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Are Minimum Wages and Payroll Taxes a Constraint to the Creation of Formal Jobs in Morocco?

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Abstract

This paper uses a search-and-matching model to examine the effects of labor regulations that influence the cost of formal labor (notably minimum wages and payroll taxes) on labor market outcomes in Morocco. The model assumes that the informal sector is unregulated and thus not directly affected by these labor policies. However, the model takes into consideration that although labor policies apply only to the formal sector, they may influence the size and the composition of employment in the informal sector, as well as the size and composition of unemployment and self-employment. The results indicate that these regulations, especially minimum wage policy, contribute to higher unemployment rates and constraint formalization in Morocco, especially for youth and women.

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Are minimum wages and payroll taxes a constraint to the creation of formal jobs in Morocco?

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The World Bank and *Le Haut Commissariat au Plan du Maroc*[1]

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I. INTRODUCTION

Morocco has extensive untapped human resources. According to the most recent official data, more than half of the country's working age population (15-64) is currently not participating in the country's economic activity, making Morocco one of the countries with the lowest employment rates worldwide and in the Middle East and North Africa (MENA) region (World Bank, 2012). [2] Beyond low participation rates, the unemployment rate in the country remains globally high, especially among youth and women.[3] At the same time, the labor market in Morocco remains largely informal, with 80 percent of all workers not contributing to social security in 2014 according to official estimates.

Available research (Agénor and El Aynaoui, 2003; Gatti et al., 2013) indicates that labor markets in Morocco are quite segmented. There is a formal labor market, mainly composed of public servants and wage earners with access to social security. There is also a large residual informal labor market composed of agricultural workers, wage earners that do not contribute to social security, and self-employed. The informal labor market in Morocco is characterized by the prevalence of jobs that are low-pay/low-productive and largely unprotected against risks such as aging, income loss, and health (Gatti et al., 2013; Agénor and El Aynaoui, 2003). Moreover, previous studies indicate that the mobility between the informal and the formal sectors is quite limited and not competitive, especially for youth and for women (Agénor and El Aynaoui, 2003, Verme et al. 2013, and World Bank, 2012). Such low mobility of human capital is a definite symptom of labor market inefficiency – as human capital cannot be allocated where it could yield the highest returns (Gatti et al., 2013 and World Bank, 2012).

Previous comparative analysis of labor regulation in the MENA region (see Angel-Urdinola and Kuddo, 2010 and World Bank, 2013) indicate that some features of labor regulation in Morocco, notably minimum wage policy and payroll taxes, may contribute to elevating the cost of formal labor in the country and to constrain the demand and mobility of formal labor, especially among youth (Betcherman 2012 and World Bank 2012).

In particular, the level of the non-agricultural minimum wage (SMIG) in Morocco is high relative to the average worker's productivity and well enforced in the formal private sector, especially in urban areas (Benhayoun et al. 2001 and Agénor and El Aynaoui, 2003). Compared to international benchmarks, this ratio is the highest in the MENA region, even by OECD standards (Angel-Urdinola and Kuddo, 2010).[4] Moreover, between 2007 and 2013, the SMIG increased by 27 percent while average consumer prices increased by only 13 percent.[5] Also, payroll taxes (paid by employers) and social security contributions (paid by employees) in Morocco approach 25 percent

[2] Latest available office data from Morocco's High Planning Commissariat (for year 2015) indicate that overall employment rates in the country (population 15-64) are at 42.8 percent (64.8% for men vs. 22.1% for women) (data are available at http://www.hcp.ma)

[3] Latest available office data from Morocco's High Planning Commissariat (for year 2015) indicates that the country unemployment rate was at 9.7% (20.8% for youth 15-24 and 10.5% among women). In urban area, the figures of unemployment are even worst for youth (39%) and for women (21.7%).

[4] According to the Doing Business Dataset this ratio was at 0.77 in year 2013 (www.doingbussines.org)

[5] International evidence indicates that a 10 percent increase in the level of minimum wage is estimated to reduce youth employment by a range of 1 to 4 percent in an average labor market (Angel-Urdinola and Kuddo, 2010).

of wages while the tax wedge can reach up to 32 percent.[6] While this level of tax wedge is not high for EU standards (at 44 percent), it is high relative to comparable countries within in the region, such as Jordan and Lebanon (at 22 percent) (Angel-Urdinola et al. forthcoming). High levels of payroll taxes coupled with a high minimum wage could be associated with higher unemployment and informality rates (Lehmann and Muravyev, 2014), with the effects being largest among young workers.

Previously available research in Morocco (Agénor and El Aynaoui, 2003 and Marouani and Robalino, 2008) indicates that minimum wage policy and payroll taxes in Morocco indeed contribute to higher levels of unemployment and informality, although the overall magnitudes of the effects are small. Both authors assess aggregate effects of such policies on the labor market using general equilibrium techniques.

This paper uses a search-and-matching model in order to examine deeper (by age group; gender; and employment status) the effects of minimum wage policy and payroll taxes on labor market outcomes in Morocco. The model assumes that the informal sector is not regulated. As such, it is not directly affected by labor policies. The model allows for labor policies to influence nonetheless the size and the composition of employment in the informal sector (as well as the size and structure of unemployment). The model also allows a deeper examination of the effects of labor policies on self-employed workers.

The results indicate that labor regulations, especially minimum wage policy, contribute to higher unemployment rates and constrain formalization in Morocco, especially for youth and women. The results also suggest that lowering the minimum wage and payroll taxes would mainly contribute to the formalization of self-employed workers and to a decrease in unemployment, especially among youth and women. Contrary to what was expected, the effects of policy changes on informal wage earners are limited, as most informal wage earners display very low levels of human capital (and productivity) to be able to meet the needs required by available vacancies in the formal sector.

