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OIL PRICE EXPOSURE OF CEE FINANCIAL COMPANIES

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Abstract

In recent years an alarming situation concerning the global financial markets is represented by the fact that Brent crude oil price and stock prices created the impression that they are strongly correlated. Besides, crude oil represents an indispensable and critical resource for the world economy and European Union member countries are net oil importers. In this general framework, the main purpose of this paper is to investigate the exposure to oil price risk of financial companies listed on stock exchanges from Central and Eastern European countries using monthly datasets covering the period between January 2011 and December 2018. The empirical analysis includes financial companies from seven economies from Central and Eastern Europe, all EU members and oil importers: Croatia, Czech Republic, Hungary, Poland, Romania, Slovakia and Slovenia. We use Brent crude oil prices, companies' stock returns, local stock market indices, the Dow Jones Europe Financials Index and foreign exchange rates of the domestic currencies against the US dollar, as well as an index that capture the financial sector – related stress (CLIFS) in order to shed light on the idiosyncrasies of the oil price – returns relationship. The relevance of financial companies' exposures to oil price changes is identified using the panel data methodology in a traditional OLS structure, as well as in a dynamic ARDL panel estimation that capture the long-run versus the short-run exposure of CEE financial companies to oil price risk. Our results suggest that oil price fluctuations impact the stock prices of financial companies from CEE countries, but the link between stock return and oil price risk has some specificities and is mostly observable on the long run. The oil price changes have a negative impact on companies' stock returns, thus proving that they should be understood as a risk factor for the financial sector. At the same time, our results indirectly highlight the ubiquitous exposure of CEE economies to market risk factors and the worrying role of economy-wide risk transmitter of the financial sector.

Keywords: Oil price, Exposure, Central and Eastern Europe, Financial sector.

JEL Classification : F23, G15, G32

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1. Introduction

Crude oil represents today the most treasured resource for the world economy. Fluctuating oil prices have the potential to impact the monetary, fiscal and structural policies based on a country status of oil importer or exporter. Between 2011 and 2014, the price of Brent crude oil seemed approximately stable at around $105 per barrel but since June 2014 it has plunged to reach the lowest level in twelve years in February 2016, when it fell to $30 per barrel. Still, until the end of 2016 the price of Brent crude oil bounced back (Khandelwal et al, 2016). After 2016, the price of Brent crude oil fluctuated less, with the minimum value reached in December 2018 ($52.16) and the maximum in January 2018 ($86.29).

These changes in crude oil prices seem to have a crucial impact on the entire world economy, on the global inflation rate, on the exchange rates and on the revenue of domestic and global corporations. Recently, an alarming issue is represented by the fact that oil prices and stock prices appear to be positively correlated. A possible explanation might be that oil price fluctuations influence the stock prices and corporations' values, even beyond the industries that are normally exposed to oil price changes. Based on the assumption that a stock's price represents the sum of the discounted expected future cash flows provided to investors by the issuer of the stock, as long as these future cash flows are impacted by the macroeconomic developments at the level of price fluctuations, then stock values are connected to oil prices.

Our research hypothesis builds on this economy-wide impact of oil price fluctuations, particularly for small open economies, such as the ones from Central and Eastern Europe (CEE). Thus, our goal resides in investigating the exposure to oil price changes of a set of financial companies from the region, that are not directly affected by variations in oil price. Our paper contributes to the academic literature and debate on the relationship between oil price fluctuations and the market value of companies from various sectors in CEE. We show that CEE financial companies are surprisingly exposed to systemic risk in a rather pervasive manner and that the specific exposure to oil price changes is one of the main sources of systemic risk for them.

The paper is structured as follows. Section 2 presents the empirical literature on the relationship between oil price changes and stock returns. Section 3 describes the data and the research methodology. Our findings and results are presented and then discussed in Section 4. Finally, Section 5 concludes.

2. Literature review

The academic literature on the impact of oil price risk on the market value of financial companies is still growing, as only a few studies have tackled this topic of research. The current empirical evidence indicates that oil price changes correspond with fluctuations in stock prices although the results are rather mixed. For example, authors like Hamao (1988), Huang et al. (1996), Jones and Kaul (1996), Cong et al (2008), or Jammazi and Aloui (2010) found no relationship between oil price fluctuations and stock market returns. Nevertheless, other authors like Sadorsky (1999) or Ciner (2001) provided opposite findings. These authors concluded that oil price fluctuations proved to be essential for analyzing the stock market returns.

The investigation of the impact of oil price fluctuations on the stock market industrial sectors was quite reticent thus far even though it is absolutely imperative taking into consideration the fact that every single industry may present specific responses to oil price fluctuations and investors must take these responses into account in the form of risk premiums. Also, the aggregate stock market indices from different countries are not capable to incorporate the comprehensive link between oil price movements and stock market returns and research at the stock market industrial sector level would be considerably useful. Some noteworthy examples of studies on the impact of oil price fluctuations on the stock market industrial sectors are Arouri and Nguyen (2010) and Arouri (2011), which both conclude that stock prices' reactions to changes in oil prices depend significantly on the activity sector. Thus, Arouri and Nguyen (2010) studied the relationship between oil price changes and European stock market returns using the Dow Jones Stoxx 600 index and twelve industrial sector indices from European countries. They conclude that the Food and Beverages, Health Care and Technology sectors display negative responses to oil price increases, while other sectors like the Financial, Oil and Gas, Industrials, Basic Materials and Personal and Household Goods sectors show positive responses. One year later, in a subsequent study, Arouri (2011) found that the Oil and Gas sector exhibits a positive response to oil price movements, while the Financials and Consumer Goods sectors exhibits a negative response to oil price movements. Also for Europe, Scholtens and Yurtsever (2012) found that the impact of significant changes in oil prices at the industry level in the Euro area varies considerably depending on the industry over the period 1983-2007. At the same time, they show that most Euro-area industries would benefit from a decline in oil prices.

The same year, Narayan and Sharma (2011) investigate the relationship between changes in oil price and stock prices of a number of 560 American companies listed on NYSE. With the help of a GARCH-based methodology, they show that oil price changes induce asymmetric effects on stock returns, moderated by the specific activity sector of the company. Thus, while some sectors exhibit a negative response to positive oil price shocks – Banking, Chemical, Computer, Food, General Services, Manufacturing, Medical Services, Real Estate, Supply and Transportation -, other sectors such as Energy have shown positive responses to positive oil price shocks. At the same time, the results proved to be inconclusive for the Electricity, Engineering and Financial sectors. Also for the United States, Elyasiani et al. (2011) examined the impact of oil price fluctuations on industry stock returns for thirteen US industries. The industries were divided in four main categories, based on their relationship to oil: oil-users, oil-substitute, oil-related and financial industries. The authors revealed that oil price changes have positive effects on oil-related and oil-substitute industries, but this effect is negative for the industries that are mainly oil-users and also for financial industries. Degiannakis et al. (2013) continue the previous investigations of the afore-mentioned authors and examine the time-varying relationship between oil prices and industrial sector indices in Europe. Their results confirm that the link between industrial sectors' indices returns and oil price changes is influenced by the type of industry but further conclude that this link is influenced by the origin of oil price shocks.

Specifically concerning the financial sector, the results presented in the literature tend to be inconclusive until now. Generally, the findings show the effects of oil price changes might be inconsiderable for the financial sector, which is a non-oil-related sector.

Gogineni (2010), for example, confirmed in his study these findings and clarified them by the supply chain dependency to oil markets that represents the key to proving the impact of oil price fluctuations in any sector.

So far, only few studies have tackled the impact of changes in oil prices on the various industrial sectors in Central and Eastern European countries, as researchers seemed less interested in examining the particularities of this phenomenon in this region. Of these few studies, we mention Asteriou and Bashmakova (2013) that use an international multi-factor model in a panel data framework to examine the link between oil price shocks and stock prices returns from CEE. They identify a negative exposure of stock returns to changes in oil prices, which becomes more significant when oil prices are low. At the same time, Mohanty et al. (2010) studied the link between oil price changes and stock prices of oil and gas companies in a selection of CEE countries between 1998 and 2010, but their findings showed no significant exposure of CEE companies to changes in oil prices.

3. Data and research methodology

Our empirical analysis is conducted on seven economies from Central and Eastern Europe, all European Union members and oil importers - Croatia, Czech Republic, Hungary, Poland, Romania, Slovakia and Slovenia -, for the sample period between January 2011 and December 2018. We use Brent crude oil prices, financial companies' stock prices (logarithmic return from end-of-month values) and the following local stock market indices: CROBEX for Croatia, FTSE for Hungary and Czech Republic, WIG for Poland, BET for Romania, SAX for Slovakia and Blue-Chip SBITOP for Slovenia. Table 1 presents the specific set of 20 selected financial companies and the local stock market indices employed for each CEE country in our sample. The financial companies were selected based on the maximum data availability for the period included in our analysis.

Table 1. Data on companies and market indices used in our research

Country	**Local stock market index**	**Financial company**	**Market capitalization[1] (EUR billion)**
Croatia	CROBEX	Zagrebacka Banka	2.620
Czech Republic	FTSE CZECH REPUBLIC	Erste Group Bank AG	12.293
		Komercni Banka	5.987
		Vienna Insurance AG	2.971
Hungary	FTSE HUNGARY	OTP Bank	10.364
		Takarek Mortgage Bank	0.130
		CIG Pannonia	6.592
		Forras Vagyonkezelesi Befektetesi	3.217
Poland	WIG	UniCredit	21.376
		Powszechna Kasa Oszczednosci (PKO) Bank Polski	11.271
		Santander Bank Polska	7.218
		Powszechny Zaklad Ubezpieczen (PZU SA)	7.394
		ING Bank Slaski	5.664
Romania	BET	Erste Group Bank AG	12.284
		Banca Transilvania	2.587
		BRD Groupe	1.985
		Patria Bank	0.054
Slovakia	SAX	Vseobec Uverova Banka	0.653
Slovenia	Blue-Chip SBITOP	Pozavarovalnica Sava dd (Sava Reinsurance Plc)	0.262
		KD Group	0.209

Note: [1] Market capitalization is calculated in euro at the current market exchange rates of the local currencies against the euro on August 26, 2019.

Source: Authors' own research

Also, we include in our analysis the Dow Jones Europe Financials Index as a leading EU market indicator of financial sector performance, as well as the local currencies exchange rates against the USD. The exchange rates are important transmitters of risks in any open economy, as is the case with all the countries included in our sample; moreover, changes in exchange rates also incorporate the effects of changes in net foreign direct and portfolio investments, which influence the performance of the financial sector in the CEE region – see, for example, Gal (2013) and Eller, Haiss and Steiner (2006). In addition to these variables we include in our investigation a measure of stress at the level of financial sector, specifically the Country-Level Index of Financial Stress (CLIFS) published by the European Central Bank. The calculation of the index is based on the work of Duprey, Klaus and Peltonen (2015) and includes six measures of financial stress associated to three financial market segments (equity, bond and foreign exchange), as well as the co-movements across these market segments. Data was collected with monthly frequency from The World Bank, Eurostat database, European Central Bank Data Warehouse and Bloomberg. All variables are included in the analysis in a log format of their initial values.

In order to determine the relationship between stock prices of CEE financial companies, oil prices and other macroeconomic variables, we consider the panel data as the base econometric model. The benefits of panel estimation are related, according to Greene (2018), to higher data variability and number of degrees of freedom, as well as less collinearity among the variables, which results in more efficient and robust estimates. We apply first the traditional Panel Ordinary Least Square (OLS) approach in order to estimate the long-run relationship between all these variables, but it further sophisticates the OLS approach with a Dynamic Panel estimation in an ARDL (Auto-Regressive Distributed Lags) framework with the aim of identifying the idiosyncrasies of the short versus long-run exposure of CEE financial companies to oil price changes.

The OLS specification is based on the following equation:

$$Y_{it} = \alpha_{it} + \beta_{it} X_{it} + \gamma_{it} + \varepsilon_{it} \qquad (1)$$

Where Y_{it} is the dependent variable represented by the logarithmic return of the selected financial companies' stock prices (PRICE), i denoting firms (the cross-section dimension), while t denoting time, α_{it} is is the overall constant of the model that captures the effects of those variables that are constant over time, β_{it} denotes the exposure coefficients and X_{it} is a vector which includes independent variables: Oil price (OIL), Domestic stock market index (INDEX), Dow Jones Europe Financials Index (DJFI), the Country-Level Index of Financial Stress (CLIFS) and the domestic currencies' exchange rate against the USD (FX). γ_{it} capture the cross-section fixed effects, α_{it} is the overall constant of the model and α_{it} is the error terms for i=1 to M cross-sections observed for periods t=1 to T; $\alpha_{it} \sim N(0,\sigma_{\varepsilon}^2)$, where M=20 and T=96. Ten OLS panels have been estimated, including no effects and fixed cross-effects, and varying the independent variables in order to test the robustness of our results.

ARDL models became popular for estimating long-run relationships between variables in recent years, although econometricians used them for a rather long time.

Unfortunately, the use of ARDL models that include among the regressors lags of the dependent variable and independent variables becomes challenging in a panel framework that contains cross-section effects, due to the potential bias that may be caused by the correlation between the mean-differenced regressors and the error term (Pesaran and Shin, 1999). While the bias fades when the number of observations (T) is high, given that the number of cross-sectional units in our panel is smaller than the number of periods we address this issue by employing GMM estimators in a Dynamic panel data framework (Arrellano-Bond, 1991). In large panels, the assumptions behind Dynamic GMM tend to be inappropriate and the estimators fail; when this happens, the Pooled Mean Group (PMG) estimator proposed by Pesaran, Shin and Smith (1999) is a viable alternative to the Dynamic GMM. The PGM model adapts the cointegration format of the traditional ARDL in a panel framework by allowing the intercepts, cointegrating terms and short-run coefficients to be different between cross-sections. The ARDL model is written as follows:

$$\Delta Y_{it} = \varphi EC_{it} + \sum_{j=0}^{q-1} \beta_{ij} \Delta X_{i't-j'} + \sum_{j=1}^{p-1} \delta_{ij} \Delta Y_{it-j} + \varepsilon_{it} \qquad (2)$$

$$EC_{it} = Y_{it-1} - \theta X_{it'} \qquad (3)$$

The model assumes that the same number of lags is present in each cross-section for the dependent variable and the independent variables. Overall, five ARDL panels were estimated for the identification of long-run and short-run cross-section coefficients; similar to the OLS panel estimation, we vary the number of independent variables included in the model in order to test for results' robustness. The optimal model in terms of number of lags is found based on the Akaike criterion (AIC). Eviews 10 has been used for estimating the panel equations. All results are presented and discussed in the next section.

4. Main results and discussions

A number of stationarity tests have been applied to our series and panels, such as Levin-Lin-Chu t test (Levin et al., 2002) for commom unit root processes, and Im-Pesaran-Shin test (Im et al., 2003) and the ADF-Fisher Chi-square test (Choi, 2001) that assume individual unit root processes. These tests indicated that panels were stationary at first difference in all specifications[1].

We present first the results of the OLS panel estimation in Table 2. For all panel specifications we interpret and discuss only statistically significant coefficients at least at 5% level. The first observation to be made is that all variables, except for CLIFS, show statistically significant coefficients in at least one panel specification. We interpret the

[1] Results are available from the authors.

lack of statistically significant coefficients for CLIFS, which is an indicator of stress at the level of the financial sector, as an inclusion of financial stress by market investors in the overall level of market risk, which is significantly indicated by the coefficients attached to the domestic market indices. We also note that the CEE financial companies' exposure to market risk is present and positive in all panel specifications, thus suggesting a risk premium included in financial companies' valuation by market investors. This exposure is accompanied by the pervasive exposure to the global financial risk, taken into account in our analysis by the DJFI; the positive signs of the coefficients indicate, as in the case of domestic stock indices, a risk premium included by market investors in the return of CEE financial companies.

The exposure to oil price fluctuations revealed by the OLS panel estimations has interesting particularities; as such, the statistically significant coefficients are all negative, suggesting that CEE financial companies stock returns benefit from a decline in the price of oil. This is consistent with the expectation that CEE economies generally benefit from reductions in the price of oil, as this positively impacts their imports of oil. At the same time, and rather curious, the exposure to oil price of CEE financial companies is present when both domestic market indexes and DJFI are included in panel specifications; although this needs further investigation, at first sight we might interpret it as a lack of acknowledgement by market investors of the exposure to oil price fluctuation of financial companies in the region in the absence of their exposure to market risk. Thus, it seems that market investors consider the financial companies' exposure to oil price fluctuations as a residual exposure that is emphasized by the companies' general exposure to market risk.

Last, but not least, we observe a negative exposure to foreign exchange rates of local CEE currencies against USD, which links an appreciation of the USD and a depreciation of local currencies to higher returns of CEE financial companies; this is rather surprising, as a stronger USD is associated to higher oil import bills and current account deficits and, in the end, higher market risk.

Table 2. OLS Panels estimated for CEE countries

Panel specification	**α**	**INDEX**	**DJFI**	**OIL**	**CLIFS**	**FX**	**Adj. R^2**	**S.E. of regression**	**F-stat**
No effects	0.0012	0.6930*	0.2171*	-0.0328**	0.0001	-0.0007	0.433	1.001	290.802*
Fixed effects	-0.0004	0.6961*	0.2133*	-0.0319	0.0002	-0.0007**	0.436	1.006	62.266*
No effects	0.0020	--	0.5141*	-0.0114	-0.0023	-0.0012**	0.128	1.000	70.857*
Fixed effects	0.0014	--	0.5125*	-0.011	-0.0020	-0.0010**	0.131	1.005	13.457*
No effects	0.0016	0.8170*	--	-0.0039	-0.0016	-0.0010*	0.386	1.000	298.970*
Fixed effects	-0.0009	0.8205*	--	-0.0037	-0.0014	-0.0010*	0.392	1.005	54.236*
No effects	0.0012	0.6931*	0.2169*	-0.0329**	--	-0.0007	0.433	1.000	363.721*
Fixed effects	-0.0004	0.6961*	0.2128*	-0.0319**	--	-0.0007**	0.437	1.006	65.011*
No effects	0.0010	0.6969*	0.2241*	-0.0319**	0.0000	--	0.433	1.000	362.891*
Fixed effects	-0.0005	0.7006*	0.2205*	-0.0309*	0.0000	--	0.436	1.006	64.750*

Note: * and ** denote statistical significance at 1% and 5% levels, respectively. INDEX – local stock market index, DJFI – Dow Jones Europe Financials Index, OIL – price of oil, CLIFS - Country-Level Index of Financial Stress, FX – local currency exchange rate against the USD, Adj. R^2 - Adjusted R-squared, S.E. - Standard Error of the Regression, F-stat – F statistic. The -- cells indicate that the variables were eliminated from the panel equation.

Source: Authors' own research results.

