



The Fiscal Management of Natural Resource Revenues in a Developing Country Setting

(or How to Design a Fiscal Rule If You Are Not Norway)

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The exhaustibility and volatility of natural resource revenues pose well-known economic challenges, of which those facing oil producers are the most prominent. If oil revenues represent an important share of export earnings and of government revenues, then they can be part of overheating during booms and costly adjustments during downturns, making fiscal policy exacerbate volatility.¹ At the same time, considerations of intergenerational equity suggest that fiscal policy should also preserve part of current oil revenues for future generations. To address both of these challenges, resource-rich countries commonly establish commodity funds, into which part of their resource-linked revenues are deposited and invested in income-generating assets (usually offshore financial assets). A key question in designing such funds is what share of current revenues should be spent and what share saved. Based on recent advisory services offered to the Ministry of Economy and Trade in Kazakhstan, this note summarizes one possible approach, aiming to provide rule-based anchors for sustainable fiscal policy in an oil-producing country. This approach applies traditional permanent-income and debt-sustainability frameworks, but adapts the resulting recommendations to the institutional context of the country.

When thinking about commodity funds and the fiscal management of natural resource revenues in developing countries, two principles should be applied: first, articulate a clear, methodological approach encompassing and distinguishing between the stabilizing and the saving functions of the fund. Second, take into account the institutional setting, for example, building on credibility accumulated under existing rules, promoting transparency, and respecting government capacity constraints. This note first outlines certain good-practice principles underlying rules-based fiscal approaches to managing natural resource revenues. Based on these principles, this note proposes an approach to determining a nooil deficit rule, using Kazakhstan as a case study, and simulates the impacts within a medium-term fiscal framework. The concluding section provides general lessons for policy practitioners and advisors.

Rule-Based Approaches to Fiscal Policy

Rule-based fiscal frameworks voluntarily commit governments to placing constraints on discretionary fiscal policy, typically through numerical limits on key fiscal parameters. These may include deficit rules, debt rules, expenditure rules, and

revenue rules. Such rules increase predictability and reduce the risk of profligacy in response to electoral or other pressures, especially during boom periods. While fiscal rules have been established in many countries, Chile and Norway are good examples of fiscal rules specifically designed to stabilize fiscal policy in the context of commodity revenues.

Making rules to govern the fiscal management of commodity revenues is complicated by the fact that these rules not only need to pursue the goals of good economic management (for example, consistent with monetary policy, debt sustainability, and aggregate demand management), but beyond this must reflect the fact that commodity revenues are conceptually to be considered as “financing” as opposed to “current revenue.” It is imperative to invest part of these, and therefore to define a suitable level of consumption out of these financing flows. Reflecting these dual concerns, consistent fiscal frameworks may comprise both fiscal rules (as in nonresource settings) and commodity fund rules. Overall, good practice for any framework of rule-based fiscal management of natural resource economies should respect *four key principles*:

- i. Saving: setting aside sufficient resources to protect the welfare of current and future generations.
- ii. Stabilization: managing the volatility associated with natural resource flows, including, most importantly, price fluctuations.
- iii. Transparency: reliably informing stakeholders of the use of resources and enabling them to evaluate whether rules are being applied.
- iv. Credibility: using rules that market participants (for example, bondholders) believe will be adhered to and thus increase the level of certainty about macroeconomic policy.

There are tradeoffs between these principles; no formula-based approach and/or institution will be perfect. For example, structural deficit calculations may aid stabilization, but are technically more complex and therefore may reduce transparency. As a further example, the high saving rates needed to meet equity objectives may be politically difficult to sustain and therefore lack credibility. Solid

institutional foundations (such as legislation, the use of expert panels, and clear accountability for adherence to fiscal rules) may mitigate these tradeoffs and are important for this reason.

