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MOROCCO

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MOROCCO

SELECTED ISSUES

April 30, 2019

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CONTENTS

ANNEXES

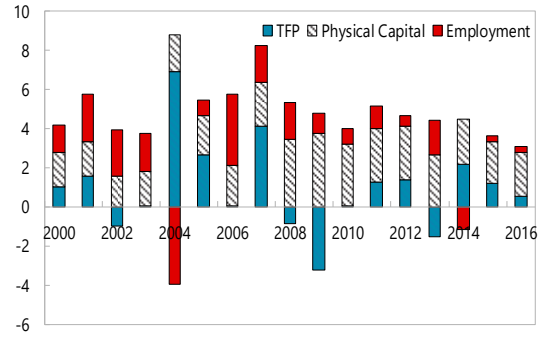
PROMOTING JOB-RICH GROWTH IN MOROCCO THROUGH WELL SEQUENCED STRUCTURAL REFORMS

This paper studies the potential for well-sequenced labor and product market reforms to play a more important role in promoting growth and job creation in Morocco. A Dynamic General Equilibrium model is used to assess the macroeconomic effects of different reform scenarios (isolated, coordinated, or sequenced) that reduce hiring costs and/or firms' entry costs in the presence of a large informal sector. We find that reforms are most effective if executed in a coordinated fashion, as implementing simultaneous reforms in the labor and product markets could add about 2.5 percent of GDP growth and reduce unemployment by about 2.2 percentage points after five years. If reforms are to be introduced sequentially, due for instance to capacity or political economy constraints, starting with product market reforms is more effective in boosting output in the short-run while starting with labor market reforms would reduce unemployment faster.

A. Introduction

1. While substantial reforms have been undertaken by the Moroccan authorities in the last two decades, promoting job-rich growth has proven challenging. Domestic and external vulnerabilities were significantly reduced, and the authorities have taken strong policy actions to improve macroeconomic conditions. However, economic growth has been volatile and not strong enough to significantly reduce unemployment. This is partly due to relatively low and volatile total factor productivity (TFP) growth, which has slowed since the global financial crisis[1] (Figure 1).

Figure 1. Nonagricultural Growth Decomposition
(Percent)



Source: IMF staff calculations.

2. Raising Morocco's growth potential and reducing unemployment will require prompt and consistent implementation of well-sequenced structural reforms. In 2017, the government planned for ambitious structural reforms on several fronts, including the education system, the labor market, the business environment, and public sector governance.[2] As a general principle, great attention needs to be paid to the coordination and sequencing of reforms, while considering their

[1] This assessment is consistent with previous studies by Bank Al Maghrib (Estimation de la croissance potentielle de l'economie marocaine, Document de travail, 2017) and the Ministry of Finance (La croissance potentielle de l'economie marocaine, DEPF Policy Brief, 2017).

[2] These reforms are to contribute to the government's objectives of raising economic growth to 4.5-5.5 percent and reducing unemployment to 8.5 percent by 2021.

distributional impacts.[3] Indeed, insufficient policy coordination could lead to either blockages from various stakeholders, or incoherent public policies. A credible reform strategy is even more desirable in a context where the authorities may lack the political and public support needed to implement some difficult reforms. Aware of these challenges, the government strengthened the strategic coordination and execution of reforms with the creation of a dedicated commission placed directly under the authority of the Head of government in 2017.

3. This paper assesses the potential reaction of output and employment to different reform scenarios in Morocco. We focus on two broad reform categories emphasized in the literature as having significant potential for promoting growth and employment in emerging markets: (i) reduction of firm's barriers to entry, and (ii) improvement in labor market policies and human capital. More specifically, a dynamic general equilibrium model with informal product and labor markets is used to study the impacts of single, combined, and sequenced sets of reforms, while considering the transitional dynamics when the economy moves to a new equilibrium.[4] In doing so, we can measure the benefits and costs of structural reforms in Morocco with the goal of identifying the most welfare-enhancing package of reforms, as well as quantifying their short- and medium-term effects on output and unemployment.

B. Macroeconomic Effects of Structural Reforms: Brief Overview of the Literature

4. The macroeconomic impact of structural reforms has been the focus of a large theoretical and empirical literature. Various types of structural reforms are covered in the literature, and this section focuses mainly on labor market reforms (LMRs) and product market reforms (PMRs). TFP is generally found to be one of the main channels through which structural reforms affect growth. With regard to product markets, several studies find robust evidence that low market competition slows productivity growth (Égert, 2017; Dabla-Norris and others, 2016). Liberalizing product markets can improve efficiency and boost job creation. When businesses are faced with onerous or inconsistent regulatory enforcement and corruption, they have an incentive to hide their activities in the underground economy (Singh and others, 2012). In addition to PMRs, a vast literature documents the impacts of labor market institutions and policies on output and employment. Cacciatore and others (2012) predicts that lower firing costs lead to an increase in unemployment in the initial year after the reform, but this effect is quickly reversed in subsequent years. While labor market deregulation generally appears to have a smaller positive impact on TFP than PMRs (Bouis and Duval, 2011), some studies find that stringent employment protection does lower productivity growth (Cette and others, 2014; Bassanini and others, 2009). Muravyev (2014) claims that more rigid labor market institutions tend to negatively affect employment rates of more disadvantaged workers (women, less educated, and the youth), and could lead to greater labor market segmentation and informality.

[3] See IMF (2017) for the distributional impacts of macro-structural policies.

[4] See Anand and Khera (2016) and Munkacsi and Saxegaard (2017). Annex I provides a detailed presentation of the model.

5. The literature also addresses the appropriate timing and sequencing of reforms. Reform coordination and sequencing matter because the impact of a specific policy may depend on other policies implemented at the same time. Bordon and others (2016) show that gains from LMRs tend to be offset in the first few years by a greater rate of job destruction if reforms are implemented during periods of economic slack. Munkacsi and Saxegaard (2017) explore reform packages and sequencing in South Africa and find that both LMRs and PMRs increase output, and that combining them reduces short-term costs. They suggest that it is usually preferable to start with LMRs as they have a shorter period of adjustment. Anand and Khera (2016) also find that combining LMRs and PMRs has greater impact on output and employment and leads to lower informality.

6. Several studies attempted to quantify the macroeconomic impact of structural reforms in Morocco. IMF (2011) finds that greater labor market flexibility could reduce unemployment in Morocco by about 1.5 to 3.5 percentage points over the medium term. IMF (2013) and IMF (2016) assess that the growth gain from undertaking a full range of structural reforms might come close to 2.5 percentage points. IMF (2018) identifies several institutional frictions that hinder labor reallocation, including restrictions on the use of fixed-term contracts, firing, and working-hours flexibility, and concludes that addressing these frictions would promote labor reallocation towards higher productivity sectors, thus raising productivity growth and employment. World Bank (2018) highlights the need to foster inclusion as a crucial factor to attain a higher level of economic growth and job creation in Morocco. This entails more inclusive market and public institutions, greater human capital formation, and more opportunities for all citizens, particularly youth and women.

