



Impact Assessment of Fiscal Policy on Employment in Morocco: A Computable General Equilibrium Model Analysis

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ABSTRACT

Employment is a key driver of economic prosperity and a crucial tool in the fight against poverty. As such, governments must prioritize job creation in their policy agendas. This study focuses on the case of Morocco to assess the impact of expansionary fiscal policy on employment, using a Computable General Equilibrium (CGE) model, specifically the PEP-1-1 framework. Through simulations involving reductions in personal income tax and corporate tax, as well as increases in public investment in education and infrastructure, the findings indicate positive effects on job creation. However, these effects remain limited due to the slow pace of structural transformation in the Moroccan economy. Moreover, the comparative analysis reveals that fiscal policy measures have a more substantial impact on employment than public investment policies.

Keywords: Fiscal Policy, Employment, Moroccan Social Accounting Matrix, Computable General Equilibrium Model

JEL Classifications: E62, J00, J21, C67, C68

1. INTRODUCTION

In emerging countries, notably Morocco, employment lies at the heart of national political debate and represents a major and decisive challenge for the years ahead. In this context, during the implementation of macroeconomic stabilization policies in the 1980s, the structure of the Moroccan economy was reshaped through economic liberalization measures. These reforms induced transformations that similarly affected the labor market. Consequently, the employment market experienced widespread imbalances and mounting pressures, leading to economic instability characterized by a rise in women's participation in the labor force under precarious conditions, an increase in informal and insecure employment, and a gradual worsening of unemployment, underemployment, poverty, and inequality.

Undoubtedly, the labor market plays a vital role in the economy, serving as a key lever for improving the population's standard

of living. This calls for public intervention to reduce existing constraints and promote sustainable economic growth, particularly by targeting full employment. However, achieving full employment remains a challenge, especially when the government faces conflicting economic policy objectives.

The State must therefore consider full employment as a public good, to be promoted through a system of incentives and appropriate policy measures. A suitable economic policy response involves, on the one hand, stimulating productivity and increasing public investment—particularly in infrastructure, education, and similar areas (Bentall et al., 1999) and, on the other hand, ensuring coordination among the various stakeholders to remove constraints and achieve the desired goals.

Despite the crucial importance of public policies in transforming the structure of the economy, if public authorities fail to account for the behavioral responses of economic agents to these policies, the intended objectives may not be achieved. It is thus essential

to conduct impact assessments of these policies in order to better inform public decision-making.

This paper pursues an ambitious objective: to assess the impact of fiscal policy on the labor market in Morocco. It holds significant academic relevance for several reasons:

- (i) First, it adopts a rigorous methodological approach through the use of a Computable General Equilibrium (CGE) model, which enables the analysis of interactions between sectors and economic agents, as well as the capture of both direct and indirect effects of fiscal policy on the entire economy.
- (ii) Second, it is set against a backdrop of persistently high unemployment, particularly among youth (ranging between 18% and 22% during the 2012–2020 period), whose integration into the labor market is critical for economic and social stability.
- (iii) Finally, this study evaluates the effectiveness of expansionary economic policies in the specific context of a developing country such as Morocco, where impact assessments using sophisticated techniques such as CGE models remain relatively scarce. While most macroeconomists agree that expansionary fiscal policy tends to boost employment and reduce unemployment in developed countries (Ravn and Simonelli, 2007; Monacelli et al., 2010, for the U.S. case), this relationship does not systematically hold in developing economies. In the latter, structural reforms and employment-targeted policies complemented by well-designed fiscal strategies often play a more decisive role in stimulating job creation (Cottarelli, 2012).

Beyond its academic contribution, this work holds strategic significance for public policymakers. By identifying the mechanisms through which fiscal policies influence employment dynamics, it offers concrete avenues for intervention to enhance the efficiency of public spending and to reduce unemployment in a targeted manner. The results obtained can thus serve as an empirical basis for adjusting or redirecting economic policies according to the specific characteristics of the national productive fabric. In a context where fiscal room for maneuver is limited, having a decision-support tool based on rigorous simulations constitutes a crucial lever for designing coherent, effective reforms that are adapted to the country's socio-economic priorities. This study therefore aims to contribute to informing public action through recommendations grounded in modeled data, while also strengthening the culture of public policy evaluation in Morocco.

The remainder of the paper is organized as follows: the first section presents the main theoretical and empirical literature. The second section focuses primarily on outlining the characteristics and various stylized facts of the Moroccan labor market, which are necessary for interpreting the study's results. The third section is devoted to the methodology and data used, as well as a discussion of the results obtained. The final section concludes.

