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MOROCCO

SELECTED ISSUES

November 2017

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MOROCCO

SELECTED ISSUES

November 29, 2017

Approved By

Middle East and Central Asia Department

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CONTENTS

DISTRIBUTIONAL EFFECTS OF TAX REFORMS IN MOROCCO[1]

Morocco would benefit from a comprehensive and well explained tax reform strategy aiming to reduce inequality and boost growth. For this, a recommended tax reform package should combine several key components: aligning the reduced VAT rate on manufacturing goods and services to the standard VAT rate; reducing tax exemptions; raising property tax; and lowering corporate tax rates. At the same time, the targeting of social programs should be strengthened. Such a reform approach would protect the most vulnerable and help broaden the tax base, remove tax distortions, and better share the tax burden.

A. Introduction

1. Since the 2013 National Tax Conference, Morocco has identified and started implementing several priority tax reforms. A consensus emerged in 2013 that Morocco's tax system had to be more equitable and supportive of competitiveness.[2] Key priorities included: removing tax exemptions on large agricultural firms, simplifying the value-added tax (VAT) regime and corporate taxation, and better enforcing tax payments from self-employed and liberal professions. Reforms implemented since then have been going in this direction, but at varying pace.[3]

2. Tax reforms should be part of a comprehensive and well explained approach. Such an approach should consider the combined impact of various tax measures in several dimensions, including growth, revenue, and fairness, as well as parallel efforts to improve the targeting and impact of public social spending. In the absence of comprehensive strategy, the risks are that isolated reforms are not sequenced properly, that they either introduce inconsistencies or distortions, or that they be perceived as unfair, and in the end counter-productive from the perspective of improving the quality, efficiency, fairness, and acceptance of the tax system.

3. This paper aims to contribute to a better understanding of tax reforms in Morocco by quantifying the potential effects of various reform scenarios, especially on inequality and growth. The paper builds a dynamic stochastic general equilibrium (DSGE) model adapted to Morocco's specificities (and applicable to similar developing and emerging market countries), which allows to capture all key reform dimensions mentioned above. The literature also provides useful

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[1] Prepared by Jean Frédéric Noah Ndela Ntsama, Hamed Ghiaie, and Gregory Auclair.

[2] See "*Synthèse des Propositions Issues des Assises Nationales sur la Fiscalité*" (https://portail.tax.gov.ma/wps/portal/DGI/Documentation-fiscale/Recommandations-des-Assises)

[3] They included: the introduction of corporate tax brackets in the 2016 budget—shifting away from a unique corporate income tax rate; the introduction of VAT exemptions for some agro-industrial inputs; improvements to the VAT refund system; increases in the social contribution for the public sector (as part of the 2016 pension reform); measures to enforce tax payments by self-employed and liberal professions; and, the simplification of various administrative procedures related to compliance and settlement of tax disputes.

guidance on the relationship between taxation and economic growth, how taxation can help reduce inequality, and the importance of strengthening social safety nets to mitigate the effects of tax reform on inequality (Box 1).

Box 1. Summary of the Literature on Tax Reforms

A key focus of the literature is on the relationship between tax reforms and economic growth. The evidence is mixed, and to some extent controversial. A large literature focuses on advanced economies, especially the U.S., and the conventional wisdom is that tax rate increases could dampen growth (McBride, 2012). For developing economies, where the body of empirical evidence is smaller, the relationship between tax and growth seems inconclusive, which has in part been attributed to the role of other factors, such as weaker tax administration and enforcement (Acosta-Ormaechea and Yoo 2012).

Regarding the growth-equality trade off, the literature is clear on the need to strengthen social safety nets to mitigate the adverse impact of tax reforms. Bird and Zolt (2014) suggest focusing on improving the design of consumption taxes, and adjusting social programs to compensate for the impact on the poor. Lustig et al. (2012) emphasize cash transfer programs over tax reform to address inequality. Other experts suggest that when designing tax policy, there is a need to balance growth and redistribution objectives and, for the poorest countries, to shift to redistributive tax policies only once a sufficient income-per-capita level has been reached (Ravallion, 2010).

The literature often classifies taxes as progressive (e.g., personal income tax), proportional (e.g., property tax), and regressive (e.g., consumption, trade taxes), each having a different impact on growth and inequality. Cross-country analyses suggest that income taxes tend to be detrimental to growth in advanced and emerging economies, and that shifting towards consumption and property taxes, while keeping overall tax revenues unchanged, can modestly increase growth (McBride, 2012; Acosta-Ormaechea and Yoo, 2012). One key reason is that progressive taxation may reduce the returns on production factors and therefore the incentives to work and invest, which in turn could undermine growth. Another reason is that disparities in effective marginal tax rates across asset types can increase resource misallocation, steering investors toward lower return tax-favored investment (IMF 2017). These effects are not evidenced in low-income emerging and developing economies. However, some studies argue that a shift from trade and consumption taxes to personal income tax, if kept tax revenue-neutral, may be detrimental to growth in some developing economies (McNabb and LeMay-Boucher, 2014). Tax reforms can also address economic distortions and unlock additional growth (Karim and Mansouri, 2005).

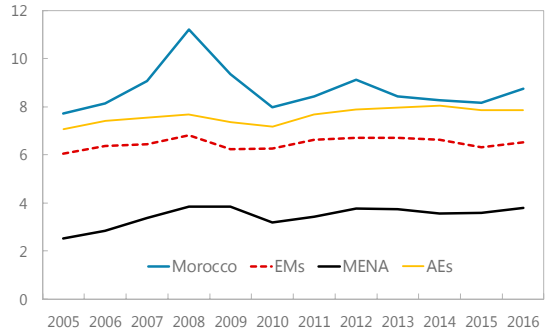
Finally, the tax mix has implications for gender biases and for the efficiency of tax administration. Income and consumption taxes can be gender-biased because of differences between men and women in household income and expenditure (Grown and Valodia, 2010), and targeted consumption tax reforms can improve consumption patterns and gender outcomes (e.g., through a lower rate on children's clothes). Tax reforms can also reduce tax evasion and avoidance, leading to more efficient and fairer tax systems (Fjeldstad, 2014). However, property tax reforms may fail in developing economies due to higher administrative and land reform costs relative to tax revenue gains (Slack and Bird, 2014). Stronger tax administration can help reduce unfair cost advantages enjoyed by the informal sector (IMF, 2017).

B. Key Features of Morocco's Tax System

4. Overall, the performance of Morocco's tax system is satisfactory, but there is scope to strengthen it and make it more equitable and less distortive. Morocco's tax revenues declined somewhat in recent years, from almost 24 percent of GDP in 2012 to 21.5 percent in 2016,[4] but they remain above the average for middle income economies.

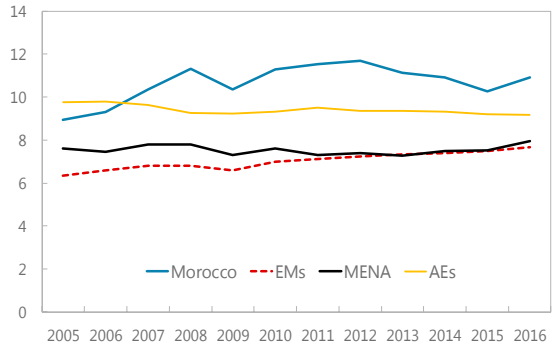
Morocco's Tax System

Revenue from Income Taxes
(Percent of GDP)

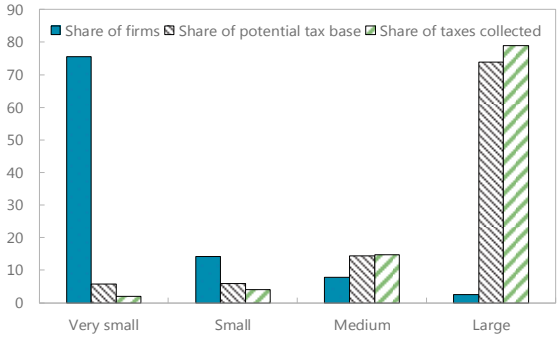


VAT Collections Efficiency
(Ratio of the VAT revenue to aggregate consumption, divided by the standard VAT rate)

Revenue from Goods and Services Taxes
(Percent of GDP)



Corporate Tax Base in Morocco Firms size



Sources: IMF FAD Tax Revenue Indicators Database.

Sources: Morocco Ministry of Economy and Finance

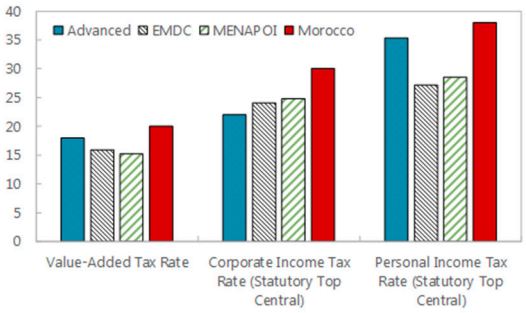
5. Morocco's tax base is relatively narrow and skewed. As in many countries, there is an important gap between the potential tax base (what the country could collect with an efficient tax system) and actual tax collection (what it does collect). Factors behind this gap include tax exemptions, evasion and avoidance. Morocco's tax base is also skewed towards (corporate and personal) income and goods and services, with these two components accounting for about 80 percent of tax revenues. The VAT does not apply to all purchases of goods and services,

[4] The decline in the tax revenue-to-GDP ratio in recent years has been driven primarily by: (i) accelerated VAT refunds (with priority given to small and medium enterprises) and lower VAT revenues due to lower oil prices; and (ii) lower "other revenues," including from administrative fees, penalties, and transfers, while the impact of large one-off "other revenues" (e.g., sales of telephone licenses) observed in previous years ended.

since several items (e.g., some foods items, medicine) are exempted. The income tax base is relatively narrow because many liberal and independent professions, and many firms (about 64 percent), avoid it.[5]

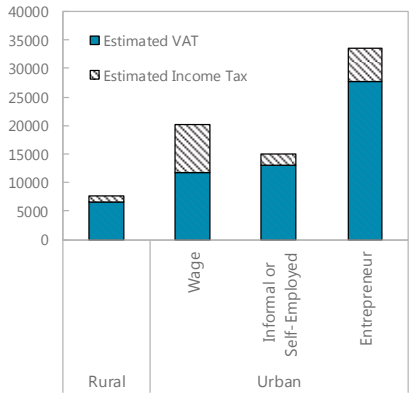
6. Morocco's tax rates vary significantly. Overall, they are above regional average. Corporate tax brackets were introduced in the 2016 budget, departing from a unique 30 percent corporate income tax rate. The VAT regime has remained unchanged since 2012, with a standard rate of 20 percent, but several items have been subject to reduced rates,[6] which has been at the sources of VAT refund issues. The current personal income tax regime has been in place since January 2010, and its rate ranges between 0 and 38 percent across income brackets.

Comparison of Tax rates
(Average by country group)

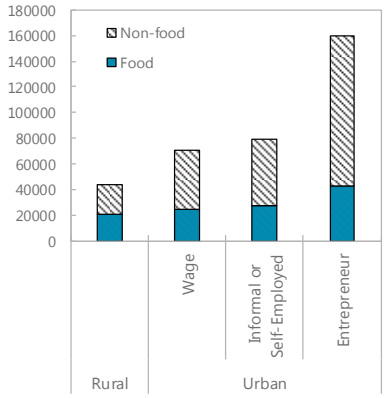


Source: IMF Fiscal Affairs Tax Revenue Indicators database.

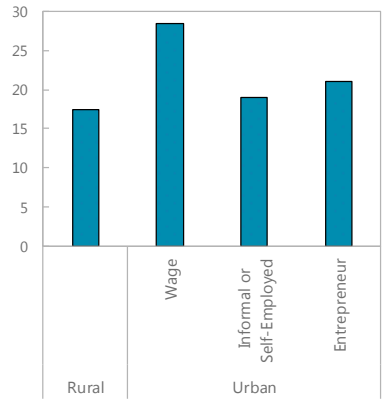
Household Tax Burden
(By household type, in MDH)



Annual Household Expenditure
(By household type, in MDH)



Average Income Tax and VAT Paid in Percent of Total Household Expenditure



Source: 2007 Morocco Household Survey.

7. Total tax expenditure is relatively low in percent of GDP, but exemptions are numerous and introduce distortions.[7] In 2016, total tax expenditure was about 3.2 percent of GDP (15.2 percent of tax revenue). The largest fraction of tax expenditure is related to VAT (1.5 percent of GDP) and to administrative fee and corporate income tax (0.6 percent and 0.5 percent of GDP, respectively). The number of exemptions reached 407 in 2016, of which about

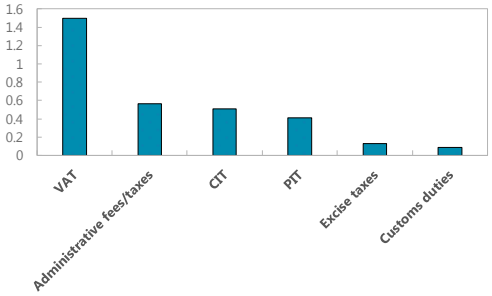
[5] For instance, 5 percent of firms produce more than 80 percent of total corporate tax revenues.

[6] For example: medicine and utilities (7 percent), essential food items (10 percent), and some processed food items and transportation equipment (14 percent).