C. Recent Trends in Growth and Job Creation in Morocco

Economic Growth

7. Since the global financial crisis, Morocco's macroeconomic performance has been challenged by a combination of domestic vulnerabilities and external shocks. GDP growth averaged about 5 percent in the 2000s, supported by strong physical capital accumulation, broadly favorable external conditions, reform implementation, and economic diversification. Extreme poverty was eradicated, and health and educational outcomes improved, though significant social and spatial inequalities persisted. Between 2010 and 2017, growth slowed and averaged 3.6 percent, reflecting the impact of external factors (e.g., euro area slowdown and higher commodity prices) and structural rigidities that slowed productivity growth. The fiscal and external positions deteriorated, with public debt increasing to 65 percent of GDP in 2017 and international reserves declining to about five months of imports in recent years.

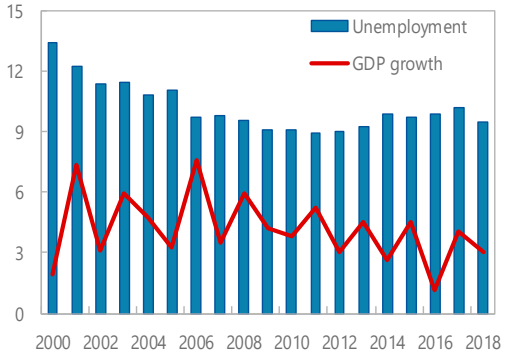
8. In light of these developments, a debate has emerged on Morocco's growth model. Recent trends highlight the slow pace of structural changes in the Moroccan economy and the need to significantly improve productivity. In a recent speech to parliament, King Mohamed VI emphasized that "the national development model no longer responds to citizens' growing demands and pressing needs; it has not been able to reduce disparities between segments of the

population, correct inter-regional imbalances or achieve social justice."[5] The authorities pointed out that a new growth model for Morocco should guarantee the effectiveness of rights, the reduction of social and territorial inequalities, and the consolidation of social cohesion, and required a structural transformation of the economy to strengthen its capacity to create jobs and improve competitiveness.

The Growth-Employment Nexus[6]

9. Despite sustained growth, unemployment has not declined significantly since the early 2000s (Figure 2). Job creation, most of which has taken place in the private sector, has not been sufficient to absorb the growing share of the working-age population.[7] The working-age population grew faster than the labor force, which resulted in a decline in the labor force participation rate by more than 6 percentage points between 2000 and 2018 (from 53.1 percent to 46.2 percent). A sharp gender gap is also persistent in the labor market, with female labor force participation rate remaining particularly low at 22.2 percent in 2018.

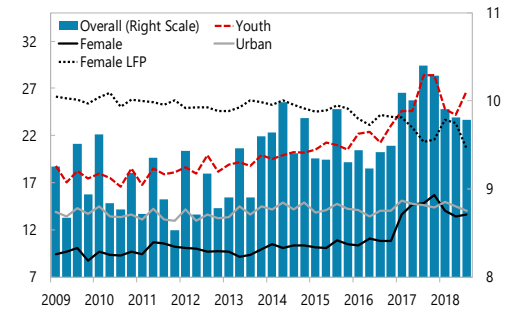
Figure 2. Growth-Unemployment Nexus
(Percent)



Source: High Commission for Planning.

10. Unemployment has hovered around 10 percent in the last decade. Youth is the category of population affected by the highest unemployment rate (26 percent), followed by graduates (17.1 percent). Underemployment is also as high as unemployment at around 10 percent (16.1 percent for the youth). Therefore, 33 percent of the youth are either under- or unemployed. This ratio reaches 50 percent in urban areas.

Figure 3. Unemployment by Category
(Percent)



Source: High Commission for Planning.

[5] His Majesty King Mohamed VI, excerpt from the speech during the parliament's opening session (October 2017). http://www.chambredesrepresentants.ma/fr/discours-royaux/sm-le-roi-mohammed-vi-prononce-un-discours-louverture-de-la-premiere-session-de-la

[6] The figures in this section are from the HCP national employment survey (2018).

[7] The private sector represents about 88 percent of total employment in Morocco. Between 2005 and 2015, private sector job creation increased by 11. 2 percent, against 8.2 percent in the public sector (*Rapport détaillé sur l'activité, l'emploi et le chômage*, HCP, 2015).

D. Key Constraints in the Labor Market

Education and Training

11. There is a stark contrast in Morocco between high education spending, poor educational outcomes, and unemployment (IMF, 2016). The 2018 national employment survey reveals an overrepresentation of untrained or poorly educated workers and only a minority of highly educated workers. About 63 percent of employed people are without a diploma (45.2 percent in urban areas compared to 81.7 percent in rural areas), whereas higher-level graduates represent only 11.4 percent. Low learning outcomes and early dropouts continue to remain serious challenges (World Bank, 2018). A crucial hurdle for the educational system is related to the mismatches between tertiary training and the skills needed in the labor market. This could indirectly affect hiring costs as employers may need to provide on-the-job training to new workers.

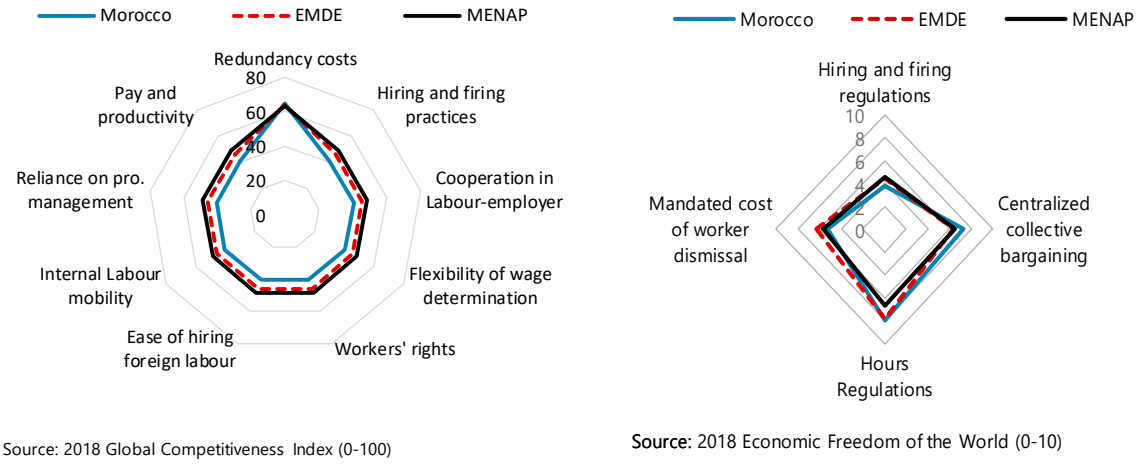
12. To reduce skill mismatches, vocational training has been strengthened. Morocco's ratio of vocational trainees is now higher than the MENA region's average (Boudarbat and Egel, 2014). Still, job prospects for vocational training graduates remain weak. Indeed, the unemployment rate among trainees was 24.5 percent in 2017, against 16 percent for general education graduates. Furthermore, the unemployment rate increases with the level of vocational training received. For vocational training graduates employed, 33 percent of them (compared to 11 percent of those in general education) occupy positions at levels below their qualification.

Labor Market Regulations

13. Labor market regulations are relatively restrictive in Morocco and may discourage job creation (Figure 4). For instance, there are important restrictions to the use of fixed-term contracts, which are only allowed in cases where the employment relationship cannot fit in an indefinite framework.[8] Furthermore, the maximum contract duration is one year, renewable only once in limited cases. After this period, companies must switch to open-ended contracts. Regarding firing regulations, the labor code stipulates that only serious professional misconduct may justify dismissal (with a few exceptions), and unfair dismissal procedures introduce considerable uncertainty for employers, potentially hindering labor demand. Finally, Morocco has a high ratio of minimum to average wages compared to neighboring countries (World Bank, 2018), and in 2015, the minimum wage in urban areas represented almost 100 percent of national income per capita, which is high by international standards (HCP, 2017).

