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April 2022

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REPUBLIC OF KAZAKHSTAN

SELECTED ISSUES

March 21, 2022

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Middle East and Central Asia Department

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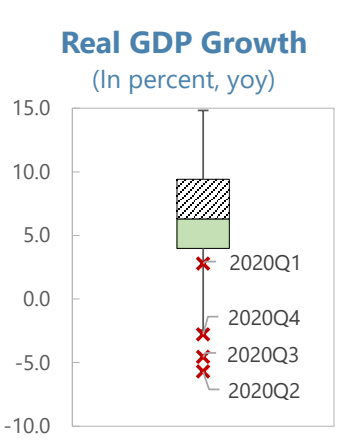
CONTENTS

KAZAKHSTAN—GROWTH AT RISK[1]

Kazakhstan's economic growth has been volatile in the past two decades, driven by both external and domestic factors. This paper applies the Growth-at-Risk approach to explore how macro-financial indicators help assess downside/upside risks to growth prospects. The analysis highlights Kazakhstan's vulnerability to external shocks and the policy tradeoff between monetary policy tightening and downside risks to growth. Elevated inflation, uncertain recovery prospects in trading partners, and limited export diversification are the main risks to Kazakhstan's growth outlook.

1. Kazakhstan has experienced significant yet volatile growth over the past two decades. Quarterly growth (year-on-year) averaged over 10 percent in 2000-08 prior to the global financial crisis, but decelerated afterwards. The COVID-19 pandemic had a strong impact on domestic economic activity, leading to the worst growth outcome of recent years. However, the floating exchange rate and prompt policy actions by the authorities, including monetary loosening by the National Bank of Kazakhstan (NBK), helped cushion the shock and support activity. To better understand how domestic and external conditions influence growth prospects, this paper applies the Growth-at-Risk approach to quantify macro-financial linkages in Kazakhstan.[2]



Sources: Haver Analytics and IMF staff.
Note: The boxplot shows, from top to bottom respectively, the maximum, 75th, 50th, 25th percentile, and the minimum quarterly growth in 2000-19.

2. The analysis focuses on the pre-COVID period. Macro-financial data used in the analysis generally cover 1999Q4–2019Q4 with a few exceptions (Table 1). Conditions identified to be closely associated with downside risks—tight domestic financial conditions and adverse developments in external demand—were also at play during the COVID pandemic, albeit at a much larger scale and thus resulting in outlier outcomes.

[1] Prepared by Wei Shi. The paper was presented to the Kazakhstani authorities and representatives from academia, the private sector, and international financial institutions during the 2021 Article IV Consultation. The author is grateful for the useful comments and questions provided by Romain Lafarguette (IMF) and seminar participants.

[2] International Monetary Fund (2017).

Table 1. Kazakhstan: Macro-Financial Indicators and Factor Loadings

Variable	*Period*	*Loading*	*Variable*	*Period*	*Loading*
Factor: Domestic Financial Condition			**Factor: External Financial Condition**		
Reserve Money	1999-2019	-0.30	VIX	1999-2019	0.72
Broad Money	1999-2019	-0.32	MOVE	1999-2019	0.24
Policy Rate 1/	2005-2019	0.36	6-Month LIBOR	1999-2019	0.65
Rate on NBK Notes	1999-2019	0.35	**Factor: External Demand**		
Deposit Rate, Legal Entities	1999-2019	0.35	Growth of USA	1999-2019	-0.05
Lending Rate, Legal Entities	1999-2019	0.35	Growth of EU	2003-2019	-0.53
Deposit Rate, Individuals	1999-2019	0.12	Growth of RUS	1999-2019	0.04
Lending Rate, Individuals	1999-2019	0.03	Growth of CHN	1999-2019	-0.42
EMBIG	2015-2019	0.28	International Oil Price 2/	1999-2019	0.49
Liquid Assets, % of ST Liabilities	2008-2019	-0.31	Real Effective Exchange Rate	1999-2019	-0.02
KASE (stock market) Index	2000-2019	-0.35	Terms of Trade	1999-2019	0.55
Factor: Domestic Credit					
Private Credit, % of GDP	1999-2019	0.65			
Private Credit, % Change	1999-2019	0.42			
Capital to Risk-Weighted Assets	2008-2019	-0.63			

Sources: National Bank of Kazakhstan, IMF World Economic Outlook, Monetary and Financial Statistics, Information Notice System (INS), Financial Soundness Indicators, International Financial Statistics, Bloomberg, Haver Analytics, and IMF staff calculations.
1/ Refinancing rate before 2015.
2/ Simple average of Brent, Dubai, and WTI.

3. Macro-financial variables are partitioned into four groups, reflecting domestic and external conditions. For each group, the first principal component is estimated to capture the common trend of the variables under consideration (Table 1 and Figure 1):

- ***Domestic financial conditions:*** This factor is calculated from monetary variables and price-of-risk indicators.[3] Given its positive loadings on interest rates and risk premium, a higher value indicates tighter monetary policy (higher policy rate), higher domestic deposit/lending interest rates, and/or elevated sovereign risk premium. In contrast, an increase in monetary aggregates (reserve and broad money, bank liquidity) or stock market index will lower the value of domestic financial conditions. For instance, a sharp tightening of domestic financial conditions was observed in 2015–16 when the NBK raised its policy rate to contain inflationary pressures following the floating of the tenge and its subsequent depreciation.

- ***Domestic credit conditions:*** This factor has positive loadings on the level and growth of credit to the private sector, and a negative loading on banks' capital levels. Therefore, higher values indicate that more credit is being extended to the private sector. This factor peaked in the mid-2000s during the credit boom, and declined after 2016 as the banking sector was deleveraging and legacy non-performing loans were written off. It has been stable in the most recent period.

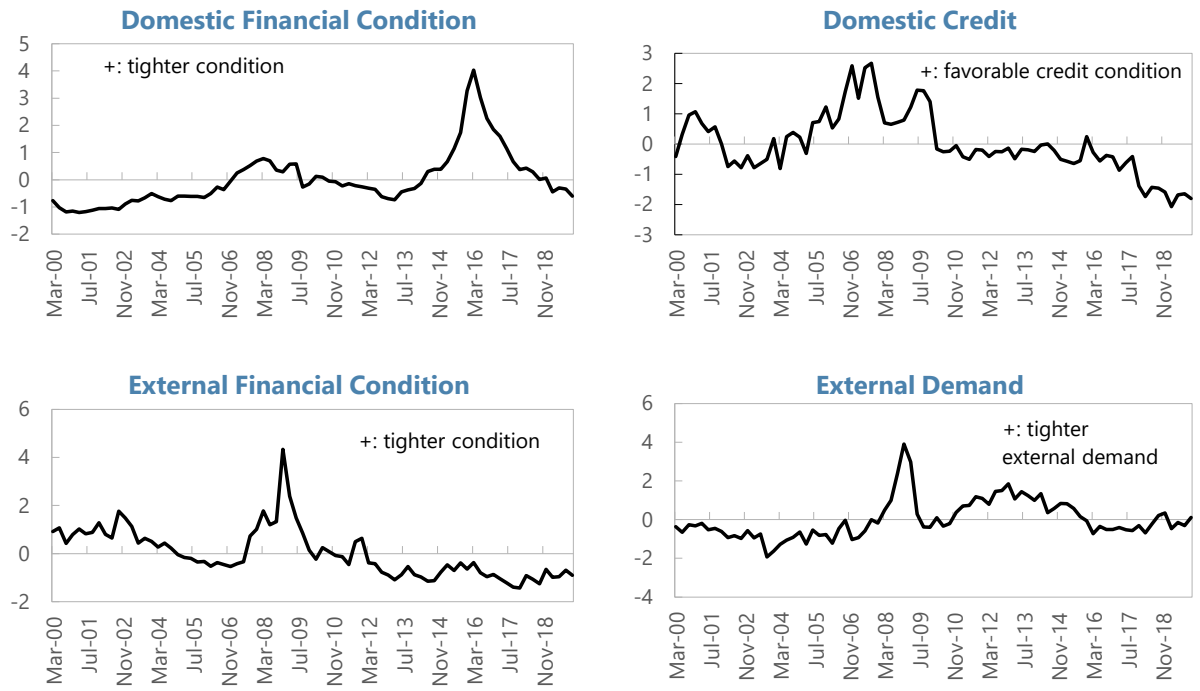
- ***External financial conditions:*** This factor mainly captures the cost of funding in the international financial market (proxied by 6-month LIBOR) and risk sentiment (VIX and MOVE

[3] The refinancing rate was used as the interest rate instrument before the policy rate (or base rate) was introduced in 2015, when the NBK switched to inflation targeting. An alternative approach using the short-term interbank rate (TONIA) instead of the refinancing rate/policy rate was tested but did not significantly change the results.

indices, i.e., volatility in international stock and bond markets). All three underlying indicators have positive loadings – their increase suggests tighter external financial conditions. This factor rose sharply in 2008–09 during the Global Financial Crisis (GFC), and remained moderately loose thereafter.

- ***External demand:*** This factor summarizes economic prospects globally and in Kazakhstan' key trading partners (EU, Russia, and China), as well as the country's relative competitiveness. It has a positive loading on international oil prices and negative loadings on growth rates of the U.S., the EU, and China. External demand dropped (illustrated by an increase of the factor) during the GFC, remained moderately tight in 2011–14 as elevated oil prices suppressed global demand, but has loosened since 2014.

Figure 1. Kazakhstan: Summarizing Indicators of Macro-Financial Conditions



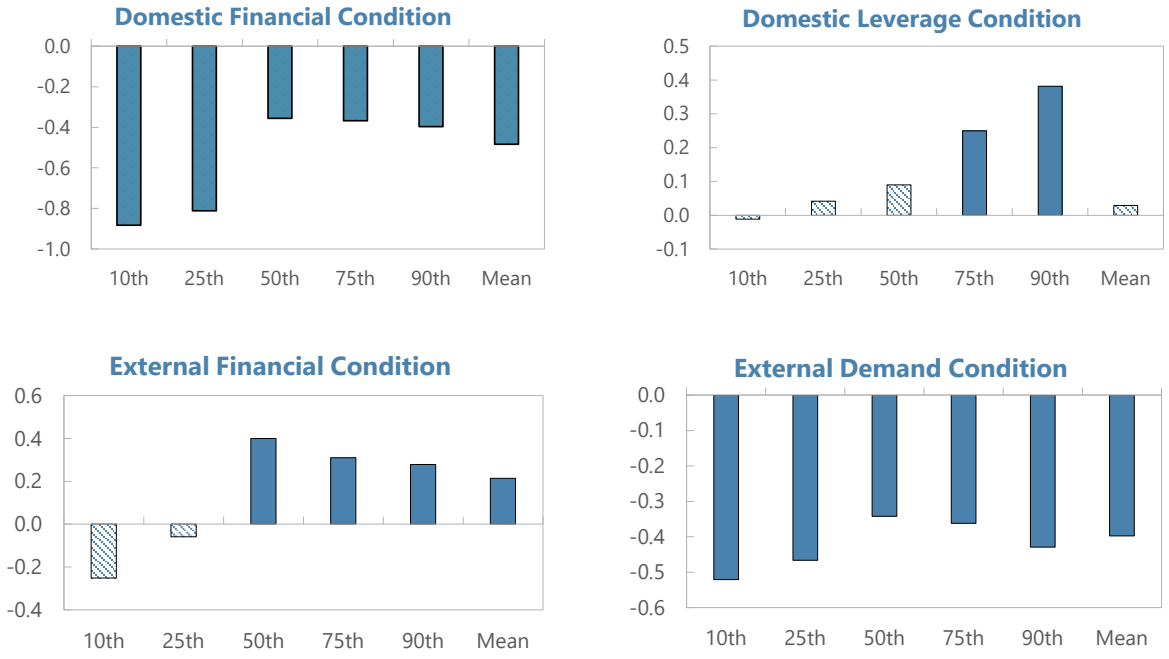
Sources: National Bank of Kazakhstan, IMF World Economic Outlook, Monetary and Financial Statistics, Information Notice System (INS), Financial Soundness Indicators, International Financial Statistics, Bloomberg, Haver Analytics, and IMF staff calculations.