[7] Tax expenditure includes tax exemptions, deductions, or credits granted to specific activities.

30 percent were related to consumption tax, 45 percent to income tax, and the rest to administrative fees, excises, and customs duties. While the objective of the exemptions was to provide incentives to certain economic activities (such as agriculture and fishing, food industries, real estate, or financial intermediation), they have also introduced a range of distortions.[8]

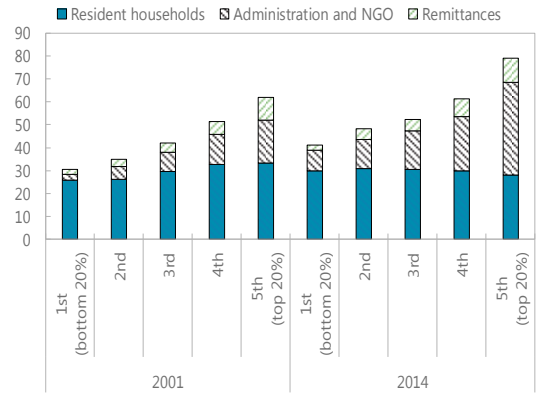
Revenue Losses Due to Exemptions
(Percent of GDP)



Sources: Morocco Ministry of Economy and Finance.

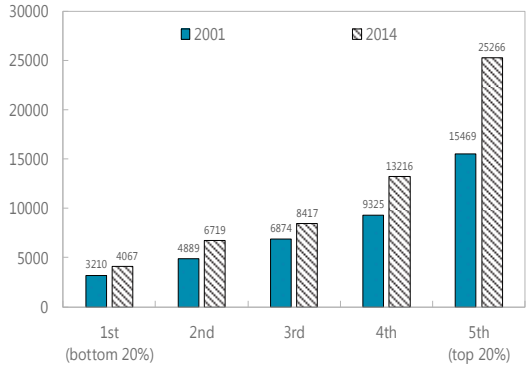
8. Public transfers have expanded in recent years, but they are very poorly targeted. The overall level of public social expenditures is relatively high in Morocco, and the share of households receiving public transfers more than doubled between 2001 and 2014 (from 10.8 percent to 22.9 percent). However, the bulk of this increase has benefited urban areas, while most of the poor reside in rural areas. In 2014, only 8.9 percent of households in the bottom quantile received public transfer as opposed to 40.2 percent in the top quintile. The average annual amount transferred to the poorest households in 2014 was 4,067 dirhams, while the wealthiest households received 25,266 dirhams, i.e., about six times more.[9]

Share of Households Receiving Transfers by Income Quintile and Source



Source : Haut-Commissariat au Plan.

Transfers by Income Quintile
(In Moroccan dirhams)



Source : Haut-Commissariat au Plan.

[8] Exemptions differ widely in their duration and scope. While some are discretionary, many are stipulated (e.g., some sectors are totally excluded). Their implementation takes different forms, including reductions in rate, deductions, allowances, lump sum taxation, and liquidity facilities. In 2016, agriculture and fishing benefited from 65.4 percent of them, and the real estate sector 23.6 percent.

[9] The authorities have also expanded a range of social programs, such as RAMED, which provides medical benefits to poor families and covers more than 2.8 million households or 7.5 million beneficiaries (against 5.5 million beneficiaries in 2013), and Tayssir, which provides scholarships and allowances to poor households for each child attending school.

9. Finally, the untaxed informal sector employs a large part of Morocco's labor force. The informal sector is estimated at about 15 percent of total economic activity, and about 22 percent of total employment. Survey data indicate that more than 78 percent of the informal sector production and about 73 percent of its labor force are concentrated in the services sector (HCP 2009).

C. Scenario Simulations

10. A dynamic stochastic general equilibrium (DSGE) model has been designed specifically to match Morocco's specificities (Annex). The model is applied to a closed economy with four types of households: informal sector workers, formal manufacturing and service workers, rural workers, and entrepreneurs.[10] The economy produces three goods: foods, manufacturing products, and informal services. The manufacturing sector includes service industries that require capital for production (e.g., communication, tourism, and finance). The large number of households and products allows the model to capture the structure of Morocco tax system, and in particular the multiple tax rates for VAT, income, and corportate tax. In addition, there is a housing market in urban areas and an informal sector to assess the benefits and impacts of a broad-based property taxation and of an expansion of VAT and income tax on the informal sector.[11]

11. The model allows to simulate a very broad range of tax reform scenarios. The simulations below focus on the impact of the following tax reforms scenarios: increasing VAT rates and/or property tax rate, reducing exemptions and corporate tax rates, introducing a flat tax rate, enforcing personal income tax rate in the informal sector, and strengthening the social safety net.[12] The key transmission channels can be summarized as follows: a tax reform changes the marginal costs/benefits of economic agents (e.g., marginal utility, relative prices, etc.), triggering a reallocation of consumption and production factors, which ultimately affects growth, tax revenue, or welfare. The welfare effects of these reforms are assessed using standard welfare measures.

12. Increased VAT rates would boost government revenues, but the impact on output depends on which types of goods are subjected to the increased rate (Figure 1). A marginal increase in VAT rate (1 percent) on food (respectively manufacturing goods) would raise government revenue by 0.9 percent (respectively 0.8 percent). However, GDP increases by 0.14 percent following an increase in VAT on manufacturing good but declines by 0.03 percent after the increase in VAT rate on food. Figure 1 shows the economy's transition under the new VAT

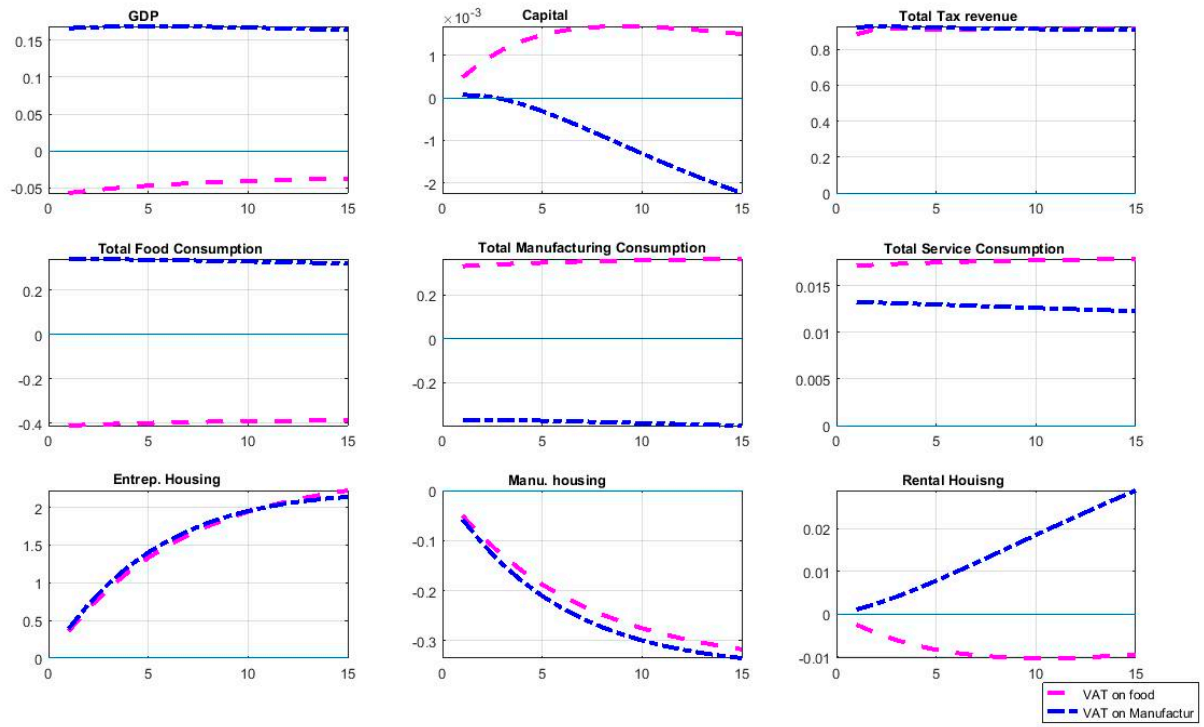
[10] The authors acknowledge that the closed economy assumption is a strong assumption. It is used here because most of Morocco's tax base rests on domestically produced goods and tax revenues from trade are less than 2 percent of GDP.

[11] It is assumed that economic agents anticipate tax reforms and fully internalize their implications for their economic choices. The initial steady state is the same for all reform scenarios, calibrated for Morocco's economy as described in the annex. The final steady state, and the transition paths to it, capture adjustments and responses of the economy and its agents to tax changes.

[12] The simulations are based on one percentage point changes from the baseline steady state and follow a perfect foresight path from the initial steady state to the new one.

regime (food and manufacturing items): in the short run, output variations reflect changes in the work effort associated with marginal tax rates, while in the long run, higher (manufacturing good) prices induce greater capital accumulation. Welfare analysis suggests that entrepreneurs would benefit the most from such a reform as their profits would increase, while workers would generally be worse off. Given Morocco's high VAT rates, and considering the growth effects of increased VAT on food, the appropriate approach to tax reform would seem to consist in aligning the reduced VAT rate on manufacturing goods and services to the standard VAT rate, to take advantage of both the growth and revenue enhancing impacts.

Figure 1. Transition Paths from VAT Rate Increase 1/

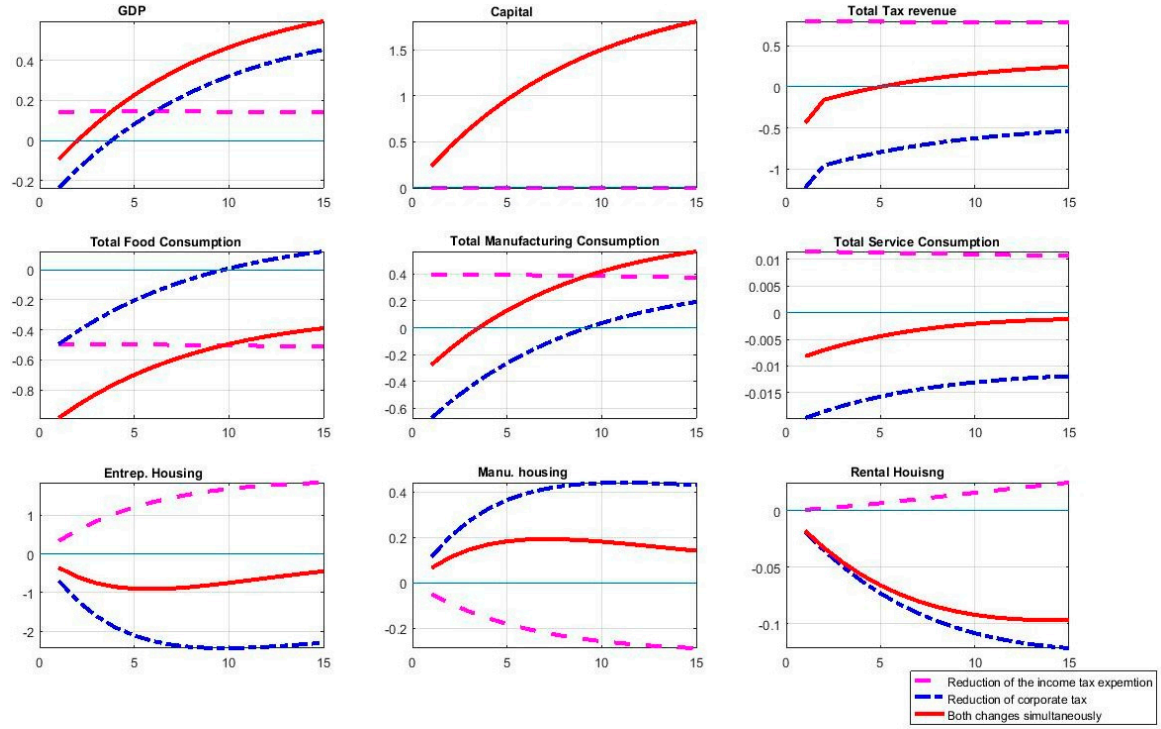


Source: IMF staff calculations.

[1] The horizontal axis gives the time horizon in years and the vertical axis the percentage deviation from the initial steady state.

13. A combination of lower exemptions and lower corporate tax rates would boost government revenue and output (Figure 2). This combination would expand the tax base and reduce tax avoidance. Lower corporate tax rates would increase investment, while lower exemptions (e.g., in agriculture) and corporate tax would induce substitution effects encouraging lower food consumption and higher manufacturing good consumption. In the long run, output would increase by 0.7 percent. The combined tax mix would increase government revenue by 0.3 percent, compensating revenue loss from the lower corporate tax rate.