[8] Fixed-term contacts can be used when replacing another employee whose employment contract is suspended, unless the latter is due to a strike; when there's a temporary increase of the company's business; or when the work is strictly seasonal.

Figure 4. Labor Market Regulations



Source: 2018 Global Competitiveness Index (0-100)

Source: 2018 Economic Freedom of the World (0-10)

Note: EMDE (Emerging Markets and Developing Economies) and MENAP (Middle East, North Africa, and Pakistan). The higher the scores the better are labor market regulations.

14. Only a minority of workers is covered by social security, which also contributes to greater informality in the labor market. The current social protection system is highly fragmented. It is composed of several insurance and social assistance programs, ranging from universal transfers to mechanisms targeting specific population groups. Rationalizing these programs could help establish a more comprehensive unemployment insurance scheme (the current scheme provides replacement income for up to six months), helping to better protect workers and complementing other LMRs.

The Informal Economy

15. Informality is a key feature of the Moroccan economy. The HCP conducted three surveys of the informal economy in the last two decades (2000, 2007, and 2014).[9] According to the 2014 survey results, the informal economy represented 11.5 percent of nonagricultural GDP, and the number of informal units increased at an average rate of 1.2 percent per year since 2007, reaching 1.68 million units in 2014, most of them (71 percent) concentrated in urban areas. Previous studies have shown that informality reflects the lack of access to education, excessive labor market regulations, and complex bureaucratic procedures among other factors.[10]

16. Labor market informality is close to 40 percent in the non-agricultural sector. Employment in the informal sector amounted to 2,376 million jobs in 2014, compared with 2,216 million in 2007 and 1,902 million in 1999. The share of informal sector employment in non-agricultural employment remains high but has declined slightly to 36.3 percent in 2014 up from 37.3

[9] These surveys covered all but the agriculture sector for which specific surveys are designed. Other studies have found the contribution of the informal economy to be larger in Morocco.

[10] See for instance Angel-Urdinola and Tanabe (2012).

percent in 2007. At the same time, the informal sector is highly labor intensive, and investment is low and represented only 1 percent of the total investment in 2014.

E. Key Constraints in the Business Environment

17. Morocco has made considerable progress in improving its business environment. Efforts have focused on easing procedures (e.g., for customs transactions, property rights, and enterprise creation) and providing better protection for investors. As a result, Morocco has attracted sustained inflows of foreign investment, and its ranking in the *Doing Business* and *Global Competitiveness* reports (Figure 5) has improved. For instance, the country gained 68 ranks in *Doing Business* between 2010 and 2019 (from 128th to 60th).

18. Further reforms would help promote more private sector-led growth. A survey of different indicators shows that further progress is needed in the following areas:

- **SME access to finance.** At about 16 percent of total credit, SME credit is relatively high, but it has been stagnant in recent years and collateral requirements can be high. While 76 percent of large enterprises in the 2013 World Bank enterprise survey had a bank loan or a line of credit, this was the case for only 42 and 57 percent of small and medium enterprises, respectively (World Bank, 2018). IMF (2019) estimated that greater SME financial inclusion could help increase economic growth in Middle Eastern countries by about 0.5 percentage point annually.

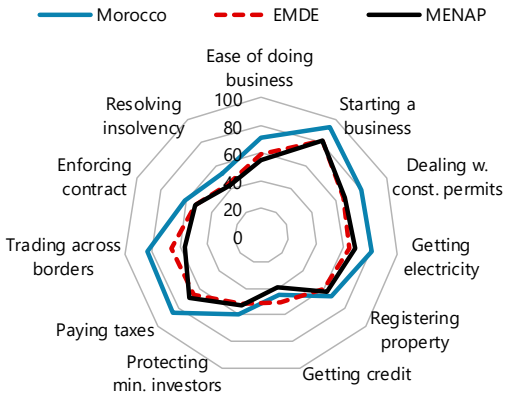
- **Payment delays.** According to the payment survey by Coface, payment delays have increased from 66 days in 2015 to 99 days in 2017 on average (the new regulatory framework aims at 60 days). The percentage of firms that faced delays greater than 120 days surged in 2017, at 42 percent instead of 13 percent in 2016, with delays of up to 158 days for very small enterprises. The government created an Observatory of payment delays to address this issue, which could rapidly improve business conditions for SMEs by easing their cash flow situations.

- **Corruption.** Corruption reduces competition and creates uncertainty for potential market entrants (Campos and others, 2010). According to the World Bank's 2013 Enterprise Survey, over 20 percent of enterprises indicate that it is the largest impediment to doing business in Morocco compared to 7 percent in the MENA region.

- **Competition.** SMEs often find it difficult to access certain markets or sectors due to barriers to entry or the existence of monopolies or oligopolies favoring dominant positions (World Bank, 2018). Promoting market competition will be key to enhance private sector-led growth, and the reactivation of the Competition Council in 2018 should support progress in this area.
  Table 1 summarizes key reforms in the areas described above that could help Morocco promote higher and job-rich growth. The next section will analyze the impact on output and unemployment of different reform scenarios in these areas, focusing on two key variables, namely formal firms' hiring costs and entry costs.

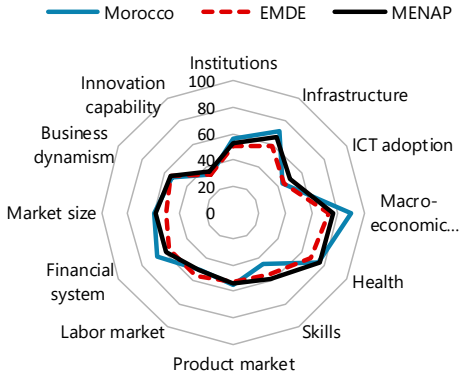
Figure 5. Doing Business and Competitiveness

Doing Business Indicators



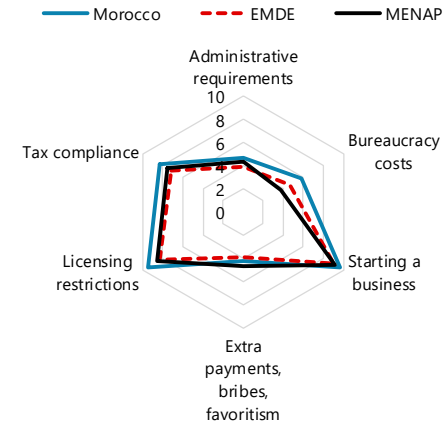
Source: World Bank's Doing Business Report (2018)

Global Competitiveness Indicators



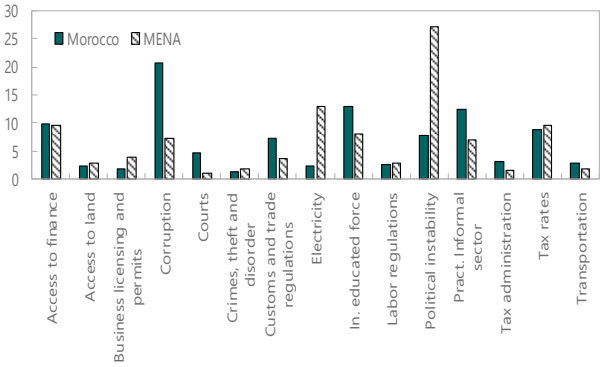
Source: World Economic Forum's Global Competitiveness Report