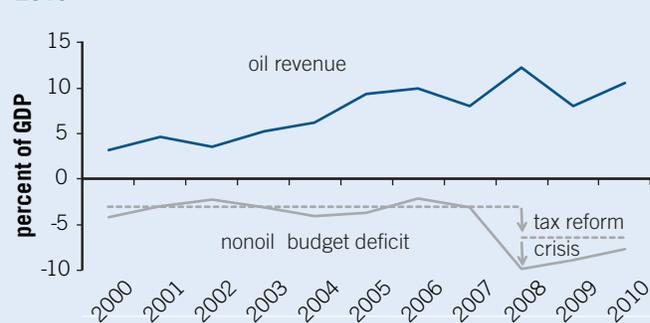
Case Study: The Fiscal Management of Oil Revenues in Kazakhstan

Existing arrangements

Kazakhstan has the Caspian region’s largest recoverable crude oil reserves, with production of roughly 1.7 million barrels per day and proven reserves of about 40 billion barrels. The economy is reliant on extractive industries, which account for more than one-third of gross domestic product (GDP) and over half of export revenues. Oil-related tax and nontax revenues in turn account for about half of government revenues. In an effort to reduce exposure to volatility in global commodity prices, the National Fund of the Republic of Kazakhstan (NFRK) was established in 2000 to serve both a saving and a stabilization function.

Fiscal management in Kazakhstan during 2000–2010 was disciplined overall. Public spending was stable at an average of about 22 percent of GDP for most of the period leading up to 2008, with the nonoil deficit averaging roughly 3 percent of GDP, despite increased inflows of oil revenues over 2000–2007 (figure 1). Savings in the NFRK had reached US\$27 billion (21 percent of GDP) by end 2008. This strong reserve position then allowed for a countercyclical response to the 2008 global crisis, which hit Kazakhstan through insolvency problems in the banking sector.² As a result of a decline in nonoil revenue

Figure 1. Oil Revenue and Nonoil Budget Deficit, 2000–2010



Source: Authors' illustration.

and a discretionary expansion of expenditure on an anticrisis program, the nonoil deficit widened to more than 10 percent of GDP (financed largely with transfers from the NFRK). A tax reform that decreased corporate income tax and unified investment credit schemes also contributed to the revenue decline; nonoil revenue is therefore expected to remain below precrisis levels even as the economy recovers.

The fiscal management of oil revenues in Kazakhstan is currently governed by a set of rules adopted by presidential decree in April 2010. These rules include:

- A fixed annual guaranteed transfer to the budget of US\$8 billion.
- A minimum NFRK balance of 20 percent of projected GDP at end of the respective fiscal year.
- Public debt service (interest) not to exceed 4.5 percent of imputed fixed investment return on the fund.
- Average cost of service and repayment of public debt over 10-year period not to exceed 15 percent of total budget receipts, including cash transfer from the NFRK.
- No off-budget financing, that is, no guarantees or lending for domestic investment.

These rules restored discipline in the use of oil revenues in the wake of the financial crisis, but their fiscal properties can still be improved. The existing framework is structured around the fixed nominal annuity (US\$8 billion) transferred on budget, with all oil-related government revenue exceeding this saved in the NFRK. The narrow focus on transfers into the fund and the resulting fund balances can be inconsistent with the fund's savings function because it may overlook situations in which accumulation in the fund is paid for by net government borrowing—this has in fact happened in recent years. Accumulating assets in this way in the NFRK, while simultaneously increasing

debt, is likely to be a costly strategy, in particular when spreads between the government's lending and borrowing rates become significant.

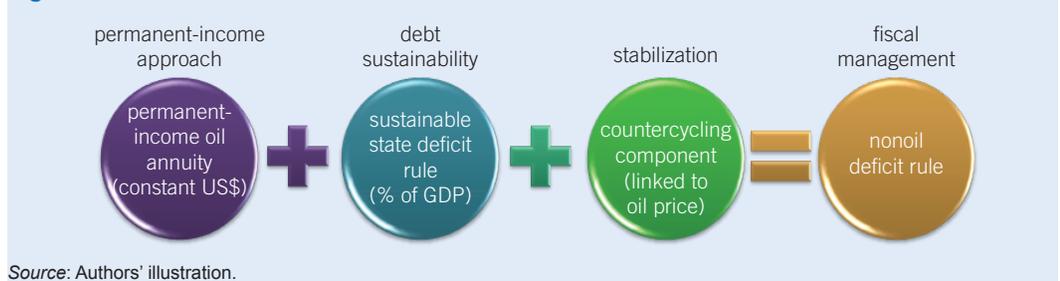
A fiscal framework for Kazakhstan: conceptual approach

Widening the focus of the fiscal rules' regime to include government saving (or dissaving) beyond the oil fund itself is a high priority. A more comprehensive measure to assess the underlying position and sustainability of fiscal policies in oil-producing countries is the so-called "nonoil deficit."³ Anchoring fiscal policies in a target for the nonoil deficit, however financed, ensures a focus on net public savings and the trajectory of government net worth; the main elements of this approach are summarized in figure 2. The rule combines an annuity-based oil revenue transfer with a state deficit target and countercyclical component linked to the oil price. An intergenerationally equitable approach to consuming natural resource wealth is typically constructed using a permanent-income method to translate the total value of the asset into an annuity in constant dollar terms.⁴ At the same time, the trajectory of overall government net worth may be set through a rule for the state deficit—the nonoil deficit minus transfers to NFRK—consistent with a desired, sustainable level of public debt. This ensures that over the long term, oil-financed expenditures and asset accumulation paths converge to sustainable levels, for any given set of underlying assumptions.

