

Which Policies Induce Structural Change in MENA Countries? Evidence from Macro and Micro Data

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Preliminary Draft

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Abstract

This paper aims at studying the policies that can leverage the structural change process at the sectoral level in developing countries while giving a particular emphasis on the Middle East and North Africa countries. The paper relies on the World Bank Enterprise Surveys firm-level data to compute structural change on the sectoral level in a large group of developing countries. Afterwards, it investigates the role of both structural and macroeconomic stabilization policies in driving structural change while proposing novel measurements to capture these policies. The empirical work relies on the multilevel model to merge sector-level data with macro data. The main findings of the productivity decomposition show that structural change patterns are very heterogeneous among the different sectors. Furthermore, structural change contribution to productivity is modest relative to the within contribution among both manufacturing and services sectors. As per the econometric findings, they show that competition, trade, financial policies and macroeconomic institutions along with business cycle downturns improve structural change. In contrast, policy rate and cyclical REER appreciation reduce it. The paper's findings also highlight the importance of countercyclical fiscal and monetary policies in driving structural change. Finally, competition and trade de facto structural policies measures enhance structural change.

Keywords: Structural Change, Resource Allocation, Firm-Level Data, Macroeconomic Policies, Structural Policies, Multilevel Model.

JEL Classification: L16, O11, O23, O24

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1 Introduction

Many developing countries suffer from having a large surplus of labor in sectors with low productivity. The engine that would help moving labor towards more productive sectors is known as structural change (Astorga, Cimoli, & Porcile, 2014). This reallocation process induces aggregate productivity growth even if there is no productivity growth within sectors. Accordingly, structural change speed would define the success of development strategies (Marouani & Mouelhi, 2016). Unfortunately, not all developing countries were able to achieve structural change and successful transformation remains limited to some cases in East Asia. The literature usually relies on aggregate sectoral shifts to capture structural change trends. Yet, the availability of rich datasets on the firm level allows having a closer understanding on how this process takes place. For instance, aggregate productivity can depend on firms' capacity to grow and markets efficiency in allocating resources. Impediments to resource allocation can adversely affect firms' productivity which would thereby reduce aggregate productivity growth (Brown, Crespi, Iacovone, & Marcolin, 2018; Hsieh & Klenow, 2009; Restuccia & Rogerson, 2008; Alfaro, Charlton, & Kanczuk, 2008). Indeed, productivity losses from misallocation can result from distortions that can be acted upon by policies (Restuccia & Rogerson, 2017). Within this context, it is important to identify the policies that would improve the reallocation process on the sectoral level in developing countries in general and in particular in the Middle East and North Africa (MENA) region.

Government policies are part of producers' external operating environments. Policies may not operate directly on productivity. However, they certainly affect producers' movement to a higher position within their industry productivity distribution as well as market share and survival responsiveness to productivity differences (Syverson, 2011). There is still no consensus on underlying supportive policies for structural change in developing countries. On the one hand, several papers have assessed the changes in allocative efficiency over the business cycle and found that misallocation increased in crises or recessions (see for example Oberfeld, 2013). Indeed, macroeconomic stability matters to accelerate structural change but it can be insufficient (Zaki, Alshyab, & Seleem, 2020; Cusolito & Maloney, 2020; Lopes, Hamdok, & Elhiraiki, 2017). In this respect, the literature suggested that well-designed macroeconomic policies connected to structural transformation agenda should go beyond this conventional macroeconomic stability and should rather come up with policy space for countercyclical policies (Aghion, Hemous, & Kharroubi, 2014; Ocampo, 2011). On the other hand, structural policies improve allocative efficiency since they eliminate market rigidities and correct market failures (Solow, 2004). There are numerous studies analyzing the policy determinants of firms and industries productivity. However, this literature does not differentiate between macro and structural policies and is rather confined to specific policies. It also remains quite scarce for developing countries, except for the agriculture sector (see for example Adomopoulos & Restuccia, 2014).

This paper gives a particular emphasis on an interesting and under-researched region, the MENA region. Several MENA countries enjoyed high though volatile growth rates prior to the Arab Spring uprisings. However, their speed of income convergence was relatively modest, and this growth did not necessarily translate into job creation and poverty reduction. Research on the region's growth identified the

lack of structural change towards more diversified activities. For instance, economic structures relatively changed and the labor share in agriculture broadly declined but this seems insufficient. MENA countries were not able to divert their growing labor force into more productive activities (Cusolito & Maloney, 2020; Galal et al., 2015). This suggests that the structural change in the region was insufficient to reduce large employment shares in lower productivity sectors, which in turn hampered aggregate productivity growth (Doemeland & Schiffbauer, 2016).

This paper relies on the World Bank Enterprise Surveys (WBES) firm level data in order to compute the structural change on the sectoral level. As per the policies, the paper considers structural policies (competition, trade, financial and macroeconomic institutions) and macroeconomic stabilization policies (outcomes and tools). Accordingly, the analysis of this paper includes data at two different levels: the policies at the country level and the structural change at the sector level. Indeed, different sectors in the same country face the same macroeconomic context as well as policies applied horizontally on all sectors. Hence, while studying structural change on the sectoral level it is important to account for the fact that sectors are nested within countries. This is why this paper employs a multilevel model. For instance, the latter model helps accounting for variables at both the country and the sector levels (Kouamé & Tapsoba, 2019). Furthermore, standard regressions with clustered errors assume homogeneous correlation within each cluster and thereby ignore the hierarchical structure of the data and can produce biased estimates (Ayadi, Giovannetti, Marvasi, & Zaki, 2020).

Against this background, the main objective of this paper is to study the policies that can improve the structural change process at the sectoral level in developing countries while giving a particular emphasis on MENA countries. The paper contributes to the literature that uses growth-accounting techniques at the firm level while applying them on macroeconomic questions. The paper makes the following contributions to this literature. First, the paper relies on the WBES firm-level data to compute structural change on the sectoral level in a large group of developing countries. Second, it investigates the role of both structural and macroeconomic stabilization policies in driving structural change while proposing novel measurements to capture these policies. Third, the empirical work relies on the multilevel model to merge sector-level data with macro data.

The main findings of the productivity decomposition show that there is a great extent of heterogeneity in the patterns of structural change among the different sectors. Furthermore, the contribution of structural change to productivity is broadly modest relative to the within component contribution among both manufacturing and services sectors. As per the econometric findings, they show that competition, trade, financial policies and macroeconomic institutions along with business cycle downturns improve structural change. In contrast, policy rate and cyclical REER appreciation reduce it. The paper's findings also highlight the importance of countercyclical fiscal and monetary policies in driving structural change. Finally, competition and trade de facto structural policies measures enhance structural change.

The paper is organized as follows. Section 2 reviews the literature. Section 3 describes the methodology and the data. Section 4 provides a summary of the stylized facts related to the patterns of structural change in some selected MENA

countries. Section 5 analyzes the empirical findings. Section 6 concludes and offers policy recommendations.

2 Literature Review

This paper is related to two main strands of the empirical literature on resource allocation, namely the literature using firm level data to explain differences in aggregate economic outcomes and the literature on the policy drivers of resource allocation.

The paper is similar to the literature that uses growth-accounting techniques at the firm level while applying them on macroeconomic questions. This growing literature investigates how firms' structure can help explaining differences in aggregate economic outcomes (such as income per capita). Productivity between firms is usually very heterogeneous, even within narrowly defined industries. This heterogeneity can indicate a misallocation of resources ([Bartelsman, Haltiwanger, & Scarpetta, 2013](#)). Accordingly, reallocating resources towards highly productive firms can induce aggregate productivity growth. For instance, the literature shifted from asking why firms in one country are less productive to analyzing how inputs are allocated across these firms ([Restuccia & Rogerson, 2013](#)). The empirical literature using firm level data tried to quantify gains from productivity resulting from better resource allocation. The seminal work of [Olley and Pakes \(1996\)](#) and [Bartelsman et al. \(2013\)](#) propose a productivity decomposition of industry productivity (weighted average of firm level productivity) into an unweighted firm level average and a covariance term or the structural change term (see further details in methodology section). They show that changes in this covariance term largely explain the aggregate productivity evolution and the cross-country differences in productivity. In the same vein, [Hsieh and Klenow \(2009\)](#) used firm level data on the manufacturing sector in China, India and the United States and they found a large effect of misallocation on total factor productivity.

The second strand of literature this paper relates to is the literature on the policy drivers of allocation of resources. The literature has extensively evaluated the impact of misallocation of resources. Yet, less attention has been attributed to understanding the drivers of allocation of resources. These policy drivers could be grouped into two main groups: structural policies and macroeconomic stabilization policies. Regarding the literature on structural policies impact, it is mostly devoted to macroeconomic aggregates (growth, employment and aggregate productivity). However, the evidence on how these policies affect firms and sectors productivity growth is confined to specific policies and remains quite scarce for developing countries. The literature suggested that product market regulations as well as credit or financial frictions can affect this process of reallocation of resources ([Restuccia & Rogerson, 2017](#)). In this respect, there are studies analyzing the impact of a group of structural policies on resource allocation and others focusing on specific ones. Among the former papers, [Brown et al. \(2018\)](#) studied the impact of policy measures on resource allocation in four Latin American countries (Chile, Colombia, Mexico and Peru). They adopted a difference in difference approach while following [Rajan and Zingales \(1998\)](#) methodology. Their findings suggest that education, financial regulation and structural reforms improve resource allocation. Similarly, [Andrews and Cingano \(2014\)](#) show that these policy frictions reduce resource allocation through specific channels depending on the policy considered.

As per the literature on specific structural policies, three policies are highlighted here: financial, trade and competition. Regarding financial policy, credit market imperfections have been also identified in the literature as generating misallocation and thereby as a source of productivity differences between countries ([Restuccia & Rogerson, 2013](#); Banerjee and Dufflo, 2005). Furthermore, the literature emphasized the impact of financial constraints on allocative efficiency. For instance, financial frictions can increase misallocation ([Oberfield, 2013](#)). In order to assess industries' dependence on external finance, several studies relied on [Rajan and Zingales \(1998\)](#) method (see for example [Chauvet & Ferry, 2021](#); [Oberfield, 2013](#); [Aghion et al., 2014](#)). This method relies on information from each industry counterpart in the US with the assumption that differences across industries reflect industries technological features and that these technological differences are likely to persist.