Business Regulations



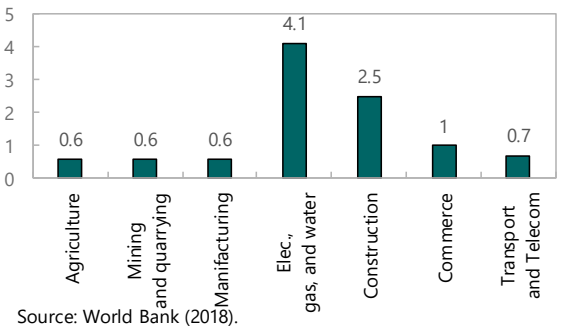
Source: Economic Freedom of the World (2018)

Ranking of the Top Business Environment Obstacles for Firms (Percent of firms, %)



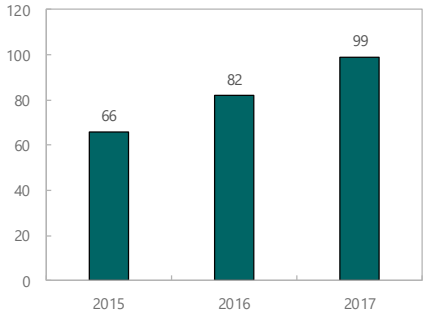
Source: Enterprise Survey (2013)

Credit to the Nonfinancial Private Sector over the Contribution of the Nonfinancial Sector to GDP (2014)



Source: World Bank (2018).

Payment Delays Average Number of Days



Source: Coface payment survey (2017).

Table 1. Selected Reform Priorities

Reforms that could reduce formal firms' entry costs include:	Reforms that could reduce formal firms' hiring costs include:
Simplification of administrative procedures	Reduction of bureaucratic hiring costs
Facilitation of SME access to finance	Better education and training
Promotion of fair market competition	Easing of hiring and firing regulations
Strengthening of anti-corruption measures	Alignment of minimum wage with labor productivity

F. Empirical Approach and Main Findings

Key Features of the Model [11]

19. A small open-economy dynamic general equilibrium model with informal product and labor markets is calibrated for Morocco. This model was developed by Anand and Khera (2016) and Munkacsi and Saxegaard (2017) and is applied based on quarterly data between 2000 and 2017. The household sector is standard; there is a representative infinitively-living household that maximizes the expected discounted lifetime utility of consumption. Regarding the production sector, a differentiation is made between a formal and an informal sector. Both formal and informal wholesale good producers produce an intermediate good through a Cobb-Douglas production function. Both pay not only for the cost of labor and capital, but also for hiring costs of newly hired workers. Due to endogenous entry, the number of retailers is not normalized to one, and the number of firms, in both the official and unofficial sectors, endogenously affects price markups.

20. Several rigidities affect the hiring of new workers and firms' market entry, and these rigidities are lower in the informal economy. As described in previous sections, hiring costs can reflect compliance with hiring regulations, training needs (to make up for insufficient worker education), or administrative costs (e.g., time spent on hiring). The hiring probability may also be affected by firing difficulties due to stringent employment protection legislations. Creating a new company is costly in terms of both money and time, and depends on existing barriers (e.g., access to finance, competition, and corruption). Alongside differences in regulation, other features distinguish the formal and informal sectors: only the formal sector's labor income is taxed; the government can only purchase formal goods; investment is a function of formal goods only; labor productivity in the informal sector is lower than in the formal sector; and formal goods are traded abroad but informal goods are not.

[11] As with any macroeconomic model, the analysis has some limitations: as the model is restricted to two sectors, formal and informal goods, the direct analysis of specific reforms (e.g. activating the competition council or easing hiring and firing regulations) is only approximated through its impact on broad aggregates.

Main Findings

Several simulations are performed to analyze the strategy for implementing labor and product market reform outcomes across three broad scenarios: uncoordinated/isolated decrease of formal firm's hiring costs and entry costs; a coordinated set of reforms where both hiring, and entry costs are reduced; and a sequential approach where one reform is introduced after the other (and vice versa).[12]

21. A first simulation focuses on the impact of *isolated* reforms that reduce formal firms' entry costs (by 10 percent) or formal firms' hiring costs (also by 10 percent). Taken in isolation, both reforms increase output and formal employment in the years following the reform with no short-term costs (Figure 6):

- Reducing formal firms' entry costs is very effective in boosting output as GDP increases by 1.4 percent after 5 years. However, the impact on unemployment is limited (-0.5 percentage point). Reducing entry costs promotes competition, which leads to a reduction in price markups. Additionally, as demand for factors of production increase, real wages and households' wealth increase, resulting in higher consumption. The higher demand for capital also stimulates private investment. The limited effect on job creation could be explained by an increase in capital intensity given unchanged labor market regulations. Overall, this simulation shows that reforms that reduce firms' entry costs, while being growth-friendly, are not sufficient to significantly boost formal job creation.

- Reducing formal firms' hiring costs increases output by about 1 percent after 5 years; this is supported by higher investment as market confidence strengthens following labor market reforms. At the same time, despite a minor decline in formal wages, household consumption increases due to higher spending by new workers, thereby supporting total output. The most significant effect resides in the significant decline in unemployment (by 1.7 pp), while the share of formal employment in total employment increases by 3.4 pp after five years. Lower hiring costs encourage more efficient allocation of resources in the economy, including labor utilization. Importantly, while the short run impact of LMRs is often found to be small or even negative because of short-term adjustment costs (e.g. Cacciatore and others, 2012), these negative effects are not observed in the case of Morocco. This could be explained by the low activity rate and the high level of informal employment, as the increase in formal employment outpaces the number of potential layoffs. Therefore, reforms that lower hiring costs would be highly effective in boosting formal job creation in Morocco, both in the short and long run.

22. A second simulation assesses how *combined* reforms can increase growth and employment over the medium term and shows that there is no conflict or tradeoff between these reforms but rather additivity of their impacts (Figure 6). A simultaneous 10 percent reduction in both formal firms' entry costs and formal firms' hiring costs result in higher output,

[12] The time lag between two reforms is assumed to be ten years to allow the model to converge before the introduction of the second reform.

lower unemployment, and there is no tradeoff between the two reforms as all macroeconomic variables improve (compared to when these reforms are isolated). At the same time, formality increases significantly as both the number of formal firms and formal workers increases after 5 years. Therefore, the benefits of PMRs are higher when implemented in a more flexible labor market environment, thus leading to a steady and smooth transition towards the new steady state. While the issue of long-run substitutability versus complementarity between PMRs and LMRs remains empirically debated, our analysis supports that a broad reform package would be more beneficial as there is no conflict between the two sets of reforms but rather an additivity of the impacts. Therefore, accelerating labor market reforms to complement ongoing improvements to the business environment in Morocco could be particularly beneficial to optimize their effects in the current environment of subdued growth and high unemployment, especially among the youth.

