

Policy Determinants of Structural Change in Developing Countries

Jala Youssef^{1, 2} Chahir Zaki² Mohamed Ali Marouani¹

¹University of Paris 1 Panthéon-Sorbonne

²Cairo University

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Introduction

- Structural change is defined as moving resources from traditional low productive activities into modern and more productive ones.
- Growth without structural change can be insufficient and may not necessarily lead to economic development.
- However, not all developing countries were able to achieve structural change.
- There is little agreement on what would constitute an appropriate set of policies conducive for structural change:
 - Macroeconomic stabilization policies or structural policies

- Macroeconomic policies should provide pro-investment macro conditions since labor movement to productive sectors depend on investment decisions.
- Developing countries can adopt a developmental approach for these policies to make them induce structural change.
- This entails going beyond the conventional and narrow concept of macroeconomic stability and undertaking countercyclical policies.
- Structural policies remove impediments to the efficient allocation of resources.
- We also need to differentiate between structural policies impact over the short run compared to the long run.

Objective and Contribution

- **Objective:**
- Exploring the policy determinants of structural change in developing countries.

- **Contribution:**
 - Investigating the role of both structural and macroeconomic stabilization policies in driving structural change.
 - Proposing novel measurements to examine policies that are likely to influence structural change:
 - Structural policies: antimonopoly policy, financial policy, labor policy, trade policy and macroeconomic institutions
 - Macroeconomic policies: exchange rate management, fiscal and monetary policies
 - Relying on the pooled mean group (PMG) estimator technique to distinguish between the short and long run impacts of the policies on structural change.
 - Using different measures of structural change: productivity growth decomposition, value added shares and exports diversification.

Outline

- 1 Introduction
- 2 Literature Review
- 3 Data
- 4 Stylized Facts
- 5 Econometric Specification
- 6 Empirical Findings
- 7 Conclusion

Literature Review

This paper is related to three main strands of the literature:

① Literature on structural change determinants

① Theoretical literature

- Challenge: Reconciling the sectoral Kuznet facts with the aggregate Kaldor facts and developing extensions to the one sector growth models
- Determinants: changes in real incomes, changes in relative sectoral prices via technological progress (Baumol cost disease), and changes in comparative advantages via international trade.

② Empirical literature

- Quite scarce, especially for developing countries.
- Measuring structural change: VA shares (Jha and Afrin, 2017; Dabla-Norris et al., 2013), labor reallocation effect (Konté et al., 2021; Morsy and Levy, 2020; Martins, 2019; McMillan et al., 2014) and exports diversification (Rougier, 2016).
- Determinants: country specific factors or initial conditions, macroeconomic stability and policy variables.
- Cross-countries empirical literature examining the determinants of deindustrialization or sectoral value added shares (Rodrik, 2016; Nickel et al., 2008).

② Literature on impact of structural policies

- Positive long run effects on growth and employment (Christiansen et al., 2013; Egert, 2018; Biljanovska and Sandri, 2018; Dabla-Norris et al., 2016).
- Existing studies do not disentangle these policies impact on the two components of labor productivity growth: structural change and within productivity.
- Different approaches (liberalization vs government intervention) are not accounted for.
- Evidence on developing countries is quite limited.

③ Literature on macroeconomic policies from a development perspective

- Macroeconomic policies connected to structural transformation agenda should go beyond conventional macro stability (Ocampo, 2011; Nissanke, 2019).
- A developmental approach of macroeconomic policies requires policy space for countercyclical policies. They help facing challenges related to external financing and fluctuations in commodity prices.
- On the empirical front, the literature provided evidence that countercyclical policies can enhance growth on the economy wide level (Aghion and Marinescu, 2007) and industry level (Aghion et al., 2014).
- The exchange rate can be also used to establish links between macroeconomic policies and structural transformation.

