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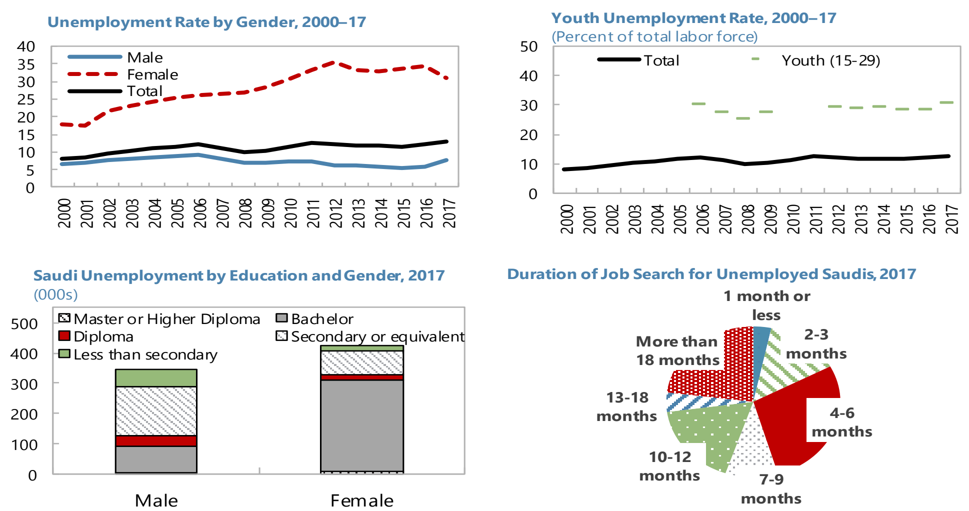
THE ECONOMIC IMPACT OF POLICIES TO BOOST THE EMPLOYMENT OF SAUDI NATIONALS[1]

Saudi Arabia's labor market is characterized by a persistently high unemployment rate, low private employment ratio, and a low labor participation rate for nationals. The authorities are undertaking a wide range of labor market interventions to address these issues. The analysis in this paper shows that these interventions are helping to reduce distortions in the labor market, including by boosting female labor force participation and reducing the wage gap between expatriates and nationals in the private sector, but the impact on the rest of the economy is not always positive as firms adjust to the higher cost of labor. Reforms should therefore be gradual to minimize their impact on growth. A comprehensive set of policies is also needed to foster job creation for nationals. Measures should include policies toward levelling the playing field between national and expatriate workers so that employers have less of a preference for employing expatriates, setting clear expectations about the limited prospects for public sector employment, boosting female labor force participation, and strengthening education and training to support increased productivity of nationals.

A. Background

1. Unemployment rates for Saudi nationals are high (Figure 1). The Saudi unemployment rate increased from 10 percent in 2008 to 12.8 percent in 2017. This increase mainly reflects higher female and youth unemployment. Most of the unemployed have some level of education; 52 percent have a bachelor's degree. Women with tertiary education constitute the vast majority of the college-educated unemployed. Long-term unemployment is also high; about 43 percent of the unemployed had been looking for a job for over 10 months as of December 2017.

Figure 1. Unemployment



Source: GASTAT Labor Force Survey; and IMF calculations.

[1] Prepared by Anta Ndoye and Michal Andrle (both IMF), and Tehmina Shaukat Khan (World Bank). Research support was provided by Tucker Stone and Jared Bebee and editorial support by Diana Kargbo-Sical. The authors are grateful to the authorities and participants at the seminars at SAMA and the IMF for their helpful comments.

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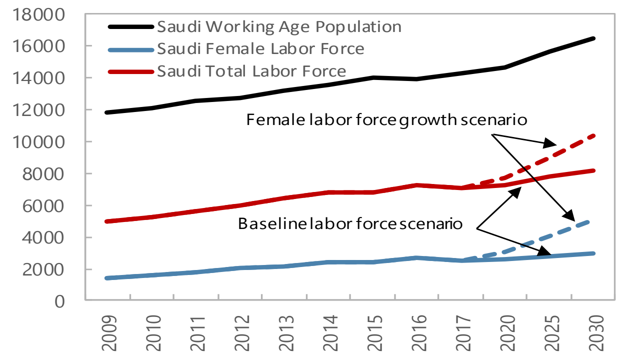
2. Saudi Arabia's key challenge is to create enough jobs for its growing labor force and reduce existing unemployment. At current low labor force participation rates, Saudi Arabia would need to create 0.5 million jobs by 2023 to absorb new entrants to the labor force. If female participation rises by 1 percentage point every year, then this figure could rise to 1.4 million (Figure 2). Almost twice as many jobs as those created in the last five years would be needed to absorb these new entrants. Saudi employment growth was 5.1 percent in the years 2010–14 and slowed to 2.2 percent in 2015–17 following the oil price shock. Most of the employment growth has come from the public sector.

Figure 2. Saudi Working Age Population and Labor Force Under Different Scenarios 1/
(In thousands)



Sources: UN Population Division, and IMF staff estimates.
1/ Female labor force participation rate increases by 1 percentage point in the female labor force growth scenarios.

3. As set out in "Vision 2030", the authorities are committed to reducing the unemployment of nationals. They have announced ambitious goals to lower the unemployment rate to 7 percent and increase the female labor force participation rate to 30 percent by 2030. The authorities intend to achieve those targets by increasing the size of the private sector, with a particular focus on SMEs, and overhauling the education system to equip young people with the skills they need to be productively employed in the private sector. They are also undertaking a wide range of labor market interventions based around the Nitaqat program of employment quotas, excluding expatriates from working in specific retail sectors, increasing fees on expatriate workers and their dependents, implementing a range of wage subsidies for nationals, and introducing measures to boost female employment.

4. This paper proceeds in the following manner. Section B illustrates the key characteristics of the Saudi labor market. Section C focuses on labor market interventions implemented by the authorities in recent years. Section D assesses the impact of selected labor market interventions on the economy. Section E concludes with some policy recommendations.

B. Structure of the Labor Market

5. There are several key features of the labor market in Saudi Arabia:

- **Saudi employment is concentrated in the public sector while the private sector is heavily dependent on expatriate labor**. Saudi workers are better educated on average than non-Saudi workers (IMF, 2013), and are primarily employed in the public sector, where they are generally paid higher wages, enjoy more comprehensive benefits, and have greater job security and shorter work week hours than they would in the private sector (Figure 3). On the other hand, expatriate workers make up 80 percent of the private sector workforce. A majority of expatriate workers are employed in small and medium sized firms (SMEs) —26 percent work in firms with less than 6 employees. Expatriate employment is concentrated in sectors such as construction and trade (Figure 3).