Table 2. Short-Term Effects (After 5 Years) of Structural Reforms on Selected Macroeconomic Indicators (In Percentage Points)

Reform Scenarios	GDP growth	Unemployment	Formal Employment
(1) 10 percent decrease in entry costs	1.4	-0.5	0.8
(2) 10 percent decrease in hiring costs	1.1	-1.7	3.4
Reform package (1) + (2)	2.5	-2.2	4.2
	Formal Wage	**Consumption %GDP**	**Investment % GDP**
(1) 10 percent decrease in entry costs	1.3	0.7	1.7
(2) 10 percent decrease in hiring costs	-0.12	0.5	0.8
Reform package (1) + (2)	0.1	1.2	2.5

23. Finally, if it is decided that labor and product market reforms should be introduced *sequentially* (e.g., due to capacity or political economy constraints), a policy prioritization would be needed between reducing unemployment or boosting GDP growth more quickly (Figure 7). In this case, two scenarios are assessed: (i) starting with reforms that reduce firms' entry costs (S1); and, (ii) starting first with reforms that reduce firms' hiring costs (S2). Under S1, output grows faster in the first step of the transition and then converges gradually toward the new steady state. Under S2, unemployment falls more quickly and stays at lower levels for a longer time. On average, the growth gain under S1 relative to S2 is about 0.5 pp, while under S2, the unemployment rate is lower than under S1 by 0.6 pp over the projection period. Therefore, each scenario has its own short-run advantages in terms of boosting output or job creation. In the case of Morocco, given the notable progress made in improving the business environment in recent years and the urgency of promoting inclusive growth, prioritizing LMRs may be a preferable option to achieve the dual objective of boosting growth and reducing the unemployment rate.

G. Conclusion

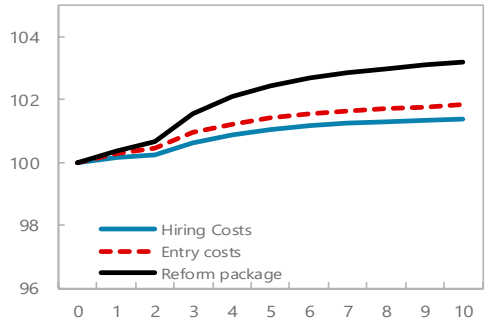
24. The benefits of well-sequenced structural reforms are likely to be considerable over the medium term in Morocco. Reforms aimed at reducing hiring costs (e.g., more flexible

contracts, minimum wage aligned with labor productivity, and better training to reduce skill mismatches) could lead to an increase in output and employment over the medium term. Similarly, policy actions that reduce firms' barriers to entry (e.g., simplifying administrative procedures, curbing corruption, and enhancing SME access to finance) would also increase output but with limited effects on formal employment. Importantly, the results provide robust evidence that a reform package combining both a reduction in hiring costs and entry costs would have a greater impact with a reduction of unemployment by 2 percentage points and an increase in GDP by about 2.5 points after 5 years. If reforms need to be sequenced, a policy choice would need to be made in the short run as starting with LMRs is more effective in reducing unemployment, while starting with PMRs would boost output faster.

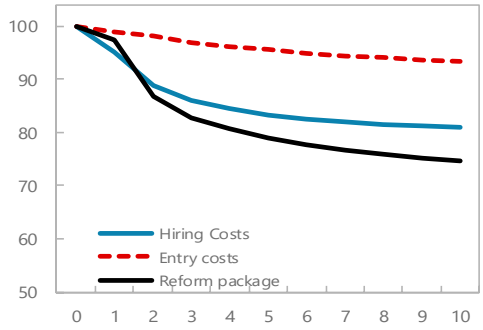
25. Compounding the impact of recent efforts to improve the business environment, ambitious labor market reforms would help promote more job-rich growth in Morocco. Morocco has made considerable progress in improving its business environment in recent years, but a new wave of reforms (e.g., access to finance and market competition) would further promote private sector-led growth. At the same time, the analysis shows that introducing reforms that lower formal firms' hiring costs will be key to improve labor market functioning and create the conditions for stronger job creation. Easing restrictions on hiring and firing would make the labor market more flexible and help reduce unemployment. Relaxing restrictions on the use of fixed-term contracts, especially for the youth and new job seekers, and implementing more efficient procedures for dismissal while strengthening social and unemployment safety nets would make it easier to create the needed formal jobs. Finally, both the education and the vocational training systems need to be upgraded to reduce skill mismatches in the labor market as hiring costs are higher in part due to insufficient human capital.

Figure 6. Macroeconomic Effects of Single/Joint Labor and Product Market Reforms in 10 Years
(10 percent decrease in entry costs and/or hiring costs)

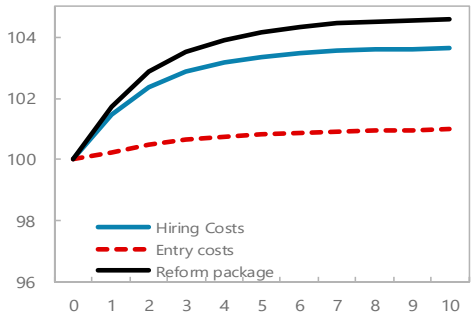
GDP
(Initial SS=100)



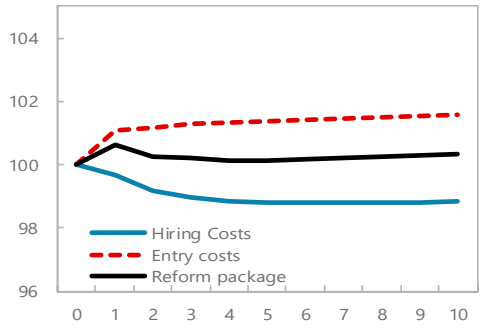
Unemployment
(Initial SS = 100)



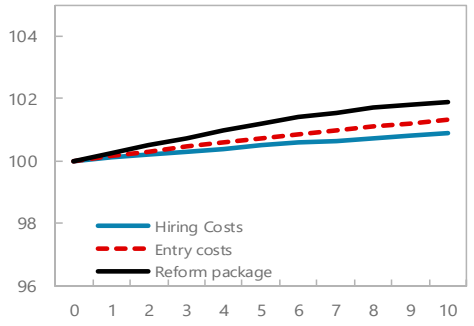
Formal employment
(Initial SS = 100)



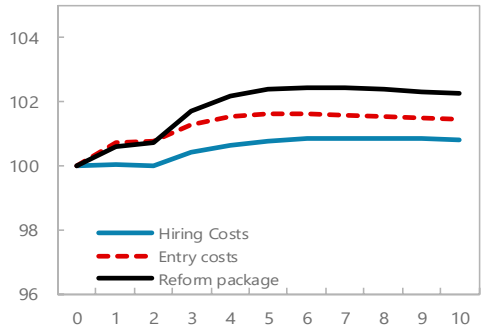
Formal wage
(Initial SS=100)



Household consumption
(Initial SS=100)