Applying the permanent-income approach to generate an oil annuity

Calibrating sustainable consumption expenditure thresholds from a natural resource asset implies seeking a rule that makes a justifiable tradeoff between welfare in current and future periods. One way that has been suggested to think about this problem is to calculate the present value of

Figure 2. Fiscal Rule Architecture



Source: Authors' illustration.

total (proven) oil reserves and spend (consume) only the annuity value of this asset, leaving the real financial value of the asset constant over time. Extraction of oil is then simply viewed as a portfolio transaction, converting the oil asset into financial assets. In estimating thresholds, two components are taken into consideration: (i) the expected real return on financial assets already accumulated (the balance of the NFRK) and (ii) the expected real return on the present value of future oil revenue (the discounted future revenue stream). The following formula is applied:

$$T_{t+1} = r \times \left[F_t + \sum_0^1 \frac{R_{t+1+i}}{(1+r)^i} \right]$$

T_{t+1}
 r
 \times
 F_t
 $+$
 $\sum_0^1 \frac{R_{t+1+i}}{(1+r)^i}$

budget transfer
real rate of return
NFRK balance
net present value of future oil revenues

where T denotes the expenditure (budgetary transfer) in period $t+1$, r denotes the expected real rate of return (interest), F denotes the balance in the NFRK for period t , and R denotes the oil revenue proceeds in period t .

Estimating thresholds requires assumptions about the volume of reserves, their price and extraction profile over time, the discount rate, and the (risk-free) rate of return on financial assets. For this analysis, the assumptions in table 1 were applied.

A range of annuity values of Kazakhstan's oil stock computed with the permanent-income-based approach is shown in table 1, and figure 3 provides a graphical interpretation of this approach for Kazakhstan's actual projected oil

revenue profile over time. Under the base case assumption for oil reserves (which uses estimates of the main industry participants), and using the approximate mean Brent crude price from 1970–2010 and a 3 percent long-run financial rate of return, the implied annuity value is about US\$8.431 billion.⁵ An initial conclusion of the analysis is therefore that the US\$8 billion rule currently used by Kazakhstan to govern transfers from NFRK to the budget is set at a level that is broadly consistent with the permanent-income approach to intergenerational equity.

Applying a debt-sustainability approach to the state deficit

The second element of the deficit rule is a constraint on the state deficit that would be financed by additional public debt. Government may want to borrow for a number of reasons, including to allow financial markets to benefit from having available a relatively safe and liquid tenge-denominated asset as well as to establish market confidence and credit ratings, which will benefit the government in the long run.⁶ Such borrowing, while affecting the net worth of the government, is consistent with long-term fiscal sustainability as long as the growth of the nonoil economy exceeds the interest paid on government debt (debt sustainability). A solution to this should logically focus on the state deficit as a percentage of GDP.

A simple way of understanding the approach is to think of the debt sustainability of the country if it did not have any natural resource endow-

Table 1. Base Case Assumptions for the Analysis of Oil Revenues

Variable	Assumption	Rationale
Proven reserves	40 billion barrels	BP Statistical Review of World Energy 2010 ^a (low case is based on historical value for proven reserves in 2000)
Long-term price of oil	US\$40/barrel	Mean oil price of last 40 years (high case is based on mean oil price plus half standard deviation)
Effective rate of taxation	30%	Current effective tax rate
Real rate of return	3%	Current interest rate on 30 years U.S. treasury bonds (used as risk-adjusted rate of return)