As per trade policy, the linkages between the latter and productivity have been extensively studied in the literature. For instance, most productive firms tend to engage in trade (whether importing or exporting) and trade liberalization induce the least productive firms to exit and the most productive firms to export ([Pavcnik, 2002](#)). In fact, trade liberalization induces changes in relative prices and the reallocation of resources will happen in response to these changes (see a review on the literature on trade liberalization and structural change in [Landesmann and Foster-McGregor, 2021](#)). The seminal work of [Melitz \(2003\)](#) shows that trade liberalization has a static effect on aggregate productivity by reallocating resources to more productive firms within sectors. [Melitz \(2003\)](#) model suggests that the exposure to trade induces productive firms to enter the export market. It shows that increases in an industry's exposure to trade lead to additional inter-firm reallocations towards more productive firms. [Wacziarg and Wallack \(2004\)](#) is an example of a study using comparable cross-country panel data to analyze the impact of trade liberalization on sectoral structural change in 25 developing countries over 1963 to 1997. Their findings show a weak negative effect of liberalization on inter-sectoral labor shifts at the 1-digit level and increased sectoral structural change at the 3-digit level. It is also worth noting that some studies account for trade by using indicators on the level of openness and others consider the impact of the trade liberalization events using the Sachs and Warner openness index ([Wacziarg & Welch, 2008](#)). The drawback of the latter index is that it does not take account of the depth of liberalization. This is why this paper accounts for trade policy using indices on the depth of trade agreements following [Ezzat and Zaki \(2022\)](#).

Competition policy

Moving to the second group of policy drivers of resource allocation, the macroeconomic stabilization policies, the literature has mostly considered each policy impact on resource allocation separately. Accordingly, this paper contributes to the literature by studying the impact of different macroeconomic policies on resource allocation and further contrasting their impact to structural policies. Three issues related to the linkages between macroeconomic stabilization policies and resource allocation are highlighted here: the real exchange rate, the business cycle and the macroeconomic policies cyclicity.

The literature has highlighted the importance of the real exchange rate (RER)

in driving structural change. Employment within and between industries can be affected by real exchange rate for several reasons. First, the RER would affect the unit labor cost of production in each sector. The RER depreciation would allow firms to compete in new sectors which would promote exports diversification and import substitution (Astorga et al., 2014). Second, the RER movements affect the prices of internationally traded goods. Within this context, Klein, Schuh, and Triest (2003) findings show that movements in RER affect jobs reallocation. In particular, they decompose movements in RER into a cyclical and a trend component. The latter one was found to affect job creation and destruction by similar magnitudes and hence has an allocative effect but no effect on net employment growth. As per the cyclical component, its appreciation increases job destruction and thereby reduces net employment growth without having an allocative effect. In the same vein, Gourinchas (1998) studied the effect of real exchange rate movements on job reallocation in the US manufacturing sector. His findings show that appreciations episodes of the exchange rate are associated with significant job churning (excess reallocation).

Productivity enhancing reallocation can also depend on the business cycle. If the resource reallocation during the downturn (or the recession) is productivity enhancing, this is known as the cleansing effect of the recession. Recessions can induce the exit of low productive firms which would contribute positively to aggregate productivity growth. Foster and Krizan (1998) confirmed this for the US manufacturing. In addition to firms exit, recessions can also cleanse the economy through job losses in firms (Bartelsman, Lopez-Gracica, & Presidente, 2018; Van den Bosch & Vanormelingen, 2022). Accordingly, recessions can make more resources available for production arrangements that are relatively more productive. However, this cleansing effect could be distorted if the recession is negatively affecting firm level productivity. Furthermore, recessions can also slow the matching of unemployed with high productivity firms (sullyng effect, see Barlevy, 2002). While studying the impact of business cycle on reallocation, it is also important to differentiate between durables and non-durables. For instance, the demand for durables can be more cyclically sensitive (sensitive to domestic demand) compared to non-durables (Oberfield, 2013).

The literature advocated for the importance of countercyclical macroeconomic policies in driving structural change in developing countries. However, this assertion does not seem to be tested empirically in the existing. Accordingly, this paper contributes to the literature by providing this quantification. For instance, macroeconomic policies exclusively focusing on macroeconomic stability can be insufficient to accelerate structural change in developing countries (Nissanke, 2019). A developmental approach of macroeconomic policies requires mitigating the procyclical effects of financial markets and strengthening domestic financial governance and thereby coming up with policy space for countercyclical policies. Sustainable countercyclical policies help facing challenges related to external financing and fluctuations in commodity prices. It is also worth noting that undertaking countercyclical policies requires a great extent of fiscal discipline and institutional setup. On the empirical front, the literature provided evidence that countercyclical policies can enhance growth on the economy wide level (Aghion & Marinescu, 2007) and industry level (Aghion et al., 2014).

The above review accordingly shows that xxx

3 Methodology and Data

3.1 Econometric Specification

The methodology of this paper consists of computing structural change at the sector level and studying afterwards its policy determinants in developing countries (including MENA countries) from 2006 to 2021. The list of countries covered in the analysis by group of income is in Annex Table A1.¹ There are also separate specifications for a group of MENA countries.² The paper combines data at different levels as follows: firm level data from the WBES, sectoral level data on tariffs, trade and value added (showing interlinkages between the sectors) and country level data on macroeconomic stabilization and structural policies (see further details below in Data section). As a first step, the WBES database is used to calculate structural change on the sector level following [Olley and Pakes \(1996\)](#) methodology (see also [Brown et al., 2018](#); [Andrews & Cingano, 2014](#); [Bartelsman et al., 2013](#) who adopt this methodology).

The first step consists of computing structural change on the sectoral level using the WBES firm level data as follows (The list of sectors is in Annex Table A2). The index of productivity of a sector³, defined as the weighted average of firm-level (log) productivity ($\Omega_{jt} = \sum_k \theta_{jkt} \omega_{jkt}$), can be decomposed as follows:

$$\Omega_{jt} = \bar{\omega}_{jt} + \sum_k (\theta_{jkt} - \bar{\theta}_{jt})(\omega_{jkt} - \bar{\omega}_{jt}) \quad (1)$$

$$\Omega_{jt} = \textit{within} + \textit{structuralchange} \quad (2)$$

Where (Ω_{jt}) is the sector j productivity index at time t, (ω_{jkt}) is the productivity of firm k in sector j, (θ_{jkt}) is the relative size of firm k, and a “bar” over a variable represents the unweighted sector average of the firm-level measure. The Olley Pakes decomposition splits a productivity index of a sector into an unweighted mean productivity (the first term: the within effect) and a covariance term between firm size and firm productivity (the second term: the between/structural change effect). This latter term helps quantifying the productivity gains stemming from reallocation of resources from low to more productive firms. The higher this term the more resources are allocated efficiently to the more productive firms. Following existing literature, two measures of productivity and associated weights are considered: a measure of labor productivity (sales per worker) with employment shares as weights and a measure of total factor productivity (TFP) with output shares as weights. Estimates of firm level TFP and labor productivity are obtained from the WBES dataset “Firm Level TFP Estimates and Factor Ratios” which follows [Olley and Pakes \(1996\)](#) methodology (a revenue based TFP estimate: TFPR since firms

¹The analysis accounts for all the low and middle income countries in the WBES comprehensive dataset.

²The group of MENA countries is based on a large definition of Middle East to be able to have a reasonable number of countries available in WBES. These countries are: Afghanistan, Armenia, Azerbaijan, Cyprus, Djibouti, Egypt, Georgia, Iraq, Israel, Jordan, Lebanon, Malta, Morocco, Pakistan, South Sudan, Sudan, Tunisia, Turkey, West Bank and Gaza.

³This paper follows [Bartelsman et al. \(2013\)](#) in undertaking the productivity decomposition on the logarithm of productivity rather than its level

revenues and costs are collected in WBES rather than physical inputs and outputs).

The second step consists of studying the impact of structural and macroeconomic policies on structural change. As a baseline, the following regression will be undertaken:

$$SC_{jit} = \beta_0 + \beta_1 X_{jit} + \beta_2 Policy_{it} + \gamma_j + \varepsilon_{jit} \quad (3)$$

The dependent variable (SC_{jit}) is the structural change term for an sector j in country i in a year t resulting from the productivity decomposition (described above, measured once with labor productivity and once with TFP). X_{jit} is a set of control variables at the sector average level including the share of firms offering formal training to employees (as indication on the existence of skilled labor), the average duration (years) of formal registration of firms in the sector, the share of foreign ownership, the share of medium size firms (firms employing 50 to 200 employees, following the classification of [Kouamé and Tapsoba \(2019\)](#)), the share of young firms (firms with age less than six years) and the share of firms with quality certification (as an indication on innovation). These control variables are obtained from the WBES comprehensive database. All variables are taken in logarithmic transformation.

$Policy_{it}$ refers to structural and macroeconomic policies. All policies variables represent their 5 years averages. As previously explained, sectoral structural change is computed using WBES and there are around 2 to 4 surveys for each country. This is why it would be interesting to match sectors' structural change with policies averaged on five years. Structural policies are examined in the following areas: trade policy, competition policy, financial policy and macroeconomic institutions. As per macroeconomic policies, they are accounted for in three different ways: tools (tax rate and lending rate), outcomes (which also represent macroeconomic stability like: exchange rate misalignment, fiscal balance, inflation and an indicator for business cycle ⁴) and cyclicity of both fiscal and monetary policies. γ_j are sector dummies to control for unobserved heterogeneity across sectors.

Separate specifications are dedicated afterwards to explore the impact of cyclicity of fiscal and monetary policy on structural change. First, following [Aghion et al. \(2014\)](#), the following specification will be undertaken to study the impact of fiscal policy cyclicity on structural change:

$$SC_{jit} = \alpha_0 + \alpha_1 fc_{jit} * fd_{it} + \alpha_2 fc_{jit} * fp_{it} + \nu_i + \eta_j + \varepsilon_{jit} \quad (4)$$

fc_{jit} is a measure of financial constraints by sector or external financial dependence following [Rajan and Zingales \(1998\)](#). [Chauvet and Ferry \(2021\)](#) undertook this methodology by using the USA input-output tables since they assume that the USA is a frictionless market. This paper follows the same approach. The USA input-output data from the World Input Output Database (WIOD) is used to calculate the intensity of reliance of each industry on finance. It is important to note that the WBES follows the ISIC Rev 3.1 whereas the World Input Output Tables

⁴Following [Bordon, Ebeke, and Shirono \(2016\)](#), the index for business cycle is a dummy variable taking the value 1 in each year in which the output gap as percentage of potential output is lower than -1 percent ("bad times"), and 0 otherwise ("good times"). Output gaps and potential output are calculated using the Hodrick-Prescott filter.

follows ISIC Rev 4. This is why merging these two databases requires matching their different nomenclatures. Annex Table A3 shows the correspondence between Input-Output Tables ISIC Rev 4 and WBES ISIC Rev 3.1 (Annex to be added in an upcoming draft). fd_{it} is a measure of financial development by country (the financial development index of Svirydzienka (2016)). fp_{it} is the fiscal policy cyclicality by country. It is not directly observed and has to be inferred. Cyclicity will be measured as the correlation between the cyclical component of real GDP or the output gap (representing the country's position in the business cycle) and total fiscal balance to potential GDP on a 5-year rolling window (to introduce a time dimension to correlation coefficients by country). The cyclical and trend components are estimated using the Hodrick–Prescott Filter. A positive (negative) correlation indicates countercyclical (procyclical) fiscal policy.