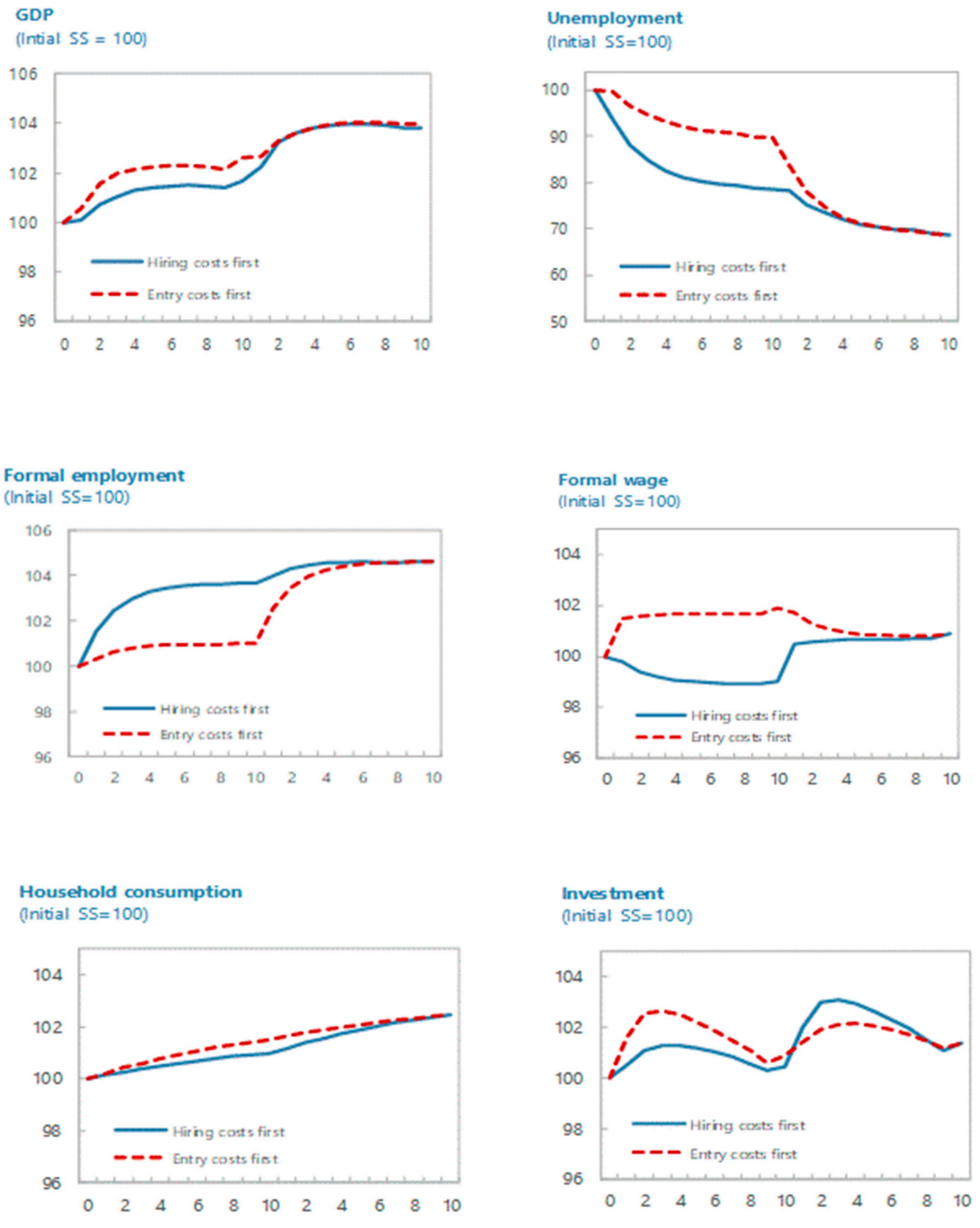


Investment
(Initial SS=100)



Note: Initial SS= Initial steady state

Figure 7. Macroeconomic Effects of Labor and Product Market Reform Sequencing in 20 Years
(10% decrease in entry costs first/hiring costs first)



Annex I. Structure of the Model

1. Representative household utility function

A representative infinitely living household with perfect foresight consumes over time a bundle of formal, informal, and foreign goods. It maximizes expected discounted lifetime utility of consumption ($\max E_0 \sum_{t=0}^{\infty} \beta^t \zeta_{C,t} U[C_t]$), where the contemporaneous utility is given by $U[C_t] = (1-hc) ln(C_t - C_{t-1})$. β is the discount factor, $\zeta_{C,t}$ is the preference shock, and $hc \in (0,1)$ is the external consumption habit parameter. In turn, the aggregate consumption bundle C_t consists of home-produced goods $C_{H,t}$ and foreign-produced (imported) goods $C_{f,t}$, $C_t = \left[\alpha^{\frac{1}{\eta}} C_{H,t}^{\frac{\eta-1}{\eta}} + (1-\alpha)^{\frac{1}{\eta}} C_{f,t}^{\frac{\eta-1}{\eta}} \right]^{\frac{\eta}{\eta-1}}$ where $\alpha \in (0,1)$ and $\eta > 0$ is the elasticity of substitution between home and foreign produced goods. The home consumption $C_{H,t}$ is also a composite of goods produced in the formal sector $C_{F,t}$ and goods produced in the informal sector $C_{I,t}$: $C_{H,t} = \left[\omega^{\frac{1}{\mu}} C_{F,t}^{\frac{\mu-1}{\mu}} + (1-\omega)^{\frac{1}{\mu}} C_{I,t}^{\frac{\mu-1}{\mu}} \right]^{\frac{\mu}{\mu-1}}$, where $\omega \in (0,1)$ represents the weight of formal sector goods in the basket, and $\mu > 0$ is the elasticity of substitution between sectoral goods.

2. Household budget constraint

The household earns labor income from working in the formal sector ($L_{F,t}$) or in the informal sector ($L_{I,t}$), or it receives social benefits WU_t, which is an exogenous shock, if it is unemployed. WF_t and

WI_t are the sectoral real wages; although only the formal sector's wage is subject to income $\tau_{Femployee,t}$ which is an exogenous variable. $Y_{HP,t}$ denotes home production.

The household's income also includes profits from wholesaler and retailer firms, denoted by W and R, respectively. The number of retailer firms is endogenous, while the number of wholesaler firms is normalized to one. The household pays for the entry costs ($entry_{F,t}$ and $entry_{I,t}$) of new firms $N^E_{F,t}$ and $N^E_{I,t}$.

The laws of motion for the retail firms are $\begin{aligned} N_{F,t} &= (1-\delta_{F,t})(N_{F,t-1}+N^E_{F,t}) \\ N_{I,t} &= (1-\delta_{I,t})(N_{I,t-1}+N^E_{I,t}) \end{aligned}$ with sectoral bankruptcy rates δ_F and δ_I.

Savings can be in the form of foreign bonds B_t or in-home bonds D_t which trade in complete markets. The household also pays a lump sum tax. Thus, the household budget constraint can be expressed as

$$\begin{aligned} &(1-\tau_{Femployee,t})WF_tL_{F,t}+WI_tL_{I,t}+WU_tU_t+Y_{HP,t} \\ &+N_{F,t}Prof^R_{F,t}+N_{I,t}Prof^R_{I,t}+Prof^W_{F,t}+Prof^W_{I,t}-N^E_{F,t}entry_{F,t}-N^E_{I,t}entry_{I,t} \\ &+DEP_t\frac{1+i^{\text{å}}_{t-1}}{\pi_t}RER_{t-1}B_{t-1}+\frac{1+i_{t-1}}{\pi_t}D_{t-1t}-RER_tB_t-D_t= \\ &C_t+Tax \end{aligned}$$

where RER_t is the real exchange rate, DEP_t is the depreciation rate of the nominal exchange rate, i_t is the nominal interest rate on home bonds, and $i^{\text{å}}_t$ is the nominal interest rate on foreign bonds, which depends on the exogenous foreign interest rate and on an interest rate premium related to the relative amount of foreign debt holdings, following Schmitt-Grohe and Uribe (2003).