2. FISCAL POLICY AND EMPLOYMENT: A LITERATURE REVIEW

The relationship between fiscal policy and employment has been extensively studied, with many works aiming to evaluate

the effects of changes in public spending or tax revenues on employment levels.

Neoclassical theories consistently argue that fiscal policies are ineffective at stimulating employment in the long run. According to this approach, an increase in public spending financed by borrowing would lead to a crowding-out effect on private investment, thereby offsetting any positive impact on employment. Neoclassicals therefore maintain that labor market imbalances should be resolved through price and wage flexibility, without active government intervention. Similarly, the new classical economists, notably Barro (1974) and Lucas (1976), emphasize the role of economic agents' expectations, which render discretionary policies ineffective, and reject the active impact of fiscal policy on economic activity. This perspective has been extensively synthesized and discussed by Duguay and Rabeau (1989), who trace the evolution of economic thought from Keynes to the neoclassical synthesis, highlighting the limitations of fiscal intervention under these theoretical frameworks.

In contrast, the Keynesian school highlights the positive effect of increased public expenditure or tax reductions on aggregate demand, and consequently on growth and employment. Keynes (1936) introduced the concept of the multiplier effect of public spending, arguing that an initial increase in investment leads to higher income, production, and employment. The resurgence of Keynesian theories in the late 1980s (notably Mankiw, 1985; Summers, 1988; Mankiw et al., 1991) fundamentally transformed the dominant models of the 1960s by revising their methodological foundations. The originality of these new analytical frameworks lies in their systematic integration of nominal and real rigidities to explain the persistence of involuntary unemployment, marking a departure from neoclassical approaches.

Beyond the Keynesian cyclical perspective, the theoretical literature also emphasizes the importance of public investment in human capital, notably through education and training expenditures. The foundational works of Mincer (1958), Schultz (1961), and Becker (1964) establish that public spending on education and research and development constitutes a productive investment in human capital. More recent empirical studies confirm that government spending on education can directly generate employment opportunities, particularly by increasing demand for teachers, administrative staff, and related services (Abdullah et al., 2017). According to this approach, education represents an accumulable asset that facilitates labor market matching, increases the profitability of hiring, and contributes to poverty reduction by enhancing individual productivity. Similarly, vocational training acts as a mechanism for skills updating (Becker, 1964) and serves as a lever for technological diffusion (Schultz, 1975).

Empirically, there is no consensus regarding the impact of fiscal policies on employment. Existing studies on the U.S. economy (Ravn and Simonelli, 2007; Monacelli et al., 2010) confirm that expansionary fiscal policy stimulates employment and reduces unemployment. Blanchard & Perotti (2002) specifically use a structural VAR model on U.S. quarterly data from 1947–1999 to empirically characterize the dynamic effects of changes in

government spending and taxes on output and employment, showing how fiscal shocks propagate over time.

Regarding tax policy, theory holds that tax burdens reduce labor demand and decrease incentives for unemployed individuals to seek employment. Indeed, in most countries, governments impose high taxes on workers' incomes to reduce inequality and finance public goods. However, this discourages labor supply from these workers.

Income tax directly affects individuals' decisions concerning the trade-off between hours worked and leisure, as taxation reduces workers' after-tax income. In other words, income tax decreases the labor supply by causing workers to reduce their working hours or to exit the labor force altogether.

Similarly, corporate taxes negatively impact the labor market by reducing labor supply because wages offered are lower due to decreased investment. Furthermore, in the case of value-added tax (VAT) on final consumption, this tax discourages workers and consequently affects employment through a reduction in real wages.

Indeed, a high level of taxation generates adverse effects on employment, which is why policies aimed at reducing the tax wedge should be considered to promote the labor market. In this context, economists demonstrate the significant effects of using taxation as an instrument to foster job creation and reduce unemployment.

A reduction in labor taxation can stimulate labor demand, enhance competitiveness, increase the employment rate, and reduce the unemployment rate (OECD). Thus, lowering corporate taxes will have a significant effect on the labor market, specifically by stimulating labor demand through increased investment that fosters higher production and job creation. Similarly, Chirinko (2002) emphasizes that a decrease in corporate taxation leads to a substantial rise in labor demand.