The cross fixed-effects panel specifications do not show different results compared to the no effects specifications, which might indicate the rather homogeneous financial sector frameworks among CEE countries. Moreover, the indicators of panel regression fit demonstrate insignificant differences between the fixed cross-effect and the no effects specifications, thus confirming our previous conclusion.

Still, besides the interesting results obtained when we employed the OLS panel regressions, their static approach is not sufficient for a comprehensive understanding of CEE financial companies to oil price risk. Therefore, we complement and extend the

OLS panel regressions with a dynamic OLS panel estimation in the ARDL framework. The main advantage of this methodology resides in identifying and contrasting the long-term versus short-term relations between the variables, which allows for a better view of the valuation of CEE financial companies' stocks by investors in the market. Moreover, the ARDL approach is superior to the standard OLS panel estimation given its ability to better handle cross-sections specificities. Table 3 presents the results of the ARDL panels estimated for CEE countries' financial companies.

First, we notice the presence of a significant cointegration between the returns of CEE financial companies and the set of variables included in the ARDL panel estimations, which shows a long-run relationship between them. Second, there is a long-run exposure of CEE financial companies to market and financial risk, indicated by the statistically significant positive coefficients for INDEX and DJFI in the Long run equation. At the same time, the long-run exposure to oil price fluctuations is less strong, compared to the results obtained in the case of the OLS estimation, and somehow confusing, as the identified statistically significant coefficients – in Panels 2 and 3 – are positive and negative; overall, we interpret this result as an absence of a long-run exposure of CEE financial companies to oil price risk.

Table 3. ARDL Panels estimated for CEE countries

Panel	**Selected model**	**Long run equation**								**S.E.**	**LL**
		INDEX	**DJFI**	**OIL**	**CLIFS**	**FX**					
Panel 1	ARDL(2,1,1,1,1,1)	1.345*	0.577*	-0.084	0.015	0.109				0.078	2682.74
		Short-run equation									
		Cointeq1	**PRICE(-1)**	**INDEX**	**DJFI**	**OIL**	**CLIFS**	**FX**	□		
		-0.054*	-0.043	0.614*	0.206	-0.015	0.000	-0.104	-0.408*		
		Short-run statistically significant cross-section coefficients - number and signs				9 (+); 5 (-)					
Panel 2	ARDL(2,1,1,1,1)	**Long run equation**								0.084	2395.99
		INDEX	**DJFI**	**OIL**	**CLIFS**	**FX**					
		--	2.269*	-0.053*	0.095	1.919*					
		Short-run equation									
		Cointeq1	**PRICE(-1)**	**INDEX**	**DJFI**	**OIL**	**CLIFS**	**FX**	□		
		-0.029*	-0.065	--	0.392*	0.015	-0.005	-0.292**	-0.266*		
		Short-run statistically significant cross-section coefficients - number and signs				8 (+); 6 (-)					
Panel 3	ARDL(2,1,1,1,1)	**Long run equation**								0.083	2579.48
		INDEX	**DJFI**	**OIL**	**CLIFS**	**FX**					
		1.356*	--	0.215**	-0.102*	0.488					
		Short-run equation									
		Cointeq1	**PRICE(-1)**	**INDEX**	**DJFI**	**OIL**	**CLIFS**	**FX**	□		

		-0.048*	0.000	-0.044	0.705*	-0.007	-0.001	-0.292*	-0.420*		
		Short-run statistically significant cross-section coefficients - number and signs				6 (+); 6 (-)					
Panel 4	ARDL(2,1,1,1,1)	**Long run equation**								0.078	2672.02
		INDEX	**DJFI**	**OIL**	**CLIFS**	**FX**					
		1.342*	0.553*	-0.080	--	0.112					
		Short-run equation									
		Cointeq1	**PRICE(-1)**	**INDEX**	**DJFI**	**OIL**	**CLIFS**	**FX**	□		
		-0.050*	-0.040	0.611*	0.204	-0.010	--	0.307	-0.410*		
		Short-run statistically significant cross-section coefficients - number and signs				6 (+); 9 (-)					
Panel 5	ARDL(2,1,1,1,1)	**Long run equation**								0.079	2658.20
		INDEX	**DJFI**	**OIL**	**CLIFS**	**FX**					
		1.368*	0.588*	-0.100	0.014	--					
		Short-run equation									
		Cointeq1	**PRICE(-1)**	**INDEX**	**DJFI**	**OIL**	**CLIFS**	**FX**	□		
		-0.050*	-0.040	0.634*	-0.010	-0.012	0.000	--	-0.406*		
		Short-run statistically significant cross-section coefficients - number and signs				6 (+); 11 (-)					

Note: * and ** denote statistical significance at 1% and 5% levels, respectively. INDEX – local stock market index, DJFO – Dow Jones Europe Financials Index, OIL – price of oil, CLIFS - Country-Level Index of Financial Stress, FX – local currency exchange rate against the USD, Adj. R^2 - Adjusted R-squared, S.E. - Standard Error of the Regression, LL – Log likelihood. The -- cells indicate that the variables were eliminated from the panel equation.

Source: Authors' own research results.

For what concerns the short-term exposure of CEE financial companies to our independent variables, we observe no overall exposure to oil price risk, but statistically significant cross-section coefficients in all estimations. At the same time, five companies show positive exposure in all ARDL panel specifications, five show negative exposure, four have both positive and negative exposure and one financial company (Patria Bank from Romania) has no exposure to the oil price risk. In the case of the latter, the lack of exposure may be explained by its small size (it is the smallest of the 20 financial companies included in our analysis). Thus, no categorical result on the idiosyncratic exposure of CEE financial companies' exposure to oil price risk may be observed.

Another interesting result is the lack of long-run exposure of CEE financial sector to currency risk, accompanied by a presence of a negative short-term exposure to foreign exchange rate fluctuations (in two of our panel estimations). Also, the panel regressions indicate no relevance of the lagged values of stock prices and returns for the actual values. At the same time, the statistically significant coefficients for the panel regression constant in all specifications point towards the existence of other influences on the CEE financial companies' returns, which deserve to be further explored.

5. Conclusion

The main purpose of this paper was to investigate the exposure to oil price risk of financial companies listed on stock exchanges from Central and Eastern European countries using monthly datasets covering the period between January 2011 and December 2018. This empirical analysis was conducted on seven economies from Central and Eastern Europe, all EU members and net oil importers: Croatia, Czech Republic, Hungary, Poland, Romania, Slovakia and Slovenia.

Our results suggest that oil price fluctuations impact the stock prices of financial companies from CEE countries, but the link between stock return and oil price risk has some specificities. The oil price changes have a negative impact on the financial companies' stock returns, when the static OLS approach was considered, thus proving that they should be understood as a risk factor for the financial sector. On the other hand, the dynamic panel analysis shows that the exposure of financial companies' stock prices and returns is a long-term one, which makes the link to market risk more obvious. Moreover, given the lack of financial companies' exposure to oil price changes when the domestic market index and the Dow Jones Financial index are included, we believe that our results indirectly highlight the ubiquitous exposure of CEE economies to market risk factors and the worrying role of economy-wide risk transmitter of the financial sector. Thus, this raises serious challenges for macroeconomic policy authorities, as shocks in oil price may have the potential to impact the foreign currency reserve policy of central banks, on one hand, and to induce higher trade balance deficits and cost-push inflation, on the other hand. Moreover, the existence of this link between oil price changes and financial companies' stocks' returns could help financial investors to better diversify their portfolios and implement more efficient investment strategies.

Certainly our research has limits and one of the most important of them is represented by the rather small number of financial companies included in our sample; nevertheless, we believe that enlarging the sample, although it would offer better insight into the

pervasive exposure of financial companies to oil shocks, it would just reinforce our results. In this framework, an interesting future research direction resides in investigating in more detail the concrete channels that make possible the financial sector's exposure to changes in oil prices, including here the use of more sophisticated quantitative methodology.

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STRUCTURAL TRANSFORMATION AND INCOME INEQUALITY, REVISITED

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Abstract

This study analyzes the mechanism of structural transformation, defined as the reallocation of economic activity from high-productivity tradable sectors (agriculture and manufacturing) to low-productivity service sectors, and its implications for changes in the overall distribution of income within an economy. The focus is on the observed fact of development that the service sector's employment share tends to increase at a faster rate than does the sector's value-added share. An empirical analysis indicates that the different rates of changes in employment and value-added shares account for a stagnant increase in per capita income in the service sector, resulting in interpersonal income inequality as economic development progresses and the service sector's share increases. Next, we present a simple static model to analyze the difference between employment and value-added shares and determine that the change in the relative capital intensity of the tradable sector versus that of the service sector is a key factor in causing the difference.

Keywords**:** Structural transformation; income distribution; value-added and employment shares of services; capital intensity

JEL Classification**:** C23; D31; O14; O15; O41

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1. Introduction

The structural transformation of a country wherein the focus of economic activity shifts from high-productivity tradable sectors (agriculture and manufacturing) to low-productive service sectors is a global phenomenon. This study examines the relationship between this structural transformation and income distribution.

This study focuses on the most important observed fact of structural transformation, which is that the service sector's employment share tends to increase at a higher rate than does the sector's value-added share. We focus on the differing structural transformation patterns because the different rates of changes in employment and value-added shares indicate a stagnant increase in per capita income in the service sector. This stagnant increase may result in interpersonal income inequality as economic development progresses and the service sector's share increases. Although the literature empirically explored the relationship between structural transformation and income distribution, little attention has been paid to the relationship between the distinctly differing structural transformation patterns between added value and employment and income inequality. In fact, previous studies on structural transformation have little explored these differing structural transformation patterns.

The implications of structural transformation for income distribution were first explored by the seminal work of Kuznets (1955). Subsequently, a number of studies have been published on the Kuznets curve of the inverted U-shaped relationship between inequality and structural transformation.

A well-established empirical fact is that a positive relationship exists between the share of services in both added value and employment and GDP per capita. On the basis of the observation, previous studies revealed that an increase in structural transformations in the service sector (deindustrialization) has important implications for income distribution. For example, Mollick (2012) used a long-run span of data from the United States (1919–2002) and revealed that as the employment share in goods-producing activities declines, income inequality increases. Kollmeyer (2018) also focused on the effect of deindustrialization and the offshoring of routine manufacturing jobs on income distribution in the United States. The author emphasized the fact that those factors create larger distributional effects within the context of institutional changes, including declines in trade unions.

Dastidar (2012) reviewed the vast literature and comprehensively analyzed the structural change–inequality relationship using data on 78 developed and developing countries. The study incorporated past levels of inequality and income per capita as explanatory variables to control for differences in countries' development levels in various economic and political institutions other than the rate of structural changes. The study found that substantial differences exist between developed and developing country experiences.

Developing countries' experiences differ from the classic pattern of structural transformation; agriculture's value-added share has declined and has been accompanied by the growing importance of the service sector rather than the industrial sector. In developing countries experiencing service-led economic growth at the expense of agriculture, inequality is likely to increase during the process, and this increase in inequality is sharper for countries with historically greater inequality. In contrast, in

developed countries, the service sector's share is increasing along with a shrinking share of industry, which is likely to reduce inequality. In recent years, however, the income inequality tends to rise also in many developed countries.

Our empirical methodology is a simple cross-country regression with a measure of income inequality as the dependent variable and the difference between the service sector's employment and value-added shares as explanatory variables without dummy variables for developed and developing countries. The different structural transformation patterns can explain the changes in income inequality equally for developed and developing countries, as discussed in the next section. In this newly discovered structural change–inequality relationship, we can clarify the mechanism that makes the Kuznets inverted U-shaped relationship apply differently to developing and developed countries. Figure 1 illustrates the relationship between the ratio of the service sector's employment share to value-added share (vertical axis) and per capita income (horizontal axis). As Figure 1 indicates, this relationship is approximated by a polynomial function; the ratio of employment share to value-added share (which is closely linked to income inequality) increases rapidly and then starts to decrease during the initial economic development phase. However, the ratio increases again in the developed phase. As such, the Kuznets inverted U-shaped relationship between income inequality and structural transformation can be applied only to developing countries.

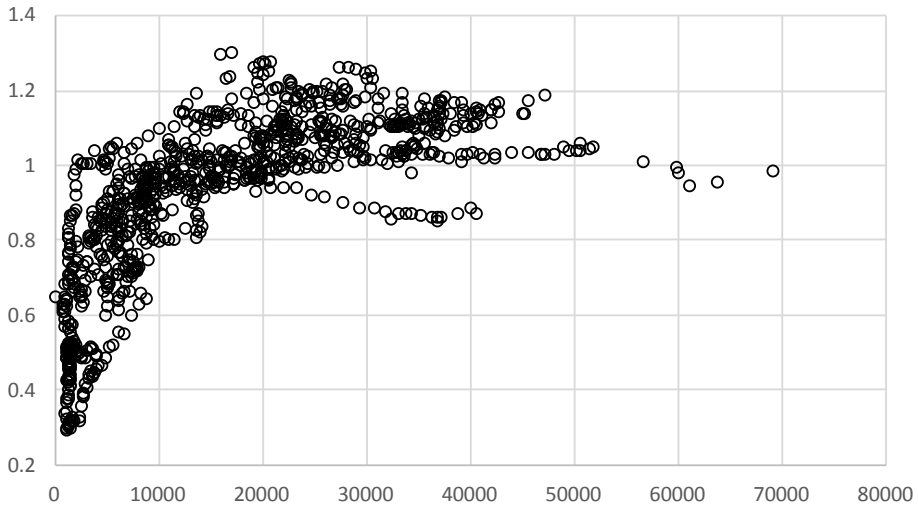


Figure 1. Ratio of the service sector's employment share to value-added share and per capita income
Notes: The horizontal axis indicates GDP per capita (value of expenditure-side real GDP at chained PPPs (in millions of 2011 US$) deflated by population (in millions)). The vertical axis indicates the ratio of the service sector's employment share to value-added share. Data source: Penn World Table version 9.0 and the GGDC 10-Sector Database

Next, we present a simple static model to analyze the factors behind the difference between value-added and employment shares and find that the relative capital intensity (the degree of capital deepening) between the tradable and service sectors is key to the difference. In the initial economic development phase, the relative capital intensity of tradable sectors to the service sector increases for industrialization. This increase works to shift labor from tradable sectors to the service sector, thus making the service sector's

employment share larger than its value-added share. In the next developed phase, the relative capital intensity of tradable sectors to the service sector levels off. Thus, the ratio of the service sector's employment share to value-added share stops increasing. However, amid the ongoing economic globalization, the ratio has started to increase again (the relative capital intensity between the tradable and service sectors increases) in developed countries. In developed countries, many tasks for which labor is substitutable by capital are automated given a steep decline in the relative price of investment goods. Thus, the degree of capital deepening increases in developed countries, implying that tasks with low elasticity of substitution between capital and labor are likely to be offshored to developing countries (Dao and Others, 2017).

Blum (2008) exhibited a research interest similar to that of this paper with respect to the causal relationship between income inequality and physical capital, which accumulates at different rates in different sectors. The author found that changes in the economy's sectoral composition, coupled with capital accumulation at different rates in different sectors, was the most important force behind the widening of the wage gap between 1970 and 1996 in the United States.

The contributions of this paper are summarized as follows. First, we find a new measure (the difference between services' employment and value-added shares) as a factor that affects income inequality. Hereafter, we call this measure the relative structural transformation measure. The estimated results from a fixed-effects panel data model indicate that this new measure has strong explanatory power for income inequality. Second, the relative capital intensity between tradable and service sectors is revealed to be a deterministic factor that affects the new measure and thus income inequality.

This paper proceeds as follows. The next section contains the empirical facts of the differing structural transformation patterns and their relationships to income inequality. Sections 3 and 4 provide the model analysis that detects the factors behind the differences between the service sector's employment and value-added shares. Section 5 concludes.

2. Empirical Facts

2.1. Differing structural transformation patterns

Figure 2 indicates the relationship between the services' share of nominal added value (GDP) (vertical axis and percentage) and GDP per capita (horizontal axis and logarithmic value) from 1950 to 2013 for 41 countries, including 15 high-income countries and 26 developing countries.[1] The dispersed share of services in developing countries with lower income can be observed in Figure 1. For developed countries—on

[1] In this section, the service sector includes all industries other than agriculture, mining, manufacturing, utilities, and construction. Forty-one countries are divided into four groups: Africa (Botswana, Ethiopia, Ghana, Kenya, Malawi, Mauritius, Nigeria, Senegal, South Africa, Tanzania, Zambia, Egypt, and Morocco), East Asia + India (China, India, Indonesia, Malaysia, the Philippines, and Thailand), Latin America (Argentina, Bolivia, Brazil, Colombia, Costa Rica, Venezuela, and Mexico), and high-income countries (the United States, Germany, Denmark, Spain, France, the United Kingdom, Italy, the Netherlands, Sweden, Japan, South Korea, Chile, Taiwan, Hong Kong, and Singapore). The source of the data is the 10-Sector Database (the Groningen Growth and Development Centre). “High income” is based on the World Bank's definition.

the far right in this figure—the overall share of the service sector appears to move upward

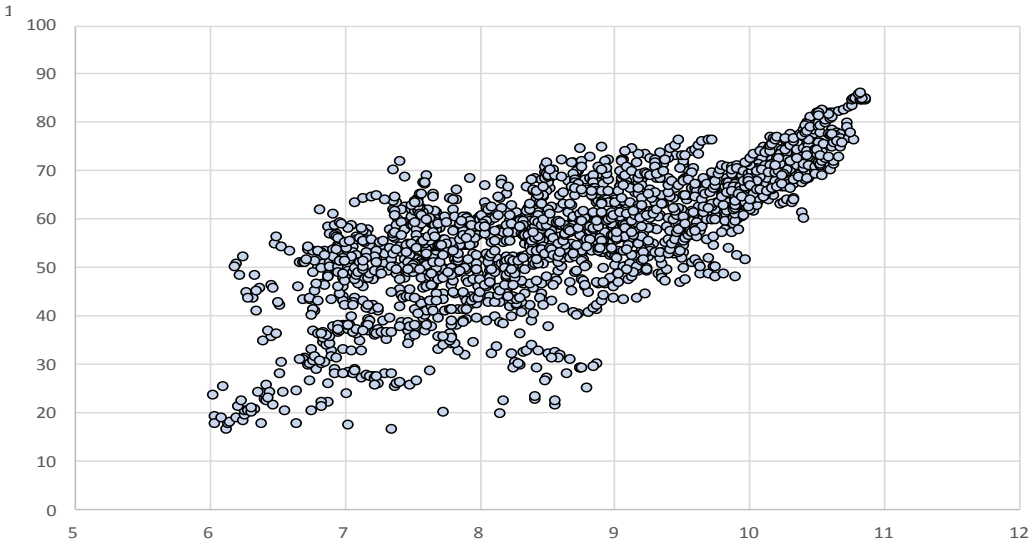


Figure 2. Services share of nominal added value and GDP per capita
Notes: The horizontal axis indicates the logarithmic GDP per capita (value of expenditure-side real GDP at chained PPPs (in millions of 2011 US$) deflated by population (in millions)). The vertical axis indicates the services share of nominal added value (%). The data source is the same as for Figure 1.