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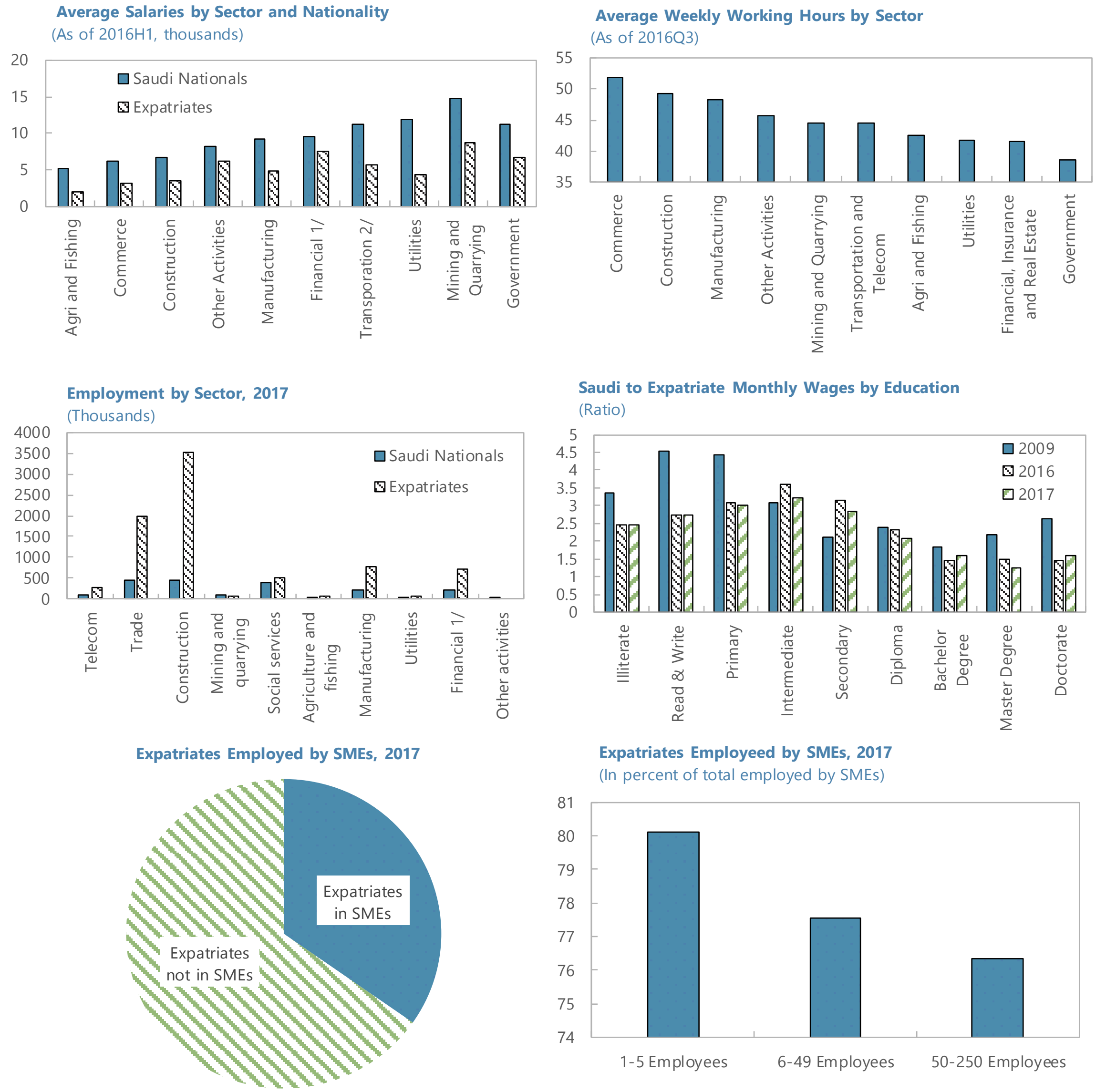
Figure 3. Employment and Wages



Sources: GASTAT Labor Force Survey; Country authorities; GOSI; Saudi Arabia SME Survey; and IMF staff calculations.
1/ Includes financial, insurance, real estate and business services.
2/ Includes trasportation and telecommunications.

- **Significant wage gaps skew the demand for labor in the private sector toward expatriates and the supply of Saudi labor toward the public sector**. Saudi entrants to the job market largely seek employment in the public sector and have reservation wages that are well above those of similarly qualified expatriate workers in the private sector (Hertog, 2013). The de-facto minimum wage for Saudis is SAR 3,000 per month, versus SAR 1,500 per month for a comparably-skilled expatriate worker. Wage gaps between expatriates and nationals are significant. Easy access to low-wage expatriate labor has meant that the private sector has not significantly contributed to Saudi employment.

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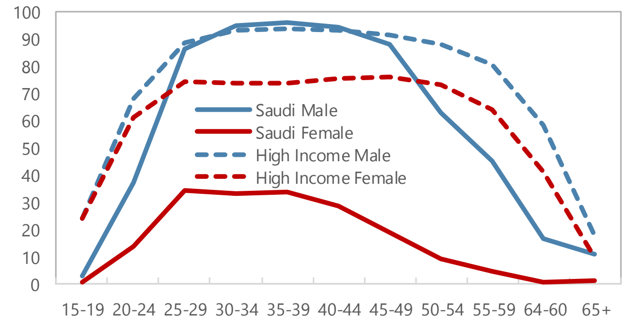
- **Saudi's participation in the labor market is low, especially for females.** Only 40 percent of Saudis participate in the labor force compared to the world average of 62.8 percent. Despite recent increases, female labor force participation is particularly low at 18 percent, well below most other countries. Women are most likely to participate between 25 and 34 years of age and they then drop out of the labor force. Men drop out of the labor force at 50 years old, which reflects the early retirement age and could affect the long-term sustainability of pension funds. Women tend to work mainly in the education sector (70 percent) and health and social sectors (13 percent) where gender segregation is easier.

Figure 4. Labor Force Participation by Gender and Age, 2017 1/

(Percent of age-band in labor force)



Sources: GASTAT; ILO; Country authorities; and IMF staff estimates
1/ Data for high income countries is as of 2015.

