



# RUSSIAN FEDERATION

## SELECTED ISSUES

August 2015

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## SELECTED ISSUES

July 2, 2015

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European Department

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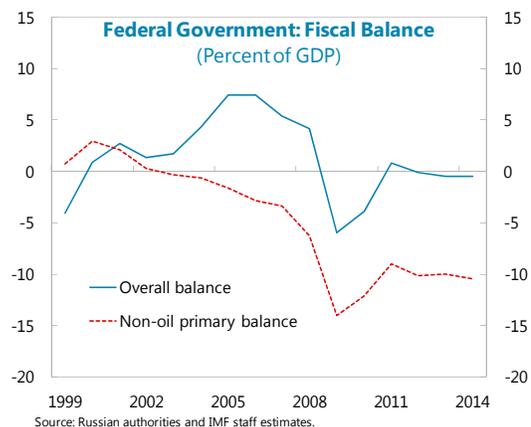
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# RUSSIA'S FISCAL FRAMEWORK AND THE OIL-PRICE SHOCK<sup>1</sup>

Resource-rich countries face two important fiscal challenges: (i) conducting a prudent fiscal policy consistent with the long-term value of their resource wealth; and (ii) managing the impact of short-term resource-revenue volatility. The recent sharp oil price decline has exacerbated these challenges. Having an appropriate fiscal framework helps to manage these challenges, reduces “Dutch disease” effects, and limits the risks of large and disruptive adjustments in the future i.e. fiscal sustainability risks. In the past, Russia has made progress in strengthening its fiscal framework, but the analysis below offers options on how to strengthen it further, noting that (i) Russia's current non-oil primary deficit is much larger than typical long-term fiscal benchmarks; (ii) changes to Russia's fiscal rule are advisable in order to generate more resource savings and adjust the fiscal balance more rapidly to lower oil prices.

## A. Introduction

1. **Russia has relied heavily on its abundant natural resource wealth to finance fiscal deficits since the global financial crisis (GFC) in 2008–09.**<sup>2, 3</sup> In particular, the federal government increased spending significantly during the GFC, mainly on public sector wages and pension benefits.<sup>4</sup> While some fiscal consolidation occurred in 2010–11, non-oil primary deficits (NOPDs) have remained large since then and have persisted despite the introduction of a fiscal rule in December 2012 (see section C).<sup>5</sup> To a large extent, this reflected the diversion of resources expected to be transferred to the Reserve Fund to offset the impact of shortfalls in non-oil revenues, privatization receipts and available financing.



<sup>1</sup> Prepared by Francois Painchaud.

<sup>2</sup> According to [British Petroleum](#), Russia ranks respectively 2<sup>nd</sup> and 8<sup>th</sup> in the world in terms of proven reserves of gas and oil. The US [Energy Information Administration](#) ranks Russia respectively, 1<sup>st</sup> and 9<sup>th</sup> in terms of proven reserves of gas and oil. For simplicity, this paper uses “oil” to mean “oil and gas”.

<sup>3</sup> For the purpose of this analysis, natural resource revenues include: exports duties on oil, gas and products manufactured from oil, as well as the Mineral Extraction Tax (MET) on oil and gas.

<sup>4</sup> The evolution of fiscal balances at the general government level was broadly similar.

<sup>5</sup> Before 2012, Russia's fiscal rule targeted a non-oil deficit of 4.7 percent of GDP, but it was suspended in 2009.

2. **This heavy reliance on revenues from exhaustible resources raises important policy questions, especially in a new environment of lower oil prices.** For example, the current large NOPD implies that possibly large and disruptive fiscal adjustments would be required in the future (once natural resources are exhausted) unless a gradual consolidation approach is adopted. It also raises concerns about intergenerational equity i.e. how much current and future generations benefit from resource wealth.

3. **In principle, short-to medium-term fiscal targets should be informed by long-term fiscal sustainability benchmarks that may reflect intergenerational equity considerations.**<sup>6, 7</sup>

For resource-rich countries, these benchmarks depend on expected resource revenues, which are based, among other things, on expected but uncertain production/extraction and prices. Therefore, the recent oil price decline, if persistent, can have a critical impact on benchmarks. Once a benchmark is determined, a well-designed fiscal rule can protect the spending path from the volatility of actual revenues while preserving sustainability. However, the fiscal rule should be flexible enough to allow the authorities to pursue counter-cyclical fiscal policy when appropriate, as long as the government has a clear and credible plan on how to return to a sustainable fiscal position over the medium term. Alternatively, depletion of precautionary savings in the short term may require more fiscal adjustments than what is prescribed by the rule in order to rebuild buffers. This highlights the need for risks analysis in the context of a credible fiscal framework, as well as periodic revisions to the fiscal rule given the uncertainty about future oil production and prices. The next two sections discuss long-term fiscal benchmarks and a menu of possible improvements to the Russian fiscal rule.

## B. Fiscal benchmarks

4. **Given Russia's abundant natural resource, its long-term fiscal benchmarks depend on estimating resource wealth and, when and how to spend it.** In turn, resource wealth depends on a number of uncertain factors including oil and gas reserves, projected rate of extraction, future oil and gas prices, exchange rate and taxation rates (see Panel 1). In addition, under the baseline, long-term real GDP growth and inflation are assumed to be respectively 1.5 percent and 4 percent (in line with the central bank's inflation target), while the discount rate used to calculate the present value of resources revenues is assumed to be roughly 7 percent.

5. **When and how to spend natural resources should depend on Russia's own social preferences and macroeconomic stability considerations.** In particular, when and how resource wealth is spent can have important consequences on the real exchange rate and the competitiveness of the non-resource export sector (Dutch disease). The current analysis focuses on

<sup>6</sup> For a detailed discussion of macroeconomic policy issues faced by resource-rich countries please see "[Macroeconomic Policy Frameworks For Resource-Rich Developing Countries](#)", IMF, August 2012. See also "[Fiscal Frameworks for Resource Rich Developing Countries](#)", IMF, May 2012.

<sup>7</sup> Other considerations could include the fiscal impact of an aging population (pensions, health and long-term care).

social preferences, as the benchmarks would lead to an improvement in the NOPD and thus improve external stability.

6. **Four fiscal benchmarks are presented to try to capture Russia's preferences in terms of intergenerational equity.** These benchmarks are calculated to satisfy the inter-temporal budget constraint of the government (see Annex 1).

- A constant NOPD as a share of GDP. This ensures a constant "perpetuity" as a share of GDP, providing the benefits of resource wealth to all future generations.
- A constant NOPD as a share of GDP for a fixed period of time. This "annuity" allows for larger NOPDs (during the annuity period) compared to a perpetuity. However, all the resource wealth is exhausted by the end of the annuity period. For this exercise, the annuity is assumed to last for 50 years. However, depleting resource wealth over time may not be consistent with the objectives of the National Wealth Fund, which is intended to support the pension system, unless the pension system undergoes a substantial reform to insure its sustainability.
- A constant real NOPD over time. Given that real GDP is expected to grow over time, a nominal perpetuity implies that more "real" resources are provided to future generations despite that they are expected to be better off as real GDP grows. An alternative is to calculate a "real" perpetuity, keeping the real transfer of resources constant over time. This initially allows for larger NOPDs compared to a nominal perpetuity. However, under a real perpetuity, the NOPDs (as a percentage of GDP) declines steadily over time and thus countries adopting this approach need to be comfortable with a diminishing role of the public sector in the economy.
- A constant real NOPD for a fixed period of time. This assumes a constant real transfer of resources but only for a fixed period of time (real annuity), after which all resource wealth is exhausted. This allows for larger NOPDs compared to a real perpetuity over the annuity period.

7. **All the fiscal benchmarks point to a need for fiscal consolidation in order to safeguard intergenerational equity** (Panel 2).

- A nominal perpetuity (constant NOPD) of 2.5 percent of GDP starting in 2015 is consistent with the estimated natural resource wealth as of end-2014. However, the projected NOPDs through 2020 are inconsistent with this fiscal benchmark, leading to a lower-than-required accumulation of wealth to maintain this benchmark. Delaying the fiscal adjustment until 2020 (while depleting wealth) results in a lower nominal perpetuity (about 1.8 percent of GDP) starting in 2021.
- A nominal annuity of 4.8 percent of GDP (lasting for 50 years) is consistent with the end-2014 estimated wealth. Again, however, the projected NOPDs through 2020 are

inconsistent with this fiscal benchmark. Delaying the fiscal adjustment leads to a reduction of the annuity to 3.4 percent of GDP starting in 2021.

- A real perpetuity of 5.0 percent of GDP in 2015 (slowly declining thereafter) is achievable based on the estimated wealth as of end-2014. Delaying the fiscal adjustment results in a lower real perpetuity (about 3.6 percent of GDP) starting in 2021.
- A real annuity of 6.5 percent of GDP in 2015 is consistent with end-2014 wealth, but would decline gradually over time. Again, delaying fiscal adjustment would reduce the annuity to about 4.6 percent of GDP starting in 2021.

8. **The need for fiscal consolidation is robust to different macroeconomic assumptions** (Panel 3). This holds for different assumptions for real GDP growth, the discount rate, and oil prices. For example, assuming lower oil prices than under the baseline would reduce the nominal perpetuity to 1.4 percent of GDP starting in 2021, compared to 1.8 percent of GDP under baseline. However, higher oil prices, would increase the nominal perpetuity to about 2.2 percent of GDP. Higher/lower oil prices have a greater impact on annuities as their impact is distributed over a fixed period of time.

### C. Fiscal Rule

9. **The broad principles governing the Russian fiscal rule are appropriate.** Under the fiscal rule, federal expenditures are capped ex ante at the sum of projected non-oil revenues, oil revenues at a benchmark price (in USD) converted to ruble, and net financing of one percent of GDP. Although it may not be consistent with the long-term benchmarks presented in the previous section, the Russian rule appropriately includes a fiscal anchor, which is a maximum “structural” deficit of 1 percent of GDP (defined as the fiscal balance excluding the cyclical component of resource revenues). In addition, the use of an oil-price benchmark appropriately delinks expenditures from externally-driven volatility in commodity prices. Finally, the rule provides a simple framework for saving (drawing down) oil resources when the actual oil price is higher (lower) than the oil price benchmark.<sup>8</sup>

10. **However, the Russian fiscal rule could be improved.** In particular, two operational aspects of the rule could be revisited: (i) the oil price benchmark; and (ii) how much savings are generated by the fiscal rule. Improvements along these two dimensions could be made without a significant reform of the principles governing the fiscal rule.

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<sup>8</sup> In principle, when current oil prices are above the benchmark price, the resulting oil savings are deposited in the oil Reserve Fund (until it reaches 7 percent of GDP), which serves as a macroeconomic stabilization fund. When current oil prices are below the benchmark price, the Reserve Fund can be tapped to help maintain expenditures and finance the deficit.

11. **The oil-price benchmark could adjust more rapidly to perceived changes in the long-term price of oil.**<sup>9</sup> Currently, the benchmark is set as the minimum of (i) a backward-looking moving average of up to ten years of Urals oil prices (USD/barrel)—a proxy for the long-term price of oil; and (ii) a three-year backward looking average, to protect the budget from excessive deficits in the event of a sustained fall in oil prices. For 2016, this would translate into an oil price benchmark of about USD90 per barrel, compared to an expected price of about USD65 per barrel for the year. Using this benchmark to calculate federal spending would lead to a significant deterioration in the fiscal balance, despite the expectation that oil prices are now permanently lower and hence there is a need for fiscal adjustment. Moreover, the impact on public finances of the slow pace of adjustment of the benchmark (in USD) would be exacerbated by the conversion to ruble using a projected exchange rate, as the ruble depreciated significantly following the drop in oil prices. Assuming that the recent oil price decline will be persistent, the pace of adjustment of the oil-price benchmark could be increased by including future oil prices in its calculation, as is done in other countries.<sup>10, 11</sup>

- Mongolia uses a 16-year moving average of mineral prices in USD: 12 years of history, the current year, and 3 years of future prices.
- Mexico uses a weighted-average of the 10-year historical average of oil prices in USD (25 percent weight), the short-term futures price in USD (50 percent weight but multiplied by a prudence factor of 0.84 determined on the basis of the standard deviation of oil prices), and medium-term futures prices in USD (25 percent weight).
- While including future prices facilitates the adjustment of the oil-price benchmark in the short term, the different rules lead to similar oil-price benchmarks in the outer-years of the projection (Panel 4). Accordingly, using different oil-price benchmarks could lead to a faster adjustment of the non-oil primary balance in the short term, but it would not affect markedly the non-oil primary balance in the long term.
- An alternative to a faster adjustment of the oil-price benchmark is to convert revenues using a different exchange rate. For example, using a three-year backward-looking average of the RUB/USD exchange rate to convert oil revenues at the benchmark price would also lead to significant fiscal consolidation in the short term. However,

<sup>9</sup> The choice of a benchmark formula represents a tradeoff between smoothing expenditures and adjusting to changes in oil prices. Typically, benchmarks based on short backward-looking averages (or including future oil prices) adjust more rapidly to changing trends but can also result in greater expenditure volatility and possibly pro-cyclical fiscal policy. In principle, fiscal policy should adjust to permanent/persistent oil price shocks and smooth-out short-term fluctuations. Hence, a higher pace of adjustment of the oil-price benchmark is desirable only if the current oil price shock proves to be permanent or persistent.

<sup>10</sup> To determine future oil prices, two approaches are possible: using oil price futures from the market or relying on an independent committee, as in the case of Chile. In practice, the former approach is more common.

<sup>11</sup> See "[Macroeconomic Policy Frameworks For Resource-Rich Developing Countries](#)", IMF, August 2012.

determining the appropriate exchange rate for conversion is complicated by the fact that (i) the ruble has not been floating until recently; (ii) the level of the exchange rate reflects a number of non-oil factors, including inflation differentials and, recently, the impact of sanctions against Russia. Furthermore, converting revenues using such an exchange rate could complicate communications with the public and markets, as the exchange rate used to convert revenues would be different than the projected one.

12. **The fiscal rule could generate more savings to safeguard intergenerational equity.** As noted above, the projected NOPDs under the current rule are larger than the long-term fiscal benchmarks, raising concerns over intergenerational equity. Generating greater savings could be done by changing the “structural” balance target implicit in the fiscal rule (excluding the cyclical component of oil revenues).<sup>12</sup> Increasing the “structural” balance target to a surplus of 1–2 percent of GDP (instead of a deficit of 1 percent of GDP) would result in non-oil primary balance broadly consistent with the fiscal benchmarks that would safeguard intergenerational equity (bottom of Panel 4). Increasing the structural balance could also allow some of the fiscal consolidation to occur via an increase in non-oil revenues.