3. Wholesale good firms

Formal and informal goods are produced by wholesale good producers and sold by retailers. A continuum of entrepreneurs of $(0,1)$ in each sector use labor ($L_{F,t}$ or $L_{I,t}$) and physical capital ($K_{F,t}$ or $K_{I,t}$) to produce intermediate goods ($Y_{F,t}$ or $Y_{I,t}$), following a constant returns to scale technology[1]: $\begin{matrix} Y_{F,t} = \theta_{F,t}(K_{F,t-1})^{\psi_F}(L_{F,t})^{1-\psi_F} \\ Y_{I,t} = \theta_{I,t}(K_{I,t-1})^{\psi_I}(L_{I,t})^{1-\psi_I} \end{matrix}$, where $\theta_{F,t}$ and $\theta_{I,t}$ are exogenous sectoral productivities, and ψ_F and ψ_I are the sectoral capital income shares. Wholesale firms choose capital and labor by maximizing profits,

$Prof^W_{F,t} = MC_{F,t}Y_{F,t} - WF_tL_{F,t} - RK_tK_{F,t-1} - HC_{F,t}H_{F,t}$, where $MC_{F,t}$ is the price of wholesale goods. The hiring cost is denoted by $HC_{F,t}$, while $H_{F,t}$ is the number of hired people.

4. Retailer good producers

Retailer S maximizes its expected discounted stream of future profits $\max E_t \sum_{k=t}^{\infty} Q_{t,k} Prof^R_{F,k}(s)$, where $Q_{t,k}$ is the stochastic discount factor and the one-period profit is

$Prof^R_{F,t}(s) = \left(\frac{P_{F,t}(s)}{P_t} - MC_{F,t}(s)\right)\left(\frac{P_{F,t}(s)}{P_{F,t}}\right)^{-\delta_{F,t}} QD_{F,t} - R(P_{F,t})(s)$. $MC_{F,t}(s)$ is the price final firm S pays when purchasing the wholesale goods.

[1] Because in equilibrium all $i \in (0,1)$ intermediate firms follow the same optimization process, for the sake of simplicity we disregard the symbol i when describing their optimization in most of this section.

5. Investment and capital goods

The capital producer owns physical capital, and, by investing, produces new physical capital. Investment is subject to a capital adjustment cost. This set-up follows that of Bernanke and others (1999). The capital producer invests such that its profit is maximized:

$$\max Q_t \left\{ \frac{P_{INV,t}}{P_t} I_t - \frac{\phi_{INV}}{2} \left(\frac{\frac{P_{INV,t}}{P_t} I_t}{K_{t-1}} - \delta \right)^2 K_{t-1} - \frac{P_{INV,t}}{P_t} I_t \right\}$$

where Q_t is the price of physical capital.

The capital law of motion is standard, except that the price of investment is not equal to the general economy-wide price level, because only goods produced in the formal sector can be used for investment:

$$K_t = (1-\delta)K_{t-1} + \frac{P_{INV,t}}{P_t} I_t - \frac{\phi_{INV}}{2} \left(\frac{\frac{P_{INV,t}}{P_t} I_t}{K_{t-1}} - \delta \right)^2 K_{t-1}$$

Aggregate investment is a composite of home produced and imported goods: $I_t = \left[\alpha^{\frac{1}{\eta}} I_{H,t}^{\frac{\eta-1}{\eta}} + (1-\alpha)^{\frac{1}{\eta}} I_{f,t}^{\frac{\eta-1}{\eta}} \right]^{\frac{\eta}{\eta-1}}$

6. Labor market dynamics

The labor force is fixed at 1, so that the unemployment rate $UNEMP_t$ is 1 minus formal and informal employment L_t, $\begin{matrix} L_{F,t} + L_{I,t} = L_t \\ U_t = 1 - L_t \end{matrix}$. Employment in each sector follows a law of motion of the type $L_{F,t} = (1 - probf_{F,t}) L_{F,t-1} + H_{F,t}$. At the beginning of period t, $L_{F,t-1}$ people are employed. Then,

at the beginning of period t, $probf_{F,t}L_{F,t-1}$ people are fired, where the exogenous firing probability is $probf_{F,t}$. During period t, firms hire new workers. After firing and hiring is over at the end of period t, employment will be $L_{F,t}$, which is also the level of employment at the beginning of period $t+1$.

Hiring cost is a function of hiring probability: $HC_{F,t} = \beta_{HCF,t}\left(probh_{F,t}\right)^{\alpha_{HCF}}$, where the hiring probability is $probh_{F,t} = \dfrac{H_{F,t}}{U_{t-1} + probf_{F,t}L_{F,t-1} + probf_{I,t}L_{I,t-1}}$. Thus, the probability of hiring depends on the number of hired people $H_{F,t}$ (the higher the number of hired people, the higher the probability of hiring) and on the number of people – potentially – available to hire. We assume that not only those who were unemployed at the beginning of period t can be hired but also those who have just lost their jobs in any of the sectors. The exogenous term $\beta_{HCF,t}$ represents the per capita hiring cost, and this is the labor market deregulation variable, too. Finally, α_{HCF} is the elasticity of hiring cost with respect to the hiring probability.

7. Wage bargaining

Workers and firms bargain over real wages through a Nash bargaining process that can be proxied by a weighted maximization of the relative benefits to firms and workers with the weights being the exogenously determined bargaining power of workers:

$$\max\left(V_t^F - V_t^U\right)^{\lambda_{F,t}}\left(J_t^F\right)^{1-\lambda_{F,t}}$$
$$\max\left(V_t^I - V_t^U\right)^{\lambda_{I,t}}\left(J_t^I\right)^{1-\lambda_{I,t}}$$

, where $\lambda_{F,t}$ is the bargaining power in the formal sector, V_t^F is the value function of workers in the formal sector, V_t^I is the value function of workers in the informal sector,

V_t^U is the value function of the unemployed, and J_t^S is the value function of firms in sector S (formal or informal).

8. Trade

Exports QX_t respond to the relative price of exports with elasticity $-VATHETAX$ following $QX_t = (\frac{PXPstar_t}{alphax_t})^{(-VATHETAX)}$. In turn, imports QM_t are the sum of imported consumer goods Cf_t, imported investment goods If_t, and imported government consumption goods $Gf1_t$, following

$$QM_t = Cf_t + If_t + Gf1_t$$

9. Fiscal policy

The government collects labor taxes from the formal sector $(\tau_{Femployee,t})WF_tL_{F,t}$ and a lump sum tax Tax_t to fund Government spending $\frac{P_{F,t}}{P_t}G_t$ and unemployment insurance WU_tU_t. It manages public debt issued in domestic currency $Debt_t$ to smooth temporary revenue and spending fluctuations:

$$\frac{P_{F,t}}{P_t}G_t + WU_tU_t + \frac{1+i_{t-1}}{PIE_t} * Debt_{t-1} =$$

$$Debt_t + Tax_t + (\tau_{Femployee,t})WF_tL_{F,t}$$

Government spending is partly on domestic goods $G_{H,t}$ and partly on foreign goods $G_{f,t}$, given by:

$$G_{H,t} = \alpha G_t \left(\frac{P_{F,t}}{P_{INV,t}}\right)^{-\eta}$$

$$G_{f,t} = (1-\alpha) G_t \left(\frac{P_{f,t}}{P_{INV,t}}\right)^{-\eta}$$

Fiscal policy is geared at keeping the public debt to GDP ratio $\frac{Debt_t}{ZZ_t}$ fluctuating around a steady state value $DEBTGDPbar$, and this is governed by:

$$log\left(\frac{Debt_t}{ZZ_t}\right)=(1-rhotaxF)*log(DEBTGDPbar)$$
$$+rhotaxF*log\left(\frac{Debt_{t-1}}{ZZ_{t-1}}\right)+epsTax_t$$

