UAH/USD. In 2006, exchange rate dynamics will be affected by the worsening of foreign trade performance, which will lead to the relatively small current account deficit, and the large increases in wages that have taken place over the past year. We also believe that the current account deficit will be only partially covered by capital inflows

due to political uncertainties related to parliamentary elections and the introduction of changes to constitution.

> **Ukraine has experienced significant changes in its structure of fuel consumption. There was a clear trend towards a diminishing role for both oil and coal as energy resources, which were substituted by gas.**

As a result, there may be depreciation pressures on the exchange rate during the year. In fact, due to weaker exports at the end of 2005, the foreign exchange market has experienced a shortage of foreign currency since the beginning of 2006, causing the NBU to sell its international reserves. At the same time, the NBU has enough reserves (about USD 19.3 billion at the end of 2005) to keep the exchange rate unchanged at least in the first half of the year in order to contain pressures on inflation and exchange rate generated by political and gas issue uncertainties. However, we believe the exchange rate will be allowed to gradually depreciate to 5.2 UAH/USD to avoid possible abrupt drop in the central bank's international reserves.

The microeconomic implications of a gas price shock

Over the last 15 years, Ukraine has experienced significant changes in its structure of fuel consumption. There was a clear trend towards a diminishing role for both oil and coal as energy resources, which were substituted

by gas. Currently, Ukraine consumes around 76 billion m^3 of natural gas, which constitutes almost 40% of the country's total fuel consumption, while in 1990 this share did not exceed 28%. These changes were induced by low prices for gas, which was imported under the special preferential arrangements. Since gas can be substituted relatively easily by other types of fuel and vice versa, some significant changes occurred in the Ukrainian economy over that period of time. More precisely, many sectors of the economy started to increase their exposure to gas and equipped themselves with the respective technology and machinery.

The geographical breakdown of gas consumption suggests that Ukraine is highly dependent on its imported gas, since only around 20 billion m^3 is produced domestically. Around 36 billion m^3 is imported from Turkmenistan and around 25 billion m^3 from Russia. Given that the gas dependency ratio for the Ukrainian economy from imported gas is high at around 73%[11], any increase in prices for gas will have a significant effect on enterprises. These microeconomic effects will be split between different sectors of the economy due to differences in their individual exposures to gas dependency.

The current structure of the gas consumption in the country suggests that the most gas consuming sector is the industrial sector, whose annual total demand for gas is estimated at 55 billion m^3 or 72% of the country's total consumption of gas.[12] The second largest sector is transportation, whose share in gas consumption does not exceed 8%. Therefore, the industrial sector is the most sensitive to any changes in gas prices.

Within the industrial sector there are three sub-sectors that are the most dependent on gas consumption: (i) metallurgy, (ii) machinery, and (iii) chemicals.

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[11] Calculated as a share of imported gas to the total country's gas consumption and does not reflect any export of gas, although it can exist.
[12] Statistical Yearbook of Ukraine, 2004.— State Statistic Committee of Ukraine.

Metallurgy. The industrial sector of the Ukrainian economy consumes about half of all the energy consumed. Metallurgy (iron and steel production) is the most important component of industry at present. Its link with energy resources is two-fold. First, it uses coke coal (which is about one half of total production of coal) as an input (90% of domestic coke coal goes into this sector). Second, it consumes around 80% of gas used in

The current increase in gas prices by around 45% will lead to an increase in the share of gas cost in total production costs, and, correspondingly, to an increase in total production costs. Assuming that the market prices for metallurgical products remain unchanged, Ukrainian metallurgists will face a significant decrease in the level of their profitability. The profitability will drop from the current 20% to 13.3%–15.5%.

in the prices of inputs, particularly steel, as a result of higher gas prices. It should be expected that in the long run, companies from this sector will be implementing investments to improve their efficiency, including energy conservation technologies.

Chemicals. The share of gas in the total structure of production costs in chemicals is the highest compared to other industrial sectors. By different estimates, its average level in non- fertilizer production is up to 50%. Moreover, in fertilizer production this share jumps to 70%.