Figure 3 illustrates the change in the service sector's share of employment for all of the countries sampled in Figure 2. Compared with Figure 2, which illustrates the service sector's GDP share, Figure 3 shows that the sector's share of employment appears to grow at a mostly consistent and more rapid rate in accordance with income.

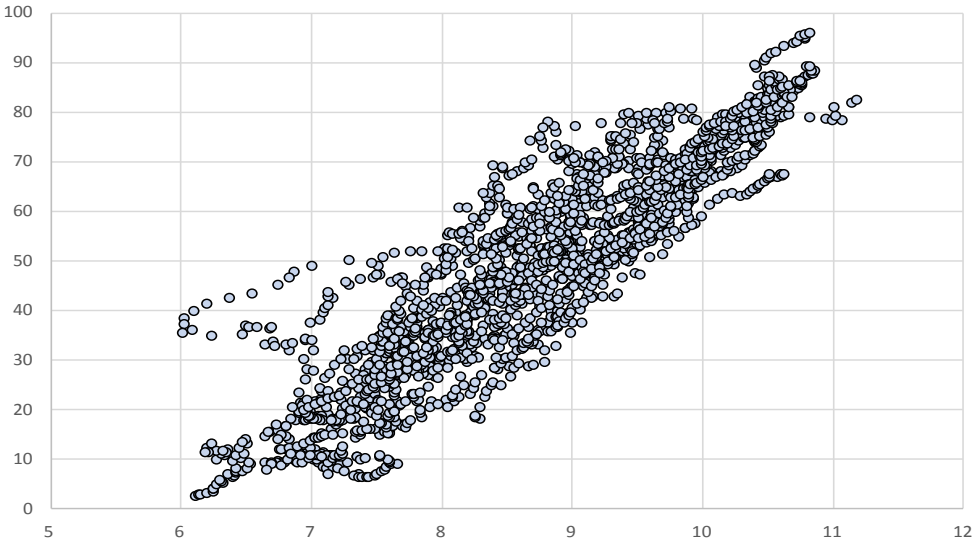


Figure 3. Services share of employment and GDP per capita
Notes: The horizontal axis indicates the logarithmic GDP per capita (value of expenditure-side real GDP at chained PPPs (in millions of 2011 US$) deflated by population (in millions)). The vertical axis indicates the services' share of employment (%). The data source is the same as that for Figure 1.

Next, we estimate the relationship between income and changes in the share of services for these countries by using panel data from these countries. Table 1 indicates the estimation results. Rows (1) to (4) indicate estimations for the value-added share, and rows (5) to (8) provide the employment share. Rows (1), (3), (5), and (7) are estimations from pooled OLS, and rows (2), (4), (6), and (8) are those from panel estimations with fixed effects for the sample countries. All estimations include an explanatory variable, GDP per capita (logarithmic values), and an OECD dummy to determine that the service sector's share appears to move significantly upward in developed countries with higher income levels in these figures. Rows (3), (4), (7), and (8) are estimations with different area dummies for developing countries in Asia, Latin America, and Sub-Saharan Africa.

From Table 1, one observes that the parameters of GDP per capita for the employment share are larger than those for the value-added share. The results are the same for both the pooled OLS and the panel estimations, which confirms that the degree of increase in the proportion of services' employment is larger than that of services' added value as economic development progresses.

Table 1 also indicates significant differences in the point estimates of the interaction terms between GDP per capita and regional dummies for these two estimation methods. These differences indicate that we should select panel estimations with fixed effects to analyze the causal relationship between income change and structural transformation and that, between developing and developed countries, significant differences exist in the impacts that an income increase has on structural transformation.

Table 1: Causal relationship between GDP per capita and structural transformation

	Dependent variables	constant		GDP per capita		GDP per capita*OECD dummy		GDP per capita*Asia dummy		GDP per capita*Latin America dummy		GDP per capita*Sub-Sahara Africa dummy		Adjusted R-squared	Total panel observation	
(1)	Value-added share	-17.893	***	7.866	***	-0.140	***							0.68	2069	pooled OLS
		(-13.05)		(47.77)		(-3.86)										
(2)	Value-added share	-2.499	*	4.508	***	4.357	***							0.89	2069	Fixed effect
		(-1.70)		(21.42)		(12.43)										
(3)	Value-added share	-16.95	***	7.783	***	-0.073	*	-0.265	***	0.043		0.085		0.70	2069	pooled OLS
		(-11.84)		(47.35)		(-1.82)		(-7.17)		(1.04)		(1.50)				
(4)	Value-added share	-9.143	***	12.129	***	2.021	***	-7.256	***	-7.873	***	-9.601	***	0.92	2069	Fixed effect
		(-5.75)		(24.94)		(5.39)		(-15.57)		(-11.69)		(-16.10)				
(5)	Employment share	-95.069	***	15.895	***	-0.252	***							0.91	2208	pooled OLS
		(-82.89)		(111.19)		(-6.84)										
(6)	Employment share	-83.879	***	11.508	***	8.118	***							0.98	2208	Fixed effect
		(-79.99)		(78.91)		(31.92)										
(7)	Employment share	-90.362	***	15.438	***	-0.178	***	-0.351	***	0.398	***	-0.354	***	0.91	2208	pooled OLS
		(-76.08)		(106.43)		(-4.13)		(-8.45)		(7.99)		(-6.63)				
(8)	Employment share	-99.072	***	16.330	***	3.958	***	-5.941	***	7.496	***	-9.283	***	0.98	2208	Fixed effect
		(-67.21)		(44.35)		(11.33)		(-16.39)		(13.78)		(-14.99)				

Notes: t-values are in parentheses. *** indicates 1% significance, and * indicates 10% significance. The sample countries are the same as those used in Figures 1, 2, and 3. OECD countries are the United States, Germany, Denmark, Spain, France, the United Kingdom, Italy, the Netherlands, Sweden, Japan, South Korea, Chile, and Mexico. Asian countries are Japan, South Korea, China, Hong Kong, Taiwan, India, Singapore, Indonesia, Malaysia, the Philippines, and Thailand. Latin American countries are Argentina, Bolivia, Brazil, Colombia, Costa Rica, Chile, Venezuela, and Mexico. Sub-Saharan countries are Botswana, Ethiopia, Ghana, Kenya, Malawi, Mauritius, Nigeria, Senegal, South Africa, Tanzania, and Zambia. Benchmark countries for the estimations are Morocco and Egypt.

2.2. Structural Transformation and Income Distribution

In the previous section, we confirm that the degree of increase in the proportion of services employment is larger than that of service added value as economic development progresses. As previously mentioned, the smaller changes in the value-added share relative to changes in the employment share indicate a stagnant increase in per capita income in the service sector, which may result in interpersonal income inequality as economic development progresses and the service sector's share increases. Table 2 provides the estimation results of the fixed effects regression with an income inequality measure as a dependent variable and structural transformation measures as explanatory variables.

We prepare four explanatory variables for income inequality changes; GDP per capita (columns (1) and (2)), services share of employment (columns (3) and (4)), services share of GDP (columns (5) and (6)), and the relative structural transformation measure (columns (7) and (8)). All estimations include quadratic terms in theses variables to

check the confirmation of the Kuznets curve of the inverted U-shaped relationship between inequality and structural transformation. Columns (2), (4), (6) and (8) are estimations with a dummy variable which takes the value 1 for high income countries and is zero otherwise. The measure of income inequality represents the share of national income going to the top 10%. Unbalanced data for this estimation are from 1950 to 2013 for 21 countries, including 14 high-income countries (the United States, Germany, Denmark, Spain, France, the United Kingdom, Italy, the Netherlands, Sweden, Japan, Korea, Taiwan, Singapore, and Chile) and seven developing countries (Mauritius, South Africa, China, India, Thailand, Brazil, and Egypt). The income distribution data are obtained from the latest version of the World Inequality Database (WID).[2]

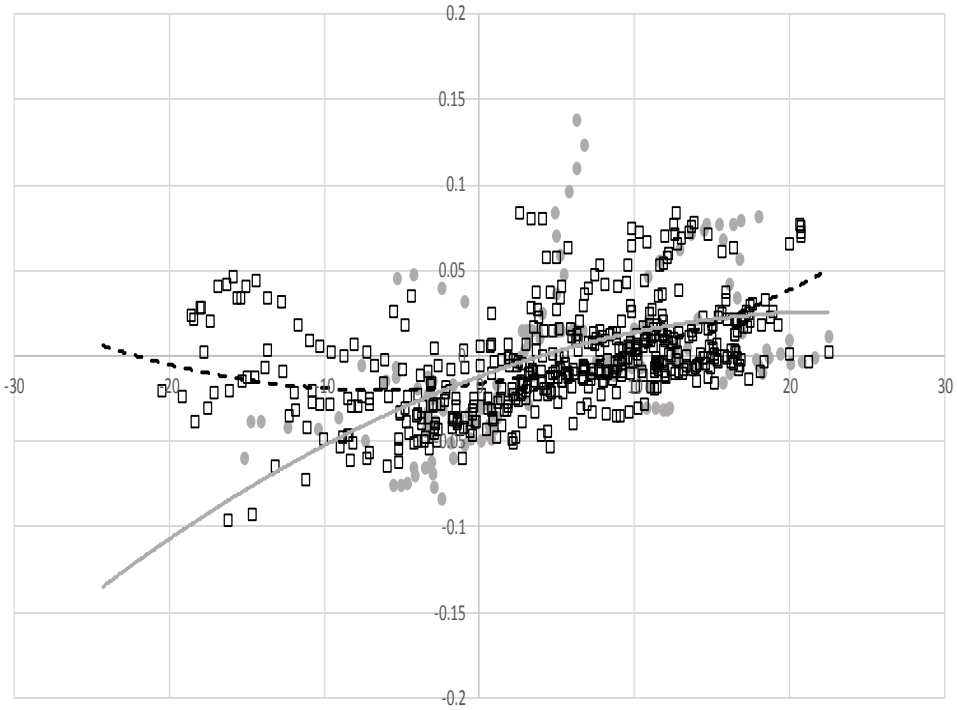
[2] The data on income distribution can also be taken from the UNU/WIDER World Income Database (WIID). This database, currently the most exhaustive compilation of secondary data, contains various types of inequality data, including income distributional shares and Gini coefficients, both of which are based on income and consumption data. The advantage of the WID database relative to the WIID database is its longer data collection period.

Table 2. Results of fixed-effects regression of income inequality

	income inequality measure							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
constant	-0.0080 ***	-0.0095 ***	-0.0150 ***	-0.0146 ***	-0.0156 ***	-0.0117 ***	-0.0063 ***	-0.0063 ***
	(-6.05)	(-7.30)	(-9.36)	(-9.27)	(-15.09)	(-9.19)	(-4.67)	(-4.66)
GDP per capita	1.6285 ***	15.8539 ***						
	(11.43)	(9.55)						
GDP per capita^2	13.0505 *	-1675.687 ***						
	(1.94)	(-6.83)						
GDP per capita*high income dummy		-14.3572 ***						
		(-8.62)						
GDP per capita^2*high income dummy		1695.037 ***						
		(6.91)						
Employment share			0.0013 ***	0.0033 ***				
			(9.33)	(8.19)				
Employment share^2			0.0000 ***	-0.0000 **				
			(5.26)	(-2.26)				
Employment share*high income dummy				-0.0022 ***				
				(-5.13)				
Employment share^2*high income dummy				0.0001 ***				
				(4.88)				
GDP share					0.0031 ***	0.0040 ***		
					(18.39)	(9.17)		
GDP share^2					0.0002 ***	0.0002 ***		
					(9.16)	(4.80)		
GDP share*high income dummy						-0.0012 ***		
						(-2.61)		
GDP share^2*high income dummy						-0.0001 ***		
						(-2.97)		
Relative structural transformation measure							0.1704 ***	0.1623 ***
							(8.31)	(4.83)
Relative structural transformation measure^2							-0.2989 ***	-0.3001 **
							(-4.03)	(-2.52)
Relative structural transformation measure*high income dummy								0.01461
								(0.34)
Relative structural transformation measure^2*high income dummy								0.0123
								(0.08)
Adjusted R-squared (Within)	0.25	0.33	0.22	0.25	0.55	0.45	0.11	0.10
Total panel observation	708	708	645	645	632	632	626	626

Notes: t-values are in parentheses. *** indicates 1% significance, and * indicates 10% significance. Sample countries are discussed in the text.

Figure 4. The relationship between services share of employment and income inequality



Notes: Circles and square dots depict developing and high-income countries respectively. The horizontal axis indicates the services share of employment. The vertical axis indicates the inequality measure. These are variables from which their average values are deducted for the fixed effects regression (Table 2, column (4)). Data source: The GGDC 10-Sector Database and the World Inequality Database (WID).

An inverted U-shaped pattern of inequality as income development progresses cannot be affirmed for high income countries in the estimations of (2), (4) and (6). In estimations of (7) and (8), the coefficients of interaction terms between the relative structural transformation measure and high-income dummies are insignificant. This means that the relative transformation measure can explain the changes in income inequality equally for developed and developing countries and the other three variables cannot.

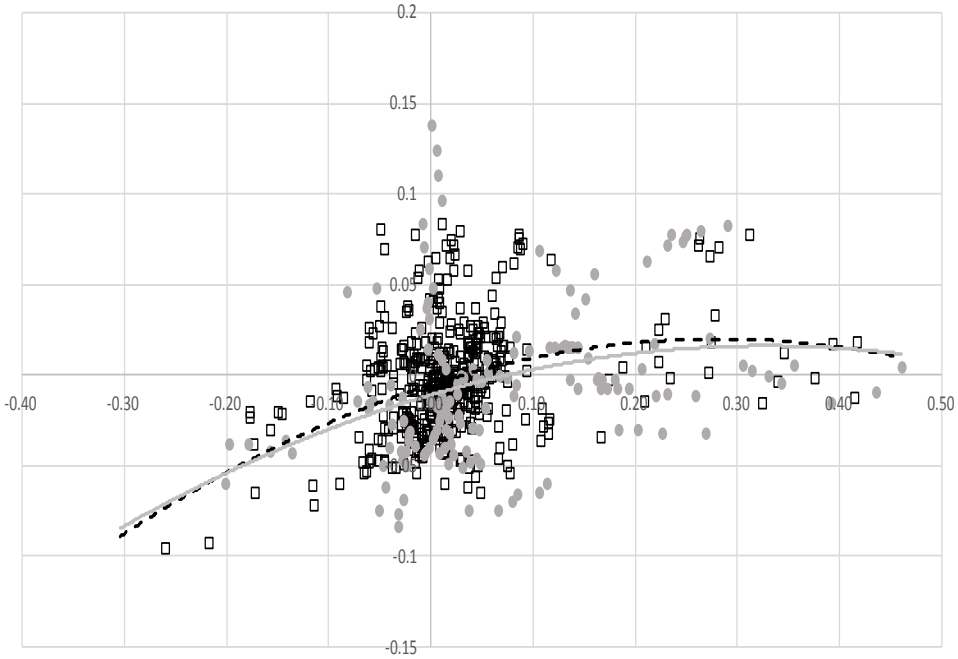


Figure 5. The relationship between relative structural transformation measure and income inequality

Notes: Circles and square dots depict developing and high-income countries respectively. The horizontal axis indicates the relative structural transformation measure. The vertical axis indicates the inequality measure. These are variables from which their average values are deducted for the fixed effects regression (Table 2, column (8)). Data source: The GGDC 10-Sector Database and the World Inequality Database (WID).

Figure 4 indicates the relationship between income inequality measure (vertical axis) and the services share of employment (horizontal axis). In Figure 5, the variable for the horizontal axis is replaced by the relative structural transformation measure. These are variables from which their average values are deducted for the fixed effects regression (within estimators). As Figure 4 and Table 2(4) indicate, the structural transformation (the increase in the services share of employment) works to rise inequality in the early developing phase. In the next developed phase, however, it turns to work oppositely; the inequality measure decreases and then rises again. Figure 5 shows the same changing pattern of inequality measure for developed and developing countries. It is because as Figure 1 and Table 2(2) indicate, the relative structural transformation measure moves the same way as inequality measure does in accordance with income.

This paper expects income inequality and the relative structural transformation measure are linearly correlated; the smaller changes in the value-added share relative to changes in the employment share indicate a stagnant increase in per capita income in the service sector, which may result in interpersonal income inequality as economic development progresses and the service sector's share increases. As Figure 5 indicates, income inequality can be regressed as a quadratic function of the relative structural

transformation measure. The inverted U-shaped function has a peak of income inequality where the transformation measure takes the value of around 0.30. The rate of income inequality keeps almost the same level even if the transformation measure exceeds 0.30 due to the shape of the quadratic function in Figure 5. We can conclude that the rise of relative transformation measure leads to higher income inequality equally for developed and developing countries.

The advantage of adopting the relative structural transformation measure as an explanatory variable for the estimation of income inequality change is its simplicity. The traditional explanatory variables, such as GDP per capita, and the closely related changes in structural transformation defined as the reallocation of economic activity among sectors cannot explain the income inequality change for developing countries in the same way as for developed countries, as indicated in Figure 4. In this traditional method of analysis on income inequality, we must detect reasons why the Kuznets curve holds only in developing countries and not in developed countries.

3. The Model

In this chapter, we introduce a simple static model to examine the factors behind the change in the relative structural transformation measure (the difference between the service sector's employment and value-added shares). The literature on macroeconomics and growth has factorized structural transformation into three components: a demand-side effect because of low income elasticity of demand for agricultural products (income effects) and two supply-side effects, one resulting from differential sectoral total factor productivity (TFP) growth rates and the other from differential sectoral capital deepening (relative price effects). These two supply-side components are combined to be labor productivity. The income effects focus on the lower income elasticity of demand for the consumption of agricultural products and the decreasing percentage of agricultural products in overall consumption as income rises. Regarding the supply-side effects, the service sector's lower labor productivity relative to the tradable sectors leads to a higher price level of services and thus to the sector's higher nominal value-added share in economic development (the elasticity of substitution between the consumption of tradable goods and services is assumed to be less than unity; i.e., a complementarity relationship between tradable goods consumption and services consumption is assumed). Supply-side effects also play a role in shifting production factors from highly productive to unproductive sectors.

Production and Preferences

Our model focuses solely on the implications for optimal consumption and production behavior within each period. The advantage of this "static" approach is that the first-order conditions for the stand-in household and the stand-in firm are given by only observed current variables, and we do not have to take a stand on the exact nature of intertemporal opportunities available to them (i.e., the appropriate interest rates for borrowing and lending). In what follows, subscript *t*, which indicates time, is omitted in each variable.