Figure 2. Transition Paths from Reductions in Exemptions and Corporate Tax



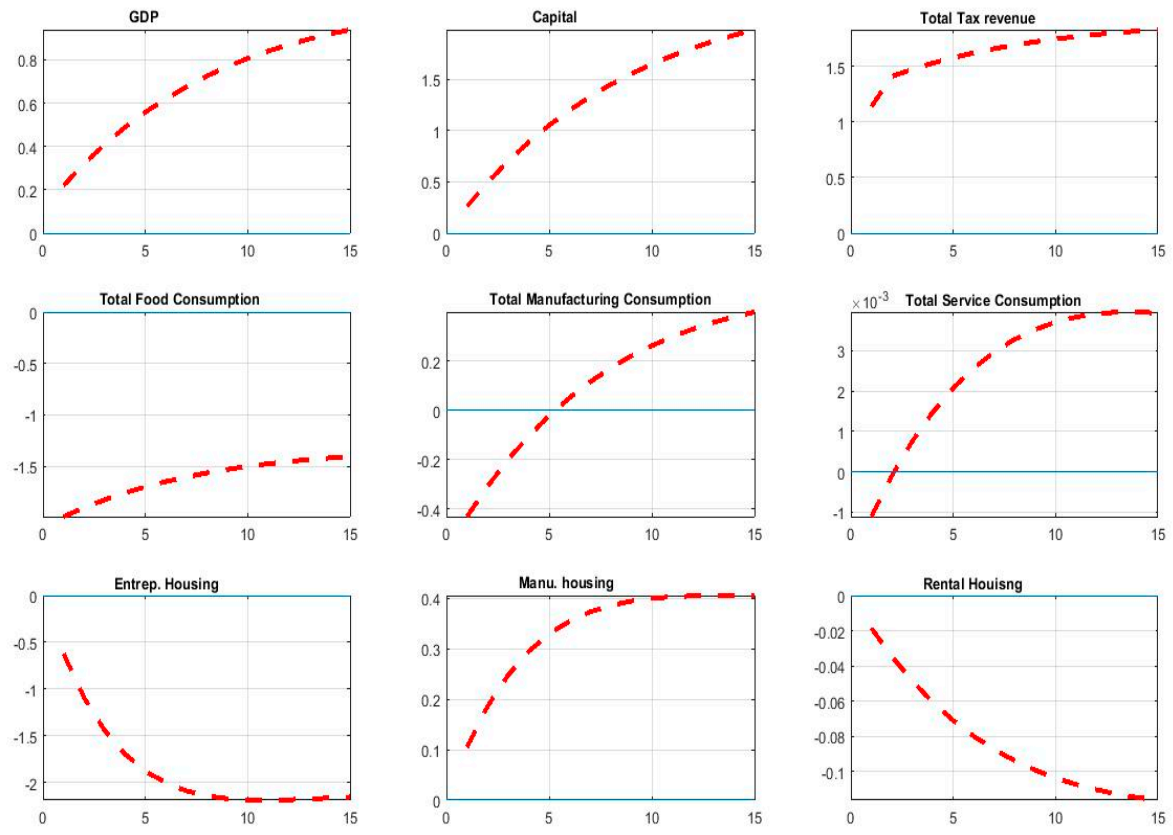
Source: IMF staff calculations.

14. A broad-based property tax associated with increased tax rates would induce beneficial substitution effects in asset accumulation. It would encourage lower real estate, but higher capital accumulation, and thus increased manufacturing production. It could generate an increase of 0.2 percent in long-run output, and of 0.9 percent in government revenues. House prices are a key channel for these effects, as they affect incentives for home ownership versus renting (through relative returns).

15. The above simulations help inform the design of a recommended reform package. First, Morocco would benefit from designing a comprehensive tax reform strategy that would enhance tax revenue, boost growth, and improve fairness. Second, an optimal tax reform package should *combine* several key reform components: (i) aligning the reduced VAT rate on manufacturing goods and services to the standard VAT rate, (ii) reducing tax exemptions, (iii) raising property tax, (iv) lowering corporate tax rates, and (v) strengthening safety nets. Such a reform package should also help broaden the tax base (e.g., by taxing self-employed and liberal professions, and introducing a broader-based property tax), remove tax distortions, and better share the tax burden (e.g., through lower corporate tax rates). Finally, it would allow to mitigate adverse distributional effects by protecting the poor.

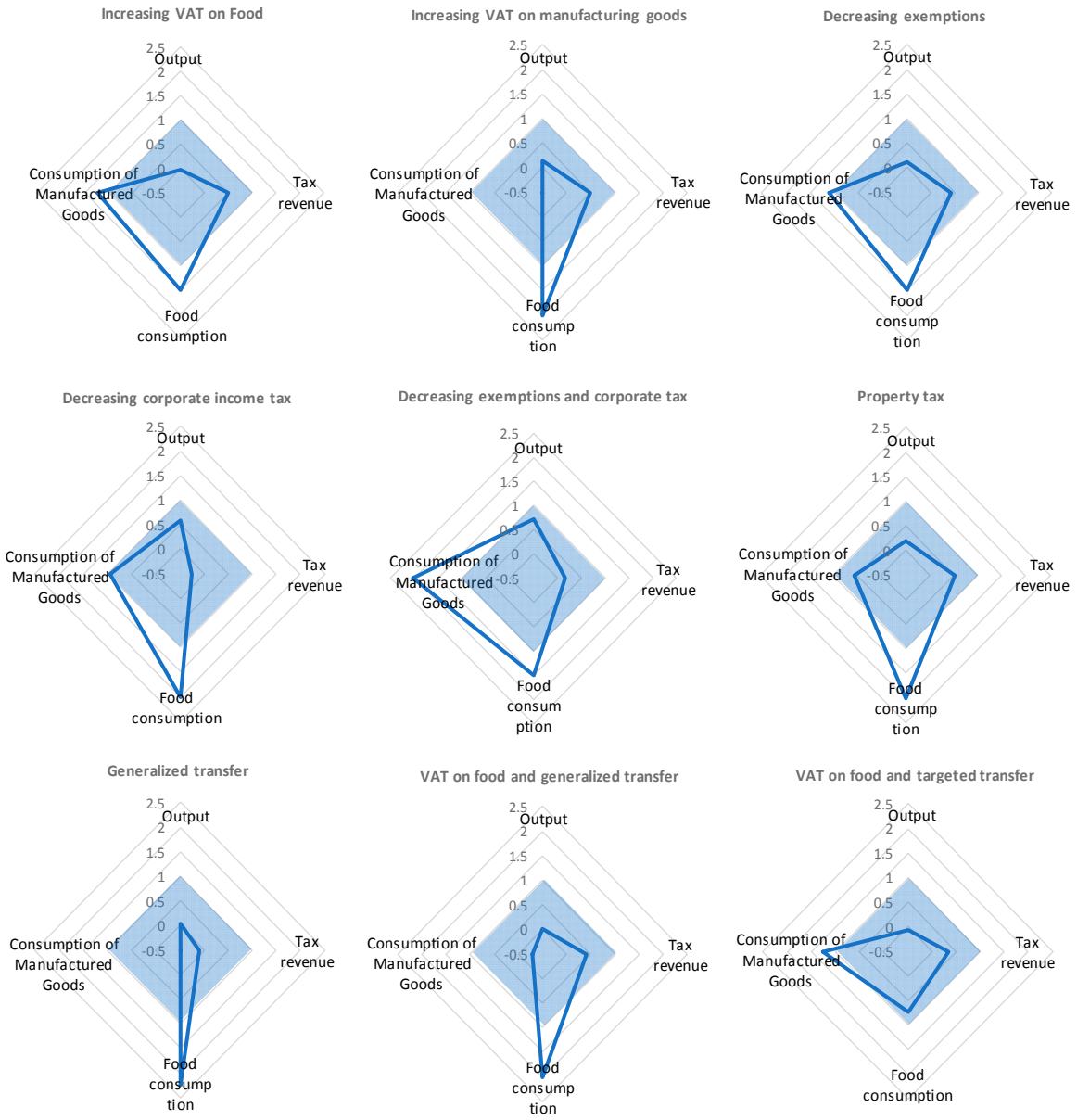
16. Such a reform package could bring about significant benefits in terms of growth, revenue mobilization, and welfare improvements. Figure 3 shows a smooth transition of the economy to the new tax system. Figure 4 summarizes the main long-run effects on the variables of interest (output, tax revenues, and consumption), calculated as percentage change between the two steady states following the implementation of various tax reform scenarios. The results indicate that the proposed comprehensive tax reform would boost growth by 1 percent in the long-run by reducing corporate taxation and raising production incentives. It would also enhance government revenues by 1.8 percent, which would help reduce the fiscal deficit and create additional fiscal space for investment and social spending. Finally, the welfare analysis in Figure 5 shows that it would improve fairness by addressing inequalities and making the tax system more progressive.

Figure 3. Transition Paths from a Comprehensive Tax Reform



Source: IMF staff calculations.

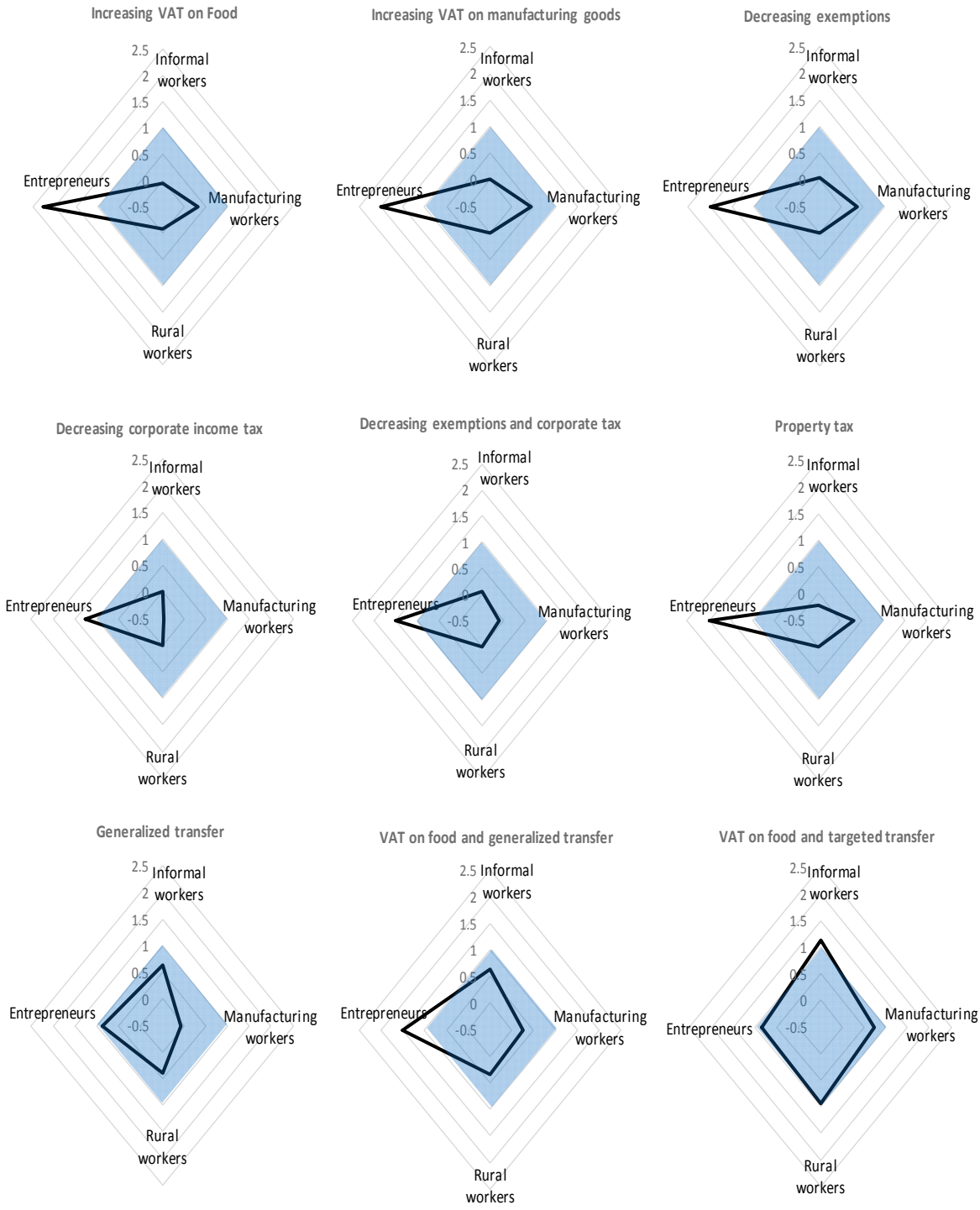
Figure 4. Impact on Macroeconomic Aggregates of Tax Reform Scenarios 1/
(Comprehensive Reform' Scenario = 1, better outcomes are greater than 1)



Source: IMF staff calculations.

[1]The comprehensive reform scenario is the benchmark scenario and its outcomes in term of output, tax revenue, food and manufacturing consumption are all set to 1 (the blue area in each diagram). For individual scenarios, the outcomes in term of output, tax revenue, food and manufacturing consumption are compared to those from the comprehensive scenario - better outcomes are greater than 1.

Figure 5. Impact on Household Welfare of Tax Reform Scenarios
(Comprehensive Reform' Scenario = 1, better outcomes are greater than 1)



Source: IMF staff calculations.

D. Conclusion

17. Morocco would benefit from designing and implementing a comprehensive approach to tax reform. Considering the distributional effects of taxation and the combined impact of tax reforms and stronger (better targeted) social safety nets on the economy and inequalities, a tax reform package should *combine* several key reform components: (i) aligning the reduced VAT rate on manufacturing goods and services to the standard VAT rate, (ii) reducing tax exemptions, (iii) raising property tax, and (iv) lowering corporate tax rates. These combined measures would help broaden the tax base (e.g., by taxing self-employed and liberal professions, and introducing a broader-based property tax), remove tax distortions, and better share the tax burden (e.g., through lower corporate tax rates).