Empirical studies examining the impact of public spending on employment yield mixed results. In developing countries, several studies highlight the importance of well-targeted fiscal interventions. For instance, Bidemi (2016), using an error correction model (ECM) for Nigeria over the period 1980–2013, concludes that public expenditures have a positive effect on employment. Similarly, Abubakar (2016) applies a dynamic econometric approach to annual Nigerian data from 1980 to 2014, showing that carefully designed fiscal policies can significantly reduce unemployment while stimulating economic growth. In South Africa, Murwirapachena et al. (2013) analyze the effects of fiscal policy on unemployment from 1980 to 2010, emphasizing that appropriate public spending and taxation measures can influence labor market outcomes in developing countries. In addition, the ILO (2021) demonstrates that investment in infrastructure has a significant positive impact on employment, illustrating how targeted public investments can serve as effective tools for job creation. In developed economies, fiscal interventions also play a key role in shaping labor markets. In the United States, Ahearn, El-Osta, and Dewbre (2006) employ an econometric

model based on a representative survey of 88,000 farm operators to assess the impact of government subsidies both coupled and decoupled—on off-farm labor participation. Additionally, Fatás and Mihob (2001), using both theoretical and empirical analysis, investigate the effects of fiscal policy on consumption and employment, showing that expansionary public spending can positively affect labor markets. Likewise, Brückner and Pappa (2012), employing a structural vector autoregression (SVAR) model for 10 OECD countries, demonstrate that an increase in public spending stimulates employment.

Similarly, Calidoni (2005), using a fixed-effects panel data approach to analyze the impact of public transfers on labor force participation in OECD countries over the period 1976–2000, finds a positive and significant effect of these transfers on the labor force participation rate.

Regarding fiscal policy, several empirical studies have demonstrated that taxation is an effective instrument for improving employment by reducing labor taxes, which in turn stimulates labor demand. According to an OECD study (2011), excessive taxation can hinder job creation. The organization therefore recommends targeted tax reforms aimed at enhancing labor market dynamism through income tax cuts and reductions in employer social contributions to encourage the hiring of recent graduates, strengthen work incentives, and consequently increase the labor force participation rate.

In the same vein, empirical studies by Swenson (1988), Sillamaa (1999), Lévy-Garboua et al. (2006 ; 2007), as well as Sutter and Weck-Hannemann (2003), demonstrate that an increase in the tax rate leads to a reduction in labor supply. These studies emphasize the need to implement incentive-based fiscal policies, particularly through reductions in labor income taxes and the alleviation of employer social charges. Such measures aim to stimulate job creation and encourage hiring, thereby contributing to a better balance in the labor market.

Panel data research by Nickell and Layard (1999), which included 20 OECD countries between 1983 and 1994, concluded that a 5 percentage point reduction in the average tax wedge leads to a 13% decrease in the unemployment rate. Based on a panel study covering 21 OECD countries from 1983 to 2003, Bassanini and Duval (2006) show that unemployment increases when the tax wedge is high and unemployment benefits rise, negatively impacting employment prospects. They affirm that a 10 percentage point reduction in the tax wedge in an OECD country results in a significant 2.8 percentage point decrease in the unemployment rate accompanied by a 3.7 percentage point increase in the employment rate.

However, it is important to note that few studies employ Computable General Equilibrium (CGE) models to assess the overall and structural impact of fiscal policies on employment, despite these models' ability to capture equilibrium effects across markets, sectoral feedbacks, and agents' behaviors. In this regard, the study by Boehringer et al. (2004) constitutes a pioneering contribution by analyzing the effects of tax cuts on employment in Germany using a CGE model incorporating sectoral wage negotiations. The authors conclude that fiscal policies have a

limited impact on structural unemployment.

An IMF study (Espinoza and Perez, 2014) also applies a CGE model to France to evaluate the impact of labor tax reductions, highlighting differentiated effects according to targeted worker groups. Similarly, Umar Bambale et al. (2022) examine the effect of fiscal policy in Nigeria through a general equilibrium model, finding that the allocation of public expenditures significantly influences growth and employment. In the case of Turkey, Yeldan (2010) proposes an integrated macroeconomic modeling approach (CGE-type) to evaluate post-2001 crisis policies, showing that targeted public investment can support growth and reduce unemployment.

These approaches underscore the importance of multisectoral and intertemporal modeling to evaluate the complex trade-offs induced by fiscal policies.

Overall, these empirical contributions highlight the heterogeneity of results depending on the studied context, the nature of the fiscal instruments employed, and the methodologies used. However, studies based on general equilibrium models remain underrepresented, particularly in the context of developing countries. It is within this perspective that the present work is situated, employing a CGE model applied to Morocco to simulate the effects of expansionary fiscal policies on employment and to derive insights for public action.

3. THE LABOR MARKET IN MOROCCO: KEY STYLIZED FACTS

Despite certain advances, the employment situation in Morocco remains strongly influenced by economic and sociodemographic factors. Since the late 1990s, the Moroccan labor market has experienced mixed developments. After a noticeable decline in the unemployment rate starting in 2008—stabilizing around 9%—concerning trends have intensified: low formal job creation, expansion of underemployment and the informal sector, growth of unpaid or precarious employment, and a persistent decline in the labor force participation rate (El Aynaoui and Ibourk, 2018). These dynamics reflect both structural rigidities and a weakening of work incentives and competitiveness.