The model has two sectors of activity: tradable (*T*) and services (*S*). The tradable sector includes agriculture and manufacturing. The production function in each sector is

assumed to be Cobb–Douglas with constant returns to scale. Our static approach allows all variables to change in each period without exceptions, and capital intensity (θ_T θ_S) is also assumed to change in each period. The service sector output can be used for consumption (C_S) and investment (I_S). The output of the tradable sector can be disaggregated into consumption (C_T), investment (I_T), and net exports (NEX_T). In each sector, the shares of investments and net exports are exogenously determined in the model. Production structures and their market clearings in each of the product markets are as follows:

$$Y_S = A_S K_S^{\theta_S} L_S^{1-\theta_S} = C_S + I_S$$

$$Y_T = A_T K_T^{\theta_T} L_T^{1-\theta_T} = C_T + I_T + NEX_T \qquad (1)$$

where $Y_i, A_i, K_i,$ and L_i are the added value, TFP, capital stock, and employment in $i = T, S$, respectively. All production resources (K_i and L_i) are fully used, meaning that

$$K_S + K_T = K$$

$$L_S + L_T = L \qquad (2)$$

We assume that the period utility function $u(C_S, C_T)$ is of the form

$$u(C_S, C_T) = \left[\omega^{\frac{1}{\varepsilon}} C_S^{\frac{\varepsilon-1}{\varepsilon}} + (1-\omega)^{\frac{1}{\varepsilon}} C_T^{\frac{\varepsilon-1}{\varepsilon}}\right]^{\frac{\varepsilon}{\varepsilon-1}} \qquad (3)$$

where ε is the elasticity of substitution between the consumption of services and tradable products.

Equation (3) is a homothetic constant elasticity of substitution preference and does not consider the income effects. This model focuses on the relative price effects to detect factors that cause long-term structural transformation.

Optimality Conditions

Next, production-side efficiency is derived. Perfect factor mobility exists across two sectors if sector-specific distortions to production factors (capital and employment) are cleared. The first-order conditions for the stand-in firm in sector *i* are given by

$$R = P_S\theta_S A_S\left(\frac{K_S}{L_S}\right)^{\theta_S-1} = P_T\theta_T A_T\left(\frac{K_T}{L_T}\right)^{\theta_T-1}$$

$$W = P_S(1-\theta_S)A_S\left(\frac{K_S}{L_S}\right)^{\theta_S} = P_T(1-\theta_T)A_T\left(\frac{K_T}{L_T}\right)^{\theta_T} \quad (4)$$

where P_i is the price of sector *i* and *R* and *W* denote rental rates of capital and employment, respectively. Both are expressed in nominal currency.

Dividing these two equations by each other gives:

$$\frac{1-\theta_S}{\theta_S}\left(\frac{K_S}{L_S}\right) = \frac{1-\theta_T}{\theta_T}\left(\frac{K_T}{L_T}\right) \quad (5)$$

From the second equation in Equation (4), the implications for relative prices can be derived:

$$\frac{P_S}{P_T} = \frac{1-\theta_T}{1-\theta_S}\frac{A_T}{A_S}\frac{k_T^{\theta_T}}{k_S^{\theta_S}} \quad (6)$$

In this equation, $k_T = \frac{K_T}{L_T}$ and $k_S = \frac{K_S}{L_S}$.

If C_S and C_T and their prices, P_S^C and P_T^C, are observed, the first-order condition for the stand-in household corresponds to

$$\left(\frac{P_S^C}{P_T^C}\right)^{\varepsilon}\frac{C_S}{C_T} = \frac{\omega}{1-\omega} \quad (7)$$

The two consumption prices, P_S^C and P_T^C, are different from the GDP deflators, P_S and P_T, because the former includes import prices and the latter does not. The proportion of relative consumption prices to relative GDP deflators, or the exogenous price effect (Φ), is defined as follows:

$$\frac{P_S^C}{P_T^C} = \Phi \frac{P_S}{P_T} \tag{8}$$

In what follows, we derive the relative consumption value of services to that of tradable products and the sectoral allocation of employment across the two sectors.

From Equations (6), (7), and (8), the relative consumption values across the two sectors are obtained as follows:

$$\frac{P_S^C}{P_T^C}\frac{C_S}{C_T} = \left(\frac{P_S^C}{P_T^C}\right)^{1-\varepsilon}\frac{\omega}{1-\omega} = \Phi^{1-\varepsilon}\left(\frac{P_S}{P_T}\right)^{1-\varepsilon}\frac{\omega}{1-\omega}$$

$$= \Phi^{1-\varepsilon}\left(\frac{1-\theta_T}{1-\theta_S}\right)^{1-\varepsilon}\left(\frac{A_T}{A_S}\right)^{1-\varepsilon}\left(\frac{k_T^{\theta_T}}{k_S^{\theta_S}}\right)^{1-\varepsilon}\frac{\omega}{1-\omega}$$

(9)

On the basis of Equation (1), we define the relationship between Y_S and C_S as $Y_S(1-\gamma S{=}CS$ and define the relationship between YT and CT as $YT1{-}\gamma T{-}\tau T{=}CT$, where $\gamma_S = \frac{I_S}{Y_S}$, $\gamma_T = \frac{I_T}{Y_T}$, and $\tau_T = \frac{NEX_T}{Y_T}$. By using these definitions and Equation (7), we derived the next equation, Equation (10):

$$\frac{Y_S}{Y_T}\frac{1-\gamma_S}{1-\gamma_T-\tau_T} = \frac{C_S}{C_T} = \left(\frac{P_S^C}{P_T^C}\right)^{-\varepsilon}\frac{\omega}{1-\omega} \tag{10}$$

To derive the implications for relative employment allocation, we substitute Equation (1) into Equation (10) and rearrange it to obtain:

$$\frac{A_S}{A_T}\frac{k_S^{\theta_S}}{k_T^{\theta_T}}\frac{L_S}{L_T}=\left(\frac{P_S^C}{P_T^C}\right)^{-\varepsilon}\frac{\omega}{1-\omega}\frac{1-\gamma_T-\tau_T}{1-\gamma_S}=\Phi^{-\varepsilon}\left(\frac{P_S}{P_T}\right)^{-\varepsilon}\frac{\omega}{1-\omega}\frac{1-\gamma_T-\tau_T}{1-\gamma_S}$$

$$=\Phi^{-\varepsilon}\left(\frac{1-\theta_T}{1-\theta_S}\right)^{-\varepsilon}\left(\frac{A_T}{A_S}\right)^{-\varepsilon}\left(\frac{k_T^{\theta_T}}{k_S^{\theta_S}}\right)^{-\varepsilon}\frac{\omega}{1-\omega}\frac{1-\gamma_T-\tau_T}{1-\gamma_S} \quad (11)$$

Equation (11) can be rearranged to obtain the next equation, Equation (12), for the relative employment allocation:

$$\frac{L_S}{L_T}=\Phi^{-\varepsilon}\left(\frac{1-\theta_T}{1-\theta_S}\right)^{-\varepsilon}\left(\frac{A_T}{A_S}\right)^{1-\varepsilon}\left(\frac{k_T^{\theta_T}}{k_S^{\theta_S}}\right)^{1-\varepsilon}\frac{\omega}{1-\omega}\frac{1-\gamma_T-\tau_T}{1-\gamma_S} \quad (12)$$

Then, we obtain some factors to decide the relative consumption and employment ratios of services.

From Equation (9), the relative consumption across the two sectors is factorized into the following three factors: (1) relative capital deepening $\left(\frac{1-\theta_T}{1-\theta_S}\right)^{1-\varepsilon}\left(\frac{k_T^{\theta_T}}{k_S^{\theta_S}}\right)^{1-\varepsilon}$, (2) relative TFP $\left(\frac{A_T}{A_S}\right)^{1-\varepsilon}$, and (3) exogenous price effects $\Phi^{1-\varepsilon}$. From Equation (12), the relative employment across the two sectors is decided by the following four factors: (1) the relative capital deepening $\left(\frac{1-\theta_T}{1-\theta_S}\right)^{-\varepsilon}\left(\frac{k_T^{\theta_T}}{k_S^{\theta_S}}\right)^{1-\varepsilon}$, (2) the relative TFP $\left(\frac{A_T}{A_S}\right)^{1-\varepsilon}$, (3) exogenous price effects $\Phi^{-\varepsilon}$, and (4) the demand composition $\frac{1-\gamma_T-\tau_T}{1-\gamma_S}$.[3]

3.1. Implications of the Model

From the empirical analyses in Section 2, the rate of increase in the services share viewed as employment share is larger than that when viewed as value-added share. In fact, this difference originates from the difference between Equations (9) and (12). The most important difference between these two equations is related to the contribution of relative capital deepening to sectoral structural change. In many countries, relative capital intensity $(\frac{\theta_T}{\theta_S})$ tends to increase as the tradable sector (especially the manufacturing sector) promotes capital deepening as economic development progresses.

[3] The nonnegative weight for services consumption (ω) is assumed to be fixed and, thus, has no effect on the sectoral changes. The weight is usually calibrated as an averaged services consumption share in the entire period of analysis.

This increase leads to a decrease in relative labor intensity ($\frac{1-\theta_T}{1-\theta_S}$) and results in an increase in the relative capital–labor ratio ($\frac{k_T}{k_S}$) from Equation (5). In Equation (9) for relative consumption share, $\left(\frac{1-\theta_T}{1-\theta_S}\right)^{1-\varepsilon}$ and $\left(\frac{k_T^{\theta_T}}{k_S^{\theta_S}}\right)^{1-\varepsilon}$ move in the opposite direction if we assume that ε is less than unity (gross complementarity). Thus, the magnitude of the change in the capital deepening factor $\left(\frac{1-\theta_T}{1-\theta_S}\right)^{1-\varepsilon}\left(\frac{k_T^{\theta_T}}{k_S^{\theta_S}}\right)^{1-\varepsilon}$ tends to be relatively small. In contrast, $\left(\frac{1-\theta_T}{1-\theta_S}\right)^{-\varepsilon}$ and $\left(\frac{k_T^{\theta_T}}{k_S^{\theta_S}}\right)^{1-\varepsilon}$ move in the same direction in Equation (12), and the magnitude of the change of the capital deepening factor $\left(\frac{1-\theta_T}{1-\theta_S}\right)^{-\varepsilon}\left(\frac{k_T^{\theta_T}}{k_S^{\theta_S}}\right)^{1-\varepsilon}$ tends to become relatively large.

This model analysis is supported by empirical data. Takeuchi (2019) decomposed the change in services share of added value and employment into the previous factors and found that the relative capital intensity factor is the most important for structural transformation in terms of value-added and employment shares. Moreover, the impact of the increase in relative capital intensity on the contribution rates of the capital intensity factor to sectoral changes is revealed to be larger when services' share is treated as employment share rather than value-added share. This finding indicates that the capital intensity factor plays a most important role in making a difference between value-added and employment shares of the service sector.

The relative capital intensity factor is also expected to affect economic development. According to Takeuchi (2019), the relationship between capital intensity and economic development differs between East Asia and other regions. For example, in Latin America, services' share grows quickly, along with a rapid increase in capital intensity. The productivity of the service sector is relatively low. Thus, macroeconomic growth rates stay relatively low. A rapid increase in capital intensity as such leads to lower economic growth and higher income inequality.

4. Conclusion

This paper examines the implications of the structural transformation for income distribution from a new perspective. We focus on the observed fact of structural transformation that the service sector's employment share tends to increase at a higher rate than does the sector's value-added share. The results reveal that this fact leads to a stagnant increase in per capita income in the service sector, resulting in interpersonal income inequality as economic development progresses and the sector's share increases. This distinctly differing pattern of structural transformation demonstrates superiority against the traditional Kuznets curve of the inverted U-shaped relationship between inequality and structural transformation; the change in income inequality can be regressed on the relative structural transformation measure in the same manner for developed and developing countries.

We introduce a simple static model to examine the factors behind the difference between the service sector's employment and value-added shares and find that the change in the relative capital intensity of the tradable sector versus that of the service sector is a key factor in causing the difference. The sectoral capital intensity is controlled by industrial policies, especially in developing countries. This examination has an important policy implication: that a slow-paced capital deepening in the tradable sector relative to the service sector in line with their comparative advantages (abundant labor force) is a favorable policy that results in relatively high economic growth and low-income inequality.

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EFFECTIVENESS OF PUBLIC POLICIES DESIGN AND THE ROAD TO SUSTAINABLE GROWTH IN TUNISIA

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Abstract

The main purpose in this paper is to examine the impact of different public policies on the economic growth in Tunisia between 1990 and 2014. We estimated our basic model by using the ARDL bounds test technique. The econometric analysis gave various images and very interesting results .Our main findings indicate that Tunisian's disappointed economic growth results from bad designed and misguided public policies. This finding provides key insights on policy recommendations for policymakers.

Keywords: Economic Growth; Public policy; ARDL

JEL Classification: O40; E62; C22

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1. Introduction

Many nations grow and prosper while others regress and face economic problems. In fact, this is has nothing to do with miracles, luck or divine intervention. Many countries are the richest in terms of natural resources are classified among the poorest. Others with fewer resources have successfully generated wealth and high level of economic and technological growth based on a combination of locally designed policies.

During the last economic development plans, Tunisia tried to achieve a higher economic performance, dreaming to catch up the pool of emerging countries. However, the government policies failed to solve many economic and social problems associated to the high unemployment rates especially among the young graduates, the low attractiveness of investment, the deficit trade balance, the inefficient financial and fiscal regulation, the policies related to innovation , education , institutional and governance aren't well designed.

After the revolution, the economic situation was more deteriorated. There wasn't a clear government plans to reduce the economic crises worsened by the social demands for economic justice. The revolution in Tunisia was based on the concerns of young people about their right of employment, democracy, social inequality and a political change totally in rupture with the past. The selfishness of politicians has worsened the country's economic situation. They forgot the real reason on which the revolution was born. After the Arabic revolution, Tunisia had suffered from a deep decline in economic development especially after the last terrorism acts. The situation was more complicated with the social unbalanced situation, the instability of political regime and the lack for a clear road map for achieving a better economic growth. Due to these facts, many steps have to be taken forward by government to set up a new vision and strategies. Many radical reforms have to be executed indeed to fix the economic decline and the social issues. On the reality grounds, the educational system in Tunisia is no longer performing since its quality has deteriorated for many years, giving a poor human capital in lag with technological changes and inappropriate to the needs of companies recruitments. According to the annual report of Lagos (2014-2015), the educational system is at the bottom of the international ranking, as it is classified in the 68^{th} place among 144 countries. By referring to the government and central bank reports of Mars 2014, the GDP growth was 2.6% in 2013; the government has revised this rate in 2014 which would be only 2.8% against 3.5% previously due to slow down in the industrial activity.

Moreover, the National Statistics Institute (NSI) shows that the external balance of trade for January 2015 is in deficit when the exports decreased by 0.2% at constant prices. Also, the rate of Tax revenues recorded a low increase of 8.3% per year since 2010 accompanied with a remarkable inflation close to 6%. Beside these facts, the non-tax revenues excluding privatization, like the gain of public enterprises and oil fees, knew a sharp decrease. The budget deficit and the public debt increased from 3% of GDP in 2010 to 6.1% in 2013 and from 40% to 45% in 2013.

According to the latest statistics released by the Foreign Investment Promotion Agency (FIPA), foreign investments in Tunisia fell to 24.6% over the first 5 months of 2014, compared to the same period of 2013. The FDI could be an important factor to heal the unemployment high rate of youth and to renew the technologies used in production process. The internal resources are not enough to ensure sufficient growth for present

and future generation. The government must modify the existent policies to strengthen the attractiveness to FDI flows.

This is the 4th consecutive year of growth decline, a first in the Tunisian economic history has never experienced such a long period of low growth. According to the IMF report (2014), the slowdown in GDP growth is worsening the unemployment rate reaching 15, 3%. It has also slowing the government revenues while public spending continues to rise. The investment, both private and public, results in a rate Investment of only 20% of GDP. There are not sufficient means for providing the necessary equipment and production tools. This will weaken the productive capacity of the country and block the recruitment and employment. The World Bank and the rest of international institutions had called on Tunisia to improve its political reforms to get out of the crises. The government must take actions to save its economy that remains in a weak performance, where companies have stagnated in terms of productivity and job creation.

Recently, the Tunisian minister of economy and finance had shown a positive signal about making the necessary reforms to solve the problem of unemployment and low growth rates. The main brief for Tunisian authority should lead to the establishment of a new economic model. To do that, the government must change its policies in many fields of decision. The reforms have to ensure political and security balance, to ameliorate the quality of educational system, to create a new vision in financial and fiscal sectors, to enhance the industrial competiveness and innovation abilities, to promote investments and trade in the same time with others policies related to governance, competition, employment and environment.

The commune consensus is to know the limits and difficulties of the current growth model. The urgent character of the national economic situation involves preparing solutions for economic recovery in the short and medium term in order to build solid foundations for long-term economic development, hoping to reach the constellation of emerging countries. The government has to act rapidly to modify some policies which can enhance economic growth in short term. Some of these policies can represent a weakness or an obstacle. Our analysis tends to examine the impact of various economic policies on economic growth in Tunisia. The study adopts the political economy approach to explain which policies which fail to contribute to Tunisian economic development. So, are these policies good or bad for economic growth in Tunisia?

This paper is organized as follow: section 1 reviews the theoretical and empirical literature on the effect of economic policies on economic growth. Section 2 discusses our empirical methodology, data and contains the main results. Section 3 will be dedicated to the conclusion.

2. Literature Review

Many theoretical and empirical Literatures had shown that every public policy is a core factor that causes economic growth. The link between these policies and economic growth has been widely studied:

2.1. Promoting the Financial Policy

Gurley and Shaw (1955) identified a significant relationship between financial intermediaries and growth. According to Patrick (1966), the demand-following mean

that the creation of modern financial institutions, their assets and financial services come from the need of investors and savers. In this case, the financial system is able to support the leading sectors in the process of economic growth. The evolution of the financial system is a consequence of real economic growth. Then, the supply of financial services provided by the creation of financial institutions and markets, lead to a causal relationship running from financial development to economic growth. The supply-leading financial development provides a real capital formation in the early stages of economic development. The theory of endogenous economic growth started with Romer (1990), Lucas (1988) and Barro (1991) had a significant contribution about financial policy and growth. The first views represented by Schumpeter (1911); Gurley and Shaw, (1955); Goldsmith, (1969); McKinnon, (1973); Shaw, (1973); Roubini and Sala-i Martin, (1992) suggest that government policies should focus on improving financial system, because financial development cause growth. In other hand, others like Lucas, (1988); Stern, (1989); Stiglitz, (1994) induce that the policies induced by government to promote financial system have a weak impact on growth, as causality run from growth to financial development. The first significant study of comparison between countries was done by Goldsmith (1969). He adopted the cross-section analysis and time series in same time. His sample covered 35 countries, 19 developed and 16 less developed. His findings suggested a positive correlation between financial development, as measured by the size of financial intermediaries relative to GDP, interpreted as an indicator of quality of financial services provided, and economic growth. Levine et al. (2000) and Beck et al. (2000) use a panel technique to support the existence of a causal relationship from financial development to economic growth. Using a panel of 77 countries for the 1960–1995 periods, they find that higher levels of banking sector development produce faster rates of economic growth and total factor productivity (TFP) growth.