- **There is evidence of skill mismatches in the labor market**. Saudi workers may not be equipped for the needs of employers, not only in cases where they lack education, but also, when they do not possess the skills that employers need. In Saudi Arabia, university graduates typically complete degrees in education, humanities and arts, which do not necessarily cater to the demands of the private sector as evidenced by the large share of unemployed with degrees in education, humanities and arts (Figure 5).

- **While educational enrollment has increased significantly over the past 20 years, learning outcomes remain below many other countries**. The share of adults without education has been dropping for both men and women and Saudi Arabia is close to attaining universal literacy. Tertiary education enrollment has increased significantly since 2000, especially for females (Figure 6). This was achieved through significant public investment in tertiary education, including the establishment of numerous universities and generous scholarship programs – such as the King Abdullah Scholarship Program which provides Saudi students scholarships to study abroad. However, available data on education outcomes shows that Saudi Arabia scores relatively low on standardized cross-country math and sciences and reading tests relative to countries with similar income, with girls tending to outperform boys (TIMSS 2015 and PIRLSS 2016).[2]

[2] TIMSS is an international assessment of the mathematics and science knowledge, conducted by the International Association for the Evaluation of Educational Achievement (IEA) every 4 years since 1995. In TIMSS 2015, nationally representative samples of students in 57 countries participated in the 4th-grade assessment, the 8th-grade assessment, or both. PIRLS is also an internationally comparative assessment that measures student learning in reading, and is produced by the IEA every four years since 2001. 50 countries participated in the 2016 PIRLS for students in the grade that represents 4 years of schooling.

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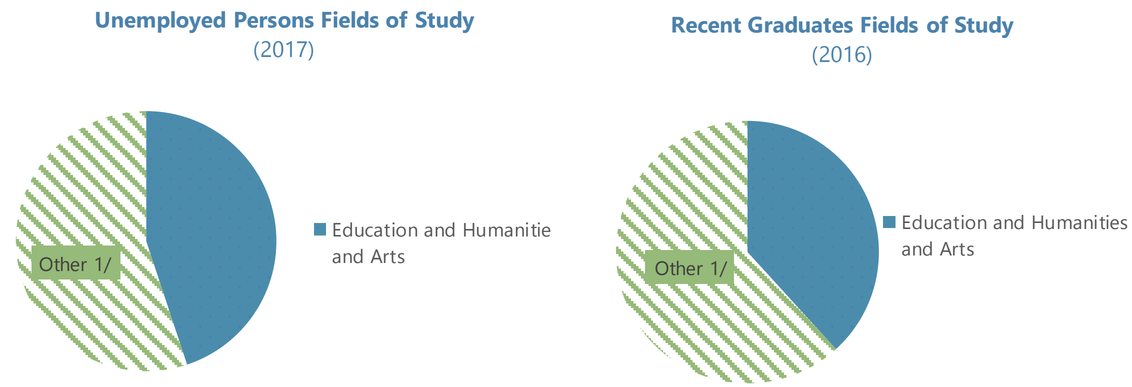
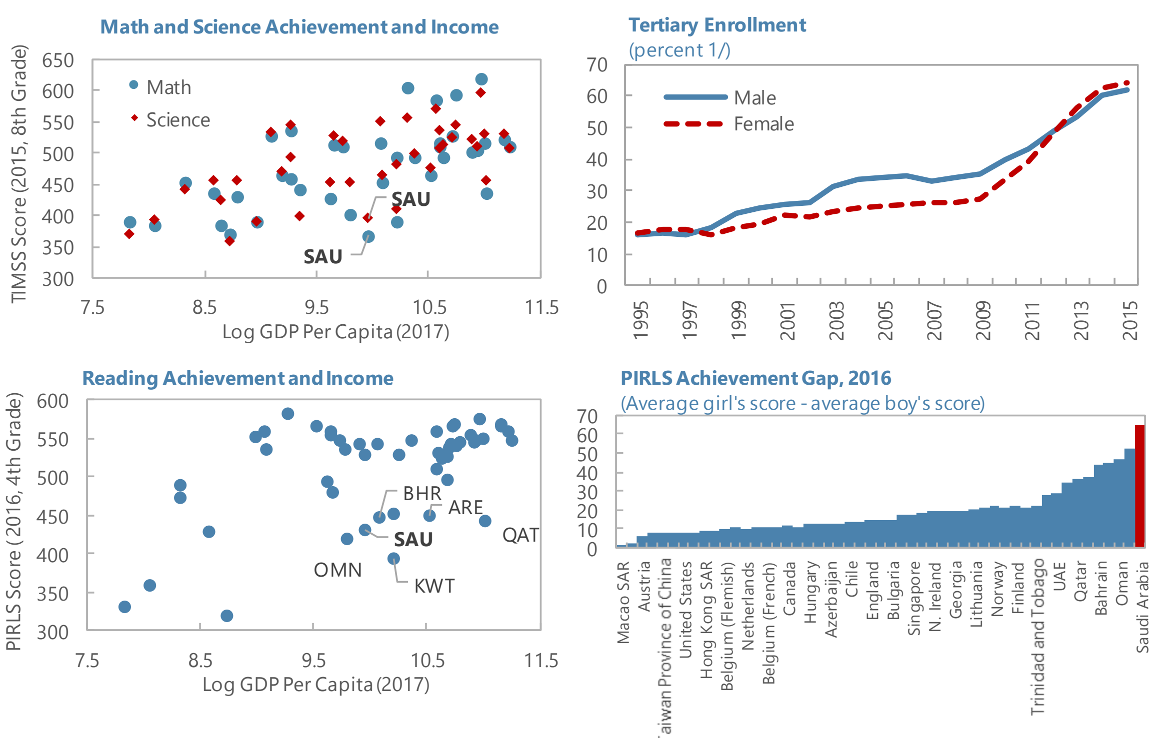
Figure 5. Skills Mismatches



Sources: GASTAT, Labor Force Survey; Ministry of Education; and IMF staff calculations.
1/ Other includes Social Science, Business, and Law Programs; Programs of Natural Sciences, Mathematics, and Computer Science; Engineering, Industries, and Construction; Program Agriculture and Veterinary; Health and Social Services Programs; and Services Programs.

Figure 6. Education and Outcomes



Sources: TIMSS 2015, PIRLS 2016, World Development Indicators; and IMF staff calculations.
1/ Ratio of total enrollment to the population of the age group that officially corresponds to tertiary schooling.

C. Recent Labor Market Policies

6. **Labor market policies have been introduced in recent years to increase employment of Saudis in the private sector**. These policies have sought to increase the attractiveness of Saudi workers to private sectors firms by reducing the cost/wage differential between nationals and

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expatriates (e.g. expatriate levy, wage subsidies), training programs, through employment quotas (Saudization programs), and targeted measures to boost female employment.