Data

Structural Change Data

152 low- and middle-income countries over the period 1991-2019

- 1 The productivity growth decomposition method (McMillan et al. (2014); McMillan and Rodrik (2011))

$$\frac{\Delta P_{it}}{P_{it-k}} = \frac{\sum_{j=1}^n \theta_{ijt-k} \Delta P_{it}}{P_{it-k}} + \frac{\sum_{j=1}^n P_{ijt} \Delta \theta_{ijt}}{P_{it-k}} \quad (1)$$

P_{it} economy wide labor productivity; P_{ijt} sector labor productivity; θ_{ijt} share of sector j in total employment; Δ change between $t-k$ and t .

- 2 Real value-added shares in agriculture, manufacturing and services (Jha and Afrin, 2017; Dabla Norris et al., 2013; Nickell et al., 2008)
- 3 Exports diversification index (Rougier, 2016)
 - Instead of being specialized in agricultural or resource-based activities, structural transformation involves a diversification into a more balanced domestic production structure and thereby more diversified export structure.

Structural Change Data

Employment by economic activity	Value added by sector (constant 2015 prices)
1. Agriculture; forestry and fishing	1. Agriculture, hunting, forestry, fishing
2. Mining and quarrying	3. Mining and utilities
4. Utilities	2. Manufacturing
3. Manufacturing	4. Construction
5. Construction	5. Wholesale, retail trade, and restaurants and hotels
6. Wholesale and retail trade	6. Transport, storage, and communication
8. Accommodation (restaurants and hotels)	
7. Transport; storage and communication	7. Other activities
9. Financial and insurance activities	
10. Real estate and administrative activities	
11. Public administration and defense	
12. Education	
13. Human health and social work activities	
14. Other services.	

Structural Policies	
Antimonopoly Policy	De jure Competition law, age and dummy De facto Index of freedom to compete Index of promotion of competition
Financial Policy	Domestic: Domestic financial reforms index International: De jure financial integration index Public: Public development banks by mandate, age or dummy
Labor Policy	Hiring and firing regulation

Structural Policies

Trade policy

Export promotion agencies, age or dummy
Indices of trade agreements enforceability and depth
WTO membership

Macro institutions

Fiscal rules
Inflation targeting
Central bank transparency Eichengreen

	Outcomes
Fiscal policy	Fiscal balance (IMF Fiscal Monitor)
Monetary policy	Inflation (WDI)
Exchange rate policy	Exchange rate misalignment (CEPII)

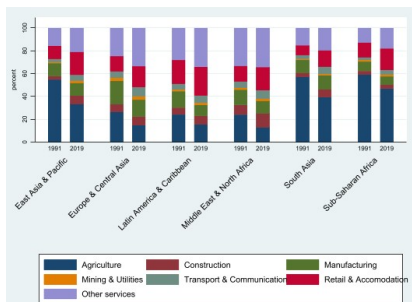
- **Countercyclicality of fiscal policy**
- Cyclicity: the correlation between cyclical components of real government expenditure or real government primary expenditure and real GDP on 20-year rolling windows (Frankel et al., 2013).
- Cyclical components are estimated using the Hodrick–Prescott Filter.
- A positive (negative) correlation indicates procyclical (countercyclical) fiscal policy.

- **Other macroeconomic controls**
WDI and Penn World Tables. Barro and Lee educational attainment dataset for robustness check.

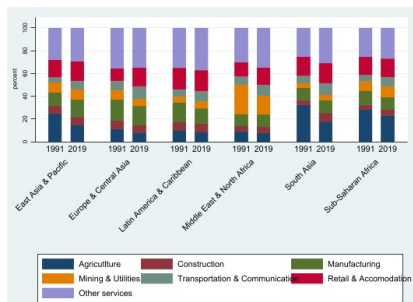
Stylized Facts

Stylized Facts

- All regions witnessed a reallocation of resources away from agriculture.
- Developing countries are not following the typical structural change path: a shift from agriculture directly to services without witnessing much industrialization.



(a) Employment



(b) Value Added

Figure 1: Sectoral shares (averages by regions)

Stylized Facts

- Labor moved to retail and accommodation sector in all regions while the sector has productivity level below the economy wide average.
- The same applies on construction in East Asia, MENA and South Asia.