2.2. Fiscal policy through taxation instrument

The fiscal policy has an important role in government policy as an economic growth determinant. Based on the Keynesian theory, it state that government can influence macroeconomic productivity levels by increasing or decreasing tax levels and public spending. Fiscal policy must be oriented toward full employment, as its impact directly private income and agents' expectations concerning the future. For that reason Keynes proposed the use of public expenditures or investment rather than increasing consumption, due to its stronger multiplier effect. Many frameworks attempted to explain how government policy can effect economic growth. Barro (1990) argued that the effect of an increase in government investment financed by incomes taxes is ambiguous, the tax policy depends on the orientations of policymakers and its impact isn't the same for economic actors.

Alesina and Ardagna (2009) examined the effect of large change in fiscal policy in OCDE countries between 1970 and 2007. By using simple regression, they found that fiscal stimuli based on tax cut increase growth more than government spending increases. Those based upon spending cuts and no tax increases are more likely to reduce deficits and debt over GDP ratios than those based upon tax increases.

2.3.Education policy and human capital

The public policies in the world focus on promoting the quality of the educational system, since education is a premium source of productive and efficient labor force. In fact, the quantitative aspects of human capital were enough revealed, but less attention has been accorded to study the qualitative aspects of education.

The establishment of an effective education policy is necessary to form a human capital able to assimilate the foreign technology and to innovate. Lucas (1988) believes that human capital is the real engine of economic growth. He stressed the crucial role of human capital and training in the production of knowledge. Nelson and Phelps (1966) analyzed the relationship between education and growth through innovation. They concluded that the level of education boosts economic growth because it allows workers to acquire new knowledge. They argued that catching up countries would decrease their distance towards the technological frontier at a rate depending on the quality of human capital. In the same vein, Aghion (2006) showed that the growth effect of skilled labor is stronger when a country gets closer to the technological frontier.

Romer (2000) illustrated the complementarity between higher education policy and innovation policy; he assumed that the supply of researchers is constant and that the equipment used in the research sector are complementary to the highly skilled workforce; he showed that the increase in R&D subsidy in this case has no effect on investment in R&D. Aghion and Cohen (2004) showed the importance of education in economic growth. The endogenous growth theory suggests that the differences in growth between countries are due to differences in the effectiveness of R&D policies and the education system. For example, in countries close to the international technological frontier, education increases the supply of researchers and engineers; this increases the effect of any policy to encourage R&D on the degree of innovation. In the least developed countries, education facilitates the adaptability of the new technology and improves productivity.

2.4. Importance of the Innovation policy

Innovation policy can't be successful without robust policies that ameliorate the quality of institutions, stimulate the industrial competiveness and encourage university-industry collaboration in R&D. If IPR give an image about the quality of institutions, so innovation policies can't be efficient without upgrading the IPR policy. Innovation and intellectual property rights as a two complementary policies provide a clear picture about the degree of economic efficiency of a country. A country that gives more importance to R&D and protect well the rights of it inventors, is classified among the nations that register high rates of annual economic growth. So, developing countries must upgrade institution quality, industrial competitiveness and university-industry collaboration in R&D.

Most of endogenous economic growth models had shown a positive relation between innovation activities and economic growth .Beginning with Schumpeter (1931) who is the first economist who had studied the importance of innovation in promoting economic activity. He stressed the importance of patent protection for the entrepreneur who is the only one who is able to innovate, for protecting his profits coming through his invention, the inventor have to enforce the protection of his patent against imitation. He believes

that companies should be able to keep their production processes a top secret; their brands must be protected from any form of counterfeiting. The protection provided by the patent provides to firms stability in terms of innovation performances and profits until the launch of a new innovative activity and achieve the cost compensation. Arrow (1962) was a pioneer in the treatment of the relationship between the economy of intellectual property rights and innovation. The protection of property rights in all it various forms, play a crucial role in innovation systems. IPRs act as an incentive for innovation, since knowledge has the characteristics of a public good. In other vein, Endogenous theory, initiated by Romer (1986) and others economists like jones (1995), Aghion, Howitt (1995), Helpman and Grossman (1991), considers that innovation is a key factor to sustain economic growth. Innovation is generated by a stock of human capital devoted to research sector and it increase with the productivity of R&D. Romer (1990,1993) said that economic growth arises from a specific activity called the R&D and then he argued that protection by patent is an incentive to do more R&D and stimulate knowledge transfer. Countries should adopt attractive economic policies to invest in R&D and innovation, such as the protection of the invention through the establishment of an effective protection of the intellectual property system.

Rosenberg (1982), Jaffe (1986), Lichtenberg (1992) and Coe & Helpman (1993) claimed that the R&D efforts as measured by the number of innovations produced, have a significant and positive effect on economic growth, which don't depends on the country and the R&D sector sizes. Mansfield (1993) concluded that countries adequately protect intellectual property by patents, receive more foreign direct investment and thus more economic growth.

2.5. Benefits of the trade policy

Promoting international trade is at the core of public concern in most countries because it plays a big role in economic development. To ameliorate the economic performance, developing countries would increase its trade openness, lower the tariff level, and reduce the importation costs, specialized in exportation of value-added products and importation of high technologies. These factors will benefits the economic growth of developed countries.

Thirwall (1994) Romer (1993), Grossman and Helpman (1991) and Barro and Sala-i-Martin (1995) among others, argued that "openness can be good for growth. The opened economies grow faster than closed economies". In new growth theory, trade policy affect long-run growth by activating the technology transfer between the North and the South. Romer (1991), Grossman and Helpman (1991, 1992) affirmed that the commercial opening provides access to a global knowledge stock. This free access to larger markets promotes the exploitation of increasing returns to scale and avoid excessive activities in the sectors of R&D by devoting a larger share of human capital in R&D. Thus, Grossman and Helpman (1992) stressed that economic growth of developing countries will remain in progress if there are a strong protection of North products against imitation.

2.6. Improving the doing business climate

FDI is very important source of funding and employment for developing countries especially in crises time. The countries set up more attractive policies to bring the

foreigner capital on their territory; it raises economic growth by generating technology diffusion and creating new jobs opportunities. FDI can play an important role in modernizing the national economy and promoting growth through technology diffusion [Grossman and Helpman (1991, 1995), Barro and Sala-i-Martin (1995, 1997)]. Empirically, Alfaro, Chandra, Kalemli-Ozcan, and Sayek (2000) used a cross-country data between 1975 and 1995. They showed that FDI alone plays an ambiguous role in contributing to economic growth. They noted that only countries with well-developed financial markets can gain significantly from FDI.

2.7.Targeting inflation and ensuring macroeconomic stability

Many industrial economies, such as OECD countries, had used income policies as a tool to control inflation high pressure. The Literature had focused on the inflation issue through many studies that based on Phillips curve and traditional wage-price models like Lipsey and Parking (1970). Fisher (1993) had highlighted the different indicators that describe the macroeconomic stability such as the inflation rate, the budget surplus or deficit, and the black market exchange premium. To guaranty a macroeconomic stability, the inflation rates have to be low, stable and easily predictable. If macroeconomic stability shows that the government is able to manage smoothly the economy in long and short run. But, if there are a high inflation rates, the government had failed to prevent macroeconomic instability and lost totally control. According to Dornbusch and Fischer (1993), the aim of government is to maintain its inflation rate in a low level to prevent economic growth decline. Many economies in which inflation remains at moderate levels for long periods, economic agents in a high or medium inflation economy have to expect many attacks on inflation at any moment. Fisher (1993) argued that macroeconomic policies can matter to growth due to the uncertainly. It affects the efficiency of price mechanism because it's associated with high inflation or instability of the budget so it reduces also the productivity. The temporary uncertainly about the macroeconomic stability lead to a low rate of investment because the investors don't like risks in uncertain situation. When uncertainly is high, the investment are low. Empirically, Fisher (1991) extended the analysis of Levine and Renelt (1992) based on forty cross-sectional growth studies published between 1980 and 1990. He included macroeconomic indicators in their basic equation. The main results showed that the per-capita growth is negatively associated with inflation and positively associated with the budget surplus as a share of GNP.

2.8. Reducing the external debt effects

The foreign debt is still an important subject in the economic policy studies until nowadays. In the theoretical literature, foreign debt can damage the economic growth if it is in a high level, but in moderate level it enhances growth and welfare. According to Panizza (2008), the developed countries rely too much on external debt to cover the lack of domestic capital and to ameliorate economic growth. The accumulations of external debts obstruct the economic development in the long run due to the difficulties to improve stronger fiscal reforms. In this situation, the government will be under pressure and must repay foreign creditors. The need of incentives to improve ne reforms are needed by developed countries to reduce the financial gap and to maintain their growth rate. Barro (1979) argued that in the presence of heavy fiscal charge, the government must use an optimal policy by borrows from abroad to reduce the fiscal charge.

3. Empirical analysis

3.1. Variables and data sources

Basing on economic growth theory, we can construct our basic model to study the Tunisian case. We will use the set of proxies presented in the next table. All data are collected from different sources such as World Bank, IMF and Sherbrook university data bases.

Table 1: The variables used as proxies to public policies*Author's compilation

Policy	**Proxy**
Financial policy	Domestic credit provided by financial sector (% of GDP)
Fiscal policy	Government Expense (% of GDP)
Macroeconomic policy	Inflation, GDP deflator (annual %)
Employment policy	Unemployment with tertiary education (% of total unemployment)
Trade policy	Trade Terms (2000=100)
Attractiveness policy	Foreign direct investment, net inflows (BoP, current US$)

*Author's compilation

3.2.Model and estimation procedure

In this paper, we investigate the short-and long-run effect of public policies on economic growth. We attempt to contribute to the existed empirical literature by studying the Tunisian case and estimating a time series model by putting in consideration the existence of the structural breaks. The selection of variables relies on the theory background but we allow using other proxies. The model is represented in the form of a cobb-Douglas function inspired from Stanley Fischer (1993) cross-section study of the role of macroeconomic factors in growth. We will use a set of growth repressors as policy variables which doesn't differ a lot from the previous studies but in a time series regression case.

(Y) denote the economic growth (LGDP), (K) is the physical capital reflected by the foreign investment (LINV), (G) describes the government expenses (LBD). X denote some additional variables usually used in regression growth models called (X).

$$Y = f(k_t + G_t + + X_t + \epsilon_t) \quad \textbf{(1)}$$

(X) is a vector of variables containing: the inflation (LINF), the Trade Terms (LTR), the unemployment with tertiary education (LEMP) and the private domestic credits (LFIN). is the error term. The econometric specification of the model will be;

$$LGDP_t = \alpha_0 + \alpha_1 LTR_t + \alpha_2 LINF_t + \alpha_3 LINV_t + \alpha_4 LFIN_t + \alpha_5 LEMP_t + \alpha_6 LBD_t + \varepsilon_t \quad (2)$$

To estimate this model, we will use the ARDL bound test methodology elaborated by Pesaran et.al. (2001) to analyses the short- and long-run association between variables. The ARDL bound test can be used just when we have not any series that could be integrated in second difference I (2). To do so, we will refer to ADF unit roots test. We will make sure by adding the PP unit roots test because our sample is small. In fact, the ADF and PP tests are doubtful in the presence of outliers in series. To deal with this case, we will just use the procedure developed by Zivot and Andrews (1992) for a time series allowing for one structural break and Clemente et al (1998) unit roots test for two structural breaks[xi]. Then, we will formulate an unrestricted error-correction model (UECM) as a particular type of ARDL model. We will determine the pertinent lags for our models and test if our model passes the diagnostic tests. We will perform the bound test to see if there is a long- and short-run co-integration using Wald test. To test for co-integration in model (3), we will set the following conditional Unrestricted Error Correction Model (UECM);

$$\begin{aligned}\Delta LGDP_t = \alpha_0 &+ \sum_i \alpha \, \Delta LGDP_{t-i} + \sum \alpha_t \, \Delta LTR_{t-\tau} + \sum \alpha_s \, \Delta LINF_{t-s} \\ &+ \sum \alpha_k \, \Delta LINV_{t-k} + \sum \alpha_n \, \Delta LFIN_{t-n} + \sum \alpha_m \, \Delta LEMP_{t-m} \\ &+ \sum_\gamma \alpha \, \Delta LBD_{t-\gamma} + \theta_1 LGDP_{t-1} + \theta_2 LINF_{t-1} + \theta_3 LINV_{t-1} \\ &+ \theta_4 LFIN_{t-1} + \theta_5 LEMP_{t-1} + \theta_6 LBD_{t-1} + \varepsilon_t\end{aligned}$$

(3)

4. Result Analysis

4.1. Stationary test

To study the stationary of our series, the graph and the correlogram are the best way to explore our series stabilities. The well-known properties of a stationary series are the absence of serial correlation means that the ACF must be small or converge quickly to zero. The most of series are not stationary beside LEMP, LINV and LBD. For LEMP and LINV series, the graph indicates the presence of a Trend that makes the series not stable. Q-stat is important and the ACF dies out slowly to zero. The p-value is less than 5% indicating that the variable is significant and the null hypothesis of non-stationarity

is accepted. The LBD series shows a suspicious case, it is non-stationary in the graph, but in the correlogram it indicates that it is stationary. To make sure of our analysis, we will use the augmented Dickey-Fuller test (ADF). But, due to the small size of the sample, our results will be confirmed by the Phillips-Perron (PP) unit root test, because it's more efficient in this case. Moreover, the graph shows the existence of some structure break points. The traditional unit root tests don't allow for the possibility of a structure break and they are biased towards the non-rejection of the null hypothesis. In other words, for the series that are found to be I(1), there may be a possibility that they are in fact stationary around the structural break(s), I(0), but are erroneously classified as I(1). The results derived from ADF and PP tests are doubtful in the presence of outliers in series. To deal with this case, we will just use the procedure developed by Zivot and Andrews (1992) for a time series allowing for one structural break in time series.

4.2. Conventional unit root test

We summarize the results of traditional unit root tests in the following table:

	ADF test		PP test		Decision
	t-stat	t-critical	t-stat	t-critical	
LGDP					
• **Trend + constant**	-5,13	-3,61	-5,23	-3,61	Stationary
• **Constant**	- 5,22	- 2,99	-5,32	-2,99	I(0)
• **None**	- 0,61	-1,95	-0,28	-1,6	
LINF					
• **Trend + constant**	-0,64	-3,61	-0,64	-3,61	Non-Stationary
• **Constant**	-0,13	-2,99	-0,13	-2,99	I(1)
• **None**	-0,36	-1,6	-0,44	-1,95	
LTR					
• **Trend + constant**	-0,88	-3,61	-0,88	-3,61	Non-stationary
• **Constant**	-0,25	-2,99	-0,25	-2,99	I(1)
• **None**	-1,094	-1,95	-1,094	-1,95	
LFIN					
• **Trend + constant**	-1,62	-3,63	-1,24	-3,61	Non-stationary
• **Constant**	-1,40	-3	-0,97	-2,99	I(1)
• **None**	-1,01	-1,95	-1,04	-1,95	
LINV					
• **Trend+ constant**	-4,70	-3,63	-5,05	-3,61	Stationary
• **Constant**	-4,24	-2,99	-4,32	-2,99	I(0)
• **None**	-1,05	-1,95	-1,41	-1,95	

LEMP					
• **Trend + constant**	-3,51	-3,62	-2,96	-3,61	stationary
• **Constant**	-0,72	-2,99	-2,68	-2,99	I(0)
• **None**	-3,3	-1,95	-5,41	-1,95	
LBD					
• **Trend+ constant**	2,69	3,64	3,2	3,61	stationary
• **Constant**	3,24	2,99	3,26	2,99	I(0)
• **None**	0,57	1,95	0,65	1,95	

Table 3: Unit root tests without accounting for a structural break

*t-stat and t-critical value (5%) compared in absolute values. Tests have been performed using E-Views 8.

4.3. Zivot and Andrews (1992) unit root test results

According to the Zivot and Andrews test (ZA), the unit root hypothesis cannot be rejected at 5% significance level. The results show also that the 4 series has unit root with a structural break in the trend.

Table 4: ZA unit root with one structural break results

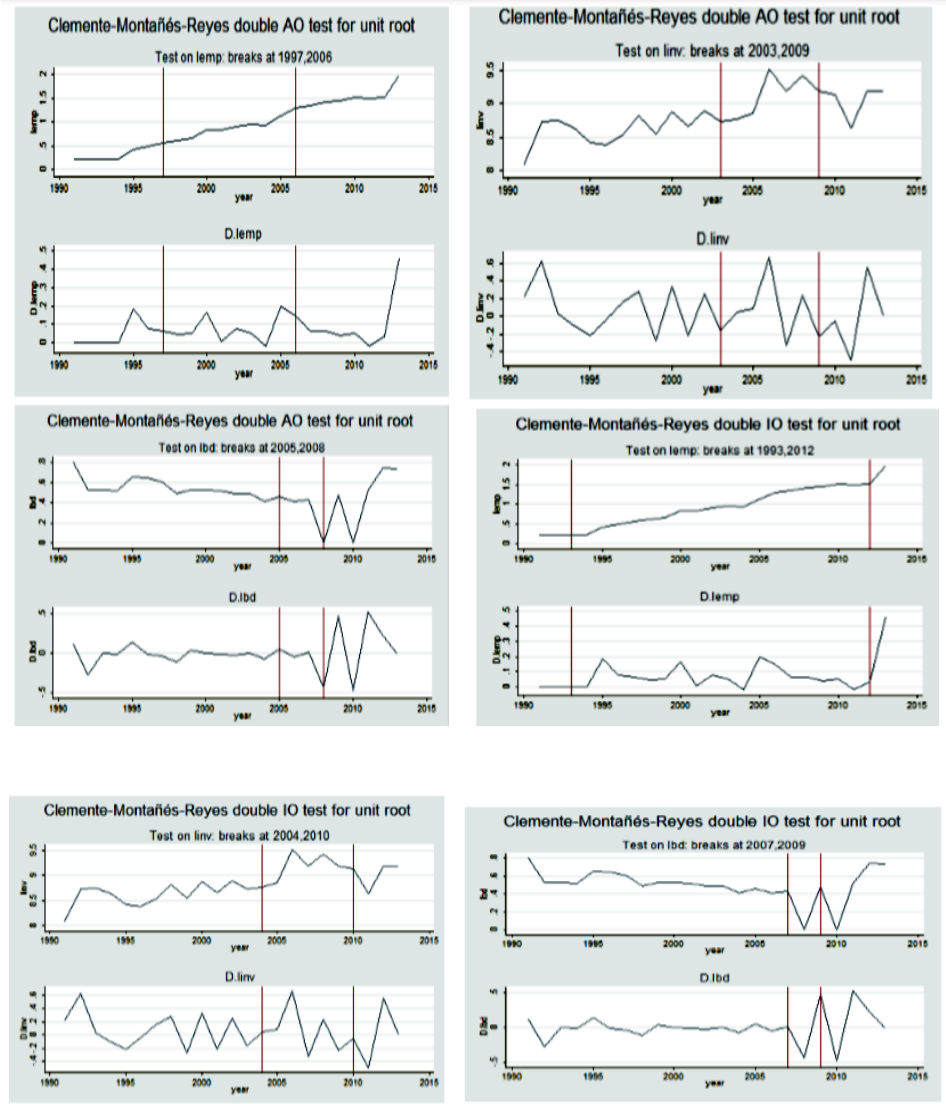
	t-stat	Model TB	K	Decision
LGDP	-5,06	B	4	Stationary I(0)
LINF	-3,32	B	4	Non-stationary I(1)
LTR	-3,36	B	4	Non-stationary I(1)
LFIN	-4,40 2010	B	4	Non-Stationary I(1)

*TBisthebreakdate,Kisthelaglength,t-statandt-criticalvalueareinabsolutevalues, t-criticalvalue=-4,42at 5%levelforBmodel,t-criticalvalue=-5,08at5%levelforC model. , t-criticalvalue=-4,93at5%level for A model. A- Intercept, B-Trend and C- Both. The lag length is chosen by SIC. Tests have been performed usingE-Views8.