Second, similar specification with similar rationale is undertaken to study the impact of monetary policy cyclicality on structural change following [Aghion, Farhi, and Kharroubi \(2012\)](#):

$$SC_{jit} = \alpha_0 + \alpha_1 fc_{jit} * mpc_{it} + \nu_i + \eta_j + \varepsilon_{jit} \quad (5)$$

mpc_{it} is a measure of monetary policy cyclicality by country. Similar to fiscal policy cyclicality, it is not directly observed and has to be inferred. Monetary policy cyclicality represents the sensitivity of the real short term interest rate to the domestic output gap. It is measured as the correlation between the cyclical component of real GDP or the output gap and the real short-term interest (which is the difference between the policy rate and inflation) on a 5-year rolling window. A positive (negative) correlation indicates countercyclical (procyclical) monetary policy since the short-term cost of capital is increasing (decreasing) while the economy is improving (deteriorating).

The above specifications can serve as a baseline but there is still a need to employ a multilevel modeling approach. Sectors in the same country may not be independent since they share similar contextual characteristics, macroeconomic context and policies affecting their performance. To that effect, a multilevel mixed model suits the structure of the data since it accounts for this clustering effect and helps obtaining correct and efficient estimates. It can also address potential endogeneity challenges ([Kouamé & Tapsoba, 2019](#)).

Following [Kouamé and Tapsoba \(2019\)](#), the estimated multilevel mixed model will be based on a two-level model where the highest level is the country and the lowest level is the sector:

Level 1:

$$SC_{jit} = \gamma_{0i} + \gamma_1 X_{jit} + \gamma_2 Policy_{it} + \epsilon_{jit} \quad (6)$$

Level 2:

$$\gamma_{0it} = \gamma_{00t} + \mu_{it} \quad (7)$$

Combining levels 1 and 2, the model could be written as follows:

$$SC_{jit} = \gamma_{00t} + \gamma_1 X_{jit} + \gamma_2 Policy_{it} + \mu_{it} + \epsilon_{jit} \quad (8)$$

$\mu_{it} + \epsilon_{jit}$ are the random part of the model and they are normally distributed. μ_{it} is the country specific error term. Country, year and sector fixed effects are included to account for unobservable heterogeneity among sectors and countries. Standard

errors are clustered at the country level. The multilevel models are estimated in this paper through maximum likelihood.

Finally, as extension, in order to further explore the policies impact on sectoral structural change, the different policies are measured on the sectoral level (instead of being measured on the country level as in the previous specifications). Regarding the structural policies, the WBES allows replacing them with the de facto sectoral performance on the average level (see further details in [Data](#)). In addition, tariffs are obtained on the sector level. As per the macroeconomic policies, measures on the sector level are calculated for the real exchange rate and the business cycle as follows. First, the proxy of the business cycle follows the methodology of [Bartelsman et al. \(2018\)](#) and [Bartelsman, Caballero, and Lyons \(1994\)](#) and it aims at capturing the exogenous demand variation. The index for each industry corresponds to an output weighted average of percentage changes in activity of all other industries that purchase product from that industry. Second, the sector based real exchange rate follows the methodology of [Gourinchas \(1998\)](#) and [Klein et al. \(2003\)](#). It is constructed by weighting the bilateral real exchange rates by trade shares. It is decomposed afterwards to cyclical and trend components using the HP filter.

3.2 Data

- **Firm-level data: World Bank Enterprise Surveys (WBES)**

The WBES is a collection of enterprise surveys in developing countries. It offers representative samples (stratified random sampling) of the non-agricultural, non-extractive formal private sector with five or more employees. Surveys are undertaken with a standard questionnaire and standard implementation methodology which allows for comparison across countries. This paper relies on the Firm Level TFP Estimates and Factor Ratios dataset and the standardized dataset. The latter initially includes 143 countries over 2006 to 2021 with a pseudo-panel structure. After dropping the surveys where the key variables needed for the analysis are not included and the high-income countries, the paper will focus on 121 low- and middle-income countries (following the World Bank historical income classification which classifies countries by income on yearly basis). Annex Table [A1](#) shows the list of countries by group of income and their rounds of WBES.

- **Country-level data: structural and macroeconomic policies**

With regards to policies measurements, novel indicators for each area will be compiled from several sources. This is why the policies measurements are on the country level. Structural policies are considered in four areas: trade policy, competition policy, financial policy and macroeconomic institutions. The following indices are employed in each area.

First, regarding trade policy, several indices reflecting the enforcement and depth of content preferential trade agreements will be constructed using use the World Bank deep trade agreements database (following the methodology of [Ezzat and Zaki \(2022\)](#) which is described in Annex xxx - Annex to be added in an upcoming draft). Other measurements include the WTO membership (CEPII gravity dataset).

Second, competition policy is accounted for from de jure and de facto perspectives as follows. On the de jure front, the age of competition law (using Petersen, 2013 and our compiled dataset) is considered. On the de facto front, the economy wide markup (the inverse of labor income share) from Penn World Tables is used (more details on methodology is in Annex xx - Annex to be added in an upcoming draft).

Third, financial policy is accounted for on the domestic and international fronts. On the domestic front, Svirydzenka (2016) financial development index and the domestic credit to the private sector (World Development Indicators, World Bank) are used. As for the international finance front, the de jure financial openness index of Quinn and Toyoda (2011) as well as the de jure financial integration index (overall restrictions and foreign direct investment restrictions) from the capital control measures dataset of Fernández et al. (2019) are considered. (international finance indicators to be added in an upcoming draft)

Fourth, macro institutions are accounted for using fiscal rules from the IMF Fiscal Rules Dataset, the presence of inflation targeting from the IMF Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER) and the central bank transparency index of Dincer and Eichengreen (2014).

The macroeconomic policies are analyzed in three different ways: tools, outcomes and cyclical. Macroeconomic outcomes include the fiscal deficit from the IMF Fiscal Monitor database, inflation from the World Development Indicators of the World Bank, the exchange rate misalignment (an overvaluation index, CEPII EQCHANGE database) and the real effective exchange rate (REER) from Bruegel database (and its decomposition to cyclical and trend components using the HP filter). Macroeconomic tools include tax rate from KPMG and Tax Foundation and monetary policy and lending rates from the IMF International Financial Statistics.

As per the policies measured on the sectoral level, structural policies measures will be replaced with the de facto sector performance on the average level from WBES. Trade policy measures will be replaced with the share of exporting firms and the share of imported inputs. Competition policy will be replaced with the normalized number of firms by sector (direct measure of competition). Financial policy will be replaced with average access to finance. The tariff by product are obtained from the WTO (see Annex Table A3) . The proxy index of the business cycle is calculated using data from the input-output EORA database (to be included in an upcoming draft). The real exchange rate by sector is calculated using bilateral exchange rate from the World Development Indicators, World Bank and trade data from xx (to be included in an upcoming draft).

Finally, it is also important to mention that it would be interesting to account for the policies reflecting discretionary provisions by the government or banks to some industries (tax breaks, low interest loans, etc.). However, it is very hard to obtain such data for a large group of countries, especially developing ones.

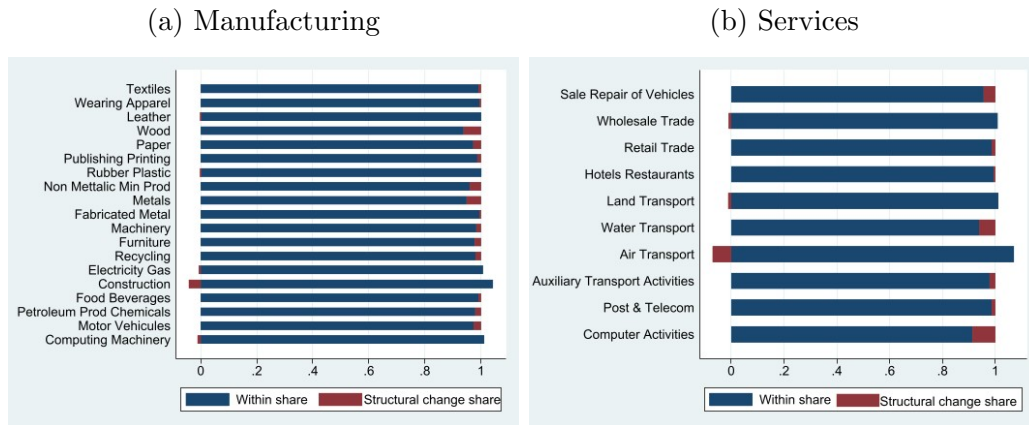
4 Stylized Facts

This section documents the patterns related to the resource reallocation in some selected MENA countries and the regional average (see the complete list of sectors in annex A2). The undertaken productivity decomposition helps analyzing whether these countries witness a productivity-enhancing reallocation in the different sectors (i.e. whether resources are moving towards more productive firms). The decomposition also shows the heterogeneity among the different sectors with regards to the resource allocation patterns.

Figures 1-4 show the undertaken labor productivity decomposition for some countries and for MENA countries and Figure 5 shows their regional average. The following conclusions can be drawn. First, sectors indeed have different technologies and hence this is reflected in the heterogeneity in the structural change patterns across the sectors. Second, the contribution of structural change to productivity is broadly modest relative to the within component contribution across the different sectors in different countries and similarly in the regional average. More insights on specific sectors will be added here in an upcoming draft.