13. **Other changes to the fiscal rule could also be considered.** First, a possible alternative is to express the current fiscal rule in terms of its minimum “structural” balance (excluding the cyclical component of oil revenues). In principle, the current fiscal rule can either be expressed as a cap on expenditures or a minimum “structural” balance (Annex 2). However, expressing the fiscal rule in terms of a minimum “structural” balance could shift the focus away from spending and toward savings. Second, the fiscal rule could usefully include a limit on spending growth. This could help contain spending, especially during periods of revenue windfalls, and limit the risks of conducting a pro-cyclical fiscal policy. A number of countries have adopted this feature in their fiscal rule, including Mexico.<sup>13</sup> A cap on spending could be introduced even if the fiscal rule were to be expressed in terms of a minimum “structural” balance. Third, the fiscal rule could be expressed in terms of the structural component of non-oil revenues (adjusting for the economic cycle) while the fiscal anchor could be expressed in percentage of potential non-oil GDP. These changes would reduce the pro-cyclicality embedded in the rule i.e. a high (low) forecast of nominal GDP growth (especially non-oil GDP) would translate into higher (lower) cap on spending, regardless of Russia’s economic cycle. Adjusting for the economic cycle is, however, more complicated and subject to great uncertainty, and cyclically adjusted balances are often revised ex post due to revisions to potential GDP. Russia would also need to start compiling data on non-oil GDP, which is currently unavailable.

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<sup>12</sup> An alternative to changing the structural balance would be to discount the benchmark price.

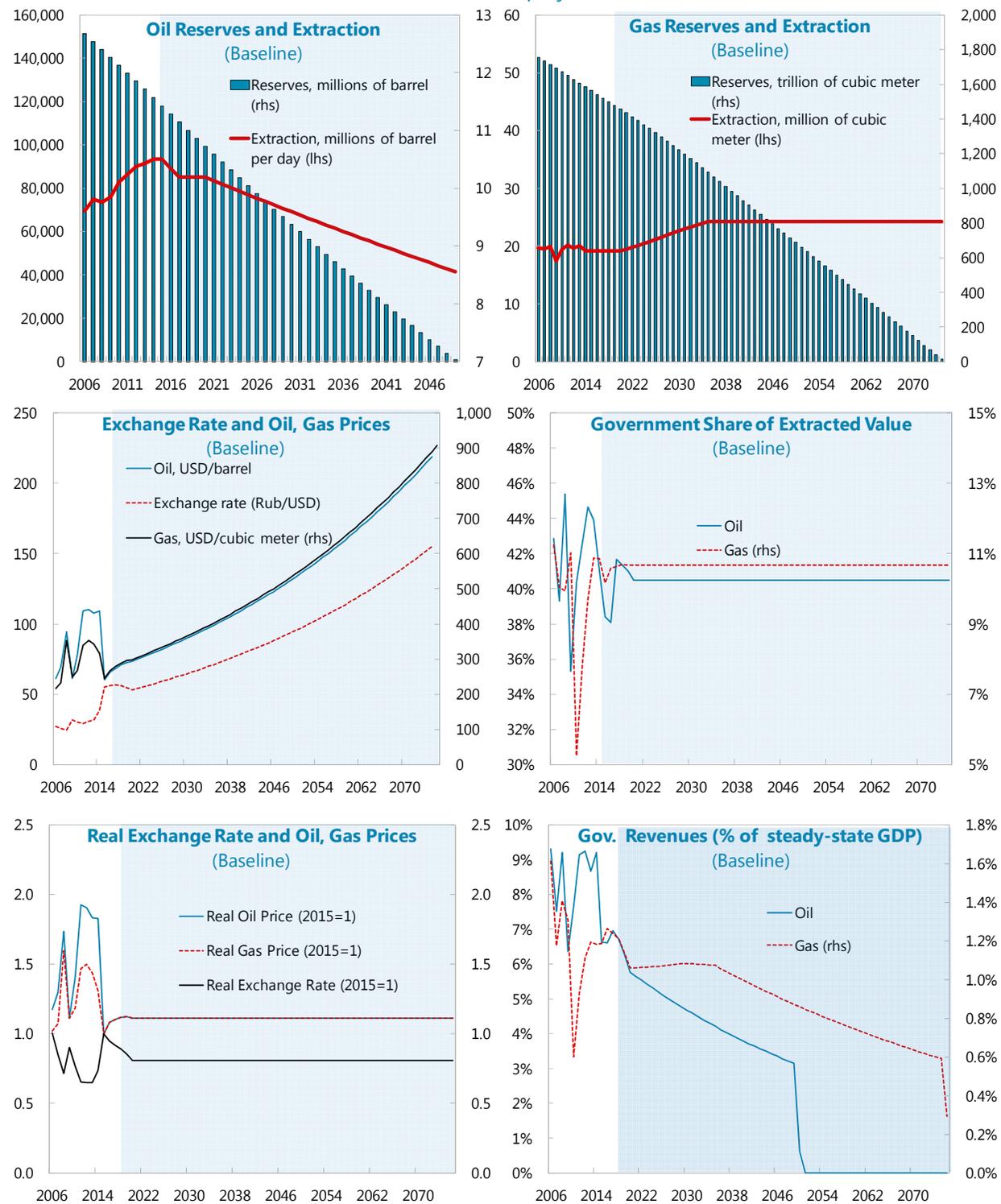
<sup>13</sup> See “[Mexico – Reforms to the Fiscal Framework](#)”, Selected Issues Paper, IMF, November 2013.

## D. Conclusion

14. **Having an appropriate fiscal framework can help resource-rich countries conduct a fiscal policy consistent with their long-term wealth and manage the impact of short-term price volatility.** It can also reduce the risks of “Dutch” disease and limit fiscal sustainability risks. In addition, the fiscal rule should be flexible enough to accommodate ongoing economic developments, subject to periodic revisions, and part of a credible fiscal framework supported by strong institutions.

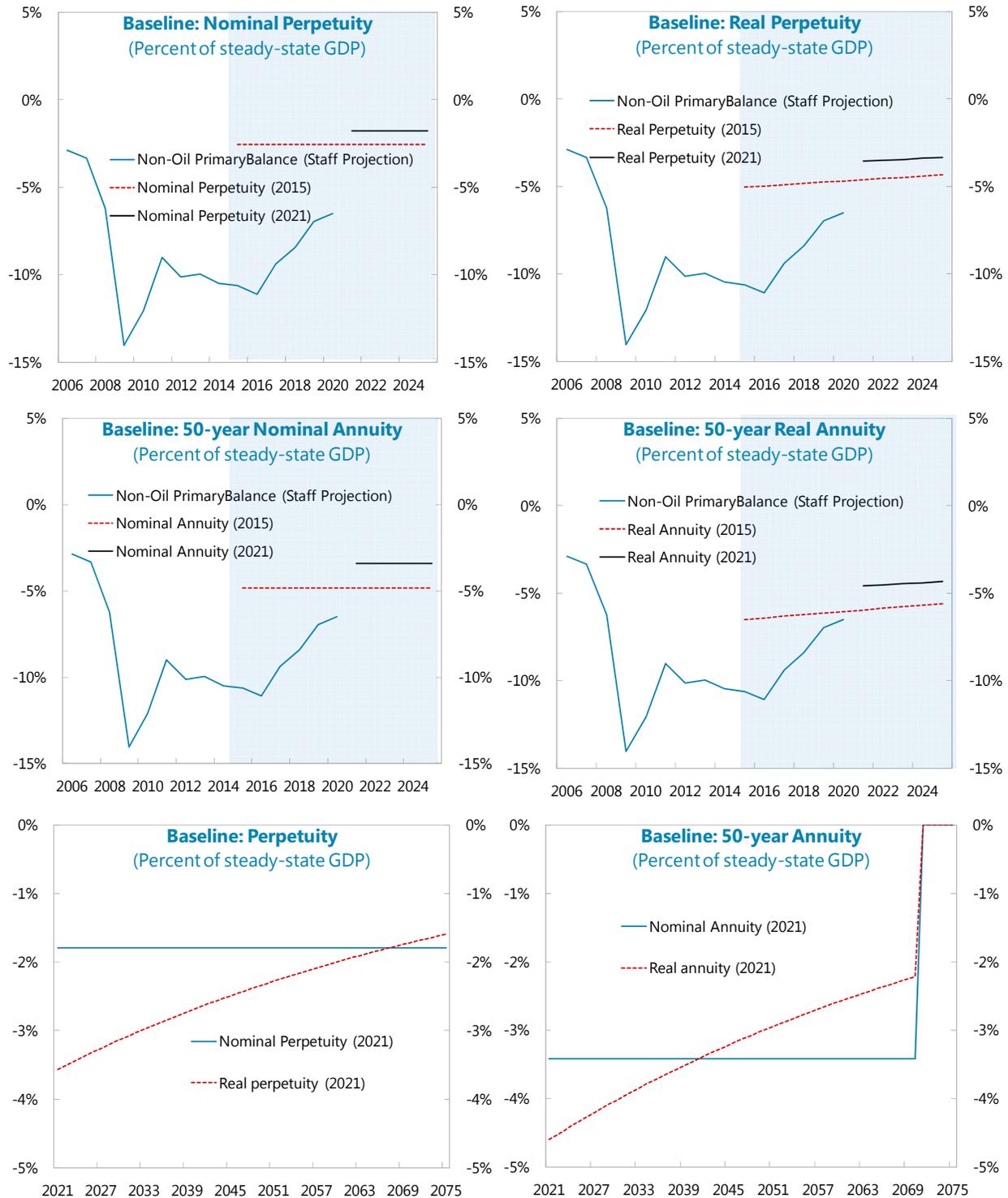
15. **While the broad principles governing the Russian fiscal rule are appropriate, the analysis above noted a menu of options to improve it.** In particular, the pace of adjustment of the oil-price benchmark could be increased by including future prices in its calculation. While converting oil revenues using a backward-looking average of the exchange rate could also lead to a more rapid fiscal adjustment, it also implies additional technical and communication challenges. In addition, the fiscal anchor could be more ambitious in order to safeguard intergenerational equity. Expressing the fiscal rule in terms of a minimum “structural” balance could promote greater savings. Moreover, including a cap on spending growth could be considered in order to avoid excessive spending when oil prices increase significantly. Finally, in order to avoid pro-cyclicality, non-oil revenues could be cyclically adjusted and expressed in terms of non-oil GDP.

**Table 1. Baseline Assumptions**  
(shaded area is projection)



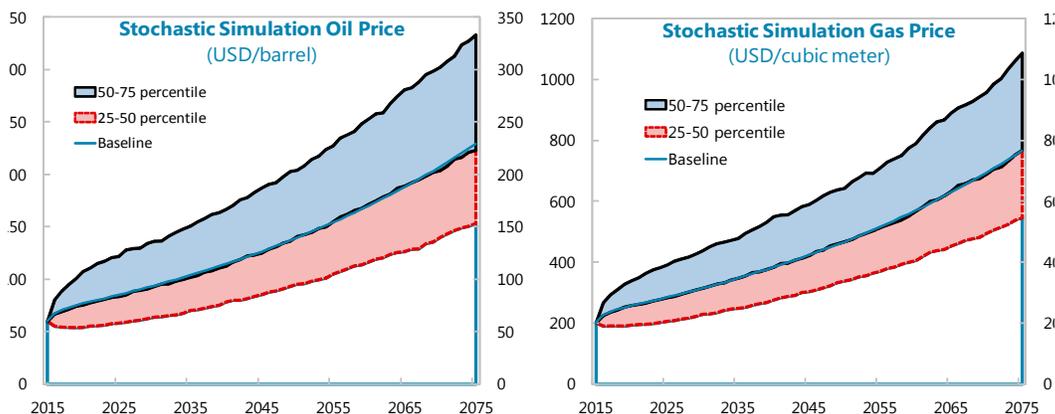
Source: IMF staff calculations

**Table 2. Baseline Results**



Source: IMF staff calculations

**Table 3. Sensitivity Analysis**

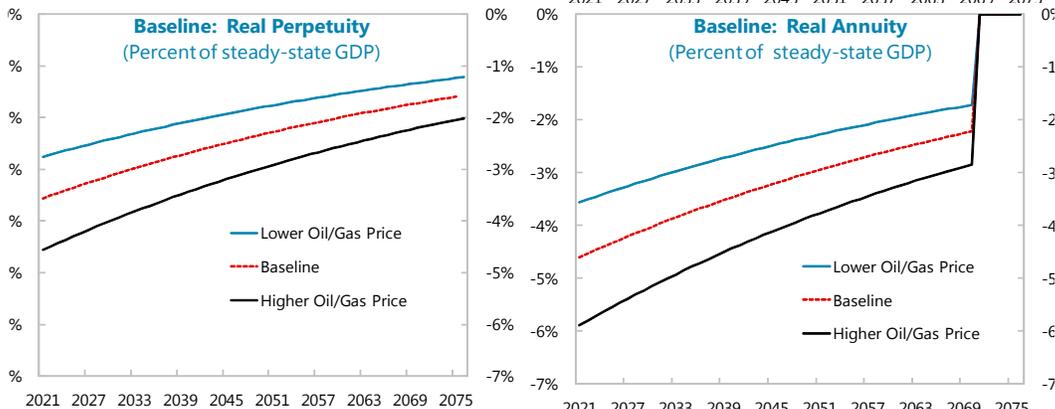
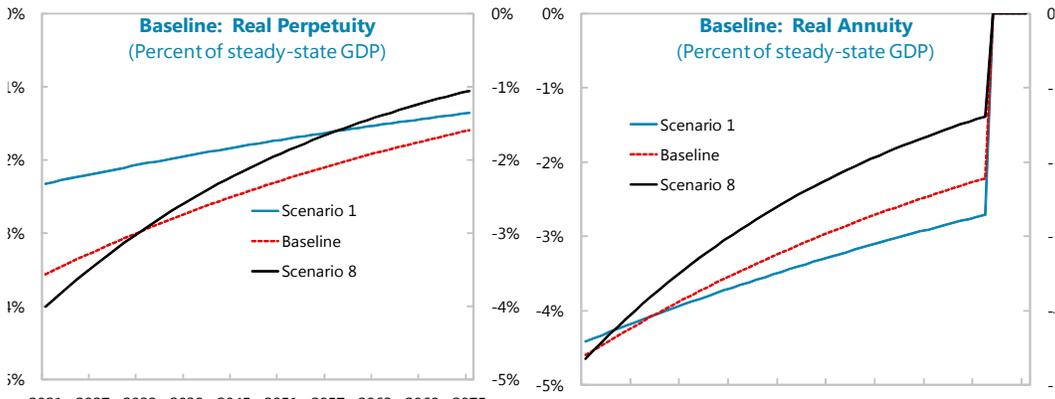


**Basic Assumptions**

	Real GDP Growth	Real Interest Rate	Inflation	Nominal interest rate	Nominal GDP Growth
Scenario 1	1.0%	1.5%	4.0%	5.6%	5.0%
Scenario 2	1.0%	2.5%	4.0%	6.6%	5.0%
Scenario 3	1.5%	2.0%	4.0%	6.1%	5.6%
<b>Baseline</b>	<b>1.5%</b>	<b>3.0%</b>	<b>4.0%</b>	<b>7.1%</b>	<b>5.6%</b>
Scenario 5	2.0%	2.5%	4.0%	6.6%	6.1%
Scenario 6	2.0%	3.5%	4.0%	7.7%	6.1%
Scenario 7	2.5%	3.0%	4.0%	7.1%	6.6%
Scenario 8	2.5%	4.0%	4.0%	8.2%	6.6%