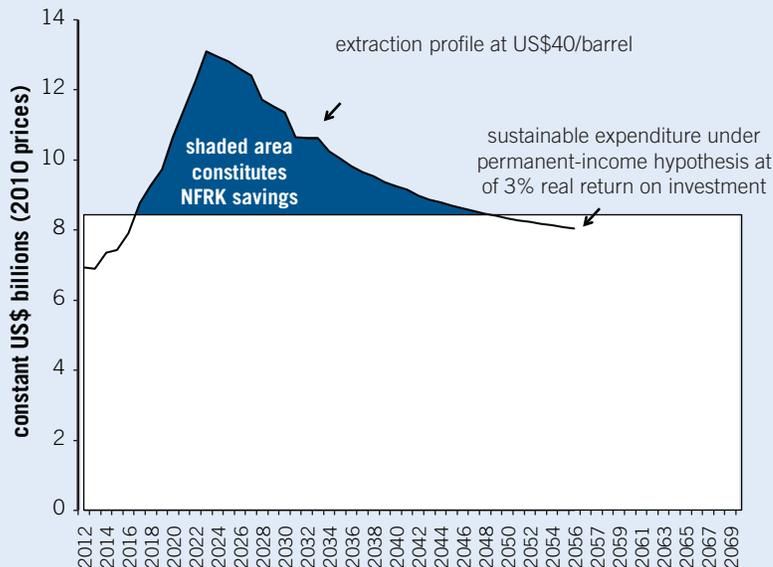
Source: Authors compilation.
a. www.bp.com.

Table 2. Permanent-Income-Based Annuity Values of Oil

Oil reserves		Oil price (US\$)	Rate of return 3.00% (US\$)	Rate of return 4.50% (US\$)
Low case	3.4 billion T	40	6,306	8,140
	(25.5 billion barrels)	60	8,927	11,413
Base case	5.6 billion T	40	8,435	10,022
	(41.9 billion barrels)	60	12,121	14,236

Source: Authors' compilation.
Note: T = budgetary transfer.

Figure 3. Permanent-Income-Based Annuity and Projected Revenue Profile for Kazakhstan



Source: Authors' illustration.

ments. Resource endowments are then considered separately, through a lens of intergenerational equity.

Constructing a simple countercyclical component

One potential disadvantage of deficit rule approaches is that by constraining fiscal expansion regardless of the economic cycle, they may induce pro-cyclical fiscal policy. To overcome this limitation, the fiscal rules adopted by some countries target the structural (that is, cyclically adjusted) balance rather than the cash (or annual accrual) balance; this allows increased spending in downturns, financed through a tighter fiscal stance

during booms. An example is Chile's fiscal rule, which rather than setting a target for the actual budget surplus, targets the structural budget balance. Similarly, Norway's parliamentary budget approval process targets a structurally adjusted measure of budget balance.

While structural balance targets have desirable properties in theory, one drawback is that they can be complicated to implement. Their advantages may therefore come at a cost of reduced transparency. If they are viewed as too difficult for government to execute properly, they may also undermine credibility with markets. Strong institutions are needed for successful implementation. For example, Chile's approach uses outside,

independent expert panels to set key parameters and recommend policy to government.

Kazakhstan's business cycle is empirically closely tied to the price of oil. A simpler approach, if the government of Kazakhstan wishes to introduce greater stabilization features into fiscal management, might therefore be to tie a cyclical component of deficit spending to variations in the oil price around a long-term equilibrium oil price. Chile executes such an approach with its Copper Fund, with another external panel determining the long-term equilibrium price of copper to be used. Such a mechanism could make up for variations in Kazakhstan's nonoil revenue, which (despite the "nonoil" label) is highly correlated with the oil price.

Simulating fiscal impact

The fiscal impact of adopting a reasonably calibrated state deficit rule in Kazakhstan in conjunction with a transfer on budget of US\$8 billion in constant (2010) dollars is illustrated in figure 4. The rule that is simulated sets the state deficit to 2.5 percent of GDP, which is consistent with debt sustainability as well as with sufficiently liquid domestic debt markets—for example, bearing in mind objectives of capital market development and effective monetary policy, which are not discussed in detail here. The adoption of such a rule would still not allow any expansion of