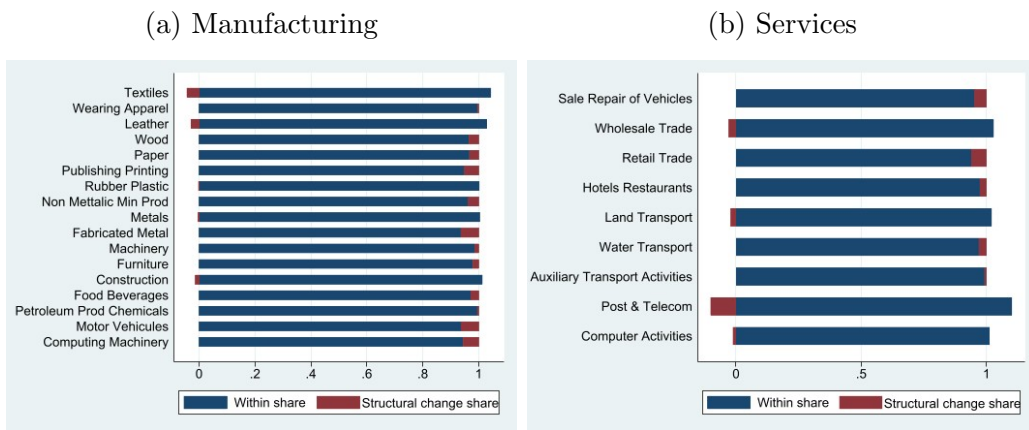
Results with TFP decomposition will be added in an upcoming draft.

Figure 1: Labor productivity Decomposition in Egypt (Percent of total)



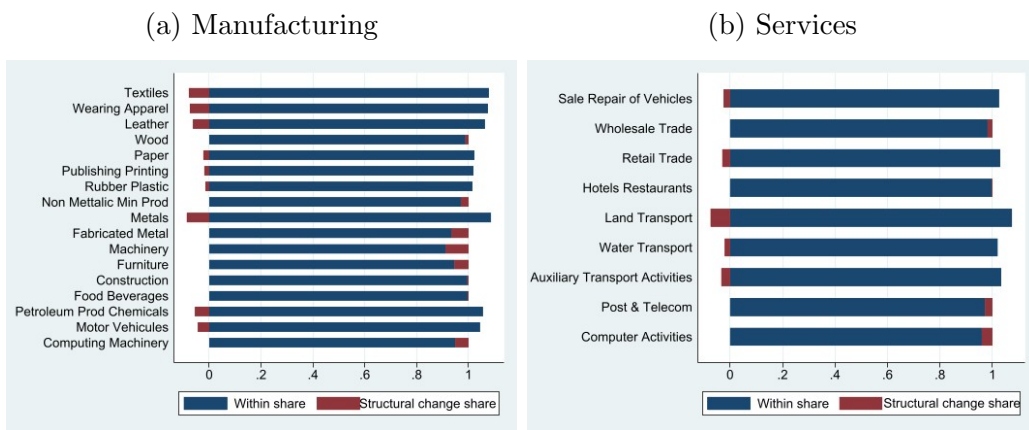
Source: Author calculation based on WBES data

Figure 2: Labor productivity Decomposition in Jordan (Percent of total)



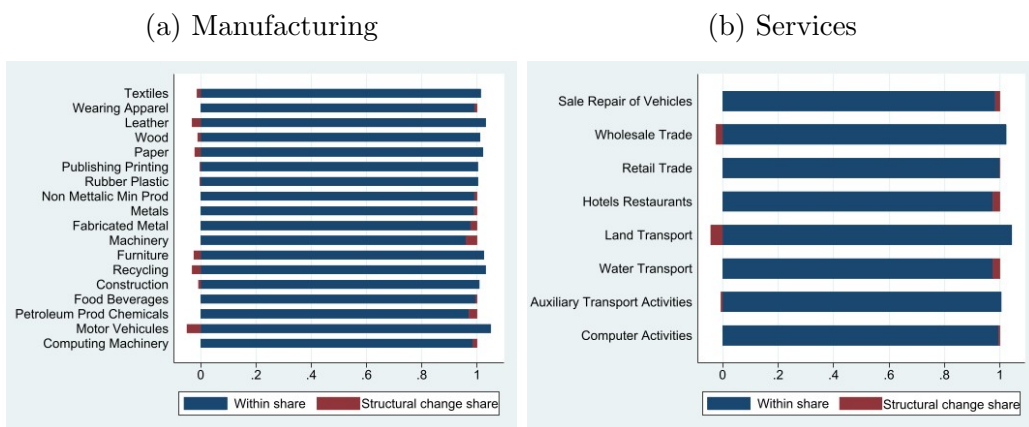
Source: Author calculation based on WBES data

Figure 3: Labor productivity Decomposition in Morocco (Percent of total)



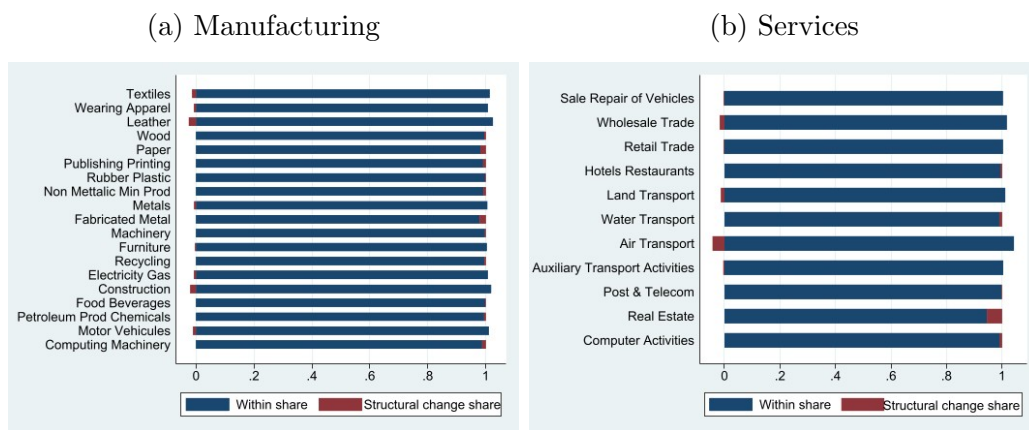
Source: Author calculation based on WBES data

Figure 4: Labor productivity Decomposition in Tunisia (Percent of total)



Source: Author calculation based on WBES data

Figure 5: Labor productivity Decomposition in Middle East (Percent of total, Region average)



Source: Author calculation based on WBES data

5 Empirical Findings

As previously explained, the productivity decomposition exercise is undertaken for labor productivity and TFP and the resulting sectoral structural change (the covariance term) from this exercise represent the dependent variables with two groups of findings. The higher this covariance term (measuring structural change), the larger the share of employment allocated to productive firms and thereby the more efficient is the resource allocation. The section currently describes the first group of findings where the structural change results from the labor productivity decomposition. Findings for TFP decomposition will be added in an upcoming draft.

The Baseline results are reported in Tables 1-3 and multilevel results are reported in Tables 4-5. All estimates of multilevel model are standardized and can be compared across the different policies. Furthermore, standard errors are clustered at the country level. In fact, the multilevel model addresses the challenges related to the data structure and the nesting effects as well as the challenges of potential endogeneity issues. In addition, the multilevel model allowed including simultaneously country level variables along with country, year and sector fixed effects.

Most of the controls are significant and exert the expected signs. Foreign ownership increases structural change since foreign-connected firms can better absorb advanced production technology and knowledge available abroad (Kouamé & Tapsova, 2019). Similarly, formality increases structural change. Training is a proxy for skilled labor and it enhances structural change since the human capital is at the heart of this structural change process. Younger firms (firms with age less than six years) exert a positive and significant effect on structural change. This is consistent with the literature suggesting that young firms usually have higher net job growth rates than old-large firms (Aga, Francis, & Meza, 2022). Medium sized firms exert a negative and significant impact on structural change. This is consistent with the literature highlighting the poor performance of small and medium size firms in developing countries (Aterido, Hallward-Driemeier, & Pagés, 2011).

Starting with structural policies, competition significantly improves sectoral structural change in both the multilevel model (the markup exerts a negative and significant effect on structural change. See Table 4). The linkages between competition and productivity has been extensively studied (see Syverson (2011) for a review on this literature). Competition improves productivity on both the within and the structural change fronts. For instance, competition enhances structural change since it helps moving market shares to the most efficient firms (the so called Darwinian selection effect). It also increases efficiency within the firms since increased competition can incentivize firms to take costly actions that would raise productivity and that they may not take in the absence of competition.

Trade policy was also found to improve sectoral structural change. WTO membership has a positive and significant effect on sectoral structural change according to the baseline results (Table 1). Trade is indeed a fundamental determinant of structural change in the theoretical literature on structural change determinants. Barriers to trade can impede resource allocation and thereby reduce productivity growth (Dabla-Norris, Ho, & Kyobe, 2016). Furthermore, deeper integration in international trade can increase the pace and extent of industrialization and raise

productivity, within and across sectors.

Regarding financial policy, financial development index exerts a positive and significant effect on sectoral structural change in the multilevel model (Table 4). This finding indeed corroborates with the existing literature suggesting that low financial development can lead to misallocation of credit among producers in developing countries (Andrews & Cingano, 2014).

As per the macroeconomic institutions, central bank transparency and fiscal rules improves structural change according to the baseline results (Table 4). These macroeconomic institutions endorse macroeconomic stability and improve the implementation of structural policies. In particular, central bank transparency ensures the accountability of the monetary stability. This makes the domestic environment more predictable and improves the allocation of resources.

Moving to the macroeconomic stabilization policies, the effects of macroeconomic outcomes and tools on sectoral structural change are studied. Regarding macroeconomic outcomes, the business cycle (indicating bad times) increases structural change as per the multilevel model (see Tables 1 and 5). This is known as the cleansing effect of the downturns which provides some silver lining to economically painful periods (Bartelsman et al., 2018). For instance, the downturns can induce the exit of low productive firms which would contribute positively to aggregate productivity growth. In addition to firms exit, recessions can also cleanse the economy through job losses in firms. Hence, downturns can make more resources available for production arrangements that are relatively more productive (Bartelsman et al., 2018; Van den Bosch & Vanormelingen, 2022).

Furthermore, the cyclical component of the REER exerts a negative and significant effect on structural change as per the baseline results (Table 2). It is worth noting that the an increase in REER index indicates appreciation of the home currency against the basket of trading partners' currencies. REER usually exhibit short term volatility and this might be reflected on the cyclical component of the REER. The literature suggested that movements in real exchange rates generate labor market adjustment costs. Some studies found that manufacturing employment declines in response to an appreciation of the real exchange rate as part of these adjustment costs (Klein et al., 2003).