**Nominal Perpetuity and Annuity (starting in 2021)**

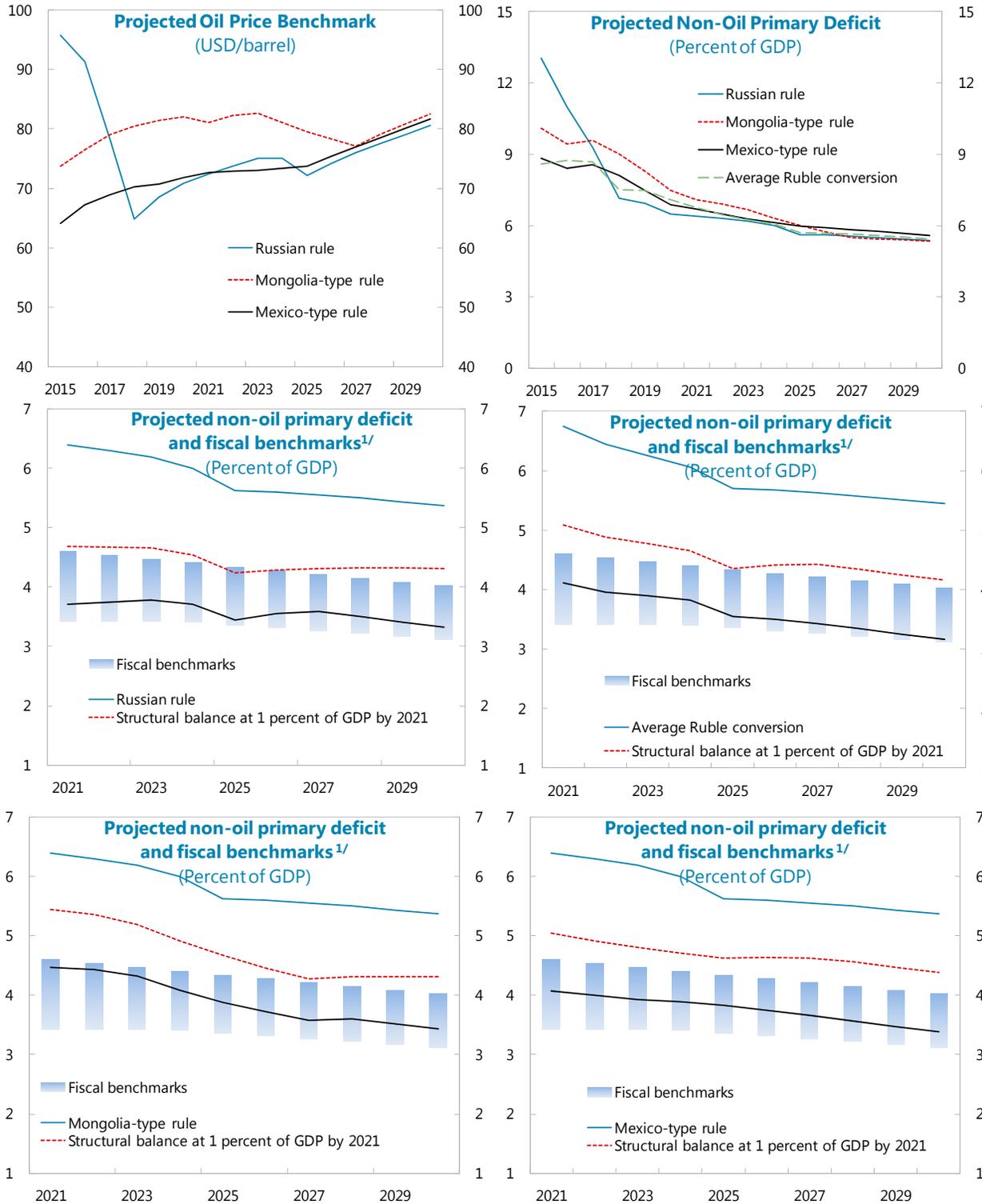
Perpetuity			50-Year Annuity		
Lower oil/gas Prices	Baseline oil/gas prices	Higher oil/gas Prices	Lower oil/gas Prices	Baseline oil/gas prices	Higher oil/gas Prices
-0.6%	-0.8%	-1.0%	-2.7%	-3.5%	-4.5%
-1.5%	-2.0%	-2.5%	-2.9%	-3.7%	-4.7%
-0.6%	-0.7%	-0.9%	-2.5%	-3.2%	-4.1%
<b>-1.4%</b>	<b>-1.8%</b>	<b>-2.3%</b>	<b>-2.6%</b>	<b>-3.4%</b>	<b>-4.4%</b>
-0.5%	-0.7%	-0.8%	-2.3%	-3.0%	-3.8%
-1.3%	-1.7%	-2.1%	-2.4%	-3.1%	-4.0%
-0.5%	-0.6%	-0.8%	-2.1%	-2.7%	-3.5%
-1.2%	-1.5%	-2.0%	-2.2%	-2.9%	-3.8%



Lower oil price is 25th percentile of stochastic simulation; higher oil price is 75th percentile.

Source: IMF staff calculations

**Table 4. Fiscal Rule**



1/ Fiscal benchmarks include real perpetuity, real annuity and nominal annuity. It excludes the nominal annuity.

Source: IMF staff calculations

## Annex I. Long-term Fiscal Sustainability Analysis

1. This annex presents the analysis underpinning fiscal sustainability benchmarks. These benchmarks rely on the inter-temporal budget constraint, which requires that the initial stock of net debt (A-D) be equal to the present value of future primary balances. The latter is decomposed into the non-oil primary deficits (NOPD) and resource revenues (RR):<sup>1</sup>

$$A_{t-1} - D_{t-1} = \sum_{s=t}^{\infty} \frac{NOPD_s}{(1+i)^{s-t+1}} - \sum_{s=t}^N \frac{RR_s}{(1+i)^{s-t+1}}$$

2. This equation captures adequately the exhaustibility of natural resources as RR are discounted only up to a specific point in time (N), after which natural resources are assumed to be exhausted. Note that the present value of resource revenues can be viewed as an asset of the government (V), and thus the inter-temporal budget constraint can be expressed in terms of the government's net wealth (W), including resource wealth:

$$V_{t-1} = \sum_{s=t}^N \frac{RR_s}{(1+i)^{s-t+1}}$$

$$A_{t-1} + V_{t-1} - D_{t-1} = \sum_{s=t}^{\infty} \frac{NOPD_s}{(1+i)^{s-t+1}}$$

$$W_{t-1} = \sum_{s=t}^{\infty} \frac{NOPD_s}{(1+i)^{s-t+1}}$$

3. While informative, this equation does not provide insights on the future path of the NOPD that would satisfy the inter-temporal budget constraint. For example, the inter-temporal budget constraint could accommodate large non-resource primary deficits in the short term, as long as they are followed by an appropriate fiscal consolidation. Note that a number of factors can affect the particular path of the NOPB over time, including the reaction of fiscal policy to the economic cycle, concerns over fiscal profligacy and Dutch disease, and inter-generational equity.

4. This annex presents four simple solutions to the inter-temporal budget constraint in order to provide fiscal benchmarks: (i) a constant NOPD as a share of GDP over time; (ii) a constant NOPD as a share of GDP over a fixed period of time; (iii) a constant real NOPD over time; and (iv) a constant real NOPD over a fixed period of time.

<sup>1</sup> For simplicity, we assume here that the interest rate on assets is equal to the interest rate on debts and the discount rate (i). This also includes the non-Ponzi game condition which excludes the possibility that the government service its debt (principal and interest) by issuing new debt.

5. First, the government finances constant NOPD as a share of GDP using its wealth thus providing all future generations the benefit of resource wealth. This is akin to providing a “perpetuity” equal to :

$$\alpha = \frac{\text{NOPD}_s}{\text{GDP}_s} = \frac{\text{NOPD}_t}{\text{GDP}_t} \text{ for all } t$$

Replacing  $\text{NOPD}_t$  with  $\alpha * \text{GDP}_t$  in the inter-temporal budget constraint and assuming constant nominal GDP growth ( $\gamma$ ) over time<sup>2</sup>, leads to the following solution<sup>3</sup>:

$$\begin{aligned} W_{t-1} &= \sum_{s=t}^{\infty} \frac{\alpha * \text{GDP}_s}{(1+i)^{s-t+1}} \\ W_{t-1} &= \sum_{s=t}^{\infty} \frac{\alpha * \text{GDP}_t * (1+\gamma)^{s-t}}{(1+i)^{s-t+1}} \\ W_{t-1} &= \frac{\alpha * \text{GDP}_t}{(1+i)} * \sum_{s=t}^{\infty} \left( \frac{1+\gamma}{1+i} \right)^{s-t} \\ \alpha &= \frac{W_{t-1} * (i-\gamma)}{\text{GDP}_t} \end{aligned}$$

6. Alternatively, the government may prefer to draw down its wealth over a fixed period of time i.e. provide an annuity instead of a perpetuity. Compared to the previous solution, this would allow the government to run larger NOPDs ( $\beta$ ) for a limited period of time. However, wealth would be fully exhausted after K years, and thus not all future generations would benefit from the natural resource wealth.<sup>4</sup>

$$\begin{aligned} W_{t-1} &= \frac{\beta * \text{GDP}_t}{(1+i)} * \sum_{s=t}^{K-1} \left( \frac{1+\gamma}{1+i} \right)^{s-t} \\ W_{t-1} &= \frac{\beta * \text{GDP}_t}{(1+i)} * \left[ \sum_{s=t}^{\infty} \left( \frac{1+\gamma}{1+i} \right)^{s-t} - \sum_{s=K}^{\infty} \left( \frac{1+\gamma}{1+i} \right)^{s-t} \right] \\ W_{t-1} &= \frac{\beta * \text{GDP}_t}{(1+i)} * \left( 1 - \left( \frac{1+\gamma}{1+i} \right)^K \right) * \sum_{s=t}^{\infty} \left( \frac{1+\gamma}{1+i} \right)^{s-t} \end{aligned}$$

<sup>2</sup> The last step uses the fact that:  $1/(1-q) = \sum_{n=0}^{\infty} q^n$ , if and only if  $q < 1$ . In our case, this requires that nominal growth must be higher than the nominal interest rate.

<sup>3</sup> For simplicity, this annex excludes the potential impact of additional public investment on growth.

<sup>4</sup> In addition, after the depletion of resource wealth the government would need to adjust fiscal policy.

$$\beta = \frac{W_{t-1} * (i - \gamma)}{GDP_t} \left( 1 - \left( \frac{1 + \gamma}{1 + i} \right)^K \right)$$

7. The previous two solutions kept NOPDs constant as a share of GDP. However, given that real GDP grows over time, this implicitly assumes that more “real” resources are provided to future generations, despite the fact that they are better off (as real GDP grows). An alternative to this assumption is to keep the “real” NOPD constant over time:

$$\vartheta = \frac{NOPD_s}{Deflator_s} = \frac{NOPD_t}{Deflator_t} \text{ for all } t$$

8. Replacing  $NOPD_t$  with  $\vartheta * Deflator_t$  in the inter-temporal budget constraint and assuming constant inflation ( $\pi$ ) over time, leads to the following solution for a real perpetuity:

$$W_{t-1} = \sum_{s=t}^{\infty} \frac{\vartheta * Deflator_t * (1 + \pi)^{s-t}}{(1 + i)^{s-t+1}}$$

$$W_{t-1} = \frac{\vartheta * Deflator_t}{(1 + i)} * \sum_{s=t}^{\infty} \left( \frac{1 + \pi}{1 + i} \right)^{s-t}$$

$$\vartheta = \frac{W_{t-1} * (i - \pi)}{Deflator_t}$$

while the solution for a real annuity (using similar algebra as above) is given by:

$$\varphi = \frac{W_{t-1} * (i - \pi)}{Deflator_t} \left( 1 - \left( \frac{1 + \pi}{1 + i} \right)^K \right)$$

## Annex II. The Russian Fiscal Rule<sup>1</sup>

1. This annex discusses the advantages and limitations of Russia's fiscal rule. The overall balance (OB) is initially expressed as the sum of non-resource revenues (NRR) and resource revenues (RR) minus expenditures (E):

$$OB_t = NRR_t + RR_t - E_t$$

2. Given that the fiscal rule relies on the concept of resources revenues at a benchmark price (RR\_bench), RR is further decomposed into RR\_bench and resource revenue savings (RR - RR\_bench)<sup>2</sup>:

$$OB_t = NRR_t + RR_{bench_t} + (RR_t - RR_{bench_t}) - E_t$$

3. Under the fiscal rule, federal expenditures are capped at the sum of ex ante NRR, RR\_bench, and one percent of GDP, where superscript "e" means, ex ante, expected revenues:

$$MAX(E_t^e) = NRR_t^e + RR_{bench_t}^e + 1\% * GDP_t^e$$

4. Using the maximum level of expenditures allowed under the fiscal rule, the minimum expected overall balance (OB) and non-oil balance (NOB) are:

$$OB_t^e \geq NRR_t^e + RR_{bench_t}^e + (RR_t^e - RR_{bench_t}^e) - (NRR_t^e + RR_{bench_t}^e + 1\% * GDP_t^e)$$

$$OB_t^e \geq (RR_t^e - RR_{bench_t}^e) - 1\% * GDP_t^e$$

$$NOB_t^e \geq -RR_{bench_t}^e - 1\% * GDP_t^e$$

while expressing the fiscal rule in terms of a structural balance (SB) – overall balance using RR\_bench instead RR – implies that the maximum expected "structural" deficit is 1 percent of GDP (excluding the cyclical component of oil revenues) :

$$SB_t = NRR_t + RR_{bench_t} - E_t$$

$$SB_t^e \geq NRR_t^e + RR_{bench_t}^e - (NRR_t^e + RR_{bench_t}^e + 1\% * GDP_t^e)$$

<sup>1</sup> For simplicity, the discussion abstracts from the interaction of the fiscal rule with other budget rules which provides a floor on expenditures.

<sup>2</sup> Under the rule, the oil-price benchmark is set as the minimum of (i) a backward-looking moving average of up to ten years of Urals oil prices (USD/barrel) —a proxy for the longer term price of oil; and (ii) a three-year backward looking average. Oil revenues at the benchmark price are then converted to ruble using a projected USD/Rub exchange rate.

$$SB_t^e \geq -1\% * GDP_t^e$$

5. The OB and NOB can be expressed in terms of oil prices ( $P_{oil}$  or  $P_{oil\_bench}$ ), oil extracted ( $Q_{oil}$ ), the effective tax rate ( $Tax\_rate$ ) and the exchange rate (RUB/USD)<sup>3</sup>:

$$OB_t^e = (P_{oil_t^e} - P_{oil\_bench_t}) * Q_{oil_t^e} * Tax\_rate_t^e * RUB/USD_t^e - 1\% * GDP_t^e$$

$$NOB_t^e = -P_{oil\_bench_t} * Q_{oil_t^e} * Tax\_rate_t^e * RUB/USD_t^e - 1\% * GDP_t^e$$

6. This offers a useful framework to discuss the advantages of the fiscal rule:

- The fiscal rule includes a structural anchor (a deficit of 1 percent of GDP, excluding the cyclical component of oil revenues).
- Fiscal policy is sheltered from short-term oil price fluctuations i.e. current oil prices do not affect the level of spending and hence the non-oil primary balance.
- It provides a framework for saving oil resources (when the actual oil price is higher than the oil price benchmark) and drawing them down (when the actual oil price is lower than the benchmark).
- It provides some flexibility to conduct counter-cyclical fiscal policy. For example, an oil price shock translates into lower-than-expected GDP (ex post), without affecting the maximum level of spending, leading to a worsening of the NOPB-to-GDP ratio i.e. a fiscal stimulus.