Similarly, the government spending to GDP ratio is kept around a given policy level $Gbar$, so that:

$$log\left(\frac{G}{ZZ}\right) = (1-rhoG)*log(Gbar)+rhoG*log\left(\frac{G_{t-1}}{ZZ_{t-1}}\right)+epsG_t$$

Labor tax rates for employees and the unemployment allowance are kept stable around fixed levels ($taxF\_employeebar$ and $WUbar$). The fiscal adjustment takes place on the lump-sum taxes Tax_t, according to:

$$log(taxF\_employee_t) = (1-rhotaxF)*log(taxF\_employeebar)$$
$$+rhotaxF*log(taxF\_employee_{t-1})+epstaxF\_employee_t$$

$$log(WU_t) = (1-rhoWU)*log(WUbar)+rhoWU*log(WU_{t-1})+epsWU_t$$

10. Monetary Policy

The central bank follows an inflation targeting regime with a policy reaction function that cares about interest rate smoothing and cares about deviations of inflation and output from their steady state levels. The central bank's response function is thus:

$$log(1+i_t)-log(1+i^{SS}) = gammai*\left(log(1+i_{t-1})-log(1+i^{SS})\right)$$

$$+(1-gammai)*\begin{pmatrix} gammaPIE*\left(log(PIE)-log(PIE^{SS})\right) \\ +gammaY*\left(log(ZZ)-log(ZZ^{SS})\right)\end{pmatrix}+epsi;$$

11. Market clearing

The demand for formal goods QDF_t is equal to the sum of formal consumption goods CF_t, formal goods used for investment IH_t, formal goods used for government consumption GH_t, and formal goods exported QX_t. $QDF_t = CF_t + IH_t + GH_t + QX_t$ In contrast, the demand for informal goods QDI_t is only used to satisfy the consumption demand of informal goods CI_t. $QDI_t = CI_t$

At the aggregate level, the hiring costs and firm entry costs generate frictions that create a wedge between the production of formal and informal goods and the demand for both goods, explaining why reducing those frictions can increase both production and consumption. These productions functions are thus:

$$YF_t = QDF_t + \frac{HCF_t * HF_t}{\frac{PFPP_t}{PHP_t}} + \frac{NFE_t * ENTRYNF_t}{\frac{PFPP_t}{PHP_t}} + \frac{dF_t}{2} * \left(\frac{PFP_t}{PFP_{t-1}} * \frac{PIEH_t}{PIE^{SS}} - 1 \right)^2 * \frac{QDFs_t}{\frac{PFPP_t}{PHP_t}} * NF_t$$

$$YI_t + YHP_t = QDI_t + \frac{HCI_t * HI_t}{\frac{PIPP_t}{PHP_t}} + \frac{NIE_t * ENTRYNI_t}{\frac{PIPP_t}{PHP_t}} + \frac{dI_t}{2} * \left(\frac{PIP_t}{PIP_{t-1}} * \frac{PIEH_t}{PIE^{SS}} - 1 \right)^2 * \frac{QDIs_t}{\frac{PIPP_t}{PHP_t}} * NI_t$$

GDP is defined as usual, adjusting the components by their relative prices:

$$ZZ_t = C_t + \frac{PFPP_t * PHP_t}{PHPP\_I_t} * (I_t + G_t) + PFPP_t * PHP_t * QX_t - PfPP_t * QM_t$$

Annex II. Evaluating the Steady State of the Model

Variable	Data (percent)			Data source and coverage	Model (percent)
	Average	Min	Max		
Investment as a share of GDP	32.1	26.4	39.1	HCP 2000-2017	31.7
Household consumption as a share of GDP	58.5	56.5	61.6	HCP 2000-2017	58.6
Public consumption as a share of GDP	18.4	16.8	19.9	HCP 2000-2017	18.3
Imports of goods and services as a share of GDP	41.1	30.8	50.2	HCP 2000-2017	40.4
Exports of goods and services as a share of GDP	32.1	26.8	37.1	HCP 2000-2017	31.7
Unemployment rate	10.2	8.9	13.4	HCP 2000-2017	10.2
Shadow economy as a share of GDP	17.9	11.5*	24.2**	HCP-2013/2014	17.9
Shadow economy as a share of total employment	37.3	22.1*	52.5**	HCP 2013/2014	45.4

Note: * means excluding agriculture, ** means including agriculture.

Annex III. Calibration of Steady State Parameters[1]

Name of parameter/variable	Value	Source
Discount rate	0.98	Based on historical data (2000-2017)
Physical capital depreciation rate	0.045	Based on historical data (2000-2017)
Formal capital income share	0.5	Based on historical data (2000-2017)
Informal capital income share	0.1	Based on historical data (2000-2017)
Home inflation (%, y-o-y)	2	HCP (2000-2017)
Exit rate of formal retailers	0.32	Authors' calculations based on bankruptcy data from HCP and Inforisk
Exit rate of informal retailers	0.5	Assumed to be 50 percent higher than in the formal sector
Firing probability in the formal sector	0.15	Authors' calculations based on employment data from HCP (2000-2017)
Firing probability in the informal sector	0.45	Authors' calculations based on employment data from HCP (2000-2017)
Ratio of hiring cost to wage in the formal sector	1.75	Global Competitiveness Index, World Bank Doing Business, and ILO
Ratio of hiring cost to wage in the informal sector	0.44	Assumed to be 1/4 of formal hiring cost
Elasticity of substitution between home and foreign goods	0.6	Ait Lahcen (2014)
Home bias	0.8	Authors' calculation based on trade data (HCP 2000-2017)
Export price elasticity	2	Trade Ministry, World Bank (2012), and Abbad (2017)
Share of income tax revenue to GDP (%)	0.04	Ministry of Finance (2000-2017)
Exchange rate pass-through to import prices	0.4	Goldfajn and Werlang (2000), and Abida and Sghaier (2012)
Entry cost in the formal sector (in months of production)	2.07	World Bank Doing Business, World Economic Forum, and authors' calculation.
Entry cost in the informal sector (in months of production)	0.52	Assumed to be 1/4 of formal entry cost
Elasticity of hiring cost wrt to hiring probability in the formal sector	0.5	Munkacsi and Saxegaard (2017)
Elasticity of hiring cost wrt to hiring probability in the informal sector	0.5	Munkacsi and Saxegaard (2017)
Elasticity of substitution between the formal and informal goods	1.5	Authors' calculations based on HCP data (2000-2017)
Formal bargaining power of workers	0.5	Calibrated to match the unemployment rate
Informal bargaining power of workers	0.1	Calibrated to match the unemployment rate and lower than in the formal sector

[1] Several robustness checks were performed to ensure that the main findings are not sensitive to the assumptions made to calibrate the steady state.

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