7. The introduction of an "expat levy" has raised the cost of hiring expatriate workers for private sector firms. The levy, which first came into force in 2012, imposed a monthly levy of SAR 200 ($53) per worker on firms with a majority of expatriate workers. In January 2018, as set out in the Fiscal Balance Program (FBP), the authorities raised the monthly levy to SAR 300 ($80) and SAR400 ($107) per worker and rising to SAR 700–800 ($213) by 2020, depending on the percentage of Saudis in their workforce. These levies will amount to about 20 percent of the current average wage gap between Saudis and expatriates by 2020 when fully implemented. Monthly fees of SAR 100 ($27) for each dependent of expatriate workers were also introduced in July 2017. Other schemes have included fees on expatriate labor visas that effectively increases the cost of expatriate workers above their wage. At the same time, regulations strengthening the rights of expatriate workers have also been tightened, including by increasing fines for violations of workers' rights.[3]

8. Wage subsidies for Saudi nationals working in the private sector have been introduced. Various training and wage-subsidy programs have been introduced to improve the skills of Saudi workers and reduce their hiring costs, mostly targeted at women and young job-seekers. Most programs subsidize wages and training for Saudis for up two years. However, it is not clear whether Saudis remain competitive employees after the wage subsidies are phased out (Hertog, 2013). Sectoral programs such as the Women's Employment in the Retail Sector and the Support Women's Jobs in Factories also provided incentives via wage subsidies for training and hiring Saudi women in the retail and manufacturing sectors. However, these programs required a fundamental restructuring of the firm (due to mandated segregation) and it is unclear whether these subsidies cover the lump sum costs associated with participation in these programs (Evidence for Policy Design, 2013).

9. Current unemployment assistance programs aim to facilitate job matching. The two main unemployment assistance programs are Hafiz and Sanid and provide job seekers with monthly temporary income with which to finance both job search costs and living expenses. The introduction of these schemes are important steps in strengthening the social safety net in Saudi Arabia and are partly aimed at providing some income security to those working in the private sector who have greater risk of job loss than in the public sector. Under both programs, financial assistance is made conditional on participation in training and job search efforts.

10. Saudization efforts have accelerated in recent years. A revamped Saudization (Nitaqat) program with sector- and firm-size based employment quotas to require firms to hire Saudis was introduced in 2011. Under *Nitaqat,* quotas for hiring nationals in private sector firms were introduced, with penalties or benefits depending on the degree of firms' compliance with the nationalization targets. Amendments to *Nitaqat* were introduced in mid-2017 increasing the mandatory employment ratio of nationals to expatriate employees. Other measures were introduced between 2016 and 2018 to ban the employment of expatriate workers in some retail sectors (e.g. gold and jewelry, mobile phone and electrical shops).

[3] https://mlsd.gov.sa/en/%D8%A3%D8%AE%D8%A8%D8%A7%D8%B1/minister-labor-and-social-development-approves-changes-violation-table.

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11. Evidence suggests mixed success for Nitaqat thus far. At the time of its introduction, the Nitaqat program covered all firms in the private sector with 10 or more employees, and affected approximately 6.3 million national and expatriate workers. While the employment of nationals initially increased, there are indications that Nitaqat has taken a toll on firm profitability due to the costs of training Saudis and the higher wages they received relative to expatriate workers. This may have resulted in the closure of substantial numbers of firms and a decrease in overall and Saudi employment in the private sector over time (Peck, 2017, Koyame-Marsh, 2016). Other studies have pointed to the potential for reduced productivity from Nitaqat as well as reduced investment by foreign firms that find the costs associated with quota-based employment too onerous (Ramady, 2013).

12. The authorities are implementing several measures to increase female labor force participation. To reduce some of the constraints to women entering the workforce, the authorities are subsidizing transportation and childcare costs, expanding the availability of childcare facilities, and encouraging greater use of teleworking. With women now allowed to drive, this should help ease transportation constraints for women looking to enter the job market. Since February 2018, women no longer need the consent of a male guardian to start a business and have access to certain jobs in the military.

13. Policies are focusing on education sector reforms and vocational training. As part of Vision 2030 and National Transformation Program, major education sector reforms are planned, encompassing curriculum reform, early childhood education and teacher training. Strengthening vocational training is also a centerpiece of these reforms to better align the skills of nationals with those demanded by private sector firms.

D. Assessing the Impact of Labor Market Policies on the Economy

14. A model-based approach is employed to assess the impact of labor market reforms on the Saudi economy over the medium-term. The potential impact of the expat levy, higher female labor-force participation, and Saudization of the retail sector are analyzed. Whereas the impact of the levy may negatively affect growth, the opposite is true for increasing female labor force participation. The impact of Saudization of the retail sector depends on the productivity differential between expatriates and nationals and the impact on overall employment.

15. The G20MOD module of the IMF's Flexible System of Global Models (FSGM) is used in the analysis (Annex 1). G20MOD is a multi-country structural model that has individual blocks for each of the G20 countries and four other blocks to complete the rest of the world. The model has a complete set of stock-flow accounting relationships that complement the behavioral relationships driving the model dynamics. The behavior of households and firms is forward-looking, reacting to economic shocks and policies. The setup of the model reflects key stylized facts of each of the economies as well as the specifics of monetary and fiscal policy regimes.[4] G20MOD also features a complete set of bilateral migration and remittance flows. In relevant countries and regions, the labor

[4] In the model, the authorities use government consumption, government investment, and fiscal transfers on the expenditure side and labor income taxes, consumption taxes, capital income taxes, and royalties on commodities to manage the government budget, with a set goal for long-term debt-to-GDP ratio.

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force distinguishes between the "domestic" and "expatriate" labor force. The wage differential between the two groups is used as a proxy for their relative productivity, a crucial assumption in the model. The expatriate workers are assumed to be liquidity constrained, consuming all their after-tax income that they do not remit to their home country. In contrast, only a share of nationals are liquidity constrained with the rest smoothing consumption through saving.

Impact of the Expat Levy

16. Two scenarios of the levy implementation are considered. In the first scenario, the levy is fully paid by expatriate workers. In the second scenario, private firms bear the cost of the levy. In line with the schedule set out in the FBP, the levy gradually increases over three years and is projected to raise roughly 2 percent of GDP in additional revenue by 2020. In both cases, the impact on real GDP is negative, i.e. real GDP is lower than in the baseline where there is no change in the expat levy. It is important to recognize that the scenario is not implying that growth will be negative.