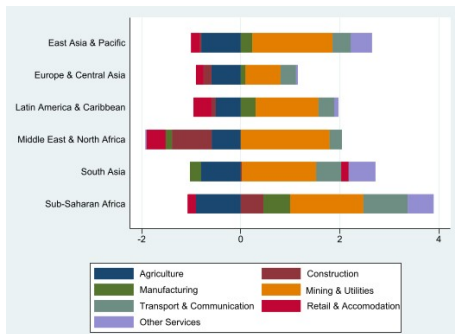


Figure 2: Relative sectoral labor productivity (2019)

Stylized Facts

- The relationship between the coefficient of variation of log sectoral productivities and average labor productivity is negative.
- This confirms the role of structural change in inducing convergence and that the reallocation from low productivity to high productivity sectors should raise economy wide productivity

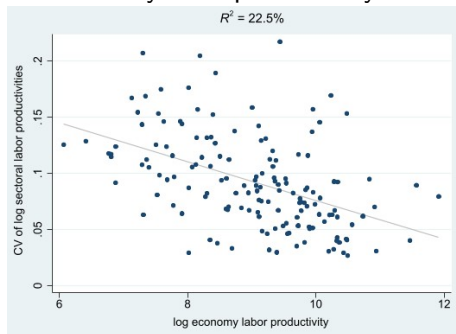


Figure 3: Intersectoral productivity gaps and econ wide productivity (2019)

Stylized Facts

- Productivity growth has been largely increasing in East Asia and to a lower extent in Sub-Saharan Africa. The within-sector improvements have been the main driver.
- Structural change contribution to productivity growth in MENA and Latin America is negative: displaced moving to less productive activities on average.

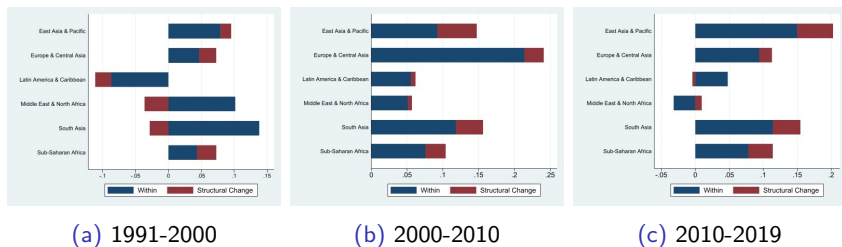


Figure 4: Productivity growth decomposition (t and t-5, average)

Econometric Specification

Baseline Specification

- We study the fundamental and the policy determinants (structural and macroeconomic policies) of structural change in developing countries over 1990-2019. We estimate the following panel fixed effects regression:

$$SC_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 Policy_{it} + \nu_i + \varepsilon_{it} \quad (2)$$

- The dependent variable: structural change for country i in year t
 - Productivity growth decomposition method
 - Real value-added shares in manufacturing and services
 - Exports diversification index (Theil index)
- Explanatory variables:
 - Controls: Human capital, physical capital, share of agriculture in total employment, income, share of raw materials in exports
 - Structural or macro policy
 - Country fixed effects to account for time-invariant unobservable country-specific factors.

Dynamic Heterogeneous Panel

- **Why do we opt for the dynamic heterogeneous panel?**
 - Traditional static panel models may not capture the dynamic structure of our data set.
 - GMM estimators capture only short run dynamics. Hence, they may not represent the long-run equilibrium relationship.
- Following Samragandi et al. (2015) and Aksoy (2015), we examine the long- and short-term effects of policies on structural change.
- The dynamic heterogeneous panel regression can be incorporated into an error correction using the autoregressive distributed lag ARDL (p,q) model:

$$\Delta SC_{it} = \sum_{j=1}^{p-1} \gamma_j^i \Delta SC_{it-j} + \sum_{j=0}^{q-1} \delta_j^i \Delta X_{it-j} + \phi_i [SC_{it-1} - (\beta_0^i + \beta_1^i X_{it})] + \varepsilon_{it} \quad (3)$$

Where γ short run coefficients of lagged dependent; δ short run coefficients of lagged independent variables; β long run coefficients; ϕ coefficient of the speed of adjustment to the long run equilibrium.