On the macroeconomic tools front, policy rate exerts a negative and significant effect on structural change (Table 5). In fact, high policy rates are sometimes prevalent in developing countries in order to control inflation. This results in crowding out loans to firms, especially small ones that do not have access to capital markets and as previously mentioned access to finance is essential for structural change. Furthermore, fragmented financial markets can lead to keeping high spreads between deposits and loans rates which makes obtaining loans difficult for most firms (Nissanke, 2019). While mentioning the impact of policy rates, it is important to highlight that the effectiveness of monetary policy transmission mechanisms (the extent to which official rates affect market rates) depends on the development of the financial system (Lopes et al., 2017). As per the fiscal policy, the corporate tax rate exerts a positive and significant effect on structural change. In fact, fiscal policy matters for structural change since it can correct market failures by defining

micro adjustments at firms and households level. In particular, taxes can be used to penalise uncompetitive behavior by economic agents (Lopes et al., 2017).

As per the cyclicity, fiscal policy procyclicality index reduces structural change according to the multivel model results. Similarly, monetary policy countercyclicality index increases structural change according to the baseline (Tables 2 and 5). Developing countries can be particularly vulnerable to exogenous shocks, including commodity prices swings. In this context, countercyclical policies have been advocated in the literature as policy drivers of structural change in developing countries and this paper findings provides a useful quantification to this argument.

Finally, regarding the policies measures on the sectoral level, competition and trade de facto measures from WBES exert a positive and significant effect structural change (Table 3). The number of firms represents a direct measure of competition (Youssef & Zaki, 2022). As per the share of foreign input, This is an interesting finding since it highlights the reliance of firms in developing countries on imported intermediate inputs. The literature suggests the use of foreign inputs improve firms productivity and more broadly improves growth and development. This is due to the high quality of these inputs and the related embedded technology and to the fact that domestic inputs can be imperfect substitutes (Amin, Islam, & Wong, 2014).

MENA specific results are reported in Tables 6-10 and they are broadly consistent with the overall results that are based on all low and middle income countries in the sample. Results on real exchange rate by sector and proxy of exogeneous demand or business cycle by sector will be included in an upcoming draft.

Table 1: Sectoral structural change and structural policies, baseline

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Foreign ownership	0.0286*** (0.00687)	0.0315*** (0.00809)	0.0285*** (0.00707)	0.0289*** (0.00707)	0.0250*** (0.00695)	0.0282*** (0.00691)	0.0268*** (0.00692)	0.0266*** (0.00707)	0.0221*** (0.00700)	0.0332*** (0.0108)	0.0199 (0.0144)
Regis. duration	0.0968*** (0.0244)	0.125*** (0.0279)	0.134*** (0.0256)	0.136*** (0.0256)	0.129*** (0.0250)	0.0936*** (0.0244)	0.0965*** (0.0244)	0.0961*** (0.0252)	0.114*** (0.0251)	0.147*** (0.0361)	0.167*** (0.0503)
Training	0.144*** (0.0500)	0.166*** (0.0584)	0.0915* (0.0532)	0.0991* (0.0534)	0.0919* (0.0514)	0.143*** (0.0508)	0.148*** (0.0507)	0.158*** (0.0517)	0.172*** (0.0511)	0.220*** (0.0764)	0.0479 (0.102)
Young	0.269*** (0.0857)	0.383*** (0.101)	0.274*** (0.0880)	0.276*** (0.0880)	0.294*** (0.0851)	0.258*** (0.0859)	0.251*** (0.0858)	0.141 (0.0879)	0.262*** (0.0870)	0.303** (0.131)	0.392** (0.173)
Medium	-0.157** (0.0670)	-0.230*** (0.0778)	-0.191*** (0.0694)	-0.191*** (0.0694)	-0.178*** (0.0678)	-0.173** (0.0672)	-0.170** (0.0672)	-0.126* (0.0689)	-0.132* (0.0681)	-0.0690 (0.104)	-0.105 (0.139)
Certification	-0.0122 (0.0227)	0.0191 (0.0256)	-0.00775 (0.0232)	-0.00793 (0.0232)	-0.00162 (0.0230)	-0.00710 (0.0228)	-0.00489 (0.0228)	-0.00557 (0.0231)	-0.00779 (0.0229)	-0.0990*** (0.0367)	-0.0391 (0.0450)
Competition											
Comp law age	0.00270 (0.00709)										
Markup		0.0558 (0.0723)									
Trade											
Enfo. of trade agreem (WTOX)			0.0114 (0.0116)								
Enfo. of trade agreements				-0.00604 (0.0169)							
WTO member					0.0766*** (0.0236)						
Tariff MFN						0.0342 (0.0220)					
Tariff applied mean							0.0515*** (0.0171)				
Finance											
Credit to priv sec								-0.0578*** (0.0133)			
Fin dev									-0.398*** (0.0843)		
Macro institutions											
Central bank transp.										0.0567* (0.0317)	
Fiscal rules											0.0859* (0.0520)
Constant	3.749*** (0.0733)	3.614*** (0.124)	3.657*** (0.0779)	3.686*** (0.0886)	3.630*** (0.0759)	3.694*** (0.0866)	3.659*** (0.0816)	3.968*** (0.0830)	3.789*** (0.0750)	3.460*** (0.121)	3.544*** (0.154)
Sector fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,667	2,698	3,412	3,412	3,530	3,649	3,649	3,492	3,566	1,513	1,029
R-squared	0.047	0.054	0.053	0.053	0.053	0.047	0.049	0.053	0.053	0.081	0.083

Notes:

Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

All policies variables represent 5 years averages.

Table 2: Sectoral structural change and macroeconomic stabilization policies, baseline

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Foreign ownership	0.0292*** (0.00687)	0.0289*** (0.00671)	0.0348*** (0.0114)	0.0314*** (0.00704)	0.0312*** (0.00704)	0.0351*** (0.00948)	0.0259*** (0.00687)	0.0275*** (0.00692)	0.0235*** (0.00750)
Regis. duration	0.0957*** (0.0245)	0.103*** (0.0239)	0.105** (0.0411)	0.0918*** (0.0250)	0.0932*** (0.0250)	0.0907*** (0.0332)	0.0961*** (0.0244)	0.0993*** (0.0243)	0.103*** (0.0266)
Training	0.127** (0.0504)	0.137*** (0.0492)	0.155* (0.0875)	0.157*** (0.0514)	0.149*** (0.0514)	0.235*** (0.0679)	0.118** (0.0502)	0.138*** (0.0506)	0.146*** (0.0542)
Young	0.253*** (0.0856)	0.253*** (0.0833)	0.240 (0.149)	0.290*** (0.0882)	0.297*** (0.0882)	0.324*** (0.119)	0.250*** (0.0853)	0.242*** (0.0854)	0.214** (0.0922)
Medium	-0.159** (0.0671)	-0.161** (0.0658)	-0.122 (0.111)	-0.174** (0.0686)	-0.171** (0.0686)	-0.159* (0.0915)	-0.174*** (0.0671)	-0.156** (0.0679)	-0.126* (0.0735)
Certification	-0.00536 (0.0227)	-0.0156 (0.0224)	-0.0490 (0.0392)	-0.0106 (0.0231)	-0.0110 (0.0231)	-0.00499 (0.0307)	-0.000779 (0.0227)	-0.00748 (0.0229)	-0.0287 (0.0264)
Outcomes									
Inflation	-0.0207 (0.0132)								
Business cycle		0.0617*** (0.0176)							
Misalignment			-0.0233 (0.0155)						
REER cyclical				-0.211** (0.105)					
REER trend					0.116** (0.0545)				
Tools									
Policy rate						-0.0687*** (0.0215)			
Corpo tax rate							0.0979*** (0.0239)		
Cyclicality									
Fiscal policy procyclicality								0.0156 (0.0148)	
Monetary policy countercyclicality									0.0348** (0.0174)
Constant	3.799*** (0.0795)	3.713*** (0.0729)	3.674*** (0.131)	3.765*** (0.0759)	3.219*** (0.260)	3.876*** (0.108)	3.466*** (0.100)	3.750*** (0.0737)	3.757*** (0.0805)
Sector fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,637	3,753	1,184	3,536	3,536	2,111	3,640	3,651	3,030
R-squared	0.047	0.050	0.053	0.050	0.050	0.059	0.052	0.046	0.053

Notes:

Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

All policies variables represent 5 years averages.

Table 3: Sectoral structural change and policies measured at sector level, baseline

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Foreign ownership	0.0281*** (0.00672)	0.0282*** (0.00757)	0.0331*** (0.00682)	0.0290*** (0.00673)	0.0324*** (0.00965)		
Regis. duration	0.0946*** (0.0240)	0.0805*** (0.0259)	0.112*** (0.0241)	0.102*** (0.0240)	0.0741** (0.0316)		
Training	0.139*** (0.0493)	0.175*** (0.0555)	0.164*** (0.0497)	0.151*** (0.0501)	0.219*** (0.0723)		
Young	0.242*** (0.0836)	0.250*** (0.0951)	0.255*** (0.0833)	0.250*** (0.0835)	0.216* (0.122)		
Medium	-0.161** (0.0658)	-0.178** (0.0729)	-0.127* (0.0664)	-0.152** (0.0661)	-0.282*** (0.0911)		
Certification	-0.00375 (0.0225)	-0.0103 (0.0248)	-0.00472 (0.0224)	-0.00835 (0.0224)	0.0139 (0.0327)		
De facto structural policies							
Number of firms	0.0198** (0.00944)						
Share of foreign inputs		0.0218** (0.00957)					
Exporting firms			-0.191*** (0.0526)				
Firms access to finance				-0.123 (0.0989)			
Macro policies on sector level							
Tariff					0.0669*** (0.0240)		
Business cycle							
Real exchange rate							
Constant	3.714*** (0.0742)	3.743*** (0.0823)	3.738*** (0.0722)	3.816*** (0.0897)	3.707*** (0.107)		
Sector fixed effect	Yes	Yes	Yes	Yes	Yes		
Observations	3,753	3,151	3,753	3,753	2,023		
R-squared	0.048	0.046	0.050	0.047	0.043		

Notes:

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Sectoral macro policies will be added in an upcoming draft.