18. Such a strategy could bring about significant benefits in terms of addressing inequalities and supporting growth, while preserving revenue mobilization. It would improve fairness by addressing lingering inequalities and making the overall tax system more progressive. It would also boost long-term growth by 1 percent through increased production incentives, and enhance government revenues by 1.8 percent, which would help to reduce the fiscal deficit and create additional fiscal space for investment and social spending.

Annex I. The Model Economy

In this annex, we present the dynamic stochastic general equilibrium (DSGE) model used to capture the main features of Morocco tax system and economic structure and to simulate the various impact of the tax reforms. The model simulates a closed economy with four types of households: informal sector workers, formal manufacturing and service workers, rural workers, and entrepreneurs. It produces three goods: foods, manufacturing products, and informal services. The large number of households and products allows the model to capture the structure of Morocco tax system, specifically, multiple tax rates for VAT, income, and corporate tax.

Households

Households have utility for consumption, housing, and leisure. The consumption basket has three main goods: food c^f, manufacturing products c^m, and services c^s, where the superscripts f, m and s represent food, manufacturing and services, respectively. Preferences are identical for all types of households, but the structure of the consumption basket and the importance of housing and leisure in utility vary across household types. The population is normalized to unit, and we assume households live infinitely. The households intertemporal utility function is given by

$$E_t \sum_{\tau=t}^{\infty} \beta_i^{\tau-t} \left[\varphi_f^i \ln c_\tau^{if} + \varphi_s^i \ln c_\tau^{is} + \varphi_m^i \ln c_\tau^{im} + \varphi_h^i \ln h_\tau^i + \varphi_l^i \ln(1-l_\tau^i) \right] \quad (3.1)$$

where $i \in \{I, M, R, E\}$ with I, M, R, E representing informal, manufacturing, rural workers and entrepreneurs, respectively. β_i is a discount factor specific to each type of household; h denotes housing services, and $(1-l)$ leisure time. The share of each category of households in the population is given by $\mu_i, i \in \{I, M, R, E\}$; and the coefficients $\varphi_j, j \in \{f, m, s, h, l\}$ reflect the relative importance of consumption goods, housing and leisure in the utility.

Informal Worker Households

Informal workers are self-employed who produce services in competitive markets. They live in urban areas where they rent houses owned by entrepreneurs. The budget constraint for a representative informal household is given by:

$$(1+\tau_f) p_t^f c_t^{If} + (1+\tau_m) p_t^m c_t^{Im} + (1+\tau_s) p_t^s c_t^{Is} + p_t^r h_t^r = (1-\xi\tau_w^I) w_t^I l_t^I + \Gamma_t^I \quad (3.2)$$

where c_t^{Si} and $p^i, i \in \{f, m, s\}$ represent consumption and price for food, manufacturing goods and services, respectively. h_t^r are houses rent by informal workers and p_t^r is the rental price, determined in a competitive house renting market. The production of services in the informal sector is labor intensive, $w_t^I = p_t^s z^I$ is the labor unit cost in the sector, and it depends on a constant productivity z^I and the service market price p_t^s. Γ_t^I is a government lump-sum tranfer to informal sector households. Informal sector workers face: (i) VAT when they purchase goods and services; VAT rates are established by the tax code and are respectively τ_f, τ_m, and τ_s for food, manufacturing

goods, and services that they consume; (ii) personal income taxation that depends on tax administration collection efficiency rate $\xi \in [0,1]$ for the informal sector.

The representative informal sector household maximizes his utility (3.1) subject to the budget constraint (3.2). The optimum conditions for consumption, housing and leisure are as follows:

$$\frac{\varphi_f^I}{c_t^{If}} = (1+\tau_f)\, p_t^f \lambda_t^I \tag{3.3}$$

$$\frac{\varphi_m^I}{c_t^{Im}} = (1+\tau_m)\, p_t^m \lambda_t^I \tag{3.4}$$

$$\frac{\varphi_s^I}{c_t^{Is}} = (1+\tau_s)\, p_t^s \lambda_t^I \tag{3.5}$$

$$p_t^r = \frac{\varphi_h^I}{\lambda_t^I h_t^I} \tag{3.6}$$

$$\frac{\varphi_l^I}{1-l_t^I} = \lambda_t^I (1-\xi\tau_w^I) w_t^I \tag{3.7}$$

where λ^I is the Lagrangian multiplier for the informal sector worker's budget constraint. The optimal allocations of consumption and labor by informal sector workers depend on tax rates, the marginal rate of substitution between labor and leisure in the informal sector could be affected by tax collection.

Formal Manufacturing and Service Workers

Manufacturing and service sector households supply labor to productive units managed by entrepreneurs. They live in urban areas, buy and sell houses, and pay taxes, specifically, VAT on the purchase of goods and services, personal income tax, and property tax at a rate τ_h. The representative household's budget constraint is given by

$$(1+\tau_f)p_t^f c_t^{Mf} + (1+\tau_m)p_t^m c_t^{Mm} + (1+\tau_s)p_t^s c_t^{Ms} + p_t^h (h_t^M - (1-\tau_h)h_{t-1}^M) =$$

$$(1-\tau_w^M) w_t^M l_t^M + \Gamma_t^M + AC_t^M \tag{3.8}$$

where $c_t^{Mi}, i \in \{f,m,s\}$ represent food, manufacturing goods and services consumption; h^M is housing for manufacturing workers and p_t^h is housing price, l_t^M worked hours, and Γ_t^M a lump-sum transfer received from the government. Manufacturing and service workers supply labor on competitive market at a wage w_t^M, subject to a personal income tax rate τ_w^M, which applies to their income backet. There are some adjustment costs attached to homeownership since acquiring a house could be a costly process due to administration fees and searching time. The adjustment costs add some frictions to the housing market and are defined by the quadratic function $AC_t^M = (\psi_h/2) p_t^h \left(\frac{h_t^M - h_{t-1}^M}{\bar{h}^M}\right)^2$.

The representative household maximizes his utility (3.1) subject to the budget constraint (3.8); his optimum conditions for consumption, housing and leisure are given by:

$$\frac{\varphi_f^M}{c_t^{Mf}} = (1+\tau_f)\, p_t^f \lambda_t^M \tag{3.9}$$

$$\frac{\varphi_m^M}{c_t^{Mm}} = (1+\tau_m)\, p_t^m \lambda_t^M \tag{3.10}$$

$$\frac{\varphi_s^M}{c_t^{Ms}} = (1+\tau_s)\, p_t^s \lambda_t^M \tag{3.11}$$

$$p_t^h = \frac{\varphi_{Mh}}{\lambda_t^M h_t^M} + \beta_M E_t \frac{\lambda_{t+1}^M}{\lambda_t^M} p_{t+1}^h (1-\tau_h) \tag{3.12}$$

$$\frac{\varphi_l^M}{1-l_t^M} = \lambda_t^M (1-\tau_w^M) w_t^M \tag{3.13}$$

where λ^I is the Lagrangian multiplier for manufacturing and service sector worker's budget constraint.

Rural Workers

Rural workers live in rural areas and supply labor (for which they receive wages) to productive units (farms) that belong to entrepreneurs. Rural activities include working on land to produce food. We assume that frictions limit population movements across urban and rual areas, which eliminates migrations from wage differential, and renders the share of rural and urban population relatively stable. Rural households are composed by individuals who spend all their income in consumption. Because of high poverty in rural areas, the government implements a generalized subsidy scheme to lower the price of food items and to help low-income households satisfy their food needs. We further assume that rural workers own their own houses; these are typically small dwellings of low value than urban houses, and for that reason they are exempted from property tax. Moreover, the housing market remains very shallow in rural area, and homeowners keep their houses infinitely.

The budget constraint for a representative rural worker is given by:

$$(1+\tau_f-\sigma_R) p_t^f c_t^{Rf} + (1+\tau_m) p_t^m c_t^{Rm} + (1+\tau_s) p_t^s c_t^{Rs} = (1-\tau_w^R) w_t^R l_t^R + \Gamma_t^R \tag{3.14}$$

where $c_t^{Ri}, i \in \{f, m, s\}$ denote food, manufacturing goods and service consumption respectively, w_t^R is the wage paid in rural labor market, Γ_t^R is the government lump sum transfer to rural households, τ_w^R is the personal income tax rate for rural workers and the lowest payroll tax rate, σ_R is the government subsidy (and policy parameter) to lower food price in rural areas. The representative rural household maximizes his utility (3.1) subject to the budget constraint (3.14). The optimum conditions for consumption and leisure are the following:

$$\frac{\varphi_f^R}{c_t^{Rf}} = (1+\tau_f-\sigma_R)p_t^f\lambda_t^R \tag{3.15}$$

$$\frac{\varphi_m^R}{c_t^{Rm}} = (1+\tau_m)p_t^m\lambda_t^R \tag{3.16}$$

$$\frac{\varphi_s^R}{c_t^{Rs}} = (1+\tau_s)p_t^s\lambda_t^R \tag{3.17}$$

$$\frac{\varphi_l^R}{1-l_t^R} = \lambda_t^R(1-\tau_w^R)w_t^R \tag{3.18}$$

where λ_t^R is the Lagrangian multiplier for the rural worker's budget constraint. The optimal allocations of consumption and labor for rural workers are affected by tax rates. A marginal increase in VAT rate for a consumption good or service would make that item relatively more expensive than other, lowering its consumption and switching the structure of consumption basket. The government could attemp to influence food consumption by adjusting food subsidies to change the effective food price.

Entrepreneurs

Entrepreneurs manage productive units of this economy. There are two type of firms: agricultural firms in rural areas and manufacturing and service firms in urban areas. The production of foods combines land and labor from rural workers, while the production of manufacturing goods and (formal) services uses capital and the labor supplied by urban households. The technologies of production are given by a Cobb-Douglas functions in both sectors of production.

Food output Y_t^f uses the technology

$$Y_t^f \equiv \mu_E z^F L_t^{\alpha_F}(n_t^F)^{1-\alpha_F} \tag{3.19}$$

where z^F is a productivity factor, L_t is land used in food production, n_t^f is rural workers labor, α_F and $1-\alpha_F$ denote the share of land and labor in food output respectively.

The output from manufacturing goods and services Y_t^m is given by the technology

$$Y_t^m \equiv \mu_E z^E k_{t-1}^{\alpha_E}(n_t^E)^{1-\alpha_E} \tag{3.20}$$

where z^E is the technology factor, n_t^E is the labor hired by entrepreneurs from manufacturing workers, k_t the capital effectively utilized by the manufacturing and services firms, α_E and $1-\alpha_E$ represent respectively the shares of capital and labor in the output of manufacturing goods and services. The capital stock k_t evolves according to the law of motion

$$k_t = (1-\delta_k)k_{t-1} + [1 - \frac{\psi_{kb}}{2}(\frac{i_t^k}{i_{t-1}^k} - 1)^2]i_t^k \quad (3.21)$$

where δ_k is the depreciation rate of the capital and i_t^k is the economy's gross investment. Manufacturing and service firms face internal adjustment costs given by $AC_t^E = \frac{\psi_{kb}}{2}(\frac{i_t^k}{i_{t-1}^k} - 1)^2 i_t^k$ when changing their capital stock. The adjustment cost equals zero at the steady state.

Entrepreneurs own all productive units in this economy. They finance investment for manufacturing and service firms and place their extra savings in government bonds. Their income includes corporate profits (from agricultural firms $\pi_t^F = p_t^f Y_t^f - w_t^R n_t^F$ and manufacturing and services firms $\pi_t^E = p_t^m Y_t^m - w_t^M n_t^E$), rent pay by informal sector workers, and interest payment from government bonds. Entrepreneurs are subject to VAT, personal income tax, and taxation at the firm. At the firm level, entrepreneurs pay corporate tax on profits. The corporate tax rate for agricultural firms τ_w^F, is below that of manufacturing and service firms τ_w^E.