This paper contributes to the literature on several fronts. First, it confirms previous results using semi-parametric / search methods rather than general equilibrium techniques. Second, the results allow for a more disaggregated assessment of the overall effects of labor regulations (by gender, age group, and employment status). Finally, this study uses more recent data.

II. THE MODEL

The model follows closely Albrecht et al. (2009) and Margolis et al (2012). The model assumes that workers are risk neutral, that time is continuous, and that workers discount the future at rate r. Firms can create vacancies in the formal or in the informal sector based on a matching function $m(\theta)$ where $\theta = Vacancies / Unemployment$ is a measure of labor market tightness. Let ψ represent the share of vacancies in the informal sector and $1-\psi$ the share of vacancies in the formal sector. There is a cost c that employers bear when they create a new vacancy. [7]

[6] The so-called "tax-wedge" (i.e. the difference between the total cost of labor and take-home pay) has often been used in the literature to assess the adequacy of the level of payroll taxes (Betcherman, 2012).
[7] Without loss of generality, our simulations assume free entry of vacancies (c = 0).

The model assures that workers' human capital (i.e. worker's type) follows an exogenous distribution, $y \sim F(y)$ with with $y_{min} < y < y_{max}$. The model also assumes that matches in the informal sector produce a different value of output x_I (for a given level of human capital) than in the formal sector x_F where $x \sim G_i(x|y)$ with $x_{min} < x < x_{max}$ and $i = \{I,F\}$ indicating whether the job is in the formal or informal sector. Once x is realized, the parties decide to produce (i.e. issue a contract) if the net surplus of the match is positive and continue searching otherwise. Formal contracts are subject to labor market regulations (like payroll taxes, social contributions, minimum wages, etc…) while informal contracts (informal wage earners and self-employed workers) are not directly affected by labor policies. The match surplus, and so the negotiated wage, depend both on the productivity x and on the worker's type y. This joint surplus is then split via Nash bargaining. Vacancies get filled when an unemployed worker and a vacancy meet and if the match generates a joint surplus for the worker and the employer compared to what they would get if the match does not take place. Self-employed workers receive an income y equivalent to their type and workers meet opportunities for self-employment at a rate $\boldsymbol{\alpha}$. Finally, idiosyncratic shocks (job destruction shocks) that destroy the match and send the individual back to unemployment arrive at rate λ_i, $i \in \{I, F\}$. Self-employment matches end at a rate λ_s when capital gains are negative. The model also considers that there is mobility across the formal and informal sector; so that workers are not always in their preferred job.[8]

<u>*Unemployment Value Function*</u>

Let $U(y, \tilde{\omega})$ be the value of unemployment for a worker of type y, which can be written as:

$$\begin{aligned} r\,U(y, \tilde{\omega}) = {} & b(\tilde{\omega}) + \alpha \max\left[N_S(y) - U(y, \tilde{\omega}), 0\right] + \\ & m(\theta)\,\psi E \max\left[N_I(x_I, y) - U(y, \tilde{\omega}), 0\right] + \\ & m(\theta)\,(1-\psi) E \max\left[N_F(x, y) - U(y, \tilde{\omega}), 0\right] \end{aligned} \tag{1}$$

This worker receives a flow utility of $b(\tilde{\omega})$, where $\tilde{\omega}$ is the wage on the previous job. At a rate α, the worker meets an opportunity for self-employment and, if it is taken, realizes a capital gain of $N_S(y) - U(y, \tilde{\omega})$. The matching function $m(\theta) = a\theta^{\beta}$ determines the probability of an individual meeting a vacancy for a wage and salary job, with θ being the ratio of vacancies to unemployment and β a bargaining power. Conditional on meeting a vacancy, a worker is confronted with an informal sector vacancy with probability ψ and a formal sector vacancy with probability $1-\psi$. If the job is taken, the worker realizes a capital gain of $N_i(x_i, y) - U(y, \tilde{\omega})$, where $i \in \{I, F\}$. The employment value functions consider that the initial flow value of the match is given by the sector-specific productivity x, which varies across individuals and sectors (formal and informal).

<u>*Self-Employment Value Function*</u>

Let $N_S(y)$ be the value of self-employment for a worker of type y, which can be written as following:

[8] The model's optic to self-employment and informal employment assumes that, to some extent, worker's participation in these sector is a matter of choice given its relative productivity and pay in both sector (see Maloney 2004).

$$r\, N_S(y) = y + \lambda_S\, [U(y, y) - N_S(y)] \qquad (2)$$

This expression shows that the self-employed receives a flow value equivalent to her type but at rate λ_S the opportunity ends in which case there is a (negative) capital gain of $U(y, y) - N_S(y)$.

Wage and Salary Sector Value Functions

Let $N_F(x_F, y)$ and $N_I(x_I, y)$ be the values of employment in the formal sector and informal salaried sector, respectively, for a worker of type y with a draw x from the sector-specific productivity distribution. The contributions paid on wages in the formal sector are expressed as γ. The flow values of these jobs can be written respectively as:

$$r\, N_F(x_F, y) = w_F(x_F, y)\,(1-\gamma) + \lambda_F\, [U(y, w_F(x_F, y)) - N_F(x_F, y)] \qquad (3)$$

$$r\, N_I(x_I, y) = w_I(x_I, y) + \lambda_I\, [U(y, w_I(x_I, y)) - N_I(x_I, y)] \qquad (4)$$

A worker of type y who has a formal sector job receives a wage $w_F(x_F, y)$ determined by Nash bargaining. Idiosyncratic shocks that destroy the match and send the individual back to unemployment arrive at rate λ_i, $i \in \{I, F\}$. A similar idea applies to the value of employment in the informal wage sector.