Table 4: Sectoral structural change and structural policies, multilevel model

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Foreign ownership	-0.0132 (0.0214)	-0.0244 (0.0235)	-0.00696 (0.0217)	-0.00673 (0.0217)	-0.0101 (0.0211)	-0.00795 (0.0211)	-0.00771 (0.0211)	-0.0107 (0.0221)	-0.0122 (0.0212)	0.000158 (0.0359)	-0.0133 (0.0399)
Regis. duration	0.00337 (0.0350)	0.0387 (0.0287)	0.0314 (0.0267)	0.0318 (0.0268)	0.0340 (0.0264)	0.00368 (0.0346)	0.00379 (0.0344)	0.000809 (0.0347)	0.00160 (0.0361)	0.0289 (0.0409)	0.0889* (0.0494)
Training	0.0286 (0.0213)	0.0206 (0.0264)	0.0234 (0.0222)	0.0233 (0.0222)	0.0225 (0.0213)	0.0296 (0.0215)	0.0292 (0.0214)	0.0285 (0.0213)	0.0269 (0.0223)	0.0917*** (0.0344)	0.0170 (0.0337)
Young	0.0126 (0.0249)	0.0313 (0.0299)	0.0175 (0.0258)	0.0177 (0.0258)	0.0229 (0.0248)	0.0139 (0.0248)	0.0139 (0.0246)	-0.00277 (0.0265)	0.0149 (0.0262)	0.0480 (0.0403)	0.00670 (0.0521)
Medium	-0.0234 (0.0159)	-0.0427** (0.0171)	-0.0336** (0.0159)	-0.0337** (0.0159)	-0.0326** (0.0156)	-0.0253 (0.0160)	-0.0254 (0.0160)	-0.0260 (0.0162)	-0.0204 (0.0163)	-0.0311 (0.0241)	-0.0489* (0.0286)
Certification	0.00782 (0.0184)	0.0176 (0.0238)	0.00908 (0.0180)	0.00919 (0.0180)	0.0119 (0.0179)	0.0109 (0.0178)	0.0109 (0.0178)	0.00764 (0.0175)	0.00863 (0.0198)	-0.0193 (0.0245)	0.0239 (0.0300)
Competition											
Comp law age	-0.183 (0.241)										
Markup		-0.123* (0.0677)									
Trade											
Enforc. of trade agreem (WTOX)			0.00833 (0.0566)								
Enforc. of trade agreements				-0.0310 (0.106)							
WTO membership					-0.121 (0.143)						
Tariff MFN						-0.151 (0.168)					
Tariff applied mean							-0.0704 (0.149)				
Finance											
Credit to priv sector								0.112 (0.138)			
Fin dev									0.307** (0.143)		
Macro institutions											
Central bank transp.										-0.191 (0.153)	
Fiscal rules											-0.366 (0.246)
Constant	-0.754** (0.347)	-0.0473 (0.232)	0.00789 (0.211)	-0.0278 (0.229)	-0.543** (0.255)	-0.281 (0.413)	-0.422 (0.396)	-0.374 (0.310)	0.353 (0.261)	0.265 (0.250)	0.276 (0.308)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,925	2,887	3,662	3,662	3,783	3,904	3,904	3,737	3,812	1,593	1,095
Number of groups	115	82	112	112	116	117	117	116	114	61	46

Notes:

Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Standard errors are clustered at the country level

All policies variables represent 5 years averages.

Table 5: Sectoral structural change and macroeconomic stabilization policies, multilevel model

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Foreign ownership	-0.00893 (0.0213)	-0.0102 (0.0209)	-0.0105 (0.0244)	-0.00862 (0.0213)	-0.00829 (0.0212)	0.0212 (0.0315)	-0.0138 (0.0217)	-0.0117 (0.0217)	-0.0238 (0.0210)
Regis. duration	0.00250 (0.0349)	0.00428 (0.0347)	-0.00110 (0.0416)	0.00228 (0.0363)	0.00189 (0.0361)	-0.0419 (0.0523)	0.00528 (0.0346)	0.00455 (0.0345)	-0.0155 (0.0392)
Training	0.0282 (0.0210)	0.0285 (0.0210)	0.0192 (0.0245)	0.0344 (0.0215)	0.0334 (0.0216)	0.0784*** (0.0281)	0.0271 (0.0215)	0.0260 (0.0216)	0.0379* (0.0222)
Young	0.0102 (0.0250)	0.0127 (0.0242)	0.0136 (0.0321)	0.0166 (0.0255)	0.0180 (0.0253)	0.00674 (0.0378)	0.00963 (0.0252)	0.0119 (0.0240)	-0.00173 (0.0265)
Medium	-0.0253 (0.0156)	-0.0242 (0.0155)	-0.0253 (0.0181)	-0.0262 (0.0160)	-0.0257 (0.0161)	-0.0135 (0.0208)	-0.0270* (0.0161)	-0.0252 (0.0163)	-0.0173 (0.0176)
Certification	0.00903 (0.0168)	0.00669 (0.0168)	0.0172 (0.0238)	0.0114 (0.0201)	0.0112 (0.0201)	0.0141 (0.0291)	0.00885 (0.0173)	0.00964 (0.0179)	0.00703 (0.0196)
Outcomes									
Inflation	-0.0525 (0.0380)								
Business cycle		0.0855* (0.0466)							
Misalignment			0.0246 (0.0595)						
REER cyclical				-0.0397 (0.0396)					
REER trend					0.0134 (0.0427)				
Tools									
Policy rate						-0.0869** (0.0394)			
Corporate tax rate							0.125 (0.107)		
Cyclical									
Fiscal policy procyclicality								-0.0792** (0.0337)	
Monetary policy countercyclicality									0.0442 (0.0338)
Constant	-0.560** (0.252)	-0.603** (0.247)	-1.086*** (0.321)	-0.524* (0.278)	-0.492* (0.288)	-0.395 (0.299)	-0.438 (0.274)	-0.528** (0.242)	-0.408 (0.282)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,901	4,017	2,829	3,783	3,783	2,244	3,897	3,905	3,235
Number of groups	117	120	82	113	113	61	116	117	101

Notes:

Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Standard errors are clustered at the country level

All policies variables represent 5 years averages.

Table 6: Sectoral structural change and structural policies, Middle East baseline

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Foreign ownership	0.0195 (0.0205)	0.0211 (0.0233)	0.0155 (0.0209)	0.0158 (0.0207)	0.0225 (0.0202)	0.0179 (0.0201)	0.0181 (0.0203)	0.0161 (0.0200)	0.0163 (0.0201)	0.0436 (0.0316)	-0.0476 (0.0579)
Regis. duration	-0.00322 (0.0685)	0.0477 (0.0892)	-0.00705 (0.0769)	-0.00551 (0.0753)	0.0150 (0.0707)	-0.00120 (0.0706)	-0.0263 (0.0708)	-0.0653 (0.0847)	-0.0321 (0.0817)	0.0587 (0.108)	-0.353 (0.244)
Training	-0.0904 (0.138)	-0.120 (0.162)	-0.175 (0.150)	-0.185 (0.149)	-0.123 (0.142)	-0.0856 (0.140)	-0.123 (0.142)	-0.118 (0.146)	-0.0951 (0.151)	0.0617 (0.228)	0.0821 (0.447)
Young	-0.153 (0.211)	-0.0895 (0.257)	-0.182 (0.232)	-0.165 (0.227)	-0.0976 (0.213)	-0.193 (0.214)	-0.157 (0.216)	-0.158 (0.223)	-0.168 (0.233)	-0.0832 (0.324)	-0.818 (0.587)
Medium	-0.201 (0.176)	-0.152 (0.208)	-0.196 (0.188)	-0.224 (0.188)	-0.227 (0.182)	-0.240 (0.179)	-0.250 (0.180)	-0.207 (0.190)	-0.147 (0.193)	-0.124 (0.271)	-0.0123 (0.471)
Certification	-0.0681 (0.0587)	-0.0555 (0.0649)	-0.0672 (0.0604)	-0.0731 (0.0604)	-0.0659 (0.0604)	-0.0895 (0.0592)	-0.0766 (0.0595)	-0.0676 (0.0614)	-0.0555 (0.0609)	-0.143 (0.113)	-0.111 (0.290)
Competition											
Comp law age	-0.00966 (0.0184)										
Markup		0.168 (0.149)									
Trade											
Enfo of trade agreements (WTOX)			0.0481 (0.0322)								
Enforc. of trade agreements				0.0932* (0.0494)							
WTO member					-0.0254 (0.0503)						
Tariff MFN						-0.134*** (0.0437)					
Tariff applied mean							-0.0358 (0.0379)				
Finance											
Credit to priv sector								0.0482 (0.0325)			
Fin dev									0.00879 (0.239)		
Macro institutions											
Central bank transp.										-0.0605 (0.0690)	
Fiscal rules											0.185 (0.210)
Constant	4.048*** (0.212)	3.643*** (0.376)	3.981*** (0.227)	3.784*** (0.239)	3.992*** (0.214)	4.325*** (0.230)	4.181*** (0.234)	4.039*** (0.225)	4.094*** (0.238)	3.903*** (0.337)	4.995*** (0.664)
Sector FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	588	444	525	525	562	569	569	558	506	282	105
R-squared	0.063	0.083	0.074	0.076	0.065	0.084	0.070	0.065	0.080	0.107	0.232

Notes:

Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

All policies variables represent 5 years averages.

Table 7: Sectoral structural change and macroeconomic stabilization policies, Middle East baseline

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Foreign ownership	0.0175 (0.0183)	0.0154 (0.0185)	-0.0844* (0.0435)	0.0188 (0.0207)	0.0221 (0.0208)	0.00588 (0.0283)	0.0295 (0.0187)	0.0313 (0.0207)	0.0188 (0.0184)	0.0353* (0.0208)
Regis. duration	-0.0746 (0.0701)	-0.0119 (0.0661)	-0.234 (0.180)	-0.0667 (0.0767)	-0.0533 (0.0719)	-0.261** (0.115)	0.0129 (0.0656)	0.00581 (0.0820)	-0.0254 (0.0663)	0.0389 (0.0702)
Training	-0.105 (0.134)	-0.0973 (0.135)	0.710** (0.308)	-0.0886 (0.142)	-0.0452 (0.144)	0.221 (0.218)	-0.0405 (0.137)	0.0112 (0.158)	-0.140 (0.136)	-0.00724 (0.158)
Young	-0.185 (0.203)	-0.139 (0.203)	-0.569 (0.459)	-0.222 (0.219)	-0.217 (0.218)	-0.652** (0.299)	-0.163 (0.205)	-0.0818 (0.216)	-0.121 (0.203)	-0.0283 (0.211)
Medium	-0.195 (0.170)	-0.215 (0.171)	0.0802 (0.363)	-0.163 (0.185)	-0.161 (0.184)	-0.0806 (0.250)	-0.271 (0.171)	-0.0949 (0.188)	-0.171 (0.171)	-0.110 (0.187)
Certification	-0.0516 (0.0577)	-0.0678 (0.0577)	-0.0529 (0.166)	-0.0459 (0.0608)	-0.0506 (0.0605)	-0.158 (0.117)	-0.0970* (0.0578)	-0.159* (0.0929)	-0.0555 (0.0578)	-0.157* (0.0929)
Outcomes										
Inflation	-0.0912*** (0.0327)									
Business cycle		-0.0527 (0.0464)								
Misalignment			-0.0209 (0.0351)							
REER cyclical				-0.238 (0.213)						
REER trend					0.215* (0.117)					
Tools										
Policy rate						-0.109 (0.0698)				
Corp tax rate							-0.226*** (0.0847)			
Lending rate								-0.0601 (0.0744)		
Cyclicality										
Fiscal policy procyclicality									-0.0727** (0.0335)	
Monetary policy countercyclicality										-0.0347 (0.0398)
Constant	4.387*** (0.240)	4.074*** (0.207)	4.499*** (0.517)	4.195*** (0.234)	3.142*** (0.567)	4.965*** (0.387)	4.678*** (0.317)	4.171*** (0.376)	4.100*** (0.206)	3.924*** (0.218)
Sector fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	604	604	151	546	546	295	589	393	604	393
R-squared	0.074	0.064	0.227	0.071	0.075	0.135	0.077	0.117	0.069	0.117

Notes:

Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

All policies variables represent 5 years averages.