The budget constraint of the representative entrepreneur is given by

$$\begin{aligned}&(1+\tau_f)p_t^f c_t^{Ef} + (1+\tau_m)p_t^m c_t^{Em} + (1+\tau_s)p_t^s c_t^{Es} + p_t^h(h_t^E - (1-\tau_h)h_{t-1}^E) \\ &+ p_t^h(h_t^r - (1-\tau_h)h_{t-1}^r) + p_t^k i_t^k + b_{t+1} + \delta_L L_t = \\ &(1-\tau_w^F)\pi_t^F + (1-\tau_w^E)\pi_t^E + (1-\tau_r)p_t^r h_t^r + (1+r_{t-1}(1-\tau_b))b_t + \Gamma_t^E + AC_t^E \end{aligned} \quad (3.22)$$

where $c^{Ei}, i \in \{f, m, s\}$ denote food, manufacturing goods and service consumption, respectively; h_t^E residensial houses for entrepreneur, h_t^r renting houses, $\delta_L L_t$ entrepreneur cost for land use, b government bonds bearing interest rate r_t subject to a tax rate τ_b, and Γ_t^E a lump sump transfer from the government. The representative entrepreneurs household maximizes his utility (3.1) subject to the budget constraint (3.22). The optimum conditions for consumption, residential housing, rental housing, bonds, capital, land, and labors are the following:

$$\frac{\varphi_f^E}{c_t^{Ff}} = (1+\tau_f)p_t^f \lambda_t^E \quad (3.23)$$

$$\frac{\varphi_m^E}{c_t^{Fm}} = (1+\tau_m)p_t^m \lambda_t^E \quad (3.24)$$

$$\frac{\varphi_s^E}{c_t^{Fs}} = (1+\tau_s)p_t^s \lambda_t^E \quad (3.25)$$

$$p_t^h = \frac{\varphi_h^E}{\lambda_t^E h_t^E} + \beta_E E_t \frac{\lambda_{t+1}^E}{\lambda_t^E} p_{t+1}^h (1-\tau_h) \quad (3.26)$$

$$p_t^h = \beta_E E_t \frac{\lambda_{t+1}^E}{\lambda_t^E} p_{t+1}^h (1-\tau_h) + (1-\tau_r) p_t^r \quad (3.27)$$

$$1 = \beta_E E_t \frac{\lambda_{t+1}^E}{\lambda_t^E} (1 + r_{t-1}(1-\tau_b)) \quad (3.28)$$

$$1 = \beta_E E_t \frac{\lambda_{t+1}^M}{\lambda_t^M} (1 - \delta_k + (1-\tau_w^E) p_{t+1}^m z^E \alpha_E (\frac{n_{t+1}^E}{k_t})^{(1-\alpha_E)}) \quad (3.29)$$

$$\delta_L = (1-\tau_w^F)(1+\sigma_f) p_t^f z^F \alpha_F (\frac{n_t^F}{L_t})^{1-\alpha_F} \quad (3.30)$$

$$(1-\alpha_E) p_t^m z^E (\frac{k_{t-1}}{n_t^E})^{\alpha_E} = w_t^M \quad (3.31)$$

$$(1-\alpha_F) p_t^f z^F (\frac{L}{n_t^F})^{\alpha_F} = w_t^R \quad (3.32)$$

The optimal allocations by entrepreneurs are affected by tax rates, which could switch production and saving incentives.

Government

The government collects tax revenue and has a redistributive role through lump sum transfers to households and public spending. The government budget constraint is given by:

$$T_t + b_{t+1} + Gr_t = g_t + (1+r_{t-1}) b_t + \Gamma_t + Sb_t \quad (3.33)$$

where T_t is the tax revenue, b_t government bond, g_t government expenditure, Sb_t food subsidies to rural workers, and Γ_t total lump sump transfer to households. Gr_t represents other revenue received by the government, including grants and voluntary contributions[13]. We assume that government expenditure follows the path

$$g_t = \rho_g g_{t-1} + (1-\rho_g)\bar{g} \quad (3.34)$$

where $\bar{g}$ is the steady state of government expenditure and ρ_g is a positive constant smaller than one. The total lump sump transfer is distributed to the four households following fixed proportions $\gamma_i, i \in \{S, M, R, E\}$, as a share of GDP. The government transfer and subsidy policies are defined as follows:

$$\Gamma_t^i = \gamma_i Y_t, \quad i \in \{S, M, R, E\} \quad (3.33)$$

[13] This variable follows a smooth trend and is treated as an AR (1) stochastic variable.

$$\Gamma_t = \mu_S \Gamma_t^I + \mu_M \Gamma_t^M + \mu_R \Gamma_t^R + \mu_E \Gamma_t^E \tag{3.34}$$

$$Sb_t = \sigma_R \mu_R p_t^f c^{Rf} \tag{3.35}$$

where Y is the economy GDP and Y^f the total food production. Government tax revenue includes VAT, property tax, income taxes on wage, profit and interest payment. The total tax revenue collected in this economy is given by:

$$\begin{aligned} T_t &= \tau_f p_t^f C_t^f + \tau_m p_t^m C_t^m + \tau_s p_t^s C_t^s + p_t^h \tau_h H_{t-1} + \tau_b r_{t-1} B_{t-1} + \tau_r p_t^r \mu_E h_t^r \\ &+ \xi \tau_w^J w_t^J + \tau_w^M W_t^M + \tau_w^R W_t^R + \tau_w^F \Pi_t^F + \tau_w^E \Pi_t^E \end{aligned} \tag{3.36}$$

where

$$C^i = \mu_S c_t^{Si} + \mu_M c_t^{Mi} + \mu_R c_t^{Ri} + \mu_E c_t^{Ei}, \quad i \in \{f, m, s\} \tag{3.37}$$

$$\mu_E h_t^r = \mu_S h_t^I \tag{3.38}$$

$$H_t = \mu_S h_t^I + \mu_M h_t^M + \mu_E h_t^E \tag{3.39}$$

$$W_t^i = \mu_i l_t^i w_t^j, \quad i \in \{S, M, R\} \tag{3.40}$$

$$\Pi_t^F = \mu_E \pi_F \tag{3.41}$$

$$\Pi_t^E = \mu_E \pi_E \tag{3.42}$$

$$B_t = \mu_E b_t \tag{3.43}$$

$C^i, \quad i \in \{f, m, s\}$ is the aggregate consumption of food, manufacturing goods and service, respectively; H_t is the number of houses and is normalized to one, $W_t^i, i \in \{S, M, R\}$ the wage income for informal, manufacturing, and rural sector, respectively; B_t is the stock of government's bonds, and Π_t^F and Π_t^E the aggregate profits from agricultural and manufacturing firms, respectively.

Market Clearing

Market clearing conditions hold in all goods and services markets, which implies:

$$Y_t^f \equiv \mu_E z^F L^{\alpha_F} (n_t^F)^{1-\alpha_F} = C_t^f \tag{3.44}$$

$$Y_t^s \equiv \mu_S l_t^I z^I = C_t^s \tag{3.45}$$

$$Y_t^m \equiv \mu_E z^E k_{t-1}^{\alpha_E} (n_t^E)^{1-\alpha_E} = C_t^m + \mu_E i_t + g_t \tag{3.46}$$

Manufacturing goods are used for consumption, investment, and government expenditure. In addition, manufacturing goods serve as numeraire in this economy. The GDP is the sum of all sectors' output and is given by:

$$Y_t = p_t^f Y^f + p_t^m Y^m + p_t^s Y^s \tag{3.47}$$

The labor market clearing conditions are

$$\mu_E n_t^F = \mu_R l_t^R \tag{3.48}$$

$$\mu_E n_t^E = \mu_M l_t^M \tag{3.49}$$

and total capital stock is

$$K_t = \mu_E k_t \tag{3.50}$$

The equilibrium is definied by the set of prices $(p^f, p^m, p^s, p^h, p^r, p^k, r)$, the allocations of all the agents in the economy and the market clearings conditions.

Calibration

We calibrate the model to match Morocco's economy and its long run properties as closely as possible. Since all the parameters (except those from the adjustment cost functions) relate to the optimality conditions, the calibration is an appropriate method to infer the model's parameters.[14] We reverse-engineer the process and solve the structural parameters as function of steady state ratios using non-linear decision rules, and then compute the parameters values with sample long-run averages. We conduct a sensitivity analysis to calibrate the parameters to the adjustment cost functions and retain the values consistent with the short run volatility of the economy.

The data are from Morocco's 2007 Household Survey, macroeconomic variables, and Tax code (for VAT rates, income tax, property, and capital gains). Macroeconomic variables from national accounts, IMF and World Bank databases permit the calculation of the steady state values. The shares of each sector in total output and household consumption are derived from input-output tables published in the EORA Multi-Region Input-Output (MRIO) database. The distribution of households by type in the economy, the household wages and consumption of goods and services, and the transfers received from government, are calculated from the 2007 Household Survey (and when available, from the 2014 Household Survey). The table below provides the calibrated parameters.

[14] See Canova (2007), and Dejong and Dave (2007), for methods to infer DSGE models parameters.

Calibrated Parameters

Parameters	Symbol	Value
VAT on food, manufacturing, service	τ_f, τ_m, τ_s	0.10,0.20,0
Income tax on workers	$\tau_w^I, \tau_w^M, \tau_w^R$	0.10,0.20,0.10
Income tax on Entrepreneurs	τ_w^F, τ_w^E	0.10,0.30
Tax on return, rent, property	τ_b, τ_r, τ_h	0.15,0.13,0.05
Share of each agent	$\mu_S, \mu_M, \mu_R, \mu_E$	0.28,0.32,0.39,0.01
Targeted transfer	σ_R	0
Informality index	ξ	0
Discount factors	$\beta_S, \beta_M, \beta_R, \beta_E$	0.95,0.96,0.94,0.97
Direct transfer	$\gamma_S, \gamma_M, \gamma_R, \gamma_E$	0.028,0.039,0.010,0.0007
Coef. for utility, Service	$\varphi_f^S, \varphi_m^S, \varphi_s^S, \varphi_h^S, \varphi_l^S$	1.1,1,0.82,0.16,7.5
Coef. for utility, Manufac.	$\varphi_f^M, \varphi_m^M, \varphi_s^M, \varphi_h^M, \varphi_l^M$	0.90,1,0.61,0.15,8.3
Coef. for utility, Rural	$\varphi_f^R, \varphi_m^R, \varphi_s^R, \varphi_h^R, \varphi_l^R$	1,1,0.50,0,8.6
Coef. for utility, Entre.	$\varphi_f^E, \varphi_m^E, \varphi_s^E, \varphi_h^E, \varphi_l^E$	0.95,1,0.80,0.10,0
Capital depreciation rate	δ_k	0.1
Land preparation rate	δ_L	0.001
Elasticity of capital	α_E	0.35
Elasticity of land	α_F	0.70
Factor productivity	z_S, z_F, z_E	1,1.5,0.96
Adj. cost coeff.	ψ_k, ψ_h	2.4,2
AR parameter of government	ρ_g	0.95

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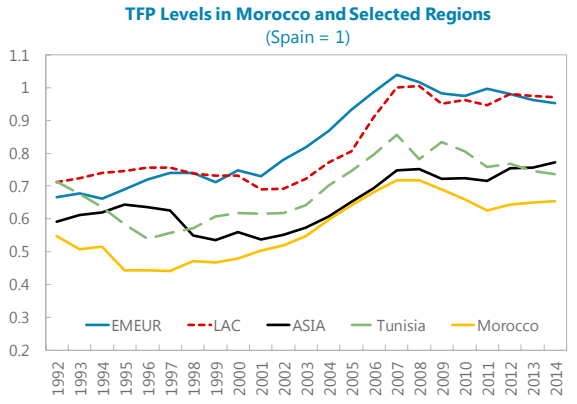
STRUCTURAL REFORMS AND SECTORAL LABOR REALLOCATION IN MOROCCO[1]

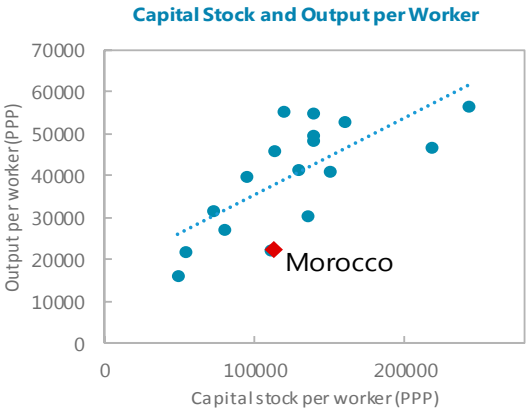
Over the last decade, productivity gains within the agricultural sector accounted for the bulk of aggregate productivity growth in Morocco, while about one third of the gains came from labor reallocation from low to higher-productivity sectors (structural transformation). Our analysis shows that higher structural transformation would significantly boost productivity. To facilitate labor reallocation and structural change, Morocco needs to improve its business climate, governance, access to finance, and education, and reduce its labor market rigidities.

A. Motivation

1. Stimulating productivity growth and job creation are among Morocco's main economic challenges. A growth accounting exercise shows that the weak growth performance of Morocco's economy can be explained by low productivity growth, which is linked to relatively low levels of total factor productivity (TFP) and human capital compared to emerging market peers (Figure 1). Job creation and labor force participation are also lower compared to peers while physical capital levels are closer to international benchmarks (see 2016 Morocco Article IV report).

Figure 1. Growth Accounting





Sources: IMF WEO and Penn World Tables (9.1).
Comparator countries: Emerging Europe (EMEUR): Bulgaria, Croatia, Hungary, Poland, and Turkey; Latin America and Caribbean (LAC): Chile, Costa Rica, Dominican Republic, Panama, and Peru; Asia: Indonesia, Malaysia, and Philippines; Middle East and North Africa (right chart only): Egypt, Jordan, and Tunisia.

[1] Prepared by Khalid ElFayoumi, Anta Ndoye, Sanaa Nadeem, and Gregory Auclair.

2. Structural transformation, defined as the reallocation of labor resources from low to higher productivity sectors, can raise aggregate productivity.[2] The shift of labor from low to higher productivity sectors (e.g., from agriculture to manufacturing and services) has been an important source of aggregate productivity growth (McMillan and Harttgen 2014; Figures 2 and 3) for both advanced and emerging economies (Dabla-Norris et al. 2013, Hnatkovska and Lahiri 2014).[3]

3. This paper aims to provide a comprehensive view of how policy reforms affect optimal sectoral labor allocation and job creation in Morocco. It estimates a dynamic panel error correction model of labor reallocation across sectors. The model provides an estimate of sectoral labor reallocation efficiency (i.e., the speed of adjustment of relative labor shares across sectors) and measures institutional frictions that hinder the efficient reallocation of labor, notably those related to education, governance (e.g., business regulation and competition), labor market regulation, and financial market regulation. Understanding the source of such frictions is valuable for Morocco, which has set in place ambitious structural reform agenda and sectoral policies to boost productivity and employment.