Employer-Side Value Functions

Let V_k be the value of the expected profit of posting a vacancy and $J_k(x_k, y)$ the value of a filled job in sector $k \in \{I, F\}$. The filled job values can be written as:

$$r\, J_F(x_F, y) = x_F - w_F(x_F, y)\,(1+\tau) + \lambda_F\, [V_F - J_F(x_F, y) - s_i] \qquad (5)$$

$$r\, J_I(x_I, y) = x_I - w_I(x_I, y) + \lambda_I\, [V_I - J_I(x_I, y)] \qquad (6)$$

Regulations affecting the formal sector filled job value are payroll taxes τ and severance payments s_i. Note that regulations do not affect $J_I(x_I, y)$.

The values of formal and informal sector vacancies, V_F and V_I, are defined respectively by

$$r\, V_F = -c + \frac{m(\theta)}{\theta}(1-\psi) E\max\, [J_F(x_F, y) - V_F, 0] \qquad (7)$$

$$r\, V_I = -c + \frac{m(\theta)}{\theta}\psi E\max\, [J_I(x_I, y) - V_I, 0] \qquad (8)$$

The expectation term in (7) and (8) reflects the assumption that the firm does not know in advance which type of worker it will meet.

Wages

A surplus is realized when a match between the worker and the employer is formed. This surplus is given by the net gain from matching for both the firm and the worker, that is $N_k(x_k, y) - U(y) + J_i(x_i, y) - V_i$, where $i \in \{I, F\}$. Wages are determined by rent sharing over the surplus of the match. A wage is a solution to a generalized Nash Bargaining problem with threat points equal to the worker's and the firm's respective continuation values. Given an exogenous share parameter β and

the free entry condition ($V_i = 0$), the formal contract wage $w_F(x_F, y)$ for a worker of type y producing at x_F is following.

$$w_F = \underset{w_F(x_F,y)}{arg\ max}[\,N_F\,(x_F, y) - U(y)]^{\beta_F}\,[J_F\,(x_F, y) + s_i]^{\,1-\beta_F} \qquad (9)$$

$$w_F = \begin{cases} \frac{\beta_F(x_F + rsi)}{\tau+1} + \frac{rU(y)(\beta_F - 1)}{\gamma - 1} & \textbf{\textit{if}}\ N_F > U(y) \\ 0 & \textbf{\textit{otherwise}} \end{cases}$$

$$w_I = \underset{w_I(x_I,y)}{arg\ max}[\,N_I\,(x_I, y) - U(y)]^{\beta_I}\,[J_I\,(x_I, y)]^{\,1-\beta_I} \qquad (10)$$

$$w_I = \begin{cases} \beta_I\,x_I + (1 - \beta_I)rU(y) & \textbf{\textit{if}}\ N_I > U(y) \\ 0 & \textbf{\textit{otherwise}} \end{cases}$$

The wage in sector i is the weighted average of the worker's productivity and the worker's outside options. Evidently, regulations affect the formal wage bargaining process.

III. DATA AND CALIBRATION

The model is calibrated using data from the 2015 Moroccan Labor Force Survey (MLFS), the latest publicly available to conduct this research. The survey have been conducted by the High Planning Commissariat of Morocco, covering all residents on the national territory. The MLFS is representative at the strata (urban/rural) and region levels. The MLFS provides information on wages and has large size (60,000 households of which 40,000 are urban, and about approximately 270,000 individuals every year).

Given the nature of the model, our sample excludes agricultural employment and the public sector. The agricultural sector (albeit large) is mainly composed of unpaid family workers, a group that is unlikely to be affected by changes in the labor policies assessed in the study. Also, the main features of public sector employment in Morocco (wages, size, hiring/firing decisions) are not necessarily driven by the model's assumptions, despite the fact that this sector is quite compliant with labor regulation. Indeed, public sector decisions to set wages, hire and fire workers, etc., are not likely to follow the assumptions of the value functions proposed by the model but to be driven by other factors (e.g. politics / pork barrel / social peace). As a result, our sample choice is largely urban (75%) and accounts for 51% the national labor force (Table 1). While this sample choice leaves us with about half of the overall Moroccan labor market, we believe that it is a good representation of the share of the market that is somehow affected by the type of labor regulations assessed in the study. As such, the results of the study need to be interpreted with care and may not be generalized, as they are pertinent only to urban and non-agricultural settings.

Table 1: Descriptive Statistics – choice of sample.

	National	*Urban*	*Rural*	*Women*	*Men*	*Formal*	*Informal*
Public sector (% of total employment)	8.9	16.9	1.5	8.4	9.1	47.8	0.9
Agriculture (% of total employment)	41.6	5.5	75.4	59.7	36.2	4.8	49.2
Sample as % of total Labor Force	50.5	75.6	22.6	36.3	55.8	46.7	48.1

Source: Author's own estimates using the 2015 MLFS.