Decrease in metallurgical companies' profitability after the gas price shock

Share of gas in total production costs of the companies before the price increase	Increase in total costs of production after the gas price increase	Average profitability of metallurgical companies after the gas price increase
10%	4.5%	15.5%
15%	6.8%	13.3%

the industrial sector[13]. The Ukrainian metallurgical sector had benefited from the low prices of gas and was able to show average profitability in 2003-2004 of around 20%.[14] This level of profitability is significantly lower than the average shown by international steel producers. For instance, even in 2003, when metal prices were considerably lower than their current level, the profitability of hot rolled coil was 14.2%. In 2004, when metal prices started to grow significantly, it reached 41.4%, and 52.4% in 2005.[15]

Due to the low quality and imperfect technology of the existing production facilities in the metallurgical sector, the share of the gas cost in the total structure of production costs is high. By different estimates it varies from 10% to 15% depending on the type of production compared with 3% to 7% in EU countries.[16]

The expected drop in the profitability level is not critical and should not significantly affect the behavior of the Ukrainian metallurgical companies in the short run. However, in the long run companies from this sector will be needed to introduce new technologies with a significantly higher level of efficiency in terms of gas utilization. In fact, while about 95% of steel production in the world utilizes the more efficient continuous casting process, only 27% of steel making is based on this technology in Ukraine. This percentage is even lower than the 50% achieved in Russia.

Machinery. The cost of gas in the Ukrainian machinery sector does not exceed 5% of the total costs of production.[17] Therefore, the increase in gas price should not lead to significant immediate changes in the country's ma-

The chemical sector greatly benefited from cheap gas, which made it highly competitive on the world market. In 2003-2004, around 90% of Ukrainian chemicals production was exported. Therefore, within Ukrainian industry, the chemical sector is the most sensitive to any changes in gas prices due to the significant share of gas costs in the total costs of production.

The increase in gas prices will be quite damaging for the Ukrainian chemical sector. However, it will not destroy it, especially if the urgent supportive measures in this sector are introduced. Due to differences in profitability within the industry, which varies from 25% in non-fertilizer production to almost 50% in fertilizer production, and different dependency on the gas, it could be expected that the price shock will also differ within this sector. While fertilizer producers will be able to make a 18.5% profit, the non-fertilizer producing companies will be able to make 7.5%. However, the increase in world prices for chemicals of around 9.3% projected for 2006 could partially eliminate the negative consequences of the gas price increase.[18]

[13] "The Major Problems of Development of the Coal Sector and the Donbass Region", 2003. — Report of a Group of Ukrainian experts for the World Bank.
[14] Own estimates.
[15] See for more details Global Iron & Steel Plant Information & Sector Forecasts at www.steelonthenet.com.
[16] See for more details www.metall.com.
[17] Own estimates based on industry expert views.
[18] Own calculations based on projections of Farm & Ranch Guide 2006.

Decrease in chemical companies' profitability after the gas price shock

Type of products	Profitability before price shock	Share of gas in total production costs of the companies before the price increase	Increase in total costs of production after the gas price increase	Average profitability after the gas price increase
Fertilizer	50%	70%	31.5%	18.5%
Non- fertilizer	30%	50%	22.5%	7.5%

chinery. However, this industry will be affected indirectly by the increases

The Ukrainian chemical sector is in a clear need of changes in their tech-

nology to those oriented toward more efficient gas conservation. In order to avoid damaging consequences of the introduced price shock, the corresponding measures in this sector should be implemented immediately.

Indirect effect. The increase in prices for gas should lead to a substitution of gas by other energy sources. At the same time, increasing demand for alternative energy resources will be reflected in the increasing prices for them. Therefore, the increase in gas prices will have a spillover effect on other sectors of the economy, which are not directly related to gas consumption. ∎

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[19] We assume that the quantity and price for Turkmen gas declared by the state officials will be unchanged during 2006 and the gas will be imported in equal quantities per each half-year. Hence, the average price of USD 55 per 1,000 m^3 is obtained as the simple average of prices in the first half of the year (USD 50 per 1,000 m^3) and the second half (USD 60 per 1,000 m^3).

[20] Total amount of imported gas in 2005 was 61 billion m^3 while the required amount was about 56 billion m^3, hence Ukraine was able to export about 5 billion m^3 of its own gas. In 2006 Ukraine's import of gas will amount to 56 billion m^3 and according to the contracts will not have the right to re-export.

[21] To get 22 billion m^3 of gas, Ukraine has to "pay" additional 13.2 billion m^3, which is exactly 37.5% of total imported gas from Turkmenistan under the separate contract (37.5%*35.2 billion m^3 = 13.2 billion m^3).