B. Structural Transformation in Morocco

4. Structural transformation has contributed modestly to Morocco's overall productivity growth, mostly through the movement of labor away from agriculture into services. Despite rapid urbanization, agriculture continues to employ the largest share of Morocco's workforce, around 37 percent in 2017 and the share of agriculture in total value added has decreased slowly. Weak private sector (including SME) growth and a large degree of informality have limited employment in higher productivity sectors. Between 2000 and 2014, the Moroccan economy generated about 1.7 million jobs outside of agriculture, over half of which were in two low productive sectors: construction and hospitality (World Bank 2017; see Figures 3, 4, and 5) as well as in textiles and trade. Agriculture also accounts for the largest contribution to "within-sector" productivity in recent years. This contrasts with Asian and Latin American countries where the "structural" and/or "within" contributions from the manufacturing sector have been large (Figure 2).

5. Analysis of Morocco's relative sectoral productivity suggests that structural transformation could increase aggregate labor productivity by about 40 percent (Annex II). This stylized estimate assumes that the labor productivity levels and employment shares completely equalize between sectors (and no further "within" productivity growth). This has been the general trend observed in developing countries, where sectoral value-added and employment shares have been converging in recent decades, generally due to movement of labor out of agriculture.

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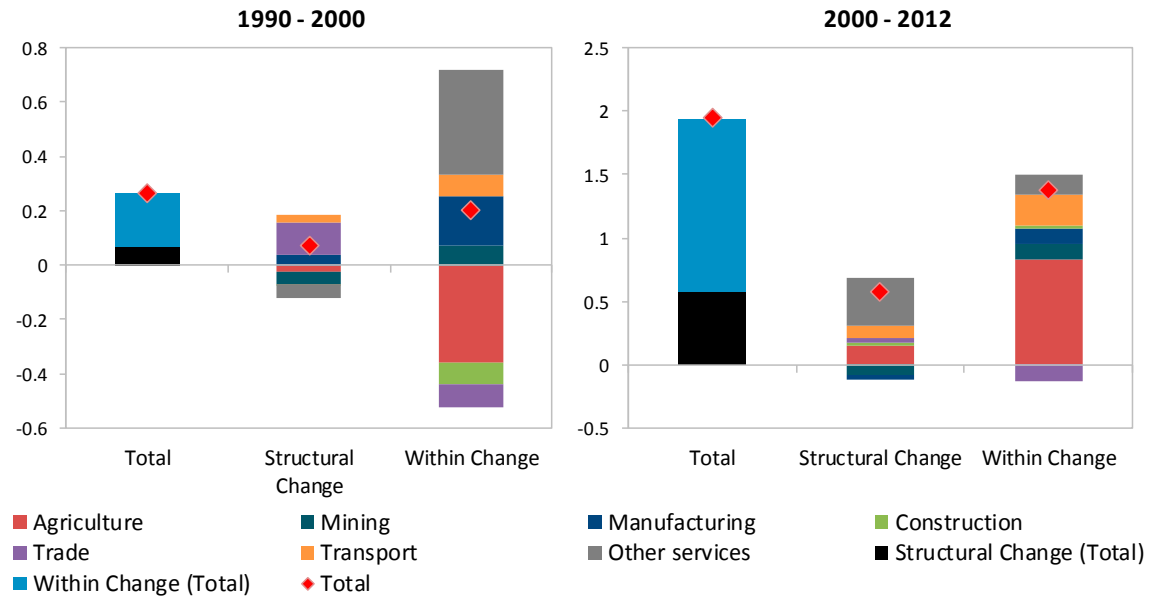
[2] In a multisector economy, gains to aggregate productivity can stem from productivity growth in a sector, i.e., within-sector productivity growth, or the reallocation of resources from lower to higher productivity sectors. This paper focuses on the latter driver of productivity growth.

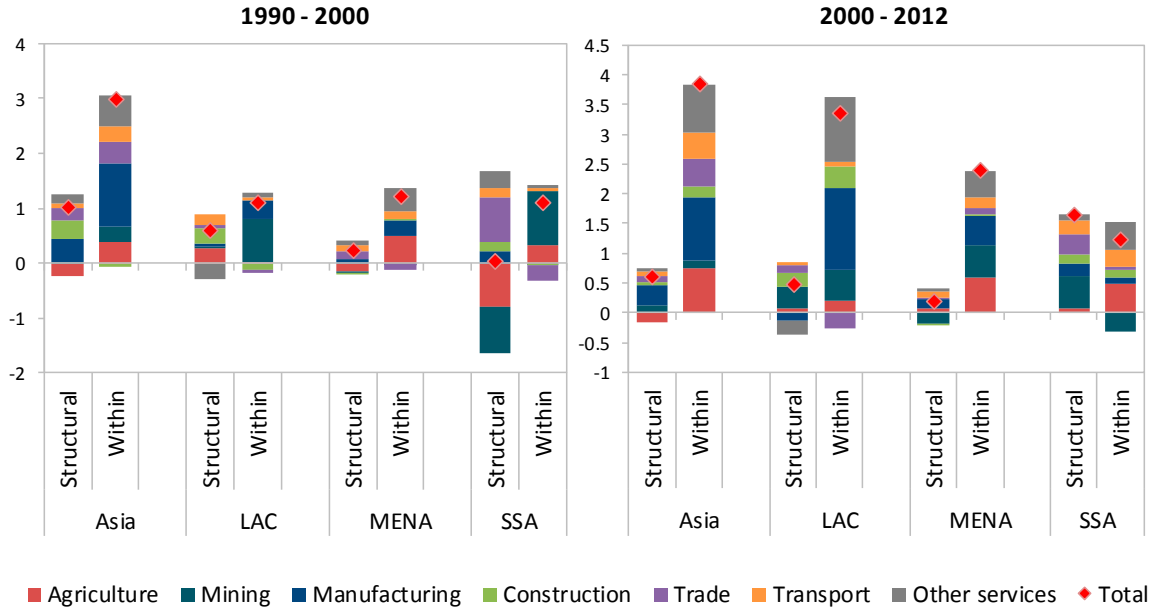
[3] The relative contributions of "structural" and "within" changes depend on the number of sectors measured. For example, dividing manufacturing into subsectors would capture the movement of labor from textiles to car production. This would increase the observed contribution of structural change to productivity growth.

Figure 2. Decomposition of Productivity Growth

Decomposing Aggregate Productivity Growth in Morocco



Decomposing Aggregate Productivity Growth by Region



Sources: Groningen Growth and Development Centre and Dabla-Norris "Anchoring Growth in EMDEs" databases.

Figure 3. Productivity Levels and Employment Shares by Sector in Morocco, 2015
(in USD)

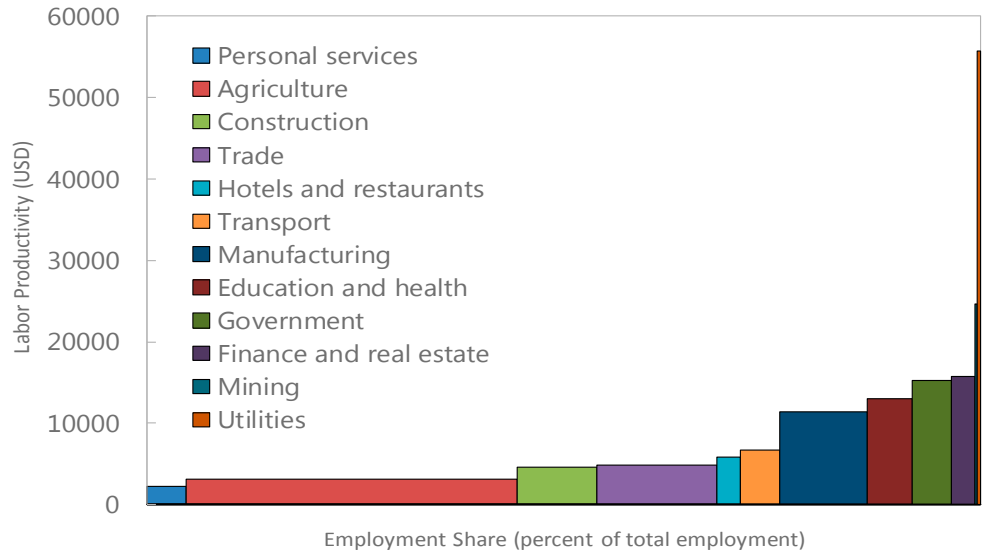
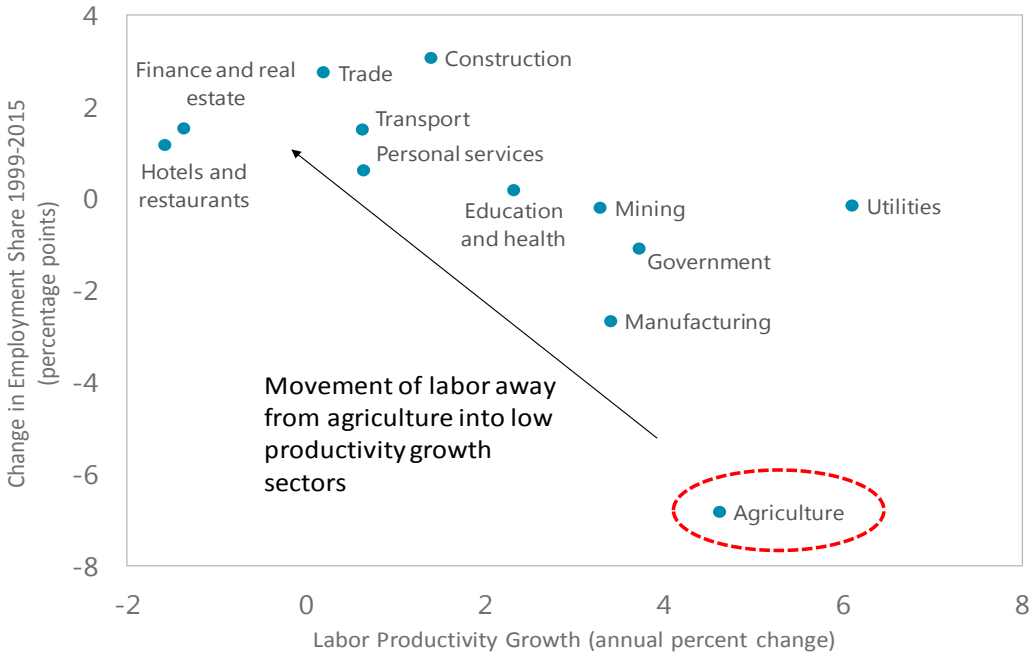


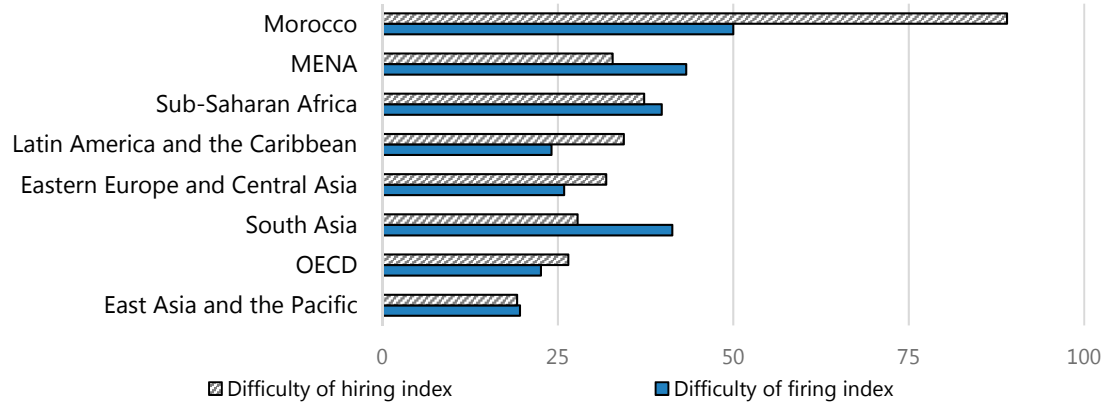
Figure 4. Productivity Growth and Employment in Morocco, 1999–2015



Source: Haut-Commissariat au Plan.

6. In Morocco, several institutional frictions hinder the reallocation of labor. The literature has documented several frictions at the firm and sector levels that play a role in the misallocation of labor (Box 1). Compared with many competitor countries, labor market regulations in Morocco are particularly restrictive in terms of the use of fixed-term contracts, firing, and working-hours flexibility (Figure 5). High social security contributions also help drive up the cost of labor and discourage formal employment, particularly for young people. The informal sector is large and estimated, by the national statistics office to be around 15 percent of total economic activity. Additionally, more than half of public investment in Morocco is channeled through state owned enterprises (SOEs), of which 40 percent corresponds to only four SOEs (World Bank, 2017).

Figure 5. Hiring and Firing Difficulties



Source: Doing Business 2013.