4. Quantile regressions suggest that domestic factors are associated with asymmetric growth prospects over a one-year horizon (Figure 2)**.** Tightening domestic financial conditions signal negative one-year-ahead growth for all percentiles, but the estimated coefficients at the 10th and 25th percentiles are about twice the magnitude compared to other percentiles. In contrast, favorable domestic credit conditions are found to be positively correlated to good growth outcomes (the 75th and 90th percentiles) but have no significant impact on other percentiles.

5. As expected, unfavorable external demand is negatively associated with near-term growth prospects (Figure 2)**.** The estimated coefficients are of comparable sizes across percentiles,

indicating Kazakhstan's overall vulnerability given its high dependence on external trade. In addition, the estimated coefficients of external financial conditions are positive for above-median growth outcomes with borderline statistical significance.[4]

Figure 2. Kazakhstan: Estimated One-Year Ahead Quantile Coefficients

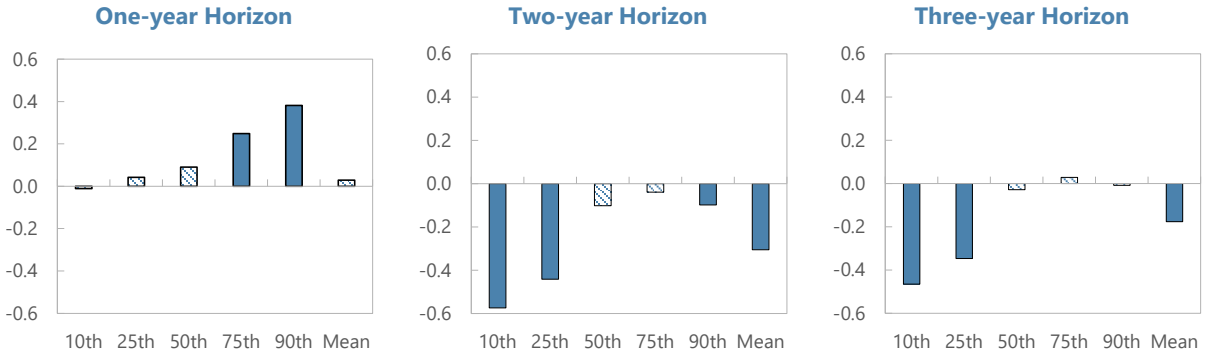


Source: IMF staff estimates.
Note: The bars denote the standardized quantile regression coefficients, with solid bars indicating statistical significance at 5 percent.

6. Some of these factors point to growth risks over longer time horizons. For instance, over 3–4 years, both the positive growth implications of tighter external financial conditions and the negative ones of unfavorable external demand remain statistically significant at 10 percent level. Over 2–3 years, loose domestic credit conditions may aggravate bad growth outcomes, even though they may boost good growth outcomes in the near term (Figure 3). In contrast, the impact of domestic financial conditions is short-lived and dissipates beyond two years.

[4] This may seem counter-intuitive. One explanation is that Kazakhstan holds substantial foreign currency assets in its national oil fund, implying that higher international interest rates tend to improve its fiscal position.

Figure 3. Kazakhstan: Estimated Quantile Coefficients: Domestic Credit



Source: IMF staff estimates.
Note: The bars denote the standardized quantile regression coefficients, with solid bars indicating statistical significance at 10 percent.

7. The analysis highlights Kazakhstan's vulnerability to external shocks and the policy tradeoff between monetary policy tightening and downside risks to growth. Historically, downside risks to growth intensified due to either heightened external demand and/or tight domestic financial conditions. The two most significant episodes when projected growth sharply deteriorated at the lower end (10th percentile) are (i) during the GFC, due falling global demand, and (ii) in 2015–16, due to the policy rate hike to counter currency pressures induced by the oil price decline and exchange rate regime shift (Figure 4). The counter-factual simulations (Table 2) also suggest reductions in the projected near-term growth associated with permanent increases in the policy rate or the sovereign risk premium, lower level of credits, less favorable trading partners' growth, and/or permanently higher oil prices that dampen global demand.[5]

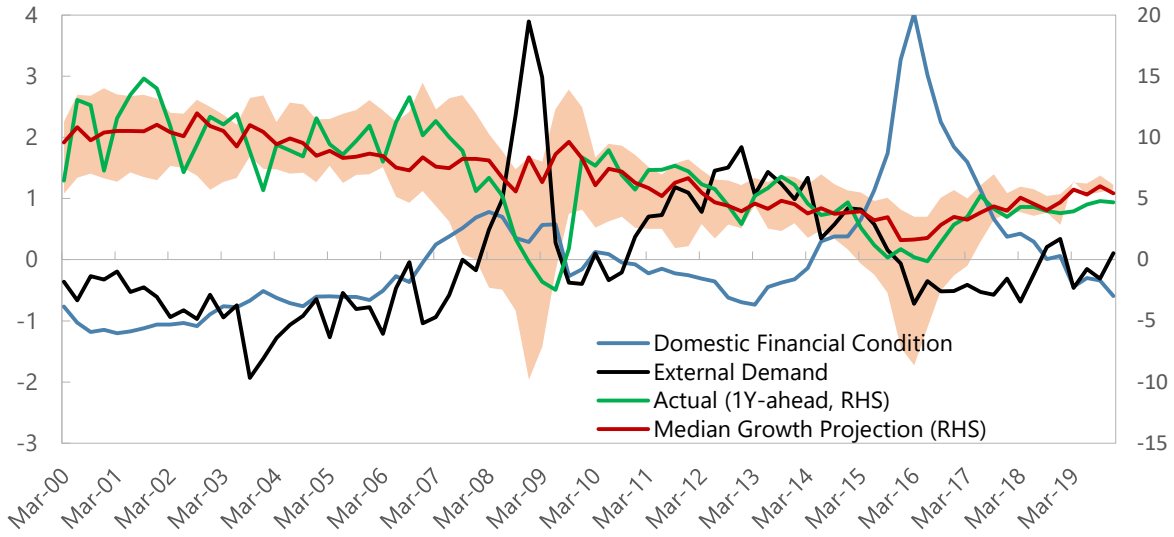
Table 2. Kazakhstan: Simulated Impact of Selected Macro-Financial Shocks
(Projected one-year ahead growth post- vs pre-shock, in percent)

Variable	Shock	10th	50th	90th
Policy Rate	+200 bps	-2.2	-2.1	-2.0
EMBIG	+200 bps	-2.0	-1.9	-1.9
Private Credit, % of GDP	-5 percent of GDP	-1.2	-1.0	-0.7
6-Month LIBOR	+200 bps	0.2	0.5	0.7
Growth of EU	-1 percent	-0.7	-0.7	-0.7
Growth of CHN	-1 percent	-0.4	-0.4	-0.4
International Oil Price	+$5	-2.9	-3.0	-3.0

Source: IMF staff calculation.

[5] Kazakhstan being an oil exporter, high oil prices help strengthen its fiscal and external positions. However, the Growth-at-Risk analysis in this paper focuses mainly on the global demand channel and therefore is not able to fully capture the potential benefits of strong oil prices.

Figure 4. Kazakhstan: One-Year Ahead Projected Growth, 2000–19
(In percent, yoy)



Source: IMF staff estimate.
Note: The shaded area denotes the one-year ahead projected 10-90th percentile.

8. Looking ahead, elevated inflation, uncertain recovery prospects in trading partners, and limited export diversification are the main risks to Kazakhstan's growth outlook. In particular, further monetary tightening might be necessary if inflation pressure persists, which could pose downside risks to growth, although accommodative fiscal policies are a mitigating factor. In the longer term, further export diversification in both products and trading partners will help reduce the country's vulnerability to external shocks and enhance economic resilience.

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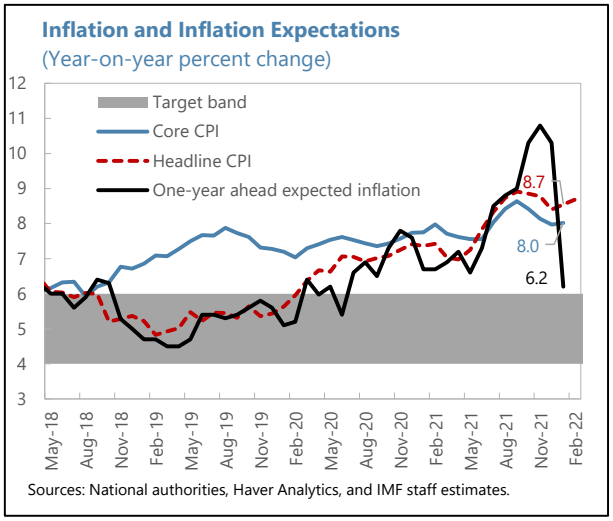
SHOCKS AND MONETARY POLICY TRANSMISSION IN KAZAKHSTAN: EMPIRICAL FINDINGS FROM AN ESTIMATED DSGE MODEL[1]

Since 2015 monetary policy in Kazakhstan has been based on an inflation targeting (IT) regime with a target band of 4–6 percent for headline inflation. Headline inflation was brought down to the mid-range of the band in 2019, before rising again to above the target range in 2020. This note analyses the impact and the persistence of various shocks to the Kazak economy and assess the appropriateness of monetary policy responses.

Empirical results suggest large depreciation can have substantial immediate and persistent impact on inflation, implying difficult policy tradeoffs; the interest rate channel is working but remains relatively weak; US monetary policy shocks so far have an insignificant impact on Kazakhstan; and fiscal dominance could undermine the National Bank of Kazakhstan's (NBK's) policy credibility that is crucial to anchor inflation expectations and improve policy tradeoffs.

1. Since 2015 monetary policy in Kazakhstan has been based on an inflation targeting (IT) regime with a target band of 4–6 percent for headline inflation. The current IT regime is characterized by the NBK as "transitory," acknowledging the remaining constraints to monetary policy effectiveness, such as procyclical fiscal policy and subsidized government lending. Headline inflation declined to the middle of the target range in 2019 but has risen well above it since then. The NBK aims to achieve full-fledged IT by 2030 and has laid out a comprehensive reform agenda for this purpose, including a lower inflation target range of 3–4 percent by 2025.[2] Progress has been made recently to improve transparency (for example, by publishing the FX transactions of the oil fund), policy independence (by creating a Monetary Policy Committee without government representation or participation), analytics (with ongoing Fund TA support), and public communication.



2. Kazakhstan needs to manage delicate monetary policy trade-offs, due in part to the structure of its economy. Kazakhstan is an oil-exporting country that imports most of its food and

[1] This is based on a forthcoming IMF Working Paper "An Estimated integrated Policy Framework (IPF) Model for Kazakhstan" by Jesper Linde, Hou Wang, Jianping Zhou, and Kaili Chen. The paper was presented to the Kazakhstani authorities and other audience from academia, the private sector, and international financial institutions during the 2021 Article IV Consultation.

[2] See *Monetary Policy Strategy 2030*, the National Bank of the Republic of Kazakhstan, 2021.

consumer goods. Therefore, a sharp decline in oil prices tends to both weaken the economy and raise inflation due to the high pass-through from depreciations of the tenge to domestic prices. Moreover, the interest rate transmission channel continues to be hampered by underdeveloped domestic bond markets, excess bank liquidity, widespread credit subsidies, and elevated deposit dollarization.

3. This note assesses the effectiveness of monetary policy transmission channels based on a two-country DSGE model estimated for Kazakhstan. The model includes both nominal rigidities and financial frictions. The estimated model allows us to quantify the importance of these frictions as well as the magnitude and persistence of various shocks to the economy, and to assess the merits of alternative monetary policy responses.

A. A Brief Description of the Model and Estimation

4. The model is based on the IMF's quantitative IPF framework.[3] It captures features common to emerging market economies (EMEs) including Kazakhstan, such as larger exchange rate pass-through and less developed financial markets relative to advanced economies (AEs). The model emphasizes the importance of anchoring inflation expectations so that monetary policy can focus more on output stabilization. Anchoring inflation expectations to improve policy tradeoffs requires strong monetary and fiscal policy credibility. For countries that recently adopted IT, such as Kazakhstan, building policy credibility takes time and during the transition, the use of additional policy tools may be necessary in some specific cases to help improve policy tradeoffs.