[22] In other words, the price of Turkmen gas at Ukrainian border was about USD 75 per 1,000 m^3.

[23] An approximate distance, which is estimated based on previous agreement with Russia. According to that agreement Ukraine transited about 130 billion m^3 and "paid" for the transit 25 billion m^3. Under this barter agreement, the price of Russian gas was USD 50 per 1,000 m^3 while the transit fee was USD 1.09 per 1,000 m^3 per 100 km. At the same time, according to the attachment #4 to the contract between Naftogaz and Gazprom signed in August 2004, Ukraine received an advanced payment of USD 1.25 billion for future transit. This amount would have been equally distributed (USD 250 million) per each five years of contract enforcement (2005–2009). As a result, the approximate distance of approximately 1060 km is obtained from (USD 50 * 25 + USD 250) / (USD 1.09 * * 130).

[24] According to the Cabinet of Ministries Decree *On approval of the forecasted gas balance for Ukraine in 2005 as of 16 December 2004.*

ANNEX 1. GAS PRICE INCREASE CALCULATIONS

Assumptions

Due to the lack of publicly available information, for the purpose of this analysis we assume: (i) the price of the imported gas under the arrangement between Russia and Ukraine will be unchanged during 2006–2007 at USD 95 per 1,000 m^3; (ii) Ukraine will receive 22 billion m^3 of Turkmen gas under the separate contract at an average price of USD 55 per 1,000 m^3;[19] (iii) the amount of gas will be delivered in equal quantities per each half-year under both deals; and (iv) Ukraine will be unable to export any amount of gas in 2006[20].

We differentiate "gross" increase in imported gas prices, i.e. not including the increase in transit fee for gas transported through the territory of Ukraine, and "net" increase in imported gas prices, i.e. including the increase in transportation fee and change in the Ukrainian gas exports.

Calculations

The average price of imported gas in 2006 will be around USD 92.5 per 1,000 m^3:

Payments in accordance with the Russian deal:	USD 95 per 1,000 m^3 * 34 billion m^3 = USD 3,230 million
Payments for Central Asian gas (separate contract):	USD 55 per 1,000 m^3 * 22 billion + USD 55 per 1,000 m^3 * * 13.2 billion m^3 [21] = USD 1,940 million
Total payment for imported gas:	USD 5,170 million
Total amount of imported gas to Ukraine:	56 billion m^3

The average price of imported gas in 2005 was USD 64.8 per 1,000 m^3:

Payment for Turkmen gas:	36 billion m^3 * USD 47 per 1,000 m^3 + 21.6 billion m^3 (payment for transit) * USD 47 per 1,000 m^3 [22] = = USD 2,707 million
Payment for Russian gas:	25 billion m^3 * USD 50 per 1,000 m3 = USD 1,250 million
Total payment for imported gas:	USD 3,960 million
Total amount of imported gas to Ukraine:	61 billion m^3

Hence, the "gross" increase in the price of imported gas since 2006 constitutes around 42.5%.

Transit fee payments in 2006:	(USD 1.6 per 1,000 m^3 per 100 km) * 121 billion m^3 * * 1060 km[23] = USD 2,050 million
"Net" cost of imported gas to Ukraine in 2006:	USD 5,170 - USD 2,050 = USD 3,120 billion.

In 2005, the cost of the gas imports from Russia was totally offset by transit fees. No additional cost to Ukraine was incurred for the Russian gas. Therefore in 2005, Ukraine had to pay only for the 36 billion of gas imported from CA. At the same time, Ukraine exported about 5 billion m^3 of gas in 2005.[24] It looks reasonable to assume that the price was comparable to the average European gas price in 2005 (USD 150-200 per 1,000 m^3). However, according to preliminary data released by the State Statistics Committee of Ukraine, natural gas exports amounted to about USD 350 million for January–November 2005. The released data is very preliminary and the actual amount of gas exports in 2005 may reach USD 500 million.

"Net" cost of imported gas to Ukraine in 2005:	USD 2,707 million (payment for Turkmen gas, see above calculations) - USD 500 million = USD 2,207 million.
Total amount of gas consumed in 2005 and 2006:	56 billion m^3.

Hence, the "net" increase in the price of imported gas since 2006 constitutes around 41%.