Estimating the worker's type

As mentioned above, the model assumes that self-employed individuals earn the value of their type, y_i. In turn, a worker type is, thus, assumed to be a function of a set of observable characteristics, so that $y_i = Z_i \Upsilon$. We can then write the earnings equation for self-employed workers using a standard Mincerian equation where $v \sim N(0, \sigma_v)$ is an individual's idiosyncratic shock that affects income[9]:

$$w^{SE} = Z_i \Upsilon + v_i \qquad (11)$$

Since the model assumes that self-employed individuals are a selected sample (they prefer to take self-employment opportunities rather than available offers for formal/informal job opportunities), we correct for this possible selection bias using a standard Heckman correction. [10]

Estimating the Productivity Functions

The distributions $G_j(x|y)$, with $j \in$ {Formal; Informal}; are assumed to be drawn from a logistic distribution with a mean equal to $y + k_j$, where k_j is a form of unobserved individual-specific heterogeneity that can influence the mean of the x distribution. It is assumed that k_j is a Bernoulli-distributed random variable. Recovering the productivity distributions requires a four step procedure:

a. Estimate the part of observed wages, w_j $j \in$ {Formal; Informal}, that is not due to the worker's type. This is: $w_j - y_{hat}$. To estimate y_{hat} we use the coefficients Υ of the determinants used in the recovery of y from the self-employed.
b. Recover the part of this residual that is explainable by unobserved characteristics, and use this to characterize the distribution of the heterogeneity component k_j.
c. Recover the value of the draw that is added to the mean $y_{hat} + k_j$; and
d. Calculate the distribution of these draws.

The result of these calculations is a distribution (centered around y or $y + k_j$) of means for the draws from the x distribution. Subtracting this mean from the observed wage gives an estimator of the value of the draw from the x distribution.

The remaining parameters to calibrate the model need to be estimated, recovered from the data, or withdrawn from the labor law. We estimate directly from the MLFS the shares of population in each employment state (unemployment, formal employment, informal employment and self-

[9] Our Mincerian estimations control for strata, region, gender, age, age squared, level of education and sector of employment (agriculture/primary, manufacturing/secondary, services/tertiary).
[10] Estimates are available upon request.

employment) as well as the mean and variance of log earnings in the formal, informal and self-employment sectors (Table 2). Parameters corresponding to the social contributions for employees (γ = 0.04) and to payroll taxes for employers (τ = 0.16) are directly withdrawn from the labor law.

With all the information obtained above, the model simulates a workers' path into the labor market as follows. Starting from unemployment, the individual receives self-employment offers, formal job offers and informal job offers, and accepts or refuses them according the behavior dictated by the value functions described above. When self-employed, formally employed, or informally employed, job destruction shocks arrive with probabilities λ_S, λ_F and λ_I respectively. Each individual's transitions and wages were repeatedly simulated until the simulations converged to a stable share of the population in each labor market state and stable wage distributions within the formal and informal employment states.

The simulation focuses on a sample of 2,000 individuals drawn from the distributions of y_i and x_i as estimated by following up the steps mentioned above, where i indexes the individuals in formal, informal, or self-employment. At the beginning of the simulation all workers are unemployed. The micro simulation model follows over time (one iteration can be interpreted as one month) each of the individuals in the sample, who are characterized by a type y_i and productivity x_i. Through aggregation, the model generates steady state distributions for variables of interest. The identification of the model parameters is based on the minimization of the following function:

$$\sum_{i=1}^{3} \quad (s_i - s_i^*)^2 + (w_i - w_i^*)^2 + (v_i - v_i^*)^2 \qquad (12)$$

where s_j is the share of the labor force working in sector i, w_i is the average of log wages across individuals by sector, and v_i is the variance of the wage. The values with a * indicate the targeted values of the variable, which is estimated directly from the data.

The steady state allows to estimate the following parameters: the job destruction rates λ_i; the share of informal vacancies ψ; the arrival rate of job opportunities for self-employment α; the bargaining power coefficients β_i; and the scale factor in the matching function a. Table 2 presents the full set of parameters resulting from model convergence. As presented in the table, the values of the recovered parameters, conditional on the sample of individuals drawn, provide a rather close representation of the observed wages and employment composition of the Moroccan labor market.

IV. RESULTS

After achieving convergence, the model arrived at the following composition of the Moroccan labor force, which we take as "baseline" scenario for all simulations: 22.3 percent unemployed, 29.7 percent informal wage earners, 20.1 percent formal wage earners, and 27.8 percent in self-employment. In terms of average monthly wages, the model converges to the following results: 1,765 Moroccan Dirhams (MAD) for informal workers, 3,264 MAD for informal workers, and 1,955 MAD for the self-employed (Tables 2 and 3). Using these "baseline" estimates, as well as all other estimated parameters, several policy experiments were conducted to assess the impact of labor regulation, and notably of regulations that influence the cost of formal employment such as payroll taxes, the minimum wage, and severance pay.

Table 2: Model Parameters and calibration

	Baseline Scenario
Estimated Parameters	
Share of informal job offers (ψ)	0.77
Bargaining power for the formal sector (β_f)	0.99
Bargaining power for the informal sector (β_i)	0.99
Scale factor in matching function (a)	0.19
Arrival of self-employment opportunities (α)	0.11
Job destruction rate in the informal sector (λ_I)	0.11
Job destruction rate in the formal sector (λ_F)	0.01
Job destruction rate for the self-employed (λ_S)	0.08
Labor market composition	
Share informal work	0.297
Share formal work	0.201
Share self-employment	0.278
Mean log-wage informal sector	7.48
Mean log-wage formal sector	8.01
Std log-wage informal sector	6.33
Std log-wage formal sector	6.64

Source: Author's own estimates using the 2015 MLFS.