7. The movement of labor is also impeded by low human capital levels and education outcomes. The scores of Moroccan students on international tests are subpar, while dropout rates are high. Illiteracy persists in rural areas, especially among women. At the university level, students overenroll in social science fields at the expense of technical careers, which leads to skills mismatches. The average education level by sector in Morocco is strongly correlated with productivity, making education a key determinant of labor reallocation (see Annex II).

Box 1. Sectoral and Firm-Level Frictions and Labor Misallocation

The literature has documented several frictions at the firm and sector levels that play a role in the misallocation of labor. At the firm level, these include:

- Labor market regulations (Haltiwanger, Scarpetta and Schweiger 2014);
- Credit frictions and banking regulations (Bai, Carvalho and Phillips 2015);
- Trade costs (Costinot and Donaldson 2012);
- The presence of large state-owned enterprises (Hsieh and Klenow 2009); and,
- A large informal sector (Hsieh and Klenow 2014).

At the sector level, the literature highlights several additional frictions, including:

- Customs on imported goods that protect less efficient firms from international competition;
- Currency devaluation practices serving as a subsidy to less productive firms;
- Revealed comparative advantage in natural resources or extractive sector (McMillan and Rodrik 2011);
- Barriers to entry (Ciccone and Papaioannou 2008); and,
- Monopoly powers (Cheremukhin et al 2017).

These frictions can pose headwinds for labor reallocation in higher value added sectors**.** For example, excessive labor regulations can prevent the appropriate alignment of wages with productivity and discourage the efficient labor reallocation toward higher productivity sectors. Lower educational attainment can also prevent labor reallocation toward higher productivity sectors, as workers lack the necessary skills to adapt to new or complex jobs.

Figure 6. Changes in Employment by Sector in Morocco, 2000-15
(Annual Average)

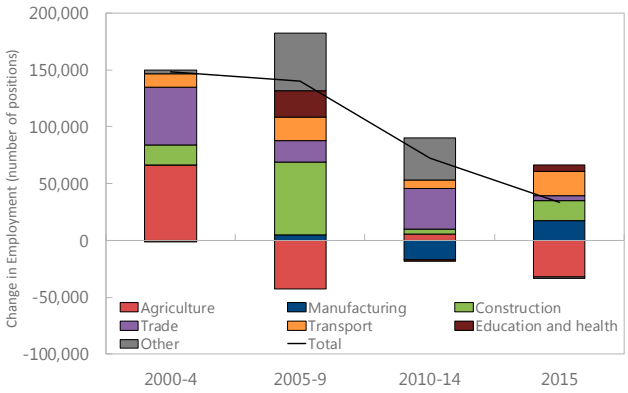


Figure 7. Labor Productivity Relative to the United States, 2012
(In Percent)

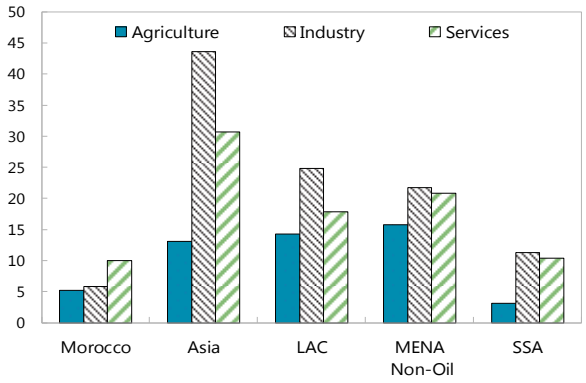
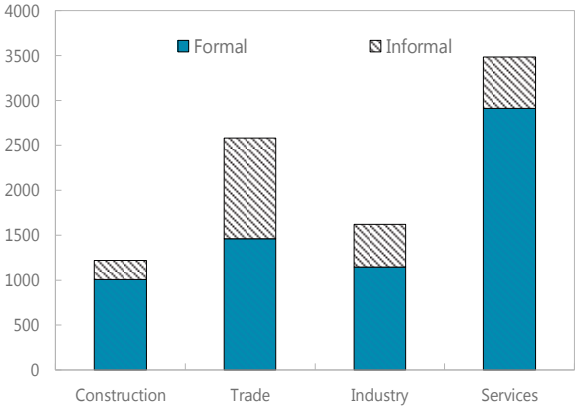


Figure 8. Formal and Informal Workers by Sector, 2014
(Thousands)



Sources: Haut-Commissariat au Plan, and GGDC database (Figure 6).

C. Estimating Labor Reallocation Efficiency in Morocco

8. A cross-country model is used to estimate the speed of sectoral labor reallocation and the role played by institutional frictions in preventing more efficient reallocation. We use an error correction model (ECM) of relative employment and value added shares across sectors (Annex I). A productivity shock in one sector should optimally result in a relatively higher rate of job creation within the sector until productivity gaps are minimized, and the sectoral shares of employment and value added are equal. However, lower levels of institutional and market development impose costs on the flow and creation of jobs in reaction to productivity shocks, causing a slower adjustment process and persistence in productivity gaps. We estimate this model using fixed effects and system generalized method of moments (GMM) respectively[4]. The panel dataset, comprises 42 countries and 10 sectors over the periods 1960-2012, and includes sector level value-added and employment data from the Groningen Growth and Development Center 10-sector (GGDC) database. The reform variables include indices compiled by the IMF (2008) of de jure reforms and liberalization in the real and financial sectors, and other structural reforms (in the labor market, agriculture, etc.).[5]

9. The speed of labor reallocation varies by income level and sectors (**Table 2, Annex 1) while structural reforms can remove key frictions that slow the adjustment**. Higher income countries close productivity gaps across sectors 2.4 times faster than in lower middle income countries such as Morocco. Mining and utilities are the fastest in attracting labor out of agriculture, while manufacturing, trade and tourism have the most persistent productivity gaps. Lower payroll and income taxes as well as severance payments, deeper financial systems, better governance and regulatory environment, and educational attainment are associated with faster labor reallocation and less persistent productivity gaps across sectors. Higher female enrollment in secondary education and stronger market competition are more important for low income countries. This is particularly relevant for Morocco, given large gender gaps in secondary education (IMF, 2016) and the limited degree of market competition. For the manufacturing sector, stronger competition in the product market, and less government support for SOEs paired with stronger public investment appear to be significantly linked with faster creation of manufacturing jobs and smoother movement of labor from agriculture towards manufacturing.

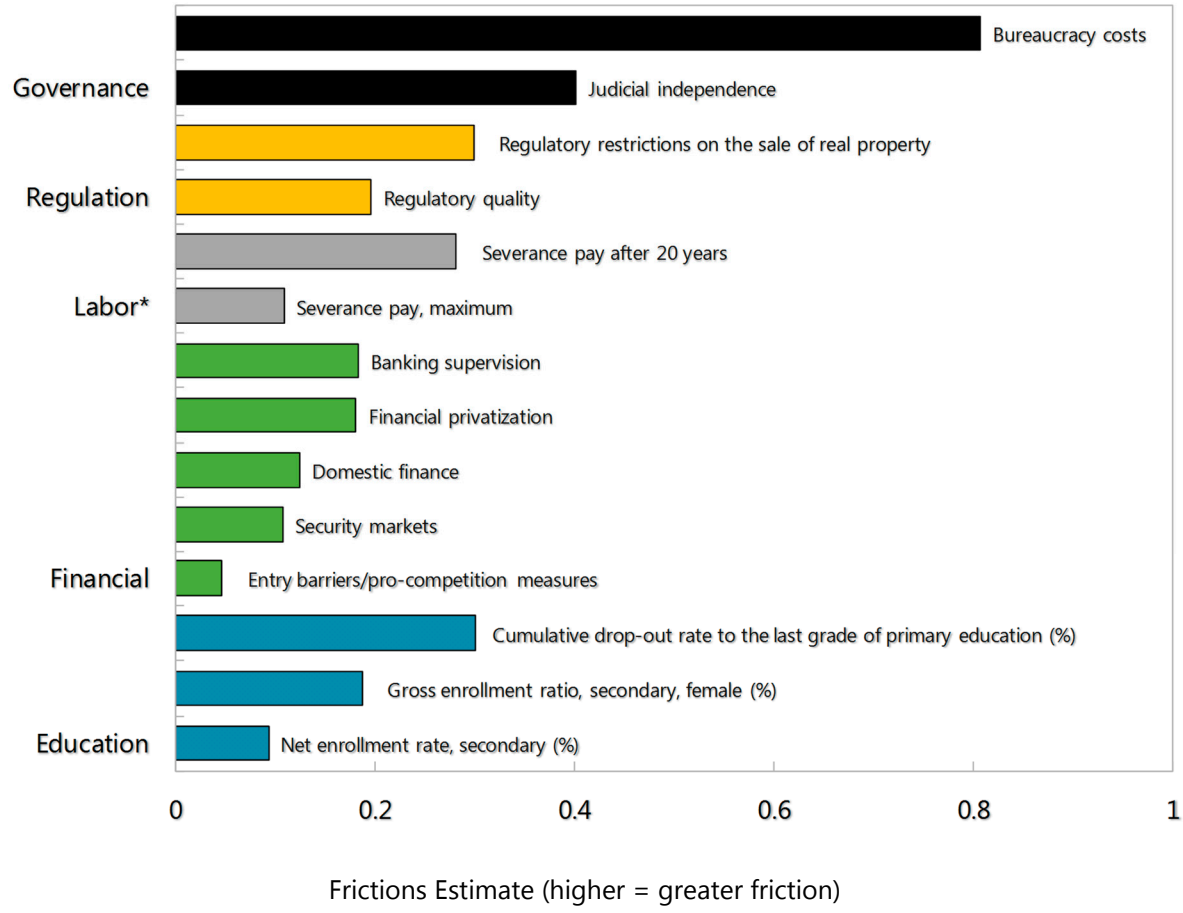
10. A distance-to-frontier analysis highlights the role of frictions related to governance, labor, finance, and education for Morocco. Figure 9 illustrates the distance between Morocco and the highest-achieving economies in the sample on different structural indicators, multiplied by the

[4] The generalized method of moments (GMM) approach addresses the endogeneity between employment and value added shares, and relative sectoral prices. GMM also handles the endogeneity induced by the inclusion of the fixed effect in our dynamic setting (Nickell 1981). Fixed effects help minimize the bias due to unobserved factors over time and across sectors/countries.

[5] These are annual indicators of enacted reforms at the country level. These measures are supplemented with variables on institutional quality and regulatory restrictiveness from the Economic Freedom index. Institutional variables also include the quality of labor market institutions, business regulations, and governance as captured by the Fraser index.

indicator's estimated coefficient in slowing the adjustment of labor to productivity shocks. These signal that potential priorities for policy reform to support structural transformation in Morocco would need to include reforms to improve judicial independence, reduce bureaucracy costs, ease restrictions on property sales, decrease severance payments, financial market development, and increase secondary education enrollment rate (particularly for females).

Figure 9: Morocco: Distance-to-Frontier



Last Reported Year: Cumulative drop-out rate, 2012; Financial: Entry barriers/pro-competition, 2005; Net enrollment rate, secondary, both sexes, 2012; Financial: Security Markets, 2005; Domestic Finance: (Composite), 2005; Financial Privatization, 2005; Banking Supervision, 2005; Gross enrollment ratio, secondary, female, 2012; Regulatory Quality, 2012; sale of real property, 2012; Judicial independence, 2012; Bureaucracy costs, 2012.

Source: IMF staff calculations.
*Note: Labor indicators are not widely available for Morocco. The results are based on Schindler and Aleksynska 2011

11. Morocco has improved substantially on several indicators since the end of the observation period in 2012, but more remain to be done (Table 1). Efforts have been made to simplify administrative procedures for businesses and improve school enrollment rates. Morocco has undertaken several reforms in recent years to improve capital market financing and infrastructure as well as strengthening the regulation and supervision of financial intermediaries.

Table 1. Structural Indicators

Indicator	Morocco		Best observed	Scale (worst to best)
	2000-12 Average	Latest		
Bureaucracy costs	5.3	5.3	10.0	0 to 10
Judicial independence	4.9	4.5	9.8	0 to 10
Regulatory restrictions on the sale of real property	6.9	7.6	10.0	0 to 10
Regulatory quality	-0.2	0.5	2.2	-2.5 to 2.5
Cumulative drop-out rate to the last grade of primary education, both sexes (%)	20.4	11.2	0.8	100 to 0
Gross enrolment ratio*, secondary, female (%)	48.5	63.5	100.0	
Net enrolment rate, secondary, both sexes (%)	47.6	56.1	99.7	0 to 100

*Note: Calculated as the percent ratio of females to males. A ratio of 100 is desirable, representing equal female and male enrollment.

D. Conclusion

12. The above analysis shows that addressing frictions helps promote labor reallocation towards higher productivity sectors, raising aggregate productivity growth and employment. Reduced structural frictions can in turn support the effectiveness of sectoral policies. However, there is no one-size-fits-all policy prescription for all countries, given individual circumstances and growth experiences. Reform priorities depend on country-specific settings, including productivity gaps between sectors, income level, fiscal situation, cyclical position and the scale of particular policy distortions. For example, a more flexible labor market is likely to have a dampening short-term effect on growth and employment and should therefore be coupled with more effective active labor market policies, as well as other growth-enhancing structural reforms to limit the job losses and negative impact on growth.