17. The impact of the levy depends on several key assumptions. In addition to whether the burden of the levy falls on firms or workers, it also depends on how the collected revenue is spent. It is assumed here that a portion of the revenues (0.5 percent of GDP) are used to finance a temporary labor subsidy, provided for two years to Saudi nationals, while the remainder is used to improve the fiscal balance and thus the net government asset position is permanently improved.

Impact of the Levy when Expatriates Bear the Burden

18. When the levy is borne by the expatriate workers, employment of nationals and expatriate workers remain broadly unchanged. This assumes that expatriates' new after-levy wage is still higher than their reservation wage. The net disposable income of expatriate workers declines by the full amount of the levy and thus their consumption of goods and services in the domestic economy permanently declines (according to the 2013 Household Survey, about 20 percent of consumption is accounted for by expatriate households). Expatriate workers are assumed to remit a constant fraction of their after-tax disposable income to their country of origin. With lower disposable income, remittance outflows are also lower.[5]

19. Given the permanent decline in domestic private consumption, private investment declines and the economy transitions to a new, lower long-run level for the capital stock and output (Figure 7). Given the important share of migrant workers in the domestic economy, both actual and potential output permanently fall owing to their lower consumption. The temporary wage subsidy mitigates slightly the decline in output for two years. With less capital, the marginal product of labor declines leading to a fall in real wages. Lower real wages also lead to a marginal decline in the domestic labor force.

20. The external and fiscal balances improve. With lower consumption and private investment, the volume of imported goods and services declines along with remittance outflows. Because the economy is importing less, the real effective exchange rate appreciates to maintain

[5] Should the expatriate workers desire to keep the nominal value of their remittances unchanged, and thus effectively increase the share of remittances in their lower income, the negative impact on the Saudi economy would be larger.

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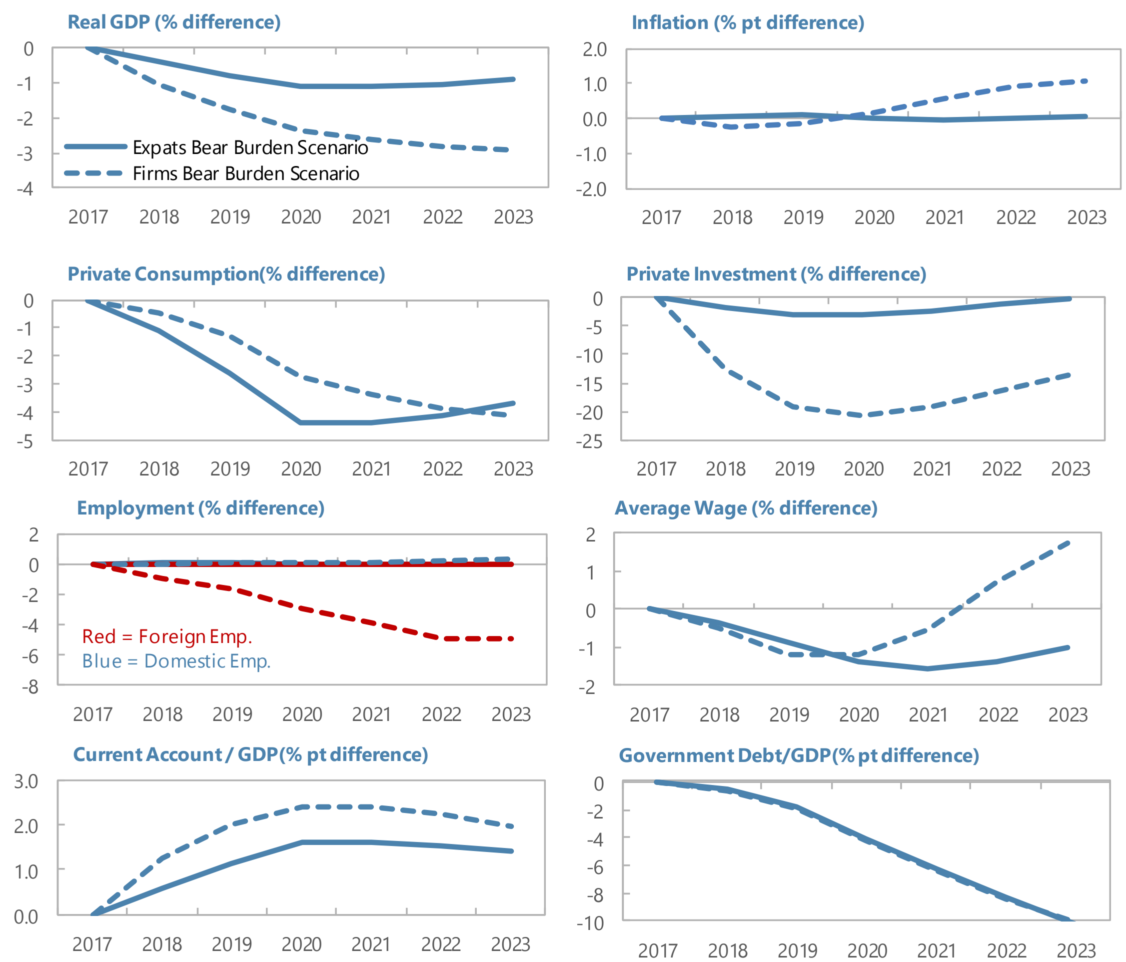
external balance. However, with the proceeds of the levy fully saved by the authorities after the first two years, national savings rises and this is reflected in a permanent increase in the current account balance. The net government asset position gradually improves towards its new permanently higher level. In the long run, as the income from net government asset increases, the fiscal position further improves.

Figure 7. Expatriate Levy Scenarios (Cumulative Impact)



Source: FSGM Simulations.

Impact of the Levy when Firms Bear the Burden

21. When firms bear the burden of the levy, the growth impact is more negative than when expatriate workers bear the burden. The levy reduces the after-tax return on capital, inducing firms with no economic rents to reduce investment.[6] With a lower capital stock, the marginal product of labor declines, and firms reduce the real wages of both Saudi and non-Saudi employees. This in turn leads all households to reduce consumption and Saudi households to reduce

[6] Economic rent is defined as a payment to an owner of a factor of production beyond the marginal cost of the factor. Economic rents are associated with imperfect competition in product and factor markets.