Analyses of the Moroccan labor market reveal several structural imbalances that policymakers must take into account when formulating employment policies (El Aynaoui and Ibourk, 2018).

Regarding labor supply, three major characteristics emerge:

- (i) A low level of workforce qualification, directly linked to deficiencies in the education system. According to the High Commission for Planning (HCP, 2023), although the enrollment rate for children aged 6 to 11 reached 99.4% in 2022–2023 (compared to 80.4% in 2004), one-third of the population remains illiterate, limiting access to skilled jobs and penalizing productivity.
- (ii) A significant demographic shift marked by a decrease in the youth population (<15 years) and an increase in the active

labor force (from 10.2 million in 2000 to 12.1 million in 2019, representing an annual growth of 0.89%). This transition presents both an economic opportunity and a challenge in terms of labor absorption.

- (iii) Low inclusion of vulnerable groups, notably women, whose labor force participation rate declined from 28.1% to 19% between 2000 and 2023, especially in rural areas, due to sociocultural factors and marital constraints. The same applies to youth, with persistently high structural unemployment among those aged 15–24 (22.5% in 2022, compared to a national average of 9%) (HCP, 2023). These constraints significantly weigh on the country's economic and social transformation.

On the demand side, the Moroccan labor market experienced mixed developments between 2000 and 2023. While the period from 2000 to 2019 saw moderate employment growth, with an average annual rate of 1.2% (HCP, 2020), the subsequent years were marked by net job losses. Between 2022 and 2023, the national economy lost 157,000 jobs, resulting from a decrease of 198,000 jobs in rural areas and an increase of 41,000 in urban areas.

This dynamic was accompanied by notable imbalances in terms of job quality and sectoral distribution. In 2023, the tertiary sector accounted for 48.3% of employed persons, compared to 44.9% in 2019 and 34.7% in 2000, reflecting a gradual shift away from the primary sector, weakened by agricultural mechanization and rural exodus. This structural transition towards less labor-intensive sectors contributes to the labor market's limited capacity to absorb young graduates, whose unemployment rate stood at 19.7% in 2023.

Underemployment remains a major obstacle to productivity in Morocco. After a decline between 2000 and 2012, its rate increased, reaching 9.8% nationally in 2023, with significant disparities between areas: 8.7% in urban areas and 11.6% in rural areas. This situation reflects chronic underutilization of labor, particularly concentrated in the informal sector. In 2023, informal employment represented 33.1% of non-agricultural employment, marking a decrease of 3.2 percentage points compared to 2014. Informal workers, often lacking social protection and labor rights, are mainly active in low-productivity sectors, which limits their contribution to economic growth and exposes them to increased precariousness.

The private sector remains the main provider of jobs in Morocco, accounting for 91.3% of employment in 2019, compared to 88% in 2000. However, this growth conceals increasing job precariousness. In 2023, nearly two out of three employees worked without a formal contract, particularly in the agriculture and construction sectors, where this proportion exceeded 90%. Moreover, less than 20% of employed persons had medical coverage, with marked disparities between urban areas (32%) and rural areas (4.5%). This persistent informality limits both household incomes and state tax revenues.

In terms of job quality, Morocco faces numerous challenges. A large portion of workers, especially those in the informal

sector, suffer from poor working conditions, low wages, and job instability. This precariousness creates a vicious cycle: it demotivates workers, reduces average productivity, and hampers business innovation and competitiveness. In light of these findings, a thorough reform is necessary, combining the expansion of social protection and strengthening of labor inspections.

4. EVALUATION OF THE IMPACT OF FISCAL POLICY ON EMPLOYMENT IN MOROCCO

4.1. Methodology

This study evaluates the impact of fiscal policy on employment in Morocco using the PEP-1-1 Computable General Equilibrium (CGE) model. Our approach is based on a Social Accounting Matrix (SAM) disaggregated specifically to isolate the employment effects of fiscal policy and to capture sectoral interactions.

The model relies on a static representation of the national economy over a specific period, structured around three fundamental principles:

- i) Walras' law, which states that general equilibrium is achieved in a system with n markets when $(n-1)$ markets are in equilibrium;
- ii) The optimizing behaviors of households and firms, which maximize their utility subject to budget constraints and profits subject to technological constraints, respectively;
- iii) The determination of international trade flows, where exchanges between the national economy and the rest of the world are governed by changes in relative prices, with normalization by a numéraire.