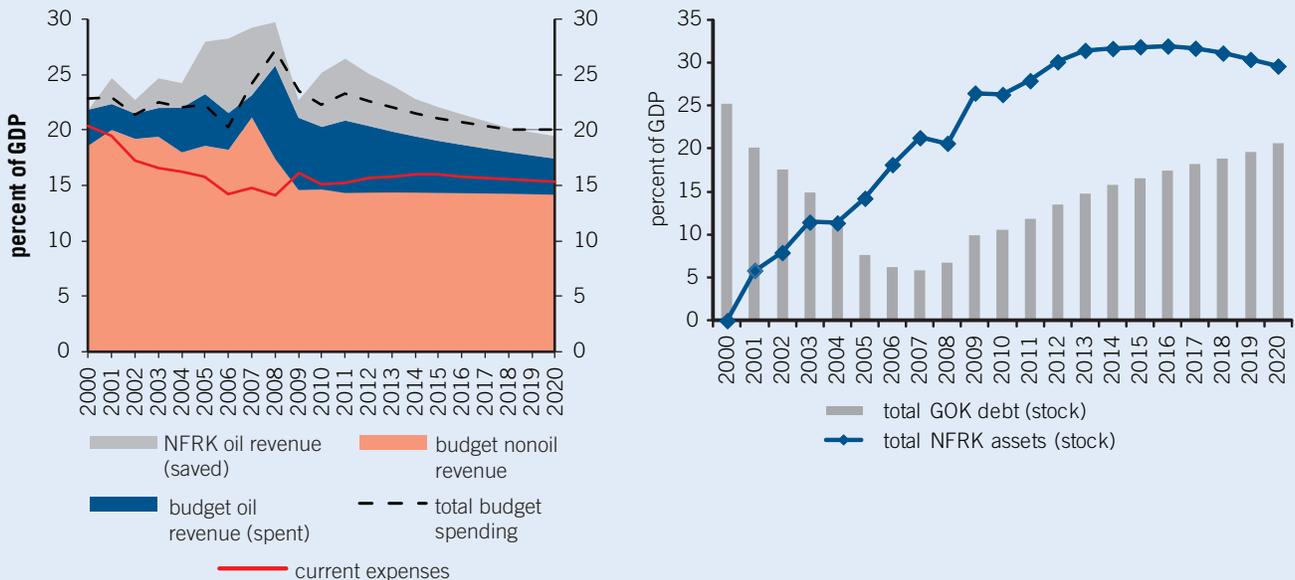
spending in the short term. This is consistent with countercyclical fiscal policy, given that the Kazakhstan economy is now well into a recovery phase, with GDP growth around 7 percent and inflation above its target band—Consumer Price Index (CPI) inflation was 8.3 percent as of May 2011. Discretionary fiscal expansion at the present time is unlikely to be growth enhancing.

A state deficit rule would encourage policy makers to focus on the suitable combined trajectories of the NFRK balance and gross public debt. Figure 4 shows these trajectories as shares of GDP under the 2.5 percent state deficit rule. For a given government revenue share, setting the state deficit is equivalent to choosing between higher NFRK balances and lower gross public debt. Under the baseline parameters for the economy and the rule as specified, the NFRK balance reaches about 30 percent of GDP by 2020, while public debt remains below a threshold of about 20 percent of GDP, consistent with international experience of prudent public debt management for a middle-income country (Reinhart, Rogoff, Savastano 2003).

Summarizing the Kazakhstan Case

One important attribute of the proposed framework for Kazakhstan is that it could build upon the country's existing set of rules. The main exist-

Figure 4. State Deficit Rule (2.5 percent of GDP)



Source: Authors' illustration.

ing feature of the oil fund management, the US\$8 billion limit on transfers to the budget (combined with no off-budget spending transfers), could be maintained. This rule is simple and transparent. And not only is its level well calibrated according to a permanent-income-based approach, but keeping the present framework in place will allow the government to build a track record of rule-based management and thus enhance credibility.

A rule governing budget transfers from the fund does not, however, govern changes in the financial net worth of the government, which also depends on (net) public debt issuance. A useful addition to the oil transfer rule (based on an annuity and therefore fixed in constant dollars) would be a rule governing the state deficit. In scenarios, a state deficit rule in the range of 2 to 3 percent of GDP had reasonable properties: more detailed analysis would be needed to underpin a firmer recommendation.

Going further, oil-based economies such as Kazakhstan tend to exhibit volatile growth as well as unpredictable government revenue. This capriciousness shows that simple approaches to rendering fiscal management more stabilizing (countercyclical) should also be considered. For Kazakhstan, one possibility is to include a deficit component in a fiscal rule, linked to variations in the oil price from an assumed long-term equilibrium. This has desirable stabilizing properties because in Kazakhstan, nonoil revenue is highly correlated with the oil price. Finally, Kazakhstan's current practice of keeping *all* transfers from the NFRK to public spending *on budget* should be fully supported.