13. For Morocco, given large productivity gaps between sectors, further improvements in governance, labor regulations, and education are needed to support structural transformation. These have already been identified in previous work on Morocco and the above analysis reinforce their importance for productivity and job creation.

- **Governance.** Business environment improvements include continuing to streamline business regulations and tax codes, reducing bureaucratic red tape, discouraging corruption, and making the judicial system more independent. These policies call for close, efficient coordination among the different public and private players concerned, especially SMEs. An enabling business environment would support firm expansion and worker training, resulting in productivity and wage gains.

- **Finance.** Key areas for improvement include a continued shift to more risk-based and forward-looking supervision. SME credit guarantees could help address potential obstacles to SME credit access and improve domestic finance. A new legal framework for collateral execution could help accelerate NPL resolution and increase recovery rates, thereby improving domestic financial conditions as well.

- **Education**. Augmenting human capital by improving the quality of education and reducing skills gaps between the education system and the needs of high-productivity sectors can better support job creation in such sectors. Investment in female education can help workers move from agriculture and informal sectors (which have a high rate of female labor force participation) towards higher-productivity service and manufacturing sectors. Complementary measures, such as investing in transport, infrastructure and childcare facilities, can further help increase female labor force participation in the secondary and tertiary sectors.

- **Labor regulation.** Restrictive labor regulations are incompatible with the country's plans for structural transformation towards higher productivity sectors and job creation. Labor market reforms should focus on hiring and firing costs, by relaxing restrictions on fixed-term contracts and layoffs to better integrate young workers in the labor market, while establishing adequate safety nets for the unemployed.

Annex I. Error Correction Models for Labor Reallocation and Job Creation

Labor Reallocation

Following Ngai and Pissarides (2007), sectoral labor allocation and productivity are governed by a long-run equilibrium relationship equilibrium refers to the long run optimal case when employment shares follow value added shares of the different sectors in the economy. At this point, (1) total factor productivity (TFP) a_i of all i sectors grow with the same rate; (2) equilibrium sectoral prices are proportional to sectoral TFP, (or alternatively, labor productivity levels are equal); and, (3) labor shares n are allocated to sectors according to their relative consumption expenditure $c \times p$.

When growth rates of productivity differ across sectors, the reallocation of labor takes place to compensate (i.e., structural transformation). Multi-sector growth models such as Ngai and Pissarides (2007) assume a frictionless world, where labor allocations and prices can fully adjust to restore optimality in response to changes in sectoral productivity growth. Nonetheless, frictions in the real world can slow this adjustment process, creating a wedge between the observed sectoral allocation of labor and the long-run optimal case where labor productivity across sectors is equalized. The speed by which labor flows towards its optimal allocation reflects the magnitude of the adjustment costs in the structural transformation process, which result from the institutional and policy frictions.

The costs facing the adjustment of employment levels across sectors can be estimated within an Error Correction Model (ECM). Let *N, P, A, Ω* be the relative values to agriculture of labor share, sector price level, sector TFP, and sector weight in consumption, respectively, for any sector i in a country j at time t. Following Pagan 1985 and Alogokoufis and Smith 1991, the ECM model can be interpreted as the optimal adjustment rule of an economy that faces a penalty for both deviations from equilibrium as well as rapid adjustments. Taking the simple case of a minimization of a myopic quadratic cost function,

$$\Lambda_{i,j,t} = \frac{1}{2}\left(N_{i,j,t} - N^*_{i,j,t}\right)^2 + \frac{\kappa}{2}\Delta N^2_{i,j,t} \tag{7}$$

where κ is the ratio of the marginal cost of adjustment relative to the marginal cost of being away from equilibrium. The optimal allocation of labor at time t would have the following solution,

$$\Delta N_{i,j,t} = \lambda\left(N^*_{i,j,t} - N_{i,j,t-1}\right) = \Delta N^*_{i,j,t} - \lambda(N_{i,j,t-1} - N^*_{i,j,t-1}) \tag{8}$$

where $\lambda = \frac{1}{1+\kappa}$ is the speed of adjustment and lies between 0 and 1; the closer it is to 1 the faster the speed of adjustment, and the lower the costs created by frictions.

From equation (3), we know that the long-run equilibrium relationship is,

$$N^{*}_{i,j,t} = f(P_i \times C_i) = f(P_i \times VA_i) \tag{9}$$

Substituting equation (9) into (8) yields an ECM for labor reallocation:

$$\Delta \log N_{i,j,t} = \underbrace{\beta_1 \Delta \log VA_{i,j,t} + \beta_2 \Delta \log P_{i,j,t}}_{\text{short-term dynamics}} - \lambda \underbrace{\left[\log N_{i,j,t-1} - \left(\delta_1 \log VA_{i,j,t-1} + \delta_2 P_{ijt-1} + \delta_3 X_{t-1}\right)\right]}_{\text{long-term dynamics}} + \beta_3 Z_{jt} + u_t \tag{11}$$

where λ is the speed of adjustment, X_t and Z_t are vectors of control variables. X_t includes the growth rate of GNP per capita, the population growth rate, as well as constant and linear trend fixed effects (sector × country), while Z_t includes an index for the global business cycle, a global linear trend, countries' GNP per capita growth rates, and population growth rates.

We modify the baseline equation (11) to study the contribution of specific structural frictions. These are introduced via an interaction term with the speed of adjustment:

$$\Delta \log N_{i,j,t} = \underbrace{\beta_1 \Delta \log VA_{i,j,t} + \beta_2 \Delta \log P_{i,j,t}}_{\text{short-term dynamics}} - \lambda_1 Error_{i,j,t-1} - \lambda_2 Error^2_{i,j,t-1} - \underbrace{\lambda_3 R_{j,t} \times Error_{i,j,t-1}}_{\text{structural indicators interaction}} + \beta_3 Z_{jt} + u_t \tag{12}$$

Where $Error$ is the deviation from the equilibrium relation, and $Error^2$ controls for the size of the productivity gap. $R_{i,j,t}$ is an aggregate structural indicator, and λ_3 is a measure of its contribution to the speed of adjustment. Within the setting of equation (2), adjustment speed is a function of the error size as well as the structural indicator we include, $\lambda = \lambda_1 + \lambda_2 Error_{i,j,t-1} + \lambda_3 R_{j,t}$.

The Error Correction Model (ECM) captures the main empirical patterns of structural transformation: The (i) underlying process of structural transformation is non-stationary, meaning that sectoral labor shares and productivities maintain a secular trend over time, as observed in the data; (ii) since these trends are driven by the same underlying process of technical change, they are co-integrated; (ii) in the short run, sector output and employment are subject to disturbances that move them away from their co-integration equilibrium values; (iv) there are frictions in the adjustment process of labor, output and prices that prevent an instantaneous reversion to the trend. By preserving the co-integration relation between the variables, the ECM model distinguishes and allows the estimation of short-term fluctuations and long term adjustment speed.

Results

Table 1: Results: Baseline ECM: Labor Reallocation

Dependent variable: $\Delta log(N_t)$

Explanatory variables:		**Estimate**	
		Without Gap Size	With Gap Size
Relative value added Growth	$\Delta log(VA_{i,j,t})$	0.281***	0.278***
Relative sectoral prices growth	$\Delta log(P_{i,j,t})$	0.0409***	0.039***
Deviation from long-run target	$Error_{i,j,t-1}$	-0.137***	-0.139***
(Deviation from long-run target)^2	$Error^2_{i,j,t-1}$	---	0.074***
GDP per capita growth rate	$\Delta log\left(\frac{GNP}{Pop}_{j,t}\right)$	0.0646***	0.0636***
Population growth rate	$\Delta log(Pop_{j,t})$	0.347***	0.282***
Global business cycle index		0.000	0.000

*** Significant at 1 percent

Table 2: Results: Baseline ECM: Labor Reallocation by Subgroup

Income groups	**Estimate**
High income	0.278
Upper middle income	0.206
Lower middle income	0.115
Low income	0.055

Sectors	**Estimate**
Mining	0.178
Utilities	0.148
Construction	0.117
Government services	0.115
Transport, Storage and Communication	0.108
Manufacturing	0.103
Trade, Restaurants and Hotels	0.102

Note: All estimates are significant at a 1 percent level of significance.
Source: IMF staff estimates.

Table 3 compares the effect of the structural indicators across five main categories—education, governance, labor regulations, product market regulations, and trade and openness—on the adjustment speeds. The higher the value of λ_3, the slower the speed of labor reallocation.

Table 3. Structural Indicators and Speed of Labor Reallocation

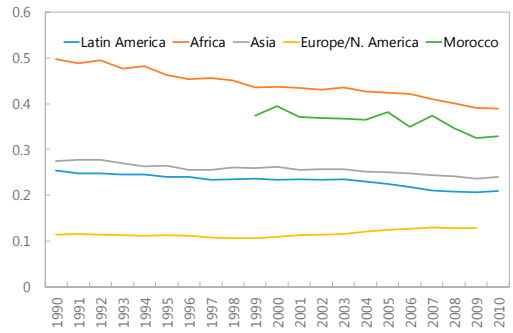
Aggregate Indicator	λ_3	Pr(>|t|)
Financial		
Interest Rate Controls	0.244	0.000
Privatization	0.271	0.010
Banking Supervision	0.274	0.004
Security Markets	0.325	0.001
Banking (composite)	0.367	0.000
Domestic Finance (composite)	0.375	0.000
Entry Barriers/Pro-Competition Measures	0.140	0.063
Labor		
Employee Payroll Taxes, lowest level	-0.859	0.000
Employer Payroll Taxes, lowest level	-0.413	0.041
OECD Score: Severance Pay (20 years)	-0.563	0.000
OECD Score: Severance Pay (maximum, in months)	-0.256	0.080
Education		
Cumulative Drop-out Rate (primary education)	-0.004	0.002
Gross Enrollment Ratio (secondary, female)	0.002	0.092
Net Enrollment Rate (secondary, both sexes)	0.002	0.091
Governance		
Judicial Independence	0.072	0.052
Regulatory Quality	0.084	0.061
Sale of Real Property Restrictions	0.112	0.000
Bureaucracy Costs	0.189	0.000
Inflation Most Recent Year	0.202	0.029
Trade and Openness		
Compliance Costs	0.119	0.002
Capital Flows	0.228	0.025
Financial Restrictions on Current Account Transactions	0.417	0.000
Restrictions on Capital Account Transactions	0.447	0.001

Source: IMF staff estimates.

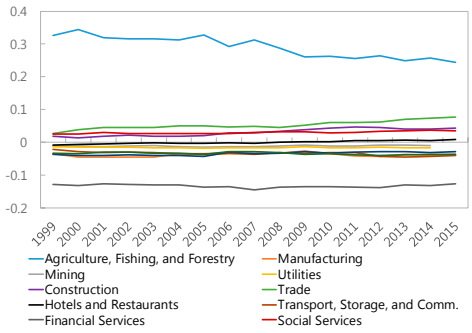
Annex II. Measuring Sectorial Distortion in Morocco

Large sectoral distortions illustrate the extent of labor misallocation in Morocco. Sectoral distortions are defined as the difference between employment and value added shares of a sector in relative terms.[1] In Morocco, distortions are driven mainly by the agriculture, construction and trade sectors. They are large compared to other countries and reducing them could help boost productivity growth. In general, total distortions for developing economies have diminished since 1990.

Sectoral Distortions Index, 1990-2010
(Index, 0 = no distortion)



Sectoral Distortions in Morocco by Industry, 1999-2015 (index, 0 = no distortion)

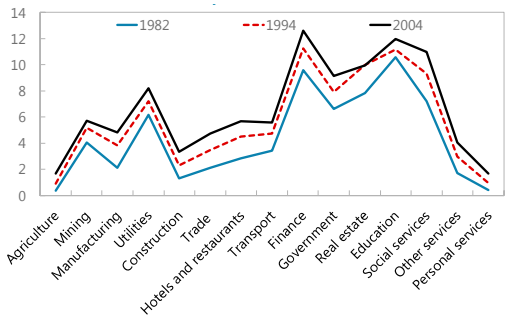


Sources: GGDC database and Haut-Commissariat au Plan.

Further structural change could increase labor productivity by almost 40 percent in Morocco.[2] When the value-added share equals the labor share for all sectors in an economy, structural change no longer contributes to growth since there is no benefit to reallocating labor. Given the disparities between the relative value added and employment shares in the Moroccan economy, structural transformation can make a large contribution to growth.

Average years of schooling is strongly correlated with sector productivity levels. This correlation is generally observed across countries with data available. As low or unequal human capital constrains the movement of labor across sectors, it is an important determinant of distortions.

Morocco: Average Years of Schooling by Sector
(By census round)



Source: IPUMS International.

[1] By taking the difference between sectoral employment and value-added shares, we calculate the level of sectoral distortion using the following index (Ando and Nassar, 2017): $d_i := \frac{E_i}{\sum_k E_k} - \frac{VA}{\sum_k VA_k}$, where E is employment and VA is value-added for sector i. The overall sectoral distortion for a country is then $d = \sqrt{\sum_i d_i^2}$.

[2] Calculated as $\Delta P = \sum_i (P_i^E - P_i^0) S_i^0 + \sum_i (S_i^{VA} - S_i^0) P_i^0$ where P^E is the average labor productivity of the economy and S^{VA} sets the employment share of sector i equal to its value-added share.

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