In this study, we utilized the PEP-1-1 Computable General Equilibrium (CGE) model to simulate the impact of certain fiscal policy measures on the Moroccan labor market. Two types of expansionary fiscal policies were considered:

- A fiscal policy consisting of a reduction in tax revenues through two distinct shocks: a decrease in household income tax and a reduction in corporate tax.
- A public expenditure policy involving a targeted increase in public investments, distributed between the national education sector and infrastructure.

The objective of these simulations is to comparatively analyze the effects of these different fiscal interventions on employment while assessing their potential to stimulate national economic activity. These simulation exercises demonstrate the relevance of the model used to inform public policy choices, providing decision-making support in the area of employment, as well as in other economic domains depending on future research directions.

The Social Accounting Matrix (SAM) used in this work summarizes Moroccan economic activity for the year 2015. It enables analysis of interactions among various economic agents and sectors across five main accounts: the factors of production account (labor and capital); the institutional units account (households, firms, public administrations, and the rest of the

world); the production branches account; the products account; and the accumulation account (investment and savings).

For analytical purposes, the production branches are grouped into four categories: Agriculture, Industry, Market Services, and Public Administration. This aggregation simplifies the analysis while maintaining a relevant representation of Morocco's economic structure.

The labor factor is disaggregated into three categories according to qualification levels: unskilled workers, moderately skilled workers, and highly skilled workers, in order to assess the impact of fiscal policy on each employment category. The data used for this disaggregation are derived from the 2015 Employment Survey conducted by the Haut-Commissariat au Plan (HCP, 2015), which provides detailed information on employment by occupation, sector, and qualification.

The accumulation account is also disaggregated into two parts to distinguish between public and private investment, thereby enabling the measurement of the impact of an increase in public investment expenditures on employment. The simulation of fiscal policy measures relies on tax data provided by the Moroccan Tax Authority (Direction des Impôts, 2015), including household income taxes and corporate taxes, which were used to model reductions in tax revenues as part of expansionary fiscal interventions.

4.2. Model Assumptions

The model considers the exchange rate (e) as a fixed variable, which serves as the numéraire.

The variables G (public expenditures), CAB (current account balance), and $INVG$ (public investment) are treated as exogenous and constant.

In this model, certain variables are treated as exogenous and held fixed. These include the minimum consumption of product i by household h ($CMIN_{i,h}$), labor supply (LS), changes in inventories ($VSTK$), and world import (PWM) and export (PWX) prices. This treatment is particularly justified for international prices, as the national economy, being a small open economy, is a price taker on global markets and cannot influence their levels.

The treatment of capital in the model distinguishes two scenarios: in the case of perfect capital mobility ($kmob = 1$), the aggregate capital supply KS_k is fixed at the macroeconomic level; in the case of capital immobility ($kmob = 0$), the capital supply $KS_{(k,j)}$ is fixed at the sectoral level.

Overall, all these variables are intended to reflect the realities of the national economy and are used to simulate the impact of selected economic policies.

Within the scope of our simulations, we analyzed the impact of two types of policies: a fiscal policy and a non-fiscal policy.

For the fiscal policy, we simulated a 20% reduction in taxes on household incomes and corporate profits, resulting in an equivalent

decrease in tax revenues. The chosen rate of 20% corresponds to adjustments commonly observed in tax reforms, thus providing a realistic benchmark¹.

For the non-fiscal policy, we modeled a 10% increase in public investment expenditures, specifically targeting the national education and infrastructure sectors. This increase is assumed to be fully financed by borrowing, reflecting the hypothesis of zero public savings—an approach consistent with a stimulus strategy prioritizing immediate investment over reserve accumulation.

4.3. Modeling

The PEP-1-1 model formalizes the situation, structure, and dynamics of the Moroccan economy, including the interactions among different institutional agents. Production activities are identified by an index $j, \in J = \{J_1, \dots, \dots\}$, and firms are assumed to operate in a competitive environment where prices adjust freely and agents are price-takers. The representative firm in each sector maximizes its profit subject to technological constraints.

Sectoral production follows a Leontief production function, where value added and intermediate consumption are combined in fixed proportions. This assumption, suited to sectors with rigid processes, implies that value added is a constant share of gross output, expressed as: $VA_j = XST_j \cdot v_j$ where v_j is the Leontief coefficient representing the value added of sector j .

Furthermore, the value added of each sector consists of labor and capital factors, combined according to a constant elasticity of substitution (CES) specification.

$$VA = B_j^{VA} [\beta_j^{VA} LDC_j^{-\rho_j^{VA}} + (1 - \beta_j^{VA}) KDC_j^{-\rho_j^{VA}}]^{\frac{-1}{\rho_j^{VA}}}$$

Where:

B_j^{VA} : Scale Parameter of the CES Value-Added Function.

β_j^{VA} : Distribution Parameter of Value Added.