Table 8: Sectoral structural change and policies measured at sector level, Middle East baseline

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Foreign ownership	0.0175 (0.0183)	0.0154 (0.0185)	-0.0844* (0.0435)	0.0188 (0.0207)	0.0221 (0.0208)	0.00588 (0.0283)	0.0295 (0.0187)	0.0313 (0.0207)	0.0188 (0.0184)	0.0353* (0.0208)
Regis. duration	-0.0746 (0.0701)	-0.0119 (0.0661)	-0.234 (0.180)	-0.0667 (0.0767)	-0.0533 (0.0719)	-0.261** (0.115)	0.0129 (0.0656)	0.00581 (0.0820)	-0.0254 (0.0663)	0.0389 (0.0702)
Training	-0.105 (0.134)	-0.0973 (0.135)	0.710** (0.308)	-0.0886 (0.142)	-0.0452 (0.144)	0.221 (0.218)	-0.0405 (0.137)	0.0112 (0.158)	-0.140 (0.136)	-0.00724 (0.158)
Young	-0.185 (0.203)	-0.139 (0.203)	-0.569 (0.459)	-0.222 (0.219)	-0.217 (0.218)	-0.652** (0.299)	-0.163 (0.205)	-0.0818 (0.216)	-0.121 (0.203)	-0.0283 (0.211)
Medium	-0.195 (0.170)	-0.215 (0.171)	0.0802 (0.363)	-0.163 (0.185)	-0.161 (0.184)	-0.0806 (0.250)	-0.271 (0.171)	-0.0949 (0.188)	-0.171 (0.171)	-0.110 (0.187)
Certification	-0.0516 (0.0577)	-0.0678 (0.0577)	-0.0529 (0.166)	-0.0459 (0.0608)	-0.0506 (0.0605)	-0.158 (0.117)	-0.0970* (0.0578)	-0.159* (0.0929)	-0.0555 (0.0578)	-0.157* (0.0929)
Outcomes										
Inflation	-0.0912*** (0.0327)									
Business cycle		-0.0527 (0.0464)								
Misalignment			-0.0209 (0.0351)							
REER cyclical				-0.238 (0.213)						
REER trend					0.215* (0.117)					
Tools										
Policy rate						-0.109 (0.0698)				
Corp tax rate							-0.226*** (0.0847)			
Lending rate								-0.0601 (0.0744)		
Cyclicality										
Fiscal policy procyclicality									-0.0727** (0.0335)	
Monetary policy countercyclicality										-0.0347 (0.0398)
Constant	4.387*** (0.240)	4.074*** (0.207)	4.499*** (0.517)	4.195*** (0.234)	3.142*** (0.567)	4.965*** (0.387)	4.678*** (0.317)	4.171*** (0.376)	4.100*** (0.206)	3.924*** (0.218)
Sector fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	604	604	151	546	546	295	589	393	604	393
R-squared	0.074	0.064	0.227	0.071	0.075	0.135	0.077	0.117	0.069	0.117

Notes:

Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Sectoral macro policies will be added in the revised draft.

Table 9: Sectoral structural change and structural policies, Middle East multilevel model

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Foreign ownership	0.0166 (0.0478)	-0.00109 (0.0443)	0.0158 (0.0471)	0.0169 (0.0483)	0.0186 (0.0471)	0.0178 (0.0489)	0.0147 (0.0459)	-0.00973 (0.0432)	-0.0128 (0.0415)	-0.0159 (0.0918)	-0.193*** (0.0622)
Regis. duration	-0.0503 (0.0815)	-0.0555 (0.103)	-0.0459 (0.0865)	-0.0442 (0.0861)	-0.0500 (0.0842)	-0.0522 (0.0840)	-0.0540 (0.0797)	-0.0430 (0.0839)	-0.0474 (0.0993)	-0.127 (0.123)	-0.298* (0.159)
Training	0.0245 (0.0655)	0.000688 (0.0805)	-0.00823 (0.0674)	-0.00441 (0.0676)	0.0136 (0.0648)	0.0251 (0.0663)	0.0309 (0.0656)	0.0214 (0.0657)	0.0263 (0.0773)	0.0890 (0.111)	0.00127 (0.122)
Young	-0.0952 (0.0940)	-0.114 (0.128)	-0.0768 (0.111)	-0.0709 (0.107)	-0.0844 (0.0914)	-0.0876 (0.0957)	-0.0870 (0.0944)	-0.0921 (0.0875)	-0.0992 (0.113)	-0.170 (0.155)	-0.289 (0.237)
Medium	-0.0710* (0.0424)	-0.0778 (0.0570)	-0.0711 (0.0499)	-0.0736 (0.0492)	-0.0779* (0.0437)	-0.0713* (0.0423)	-0.0759* (0.0429)	-0.0573 (0.0438)	-0.0572 (0.0541)	-0.102 (0.0933)	-0.0516 (0.120)
Certification	0.00222 (0.0336)	-0.0171 (0.0393)	0.00894 (0.0372)	0.0147 (0.0364)	0.00810 (0.0360)	0.000695 (0.0336)	0.000298 (0.0297)	0.00682 (0.0338)	0.00569 (0.0405)	-0.0250 (0.0764)	0.160 (0.147)
Competition											
Comp law age	-0.0620 (0.774)										
Markup		-0.720*** (0.132)									
Trade											
Enforc. of trade agreements (WTOX)			0.603*** (0.0889)								
Enforc. of trade agreements				0.487*** (0.128)							
WTO membership					-0.251 (0.266)						
Tariff MFN						0.0415 (0.216)					
Tariff applied mean							0.448 (0.353)				
Finance											
Credit to priv sector								0.822** (0.378)			
Fin Dev									1.209*** (0.337)		
Macro institutions											
Central Bank Transp										-0.0827 (0.371)	
Fiscal rules											0.385 (0.285)
Constant	-0.0532 (1.072)	0.101 (0.264)	0.0733 (0.215)	-0.193 (0.234)	0.00840 (0.239)	-0.0696 (0.559)	-0.846 (0.824)	1.069* (0.595)	-1.313*** (0.327)	0.0168 (0.477)	0.422 (0.502)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	626	474	558	558	596	604	604	590	538	293	108
Number of groups	17	14	17	17	18	16	16	18	15	11	4

Notes:

Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Standard errors are clustered at the country level

All policies variables represent 5 years averages.

Table 10: Sectoral structural change and macroeconomic stabilization policies, multilevel model

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Foreign ownership	0.00844 (0.0434)	0.00996 (0.0456)	-0.0820** (0.0386)	-0.00622 (0.0429)	-0.00200 (0.0457)	-0.0211 (0.0922)	0.00672 (0.0468)	0.0734 (0.0565)	0.00524 (0.0458)	0.0850 (0.0611)
Regis. duration	-0.0449 (0.0822)	-0.0468 (0.0804)	-0.0429 (0.136)	-0.0638 (0.0905)	-0.0614 (0.0937)	-0.274** (0.134)	-0.0441 (0.0839)	-0.141*** (0.0414)	-0.0417 (0.0815)	-0.142*** (0.0395)
Training	0.0233 (0.0598)	0.0184 (0.0603)	0.0796 (0.110)	0.0357 (0.0679)	0.0323 (0.0657)	0.136 (0.128)	0.0317 (0.0607)	-0.0246 (0.0366)	0.0104 (0.0600)	0.00950 (0.0304)
Young	-0.0899 (0.0879)	-0.0924 (0.0873)	-0.0752 (0.123)	-0.127 (0.0926)	-0.122 (0.0908)	-0.258* (0.137)	-0.117 (0.0860)	-0.0867 (0.0806)	-0.0905 (0.0847)	-0.0732 (0.0812)
Medium	-0.0687 (0.0418)	-0.0663 (0.0412)	-0.00537 (0.0545)	-0.0639 (0.0469)	-0.0604 (0.0461)	-0.0663 (0.0473)	-0.0789* (0.0418)	-0.0568 (0.0422)	-0.0664 (0.0413)	-0.0526 (0.0424)
Certification	0.00200 (0.0334)	-0.000388 (0.0337)	-0.0231 (0.0401)	-0.00117 (0.0330)	0.00185 (0.0366)	-0.0189 (0.0334)	-0.00258 (0.0347)	0.0240 (0.0307)	0.00575 (0.0337)	0.0170 (0.0323)
Outcomes										
Inflation	0.0394 (0.213)									
Business cycle		0.0961 (0.252)								
Misalignment			0.0408 (0.0965)							
REER cyclical				-0.157 (0.0983)						
REER trend					-0.0144 (0.136)					
Tools										
Policy rate						0.0597 (0.100)				
Corporate tax rate							-0.189 (0.147)			
Lending rate								-1.381*** (0.170)		
Cyclicality										
Fiscal policy cyclical									-0.122 (0.0745)	
Monetary policy cyclical										0.0455 (0.107)
Constant	-0.0133 (0.331)	-0.0815 (0.288)	-0.275 (0.353)	0.181 (0.262)	-0.00229 (0.237)	-0.429 (0.301)	0.0505 (0.220)	1.205*** (0.267)	0.00588 (0.219)	-0.0527 (0.232)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	642	642	318	582	582	310	627	410	642	410
Number of groups	18	18	9	16	16	7	17	11	18	11

Notes:

Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Standard errors are clustered at the country level

All policies variables represent 5 years averages.