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labor supply. A lower capital stock combined with lower employment leads to a drop in potential output. The lower real wages of expatriates also result in a reduction in remittances. On the other hand, if the levy falls on firms with sufficient economic rents, the impact would be less negative as the desired level for the capital stock and the marginal product of capital would not change and both domestic and expatriate workers' incomes would be essentially unchanged.

22. It is assumed that higher labor costs for expatriate workers lead firms to dismiss expatriate workers, further exacerbating the negative impact on the economy. The reaction of firms will depend on the share of expatriate workers they employ and on the wage and productivity differential between expatriate and Saudi workers (it is assumed that the relative wage differential between the two groups reflects their relative productivity, with Saudi workers being more productive than expatriates). If it is assumed that 1 percent of expatriate workers leave the country each year, either through closure of firms or through firms dismissing some expatriate workers as their cost of employment increases, this further lowers real GDP in the long run relative to the baseline.

Increased Female Labor Force Participation

23. This scenario assumes an increase in female labor force participation, in line with the objectives of Vision 2030 and owing to the policies implemented by the authorities. The female participation rate is assumed to increase by 1 percentage point a year for the next five years, increasing the female labor force by roughly 30 percent. The increase is assumed to be exogenous in the sense that current constraints to women's engagement with the labor market are gradually removed and women entering in the labor force are prepared to work at the current wage rate of nationals.

24. The increased labor force participation of women delivers strong positive effects on the economy (Figure 8). The share of Saudi nationals in the labor market rises, with domestic employment increasing by more than 6 percent. Output, consumption, and private investment all increase as a result of the higher labor supply. After five years, real output increases by about 2 percent relative to baseline. Given the structure of the model, as the economy adjusts to the higher labor force participation and the associated higher capital stock, potential output increases marginally faster than the actual output. This results in a small decline in consumer prices and nominal wage inflation relative to baseline, with real wages remaining largely unchanged.

25. The increased potential output of the economy leads to a moderate depreciation of the real effective exchange rate and adjustment in the external balance. Saudi households have higher income and increase their consumption of both domestic and foreign goods. Since it is assumed that the increase in female employment is economy wide, no change in the relative price of Saudi tradable goods takes place. The real exchange rate needs to depreciate to maintain external balance. Due to the exchange rate pegged to the US dollar, the real depreciation requires temporarily lower domestic inflation. The current account balance returns to baseline in the long term.

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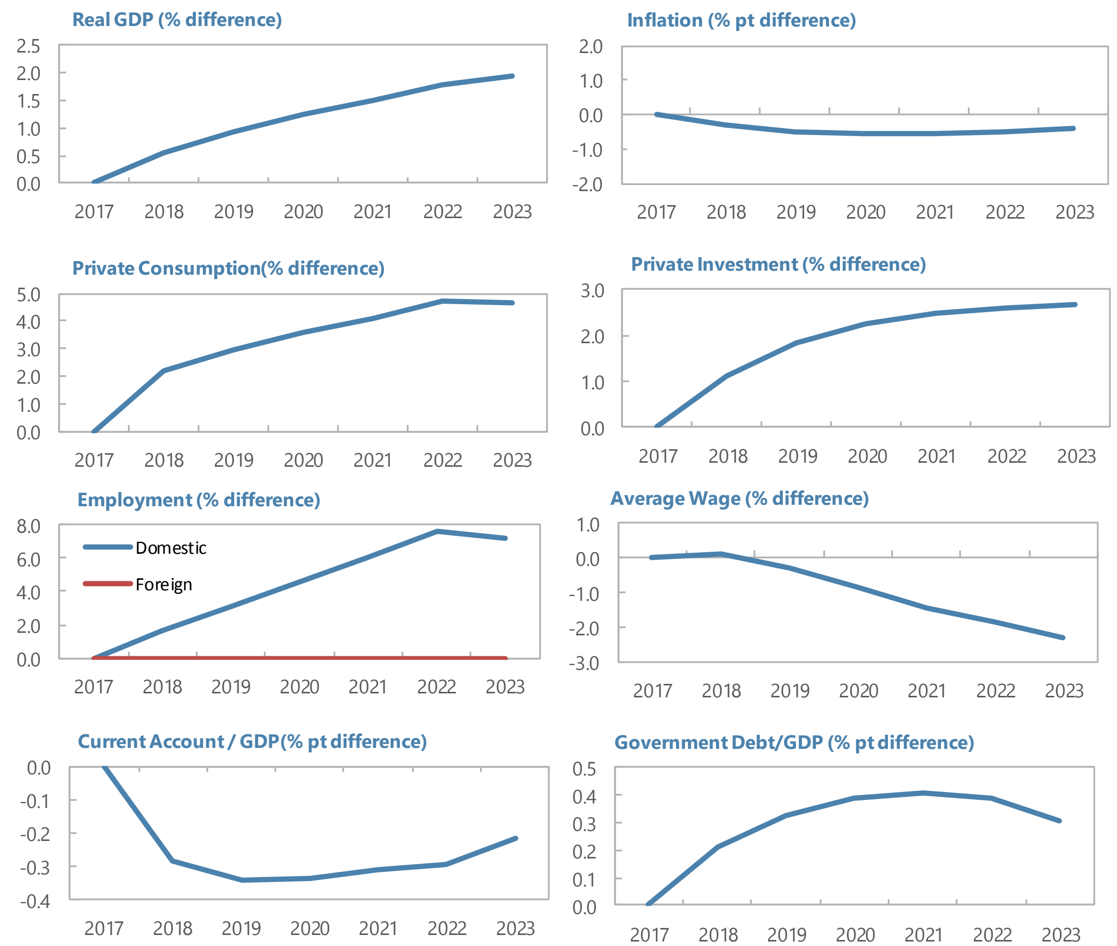
Figure 8. Increased Female Labor Force Participation Scenario



Source: FSGM Simulations.

Saudization in the Retail Sector

26. This scenario assumes a gradual increase in the employment of Saudi nationals and a decrease in the number of expatriate workers in the retail sector. The retail sector currently employs 1.2 million expatriate workers and 400,000 Saudi workers. Specifically, the scenario models the implications of a partial ban on expatriate employees in the retail sector that results in a reduction in expatriate employment of 980,000 by 2023 and increase in Saudi employment of 326,000 in a first scenario and 245,000 in a second scenario.