5. The New Keynesian model follows a canonical set up for small open economies (Gali and Monacelli, 2005)**.** In addition to nominal price rigidities, the model includes the following features: (1) incomplete international financial markets that can lead to volatile real exchange rates; (2) local currency pricing and incomplete exchange rate pass-through; (3) sticky nominal wages that can amplify exchange rate shocks; (4) discounting in IS and Phillips curves to mute the potency of future policies; and (5) micro-founded endogenous private and sovereign borrowing spreads (Adrian et al, 2021).

6. The model has the following four building blocks:

- **The aggregate demand block** includes domestic demand (endogenous), government spending (exogenous), and exports and imports (endogenous), but not capital accumulation. Exports depend on foreign demand and relative prices, and imports are disaggregated into consumption and intermediate goods and influenced by domestic consumption and relative prices. One important feature is that private borrowing spreads (which are partly endogenous and partly exogenous) enter the forward-looking consumption equation in addition to inflation adjusted policy interest rate.
- **The aggregate supply block** specifies how prices and wages are determined. Domestic prices follow a Phillips curve. Export and import pricing allow for a gradual and inherent persistent

[3] See Adrian et al (2020) and Adrian et al (2021).

pass-through of exchange rate movements. Wage growth is influenced by a gradual adjustment to catch up with long-term consumer price inflation, which could amplify exchange rate shocks if inflation expectations are not well anchored.[4]

- **The financial block** includes banks that engage in lending and financiers who trade currencies. It focuses on two types of financial frictions: the so called "agency friction" due to financiers' limited risk-bearing capacity and the balance sheet friction due to banks' occasionally binding collateral constraints, which is captured by private borrowing spreads. These frictions give rise to a modified UIP condition and possible rationale for using FXI in certain cases

- **The final building block** assumes a monetary policy reaction function based on a modified Taylor rule for the interest rate. In addition, the central bank can also use FXIs.

7. The model is estimated on quarterly data (2003Q1–2020Q3) for Kazakhstan with Bayesian likelihood methods. Parameters pertaining to structural parameters and shock processes are estimated with standard priors in the literature (Table 1). Parameters pertaining to steady-state ratios are calibrated (Figure 1).[5] It uses ten structural shocks, as well as foreign shocks, to account for the fluctuations in output, inflation, and other macro variables (Table 1). Finally, the foreign economy is proxied by a pre-estimated closed U.S. economy model.

8. The model is estimated under three specifications of FXI: (1) A baseline model without FXIs; (2) a model with an exogenous FXI based on an AR(1) process with an error correction mechanism where the change in the NBK FX reserves is included as an additional observable; and (3) a model with an endogenous FXI rule motivated by the financial frictions discussed earlier. It turns out that in the case of Kazakhstan the estimation outcome does not support that NBK uses FXIs systematically (see Table 2). Moreover, FX interventions, measured by changes in NBK's FX reserves, has modest effects on the exchange rate.[6]

[4] If supported empirically, this channel generates a more sustained inflationary impact of exchange rate depreciations and implies a more aggressive interest rate response to re-anchor inflation expectations.

[5] The model estimation is based on de-trended GDP, exports, imports, and government spending using an HP filter, and include core inflation, nominal wage growth, policy rate, long-term interest rate (10 years), real exchange rate, and FX reserves as observables.

[6] For example, an FXI (selling FX) of 10 percent of GDP leads to a 15 percent appreciation on average for a group of EMEs and small AEs according to Adler et al. (2019) and Blanchard et al. (2015). Based on staff estimates, the same size FXI (selling) would lead to only about 1.2 percent appreciation of Tenge.

Figure 1. Kazakhstan: Key Macro Variables and Steady State

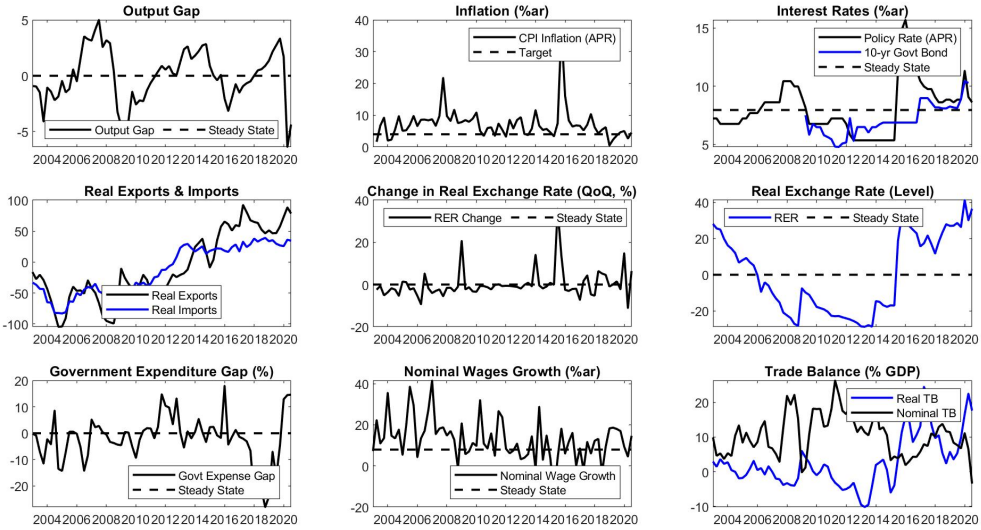


Table 1. Kazakhstan: Summary of Observables and Shocks

Observables (SOE)	Observables (ROW/US)	Domestic Shocks		Foreign/US Shocks	
Output gap	Output gap	ϵ^{c}	Domestic demand shock	ϵ^{c*}	Domestic demand shock
Core inflation	Core inflation	ϵ^{m_d}	Import demand shock	$\epsilon^{\pi*}$	Price mark-up shock
Real exports	Nominal wage growth	ϵ^{m_x}	Export demand shock	$\epsilon^{\omega*}$	Wage mark-up shock
Real imports	Real gov consumption	ϵ^{π}	Price mark-up shock	ϵ^{i*}	Policy rate shock
Real gov consumption	Policy rate	ϵ^{π_m}	Import price mark-up shock	ϵ^{g*}	Government spending shock
Nominal wage growth		ϵ^{ω}	Wage mark-up shock		
Real exchange rate		ϵ^{q}	UIP shock		
Policy rate		ϵ^{η}	Financial spread shock		
Long-term interest rate		ϵ^{i}	Policy rate shock		
Foreign exchange intervention		ϵ^{g}	Government spending shock		
		ϵ^{fxi}	FXI shock		

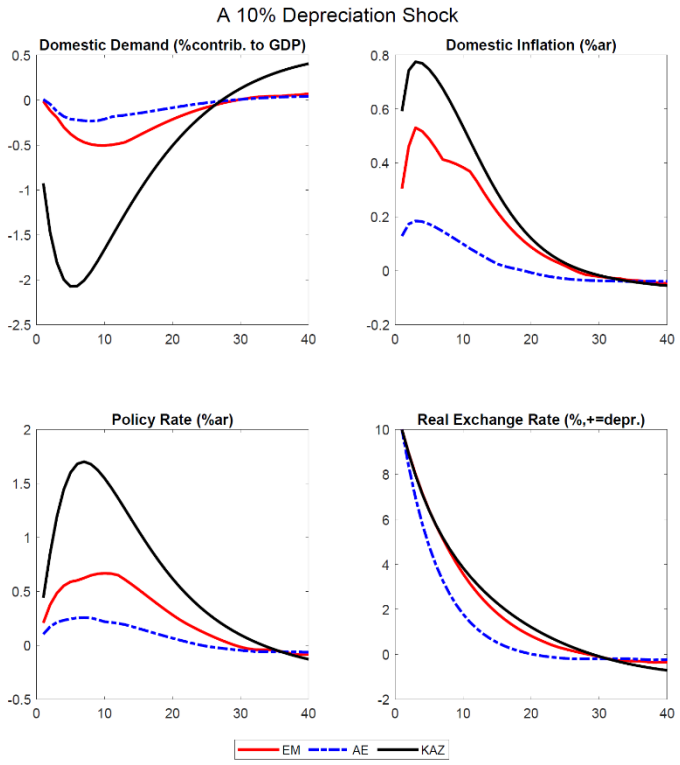
B. Impulse Responses Analysis

9. Estimated impulse response functions (IRFs) are used to analyze key transmission channels and potential implications for policy tradeoffs. The analysis focuses on key shocks, such as the impact of a large depreciation of the tenge on output and inflation, the effectiveness of the interest rate channel, and the NBK's response to COVID-style shocks. Both the initial impact and the persistence of various domestic and external shocks on the observed macroeconomic variables are explored. The IRFs to several shocks are plotted in Figures 2–7.

10. Exchange rate shocks are more inflationary and persistent in Kazakhstan than most other emerging market economies. Figure 2 plots the effects of a 10 percent depreciation due to an UIP risk premium shock on inflation, policy rate, and domestic demand. The IRF results are based on estimated models for 17 EMEs (including Kazakhstan) and AEs, using the same model and priors for dynamics and shock processes (Kolasa et al, 2021). The results show that exchange rate shocks are typically much more inflationary in EMEs than AEs, suggesting less well anchored inflation

expectations and more difficult policy tradeoffs in EMEs, and even more so for Kazakhstan, where the exchange rate pass-through is even larger and more persistent than the typical EME in our sample, leading to larger policy rate increases and sharper contractions in domestic demand.

Figure 2. Kazakhstan: Policy Tradeoffs Under an Exchange Rate Shock



11. A flexible exchange rate facilitates adjustments in the external accounts. Using the previous example, a 10 percent deprecation improves the real trade balance more than the contraction in domestic demand, leading to an overall expansion in output (Figure 3). The result that an exchange rate deprecation is expansionary holds up under alternative assumptions of FXI behavior.

12. The interest rate channel is relatively weak, but still effective. Figure 4 shows that the impact of a 100 bp increase in the policy rate on domestic demand in Kazakhstan is only about half of the impact observed in a typical EME.

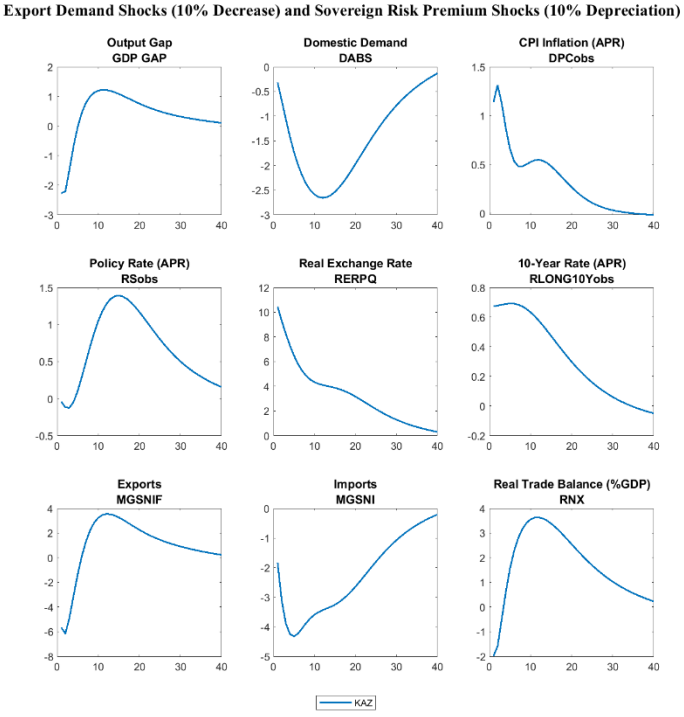
13. Figure 5 illustrates how high government spending could crowd out private demand and why effective policy coordination is crucial to achieve monetary policy credibility. The modeling of fiscal policy is rudimental and currently only allows for exogenous changes in government spending financed by lump sum taxes (implying that Ricardian equivalence holds). The scenario considers a one-time 10 percent front-loaded transient increase in real government spending and its effect on inflation, domestic demand, exchange rate, and external trade. An

independent central bank with inflation objective would react strongly (policy rate increases by almost 200 bsp at the peak) to contain inflation pressure and would maintain a tight monetary policy stance for 2–3 years. However, if the central bank is constrained by the financing need of the government, it might not be able to maintain a tight monetary policy stance and achieve price stability. Its policy credibility could be affected adversely.