Deregulation:

Our first set of simulation assume the full abolishment of payroll taxes and of the minimum wage. One would expect that abolishing such regulations would decrease the labor costs for formal employment. As such, in general, such policy would contribute to a lower unemployment and to increase the share of workers with jobs in the formal sector. Simulations confirm such results, with a much higher impact for youth and women than for the average worker. Results are presented in Table 3. Changes in the composition of employment are presented in percentage points while changes in wages are presented in percent. In order to assess the statistical significant of the results, standard errors for every scenario are calculated using bootstrapping techniques. [11]

Results indicate that deregulation (i.e. abolishment of payroll taxes and the minimum wage) would contribute to a 2.7 percentage point decrease in unemployment (about 12 percent), to a 1.0 percentage point decrease in informality (about 3 percent), to a 2.1 percentage point decrease in self-employment (about 8 percent), and to a 5.7 percentage point increase (about 28 percent) increase in formal employment. Estimates also indicate that deregulation would contribute to slightly decrease in wages in the formal sector (of about 4 percent). Estimated impacts are much larger for youth and women. For instance, results indicate that deregulation would contribute to decrease in unemployment of 11.6 percentage points (or 38 percent) for women and of 6.2 percentage points for youth (or 16 percent).

[11] For all parameters of interest (P), let S_o denote the standard error for the benchmark scenario and S_i the standard error for the simulated scenario. For every simulation scenario a t statistic (as its associated p-value) was calculated as $t = P_i - Po / SE$, where SE = $sqrt\ (\frac{So^2}{no} + \frac{Si^2}{ni})$ where n = {i,o} denotes the degrees of freedom (i.e. 25 iterations).

Table 3: Simulation results on the effects of deregulation

	% U	% I	% F	% SE	Wage I	Wage F	Wage SE
				All workers			
Baseline	22.32%	29.70%	20.14%	27.83%	1,765.4	3,264.4	1,955.9
s.e.	0.11%	0.18%	0.20%	0.19%	6.2	19.5	7.6
Full deregulation	19.6%	28.7%	25.9%	25.7%	1,800.3	3,134.4	1,987.2
Change	-2.67	-0.96	5.73	-2.09	1.97%	-3.98%	1.60%
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000
No Minimum wage	19.9%	28.6%	25.8%	25.7%	1,798.5	2,964.5	1,987.9
Change	-2.43	-1.13	5.66	-2.09-	1.87%	-9.19%	1.64%
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000
No Payroll tax	21.0%	29.2%	23.0%	26.8%	1,772.2	3,307.6	1,958.3
Change	-1.32	-0.52	2.89	-1.04	0.39%	1.32%	N.S.
p-value	0.000	0.000	0.000	0.000	0.001	0.000	0.268
				Women			
Baseline	30.58%	44.36%	11.28%	13.78%	1,412.1	2,828.6	1,573.1
s.e.	0.18%	0.19%	0.19%	0.21%	3.1	11.4	12.3
Full deregulation	19.0%	42.3%	26.1%	12.5%	1,469.7	2,457.3	1,558.1
Change	-11.55	-2.06	14.87	-1.26	4.1%	-13.1%	-0.95%
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000
No Minimum wage	21.5%	41.3%	24.6%	12.5%	1,467.0	2,185.7	1,550.6
Change	-9.07	-3.01	13.36	-1.28	3.9%	-22.7%	-1.4%
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000
No Payroll tax	25.8%	45.4%	15.7%	13.1%	1,413.3	2,907.9	1,543.1
Change	-4.82	1.05	4.42	-0.65	N.S.	2.80%	-1.9%
p-value	0.000	0.000	0.000	0.000	0.188	0.000	0.000
				Youth			
Baseline	37.88%	41.74%	6.55%	13.83%	1,492.5	2,807.4	1,738.2
s.e.	0.11%	0.18%	0.13%	0.10%	3.1	14.7	5.3
Full deregulation	31.7%	40.7%	15.4%	12.1%	1,519.0	2,465.2	1,777.6
Change	-6.16	-1.03	8.88	-1.69	1.78%	-12.19%	2.27%
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000
No Minimum wage	32.7%	40.2%	15.2%	11.9%	1,517.7	2,193.5	1,775.3
Change	-5.23	-1.53	8.68	-1.92	1.69%	21.87%	2.13%
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000
No Payroll tax	35.7%	41.6%	9.7%	13.1%	1,491.1	2,885.3	1,733.0
Change	-2.22	-0.18	3.17	-0.77	N.S	2.78%	-0.30%
p-value	0.000	0.008	0.000	0.000	0.140	0.000	0.002

Source: Author's own estimates. N.S (Not Significant at a 5 percent confidence interval)

Results also indicate that deregulation would more than double the rates for formation for youth and women. In particular, estimates indicate that such policy would increase the share of youth with formal jobs by 14.9 percentage points (or 132 percent) and of women in formal jobs by 8.9 percentage points (or 136percent). At the same time, deregulation would contribute to a drop in wages of youth and women oscillating between 12 to 13 percent, a decrease that is mainly explained by the abolishment of the minimum wage. Another important result of deregulation is that the share of self-employed (informal) workers would decrease by 1.26 (2.06) percentage points among women and by 1.69 (1.03) percentage point among youth, or 9 and 12 (5 and 3) percent respectively, suggesting that lower labor costs help informal and self-employed workers to formalize. The reason why the impact is higher for self-employed workers than for informal workers is because, on average, self-employed workers are more productive (i.e. display higher

average wages) than informal workers and thus have a higher likelihood to create productive matches given the simulated reform.