27. The impact of the Saudization measures on output depends on the productivity differential between nationals and expatriates and labor substitution. If it is assumed that the wage differential between nationals and expatriates reflects the productivity differential, and if one Saudi replaces three expatriate workers, the impact on output is slightly positive after five years (Figure 9, Scenario 1). This positive impact is driven by higher consumption, which in turns encourages firms to invest more. Specifically, unlike expatriate workers, Saudi nationals do not use

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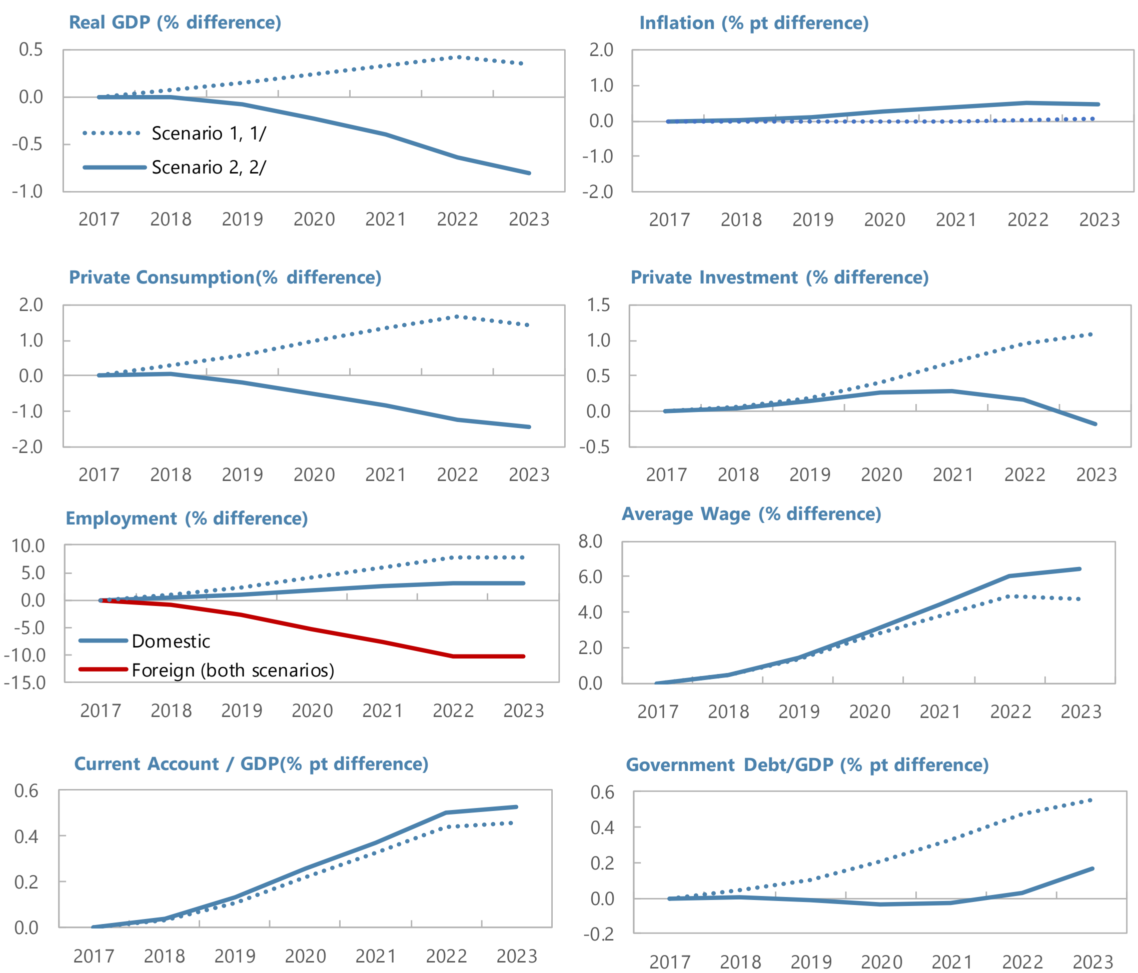
part of their income for remittances and consume more in the domestic economy. If, however, one national replaces four expatriate workers (Figure 9, Scenario 2), real output would decline by 0.8 percent relative to the baseline after five years. This could be because there are insufficient Saudi nationals with the skills to replace the expatriates at the offered wage rate, for example.

28. **Additionally, if the real wage differential between nationals and expatriates does not reflect productivity differences, the impact on growth will be even more adverse**. If firms are forced to pay higher wages to hire nationals, but the productivity of these workers is not commensurate with the wages paid, unit labor costs will increase. The impact will depend on whether firms can pass these higher costs on to consumers, or have to absorb them in their profit margins. Inflation will likely go up if markets are not competitive and costs are passed on, while if markets are competitive and it is more difficult to pass costs on, some firms will exit the market. In either case, the impact on growth relative to baseline would be more negative.

Figure 9. Saudization Scenarios



Source: FSGM Simulations.
1/ Scenario 1 has 1:3 substitution between Saudis and expatriates.
2/ Scenario 2 has 1:4 substitution between Saudis and expatriates.

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E. Conclusion and Policy Recommendations

29. Current policy shifts are first steps in mitigating major distortions visible in the Saudi labor market. Labor market policies can contribute to economic growth by facilitating a more efficient use of the country's labor resources, most notably women who are heavily underutilized.

30. However, model simulations suggest that the impact of labor market reforms on the economy is not always positive. While the expat levy increases fiscal revenues, model simulations indicate losses in output no matter who bears the burden of the levy and no employment gains as the wage gap remains large. If Saudization policies are to avoid having a negative impact on growth, two pre-conditions are needed: (i) that high-productivity national workers replace lower productivity expatriate workers; and that, (ii) a sufficient number of nationals are willing to work to replace the expatriate workers who leave, at a wage rate that reflects their productivity. Otherwise, outcomes for the economy could be negative, and even more so if unit labor costs increase and firms are forced to exit or prices rise.

31. These results and the analysis in previous sections point to the need for gradual implementation of labor reforms to minimize the impact on growth and for a comprehensive set of measures to ensure positive employment outcomes. The labor market reforms will involve a difficult adjustment for some companies, particularly those that are very reliant on expatriate labor. This calls for a gradual approach to implementing such reforms. A comprehensive and multi-pronged approach will also need to be implemented across different ministries and stakeholders to ensure positive employment outcomes, and the recently created Labor Market Policy Committee is well-placed to lead this work.

- **Reform expatriate labor policies**. Reforms that allow greater internal mobility of expatriate workers could reduce the wage differential between expatriates and nationals. This will require further reform of the expatriate labor policies, including of the sponsorship system (which have been liberalized in Oman, Bahrain and UAE) and residency rights (World Bank, 2018). Additional reforms to the visa system could seek to gradually reduce the number of visas available and target them more to higher skilled workers. This could be achieved by auctioning visas which would encourage the employment of expatriate workers in higher productivity jobs.