14. Global monetary policy shocks appear to have modest effects (Figure 6). This is consistent with the relative low degree of financial integration of Kazakhstan's economy in global financial markets and the small share of foreign investors in domestic financial markets.

15. Figure 7 considers a combination of shocks inspired by the recent COVID crisis. With collapsing oil prices in March-April 2020, export demand fell sharply while rising global risk aversion led to a sharp depreciation of the tenge. In response, the NBK raised the policy rate to 12 percent (from 9.25 percent) and intervened in the FX market to limit volatility. As market conditions stabilized, the policy rate was quickly reduced to 9 percent and interventions ceased by the summer of 2020. Overall, the tenge depreciated by 10 percent vis-à-vis the US dollar in 2020. In the second half of 2021, as inflation rose well above the target range, the NBK raised the policy rate three time by a total of 75 bp. These actions appear to be consistent with model results. Given that the depreciation could have persistent effects on inflation, the NBK needs should stand ready to raise policy rate as necessary to keep inflation expectations anchored.

Figure 3. Kazakhstan: Shocks Similar to the COVID Crisis



C. Historical Shock Decomposition

16. The historical shock decomposition assesses the main drivers of the fluctuations of macroeconomic variables. While the IRFs discussed in the previous section examine the effects on endogenous variables of specific shocks, the historical shock decomposition considers the combined effects of all structural shocks in the model on a macroeconomic variable and investigates how their relative importance evolve over time. Figure 8–10 show the contribution of key shocks to the observed deviation of the output gap, inflation, and policy rate from their respective steady states:

- The **output gap** has been driven by both domestic and foreign demand shocks. Since 2015 and the introduction of IT, real exchange rate gained a more important role. Domestic demand tends to fall with tenge depreciation, declining imports, and rising private borrowing spreads.
- **Inflation** has been influenced primarily by exchange rate shocks, reflecting a high pass-through, and in relation with global commodity price cycles. Wage inflation has become more important since 2018.
- The **policy rate** has reacted mainly to developments in domestic demand, foreign demand, exchange rate fluctuations, and wages.
- **Private borrowing spreads** have consistently exerted pressure on output, weakening the interest rate channel of monetary policy.[7]

D. Policy Conclusions

17. While the NBK has responded to the COVID crisis appropriately, containing inflation may require further monetary tightening in the coming months. Headline inflation is now well above the target range. With the recovery underway and the output gap closing, the NBK needs to be ready for further policy tightening to reduce the risk of inflation expectations becoming de-anchored in the medium term.

18. The NBK faces difficult policy tradeoffs. Whereas a flexible exchange rate is helpful for achieving external adjustment, a large depreciation can generate persistent inflationary pressures, as the NBK is transitioning to a fully-fledged IT framework to better anchor inflation expectations. Interest channel of monetary policy transition is working but remains weak, in part due to less developed domestic financial markets and subsidized lending. While changes in global financial conditions (more specifically the US monetary policy) so far appear to have limited impact on Kazakhstan, this could change as its domestic markets develop further and attract more foreign investors. Fiscal dominance would undermine the NBK's policy credibility that is crucial to anchor inflation expectations and improve policy tradeoffs.

[7] Two plausible explanations for this would require further analysis: (i) tenge depreciation could increase deposit dollarization; given restrictions on dollar lending and open FX positions, banks would have to raise rates on tenge deposits (thereby increasing lending spreads); (ii) given the 4-6 percent inflation band, banks may assume that the NBK would target 4 percent through a more aggressive monetary policy stance, leading to higher lending spread.

19. Going forward, a broad reform approach is needed to address remaining obstacles to effective implementation of IT. In line with the NBK's 2030 strategy, improving the interest rate transmission channel and overall monetary policy effectiveness will require efforts on several fronts, including to further develop domestic capital markets, reduce dollarization, coordinate with fiscal policy, manage excess bank liquidity, and eliminate non-core mandates and quasi-fiscal activities of the NBK. The NBK could also explore alternative settings of the target band (e.g., a setting that emphasizes a point inflation objective) to better communicate policy intentions and anchor inflation expectations. Surveys of inflation expectations over time horizons longer than oner year and with larger coverage than households could also be conducted to better assess de-anchoring risks.

Table 2. Kazakhstan: Prior and Posterior Distribution of Structural Parameters and Shock Processes

Parameters		Prior distribution			Posterior distribution			
					Endogenous FXI		Exogenous FXI	
		Type	mean	std	mh mean	mh std	mh mean	mh std
Interest Rate Reaction Function	γ_π	norm	0.5	0.15	**0.58**	0.15	**0.56**	0.14
	γ_y	beta	0.125	0.05	**0.18**	0.05	**0.19**	0.05
	ρ	beta	0.75	0.05	**0.81**	0.03	**0.82**	0.03
Inflation Processes	ι_m	beta	0.7	0.2	**0.68**	0.19	**0.68**	0.18
	ι_p	beta	0.7	0.2	**0.26**	0.09	**0.25**	0.08
	ι_x	beta	0.7	0.2	**0.45**	0.21	**0.39**	0.19
	ι_w	beta	0.7	0.2	**0.88**	0.07	**0.89**	0.06
	ξ_m	beta	0.75	0.05	**0.68**	0.05	**0.69**	0.05
	ξ_p	beta	0.75	0.05	**0.94**	0.01	**0.94**	0.01
	ξ_w	beta	0.75	0.05	**0.73**	0.03	**0.73**	0.04
	ξ_x	beta	0.75	0.05	**0.63**	0.07	**0.63**	0.07
	ν	beta	0.1	0.05	**0.10**	0.05	**0.11**	0.05
Consumption Habit	h	norm	0.7	0.15	**0.39**	0.07	**0.40**	0.07
Discount Factor	δ_d	beta	0.95	0.025	**0.94**	0.02	**0.94**	0.02
Impact of Market Depth on RER	Γ	beta	0.05	0.01	**0.02**	0.00	**0.01**	0.00
	ρ_{ε^c}	beta	0.85	0.05	**0.79**	0.05	**0.79**	0.05
	ρ_{ε^g}	beta	0.85	0.05	**0.80**	0.05	**0.81**	0.05
	$\rho_{\varepsilon^{m^d}}$	beta	0.85	0.05	**0.83**	0.04	**0.84**	0.04
	$\rho_{\varepsilon^{m^x}}$	beta	0.85	0.05	**0.92**	0.02	**0.92**	0.02
	ρ_{ε^q}	beta	0.85	0.05	**0.96**	0.01	**0.96**	0.01
Foreign Exchange Intervention	$\gamma_{\Delta S}$	beta	0.5	0.2	**0.24**	0.08		
	$\rho_{\Delta R}$	beta	0.5	0.2	**0.25**	0.10	**0.22**	0.10
	ρ_R	beta	0.05	0.025	**0.04**	0.02	**0.05**	0.02
Standard Deviation of Shocks		**Prior distribution**			**Posterior distribution**			
					Endogenous FXI		**Exogenous FXI**	
		Type	**mean**	**std**	**mh mean**	**mh std**	**mh mean**	**mh std**
Domestic Demand Shock	σ_{ε^c}	invg	0.5	200	**6.84**	0.87	**7.05**	0.86
Imported Inflation Shock	$\sigma_{\varepsilon^{\pi^m}}$	invg	0.1	200	**0.08**	0.05	**0.11**	0.09
Domestic Inflation Shock	σ_{ε^π}	invg	0.1	200	**1.19**	0.11	**1.18**	0.10
Wage Inflation Shock	$\sigma_{\varepsilon^{\pi^w}}$	invg	0.1	200	**3.75**	0.41	**3.71**	0.37
Financial Spread Shock	$\sigma_{\varepsilon^\eta}$	invg	0.1	200	**2.34**	0.48	**2.19**	0.39
Govt. Expenditure Shock	σ_{ε^g}	invg	0.5	200	**7.19**	0.64	**7.29**	0.63
Import Shock	$\sigma_{\varepsilon^{m^d}}$	invg	1	200	**8.01**	0.71	**8.04**	0.74
Export Shock	$\sigma_{\varepsilon^{m^x}}$	invg	1	200	**97.62**	2.11	**97.63**	2.10
Exchange Rate Shock	σ_{ε^q}	invg	1	200	**1.39**	0.20	**1.35**	0.20
Interest Rate Shock	σ_{ε^i}	invg	0.1	200	**0.23**	0.02	**0.24**	0.03
FXI Shock	$\sigma_{\varepsilon^{\Delta R}}$	invg	1	200	**6.73**	0.58	**6.62**	0.60
Log data density [ModifiedHarmonicMean] is					-2663.91		-2663.62	

Figure 4. Kazakhstan: Impulses Responses to an Exchange Rate Shock Under Various FXI Specifications