Dynamic Heterogeneous Panel

- Equation 3 can be estimated by three alternative estimators: the mean group model (MG, Pesaran and Smith, 1995), the pooled mean group estimator (PMG, Pesaran et al., 1999) and the dynamic fixed effects estimator (DFE, Pesaran et al., 1999).
- Advantages:
 - It accounts for the differentiation between the short and long run impact.
 - It can be used with variables with different orders of integration.
 - PMG and MG estimators can provide consistent coefficients despite the possible presence of endogeneity.
- The PMG estimator is relevant to the analysis: It allows the short run coefficients to be heterogeneous country by country whereas the long run coefficients are homogeneous across countries.

Empirical Findings

Fundamental Determinants

- Employment dynamism is at the heart of structural change, thereby explaining the importance of human capital in this process.
- Physical capital (measured by investment as a percentage of GDP) equally plays a crucial role in enhancing the reallocation process and inducing structural change.
- Initial agriculture employment share exerts a positive and significant impact on structural change. Countries with higher share in employment in agriculture can have greater scope to benefit from allocation.
- GDP per capita exerts a positive and significant effect on structural change. This is consistent with the income effect in the theoretical literature.
- Raw materials share in exports exerts a negative and significant effect on structural change. Resource rich countries have limited incentives to diversify their economic structures.

Fundamental Determinants, Fixed Effects

Table 1: Structural change fundamental determinants, baseline FE

	(1)	(2)	(3)	(4)	(5)	(6)
Human capital	0.0474*** (0.0179)	0.0285 (0.0180)	0.0760*** (0.0250)	0.0140* (0.00794)	0.0205** (0.00931)	
Physical capital (Inv % gdp)		0.0140*** (0.00521)	0.0139*** (0.00533)	0.00609*** (0.00164)	0.00558*** (0.00199)	0.00560*** (0.00183)
Agriculture emp share (initial)			0.165*** (0.0397)	0.222*** (0.0126)	0.266*** (0.0142)	0.240*** (0.0124)
GDP per capita				0.0345*** (0.00274)	0.0393*** (0.00330)	0.0301*** (0.00272)
Raw material exports share					-0.00218* (0.00115)	-0.00342*** (0.00103)
Human capital (share of skilled labor)						0.161*** (0.0297)
Constant	0.802*** (0.0142)	0.773*** (0.0206)	0.677*** (0.0345)	0.456*** (0.0224)	0.405*** (0.0267)	0.482*** (0.0232)
Observations	2,837	2,795	2,673	2,653	2,182	2,524
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.003	0.004	0.009	0.134	0.160	0.147
Number of countries	114	114	114	113	104	131

Dynamic heterogeneous panel results

- The Hausman test confirms that PMG estimator is efficient compared to MG.
- The negative and significant error correction coefficient confirms the existence of a long run relationship between the variables.

Structural change as value added shares

- Results point out to an important discussion on deindustrialization in developing countries.
- Structural policies exert a positive and pronounced effect on services shares whereas their effect on manufacturing and agriculture shares is either insignificant or negative.
- Developing countries are mostly turning into services economies without going first through a proper experience of industrialization or eventually undergoing the so-called premature deindustrialization (Rodrik, 2016).

Structural Change (VA shares), Fixed Effects

Table 2: Structural change and Policies, Panel FE

	Manuf VA	Serv VA		Manuf VA	Serv VA
Antimonopoly policy			Labor policy		
Comp law age	-0.000158 (0.000109)	0.00260*** (0.000823)	Hiring and firing reg	-0.00217*** (0.000478)	0.00331*** (0.000511)
Freedom to compete	0.0126*** (0.00460)	0.0108** (0.00533)	Macro instit		
Financial policy			Fiscal rules	-0.000391** (0.000183)	0.00103*** (0.000371)
Financial reforms	-0.00535 (0.00379)	0.0181*** (0.00415)			

Notes: Each cell represents a regression. Controls are similar to Table 1. Regressions include fixed effects. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Anti-monopoly policy

- Competition indices improve structural change over the long run according to the PMG estimator.
- Competition enhances the reallocation process by removing barriers to entry and exit and supporting the creation of new enterprises.