7. However, there are some limitations to the fiscal rule:

- As noted in the main text, the fiscal rule does not generate sufficient savings to rebuild buffers and save exhaustible resources.
- The oil price benchmark does not adjust rapidly to the changing oil-price outlook, as it is calculated as a backward-looking moving average. The impact on the fiscal balance of the slow adjustment of the benchmark is exacerbated by the conversion to ruble using the projected exchange rate (the exchange rate adjusts more rapidly to oil price fluctuations than the benchmark).
- A structural increase in non-oil revenues does not lead to a fiscal consolidation as expenditures are directly linked to non-oil revenues.

<sup>3</sup> The primary balance and (non-oil primary balance) is equal to the overall balance (non-oil balance) plus interest expenditures minus interest revenues.

# EXCHANGE RATE PASS-THROUGH TO INFLATION. IS RUSSIA DIFFERENT?<sup>1</sup>

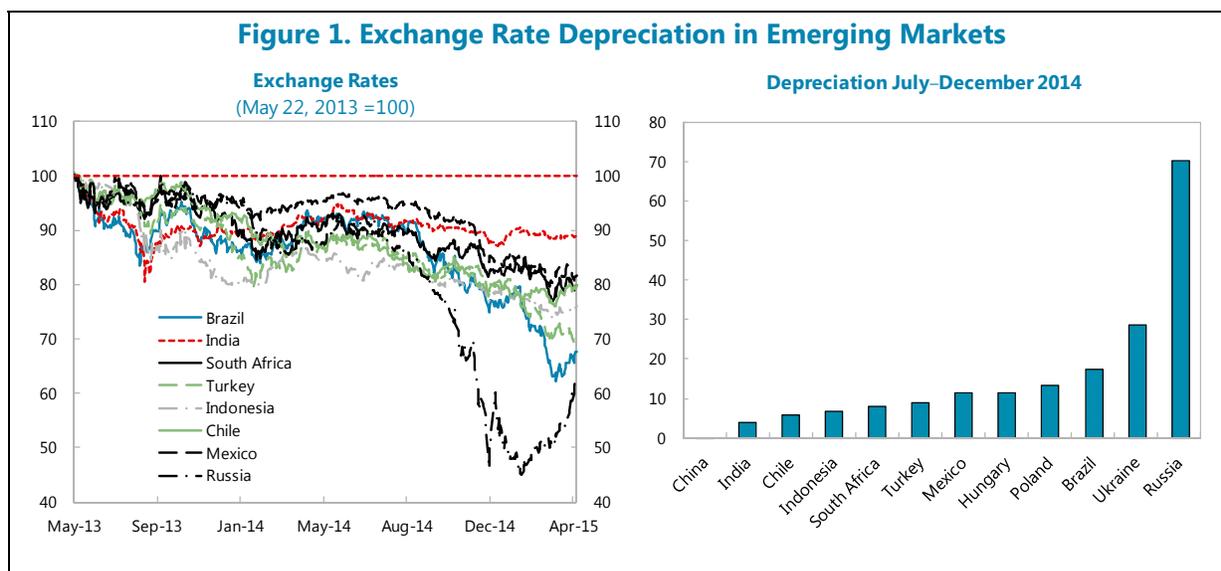
*The size of the exchange rate pass-through to inflation is relevant for timely and appropriate policy responses. Estimating the exchange rate pass-through in Russia is difficult because nominal exchange rate fluctuations have been relatively small in the recent past. Large import shares in the CPI basket, and a new exchange rate regime pose challenges to identify underlying inflation, and hence estimate the size of the exchange rate pass-through. This paper estimates exchange rate pass-through to consumer prices for emerging markets using local projection techniques. There is significant evidence of non-linearities and asymmetries. Monetary policy should take into account the time varying, and state dependent nature of the exchange rate pass-through to inflation.*

## A. Introduction

1. **The size of the exchange rate pass-through is relevant for policy makers.** Goldberg and Knetter (1997) define exchange rate pass-through (ERPT) as the percentage change in local currency import prices resulting from a 1 percent change in the exchange rate between the exporting and importing countries. Estimating the size of exchange rate pass-through and understanding the main drivers of domestic prices in advanced economies have been amongst the most debated topics in academic and policy circles in recent decades. Less is known for emerging markets (EMs). Having a good understanding and correctly measuring the transmission mechanism from exchange rate fluctuations to domestic prices is crucial for policymakers to implement appropriate, timely and effective policy responses.
2. **It is very hard to estimate the exchange rate pass-through to inflation, after a long period under a relatively rigid exchange rate regime.** The main challenge is that nominal exchange rate time series do not exhibit enough volatility. A large variety of methods can be used, but it is not possible to find meaningful estimates, if exchange rate fluctuations are small. For emerging open economies, the challenges are even bigger due to several elements. Large exogenous fluctuations (i.e., terms of trade shocks) and structural breaks pose an additional challenge to identify underlying inflation. Large shares of food and imports in consumption and investment goods, add an extra layer of complication. Hence, accurate estimations of the exchange rate pass-through to consumer prices in Russia are challenging.
3. **Pass-through estimates for EMs can be a useful benchmark for Russia.** Major EM currencies depreciated significantly during 2014 due to a variety of shocks and policy responses (Figure 1). The aim of this paper is to document and estimate ERPT to domestic prices in EMs focusing on three specific dimensions: non-linearities, asymmetries and importance of exchange rate

<sup>1</sup> Prepared by Francesca Caselli and Agustin Roitman.

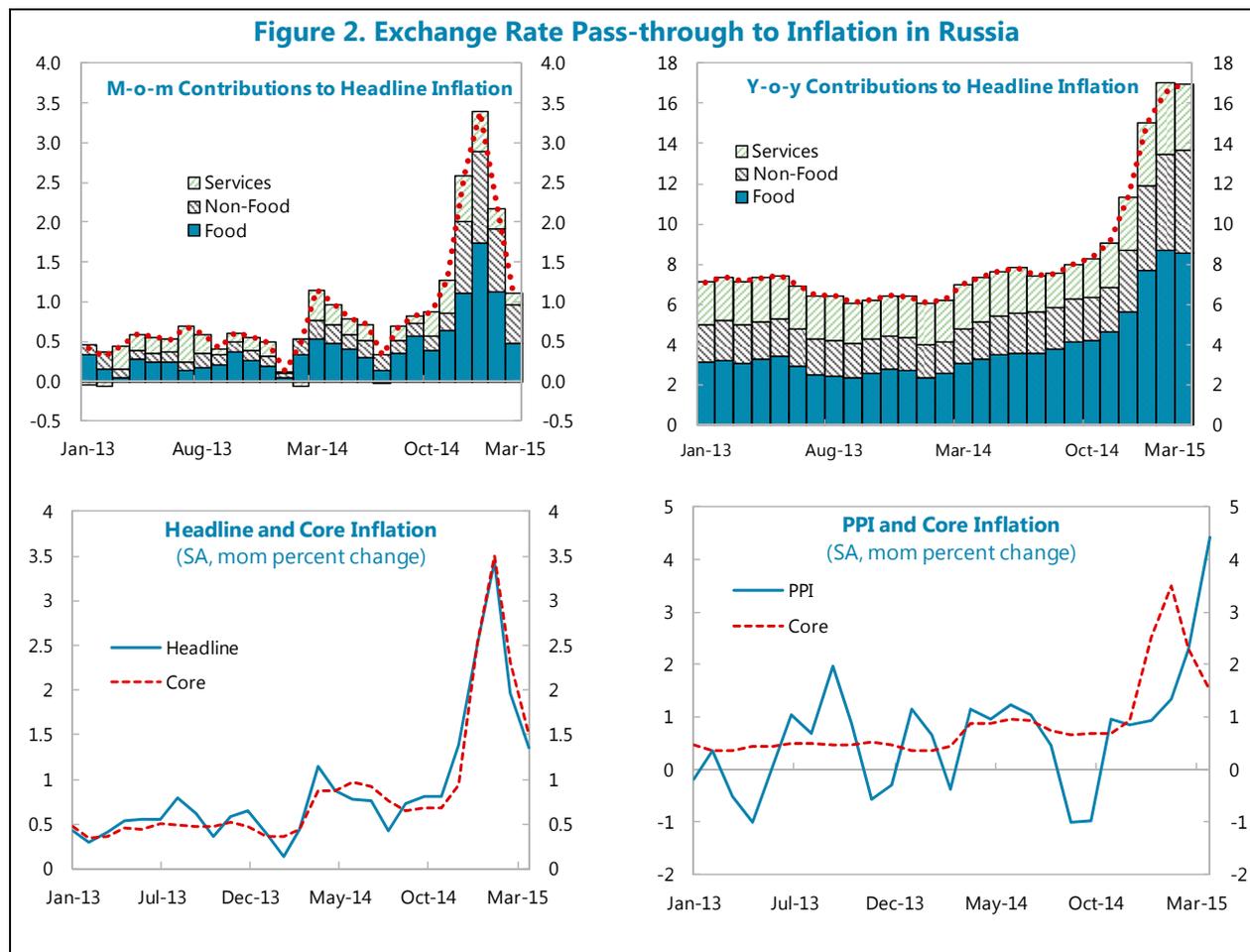
regimes. Using local projection techniques, we estimate state dependent impulse responses for the exchange rate pass-through to consumer prices in a panel of 28 emerging countries. We find that the percentage change in consumer prices due to a one percent change in the nominal effective exchange rate is 22 percent after 12 months. We also find evidence of non-linearities and asymmetries.



4. **Russia changed its nominal anchor amid significant external shocks.** The central bank of Russia (CBR) changed Russia's nominal anchor in November 2014 as part of the formal move to an inflation targeting regime. As a result, the FX rule to conduct regular interventions was formally eliminated and CBR's predetermined FX intervention policy came to a halt. As geopolitical tensions rose and oil prices tank, pressures on the ruble intensified during November and December 2014. Consequently, under the new floating exchange rate regime, and as a result of these 2 big exogenous shocks, the nominal exchange rate depreciated substantially in the course of 2 months.

5. **ERPT in Russia is time varying.** Contrary to expectations, the EPRT following the ruble's recent sharp depreciation turned out to be big, and fast (Figure 2).<sup>2</sup> The large import component in both tradable and non-tradable goods appears as an important element explaining the fast surge in inflation. Both consumer and producers prices rose sharply during (and after) the Ruble depreciation. Identifying, and measuring the ERPT in Russia after the implementation of the new nominal anchor is difficult. Hence focusing on a sample of EMs comparable to Russia, can shed light to better understand the time varying nature of the ERPT.

<sup>2</sup> Before the sharp depreciation of the ruble at the end of 2014, most ERPT estimates were around 0.1 to 0.15. These estimates probably relied on historical data (and likely fail to acknowledge the time varying nature of the ERPT).



## B. Stylized Facts

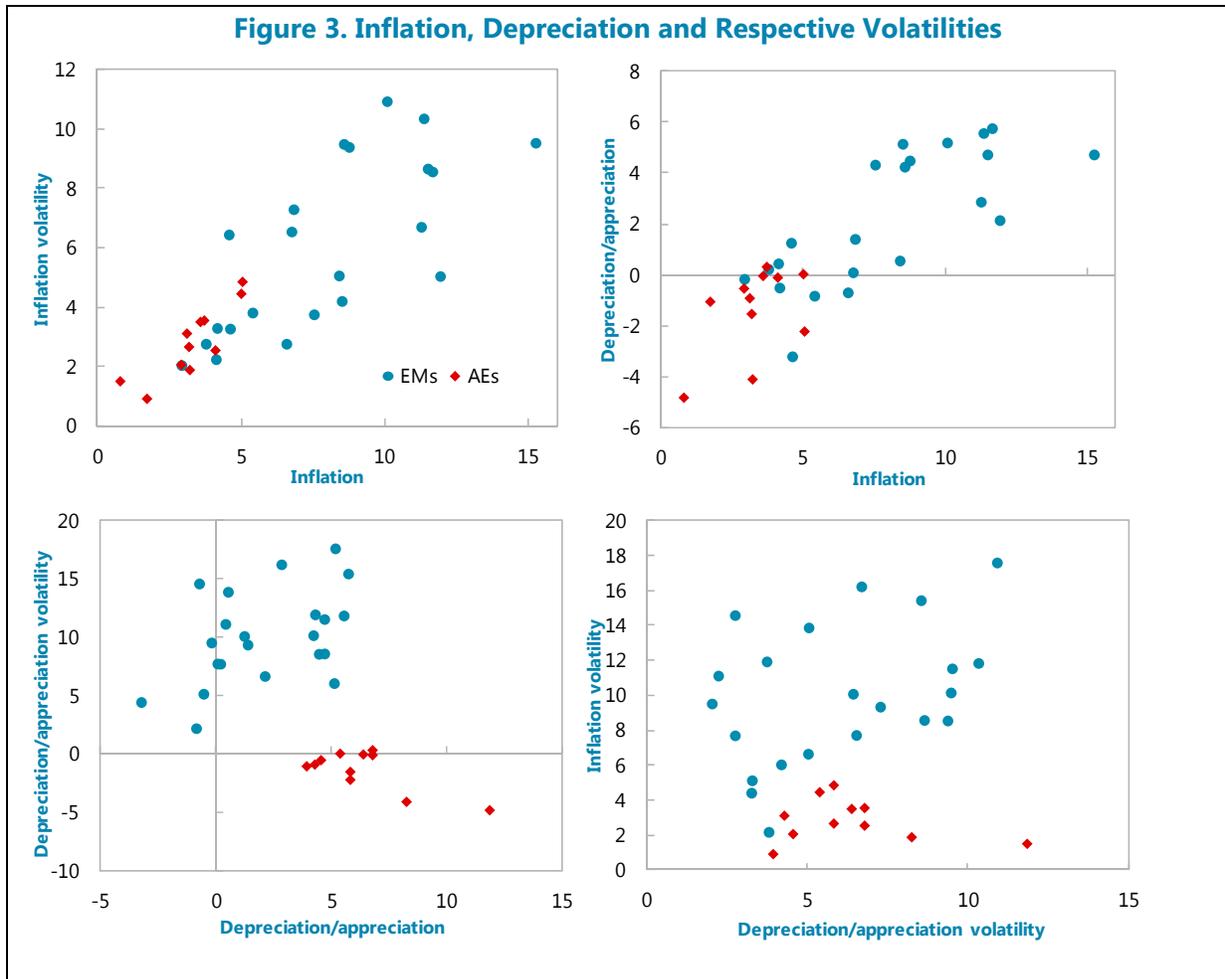
6. **Stylized facts are useful to pin down the main differences between EMs and AEs.** Based on unconditional relationships, it is possible to identify 4 stylized facts related to inflation levels, volatility, and the relationship between inflation and exchange rate movements, as well as the relationship between inflation volatility and exchange rate volatility. Figure 3 plots the average inflation, depreciation/appreciation, and the corresponding volatilities for each country, over the sample period 1980-2014.