$-\rho_j^{VA}$: Indicated as an elasticity parameter of the CES value-added function ($-1 < \rho_j^{VA} < \infty$).

Profit maximization by firms leads to the use of labor and capital factors up to the point where the value of the marginal product of each equals its price (respectively, the wage rate and the rate of return on capital).

With a CES production function, such behavior is described by the labor demand relative to capital as follows:

$$LDC_j = \left[\frac{\beta_j^{VA}}{1 - \beta_j^{VA}} \frac{RC_j}{WC_j} \right]^{\sigma_j^{VA}} KDC_j$$

Where:

RC_j : Rate of return on capital in sector j

WC_j : Wage rate of labor in sector j

σ_j^{VA} : Elasticity of substitution of the CES value-added function;

$0 < \sigma_j^{VA} < \infty$

KDC_j : Demand for capital factor by sector j

LDC_j : Demand for labor factor by sector j

The different categories of labor, indexed by $l \in L \in \{L_1, \dots, L_p, \dots\}$, are combined following a constant elasticity of substitution (CES) production function, which reflects the imperfect substitutability among the various types of labor. Furthermore, the firm chooses the composition of its labor force so as to minimize labor costs, taking into account relative wage rates.

$$LDC_j = B_j^{LD} \left[\sum_l \beta_{l,j}^{LD} LD_{l,j}^{-\rho_j^{LD}} \right]^{\frac{-1}{\rho_j^{LD}}}$$

In this model, the income and savings of institutional economic agents originate from three sources: endowments of production factors, transfers received from other agents, and foreign trade.

$$YH_h = YHL_h + YHK_h + YHTR_h$$

The savings function is defined by its intercept (autonomous savings) and its slope (marginal propensity to save). For households experiencing dissaving (negative savings), the intercept is negative, while the slope remains positive. Indeed, this negative intercept represents the income-independent component, i.e., autonomous savings. The following equation allows partially or fully indexing this intercept to variations in the consumer price index, which proves particularly useful for testing the model's homogeneity.

$$SH_h = PIXCON^\eta sh0_h + sh1_h YDH_h$$

Where:

$PIXCON$: Consumer Price Index

$sh0_h$: Intercept of the household savings function

$sh1_h$: Slope (marginal propensity to save of households)

η : Price elasticity of indexed transfers and parameters.

The total income of firms, YE_f , originates from capital income YFK_f , net transfers $YFTR_f$ (including interest on debt), as well as social contributions TIW .

$$YF_f = YFK_f + YFTR_f + \sum_{l,j} TIW_{l,j} - \sum_l TIW_{l,ADM}$$

Furthermore, the savings of firms, SF_f , represent the residual remaining after subtracting transfers paid to other agents.

$$SF_f = YDF_f - \sum_{ag} TR_{ag,f}$$

¹ Such as the corporate tax cut in France (-25% between 2018 and 2022) or the reduction of the marginal tax rate in the United States under Reagan (-23% in 1981).

The PEP-1-1 model incorporates various fiscal instruments through detailed government accounts (equations below). Public revenues are derived from income taxes, taxes on products/ imports, and other production taxes.

In addition to these various sources of tax revenue, the government also receives income related to capital remuneration and transfers paid by other institutional economic agents.

$$YG = YGK + TDHT + TDFT + TPROD + TPRCTS + YGTR$$

The current budget surplus or deficit of the public administration is obtained by calculating the difference between total revenues and total expenditures (expenditures consist of transfers paid to agents and current spending on goods and services).

$$SG = YG - \sum_{agng} TR_{agng, gvt} - G$$

Regarding the rest of the world, it receives income related to imports, a portion of capital income, and transfers from domestic agents:

$$YROW = e \sum_i PWM_i IM_i + \sum_k \lambda_{row,k}^{RK} (\sum_j R_{k,j} KD_{k,j}) + \sum_{agd} TR_{row, agd}$$

Expenditures of the rest of the world consist of the value of exports and transfers made to domestic agents.

The difference between foreign revenues (YROW) and foreign expenditures represents the savings of the rest of the world (SROW).

$$SROW = YROW - \sum_i PE_i^{FOB} EXD_i - \sum_{agd} TR_{agd, row}$$

Indeed, the savings of the rest of the world equal the current account balance (CAB) in absolute value, but with the opposite sign.

$$SROW = -CAB$$

Aggregate demand (for domestic and imported goods) includes intermediate consumption, final household consumption, investment, and public expenditures.

Household consumption demand for each product is determined by utility maximization subject to the household's budget constraint:

$$PC_i C_{i,h} = PC_i C_{i,h}^{MIN} + \gamma_{i,h}^{LES} (CTH_h - \sum_{ij} PC_{ij} C_{ij,h}^{MIN})$$

Where $\gamma_{i,h}^{LES}$ denotes the marginal share of product iii in the consumption budget of household h.