Labor policy

- Different proxies exert a positive and significant effect on structural change (baseline specifications).
- Structural transformation requires well-functioning labor markets.
- Inadequate labor regulations encourage informality and thereby make the reallocation process and the move to more productive sectors more costly.

Table 3: Structural Change and Antimonopoly Policy, PMG

	Policy long term	D.policy short term	Error correction coefficient	Hausman test (p value)
Com law age	0.00457*** (0.000805)	0.0212 (0.0216)	-0.268*** (0.0247)	0.3953
Promotion comp	0.0381*** (0.00740)	-0.0103** (0.00409)	-0.238*** (0.0383)	0.5851

Notes: Each line represents a regression. Controls include human capital index and physical capital. The lag structure is (1,1,1,1). Empty cells are regressions that did not converge. Standard errors in parentheses*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 4: Structural Change and Labor Policy, FE

	Productivity decomposition	Services VA	Exports diversification
Hiring and firing regulations	0.00138** (0.000651)	0.00331*** (0.000511)	-0.00955*** (0.00235)

Notes: Each cell represents a regression. Regressions include controls similar to Table 1 and fixed effects. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Trade policy

- Export promotion agencies exert a positive and significant effect on structural change in the long run according to the PMG estimator.
- Our novel indices on depth and enforceability of trade agreements improve structural change.
- The WTO membership reduces exports diversification (exerts a positive and significant impact) over the long run as per the PMG estimator whereas the enforcement and depth of trade agreements improves it.
- Similar findings when structural change measured as value added shares.
- Barriers to international trade can impede resource allocation and thereby reduce productivity growth. Integration in international trade can increase the pace and extent of industrialization and raise productivity, within and across sectors.

Table 5: Structural Change and Trade Policy, PMG

	Policy long term	D.policy short term	Error correction coefficient	Hausman test (p value)
Exports prom agencies	0.00932*** (0.00185)	0.000334 (0.000399)	-0.261*** (0.0232)	0.0000
Enforceability of trade agreements	- -	- -	- -	- -
WTO membership	0.0398*** (0.00265)	-0.00404** (0.00185)	-0.232*** (0.0243)	0.0437

Notes: Each line represents a regression. Controls include human capital index and physical capital. The lag structure is (1,1,1,1). Empty cells are regressions that did not converge. Standard errors in parentheses*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Structural Change (Exp Diversification), PMG

Table 6: Structural Change and Trade Policy, PMG

	Policy long term	D.policy short term	Error correction coefficient	Hausman test (p value)
Exports prom agencies	0.0441*** (0.0117)	-0.0114*** (0.00407)	-0.367*** (0.0294)	0.1332
Enforceability of trade agreements 1	-0.0655*** (0.00567)	-0.0979 (0.181)	-0.501*** (0.110)	0.6609
Enforceability of trade agreements 2	-0.0616*** (0.00445)	-0.0946 (0.170)	-0.486*** (0.0965)	0.7037
Enforceability of trade agreements 3	-0.130*** (0.0229)	-0.564 (0.666)	-0.419*** (0.0432)	0.7908
WTO membership	0.00755* (0.00427)	0.00191 (0.00470)	-0.370*** (0.0298)	0.9996

Notes: Each line represents a regression. Controls include human capital index and physical capital. The lag structure is (1,1,1,1). Empty cells are regressions that did not converge. Standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1

Financial policy

• Domestic

- Domestic financial reforms significantly improve structural change over the long run.
- Financial development improves export diversification over the long run.
- Credit allocation across firms and sectors will determine how much structural change can occur and how much resulting growth the economy can benefit from .

• International

- De jure index of overall financial restrictions exerts a positive and significant effect on structural change over the long run according to the PMG estimator.