### 7. **Four stylized facts that distinguish EMs from AEs:**

- Inflation appears to be higher and more volatile in EMs, compared to AEs.
- Higher inflation seems to be associated with higher depreciation rates in EMs, compared to AEs.

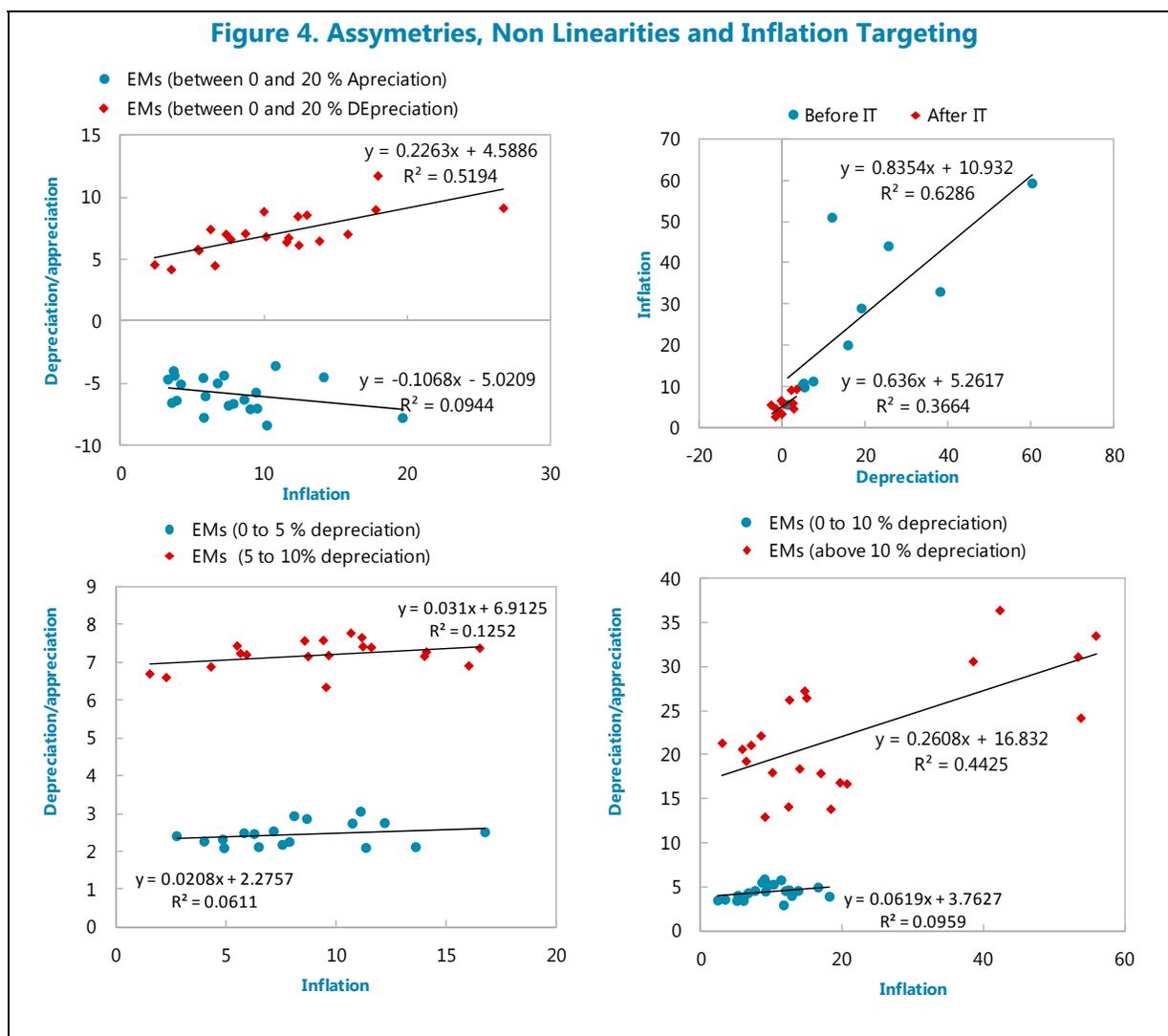
- Depreciation rates appear to be positively associated with depreciation volatility, whereas for AEs there is no apparent relationship.
- Depreciation volatility and inflation volatility appear to be positively associated in EMs, which does not appear to be the case for AEs.

8. **ERPT tends to be higher in EMs than in AEs.** Taylor (2000), similarly, links the degree of ERPT to the exchange rate regime and more specifically to the presence of inflation targeting. After the adoption of an IT framework, countries tend to experience a lower the pass-through. The rationale is that IT succeeds in keeping inflation low and this, through expectations of persistent low inflation, pushed firms to keep their prices broadly constant in order to be able to remain competitive. In other words, a low inflation environment causes a reduction in firms' pricing power that in turn leads to a decline in ERPT. Ca' Zorzi et al. (2005) argue that the private sector in EMs has fewer hedging instruments available. In a not fully competitive market, this could imply that exchange rates fluctuations are transmitted more into prices. Recent empirical studies document a decrease in ERPT in EMs due to the adoption of IT.



9. **EMs tend to be more exposed (and sometimes are more vulnerable) to terms of trade shocks.** Compared to AEs, commodities account for a large share in production and exports of many EMs. Terms of trade shocks are sometimes translated to abrupt and relatively large fluctuations in exchange rates. The share of commodity prices (i.e., food and fuel) in EMs consumer price index (CPI) baskets tends to be larger than in AEs. Commodity prices fluctuations can be big and volatile, hence introducing sudden and, often times, large movements in exchange rates, domestic import prices and domestic inflation.

10. **Asymmetries, non-linearities, and differences across exchange rate regimes exist.** The size of the pass-through, and of course the sign, can be different depending on whether the exchange rate is appreciating or depreciating. The size of the pass-through may also be different depending on the size of the depreciation/appreciation. The specific choice of the nominal anchor can also affect the size of the pass-through. Under flexible exchange rate regimes, where the monetary authority targets some monetary aggregate, the size of the pass-through may be different than under inflation targeting. Last, but not least, credibility in the conduct of monetary policy can also affect the size and speed of the pass-through.



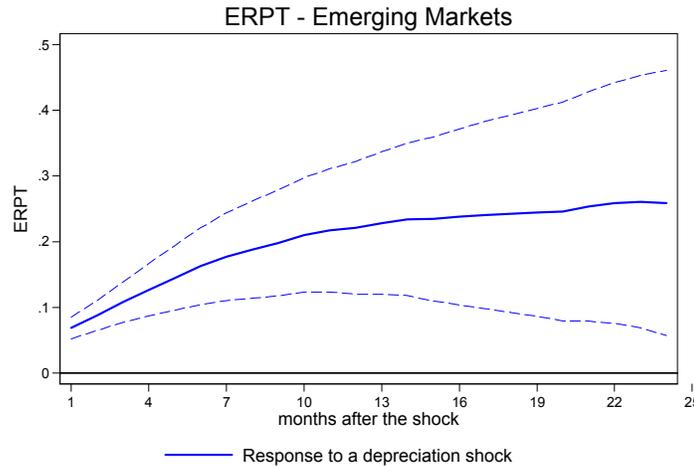
### C. Results. Size and State Dependent Nature of the ERPT in EMs

11. **The exchange rate pass-through in EMs is about 22 percent after 12 months.** Estimating the baseline model for the full sample of EMs (28 countries) indicates that exchange rate pass-through on consumer prices is around 22 percent after 12 months after the initial shock and it reaches 25 percent after two years.<sup>3</sup>

<sup>3</sup> For details on the methodology, estimation, and alternative specifications see Appendix 1.

**Table 1. ERPT Coefficients — Linear Model**

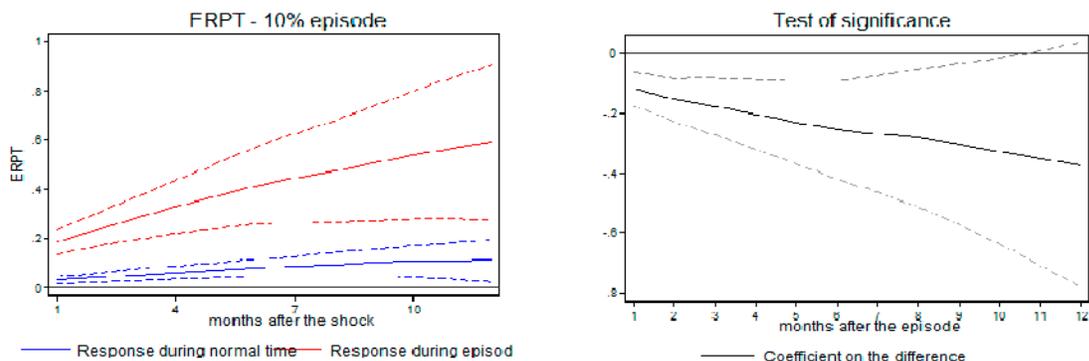
<i>Horizon - months</i>	<i>ERPT</i>	<i>Standard Error</i>
1	0.06	0.00
12	0.22	0.05
24	0.25	0.10



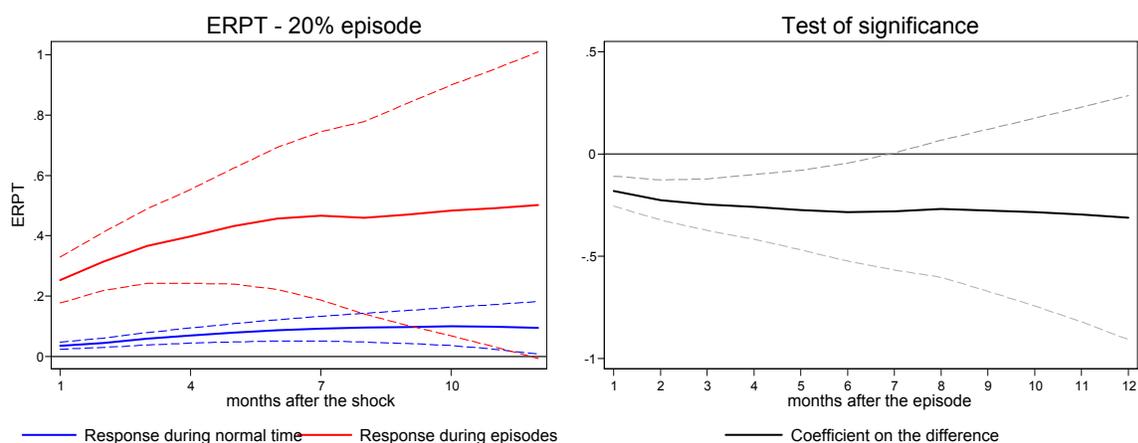
12. **EMs are usually exposed to terms of trade shocks, which in turn affect their exchange rate.** The size, frequency and nature of these shocks varies across time and across countries, but the key issue for (appropriate) policy responses is to have a good understanding of non-linearities. It is crucial to have a sense of whether the effect of an exchange rate shock on domestic prices can be different (in size) depending on the magnitude of the shock.<sup>4</sup> In line with the stylized facts presented above, the pass-through from exchange rate fluctuations to domestic prices appears to be higher, the larger the change in the exchange rate (Figures 5 and 6).

<sup>4</sup> In other words, whether a say, 5 percent depreciation would have the same pass-through as a say, 20 percent depreciation on domestic prices.

**Figure 5. Exchange Rate Pass-through during 10 Percent Depreciation Episodes**



**Figure 6. Exchange Rate Pass-through during 20 Percent Depreciation Episodes**



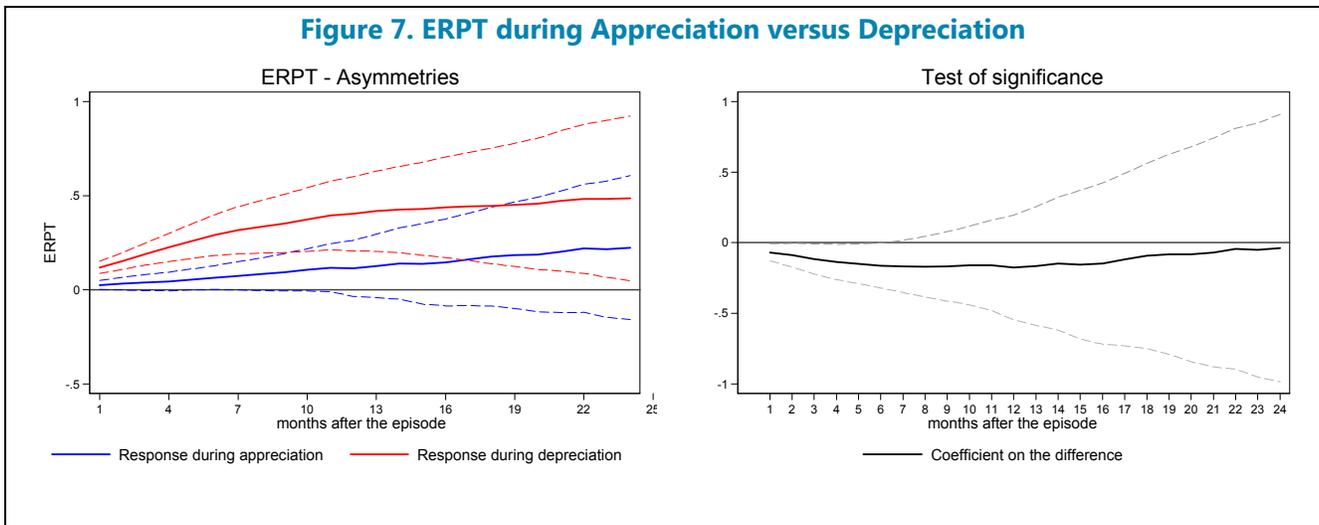
**Table 2. Exchange Rate Pass-through Coefficient in the Non-linear Model**

<i>Horizon - months</i>	<i>ERPT – 10% episodes</i>	<i>ERPT - 20% episodes</i>
1	0.18	0.25
2	0.23	0.31
3	0.28	0.36
4	0.32	0.39
5	0.37	0.43
6	0.41	0.45

13. **The response of inflation to large depreciations is faster and larger than during normal times.** After 1 month from the initial shock the ERPT is almost 20 percent and it reaches 40 percent after 6 months. Depreciations of at least 20 percent or more have an even faster effect on prices.<sup>5</sup> ERPT for depreciations' episodes of at least 10 percent or more, is equal to 40 after 6 months and 60 percent after 12 months, while in normal times it is 11 percent. For depreciation episodes of at least 20 percent or more, the ERPT is equal to 43 percent after 6 months and 50 percent after 12 months. So, for larger depreciations, the initial effect is larger but after few months the exchange rate pass-through stabilizes around 40 percent.

14. **There is significant evidence of asymmetries in the first 8 months after the initial shock:** Appreciation episodes generate a positive reaction in inflation that is not statistically significant. Depreciation episodes are characterized by about 40 percent pass-through after 12 months compared to less than 10 percent for appreciation episodes.