Note that if ZA (1992) showed a clear evidence of a structural break, the ADF (1979)andP-Perron(1988) testscan'tbeconsidered.BasedongraphsintheAppendix,

We will focus on LEMP, LINV and LBD series which can involve more than one structural break. To capture these outliers, we will use the Clemente and al (1998) unit root tests for two structural breaks. The CMR (1998) technique allows for two types of structural breaks in the mean of the series and verifies the null hypothesis of unit root with structural break(s) against the alternative of stationarity with break(s). These tests are able to analysis two kinds of outliers; additive outliers or the AO model, which captures a sudden change in a series. An innovational outliers called also the IO model, that allow for a gradual shift in the mean of the series.

Graph1 : Unit root tests



The table below gives the main results:

Table 5: Clemente et al (1998) unit root test with two structural breaks results

Variables	**Additive outliers (CLEMAO2)**		**Innovative outliers (CLEMIO2)**		**Decision**
	Min t-stat	Optimal BT	Min t-stat	Optimal BT	
- **LEP**	-2,7	1997,2006	-1,789	1993,2012	I(1)
- **LINV**	-5,39	2003,2009	-5,195	2004,2010	I(1)
- **LDB**	-2,815	2005,2008	-0,676	2007,2009	I(1)

Note: Min t-stat is the minimum t-stat calculated. Critical value for two breaks is −5.49 at 5%. BT is the break point. Tests have been performed using Stata 12.

From the table, we can notice that all series have two breaks. For LEMP and LDB and LINV series, we can't reject the null hypothesis of unit root in either AO or IO models. There are unit roots with two structural breaks in these series. Applying the unit root tests to the first-differences for LEMP and LDB and LINV, leads to a very clear rejection of the null hypothesis that the data are I (1). Finally, we will adopt the results of ZA (1992) and Clemente et al (1998) unit root tests with structural break(s).The mixture of integrations orders and the absence of I(2) in our results, we will lead us to use the autoregressive distributed lags (ARDL) model or Bound-test.

4.4. Diagnostic tests

In the most of time series models, the problems of the serial correlation, the heteroscedasticity, the model stability and the normality of distribution and the miss-specification of the model must be solved to get reliable results. In the table A7 below, our results showed that we succeed to pass these diagnostics, giving that our model is well developed.

Table 6: Diagnostic test results

Diagnostic	Tests	Results		
Normality Test	Jarque Bera	JB Stat: 1,54		(0,46)
Specification Test	Ramsey RESET	F-Stat:	32,6	(0,122)
Serial Correlation Test	B-G LM Test	Chi-sq:	0,067	(0,285)
Heteroscedasticity	ARCH LM	F-stat:	0,058	(0,81)
		P-Chi-sq:		(0,79)

For normality test, the p-value is greater than the critical value 5%, so it is non-significant; we fail to reject the null hypothesis saying that the residuals are normally distributed. The F-stat related to Ramsey Reset is not significant at 5%, so we preserve our null hypothesis and our model is correctly specified. The B-G LM test showed that the p-value exceed 5% so it is not significant, we cannot reject also the null hypothesis of absence of serial correlation. The ARCH LM test gives a p-value greater than 5%, so we succeed to pass the heteroscedasticity problem. Finally, we conclude that our model is stable since the plots of CUSUM, CUSUM of squares and Recursive Coefficients didn't cross the critical value line. All the results are proved by the next graphics:

Graph 2: Recursive Coefficients estimates

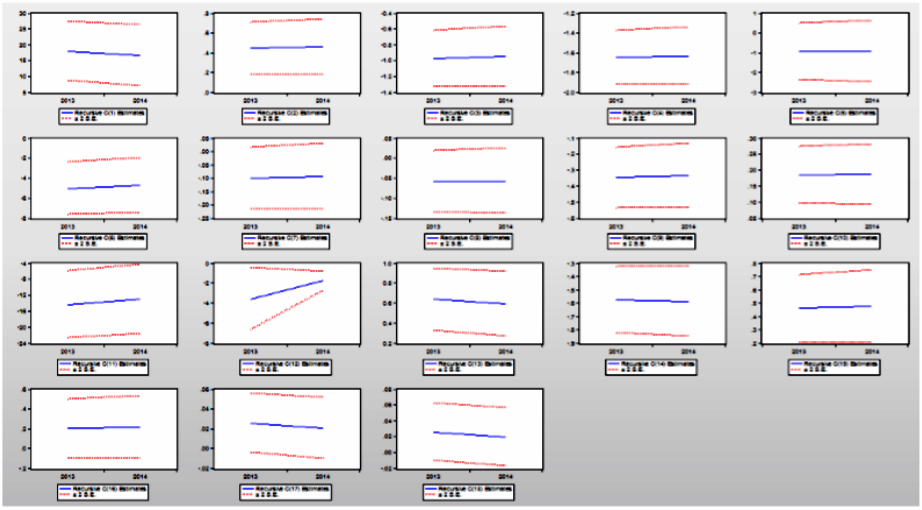


Table 7: The short run estimation test

Variable	**Coefficients**	**Standard error**
C	16,59	4,85**
LGDP(-2)	-1,63	0,14*
LGDP(-1)	-0,94	0,18**
LGDP(-3)	0,45	0,13**
LTR(-2)	-4,69	1,37**
Δ LTR (-2)	-0,93	0,76
LINF(-2)	-0,09	0,06
Δ LINF (-2)	-0,05	0,04
LINV(-2)	-0,33	0,1**
Δ LINV (-2)	0,18	0,04**
LFIN(-2)	-12,97	4,3***
Δ LFIN (-1)	-1,77	0,46**
LEMP(-2)	0,59	0,13**
LBD(-2)	0,47	0,13**
Δ LBD (-2)	0,21	0,15
AO	0,02	0,015
OI	0,019	0,018
Variable	**Coefficients**	**Standard error**
C	16,59	4,85**
LGDP(-2)	-1,63	0,14*
LGDP(-1)	-0,94	0,18**
LGDP(-3)	0,45	0,13**
LTR(-2)	-4,69	1,37**
Δ LTR (-2)	-0,93	0,76
LINF(-2)	-0,09	0,06
Δ LINF (-2)	-0,05	0,04
LINV(-2)	-0,33	0,1**
Δ LINV (-2)	0,18	0,04**

LFIN(-2)	-12,97	4,3***
Δ LFIN (-1)	-1,77	0,46**
LEMP(-2)	0,59	0,13**
LBD(-2)	0,47	0,13**
Δ LBD (-2)	0,21	0,15
AO	0,02	0,015
OI	0,019	0,018

*, **, *** means individual coefficients are significant at 1%, 5% and 10%

R-sqr = 0, 99 and Prob (F-stat) = 0, 0009*

4.5. The long run analysis

To discover if there is a long-run relationship among variables under the bounds test approach formulized by Pesaran, et al. (2001). The unrestricted Error Correction model is the pertinent technique according to the literature.

5. Discussion

The null hypothesis of co-integration relationship is tested by the F-test related to lag level coefficients. The F-stat will be computed via Wald test which gives the main significance of the variables coefficients. The null hypothesis is:

c(1)= c(4)= c(6)= c(7)= c(9)= c(11)= c(13) = c(15) = 0 : meaning that there is no long-run relationship between variables. The usually procedure is to compare the F-stat with the critical value, upper and lower bound, formulated by Pesaran, et al.(2001). According to Pesaran, et al. (2001), The F-stat is computed and compared with the critical value (upper and lower bound) given by Pesaran et al (2001). The hypothesis of no cointegration will be rejected if the F-computed exceeds the upper critical bound. But, when the F-computed is less than the lower critical bound, we will accept the null hypothesis, concluding that there is no long-run association between the variables. In a particular case, an F-value between the lower and upper bounds don't give a final conclusion. In fact, the value of our F-statistic is 71, 84 and we have k = 9 variables in our model. The results are concluded from the Bounds Test tables of critical values:

Table 8: Co-integration Properties

Dependent variable	**F-statistics**	**Critical Bound at 5%**	
		Lower bound	**Upper bound**
• ΔLGI	**71,84**	**2,14**	**3,30**

As the value of our F-statistic exceeds the upper bound at the 5% significance level, we are able to conclude that there is an evidence of a long-run relationship between series. In order to interpret the UCEM coefficients, we must calculate the long run elasticities:

ξLGDP/LTR = - $(\frac{\theta 0}{\theta 1}) = -0.35$	ξ LGDP/LFIN= - $(\frac{\theta 0}{\theta 4}) = -0.12$
ξ LGDP/LINF = - $(\frac{\theta 0}{\theta 2}) = -18.11$	ξ LGDP/LEMP = - $(\frac{\theta 0}{\theta 5}) = 2.76$
ξ LGDP/LINV = - $(\frac{\theta 0}{\theta 3}) = -4.93$	ξ LGDP/LBD = - $(\frac{\theta 0}{\theta 6}) = 3.46$

In the long-run, one percentage increase in trade terms (LTR) leads to 0, 35 % decrease in economic growth (LGDP). The coefficient of trade is negatively linked with LGDP contrary to Grossman and Helpman (1992) who argued that Trade openness enhance positively economic growth. However, the coefficient of Inflation (LINF) is not significant and has no link with LGDP. Our results don't confirm also the findings of Barro and Easterly (1998). The FDI flow (LINV) and the private financial sector credits (LFIN) have a negative impact on LGDP. Each supplement unit invested causes a loss of 5 units in LGDP value. The credit provided by private financial system inhibits economic growth due to an unorganized financial system which not efficient in term of providing financial resources needed to finance the investments. Our results don't confirm the findings of Levine and Zervos (1992) and Blonigen & Wang (2004) whom found a positive effect of credit growth rate and FDI flow on economic growth. In other side, we found that unemployment rate with tertiary education (LEMP) had a positive effect on LGDP. This can be explained by the high demand of foreigner and domestic firms to the less paid and qualified labor force. Thus, the government expense (LBD) plays a positive role in enhancing economic growth. Its coefficient is significant and impact positively economic growth. This result confirms also the findings of Barro (1991).

Now, we can check the short-run association of our model. The main output is represented in the next table:

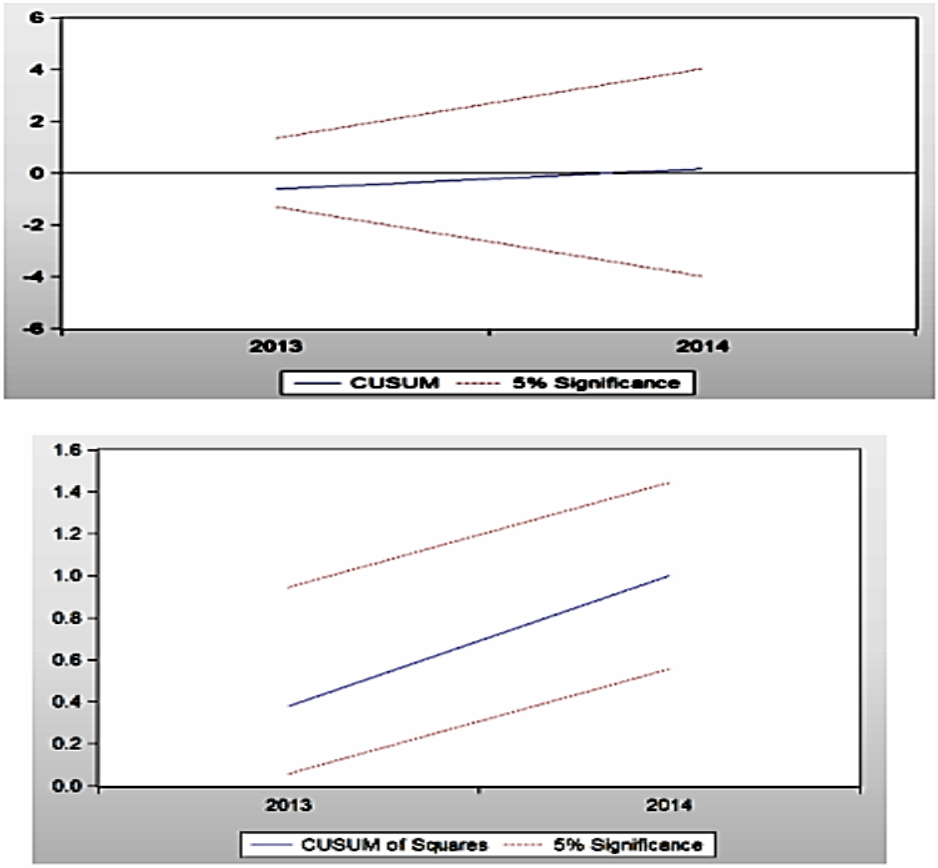
Table 9: Error correction estimation results

Variables	Coefficients
LGDP(-3)	1.67 *
LGDP(-1)	0.76**
LTR(-2)	-1.96
LINF(-2)	-0.1
LINV(-2)	0.21
LFIN(-1)	-5.67*
LEMP(-2)	-1.14**
LBD(-2)	1.41*
ECT(-1)	1.41*
ECT(-1)	0.0097**
Adj-R = 0,71 , Prob (F-stat)= 0,002 Wald test: Prob(F-stat) =0,0017	

*, **, *** means individual coefficients are significant at 1%, 5% and 10%.

Next, we will make sure that our model is stable by referring to CUSUM and CUSUM- squared tests proposed by Brown et al. (1975). We notice through the Figure 1 and 2 that the plot of CUSUM and the plot of CUSUM-squared statistics stay within the two critical bounds. So, we can say that our model is generally stable:

Graph 3: stability tests



In table 9, we must have a negative and significant coefficient of error correction so that our results are satisfactory. In our case, it is between -1 and 0 and significant at 5%. So, the ECM is generally significant. We conclude that this system is getting adjusted towards long run equilibrium at a speed of 0, 97%. The coefficient of error-correction term is very small suggesting a slow rate of adjustment toward equilibrium. Moreover, to check the existence of short-run association between variables, we will use again Wald test. The p-value of Wald test is significant, so we accept the alternative hypothesis.

So, we conclude that there is a short-run causality running from independent variables to dependent variables. In the short-run, the foreign investment (LINV (-2)), inflation (LINF (-2)) and Trade terms (LTR (-2)) do not significantly affect economic growth. The credit provided by private financial (LFIN (-1)) system and unemployment rate with tertiary education (LEMP (-2)) are significantly and negatively affected the economic growth. 1% increase of LFIN (-1) and LEMP (-2) will lead respectively to 5, 67% and 1, 14% decrease in LGDP. However, the government expense (LBD (-2))

is significant and have a positive influence on economic growth. 1% increase in LBD (-2) will lead to 1, 41points increase in LGDP.

6. Conclusion

The aim of this paper is to identify the economic policies that must be revisited by Tunisian government in short-run term and the policies that could be upgraded to foster economic growth in long-run term. More precisely, we attempt to examine this issue using the ARDL bound test approach in Tunisian case over the period 1990-2014.

Our finding draws some conclusions and implications for economic policy. We conclude that at a higher rate, inflation holds statistically insignificant and have a permanent negative impact on economic growth. Referring to Barro (1995), inflation doesn't affect directly economic growth. It reduces both the level and the efficiency of investment which also adversely affects economic growth. The Tunisian government is not able to manage smoothly the economy in long-and short-run. The high inflation rate is a proof that policy makers have failed to prevent macroeconomic instability. It is due to the imbalance between supply and demand, the lack of economic control, in addition to imported inflation. The high inflation rate is absolutely a cause of negative effect of investments on economic growth that we found in our results. If inflation is considered as hard to predict by economic agents, the foreigner's investors don't like to invest their money in an uncertain and risky business environment. So, Tunisian government is called to increase the independence of the Tunisian Central Bank so it will design more credible and efficient monetary policies. The government has not yet reacted to this situation and it is really urgent to put in place a coherent strategy for the fight against inflation in long-and short-run. The enforcement of price administration policy used by government is not well-enough in short-run.

The financial policy in Tunisia contributes negatively in economic growth in short-and long-run terms. The private sector alone is not able to provide enough financials resources to the small and medium firms which represent the big part of industrial sector. Policy makers must put into action and immediately some reforms to ameliorate the contribution of financial and banking system in a quality growth conducive to employment creation. We suggest facilitating the merger of private and public banks to be competitive and to solve the lack of necessary long-run credits, obliging them to be effective in supporting state development policies. Therefore, the size of Tunisian stock market is small and low competitive. The financial policy must introduce more attractive fiscal incentives to the small and medium firms to enter the stock markets; this can provide them with more financial resources. Then, the internationalization of stock market, by establishing consortiums with the most competitive stock markets in the developed countries, will afford more advanced technological updates to the national stock market.

Tunisian tax system is not suitable to the new attempt to realize a democratic transition. It's regarded as a complicated, unfair and inefficient from an economic point of view. The government expenses have a positive impact on economic growth. However, it's not enough to ensure the operation of its public services. It is imperative to initiate a reform of the tax legislation at all levels to boost growth in long-run term. It is crucial to

accomplish the social cohesion from the time of revolution until the next generations. The problem is not how to increase or decrease taxes, but how to prevent tax evasion, managing these resources and providing attractive fiscal incentives to investors. Taxes must be levied on the high incomes more than on the low and medium incomes. Also, Pressure has to be focus on the companies that accumulated its unpaid taxes. Therefore, the government has to upgrade its fiscal policy by establishing an oriented reform tax justice based on the participation of citizens and a local tax suited to the regional development strategy.