Investment demand includes gross fixed capital formation (GFCF) and changes in inventories. GFCF expenditures are obtained by calculating the difference between the cost of inventory changes and total investment expenditures.

However, in our case, we distinguish two types of investment (public and private), which allows us to write the following expression:

$$GFCF = (PINVG * INV) + (PINVPR * INVPR)$$

All transactions conducted by the national economy with the rest of the world are modeled by:

$$XST_j = B_j^{XT} [\sum_i \beta_{j,i}^{XT} XS_{j,i}^{\rho_j^{XT}}]^{\frac{1}{\rho_j^{XT}}}$$

Where:

$XS_{j,i}^{XT}$: Production of product iii by activity branch j

B_j^{XT} : Scale parameter of the CET function for total outputs

$\beta_{j,i}^{XT}$: Share parameter of the CET function for total outputs

ρ_j^{XT} : Elasticity parameter of the CET function for outputs;
 $1 < \rho_j^{XT} < \infty$.

This demonstrates that producers allocate total output among products so as to maximize their sales revenues, taking into account the prices of these products (they combine inputs to produce the total output XST_j).

Furthermore, the computable general equilibrium model operates with a system of prices, where the price of a given aggregate is represented by the weighted sum of the prices of its components. The following modeling describes the unit cost of production for an activity branch j, which is defined as the weighted sum of the prices of value added and total intermediate consumption.

$$PP_j = \frac{PVA_j VA_j + PCI_j CI_j}{XST_j}$$

In this equation, the weights are: $\frac{VA_j}{XST_j}$ et $\frac{CI_j}{XST_j}$

The principle of supply and demand equilibrium must be verified in the PEP-1-1 model, whether for the goods and services market or the factor market. Indeed, this block presents the various equilibrium equations of the model.

The equilibrium between supply and demand for each product i in the domestic market is defined by:

$$Q_i = \sum_h C_{i,h} + CG_i + INV_i + VSTK_i + DIT_i + MRGN_i$$

Thus, the following two equations ensure equilibrium between the total demand and total supply of each production factor (labor and capital).

$$\sum_j LD_{l,j} = LS_l \qquad \sum_j KD_{k,j} = KS_k$$

Walras' law states that if (n-1) markets are in equilibrium, then

Table 1: Effects of simulated policies on employment by economic sectors

Employment by economic sector	20% reduction in income tax (%)	20% reduction in corporate tax (%)	10% increase in public investment spending in national education (%)	10% increase in public investment spending in infrastructure (%)
Unskilled labor				
AGR	1.01	1.89	0.17	0.46
IND	-0.03	-0.19	0	-0.01
SER	-0.43	-0.7	-0.07	-0.2
ADM	-0.01	0	0	0
Medium-skilled labor				
AGR	1.16	2.16	0.19	0.53
IND	0.11	0.06	0.02	0.05
SER	-0.29	-0.45	-0.05	-0.13
ADM	0.14	0.26	0.02	0.06
Highly skilled labor				
AGR	1.11	2.05	0.19	0.5
IND	0.06	-0.04	0.01	0.03
SER	-0.34	-0.55	-0.06	-0.16
ADM	0.09	0.16	0.01	0.04

Source: Our calculations based on results obtained using the software "GAMS"

the n th market must also be in equilibrium. In our PEP-1-1 model, we have chosen to exclude the agricultural sector in order to verify Walras' law. This demonstrates that when all markets in our model—except the one related to the agricultural sector—are in equilibrium, the agricultural market is also necessarily in equilibrium.

$$LEON = Q(AGR) - \sum_h C_h(AGR) - CG(AGR) - INV(AGR) - VSTK(AGR) - DIT(AGR) - MRGN(AGR)$$

Ultimately, the closure of the PEP-1-1 model characterizes the exchange rate (e) as a fixed variable, which serves as the numéraire in the model. Similarly, government expenditures (G), the current account balance (CAB), and public investment ($INVG$) are considered exogenous and constant.

Within this framework, several other variables are also treated as exogenous and held fixed. These include the minimum consumption of product i by household h , denoted $C_{MIN}(i,h)$, labor supply (LS), inventory changes ($VSTK$), as well as world import prices (PWM) and export prices (PWX). This assumption is justified by the fact that the Moroccan economy, as a small open economy, is a price taker on international markets and cannot influence global prices.

Regarding capital, two cases are considered. Either capital is mobile across production sectors ($kmob = 1$), and the total capital supply KS_k is fixed; or capital is immobile ($kmob = 0$), and the capital supply KS_{k_j} is fixed at the sectoral level. In general, all these variables must accurately reflect the realities of the national economy and be used for simulating the impacts of the selected economic policies.