Abolishing payroll taxes:

Results indicate in the absence of payroll taxes, unemployment, self-employment and informality rates would decrease by 1.32, 0.52, and 1.04 percentage points (about 6, 2, and 4 percent respectively) while formal employment would increase by 2.9 percentage points (or 14.3 percent). Results also indicate that absence of payroll taxes would contribute to higher wages in the formal sector (about 1.3% higher). Such increase, however, is much lower than the total decrease in taxes (of about 25%) and only slightly higher than the current employee contribution rates (at 6.3%). This is so because employers are likely to not use tax cuts to increase worker's wages but to increase profits (this is so because collective bargaining power β is largely non-linear). Nevertheless, simulations show that abolishing payroll taxes would decrease female and youth unemployment by 4.8 and 2.2 percentage points (or 16 and 6 percent) respectively. Results also indicate that such policy would affect employment composition by sector for youth and women, through lower self-employment (and expected reduction between 0.6 and 0.8 percentage points or 4 to 6 percent respectively) and higher formality (an expected increase between 3.1 and 4.4 percentage points or 40 to 49% respectively).

Abolishing the minimum wage:

Simulation results indicate that abolishing the minimum would have important implications on overall labor market outcomes, but especially for youth and women. Results indicate that such policy would contribute to a reduction in unemployment, informality, and self-employment of 2.43, 1.13, and 2.09 percentage points (or 11, 4, and 8 percent) respectively. As expected, abolishing the minimum wage would decrease (on average) formal sector wages by about 10 percent. The effects of the policy are larger for youth and women. First, abolishing the minimum wage would contribute to decrease average wages for these groups of about 22 percent. Hand in hand with such decrease in wages, the policy would contribute to reduce female and youth unemployment by 9.1 and 5.2 percentage points (or 30 and 14 percent) respectively. Furthermore, such policy would contribute to increase female and youth formalization by 13.4 and 8.7 percentage points (or 118 and 132 percent respectively). Abolishing the minimum wage would also contribute to decrease the participation of women and youth in informal / self-employment by between 1.2 and 3 percentage points (or 3 and 14 percent).

Policy scenarios:

Since full deregulation is unlikely to occur; based on the results presented above we develop different policy scenarios to assess the impact of changes in the level of the minimum wage as well as on payroll taxes on labor market outcomes. We present simulations results only for youth and

women since the impacts of these policy scenarios on the overall labor market are small (albeit statistically significant).[12] In terms of policy scenarios, we simulate the effects of a 5 (10), 10 (15), and 15 (24) percent increase (decrease) in the level of the minimum wage (Table 4) and well as the effects of a 5, 10, and 15 percentage point increase (and decrease) in payroll taxes (Table 5).

Simulation results indicate that lowering the minimum wage between 10 and 24 percent would contribute to decrease in female and youth unemployment between 3.9 and 6.2 percentage points (or 13 to 20 percent). Such decrease in unemployment goes hand-in-hand with an increase in women/youth's formalization between 2.6 and 7.3 percentage points (or 23 and 75 percent). These gains would be achieved at the expense of a decrease in average wages of formal female/youth workers of between 6 and 13 percent. Simulations also indicate that raising the minimum wage between 5 and 15 percent would, as expected, mainly contribute to a decrease formal employment for youth and women (between 9 and 26 percent) and to increase informal wage employment for both groups (between 2 and 7 percent) (Table 4). As expected, the policy would contribute to increase average wages of youth/female workers by between 3 and 8 percent

With regards to payroll taxes, results indicate that lowering payroll taxes between 5 and 15 percentage points would contribute to decrease in female and youth unemployment between 1 and 4 percentage points (or 2 to 12 percent). Such decrease in unemployment goes hand-in-hand with an increase in women and youth formalization between 0.6 and 2.5 percentage points (or 5 and 28 percent). Lower payroll taxes also contribute to increase female informality by about 1 to 2 percentage points (or 4 to percent). One possible explanation if that, despite lowering labor costs, female informal workers, on average, are not productive enough to assure a job matching in the formal sector. As such, the savings obtained by enterprises from lower taxes may boost their demand for informal employment.

Simulations results of increasing payroll taxes between 5 and 15 percent would contribute to a decrease women's formal employment of about 1 to 2 percentage points (or 5 to 17 percent) and to increase women informal wage employment of about 7 to 8 percent. For youth, higher payroll taxes would also lead to a decrease in formal employment of about 1 to 2 percent. The impact of the policy on wages are largely negligible. Finally, simulation results of raising payroll taxes on unemployment and informal employment of women and youth are somehow counterintuitive. Results indicate that higher payroll taxes would contribute to lower unemployment rates and increase informality rates. A possible explanation would be that higher payroll taxes for this group would contribute to higher levels of non-compliance (i.e. higher demand for informal employment) (Table 5). Again, this may be the case because average productivity levels of young workers are much below what is required by the private sector to assure a match in the formal sector.

[12] Simulation results for all workers in the sample are available upon request.