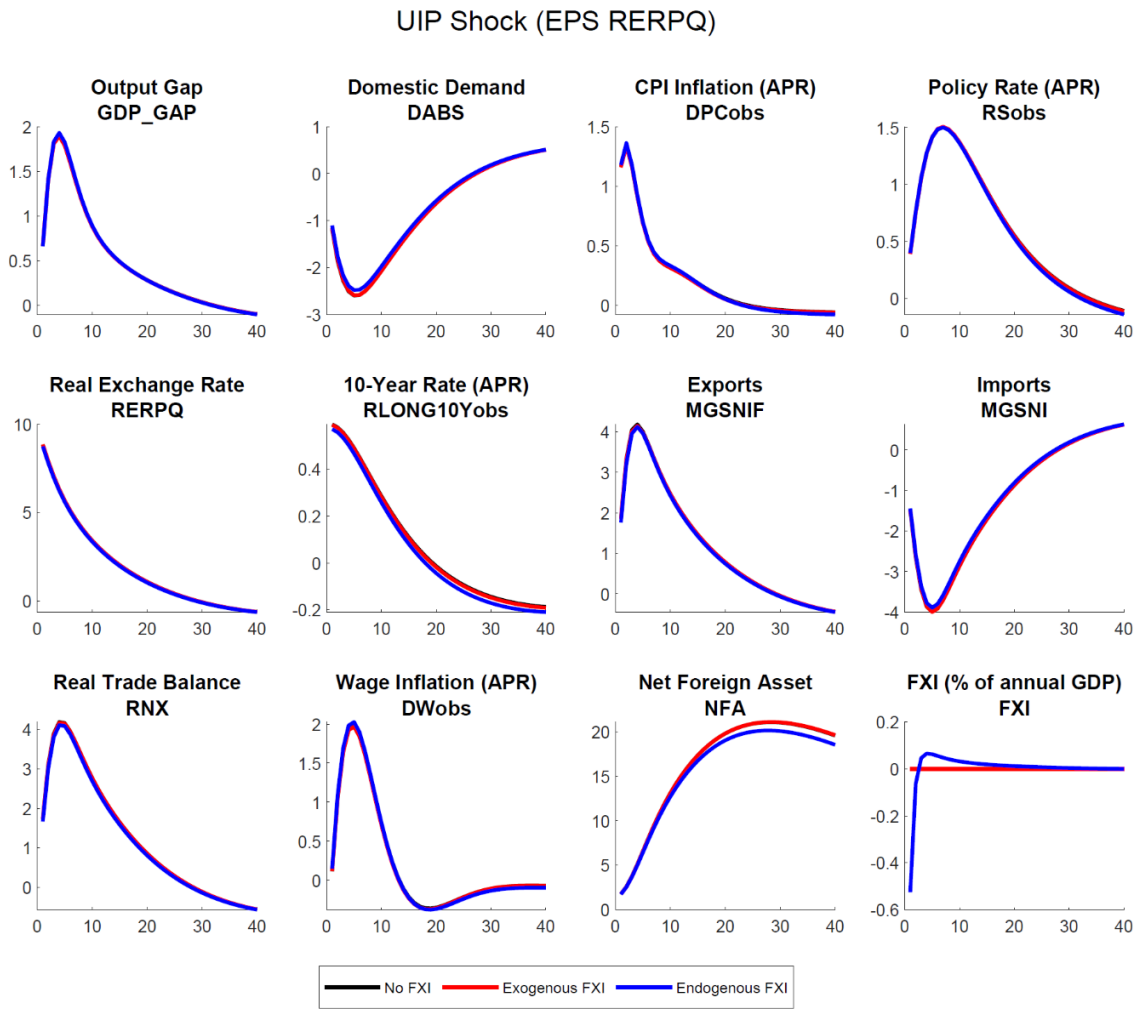


Figure 5. Kazakhstan: Impulse Responses to a Monetary Policy Shock

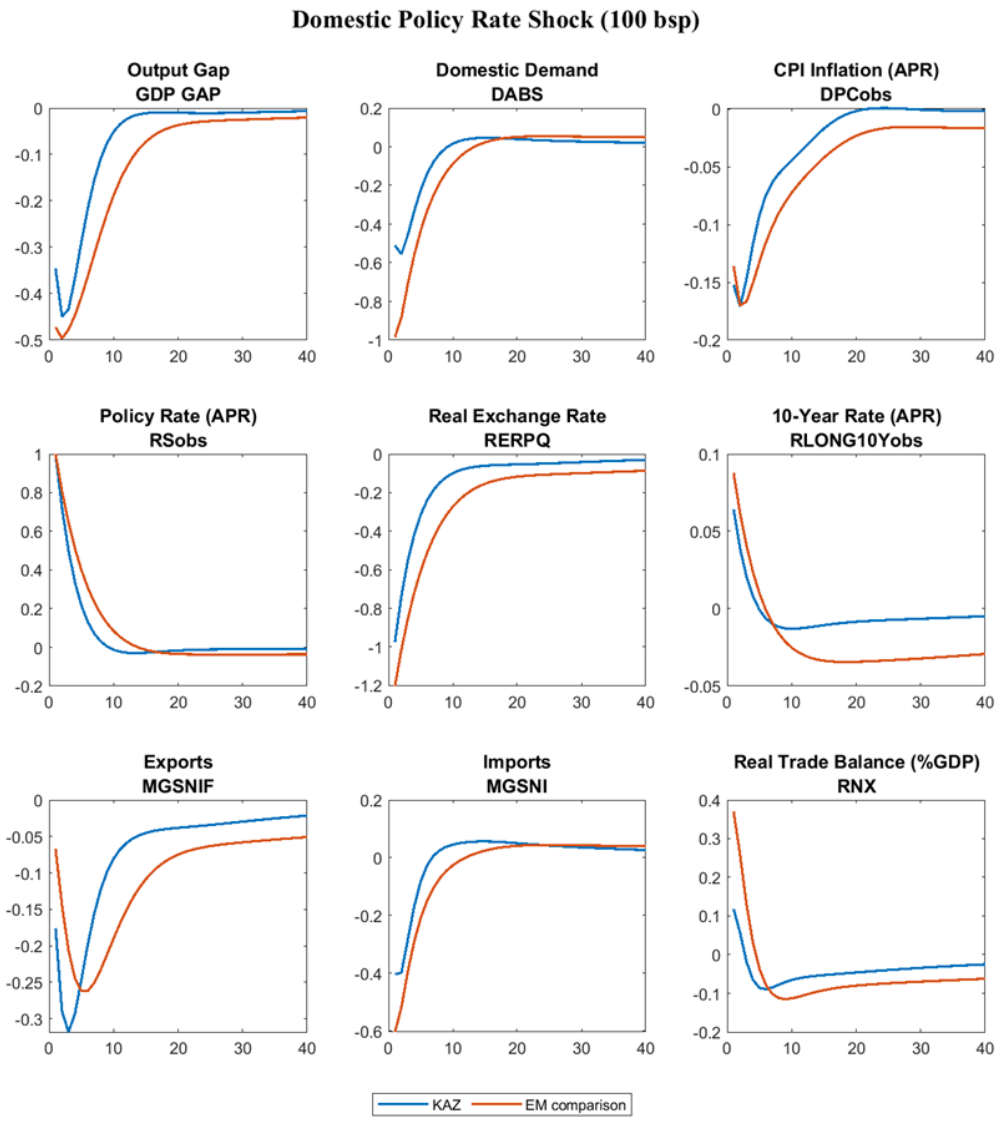


Figure 6. Kazakhstan: Impulse Responses to a Fiscal Policy Shock
(10 percent increase in real government spending)