5. RESULTS AND DISCUSSION

The main results of our estimates on the effect of expansionary fiscal and non-fiscal policies on the Moroccan labor market are as follows in Table 1.

The simulations reveal that expansionary fiscal measures—particularly the reduction of the income tax (IR) and corporate tax (IS) rates—generate differentiated effects on employment. A 20% decrease in income tax leads to a marked increase in agricultural employment, especially for unskilled workers (+1.01%) and highly skilled workers (+1.11%). This rise is explained by the increase in household purchasing power, which boosts demand for essential consumer goods—many of which depend on the agricultural sector. However, the effect is less favorable in the services sector, where employment of unskilled workers decreases by 0.43%.

A 20% reduction in corporate tax (IS) shows a more inclusive effect on agricultural employment, particularly benefiting unskilled workers (+1.89%). Compared to the 20% cut in income tax, the corporate tax reduction has a broader impact, with significant increases in agricultural employment across all skill levels, especially unskilled workers. This measure appears to encourage greater private investment, notably in agriculture and industry, although the services sector continues to experience a decline in employment for unskilled workers (-0.50%).

The increase in public spending on education has a limited short-term effect on employment. Gains are modest, with a slight rise in agriculture and a small decrease in services (-0.07% for unskilled workers). This is explained by the time needed for educational investments to improve human capital and stimulate demand for skilled labor.

In contrast, an increase in infrastructure investment produces more immediate effects. Agriculture directly benefits (+0.46% of unskilled employment) due to construction and modernization projects. The administration and other sectors also register moderate gains, as infrastructure enhances overall productivity (transport, energy, etc.).

Comparing the two strategies, fiscal policies prove more effective in the short term for stimulating employment. Indeed, the reduction of corporate and income taxes boosts private investments and

supports household consumption, with a marked impact on economic activity.

Conversely, non-fiscal policies show more moderate immediate effects but play a key role in the structural transformation of the economy. Infrastructure investments generate positive multisectoral externalities (agriculture, construction, transport) and improve productivity in the medium term. Although less visible in the short run, education expenditures are an essential lever to strengthen human capital and future competitiveness.

A balanced approach could combine targeted fiscal measures for a rapid recovery with priority public investments (infrastructure, education) to ensure sustainable and inclusive growth. Additionally, a combination of fiscal and structural levers, calibrated according to sector-specific characteristics, emerges as the optimal strategy. This would allow both an immediate stimulus and a lasting transformation of the economy, progressively integrating less responsive sectors such as services.

6. CONCLUSION

This paper aimed to evaluate the impact of expansionary fiscal policies on job creation in Morocco using the PEP-1-1 computable general equilibrium model. The analysis focused on sectoral effects and skill levels, revealing clear trends for the Moroccan economy.

The main findings reveal a positive but uneven effect: (i) Expansionary policies stimulate employment, particularly for low-skilled workers, reflecting the dominance of sectors such as agriculture in the economy. Although this sector is crucial for labor absorption, it struggles to generate sustainable productivity gains. (ii) Conversely, the impact on skilled employment remains limited due to persistent shortcomings in the education and training system.

The recorded job creations remain insufficient to significantly reduce the national unemployment rate. This situation is explained by the persistence of a slow economic transformation, labor shifts between sectors (substitution effects), and chronic underinvestment in long-term drivers such as infrastructure and R&D.

To optimize the effectiveness of public spending, a dual approach is necessary. In the short term, it aims to target sectors with high potential for low-skilled employment (e.g., agriculture, construction) through fiscal incentives. In the long term, this strategy involves strengthening productive investments (education, innovation) to raise the skill level of the workforce and modernize agriculture, transforming it into a productivity driver without sacrificing its social role.

In light of these findings, this work fully aligns with a public decision-making support approach. It provides Moroccan authorities with concrete elements to design more targeted, balanced, and coherent economic policies that address the country's structural challenges. The use of a robust simulation tool enables a rigorous assessment of trade-offs between short-term priorities (employment recovery) and long-term objectives

(productive transformation, human capital development). The results advocate for a public strategy centered on incentive-based taxation, selective investments, and differentiated sectoral support. Thus, this study contributes to fostering strategic reflection on fiscal reform and the orientation of public investments, with a view toward inclusive, sustainable, and job-creating growth.

This research, while insightful, has limitations related to the static framework of the PEP1-1 model and the limited granularity of the data. Future work could incorporate a dynamic dimension to capture the temporal effects of policies and refine the sectoral disaggregation, particularly for high value-added services.

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