Moreover, The FDI flows don't have any instantaneous impact on economic growth due to many reasons such as the instable investment environment, the heaviness of administrative procedures, and the existence of many frozen and canceled investment projects and the lack of internal funding. The government role is more efficient than the private sector in terms of devoting necessary funds in the economy. The Tunisian government exerted a crowding out effect on private sector when it borrows large amounts of capital. So, the public sector spending replaces, or drives down, private sector spending. This can increase interest rates and discourage individuals and businesses from borrowing money, which reduces their spending and investment activities. The policy makers must rebuild a new attractiveness policy for the long-run term able to attract effective projects able to absorb the qualified labor force.

The trade terms is not contributed to economic growth because of the continued trade balance deficit related to the deterioration of exports value (due to the decline in domestic production of hydrocarbons, energy, phosphates and olive oil exports and also the slowing down of Tunisians industrial products exported to the euro area characterized by a lower growth). The trade policy has to be upgraded in the short-run term. Tunisia must open its trade internationally more than regionally. Policy makers have to enforce commercial link with the European traditional partner and establish new international agreements with the Asian and African markets which represent a huge potentialities and opportunities.

Tunisia's lack of high skilled jobs is due to low private sector investment worsened by the poor business environment. There is a mismatch of high skilled labor to the needs of labor market is a big problem to Tunisia. In fact, the demand for low skilled labor force exceeds the need for high skilled labor. The educational system offers a large stock of human capital but with a low quality, worsened by the small capacity of the national labor market in absorbing the big amount of young graduates and the complicated procedures of recruitments. The most of young graduates are absorbed by the informal sector and the vacant jobs. These kinds of jobs are not stable due to the violation of employees' rights and firing risks. The employment policy must be the center of the preoccupation of the government. A good employment policy might guarantee a better employment legislation protection for these kinds of temporary jobs and to enlarge the capacity of public sectors hiring. The government has to elaborate an employment policy that focus in big part on the transition from university to work. This employment policy must be decentralized but controlled by the government and some civil society associations to ensure transparency and fairness. Therefore, there is a need for an urgent collective action, which includes together the education unions with governmental and civil institutions, to regulate the educational system.

Finally, our main findings indicate that Tunisian's disappointed economic growth results from bad designed and misguided economic policies. We argue that macroeconomic stability policy, trade policy and financial policy are the most urgent policies that matter most for Tunisian economic recovery after the revolution. However, employment, attractiveness of foreign investments and the fiscal policies can be a part of the long-run term agenda of the government. In fact, we argue that policy reforms cannot succeed without a high social awareness and participation in the fight against terrorism as a primary policy to save the economy. This new debate makes us wondering about the impact of economic costs of terrorism on economic growth in Tunisia.

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FINANCIAL REGULATION WITHOUT GLOBAL ECONOMIC GOVERNANCE: CAN IT WORK?

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Abstract

The literature on the crisis-reform nexus has documented the relationship between governments' interventions and banking crisis explained by the mass public demand. Nonetheless, the determinant of a global economic governance and coordination for an effective regulatory regime is lacking. In this context, the trade-off effect between regulatory burden for banks and shadow banking ballooning poses crucial questions on the post crisis regulations' effectiveness. The paper argues that the financial reform policy relies on its interaction with a minimum of global governance and domestic regulations. Studying shadow banks' development, we show that (a) without a minimum multilateral governance, controlling global imbalances limiting global leverage and financial interconectness is hardly possible. At the same time, shadow banks' multiple-causes development in the biggest financial centers tell us that (b) global banking regulations don't fit all due to uneven financial development and varieties of financial capitalism at the national level. Following the conventional approaches for a new governance regime, the contribution focuses on the governance-regulations nexus involved and sketches out a middle way prospective towards a "flexsecure" global governance.

Keywords*:* Governance, financial regulation, multilateralism, shadow banking, regulatory burden

JEL Classification: F3; F5; G010.

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1. Introduction

In November 2010, the G20 leaders "called on the FSB, IMF and BIS to do further work on macroprudential policy frameworks, including tools to mitigate the impact of excessive capital flows" (Summit Declaration 2010). To cope with that the G20 leaders decided to introduce three macroprudential policy instruments: (a) limiting systemic risk, that is focusing on the financial system as a whole (b) setting up instruments and (c) associated governance to mitigate the sources of systemic risk (FSB et al. 2011). These instruments refer to specific regulations like for example caps on debt service-to-income ratio and reserve requirements.

However, the associated governance is the *condition sine qua non* for mitigating the sources of systemic risk. Given free capital mobility, which accelerated global financial imbalances and created "Ponzi schemes", financial capital is able to bypass overregulated market areas. In sort, effective Financial Regulation without Economic Governance does not exist. So, the analysis of capital movements is essential for policymakers, given that capital flows can have not only welfare implications, but also regulatory ones. Reliance on capital flows can be a source of vulnerability (let alone in crisis times) to the financial stability. "Coupling with local macroeconomic conditions and financial innovation capital flows movement can put at stake the domestic regulatory status quo" (Claeys et al. 2018).

We explore the dynamic relationship between financial crises and various areas of financial reform. Some recent researches concluded that financial regulation is inherently pro-cyclical (Dagher 2018, Almasi et al. 2018). That means crises may act as turning points for stricter regulations during recessions in contrast with more lenient regulatory regime during booms. But, the main stake is whether such regulatory cycles are triggered due to electoral incentives interwoven with changing sentiments in the public or may be attributed to the structural power of the financial sector.

The literature of political economy of financial policy and the studies of the crisis-reform nexus have produced inconsistent results. More recently, Jeffrey Chwieroth and Andrew Walter (2019) demonstrated that the politics of major banking crises have been transformed by the "wealth effect": rising middle class wealth has generated "great expectations" regarding government responsibilities for the protection of this wealth, forcing governments to bail out troubled financial institutions. Also, others have argued that in the aftermath of financial crises, governments end up reversing some of previously liberal policies (Saka et al. 2019, Dagher 2018) due to mass public demands turn against "light touch" financial regulation. In this vein, Calomiris (2010), more critically, points out the aftermath of crises are moments of high risk in public policy because post-crisis reform initiatives facilitates the enactment of ill-conceived ideas and special interest measures that otherwise would not have passed. Nevertheless, it is well documented that in the medium-to-long-term, countries gradually catch up with the others and the initial effect of state interventionism disappears in each and every reform area (Campos et al. 2019).

But, electoral incentives alone cannot conceive the whole story of financial reforms. More specifically, this part of literature review does not take account of the structural power of financial sector and the distinct bail out policies in the varieties of financial capitalism. The most recent literature on bank rescues, (Mitchell 2016, Johal et al. 2014)

documents that in the more liberal economies (market-based), governments are more likely to undertake a more active role in rescuing the domestic banking system. Paradoxically, the influence of banks shrinks, throughout a financial stress. This is due to the fact that, in economies, such as the United States and United Kingdom, banking competition is highly intense and there are no strong collective financial federations with "esprit de corps". Thus, a bank's bankruptcy is not considered as a systemic risk, but rather as a benefit by the competitors. Therefore, a bank rescue is very difficult to be organized by the private sector itself. In sort, the lack of private solutions, the more competitive interbank relationships; and the absence of a common safety net imply higher state capacity to impose stricter conditions on failed banks. Consequently, governments have higher discretion, while at the same time deposits insurance is the crucial priority. For this reason, Anglo-Saxon administrations have imposed mandatory rescue programs on troubled banks. On the other hand, in bank-centered economies, such as Germany and Spain, the bankers' influence is higher on the policy making of rescue plans. In these countries, the state sought to intervene early in order to reduce the overall rescue costs. However, banks had stronger incentive to delay accepting the government proposal, looking for money firstly from private resources.

This paper provides one such case study examining the trade-off effect between the regulatory burden for banks and the shadow banks' ballooning. One important lesson from the financial crisis is the prudential regulation should take a "holistic approach", setting "requirements for capital, liquidity and disclosure together and considering their potential interactions, together with the competitive conditions" of the shadow banks (Bolton et al. 2019).

Up to now, the study of regulatory policy for financial sector has mainly been concentrated on the regulations and not the governance. The "added value" of this paper lies in stressing the governance-regulations nexus. Attributing the shadow banks rise to the uncontrollable -by a multilateral governance agreement- global financial flows we support that the overall financial reform depends more on a multilateral cooperation than spatial regulations (e.g. banking regulation). Moreover, highlighting the specific factors contributing to shadow banks' development in three financial centers (US, Europe, China) we argue that global regulations (Basel III Accord) on their own cannot create a level playing field because of various national diversities. Within this context, the divergent compliance with the rules doesn't imply higher regulatory discretion. By contrast, it means that governments intend to adapt in defensive manner their regulatory policy to financial capital movements in order to achieve domestic policy targets. For these reasons we conclude that effective domestic regulations adapted to national diversities could be possible provided a multilateral cooperation that smooth out global imbalances.

2. Two visions for a Global Governance Strategy

Although recent literature on bank rescues recognizes the structural power of financial sector in the context of varieties of financial capitalism, the studies of on the political economy of financial reforms ignore the importance of a minimum Global Economic Governance regime as a crucial reform determinant. The financial crisis has revealed the need to "rethink global economic governance and to launch a debate on what the limits of financial liberalisation should be" (Steinberg 2010). In particular, a governance which

guarantees "a better coherence of the decentralized system that characterizes global arrangements" (Ocambo 2010). Olivier Blanchard, IMF's Chief Economist, also sketched two rebalancing acts required for the global recovery to be sustainable: "internal rebalancing -replacing government spending with private-sector demand, and external rebalancing- addressing the global imbalances between exporting and importing countries the externally oriented reforms must be coordinated at the international level" (Blanchard 2010). While "internal balancing" is a domestic task, the "externally oriented reforms" require coordination at the international level.

Global governance can be defined broadly as "a set of formal and informal rules that regulate the global economy and the collection of authority relationships that promulgate, coordinate, monitor, or enforce said rules" (Drezner 2014:123). In the wake of the crisis, intergovernmental coordination has institutionalized a fragmented governance pattern. Domestic structures of the political economy thereby have become major stakes in financial regulation (Bach & Newman 2010). An "active inertia", a tendency to make changes on the margin, has fallen short of a collective response that is scaled to the task at hand (Bhattacharya et al. 2018). Undoubtedly, this "inertia" has been fed by the shift of economic power from the North to the South, which undermines hegemonic incorporation and collectivist cooperation, leading instead to gridlock and fragmentation (Chodor 2017). As a result, a host of new institutions have been created often with overlapping mandates and no clear roadmap for cooperation (Buti & Tomasi 2018).

Paradoxically, the demand for global governance has not diminished, since global -negative- externalities demand collective action at the global level (Stiglitz 2002); but nonetheless the answers on the form of coordination vary. First of all, as Slaughter put it, global governance has to fulfill (1) the need for global rules and centralized power; and (2) the need for mechanisms of political accountability for regulatory actors (Slaughter 2004). Within this context "multilateralists" and "regionalists" unfold two distinct narratives (Pisani Ferry 2018). The former support binding multilateral arrangements and require compulsory. The latter demand flexibility and voluntary participation.

In the field of financial regulation, specifically, multilateralism implies centralized institutions such as a "World Financial Organization" or "World Financial Authority" with the power to sanction members or to dispute settlements for finance (Eichengreen 2009). However, the main objections on these proposals stem from the change in the geopolitical environment. The post- war global cooperation was importantly relied on the US global leadership and the economic and political power of the 'West' (Keohane 1982). Today, both are undermined. Furthermore, the second thoughts on globalization from many governments reinforce the reluctance of countries to delegate national financial regulations to any supranational authority.

On the other side, the most crucial objection on global regulation rests on differences in financial cycles and local politics. So, even if there was a single set of regulations, different national enforcement would be one source of regulatory arbitrage. Desirable forms of financial regulation differ across countries depending on their variety of financial capitalism, credit structures as well as levels of development, institutional capacity and financial needs. In short, "there is strong revealed demand for institutional diversity among nations, rooted in differences in historical, cultural, or development

trajectories" (Rodrik 2019). So, as Dani Rodrik wrote "Financial regulation entails trade-offs along many dimensions. The more you value financial stability, the more you have to sacrifice financial innovation" (Rodrik 2009). All these undermine the global authority, e.g, Basel Committee and encourage domestic jurisdictions to introduce exceptions of their own. The clearest example is the EU's incomplete adoption of Basel III. The US unlike the EU, having largely resolved the financial crisis in 2009-10, made the implementation of Basel III requirements less challenging than in several EU member states (Véron 2013). Given these, the second option ("regionalism") lies in flexibility and voluntary participation. For this approach rules and centralized power are neither feasible nor desirable. In this view, the most appropriate regulatory regime should be relied on home country regulation of financial institutions in accordance with a global set of principles (soft law). In sort, the principles-based approach respects national diversity, and implies a set of informal norms; and fora without judicial enforcement (Warwick Commission 2009).

3. The alternative middle way: towards a "flexsecure" regime

Leaving the responsibility for regulating leverage, setting capital standards; and supervising financial markets at the national level; it creates a policy gridlock. But if we agree that the causes of financial crisis rest on rapid financial (hyper) globalization, which generated excess leverage and accelerated the severity with which illiquidity and losses diffused in the system as a whole, then regulating the total quantity of credit creation is not just a national matter.

In this vein, we have to distinct between governance matters and regulatory ones. On the one side, governance matters guarantee global financial stability ("security"). These imply a form of global control of the creation and allocation of credit. Given free capital mobility, setting alone liquidity and leverage ratios nationally is ineffective. What is needed to protect financial stability is a mixture of quantitative and qualitative guidance on the direction of lending. Monitoring whether newly credit is used for transactions that contribute directly to GDP, it is crucial for preventing speculation, asset inflation and "Minsky moments". These types of restrictions on credit are by no means a new policy instrument. Countries like Germany, the US, Japan, Korea, Taiwan adopted the so-called "window guidance"- that is, central banks determine desired nominal GDP growth, then calculate the necessary amount of credit creation and then allocate this credit across real sectors in economy. Some prominent central bankers, support that the cooperation between regulators is a crucial stake for a much needed "Money-Credit Constitution" (Tucker 2018: 463), which will enable macroprudential measures to be successful in today's world of borderless capital markets. But the entry of central banks into the field of direct controls on lending is bound to raise the question of whether this is taking delegation too far (King 2016: 174). On the other side, "flexibility" means domestic regulations adapted to national diversity, varieties of financial capitalism; and different levels of development. To achieve that we have to immune these regulations from external pressure through the mentioned above governance.

Considering that, "flexsecurity" for global governance means both global rules and national discretion or in Pisani-Ferry's words "a sufficient, critical multilateral base for flexible arrangements and to equip policymakers with a precise toolkit for determining,

on a field-by-field basis, the minimum requirements for effective collective action" (Pisani Ferry 2018, 2019).

Global rules are a precondition for the other. Take for example the 2007/8 financial crisis. Created jointly in the US and Europe as before 2007, the US and northern European banks engaged in irresponsible lending in real estate in the US and the periphery of the Eurozone. European banks were the most enthusiastic buyers for toxic debt securities. Uncontrolled capital flaws facilitated the interconnectedness feeding an undetermined by local economic fundamentals global financial cycle in capital flows, asset prices and in credit growth. This increase in synchronisation is primarily driven by fluctuations in risk appetite, time variation in investor sentiment, and financial frictions (Jordà et al. 2018). But, if there were qualitative guidance controls preventing financial booms, governments would have more discretion and autonomy to set out stricter regulation at national level.

For example, the Section 619 of the Dodd-Frank Act (the Volcker Rule) prohibited banks that enjoyed government guarantees from engaging in using their own funds to make a profit (proprietary trading). Also, it prohibited banks in investing in shadow banking activities. But, due to above mentioned interconnectedness European regulators supported that the tougher drafts of the Volcker Rule carried the threat of imposing restrictions on non-US market participants. Michel Barnier, EU Commissioner for the Internal Market, objected that the draft rule exempted US government securities from the ban on proprietary trading, but allowed no other sovereign debt instruments under the same exemption. This would limit the market for European sovereign issuers - an urgent concern given the sovereign debt difficulties of euro-area countries in 2012. In response to comments from European regulators, the final rule adopted by the five US agencies on December 9, 2013 exempted sovereign debt issued by European and other governments from the ban on proprietary trading (Ryan and Ziegler 2016: 79,80).

This example tells us that financial regulations, to be effective, have to take place in the context of a minimum supranational governance framework. Indeed, one size doesn't fit all for global regulations. In modern economy financial regulations are inherently compatible with distinct financial models, completely different political priorities and uneven levels of financial innovation. Prohibiting proprietary trading for US banks does not hamper neither credit expansion nor threaten macroeconomic imbalances. In a market based economy that's not a problem; rather is a right choice for financial stability. On the other hand, in the bank centered European economies prohibiting proprietary trading involves hidden risks. These come from the bank-sovereign nexus that multiplies and accelerates vulnerabilities in each sector, and lead to adverse feedback loops. So, the health of banks and governments affect and is affected by economic activity.

Concluding, financial rulebook it is neither feasible nor desirable to be single, but at the same time regulatory capacity at the national level depends on a minimum binding multilateral arrangement.

4. Chance lost for a Global Economic Governance

A lesson not yet learned by the policy makers is that it's not possible governing or setting global regulations without a form of global governance. In global financial

system particularly, the unfinished business on the reforming the Global Economic Governance led to an inadequate limited incrementalism. In other words, the governance of financial regulation status quo has remained weak. As Eric Helleiner commented successfully: "Unlike in the realm of international trade, there is no supranational institution to enforce international financial regulatory standards and the key international regulatory institutions have no formal power; their main roles are that of fostering networks of informal cooperation, information sharing and the development of international "soft law" whose implementation is left to the discretion of national authorities" (Helleiner 2011: 10).

Since the emergence of global financial crisis, global community neither reached the target of the establishment of a new Bretton Woods, or a Banking Constitution, nor the creation of an effective Fourth Pillar of Global Economic Governance alongside the IMF, World Bank and GATT/WTO. In contrast, the post-crisis governance framework is pure renovation of the pre-crisis loosen governance of international financial standards.