Table 4: Simulation results. Changes in the SMIG (in %)

	% U	% I	% F	% SE	Wage I	Wage F	Wage SE
				Women			
Baseline	**30.58%**	**44.36%**	**11.28%**	**13.78%**	**1,412.1**	**2,828.6**	**1,573.1**
s.e.	0.18%	0.19%	0.19%	0.21%	3.1	11.4	12.3
SMIG (↑+5%)	28.8%	47.5%	10.1%	13.6%	1,423.0	2,905.9	1,552.7
Change	-1.75	3.13	-1.22	N.S.	0.77%	2.73%	-1.30%
p-value	0.000	0.000	0.000	0.014	0.000	0.000	0.000
SMIG (↑+10%)	29.4%	47.8%	9.1%	13.7%	1,427.6	2,983.9	1,557.6
Change	-1.20	3.46	-2.21	N.S.	1.10%	5.49%	-0.99%
p-value	0.000	0.000	0.000	0.445	0.000	0.000	0.000
SMIG (↑+15%)	29.8%	48.1%	8.3%	13.8%	1,431.6	3,051.3	1,561.7
Change	-0.78	3.70	-2.96	N.S.	1.38%	7.87%	-0.73%
p-value	0.000	0.000	0.000	0.567	0.000	0.000	0.002
SMIG (↓-10%)	26.7%	46.1%	13.9%	13.3%	1,413.4	2,671.7	1,545.4
Change	-3.87	1.74	2.62	-0.49	N.S.	-5.55%	-1.76%
p-value	0.000	0.000	0.000	0.000	0.145	0.000	0.000
SMIG (↓-15%)	25.9%	45.5%	15.5%	13.1%	1,412.5	2,594.2	1,543.7
Change	-4.71	1.11	4.24	-0.63	0.03%	-8.29%	-1.87%
p-value	0.000	0.000	0.000	0.000	0.663	0.000	0.000
SMIG (↓-24%)	24.3%	44.2%	18.6%	12.9%	1,417.7	2,458.5	1,541.1
Change	-6.23	-0.16	7.28	-0.89	0.39%	-13.08%	-2.04%
p-value	0.000	0.016	0.000	0.000	0.000	0.000	0.000
				Youth 15-29			
Baseline	**37.88%**	**41.74%**	**6.55%**	**13.83%**	**1,492.5**	**2,807.4**	**1,738.2**
s.e.	0.11%	0.18%	0.13%	0.10%	3.1	14.7	5.3
SMIG (↑+5%)	37.8%	42.3%	6.0%	13.9%	1,496.0	2,881.8	1,736.6
Change	N.S.	0.59	-0.58	0.05	0.24%	2.65%	N.S.
p-value	0.069	0.000	0.000	0.128	0.000	0.000	0.273
SMIG (↑+10%)	38.2%	42.5%	5.4%	14.0%	1,498.2	2,945.4	1,739.7
Change	0.29	0.72	-1.19	0.18	0.39%	4.91%	0.09%
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.326
SMIG (↑+15%)	38.5%	42.6%	4.9%	14.1%	1,500.6	3,002.5	1,743.1
Change	0.58	0.82	-1.69	0.28	0.55%	6.95%	0.28%
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.003
SMIG (↓-10%)	36.4%	41.8%	8.5%	13.3%	1,490.8	2,666.1	1,732.2
Change	-1.53	0.05	1.98	-0.50	N.S.	-5.03%	-0.35%
p-value	0.000	N.S.	0.000	0.000	0.078	0.000	0.000
SMIG (↓-15%)	35.7%	41.6%	9.6%	13.1%	1,490.7	2,588.1	1,733.8
Change	-2.14	-0.19	3.07	-0.74	-0.12%	-7.81%	-0.26%
p-value	0.000	0.006	0.000	0.000	N.S.	0.000	0.007
SMIG (↓-24%)	34.7%	41.1%	11.5%	12.7%	1,494.2	2,460.8	1,740.0
Change	-3.17	-0.61	4.91	-1.13	N.S.	-12.34%	N.S.

Source: Author's own estimates. N.S. (Not Significant at a 5 percent confidence interval)

Table 5: Simulation results. Changes in payroll taxes (in percentage points).

	% U	% I	% F	% SE	Wage I	Wage F	Wage SE
				Women			
Baseline	**30.58%**	**44.36%**	**11.28%**	**13.78%**	**1,412.1**	**2,828.6**	**1,573.1**
s.e.	0.18%	0.19%	0.19%	0.21%	3.1	11.4	12.3
Payroll taxes (↑+5pp)	28.6%	47.4%	10.4%	13.6%	1,421.6	2,822.0	1,551.0
Change	-1.96	3.03	-0.87	-0.20	0.67%	-0.23%	-1.41%
p-value	0.000	0.000	0.000	0.003	0.000	0.082	0.000
Payroll taxes (↑+10pp)	29.0%	47.6%	9.8%	13.6%	1,424.0	2,814.6	1,554.0
Change	-1.62	3.24	-1.49	-0.13	0.84%	-0.49%	-1.22%
p-value	0.000	0.000	0.000	0.039	0.000	0.001	0.000
Payroll taxes (↑+15pp)	29.3%	47.8%	9.2%	13.7%	1,426.9	2,812.5	1,557.0
Change	-1.28	3.46	-2.13	N.S.	1.05%	-0.57%	-1.02%
p-value	0.000	0.000	0.000	0.374	0.000	0.000	0.000
Payroll taxes (↓-5pp)	27.8%	46.9%	11.9%	13.5%	1,416.9	2,843.6	1,546.9
Change	-2.77	2.49	0.61	-0.33	0.34%	0.53%	-1.66%
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Payroll taxes (↓-10pp)	27.3%	46.5%	12.8%	13.4%	1,415.0	2,854.0	1,546.4
Change	-3.27	2.17	1.51	-0.40	0.21%	0.90%	-1.70%
p-value	0.000	0.000	0.000	0.000	0.003	0.000	0.000
Payroll taxes (↓-15pp)	26.8%	46.2%	13.7%	13.3%	1,413.8	2,867.6	1,545.2
Change	-3.77	1.79	2.47	-0.48	N.S.	1.38%	-1.77%
p-value	0.000	0.000	0.000	0.000	0.067	0.000	0.000
				Youth 15-29			
Baseline	**37.88%**	**41.74%**	**6.55%**	**13.83%**	**1,492.5**	**2,807.4**	**1,738.2**
s.e.	0.11%	0.18%	0.13%	0.10%	3.1	14.7	5.3
Payroll taxes (↑+5pp)	37.7%	42.3%	6.2%	13.8%	1,495.2	2,809.1	1,735.5
Change	-0.20	0.56	-0.35	N.S.	0.19%	N.S.	N.S.
p-value	0.000	0.000	0.000	0.909	0.004	0.717	0.073
Payroll taxes (↑+10pp)	37.9%	42.4%	5.8%	13.9%	1,496.7	2,803.4	1,737.5
Change	N.S.	0.64	-0.77	N.S.	0.28%	N.S.	N.S.
p-value	0.241	0.000	0.000	0.010	0.000	0.392	0.611
Payroll taxes (↑+15pp)	38.1%	42.5%	5.4%	14.0%	1,498.0	2,798.7	1,739.7
Change	0.26	0.72	-1.14	0.17	0.37%	N.S.	N.S.
p-value	0.000	0.000	0.000	0.000	0.000	0.077	0.326
Payroll taxes (↓-5pp)	37.1%	42.1%	7.1%	13.6%	1,493.0	2,828.1	1,732.9
Change	-0.74	0.36	0.59	-0.21	N.S.	0.74	-0.31
p-value	0.000	0.000	0.000	0.000	0.565	0.000	0.001
Payroll taxes (↓-10pp)	36.8%	42.0%	7.7%	13.5%	1,491.8	2,838.4	1,732.1
Change	-1.08)	0.23	1.19	-0.34	N.S.	1.10%	-0.35%
p-value	0.000	0.001	0.000	0.000	0.489	0.000	0.000
Payroll taxes (↓-15pp)	36.4%	41.8%	8.4%	13.4%	1,490.9	2,850.3	1,732.1
Change	-1.46	N.S.	1.86	-0.48	N.S.	1.53%	-0.35%
p-value	0.000	0.221	0.000	0.000	0.092	0.000	0.000