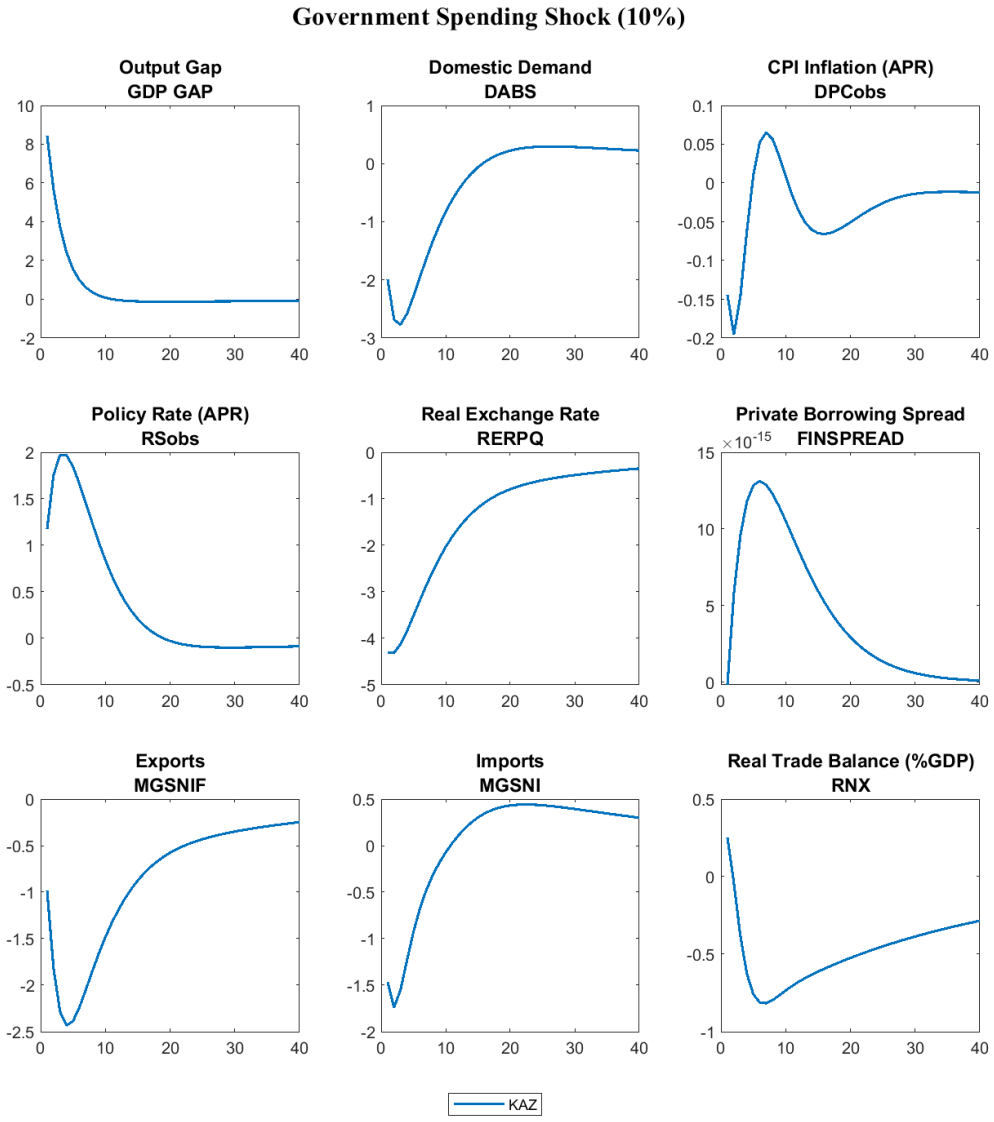


Figure 7. Kazakhstan: Impulse Responses to a Foreign Monetary Policy Shock

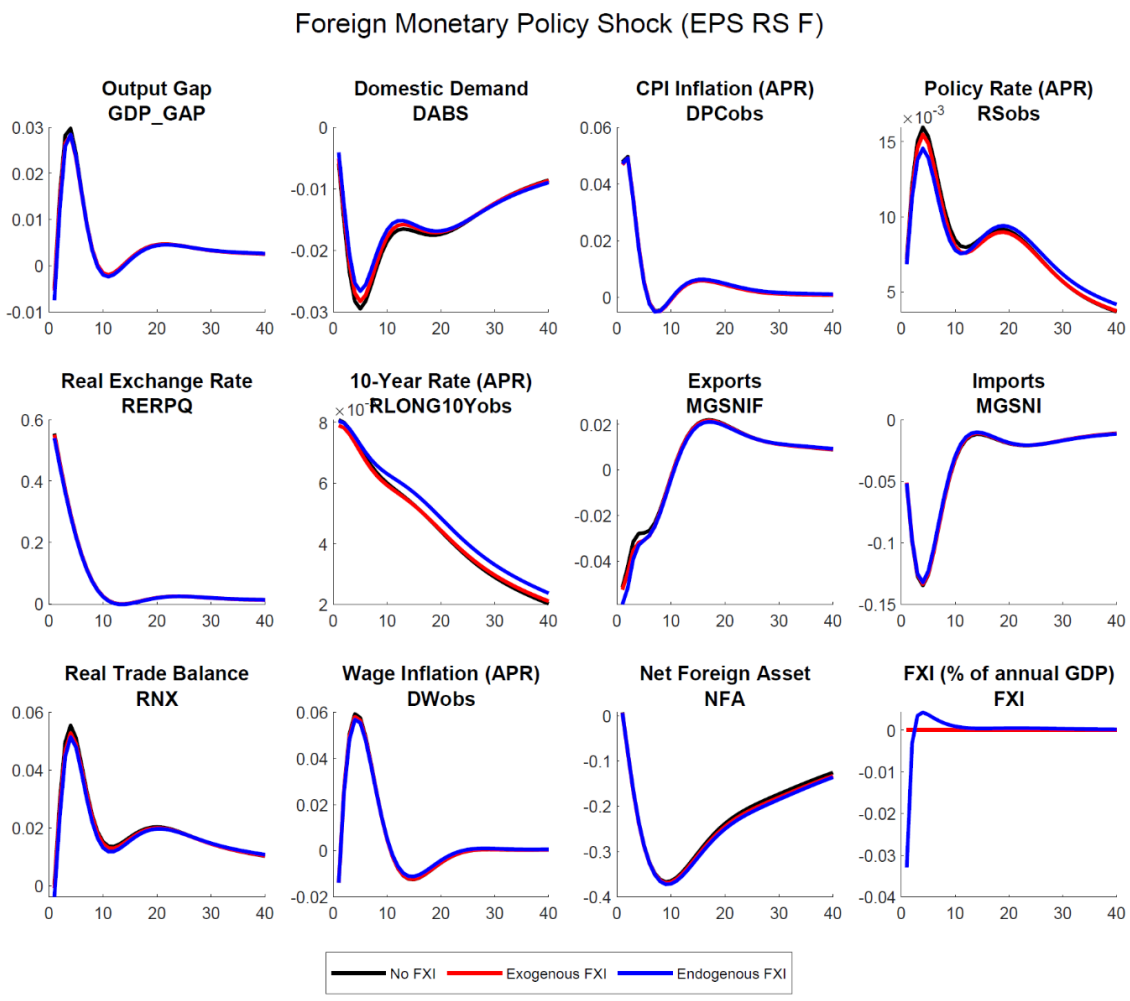


Figure 8. Kazakhstan: Output Gaps: Historical Shock Decomposition

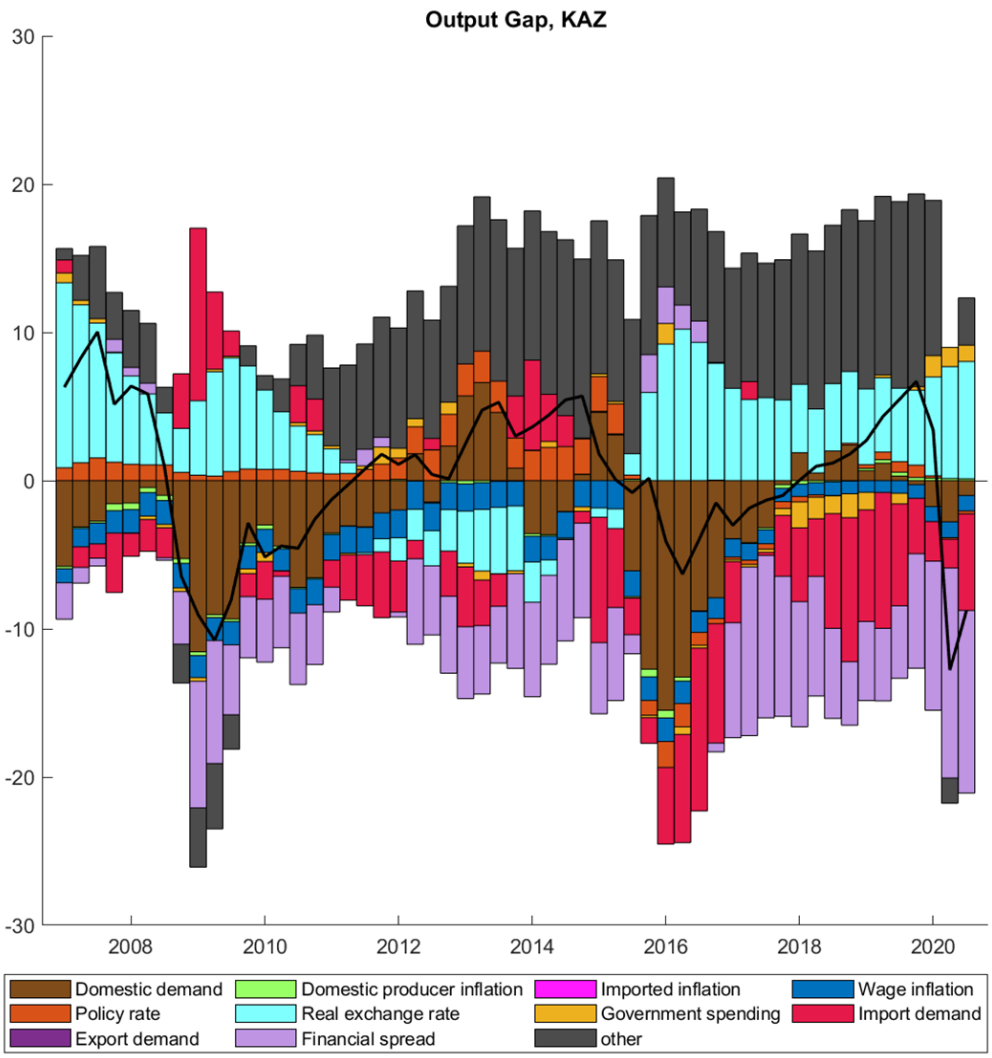


Figure 9. Kazakhstan: Inflation: Historical Shock Decomposition

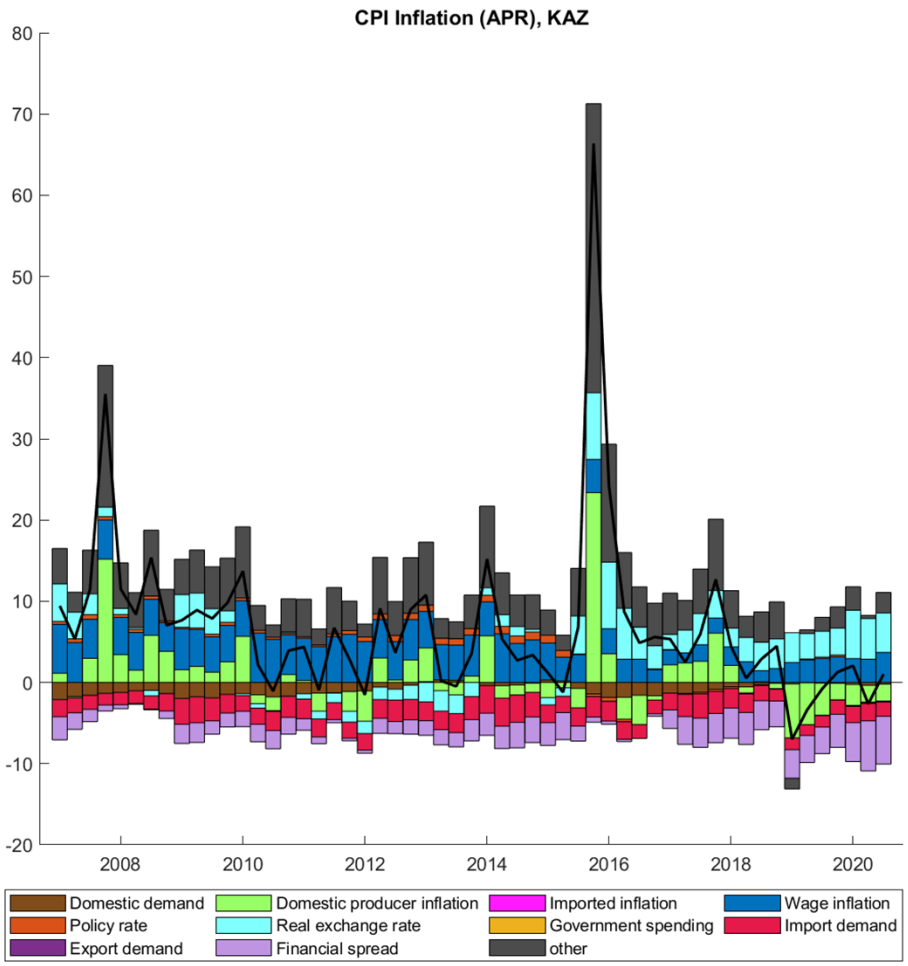
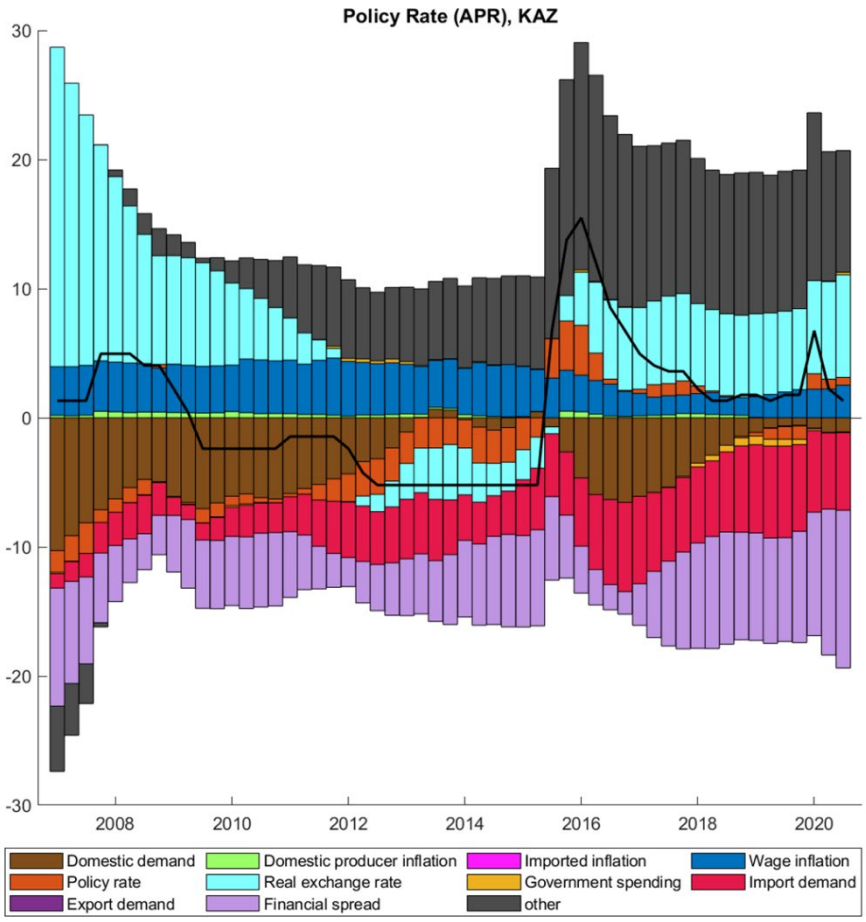


Figure 10. Kazakhstan: Policy Rate: Historical Shock Decomposition



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CLIMATE CHANGE AND STRUCTURAL TRANSFORMATION[1]

Kazakhstan faces multiple challenges from climate change. It needs to adapt to potentially adverse natural phenomena, reduce carbon emissions from current high levels, and prepare for a low-carbon global economy. The authorities have committed to cut emissions by 15 percent relative to the 1990 level and to zero net emissions by 2060. Given the country's large reliance on fossil fuels and low energy prices, this will likely require a combination of structural economic transformation and higher energy prices. Revenue mobilization from carbon taxation can support the adjustment, and the long-term fiscal impact of reduced global demand for oil appears manageable, especially if early policy implementation allows to reduce the non-oil deficit from current levels. More broadly, the pace and objectives of the long-term adjustments will raise important social and intergenerational choices. In this context, early planning will also facilitate a gradual approach to allow the private sector to adjust and to strengthen social safety nets.

A. Climate Change and Policy Challenges in Kazakhstan

1. Climate change is expected to lead to significant increases in temperatures and growing frequency of adverse natural phenomena in Kazakhstan.[2] Average annual temperatures in Kazakhstan were 0.3°C to 1.4°C warmer during the period 1997–2010 than during the baseline period of 1971–2000 and there was an average rise of 0.28°C per decade between 1941 and 2011. Changes in precipitation levels were minor. Long-term projections point to a significant average annual rise in temperatures by the end of the 21st century relative to the reference period (1986–2005), ranging from 5.8°C under the highest global emissions scenario to 2.1 °C in the lowest one. There is less clarity about projections for precipitation, but most models predict an increase. Overall, climate change would lead to a significant rise in the frequency of heatwaves, droughts, and mudflows.

2. More broadly, climate change raises multiple challenges for Kazakhstan. Climate change will affect the economy through various channels, including its long-term growth potential, the fiscal and external positions, and the financial sector. The key policy challenges (discussed in turn below) can be summarized as follows:

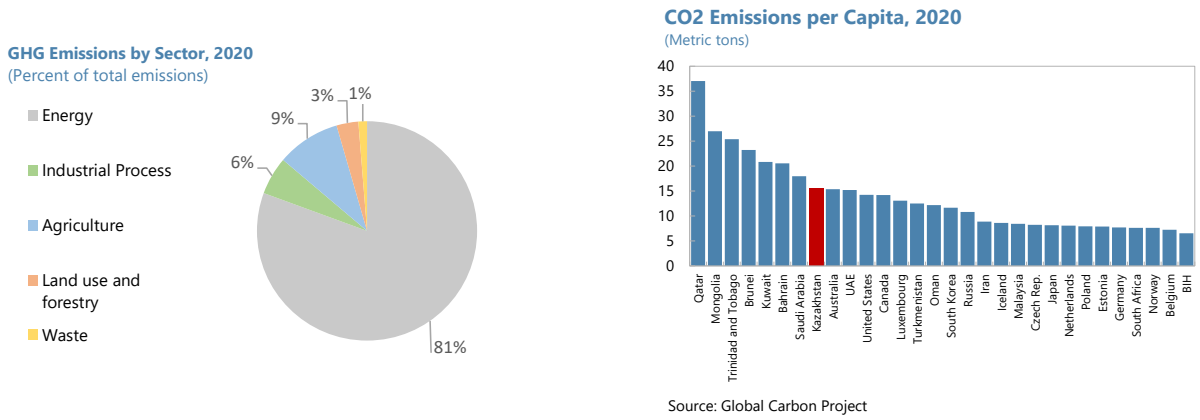
- ***Adaptation:*** *addressing rising temperatures and hydrological changes.*
- ***Mitigation:*** *reducing emissions from current high levels.*
- ***Transition:*** *preparing for a long-term decline in global demand for oil.*

[1] Prepared by Olivier Basdevant and Alejandro Hajdenberg. The paper was presented to the authorities and representatives of academia, the private sector, and international financial institutions during the Article IV mission.