Conclusions

Rule-based fiscal frameworks offer strong benefits to countries that are generating significant government revenue from extractive industries. As commitment devices, these frameworks can reinforce fiscally responsible economic management, contain volatility, and preserve fiscal savings for future generations. To design credible and practical fiscal rules, the following issues are important:

- First, the management of natural resource funds should be integrated into a comprehensive fiscal framework and asset/liability management system. The extent to which a fund is successful in achieving its objectives, however, depends on the overall fiscal policy

stance. Given that mineral revenue is only one element of overall government resources, and the fact that financial resources are fungible, a fund that is not anchored in a sound overall fiscal framework might simply result in “form without substance.” In the absence of liquidity constraints, the government can borrow (from domestic and external sources) or draw down other accumulated assets to increase spending, even if oil windfalls are partially accumulated in a fund. Therefore, the government should approach the use of natural resource revenues, and by extension the operation of the fund, within a fiscal framework that takes into account as comprehensively as possible all liabilities and assets, including the stock of public and quasi-public debt, commodity values in the ground, and future tax revenues.

- Second, the Kazakhstan case study gives an example of how rules should and can be adapted to institutional capacity. Countries with successful rule-based fiscal frameworks governing natural resource flows, such as Chile and Norway, have paid careful attention to the institutional design underpinning them. In addition to legislative components and quantitative rules, the use of independent expert panels to set or review key parameters is one such institutional feature. Another is that any fiscal rule will be most effective in an institutional environment that fosters transparency, for example through inclusion of reporting on rule compliance in budgetary and financial statements. A corollary is that where institutional capacity is given, and complex arrangements not be feasible or at least credible (for example, calculating and publishing a structural deficit in real time), simpler rules will perform better (for example, the suggestion to tie a countercyclical spending component to the oil price). Reflecting these issues, the approach proposed for Kazakhstan did not include strong assumptions about the extent of institutional reform in the country, but was rather designed to be implementable in Kazakhstan's existing institutional setup.
- Finally, an important ingredient for credibility of rule-based frameworks is a track record of compliance. For this reason, when existing frameworks are performing adequately, even if they do not precisely follow notions of inter-

national best practice, it may be best to look for ways of building on these frameworks by adding complementary measures, rather than altering them fundamentally.

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Notes

1. Cuddington (1989) and Sinnott (2009) both find that government revenues in commodity-dependent countries respond significantly to commodity prices, in turn inducing spending booms.
2. Note that although the oil fund was not set up with an explicit precautionary saving function, the exceptional nature of events in 2008 essentially lent it this function, as is the case whenever the rules of a fiscal framework are allowed to be relaxed in crises.
3. The following reflects Kazakhstan's usage (2010 values): the "nonoil deficit" (US\$11.2 billion) is total nonoil government revenues minus public expenditures; the "state deficit" (US\$3.2 billion) is the nonoil deficit minus all oil revenues transferred on budget. Thus, in Kazakhstan, the state deficit is that part of the nonoil deficit that must be financed by net public borrowing, while the nonoil deficit drives changes in government net worth.
4. The annuity value may be updated over time as new information is revealed, for example, about expected prices or reserves. Note also that a constant dollar transfer differs from the current rule used by Kazakhstan, which sets the transfer

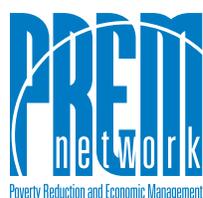
in nominal dollars (based on a three-year fixed tenge-dollar exchange rate).

5. The framework was applied assuming certainty about future government oil revenues, that is, using a discount rate equal to the assumed "risk-free" rate of return. The risk-free rate is taken to be 3 percent, consistent with long-term low-risk yields, such as the (real) return on U.S. treasury bonds (the nominal yield on 30-year treasury bonds was 4.27 percent on June 8, 2011). Allowing for uncertainty about oil revenues suggests a discount rate higher than the risk-free rate of return, which results in a rising trajectory for consumption from oil revenues, but is analytically far more complex and correspondingly less transparent as a public policy.

6. The current short supply of government securities is a significant problem for financial markets. The concern is most acute for pension funds, which would optimally hold a large share of their assets in Kazakh government securities, and are currently too exposed to various risks in their absence. Commercial banks are also in need of relatively safe liquid tenge-denominated assets; the government's borrowing program takes this need into account. This is one of the primary reasons why the size of the transfer from the NFRK will allow significant government borrowing over the medium term.

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