Source: Author's own estimates. N.S. (Not Significant at a 5 percent confidence interval)

V. CONCLUSIONS AND POLICY IMPLICATIONS

Results of this study confirm previous international and country-specific evidence suggesting that high levels of minimum wages and payroll taxes are associated with higher unemployment rates and lower formality rates, especially among youth and women. Considering the demographic

structure of the country, its low levels of employment, and the prevalence of informal employment; the main challenges in the coming years for the Moroccan labor market will be the absorption of a sustained flow of young workers, the reduction of female inactivity, and promoting the formalization of the workforce. While labor regulation may not be a silver bullet to address these issues, reforms that contribute to lower labor costs for youth and women will likely help address these challenges. A key area for reform in Morocco is to decrease labor costs for youth and women relative to their overall productivity, notably through a revision of minimum wage policy and payroll taxes. Indeed, results of this study indicate that a reduction in the minimum wage between 10 to 25 percent (and of payroll taxes between 5 and 15 percentage points) could contribute to lowering unemployment rates for youth and women by 5 to 20 percent and to increase formalization of workers in these groups by 20 to 75 percent.

How to introduce these reforms? With regards to minimum wage policy, Morocco could introduce parallel minimum wage schemes for youth and women, as has been developed recently in some countries, notably in Latin America (Chile, Costa Rica, and Paraguay). Also, Morocco could adopt a process to reduce discretion in the setting of the minimum wage. While minimum wage adjustments in the country are fixed by governmental decree after consultations with the Central Commission for Prices and Wages, the legislation does not set forth how frequently minimum wage rates should be adjusted and adjustments are mainly driven by social dialogue criteria (i.e. negotiating power of unions) rather than on criteria to reflect the economy's productivity and worker's value added. As such, Morocco could also consider establishing an independent technical commission or group in charge of periodically supporting with data and analysis the consultations among stakeholders. This same commission would be in charge to identify the right levels of minimum wage for low-productivity workers, such as youth and women.

With respect to payroll taxes, Morocco will need to review its social security system which is characterized by imposing high taxes on formal labor, thus giving incentives for firms to employ workers informally and/or under declare their wages. As a result, social insurance schemes in Morocco only cover a minority of all workers. One important factors contributing to a high tax wedge in Morocco is the absence of a linkage between the contributions made by employers and employees and the level of benefits received. For instance, payroll contributions in Morocco finance programs such as training family allowances. These programs not always benefit contributors and would create less distortion in labor outcomes if financed through general revenues. Furthermore, most social security programs require a labor contract automatically excluding the self-employed and informal wage earners. Morocco could explore developing contributive systems for these categories of workers.

Finally, it is important to build the capacity of the country to discuss reforms in labor regulation, which are generally complex. International experience shows that labor market reforms are most successful when carried out in the context of a national social dialogue, most commonly a tripartite dialogue among the government, the unions, and the employers' organization. However, to achieve inclusiveness and foster a more equitable distribution of opportunities in labor markets, these decisions need to rest on a broad-based consensus that involves the whole citizenry. In this sense, not only the regulatory framework around labor markets but also the social dialogue needs to be rebalanced, so that those who have been traditionally outside the decision-making process—informal workers, youth, the unemployed, and women—can participate in a bargaining that,

through wage and rule setting, affects them directly. Furthermore, as labor regulation becomes more modern and supple, it would be important to build the capacity of unions in the private sector to develop and sustain collective bargaining – whereby unions becomes more capable at negotiating with employers at the sector level, according to the sector's specificities and needs.

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