**Figure 7. ERPT during Appreciation versus Depreciation**

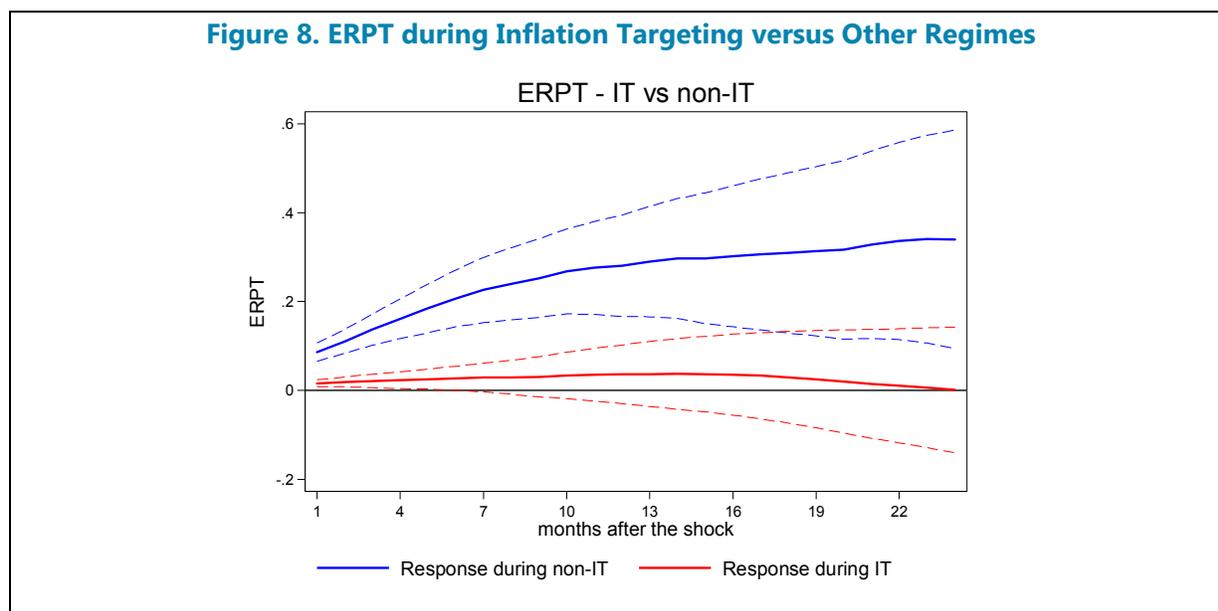


**Table 3. Coefficients Appreciation versus Depreciation**

<i>Horizon—Months</i>	<i>Appreciation</i>	<i>Depreciation</i>
1	0.02	0.11
2	0.03	0.15
3	0.03	0.19
4	0.04	0.22
5	0.05	0.25
6	0.06	0.29

<sup>5</sup> See Appendix 1 for details.

15. **The EPRT for inflation targeters is considerably lower than the one for non-inflation targeters.** It is well documented that inflation targeting regimes tend to be associated with lower inflation volatility and lower pass-through from depreciation to inflation, compared to non-inflation targeting regimes (i.e., predetermined exchange rate regimes). Non inflation targeters display more than 20 percent pass-through after 12 months.<sup>6</sup>



## D. Conclusion and Policy Implications

16. **Pass-through from depreciation to inflation in emerging markets is time varying.** Asymmetries non-linearities, and the specific exchange rate regime (i.e., fixed or floating) do affect the size of the pass-through. Emerging Markets display about 22 percent pass-through from depreciation to inflation after 12 months, and about 40 percent after 12 months when: (i) taking into account asymmetries between depreciation and appreciation, (ii) distinguishing between inflation targeters and non-inflation targeters, and (iii) depreciations are large (more than 10, and/or 20 percent yoy). These results confirm that pass-through from exchange rate to domestic prices is higher in emerging markets than in advanced economies.

17. **Assymetries, non-linearities and a new nominal anchor call for prudent policies.** The main policy implication to be drawn from the evidence presented in this paper is that policy makers should exert caution in conducting monetary policy after (and during) large depreciation episodes, especially after changes in the economy's nominal anchor. The intuition is simple: nominal variables can react differently (in terms of size, speed, transmission mechanisms, required adjustments, etc) under alternative exchange rate regimes, and depending on the size of the shocks. Appropriate

<sup>6</sup> See Appendix 1 for details.

policy reactions should take this into consideration and avoid assuming time invariant, and/or state independent parameters to characterize the response of nominal variables after large depreciation episodes. A natural implication of our findings is that monetary authorities should be cautious when assessing the transmission (and its speed) of exchange rate shocks to inflation. Premature policy responses, without sufficient evidence and understanding of non-linear and state contingent dynamics, could prove detrimental for price stability and pose a challenge to anchoring inflation expectations.

## Appendix I. Empirical Strategy

1. **Jordà (2005) local projection method (LPs) is flexible and easy to implement.** It enables to estimate the dynamic response of inflation to exchange rate movements allowing to capture non-linearities and asymmetries. Asymmetries are defined as the difference between appreciation and depreciation episodes and non-linearities as: (i) depreciation above or below certain thresholds, and (ii) countries operating under IT vs. others without an explicit IT framework. LPs are a flexible semi-parametric technique to estimate impulse responses which directly estimate a sequence of linear projections of the future value of the dependent variable on the current information set (Killian and Kim 2009).
2. **LPs technique is useful for tracing the dynamic response of variables to a shock.** LPs methods (as opposed to a standard vector autoregressive model—VAR) do not involve any non-linear transformation of the estimated slope coefficients to obtain impulse responses, and dynamic multipliers depend only on the quality of the local approximation (Jordà et al. 2013). Compared to VARs, LPs regressions are more robust to lags misspecification. If a VAR is a poor representation of the data generating process (DGP), impulse response functions (IRFs) are biased.
3. **LPs methods have also some limitations.** First, as the forecasting horizon increase, observations from the end of the sample are lost. Second, the IRFs obtained from LPs methods might show significant oscillations at longer horizons. At long horizons, LPs produce substantial oscillations that are not present in other methods. Due to the limitations of LPs methods in small samples, highlighted by Killian and Kim (2009) we use monthly data, to guarantee the longest possible sample.
4. **The baseline specification for the linear model is:**

$$\Delta cpi_{i,t+h} = \alpha + \sum_{s=1}^p \rho \Delta cpi_{i,t-s} + \beta_h \Delta NEER_t + \delta crisis_t + \sum_{s=1}^p \rho \gamma \Delta cpi^*_{i,t-s} + \varepsilon_{i,t+h}$$

LPs generate new estimates for each forecast horizon  $h$ , regressing the dependent variable at  $t+h$  on the available information set at time  $t$ . IRFs are the estimated slope coefficients of the projections. Where  $\Delta cpi_{i,t}$  is the yoy percent change in the CPI of country  $i$  at time  $t$ ,  $\Delta NEER_t$  is the yoy percent change in the nominal effective exchange rate,  $crisis_t$  is a dummy equal to one from 2009 to 2012 to proxy for the financial crisis,  $\Delta cpi^*_{i,t}$  is a proxy for foreign prices.  $\varepsilon_{i,t+h}$  is an error term capturing all other sources of variation in inflation between  $t$  and  $t+h$ . The coefficient  $\beta_h$  traces the response of inflation at time  $t+h$  to a depreciation/appreciation occurred in time  $t$ .

5. **Country by country estimations turn out to be unstable and not robust.** For Russia, this is especially true given that prior to 2015 the exchange rate regime, and the nominal anchor of the economy were different. Hence, panel estimations may shed some light to understand the

relationship between exchange rate fluctuations and domestic prices across countries. The intuition is simple: a panel delivers a larger number of observations and, in principle, more variability.

**6. The effect on domestic prices can be larger during episodes of “large” depreciations.**

In order to test whether large (relative to “normal times”) depreciations have more than proportional effects on domestic prices an episode of “high” depreciation can be defined according to two alternative criteria. Depreciation is large when:

- a. The monthly year-on-year (yoy) percent change is larger than 10 percent, or
- b. The monthly yoy percent change is larger than 20 percent.

A dummy variable *depisode* is defined as follows:

$$depisode = \begin{cases} 1 & \text{if } \Delta NEER > 0 \text{ and } \Delta NEER > \Psi \\ 0 & \text{otherwise} \end{cases}$$

Where  $\Psi$  is a threshold defined according to 1 or 2 above.

Introducing the interaction term between the dummy variable “*depisode*” and the rate of depreciation, we allow the coefficient  $\beta_h$  to be different across periods of “high” depreciation versus “normal times”.

$$\begin{aligned} \Delta cpi_{it+h} = & \alpha + \sum_{s=1}^p \rho \Delta cpi_{it-s} + \beta_h \Delta NEER_{it} + \gamma depisode + \vartheta_h \Delta NEER_{it} * depisode \\ & + \sum_{s=1}^p \lambda \Delta cpi_{it-s}^* + \delta crisis_t + \varepsilon_{it+h} \end{aligned}$$

**7. Depreciation and appreciation episodes have asymmetric effects on inflation.** A

depreciation can cause inflation to increase, but an appreciation episode need not reduce inflation by the same proportion. In order to explicitly account for this asymmetry between appreciation and depreciation the following specification can be used:

$$\Delta cpi_{t+h} = \alpha + \sum_{s=1}^p \rho \Delta cpi_{t-s} + \beta \Delta NEER_t + \gamma ddepr + \vartheta \Delta NEER_t * ddepr + \sum_{s=1}^p \lambda \Delta cpi_{t-s}^* + \delta crisis + \varepsilon_{t+h}$$

Where *ddepr* is defined as follows:

$$ddepr = \begin{cases} 1 & \text{if } \Delta NEER > 0 \\ 0 & \text{otherwise} \end{cases}$$

Hence the exchange rate pass-through to domestic inflation during depreciation period is:

$$\partial \Delta CPI_{t+h} / \partial \Delta NEER_t \text{ (if } ddepr = 1) = \beta + \vartheta$$

8. **EPRT can be different under different exchange rate regimes.** A common, and well documented result in the literature on EPRT, is that inflation targeting, succeeding in keeping inflation low, causes a reduction in firms' pricing power that in turns lead to a decrease in the ERPT. The following specification test this hypothesis:

$$\Delta cpi_{t+h} = \alpha + \sum_{s=1}^p \rho \Delta cpi_{t-s} + \beta \Delta NEER_t + \gamma IT_t + \vartheta \Delta NEER_t * IT_t + \sum_{s=1}^p \lambda \Delta cpi_{t-s}^* + \delta crisis_t + \varepsilon_{t+h}$$

Where IT is defined as follows:

$$IT = \begin{cases} 1 & \text{if Inflation targeting} \\ 0 & \text{otherwise} \end{cases}$$

Hence the exchange rate pass-through to inflation in targeting regimes is:

$$\partial \Delta CPI_{t+h} / \partial \Delta NEER_t \text{ (if } IT = 1) = \beta + \vartheta$$

## References

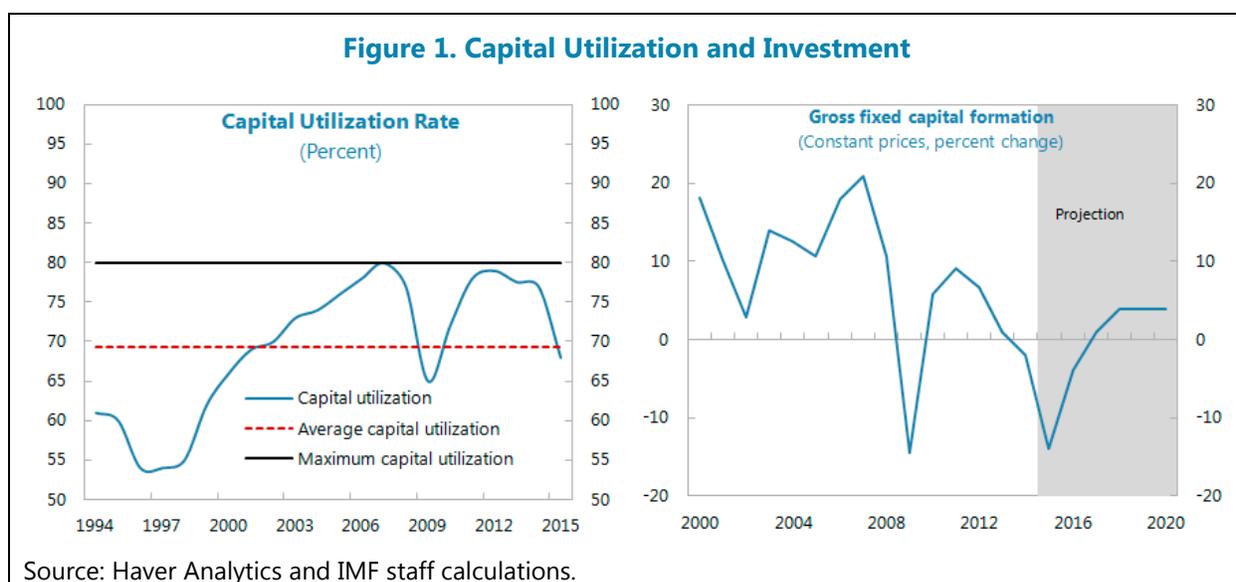
- Burstein Ariel, Martin Eichenbaum and Sergio Rebelo, 2005. "[Large Devaluations and the Real Exchange Rate](#)," [Journal of Political Economy](#), University of Chicago Press, vol. 113(4), pages 742–784, August.
- Bussière, Matthieu and Delle Chiaie, Simona and Peltonen, Tuomas A., Exchange Rate Pass-Through in the Global Economy: The Role of Emerging Market Economies (April 2014). IMF Economic Review, Vol. 62, Issue 1, pp. 146-178, 2014.
- Calvo, G.; Reinhart, C. (2002). "Fear of Floating". [Quarterly Journal of Economics](#) 117 (2): 379–408.
- Carranza et al. (2009)
- Choudhri, Ehsan U. and Hakura, Dalia, Exchange Rate Pass-Through to Domestic Prices: Does the Inflationary Environment Matter? (December 2001). IMF Working Paper, pp. 1–36, 2001.
- Edwards, Sebastian, The Relationship between Exchange Rates and Inflation Targeting Revisited (April 2006). NBER Working Paper No. w12163.
- Frankel, Jeffrey A. and Fajnzylber, Eduardo and Schmukler, Sergio L., Verifying Exchange Rate Regimes. *Journal of Development Economics*, Vol. 66, No. 2, December 2001.
- Goldberg and Michael M. Knetter. Goods Prices and Exchange Rates: What Have We Learned? *Journal of Economic Literature* Vol. 35, No. 3 (Sep., 1997), pp. 1243-1272.
- Jordà, Òscar. 2005. "Estimation and Inference of Impulse Responses by Local Projections." *American Economic Review*, 95(1): 161–182.
- Mishkin, Frederic S. and Schmidt-Hebbel, Klaus, Does Inflation Targeting Make a Difference? (January 2007). NBER Working Paper No. w12876.
- Taylor, John B., "Low Inflation, Pass-through, and the Pricing Power of Firms," *European Economic Review* 44:7 (2000), 1389–1408.

# FOSTERING FINANCIAL SECTOR CONTRIBUTION TO GROWTH<sup>1</sup>

Raising capital investment in Russia is key to achieving higher growth in the future. This paper diagnoses the state of the financial sector in Russia, using a comprehensive index of financial development, to identify potential bottlenecks. It finds that Russia's financial markets are relatively deep, accessible and efficient, but that financial institutions, in particular banks, have much to do to improve their efficiency and create further depth. Russia could potentially gain up to 1 percentage point in GDP growth on average over the medium-term from further deepening and efficiency improvements. Policies towards this outcome include reducing banking sector fragmentation through consolidation via increased supervision and tightening capital standards; strengthening the role of credit bureaus and collateral registries to reduce information asymmetries; and removal of interest rate rigidities to foster competition.