- **Change the role of the public sector**. The skills and reservation wages of Saudis are tilted towards public sector employment, particularly at lower skill levels. In this regard, the government needs to set clear expectations about the limited prospects for future public-sector employment to incentivize nationals to take private sector jobs, while also reviewing the structure of, and limiting the rate of growth of, public sector wages.

- **Remove remaining barriers to female employment**. The authorities are implementing several measures that will help increase female employment. More needs to be done, including by providing firms with sufficient financial help in defraying the cost of workplace reconfiguration to meet regulatory requirements and social norms.

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- **Increase the efficiency of public spending on education to reduce skills mismatches**. Ongoing efforts to improve training for teachers, update and modify curriculum, bring the private sector into running some schools through pilot programs, and strengthen vocational training are all welcome reforms. The effectiveness of spending on education could also be improved. The evidence available shows that spending on education has not translated into high quality education. A diagnosis of the cost-benefit of education spending could be carried out for example through a public expenditure review. A dual-education system, which combines industry apprenticeships with formal vocational schooling, could be effective in addressing the skills mismatch.[7] Fostering public–private partnerships for curriculum design and apprenticeships could also help align worker skills with private sector needs.

- **Review the effectiveness of wage subsidies**. Wage subsidies can offset the bias against first-time job seekers and reduce the cost of hiring nationals to private sector firms while the new employee is trained and learning on the job. International evidence (Almeida et al., 2014) suggests that the success of these programmes depends to a large extent on the specificities of the design (including the amount of the subsidy, the target group, and any attached conditions for employers). Further analysis is needed to determine whether wage subsidies have been appropriately designed to support a permanent increase in Saudi employment. On female employment, it is important to know whether subsidies have encouraged firms to make lump sum investments for hiring women.

- **Support private sector development**. The private sector can be the main engine of job creation if constraints to doing business, such as regulatory and administrative burden and lack of access to finance, particularly for SMEs are addressed.

[7] The dual-education system is practiced in Germany, where it has helped match training with employers' needs and enabled low unemployment and success in high-end manufacturing (Rojewski, 2004).

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Annex I. G20MOD

This annex provides a broad summary of G20MOD, a module of the IMF's Flexible System of Global Models (FSGM). The model is presented in greater detail in Andrle and others (2015).

1. **G20MOD is an annual, multi-economy, forward-looking, model of the global economy combining both micro-founded and reduced-form formulations of economic sectors**. G20MOD contains individual blocks for the G-20 countries, and 5 additional regions to cover the remaining countries in the world. The key features of a typical G20MOD country model are outlined below, noting any special circumstances that are applied for Saudi Arabia.

2. **Consumption and investment have microeconomic foundations**. Specifically, consumption features overlapping-generations households that can save and smooth consumption, and liquidity-constrained households that must consume all of their current income every period. Firms' investment is determined by a Tobin's Q model. Firms are net borrowers and their risk premia rise during periods of excess capacity, when the output gap is negative, and fall during booms, when the output gap is positive.

3. **Trade is pinned down by reduced-form equations**. They are a function of a competitiveness indicator and domestic or foreign demand. The competitiveness indicator improves one-for-one with domestic prices—there is no local-market pricing. For Saudi Arabia, most exports are oil, so competitiveness changes play a small role in the model.

4. **Potential output is endogenous**. It is modeled by a Cobb-Douglas production function with exogenous trend total factor productivity (TFP), but endogenous capital and equilibrium employed labor. The equilibrium labor is determined by equilibrium rate of unemployment of the labor force. For Saudi Arabia, potential output also moves one-for-one with the long-run average production of oil (but not cyclical swings in oil production).

5. **Consumer price and wage inflation are modeled by semi-structural forward-looking Phillips' curves**. They include weights on a lag and a lead of inflation and a weight on the output gap. Consumer price inflation also has a weight on the real effective exchange rate and second-round effects from food and oil prices. Given that energy prices in Saudi Arabia do not respond to global oil price developments, there is no feed-through from oil price changes to CPI inflation in the Saudi Arabia bloc.

6. **Monetary policy is governed by an interest rate reaction function**. For most countries, it is an inflation-forecast-based rule working to achieve a long-run inflation target. For Saudi Arabia, the monetary reaction function defends its fixed nominal exchange rate against the U.S. dollar. This means in tandem with the risk-adjusted uncovered interest rate parity condition, Saudi Arabia must, in the face of shocks, set its monetary policy interest rate equal to that of the United States to defend its peg.

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7. G20MOD captures a complete set of bilateral migration and remittance flows. The population, labor force, and employment distinguish between "domestic" and "foreign" households. The wage differential between the two groups is used as a proxy for the relative productivity of the two groups. The relative productivity of both types of labor are reflected in the potential output of the economy. Expatriate workers are assumed to remit a fraction of their disposable income to their countries of their origin. All expatriate workers are assumed to be liquidity constrained, consuming all their disposable income left after sending the remittances.

8. There are three commodities in the model—oil, metals, and food. This allows for a distinction between headline and core consumer price inflation, and provides richer analysis of the macroeconomic differences between commodity-exporting and importing regions. The demand for commodities is driven by the world demand and is relatively price inelastic in the short run due to limited substitutability of the commodity classes considered. The supply of commodities is also price inelastic in the short run. Countries can trade in commodities, and households consume food and oil explicitly, allowing for the distinction between headline and core CPI inflation. All have global real prices determined by a global output gap (only a short-run effect), the overall level of global demand, and global production of the commodity in question.

9. In Saudi Arabia, oil is the main commodity that is produced and exported, and is a dominant feature of the model. Exports of oil respond largely to Saudi production decisions. A share of oil revenues are assumed to accrue to the government, the remainder to Aramco, the state oil company. This means that oil price fluctuations affect government revenues, but have little effect on household wealth as households have no direct ownership stake in the oil sector. Oil prices also have little effect on households' and firms' decisions, as oil prices are held fixed domestically. The government, which has a large stock of financial assets, is assumed to set long-run fiscal policy with the aim of maintaining this asset stock, although in the short-run fiscal policy can result in significant deviations away from this target.

10. Countries are largely distinguished from one another in G20MOD by their unique parameterizations. Each economy in the model is structurally identical (except for commodities), but with different key steady-state ratios and different behavioral parameters. As noted above, the parameterization of Saudi Arabia is strongly determined by the fact that its economy is dominated by oil.

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