[2] The World Bank Group (WB) and the Asian Development Bank (ADB), 2021.

3. Kazakhstan is relatively well positioned to face the adaptation challenges, but adequate preparation will be essential. The Notre Dame ND-GAIN index points to moderate vulnerabilities and a good level of preparedness. [3] Nevertheless, changes in hydrological conditions would have negative implications for land degradation and the agricultural sector. Kazakhstan is a major producer of grains and livestock. Diminished rains would negatively affect crop yields (e.g., wheat yields could drop by up to 50 percent by 2050) and livestock farming (WB and ADB, 2021). This would also have spillovers on countries dependent on imports from Kazakhstan. A higher frequency of natural disasters could threaten Kazakhstan's infrastructure and disrupt economic activity. Against this background, investment to increase resilience and support to vulnerable groups will be key.

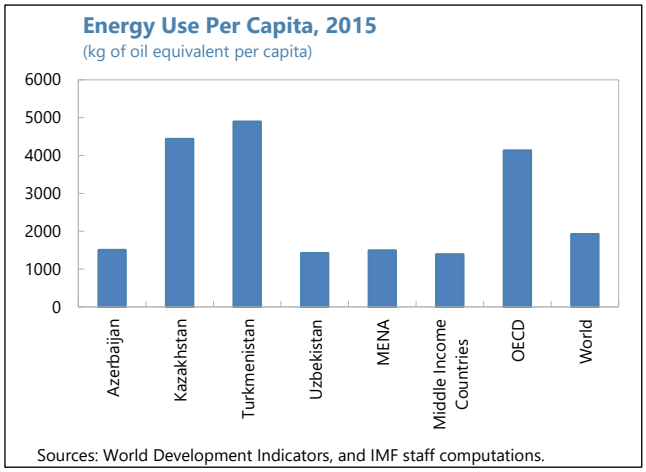
4. The mitigation challenge will be harder to address given Kazakhstan's large reliance on fossil fuels. Kazakhstan was the 20th largest GHG emitter in 2020 and in the top ten countries based on emissions per capita and relative to GDP (Global Carbon Project). GHG emissions declined sharply as the economic contracted following the collapse of the Soviet Union, but with steady economic growth since the 2000s, they have now returned to their 1990 level. The largest contribution comes from energy production (81 percent of total emissions), which is dominated by coal (50 percent) followed by gas (20 percent). Renewable sources contributed only 3 percent in 2020. Coal production generates significant employment, concentrated in few areas, which would be most affected by a shift away from coal.



Sources: Global Carbon Project, IMF Carbon Pricing Assessment Tool (CPAT)

[3] The Notre Dame Global Adaptation Index summarizes a country's vulnerability to climate change and other global challenges in combination with its readiness to improve resilience. Information on Kazakhstan can be found at https://gain-new.crc.nd.edu/country/kazakhstan.

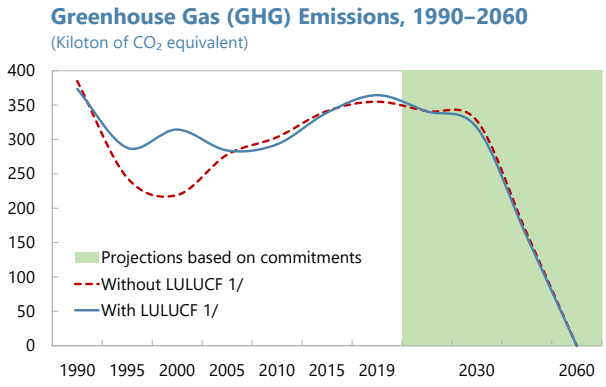
5. The shift to a low-carbon global economy increases the urgency for Kazakhstan to transition to a greener and more diversified economy. The fossil fuels energy sector contributes around 17 percent of GDP to Kazakhstan's economy. The oil sector contributes to about 1/3 of fiscal revenues and about 60 percent of exports of goods. Addressing climate change issues is therefore not just about economic greening but it also requires a structural transformation of the economy. For instance, in many rural areas of Kazakhstan, coal is currently the only energy source for heating and electricity, and new energy infrastructure will be needed throughout the country. Similarly, the private sector will need to adjust and move away from polluting energy sources.



Sources: World Development Indicators, and IMF staff computations.

B. Kazakhstan's Climate Policy Commitments

6. The government has set ambitious targets to curb emissions. As part of its Nationally Determined Contribution under the Paris Agreement, Kazakhstan has pledged an unconditional reduction of GHG emissions by 2030 of 15 percent from 1990 levels (25 percent reduction conditional on external support). More recently, President Tokayev announced the authorities' intention to achieve net zero emissions by 2060. Kazakhstan's climate policies are articulated in a number of government strategies, including: the Concept Note for the Transition of the Republic of Kazakhstan to a Green Economy (2013), the Action Plan for the Transition of the Republic of Kazakhstan to a "Green Economy" for 2021–30 (Government Decree No 479 of 2020), and the preliminary version of the Doctrine for Carbon Neutrality (DCN). The new Environmental Code implemented in mid-2021 envisages that the largest 50 companies (responsible for 80 percent of emissions) will replace old technologies by the best available technologies by 2025.



Source: United Nations Climate Change Commission.
1/ Land use, land-use change and forestry (LULUCF) activities that affect GHG emissions through their impact on the carbon cycle.

7. The authorities have outlined broad structural reforms in their preliminary carbon neutrality strategy. Reform plans in the DCN focus on energy, manufacturing, agriculture, forestry, transport, utilities, and waste management. Key announced measures include: (i) abandoning new coal-fired electricity generation projects and phasing out existing plants by 2025; (ii) planting 2 billion trees by 2025; (iii) doubling the share of renewable energy sources in electricity generation by 2030; (iv) 100 percent sorting of municipal solid waste by 2040; (v) sustainable agriculture on 75

percent of arable land by 2045; (vi) 100 percent electrification of personal passenger transport by 2045; and (vii) developing green hydrogen and eliminating coal-fired energy production from 2050 onwards. The authorities are also contemplating the construction of a nuclear plant for electricity generation within the next decade. An update of the DCN, including more detailed actions and assessments of the macroeconomic and fiscal implications, is expected by mid-2022.

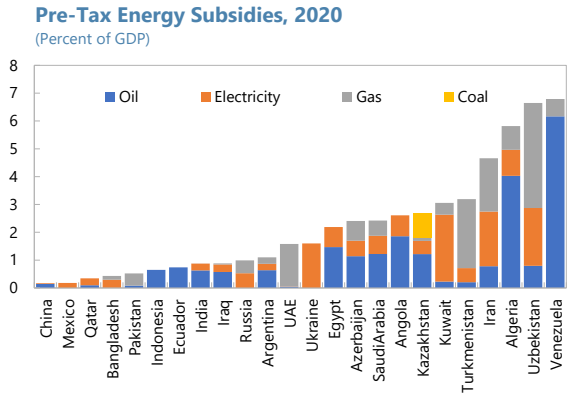
C. Policy Options

8. This section explores possible ways to integrate medium- and long-term climate challenges into policy frameworks. Two main issues are discussed: (i) mitigation measures to achieve the emissions reduction targets, and (ii) the fiscal implications of the climate change transition, mainly the reduced fiscal space owing to lower oil revenue.

Mitigation Policies to Reduce Carbon Emissions

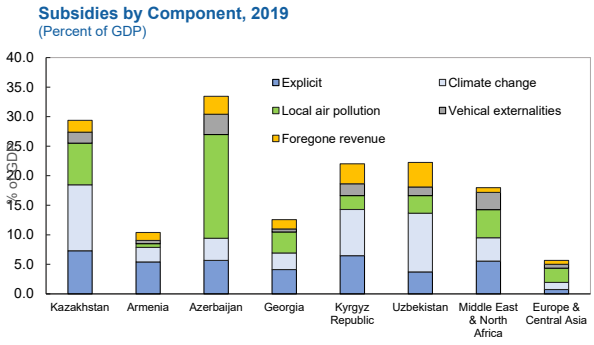
9. The current price of carbon emissions in Kazakhstan is low. This reflects several factors. First, electricity generation is highly coal-based, the cost of coal is low, and the cost of energy generation in aging coal-fueled plants is also low. Second, domestic fuel prices are kept low by the requirement for producers to supply oil to the domestic market below export prices. Third, the existing tax on carbon embedded in the Emissions Trading Scheme is only about US$ 1.10 per ton of CO_2.[4] Finally, pre-tax energy subsidies in Kazakhstan are substantial, at 3 percent of GDP, and closer to 20 percent of GDP if the definition of subsidy also incorporates the impact of externalities (e.g., on climate change and air pollution).[5]

Pre-tax subsidies are substantial…



Sources: IEA

…and total subsidies are significantly larger if externalities are taken into account.

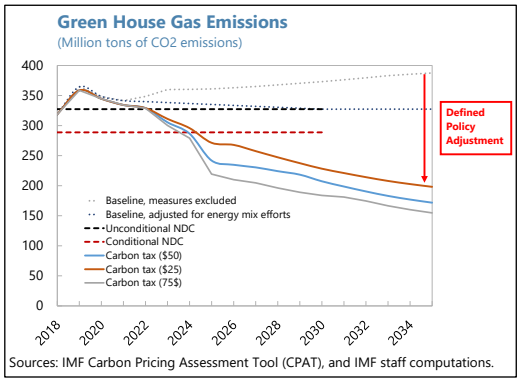


Source: IMF CPAT.

[4] An Exchange Trading System has been in place in Kazakhstan since 2013 (with a suspension during 2016-17). In 2020, it covered about 40 percent of emissions with an average allowance price of USD 1.10 per t/CO_2e.

[5] Black et al. (2021) and the online appendix and IEA fuel subsidies database.

10. The measures announced by the government to achieve emission targets will have to be supported by a higher carbon price. [6] At the global level, a global carbon tax of $75 per ton would reduce emissions to a level consistent with 2 degrees Celsius warming relative to pre-industrial levels (IMF 2019). For Kazakhstan, a carbon tax of $75 would reduce emissions drastically, but such a sharp increase from the current level (US$ 1 per tCO_2) in the near term is unrealistic. More limited (but still large) increases to $25 or $50 per ton would still imply large emission reductions (text chart).



Sources: IMF Carbon Pricing Assessment Tool (CPAT), and IMF staff computations.

11. The implications for energy prices are potentially very significant. Table 1 illustrates the impact on energy prices of raising the carbon tax to $25 per tCO_2: given its low price, the largest impact would be on coal, but other energy sources (notably natural gas and diesel), and consequently electricity, would also face substantial adjustments (in real terms).

Table 1. Kazakhstan: Impact on Energy Prices of Raising the Carbon Tax to US$ 25 per tCO2 by 2030

	Unit	2022	2030 1/	% change
Gasoline	US$ per liter	0.7	0.8	20.4
Diesel	US$ per liter	0.7	1.0	53.6
LPG	US$ per liter	0.6	0.6	10.7
Kerosene	US$ per liter	0.8	0.9	11.5
Oil	US$ per barrel	71.0	85.8	20.9
Coal	US$ per gigajoule (GJ)	2.5	7.1	186.7
Natural gas	US$ per gigajoule (GJ)	4.2	7.0	66.0
Electricity	US$ per kwh	0.0	0.1	72.3

Source: IMF Carbon Pricing Assessment Tool (CPAT).
1/ Projection inlcuding a US$ 25 per tCO2 carbon tax.

12. International experience highlights critical elements of successful energy pricing reforms (Fedelino et al., 2017). Such reforms are complex and often politically sensitive. Even though energy subsidies tend to be a regressive form of redistribution (with the richest segments of the population receiving a larger share of the benefits), dismantling them can have a negative impact on the poor if adequate social safety nets are not in place. Experience suggests that effective implementation hinges on three main building blocks:

- ***Engaging proactively and early*** with the population and key stakeholders on the need to implement the reform, its cost, but also mitigation strategies and expected benefits.