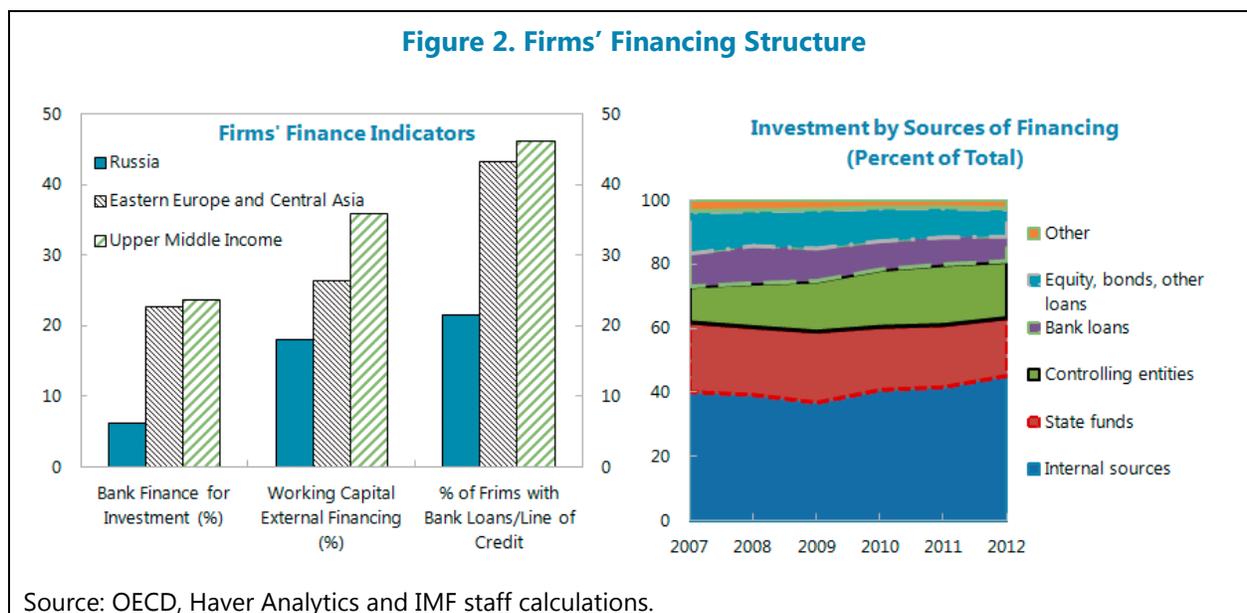
## A. Introduction

1. **Raising capital investment in Russia is key to achieving higher growth in the future (Figure 1).** Russia has been experiencing a structural slowdown since 2012, caused in part by a slowdown in investment. Lately, the prospects for a pick-up in investment to the levels needed to sustain robust growth have become dim.



<sup>1</sup> Prepared by Nazim Belhocine. I would like to thank Katsiaryna Svirydzhenka, Adolfo Barajas and Ran Bi for their helpful input regarding the data analysis in Sahay et al. (2015).

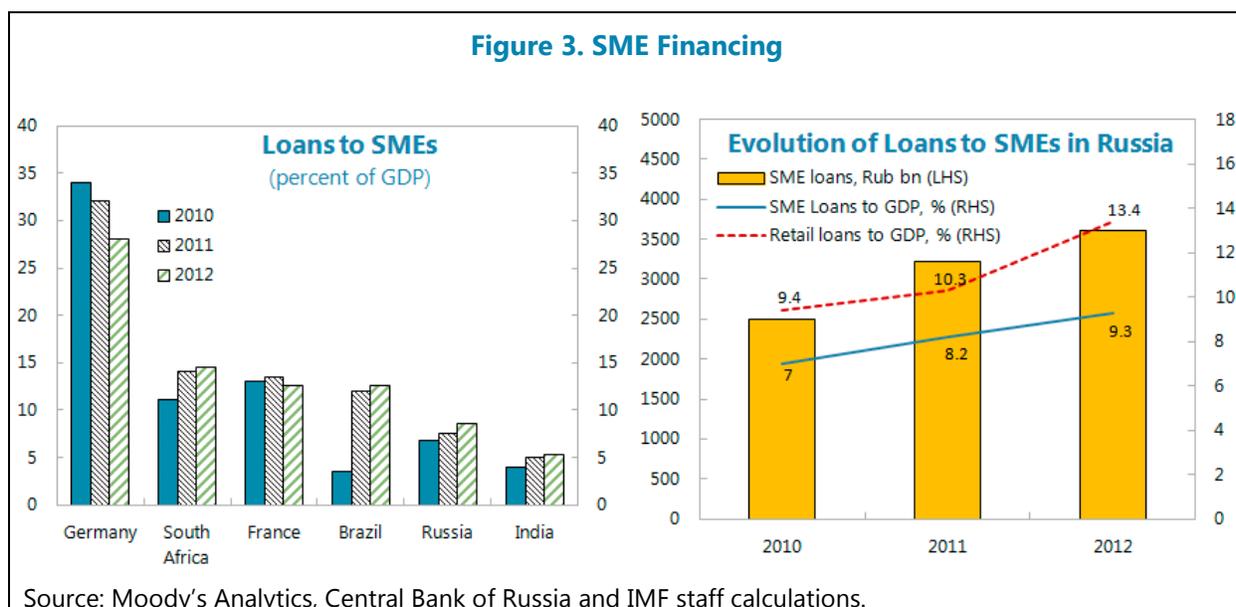
2. **The financial sector could potentially play a bigger role in financing investment (Figure 2).** Russian companies rely much less on external financing in general and on bank financing in particular, to finance investment compared to their peers in Eastern Europe and Central Asia or in their upper middle income group. Typically, internal resources, state funds and controlling entities are responsible for financing up to 80 percent of business investment. As a result, banks contribute only 6 percent of funding for business investment, with the bulk of investment financed from retained earnings.



3. **The financial sector could also channel more savings to SMEs (Figure 3).** Although more lending has been extended to SMEs over the past few years, Russia still lags behind in terms of resources flowing to SMEs. Loans to SMEs have averaged around 8 percent of GDP, lower than South Africa (15 percent) and Brazil (13 percent). Although this trend might reflect both demand and supply factors, the asset expansion of the banking sector in the last few years has disproportionately gone to consumers, missing on opportunities to promote the needed diversification of the economic base.

4. **There are few bottlenecks that could unleash further financial development.** This paper uses a newly developed tool, the financial development index, to pinpoint specific areas where Russia could make further gains in financial development. Section 2 dissects the financial system performance and discusses the areas lacking developments using the lenses of the financial development index. It finds that Russia's financial markets are relatively deep, accessible and efficient, but that financial institutions, in particular banks, have much to do to improve their efficiency and create further depth. Section 3 provides estimates of the growth dividends from a more developed financial system. Russia could potentially gain up to 1 percentage point in GDP growth on average over the medium-term from further deepening and improvements in efficiency. Policies towards this outcome include reducing banking sector fragmentation through consolidation via increased supervision and tightening capital standards; strengthening the role of credit bureaus

and collateral registries to reduce information asymmetries and fostering more lending to SMEs; and removal of interest rate rigidities.

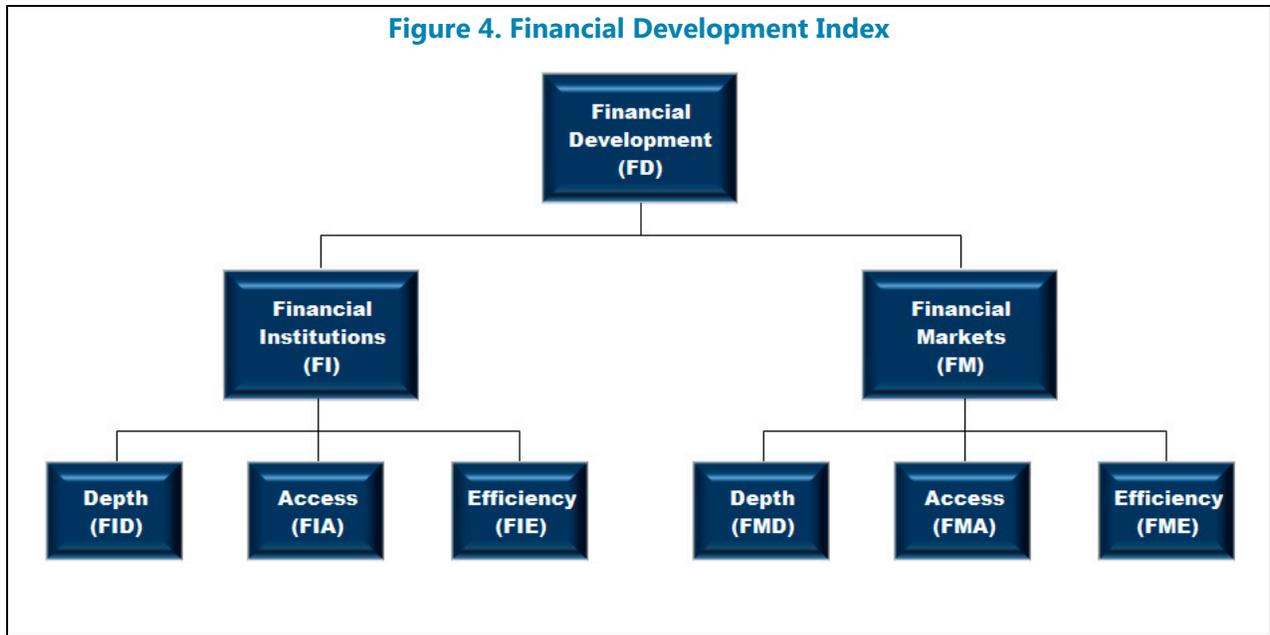


## B. Dissecting Russia's Financial System Performance

5. **Russia's financial sector is analyzed through the lenses of a broad-based measure of finance development.** Financial development is defined as a combination of depth (size and liquidity of markets), access (ability of individuals to access financial services), and efficiency (ability of institutions to provide financial services at low cost and with sustainable revenues, and the level of activity of capital markets). Sahay et al (2015) developed a financial development (FD) index which encompasses these dimensions applied to both financial institutions (FI), such as banks, insurance companies, mutual funds, pension funds, and to financial markets (FM), which include mainly stock and bond markets (Figure 4). A list of indicators is chosen to measure each sub-index at the bottom of the pyramid of Figure 4. The full list of indicators is shown in Table 1. Each indicator is then normalized between 0 and 1 and aggregated using weights obtained from principal component analysis reflecting the contribution of each underlying series to the variation in the specific sub-index.<sup>2</sup>

<sup>2</sup> For a full description of the methodology and data, please refer to the original publication of Sahay et al (2005): <http://www.imf.org/external/pubs/ft/sdn/2015/sdn1508.pdf>.

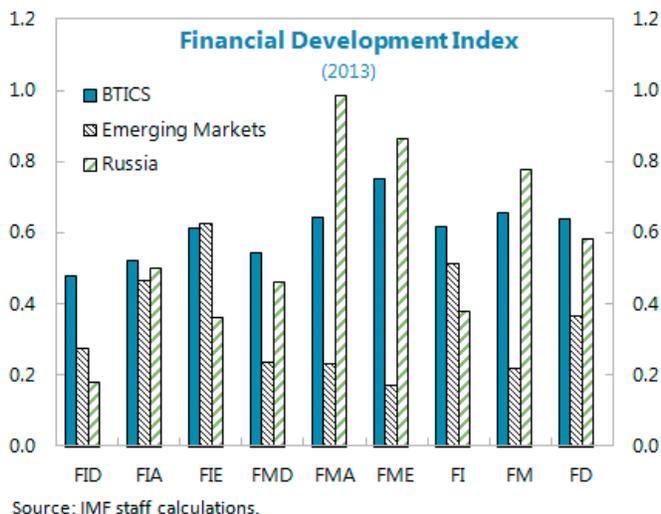
**Figure 4. Financial Development Index**



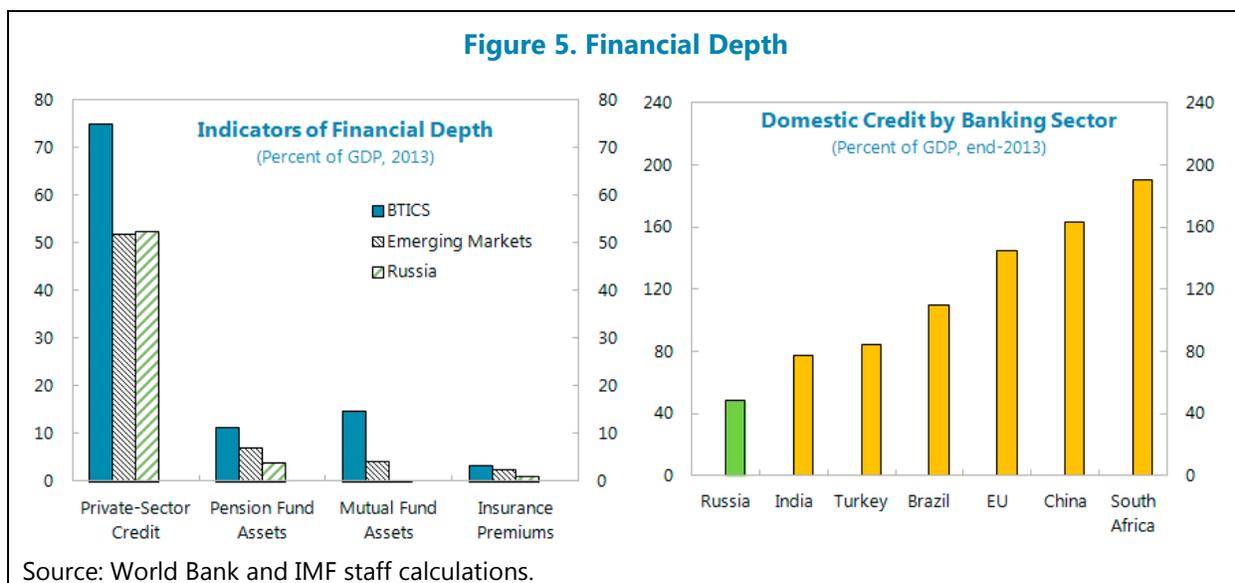
**Table 1. Components of the Financial Development Index**

	<b>FINANCIAL INSTITUTIONS</b>	<b>FINANCIAL MARKETS</b>
<b>DEPTH</b>	1. Private-sector credit (% of GDP) 2. Pension fund assets (% of GDP) 3. Mutual fund assets (% of GDP) 4. Insurance premiums, life and non-life (% of GDP)	1. Stock market capitalization to GDP 2. Stocks traded to GDP 3. International debt securities government (% of GDP) 4. Total debt securities of nonfinancial corporations (% of GDP) 5. Total debt securities of financial corporations (% of GDP)
<b>ACCESS</b>	1. Branches (commercial banks) per 100,000 adults 2. ATMs per 100,000 adults	1. Percent of market capitalization outside of top 10 largest companies 2. Total number of issuers of debt (domestic and external, nonfinancial corporations, and financial corporations)
<b>EFFICIENCY</b>	1. Net interest margin 2. Lending-deposits spread 3. Non-interest income to total income 4. Overhead costs to total assets 5. Return on assets 6. Return on equity	1. Stock market turnover ratio (stocks traded/capitalization)