6 Conclusion

Structural change drives development through a process related to transforming a country's production structure. It takes place within the sectors and involves a reallocation of resources between firms (Szirmai and Foster-McGregor, 2021; Tregenna et al., 2021). Unfortunately, this transformation has not been universal and the desirable patterns of structural change remain hindered in several developing countries. Within this context, this paper aims at studying the policies that can improve the structural change process at the sectoral level in developing countries.

As a first step, a productivity decomposition exercise is undertaken in order to study the patterns of structural change and its contribution to productivity in different sectors in selected MENA countries and their regional average. The main findings from this decomposition show that there is a great extent of heterogeneity in the patterns of structural change among the different sectors. Furthermore, the contribution of structural change to productivity is broadly modest relative to the within component contribution among both manufacturing and services sectors.

In a second step, the paper studies the policies that could possibly leverage structural change at the sectoral level. The main findings show that competition, trade, financial policies and macroeconomic institutions along with business cycle downturns improve structural change. In contrast, policy rate and cyclical REER appreciation reduce it. The paper's findings also highlight the importance of countercyclical fiscal and monetary policies in driving structural change. Finally, competition and trade de facto structural policies measures enhance structural change.

From a policy perspective, the MENA region is unfortunately prone to the recent global crises, including the Russia-Ukraine conflict and the COVID 19 pandemic. These crises are hitting while the region is already suffering from common and longstanding structural challenges, including income and gender disparities, lack of contestability, low diversification and structural transformation, limited job creation, and regional fragmentation. Policy makers need to ensure that structural change and long run sustainable growth are not being sacrificed while facing these crises. Indeed, this paper findings confirm the importance of structural policies in improving structural change. These policies can be costly to implement but they improve the allocation of resources. On the macroeconomic policies front, a sound use of macroeconomic policies is needed in order to drive structural change. This means that macroeconomic stability should not be compromised. At the same time, this stability in its own is insufficient and countercyclical policies are essential.

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Appendices

Appendix A Countries and Sectors

Table A1: Countries by yearly income and WBES survey rounds

Low income				Lower middle income				Upper middle income			
Country	Rounds WBES	Country	Rounds WBES	Country	Rounds WBES	Country	Rounds WBES	Country	Rounds WBES	Country	Rounds WBES
Afghanistan	2008 2014	Mali	2007 2010	Albania	2007 2006	Lesotho Mauritania	2016 2014	Albania	2013 2019	Lebanon	2013 2019
Bangladesh	2013		2016	Angola	2010	Moldova	2009	Antigua	2010	Lithuania	2009
Benin	2016	Mauritania	2006	Armenia	2009 2013		2013 2019	Barbuda	2006	Malaysia	2015
Burkina Faso	2009	Mozambique	2007	Belize	2010		2009	Argentina	2010	Mauritius	2009
Burundi	2006 2014		2018 2009	Bhutan	2015	Mongolia	2009 2013	Armenia	2020 2009	Mexico	2006 2010
Chad	2018	Nepal	2013	Bolivia	2010 2017		2013 2019	Azerbaijan	2013 2019	Montenegro	2009 2013
Congo, Dem. Rep.	2006 2010	Niger Nigeria	2017 2007	Cambodia	2016	Morocco	2019		2008		2019
Ethiopia	2011 2015	Rwanda Senegal	2006 2007	Cameroon	2009 2016	Myanmar	2014 2016	Belarus	2013 2013	Namibia	2014 2009
Gambia,	2006 2018	Sierra Leone South Sudan	2017 2014	Colombia	2006 2009	Nicaragua	2006 2010	Bosnia	2009 2013	North Macedonia	2013 2019
Ghana	2007		2008	Côte d'Ivoire	2016		2016	Herzegovina	2019	Panama	2006 2010
Guinea	2006 2016	Tajikistan	2013 2019	Djibouti	2013	Nigeria	2014	Botswana	2010	Paraguay	2017
Guinea-Bissau	2006		2006	Ecuador	2006	Pakistan	2013	Brazil	2009	Peru	2010
Kenya	2007 2013	Tanzania	2013 2016		2013	Papua New Guinea	2015		2007		2017
Kyrgyz Republic	2009	Togo	2016	Egypt	2016 2020	Paraguay	2006 2010	Bulgaria	2009 2013	Romania	2009 2013
Lao PDR	2009	Uganda	2006	El Salvador	2006	Peru	2006		2019	Russian Federation	2009
Liberia	2017		2013		2010	Philippines	2009	Chile	2006 2010		2019 2009
Madagascar	2009	Uzbekistan	2008		2016	Senegal	2014	China	2012	Serbia	2013
	2013	Zambia	2007	Eswatini	2006	Solomon Islands	2015	Colombia	2010		2019
Malawi	2014	Zimbabwe	2016		2016	Sri Lanka	2011		2017	South Africa	2007
				Georgia	2013	Sudan	2014	Costa Rica	2010	St. Kitts	2020
				Ghana	2013	Timor-Leste	2015	Croatia	2007		2010
				Guatemala	2006		2021	Dominica	2010	Nevis	2010
					2010	Tunisia	2020	Dominican Republic	2010	St. Lucia	2010
				Guyana	2010		2008		2016	St. Vincent	2010
				Honduras	2006	Ukraine	2013	Ecuador	2010	the Gren.	2010
					2010		2019	Georgia	2017	Suriname	2018
				India	2014	Uzbekistan	2013		2019	Thailand	2016
				Indonesia	2009		2019	Guatemala	2017	Tunisia	2013
					2015	Vietnam	2009	Grenada	2010		2008
				Iraq	2011	West Bank and Gaza	2013	Guatemala	2017	Turkey	2013
				Kenya	2018		2019	Hungary	2013		2015
					2009		2010	Jamaica	2010		2019
				Kosovo	2013	Yemen	2013		2013	Uruguay	2006
					2019		2019	Jordan	2019	Venezuela	2010
				Kyrgyz Republic	2012	Zambia	2013	Kazakhstan	2009		2010
					2016		2019		2019		
				Lao PDR	2016 2018			Kosovo	2019		

Table A2: ISIC sectors in the analysis

	code	Description
Manufacturing	1516	Manufacturing of food products and beverages, and manufacturing of tobacco products
	17	Manufacture of textiles
	18	Manufacture of wearing apparel; dressing and dyeing of fur
	19	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear
	20	Manufacture of wood and products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
	21	Manufacture of paper and paper products
	22	Publishing, printing and reproduction of recorded media
	2324	Manufacturing of coke, refined petroleum products and nuclear fuel, and manufacturing of chemicals and chemical products
	25	Manufacture of rubber and plastics products
	26	Manufacture of other non-metallic mineral products
	27	Manufacture of basic metals
	28	Manufacture of fabricated metal products, except machinery and equipment
	29	Manufacture of machinery and equipment n.e.c. Manufacturing of office, accounting and computing machinery; manufacturing of electrical machinery and apparatus n.e.c., manufacturing of radio, television and communication equipment and apparatus, and manufacturing of medical, precision and optical instruments, watches and clocks
	30313233	
	3435	Manufacturing of motor vehicles, trailers and semi-trailers, and manufacturing of other transport equipment
	36	Manufacture of furniture; manufacturing n.e.c.
	37	Recycling
40	Electricity, gas, steam and hot water supply	
45	Construction	
Services	50	Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel
	51	Wholesale trade and commission trade, except of motor vehicles and motorcycles
	52	Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods
	55	Hotels and restaurants
	60	Land transport; transport via pipelines
	61	Water transport
	62	Air transport
	63	Supporting and auxiliary transport activities; activities of travel agencies
	64	Post and telecommunications
	65	Financial intermediation, except insurance and pension funding
	70	Real estate activities
	72	Computer and related activities
	74	Other business activities
	93	Other service activities

Table A3: ISIC sectors and WTO tariffs by product

ISIC sector code	Description	Tariff code
10	Mining of coal and lignite; extraction of peat	MT2 - 12 - Minerals and metals
11	Extraction of crude petroleum and natural gas;	MT2 - 13 - Petroleum
12	Mining of uranium and thorium ores	MT2 - 12 - Minerals and metals
13	Mining of metal ores	MT2 - 12 - Minerals and metals
14	Other mining and quarrying	MT2 - 12 - Minerals and metals
17	Manufacture of textiles	MT2 - 16 - Textiles
18	Manufacture of wearing apparel; dressing and dyeing of fur	MT2 - 17 - Clothing
19	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear	MT2 - 18 - Leather, footwear, etc
20	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	MT2 - 15 - Wood, paper, etc
21	Manufacture of paper and paper products	MT2 - 15 - Wood, paper, etc
22	Publishing, printing and reproduction of recorded media	
25	Manufacture of rubber and plastics products	MT2 - 14 - Chemicals
26	Manufacture of other non-metallic mineral products	MT2 - 22 - Manufactures n.e.s.
27	Manufacture of basic metals	MT2 - 22 - Manufactures n.e.s.
28	Manufacture of fabricated metal products, except machinery and equipment	MT2 - 14 - Chemicals
29	Manufacture of machinery and equipment n.e.c.	MT2 - 19 - Non-electrical machinery
36	Manufacture of furniture; manufacturing n.e.c.	MT2 - 22 - Manufactures n.e.s.
		Average of MT2 - 01 - Animal products
		MT2 - 02 - Dairy products
		MT2 - 03 - Fruits, vegetables, plants
		MT2 - 04 - Coffee, tea
		MT2 - 05 - Cereals and preparations
		MT2 - 06 - Oilseeds, fats and oils
		MT2 - 07 - Sugars and confectionery
		MT2 - 08 - Beverages and tobacco
1516	Manufacturing of food products and beverages, and manufacturing of tobacco products	
2324	Manufacturing of coke, refined petroleum products and nuclear fuel, and manufacturing of chemicals and chemical products	MT2 - 14 - Chemicals
3435	Manufacturing of motor vehicles, trailers and semi-trailers, and manufacturing of other transport equipment	MT2 - 21 - Transport equipment
30313233	Manufacturing of office, accounting and computing machinery; manufacturing of electrical machinery and apparatus n.e.c., manufacturing of radio, television and communication equipment and apparatus, and manufacturing of medical, precision and optical instruments, watches and clocks	MT2 - 20 - Electrical machinery