• Public

- Public development banks with different mandates exert a positive and significant effect on structural change.
- The role of selective government industrial policies in inducing structural transformation is debatable.

Table 7: Structural Change and Financial Policy, PMG

	Policy long term	D.policy short term	Error correction coefficient	Hausman test (p value)
Financial reforms	0.00912*** (0.00255)	0.00916 (0.00564)	-0.427*** (0.0476)	0.8067
Financial integration	0.103*** (0.0112)	-0.00657 (0.00661)	-0.118*** (0.0225)	1.0000
Public dev banks (infra)	0.00271*** (0.000272)	5.15e-06 (0.000128)	-0.217*** (0.0211)	0.0000

Notes: Each line represents a regression. Controls include human capital index and physical capital. The lag structure is (1,1,1,1). Empty cells are regressions that did not converge. Standard errors in parentheses*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Cross cutting conclusions:

- Structural policies mostly affect structural change over the long run and not the short run.
- This is in line with the literature on structural policies suggesting that they usually take time to materialize, and as previously mentioned their impact over the short run is rather inconclusive.
- This confirms our earlier assumption that a conventional framework exclusively focusing on macroeconomic stability is insufficient to accelerate the pace of structural change in developing countries.

● **Macro institutions**

- Fiscal rules and central bank transparency improve structural change on the long run as per the PMG estimator .
- These macroeconomic institutions endorse macroeconomic stability and also improve the implementation of some structural policies.

● **Macro outcomes**

- An active exchange rate can help foster structural change (exchange rate misalignment measured by the overvaluation index).
- A competitive exchange rate can be viewed as a type of industrial policy.
- Expenditure and primary exp procyclicality index exert a negative and significant effect on structural change.
- Countercyclicality in fiscal policies can help developing countries face challenges related to swings of external financing cycles and fluctuations in commodity prices.

Table 8: Structural Change and Macro Institutions, PMG

	Policy long term	D.policy short term	Error correction coefficient	Hausman test (p value)
Fiscal rules (budget balance age)	0.00137*** (0.000322)	-6.80e-05 (4.71e-05)	-0.211*** (0.0207)	0.1066
Central bank transparency	0.00146*** (0.000386)	-0.000164 (0.000658)	-0.248*** (0.0300)	0.8852
Inflation targeting	0.00627** (0.00308)	-0.000205 (0.000429)	-0.220*** (0.0213)	0.6064

Notes: Each line represents a regression. Controls include human capital index and physical capital. The lag structure is (1,1,1,1). Empty cells are regressions that did not converge. Standard errors in parentheses*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Structural Change (Prod Growth Decomp) and FE

Table 9: Structural Change and Macroeconomic Outcomes, FE

Macro outcomes

Inflation	-0.00114* (0.000596)
Procyclicality of expenditures	-0.00420** (0.00184)
Exchange rate misalignment	-0.00450* (0.00276)

Notes: Each cell represents a regression. Regressions include controls similar to Table 1 and fixed effects. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Conclusion

- This paper analyzes the policy determinants of structural change in developing countries.
 - We investigate the role of both structural and macroeconomic policies in driving structural change.
 - We propose a large set of novel measurements to examine policies that are likely to influence structural change.
 - We differentiate between policies short and long run impact using the pooled mean group estimator.
- The within-sector productivity improvements have been the main driver of productivity growth in East Asia and Sub-Saharan Africa.
- Structural change has been growth reducing in Middle East and North Africa (MENA) and Latin America.

- Empirical findings show that structural policies in different areas improve structural change over the long run, yet they mostly have an insignificant effect over the short run.
- Results confirm the importance of countercyclical policies and undervalued currencies in enhancing structural change.
- Our results also point out to deindustrialization trends in developing countries
 - Structural policies exert a positive and significant effect on services shares whereas their effect on manufacturing shares is either insignificant or negative.

- Acknowledging deindustrialization trends implies thinking of new development strategies.
- From a policy perspective, macroeconomic stabilization matters for developing countries. However, policy makers need to ensure that structural change and long run sustainable growth are not being sacrificed.

Thanks for your attention