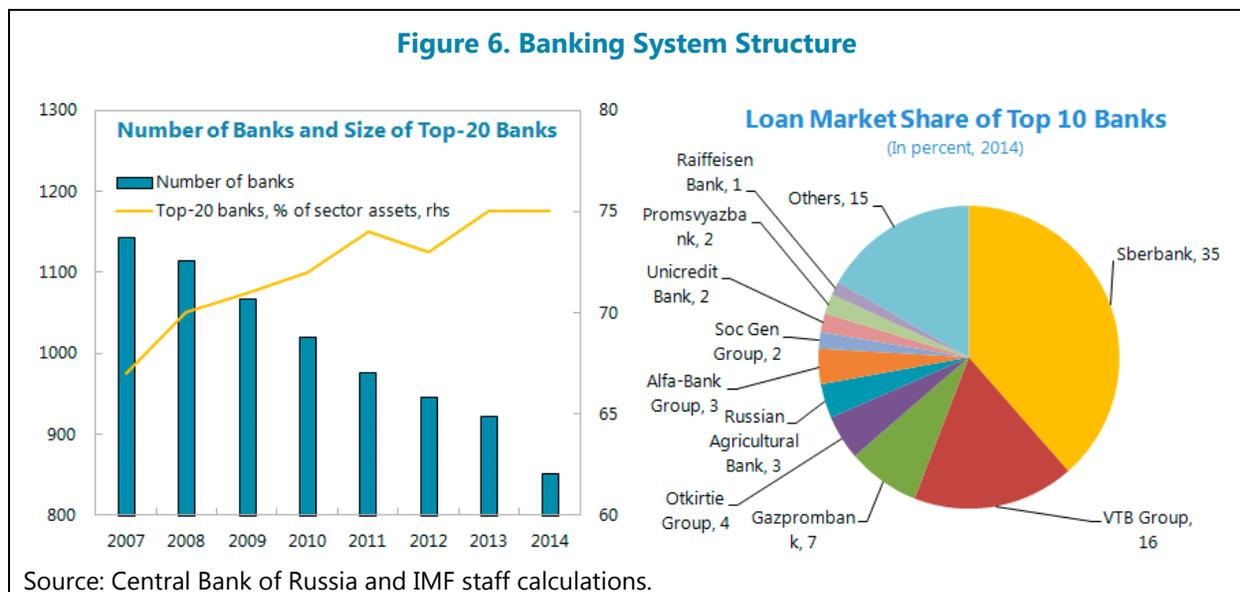
6. **Russia’s financial market s are relatively developed but financial institutions lag behind in terms of efficiency and depth.** Russia’s FD index (0.58) is higher than the average EM (0.37) and slightly lower than the average BTICS (0.64), a group of countries composed of Brazil, Turkey, India, China, and South Africa. Nonetheless, the components of the index show large disparities between levels of development of FM versus FI. Russia scores much higher than the comparator groups for FM developments as it features higher degrees of access and efficiency in the operations of its financial markets. Although the depth of financial markets is slightly lower than BTICS countries, it remains much higher than the average EM. Nonetheless, along the dimension of FI, Russia lags behind both comparator groups in terms of efficiency and depth while access to financial institutions is about the same.



7. **Financial intermediation lags behind (Figure 5).** Looking at the specific indicators of financial depth shows that financial institutions in Russia are comparatively dominated by the banking system, with fewer to non-existent assets, in percent of GDP, in pension funds, mutual funds and insurance industry. Moreover, the banking system lacks depth with domestic credit at about 50 percent of GDP being the lowest in the BTICS group.

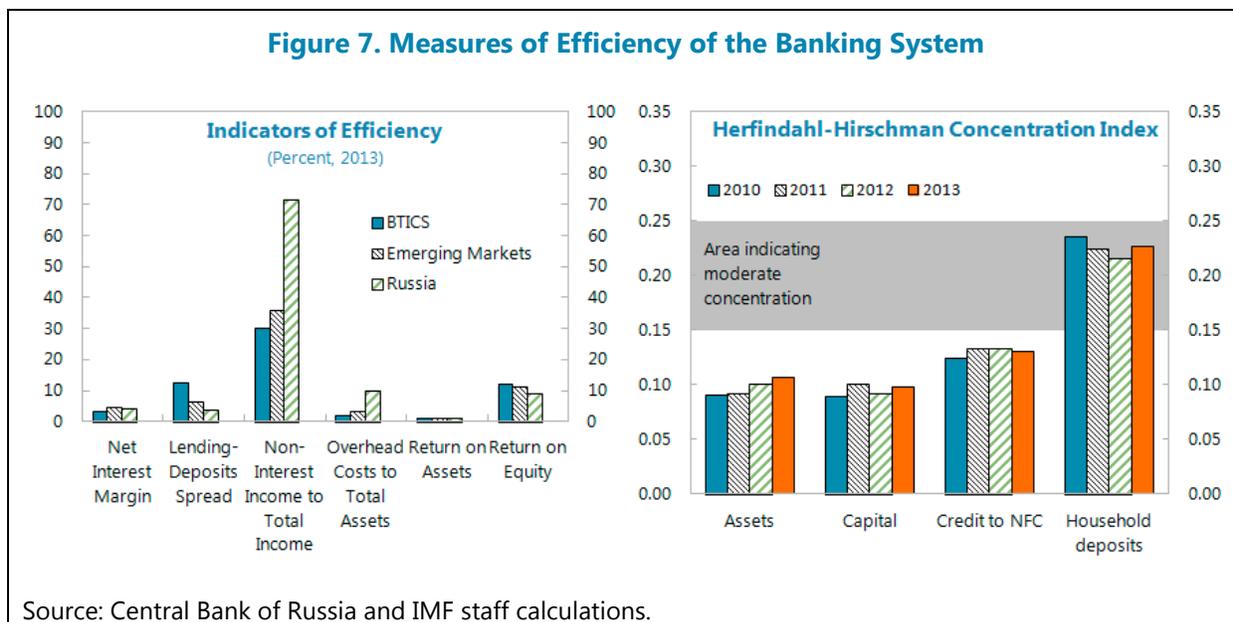


8. **The depth of the banking system is hampered by its structure (Figure 6).** With some 850 banks operating, the Russian banking system is highly concentrated at the top, and fragmented at the bottom. The top three banks (state-owned) accounted for more than 50 percent of total sector assets at year-end 2014 while the top 20 banks accounted for 75 percent of total sector assets. Lending is highly concentrated among the top 10 bank groups making about 850 banks contribute only 15 percent of total lending. In other words, VTB Group alone with 16 percent share of lending accounts for a similar share as the 830 remaining banks. Most of the banks are small and act as treasury accounts for local firms, operating in particular in mono-cities. The proliferation of small banks undermines lending to companies and SMEs as their ability to both extend credit and diversify across companies is limited while lending to consumers is usually the dominant form of credit. In addition, the nature and activities of the large number of small banks adds little to competitive pressure, while taxing the supervisory resources of the central bank and making it difficult to deal with weak banks that are often involved in fraudulent activities, which has a negative effect on public confidence in banks in general. Many of the small banks are below any plausible minimum efficient scale, and their smaller size also tends to make them more concentrated both on the deposit and lending sides (OECD, 2009).



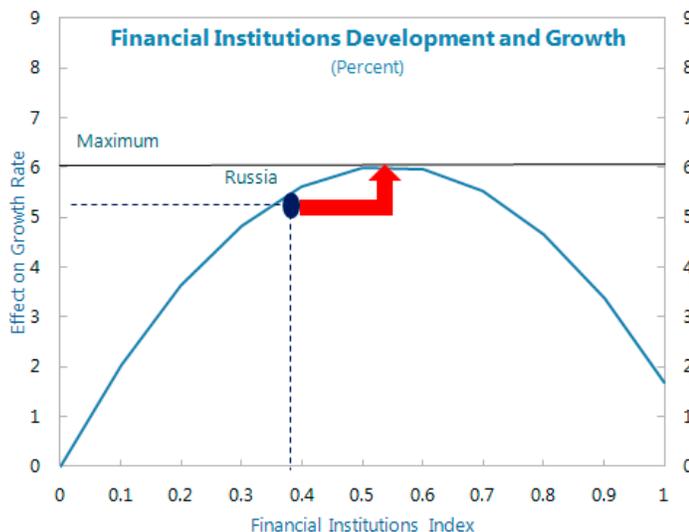
9. **Efficiency of intermediation is relatively low (Figure 7).** Some indicators of efficiency, including lending-deposit spreads, are close to the average observed in comparator groups. However, most other indicators of efficiency, in particular non-interest income to total income and overhead costs to total assets, show that the banking system is much less efficient in its operations than comparator countries. Banks appear to be mostly profitable thanks to fees and other revenues unrelated to their main lending activity or to the spread gained between lending and borrowing rates. In addition, bank operations are taking place at a high cost with overhead costs about 5 times higher than the BTICS group. These findings might stem from the fragmentation of the system, discussed above, but also from the moderate concentration of the banking system on the deposit

side which hinders competition. Other studies have found that the top 20 banks and state-owned banks seem to be able to exert more market power than the smaller banks and the privately-owned institutions (Anzoategui et al., 2010).



### C. Reaping the Benefits of More Financial Development

**10. Financial development dividends could be large.** A deeper and more efficient financial system would expand and improve the allocation of capital thereby enhancing economic growth. Financial deepening would also help unlock the potential of SMEs, which typically lack own funds to finance investment projects and are key for the diversification of the economy. Using the regression results of Sayeh et al. (2015) shows that Russia could potentially gain up to 1 percentage point in GDP growth on average over the medium-term from further deepening and improvements in efficiency by moving Russia’s FI index, at 0.38 percent, to the maximum attainable level of about 0.6 percent. Other studies reached similar results, albeit using different approaches. For instance, EBRD (2006) found that growth could improve over the medium-term by close to 1.2 percentage points in case financial intermediation matches the level prevailing in the top 25 percent countries in a CEE sample.



11. **Fragmentation of the system could be addressed via policies that promote consolidation without hindering competition.** Consolidation will help lift more banks above a minimum efficient scale, which is necessary to contribute to effective competition. Policies include intensification of supervision and the adoption of more stringent minimum capital requirements. This process should be done in a way that nonetheless fosters competition by limiting the involvement of the largest players in the consolidation process when mergers and acquisitions are the result of the winding up process. To the extent that banks in a consolidated system are on average larger than those in a diffuse system, they may benefit from greater diversification and/or economies of scale.
12. **The intensification of supervision underway should continue.** With increased supervisory powers since mid-2013, the CBR has stepped up banking supervision which resulted in a wave of bank closures and license withdrawals, mostly for very small banks. The CBR revoked licenses for 30 small banks in 2013 and 73 in 2014 involved in dubious transactions, misrepresentation of financial statements and excessive credit risk along with fraud. The removal of small, fundamentally weak banks from the banking system should reduce competition for capital at the remaining mid-sized banks, allowing them to benefit from larger economies of scale and to better compete with larger banks.
13. **The move to Basel III should support more stringent capital requirements but CBR should clarify the schedule of implementation.** The CBR is moving ahead with the Basel III schedule of implementation of higher capital requirements and new liquidity prudential ratios. Stricter requirements for Tier 1 capital were applied starting in 2015 with the minimum requirement increased to 6 percent from 5.5 percent. Starting in 2016, capital conservation buffer of 0.625 could be introduced (gradually increasing to 2.5 percent by end-2018) and CET 1 surcharge of 1 percent could be applied to SIBs. Nonetheless, these measures have yet to be confirmed and the schedule of implementation formally announced.
14. **The authorities should further strengthen the role of credit bureaus and collateral.** SMEs identify collateral provision as the main impediments for credit (European Investment Bank, 2013). Strengthening the role of collateral registries by simplifying the procedures to recognize and price assets would allow banks to secure recovery through repossession and sale of collateral. In addition, many national-level credit bureaus are in operation in Russia but poor communication and networking across these bureaus hinder the efficient sharing of information. Currently, the law does not oblige the bureaus to exchange information on borrowers to avoid information leakage and many of these bureaus are affiliated to single banks. A better design of the network and legislative amendments to information sharing could strengthen the role of credit bureaus and give a more comprehensive access to a borrower's credit histories thereby mitigating risks for banks, enhancing the efficiency of lending decisions and preventing fraud.
15. **The authorities should remove interest rate rigidities, in particular on deposit rates.** The CBR mandates banks to keep their deposit rates within 350bps above the maximum average deposit rates of the 10 largest banks. The average rate is determined once every ten days and published on the CBR website. This rigidity hinders competition by mid-size banks. CBR

implemented this policy in 2008 to limit predatory behavior by some banks which offered very high deposit rates to attract consumer funding but had riskier business models. A better policy, which would not hinder competition, would be to link deposit rates to the deposit insurance contributions, in order to discourage predatory behavior while ensuring stability.

16. **The privatization process should be rekindled when conditions allow it.** One reform which would likely boost efficiency in the long run is the gradual withdrawal of the state from the banking sector. As advocated by the OECD (2009), there is no clear long-term rationale for state ownership, while there is substantial evidence for higher efficiency of private banks (e.g. La Porta et al., 2000). On the other hand, there is no urgent need in Russia for large scale privatization, especially in light of the fragmentary evidence that public banks in Russia are not less efficient than private ones (Karas et al., 2008). Moreover, there is clear evidence that state banks have been beneficial for systemic stability in periods of crisis, while a period of depressed asset prices is hardly opportune for divesting stakes in state-owned banks. In the near term, the priority is to work on leveling the playing field and bolstering effective competition. A plan for streamlining state involvement in banking when conditions are more propitious should be developed, however.

## References

- Anzoategui Diego, María Soledad Martínez Pería, Martin Melecky (2010) "Banking Sector Competition in Russia". World Bank Policy Research Working Paper No. 5449.
- European Bank for Reconstruction and Development (2006) "Transition Report 2006: Finance in Transition", London.
- European Investment Bank (2013) "Small and Medium Entrepreneurship in Russia", Luxemburg.
- Karas, A., K. Schools and L. Weill (2008), "Are Private Banks more Efficient than Public Banks? Evidence from Russia", BOFIT Discussion Papers 3/2008, Bank of Finland, Helsinki.
- La Porta, R., F. Lopez-de-Silanes and Andrei Shleifer (2002), "Government Ownership of Banks", The Journal of Finance, Vol. 57, No 1, pp. 265-301.
- Organization for Economic Cooperation and Development (2009) "OECD Economic Surveys: Russian Federation", OECD Paris.
- Ratna, Sahay, Martin Cihak, Papa N'Diaye, Adolfo Barajas, Diana Ayala Pena, Ran Bi, Yuan Gao, Annette Kyobe, Lam Nguyen, Christian Saborowski, Katsiaryna Svirydzenka, and Reza Yousefi, 2005, "Rethinking Financial Deepening: Stability and Growth in Emerging Markets." Staff Discussion Note No. 15/8 (Washington: IMF).