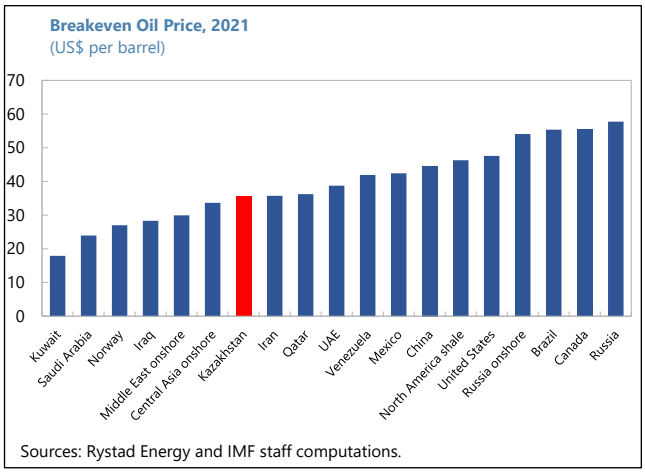
[6] Quantitative assessment of the impact of higher carbon prices presented in this paper rely on the Carbon Pricing Assessment Tool. CPAT was developed by IMF and World Bank staff. For descriptions of the model and its parameterization, see IMF, 2019, Appendix III, and Parry, Mylonas and Vernon 2021.

- ***Depoliticizing the process*** of adjusting energy prices, notably through automatic formulas (especially to remove pre-tax energy subsidies) and a pre-defined path of tax changes.
- ***Strengthening fiscal governance***, including transparency, to ensure that the funds derived from higher energy taxation are spent rightly.

Long-Term Fiscal Implications of the Transition to a Low-Carbon Future

13. This section estimates the potential impact of reduced global oil demand on Kazakhstan's long-term fiscal sustainability. The first step is to update the estimates made in the 2017 Selected Issues Paper of the sustainable fiscal position for Kazakhstan based on the Permanent Income Hypothesis. Then, assumptions about the potential impact of climate change on global oil demand are used to infer the effects on Kazakhstan's long-term fiscal accounts (Basdevant et al., 2021).[7]

14. To assess the sustainable long-term fiscal position, a range of assumptions about fundamental economic variables are made (Table 2)**.** Key variables relate to economic, demographic, financial and fiscal projections for Kazakhstan. The calculations take the latest estimate of proven oil reserves in Kazakhstan (30 billion barrels) and assume a constant level of oil production going forward. The projection of oil revenue depends heavily on (highly uncertain) oil prices and global demand for oil: it is assumed that oil prices follow the October 2021 WEO scenario for the first 5 years and remain constant after that in real US dollar terms at US$ 57 per barrel. Sustained oil exports are assumed for the next 30 years. Kazakhstan's relatively low production costs compared to other countries provide some buffers, as lower prices could be compensated by increasing market share. Under these assumptions Kazakhstan's oil reserves would be depleted in 2056.



Sources: Rystad Energy and IMF staff computations.

[7] See also Baunsgard et al. (2014), and IMF (2012) for additional work on fiscal frameworks for resource-rich countries.

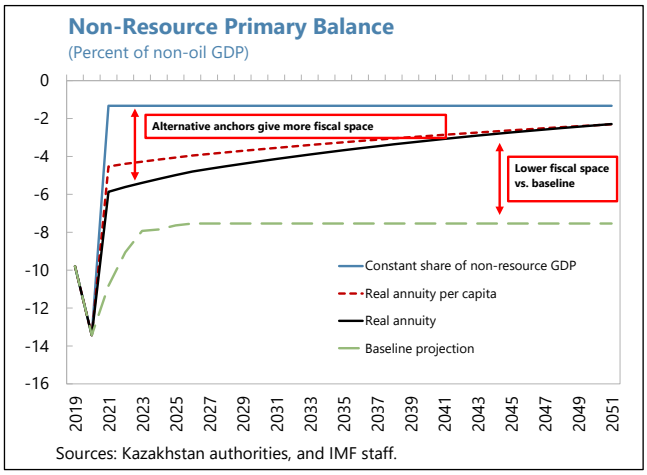
Table 2. Kazakhstan: Assumptions Underpinning the Long-Term Fiscal Projections

	(Percent)
Real non-resource GDP growth	3.0
Nominal non-resource GDP growth	6.1
Population growth	0.8
GDP deflator inflation	3.0
Real interest rate	4.0
Nominal interest rate	7.1
Interest - GDP growth differential	1.0
	(units as indicated)
Long term oil price (US$ per barrel) 1/	57
Resource depletion (year)	2056
Proven oil reserves (billions of barrels)	30

Sources: WEO and IMF staff projections.

1/ Beyond 2027 the oil price is assumed to remain constant in real terms.

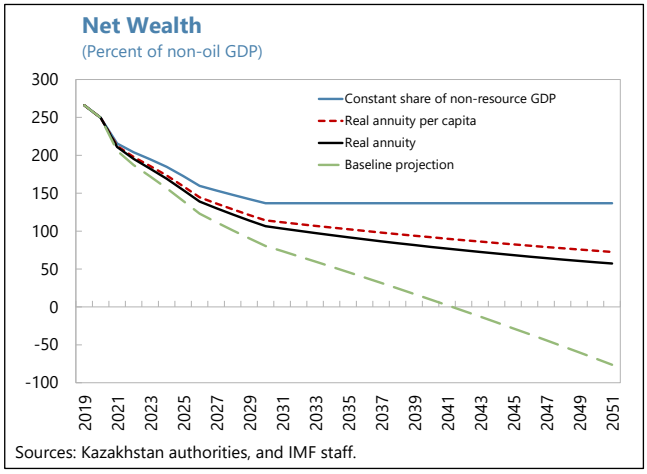
15. The results suggest that Kazakhstan's fiscal non-oil balance could converge to 2–3 percent of non-oil GDP in the long term. The PIH translates Kazakhstan's financial wealth (from oil revenues and returns on NFRK assets) into a permanent income stream which can be used to finance the non-oil fiscal deficit. The fiscal balance is ultimately a policy choice based on the country's preference for how to share the country's wealth across generations. The chart illustrates three different alternatives for setting the non-oil primary fiscal balance (NOPB): constant in percent of GDP, constant in real terms, or constant in real per-capita terms. These alternatives point to a sustainable non-oil fiscal deficit of about 2 to 3 percent of non-oil GDP in the long run.



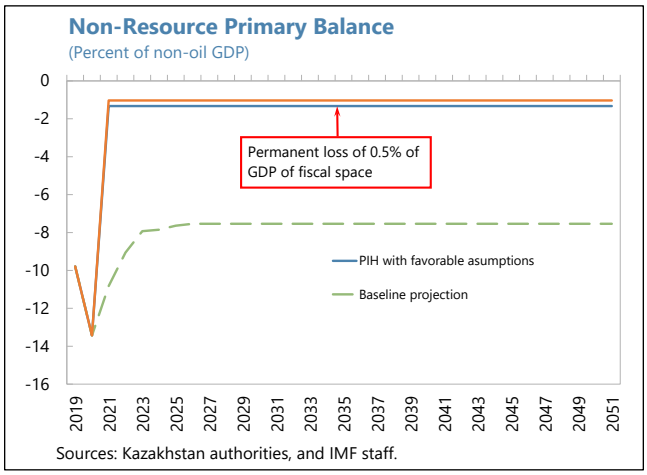
Sources: Kazakhstan authorities, and IMF staff.

While this level illustrates Kazakhstan's capacity to save for future generations, it also underscores the magnitude of the fiscal adjustment that will be needed in the future. To illustrate, staff currently projects a non-oil primary deficit as a share of non-oil GDP of about 8 percent for the coming years.

16. The choice of a long-term anchor has significant implications for the path of financial wealth and fiscal buffers. For example, adopting a PIH anchor that protects a level of annuity constant in real terms would provide greater fiscal space throughout the medium term, but at the cost of a more rapid depletion of the financial wealth than a constant anchor in percent of non-oil GDP. While ultimately these are social choices, the need to preserve a certain level of buffers against adverse shocks, in the form of liquid financial assets and/or a low level of public debt, should also be taken into account.

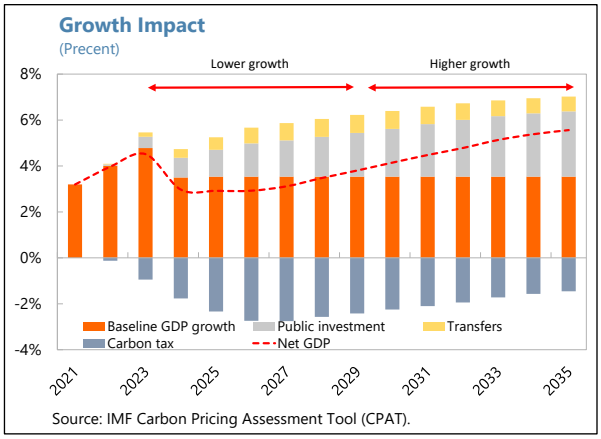


17. The fiscal adjustment needed to compensate for long-term oil revenue losses from climate change appears manageable. The global transition to a low-carbon economy is simulated by assuming that oil revenues would decline by 40 percent starting in 2028 relative to baseline projections, reflecting either lower oil prices, a decline in export volumes, or a combination of both. Such revenue losses would lead to a permanent reduction of the NOPB as a share of non-oil GDP of about ½ percentage point per year. The impact is mitigated by the fact that Kazakhstan saved significant amounts of past oil proceeds in the NFRK. In addition, continued growth of the non-oil sector of the economy would reduce the importance of the oil sector for the economy as a whole.



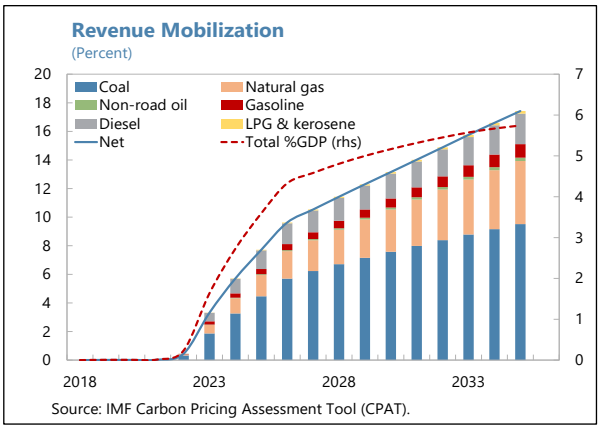
Managing the Adjustment

18. A delicate balance will be needed to meet emissions targets while allowing time for the economy to adjust. To allow time to transition to a greener and more diversified economy, energy prices should be increased gradually, but starting as soon as possible. The pace of the adjustment should be consistent with both GHG emissions goals and the time needed for the private sector to adjust and invest in more energy-efficient technologies.



19. The growth impact of a higher carbon tax would be negative initially, but positive in the long run. The simulation assumes that 60 percent of the additional revenues are devoted to productive public investment and the rest to social spending. Higher taxes and energy prices would compress aggregate demand in the short term, resulting in lower GDP growth (ceteris paribus). Over the longer term, increased investment would support faster growth.

20. Increased revenue mobilization from higher carbon taxation can support the adjustment. As noted, a carbon tax of $25 per tCO_2, once fully implemented, could generate additional fiscal revenues of 6 percent of GDP, about half from coal. This would help strengthen social safety nets and finance the infrastructure needed to facilitate the green transition. The pace of the revenue buildup will be linked to that of energy price adjustments, and some of these gains will gradually dissipate as the economy becomes greener. The above estimates assume that the carbon tax is phased in gradually starting in 2022 from its current level, and reaching $25 per tCO_2 in 2030.



21. Kazakhstan's transition to a low carbon future will require a comprehensive strategy, as well as early and sustained policy implementation. As outlined above, the challenges Kazakhstan will face in the coming years are multiple and sizeable. Addressing them raises questions related to long-term social and economic objectives, which will require in-depth public policy debate and a gradual approach, to ensure that the most vulnerable are protected and that the private sector has adequate time to adjust. Key policy questions for consideration include how to support the structural transformation required to move towards a greener and more diversified economy and how to share the country's wealth with future generations. Planning would need to start early to facilitate the adjustments. The cost implications of required public investment would need to be assessed and incorporated in the macro-fiscal framework. These activities would have to be underpinned by effective public financial management practices and a medium-term strategy to strengthen non-oil revenue mobilization.

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