In the aftermath of the East Asian financial crisis, the G7 occidental economies undertook the command of the global regulatory governance establishing the Financial Stability Forum (FSF). Ironically, the financial crisis of 2007/8 reversed the scenario. Because of that time the culprits were the developed economies the G7 transformed into the G20 including the leaders of several powerful economic centers from Latin America to Africa and Asia. But the G20 has remained a political institution that works by consensus and steers the work of technical bodies by issuing political guidelines. After initial high hopes and some success, negotiations within the G20 forum have slowed, progress is less visible and disagreement rather than agreement has come to the fore. The G20 had its high noon moment in 2008-09, but its achievements in 2010-11 have nevertheless been disappointing (Angeloni & Pisani-Ferry 2012). The G20 leaders gradually abandoned the commitment on financial stability setting out as the highest priority raising global growth to deliver better living standards and quality jobs for people across the world (G20 Leaders' Communiqué Brisbane Summit 2014). In sort, the G20 forum it is no international organization (Angeloni & Pisani-Ferry 2012).

Furthermore, at the Pittsburgh Summit 2009, the G20 leaders established the Financial Stability Board (FSB) assuming a key-role in promoting the reform of international financial regulation and supervision. Despite the advancement from Forum to Board, the FSB continues to lack accountability and create any legal rights or obligations. The picture of incomplete financial reform strategy involves also the soft law Basel Accords on banking regulations. Apart from their pro-market orientation, these regulations have adopted by the governments in a very divergent manner.

The hesitated reform of Global Economic Governance, therefore has not attempted to curb excessive leverage, credit growth; and financialization. As Helene Rey pointed out there is a global financial cycle in capital flows, asset prices and in credit growth which is not aligned with countries' specific macroeconomic conditions. As a consequence, the "financial trilemma" has been transformed into a "dilemma" or an "irreconcilable duo" (Rey 2015). The past assumption that with free capital mobility, independent monetary policies are feasible if and only if exchange rates are floating became a little bit obsolete. The global financial cycle independent monetary policies are possible if and only if the capital account is managed. In other words, the importance of global financial

developments (external pressure), such as global liquidity and asset price fluctuations transform a domestic vulnerability into financial crisis (Cerutti et al. 2014).

One of the sticking points of Rey's analysis rests on the possible solutions offered by her. To deal with the "dilemma", Rey proposes some restrictive policies on capital mobility: (a) targeted capital controls; (b) limiting credit growth and leverage during the upturn of the cycle, using national macroprudential policies; (c) imposing stricter limits on leverage for all financial intermediaries.

Taking these into account it is hardly possible the weak and informal Global Economic Governance to manage the global financial cycle. Financial capital flowing freely is able to bypass different regulatory regimes or to offset limited profit margin in some more regulatory burdened activities with business in less restrictive segments. Take for example the ineffective financial regulation both in Europe and the US. As Tamim Bayoumi showed, citing a series of regulatory mistakes in Europe and the US, the European banks in mid 80s made a transition from lightly capitalized universal banks to better capitalized commercial periphery banks. In 1992 Maastricht treaty kept bank regulation at a national, not EU level. This provoked two tendencies, which are a focus of regulators on national level and the fast expansion of banks. In the US, in comparison to the EU, there were highly separated either commercial or investment banks. In 2002 the structure of the US banking system changed from the strongly capitalized commercial banks to lightly capitalized US investment banks, which led to the transfer of mortgage from commercial to less regulated investment banks (Bayoumi 2017).

In this vein, it's not a coincidence that increased banking regulation -coupling with institutional inability and political reluctance to restrict capital flows- has prompted activity to migrate to the less regulated non-banking sector.

5. Basel III: an ineffective regulatory response

In the aftermath of the global financial crisis of 2007/8, the Group of Twenty ("G-20") countries agreed to set up a new regulatory framework for the financial system to address and mitigate the systematic risk problem. In this regard, in December 2010, the Basel Committee released Basel III focusing on the macroprudetial policy; that is to mitigate risk to the financial system as a whole and to encourage a system-wide perspective in financial regulation to create the right set of incentives for market participants.

Except of increasing the level of capital requirements, the Basel III added certain macroprudential elements to the regulatory framework, by: (i) introducing capital buffers that are built up in good times and can be drawn down in times of stress to limit procyclicality; (ii) establishing a large exposures regime that mitigates systemic risks arising from interlinkages across financial institutions and concentrated exposures; and (iii) specifying a minimum leverage ratio requirement to constrain excess leverage in the banking system and complement the risk-weighted capital requirements (Basel Committee 2010).

Paradoxically, a decade after the initial form of the Basel III, the systemic risk however has not reduced. The distinctive political priorities, between the United States and the Europe, led to a divergent implementation. For US authorities the focus was on the financial stability; in contrast, European pursuits were to preserve banking

competitiveness. That divergence stems from the distinct models of financial capitalism. On the one hand, American economy, as more market-based, is less dependent on bank lending. Increasing therefore regulatory burden for banks, it does not imply important credit restrictions. On the other, overbanking in many European economies is the key-factor explaining political reluctance for stricter banking rules by the European authorities.

Given that divergence, on December 7, 2017, the Basel Committee for Banking Supervision (BCBS) published the final regulatory standards in its post-crisis Basel III reforms. According to Stefan Ingves, Chairman of the Basel Committee, the aim was a level playing field "ensuring the standards are implemented consistently around the world". In the same vein, Mario Draghi commented from his side that "It is time for implementation, not design".

So, Basel III's pre-market orientation has been maintained. Among others, one of the most important altered rules is the revised floor, which places a limit on the regulatory capital benefits that a bank using internal models can derive relative to the standardised approaches. Thereby, banks' risk-weighted assets must be calculated as the higher of 72.5% of the total risk-weighted assets calculated using only the standardized approaches (Basel Committee 2017).

6. Shadow banking ballooning: A trade-off effect

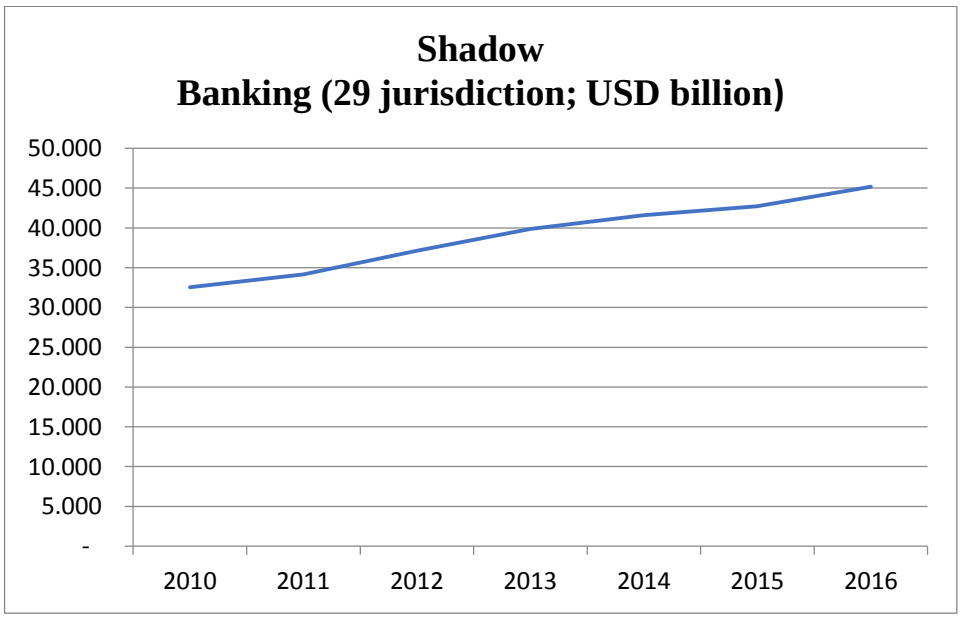
Regulating banks is an easy job respect to the difficult task of building up a global Governance for financial regulation. But as we have seen the divergent compliance to Basel III regulations came from the distinct varieties of financial capitalism between the US and Europe. Global regulations without global Governance, except of the uneven compliance, led also capital movements towards less regulated financial sectors (shadow banks). The banking business has become much more bureaucratic and a barrier to entry that favours large shadow banks, potentially shift activities out of the regulatory regime. Indeed, the risk of activities migrating to less-regulated areas where systemic risk is reproduced always exists. Additionally, given the entrenched global imbalances and the increased leverage, financial capital movement to shadow banks has been facilitated by three specific conditions in the US, Europe and China individually: (a) the post-crisis regulatory burden of traditional banks generating a regulatory arbitrage towards shadow banks in the US and in Europe; (b) the impact of FinTech on traditional banking; more evidently in the US financial market; (c) the specific macro environment -especially in the Eurozone as well as in China- accelerated non-bank lending.

A decade after the global financial crisis, many expected to see a wave of deleveraging; it never came. Public debt was mounting in many advanced economies even before 2008 as well as global nonfinancial corporate debt has more than doubled over the past decade to hit $66 trillion in mid-2017 (Lund et al. 2018). Total debt relative to GDP (including household debt, government debt, and non-financial corporate debt) has surged in the UK, US and the Eurozone from around 350% in 2006 to well over 400% last year (and closer to 500% in the UK), according to the Bank for International Settlements. Also, big banks have proved surprisingly resilient. The combined assets of the 1,000 largest banks in the world have increased by more than half in nominal terms to just over $113 trillion since 2006 (Wright & Asimakopoulos 2017: 9).

Moreover, the global non-bank financial sector has expanded its share of financial intermediation. Shadow banking -a network of non-depositary financial institutions such as money market funds, insurance companies, pension funds, collective investment vehicles as well as investment banks, structured investment vehicles (SIVs) and hedge funds- was the big "winner" from the global financial crisis. In general, shadow banks borrow short-term funds in the money markets to buy assets with longer-term maturities. Lending money like regular banks, but nonetheless they are not subject to traditional bank regulation. As a consequence, they cannot borrow in an emergency from the central banks and their funds traditional are not covered by insurance. Problems arose when investors withdrew their funds at once and to repay these. Due to the lack of the central banks' safety net, shadow banks have to realize "fire sales" reducing thus the asset value.

Leveraged loans and high-yield bonds for non-investment-grade firms that are highly indebted have doubled since the global crisis (Schoenmaker 2010). According to FSB data, the shadow banks' global financial assets have increased totally, reaching $340 trillion by end-2016. Additionally, at the same period, comparing to $137,8trn asset value of all deposit-taking corporations (banks etc), shadow banking accounted for financial assets of $160trn or 48% of the global total increasing for the fifth consecutive year (Exhibit 1).

Figure 1



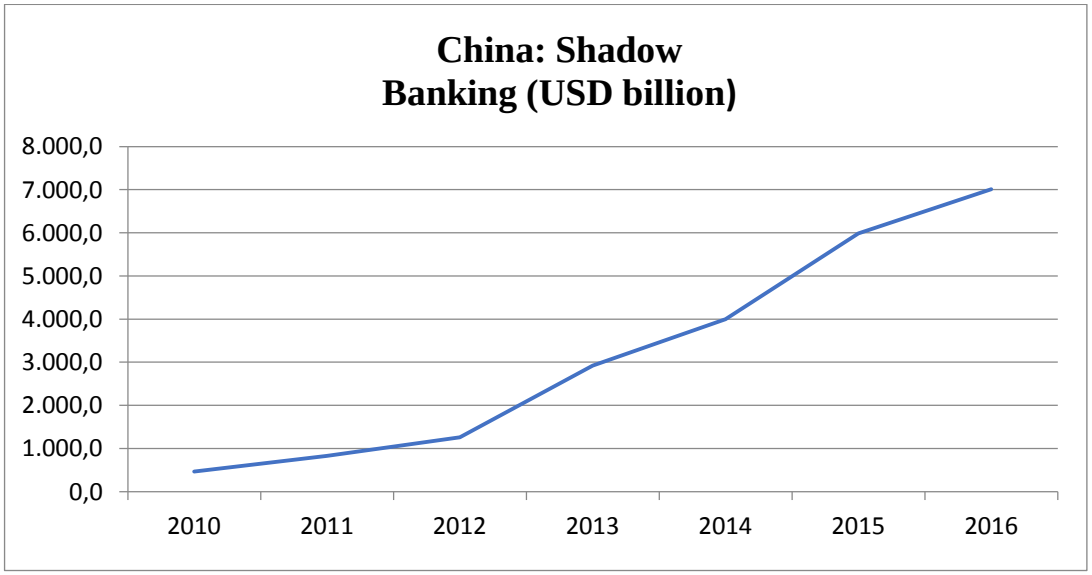
Source FSB

6.1. The macro peculiarities of the rise and the fall (?) of Chinese shadow banking

The rise of Chinese shadow banking was a result of a state driven banking system dominated since 2010. Specifically, private companies account for about two-thirds of the economy, but receive only about a third of net new lending. After the subprime crisis in the US, China decided to spend 4 trillion yuan to preserve a growth downturn. But domestic banks were not able to handle that much liquidity at once. Provincial governments set up local investment funds, namely Trusts to do so. Trusts had $200 billion in outstanding loans in 2008, and by 2013 was more than $1.8 trillion. Moreover, the share of shadow banks credit surged from about 10 percent of the system in 2008 to almost 40 percent in 2013 (Collier 2017:5,6).

In the late 2018, China threatened to exhaust its credit-driven growth model. Thus, China Banking and Insurance Regulatory Commission (CBIRC) announced that "the subsidiary shall operate independently, be responsible for its own profits and losses, and effectively prevent business risks from infecting the parent bank" (Jia & Wildau 2018). These regulations followed a broad new regulatory framework for shadow banking aiming to eliminate implicit guarantees on "wealth management products" (Exhibit 2). As a result, Chinese credit growth has continued to decelerate, despite nine months of significant central bank easing. In other words, in the past year, banking-system liquidity has risen by about a fifth, but net credit growth has fallen by about a third due to the fall of shadow banking assets by a 10% in 2018 (Taplin 2019). Consequently, "many middle class investors made the painful discovery that their money has been swallowed up by the recurring defaults in China's shadow banking market" (Hornby & Zhang 2018). Authorities, therefore, have feared that not compensating financial victims risks social unrest.

Figure 2

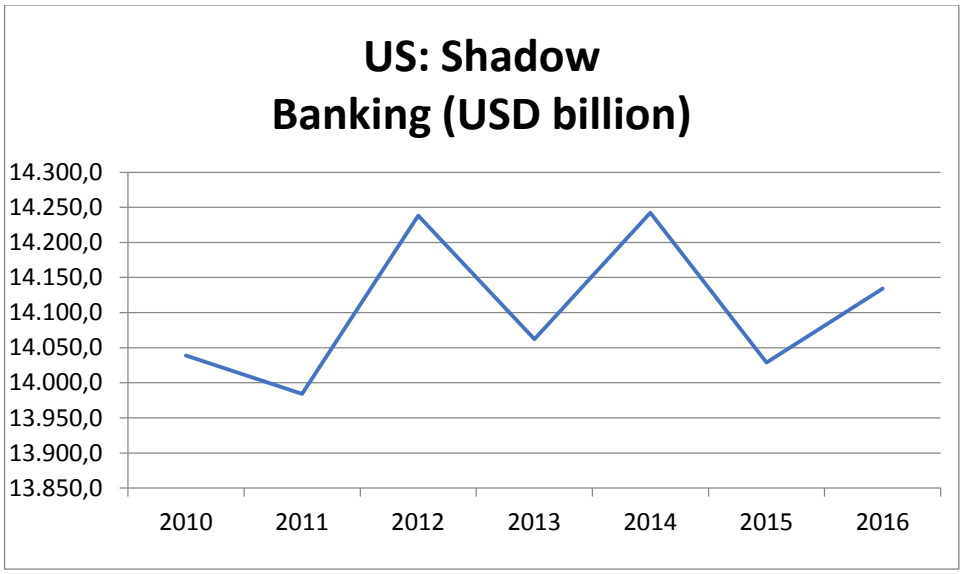


Source: FSB

6.2. Regulatory burden and FinTech in the US financial system

From 2007 to 2015, the surge of the US shadow banking rests both on the increased regulatory burden on traditional banks and the use of financial technology (Exhibit 3). The former explains about 60% of shadow bank growth and that 30% of this dynamic is explained by the use of financial technology. Specifically, shadow banks' market share in mortgage origination has almost doubled from roughly 30% in 2007 to 50% in 2015 (Buchak et al. 2017). Moreover, implicit government guarantees in the Federal Housing Administration (FHA) have advantaged shadow banks. According to the Financial Stability Board, FinTech is defined as technology-enabled innovation in financial services that could result in new business models, applications, processes or products with an associated material effect on the provision of financial services (FSB 2018).

Figure 3



Source: FSB

In the first nine months of 2016, global investment in FinTech reached $21 billion, marking a five-fold increase over 2013. Amazon, for example, offers loans to small businesses for an amount exceeding 3 billion dollars; a subsidiary of Alibaba has a monetary fund with assets of more than $ 160 billion. FinTech, therefore, poses crucial questions to regulatory authorities. What is the role of central banks in promoting and guaranteeing the reliability of payments in the era of digital transformation? What are the appropriate regulations in relation to the new payment instruments? And how can we guarantee the speed and convenience of payments with the stability of the financial system? (Bocciarelli 2017)

6.3. The macro environment as a source of the European shadow banking

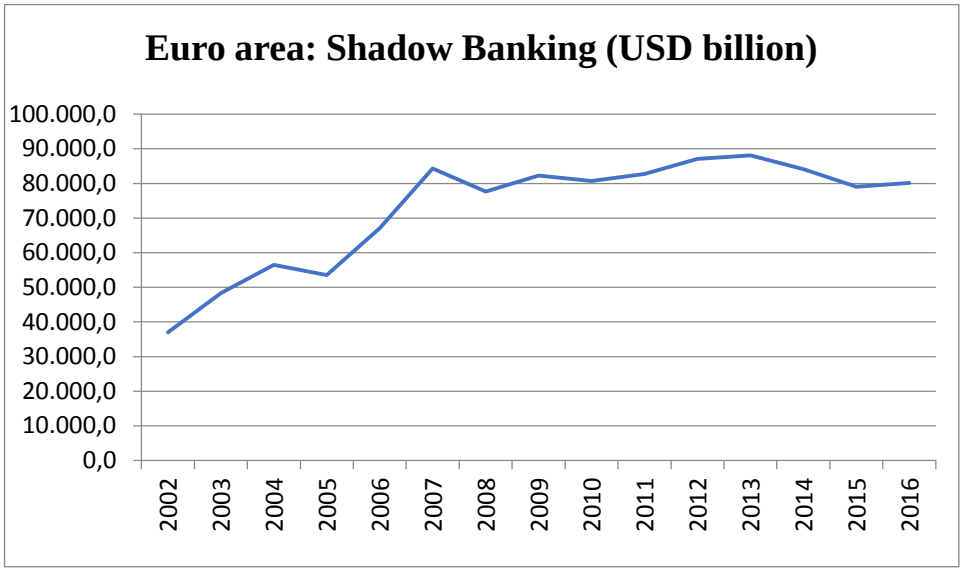
The size of the EU shadow banking system accounted for over €42 trillion total assets at the end of 2017, representing 40% of the EU financial system; almost double the at the beginning of the 2000s (Exhibit 4). The rising share of shadow financial intermediation in the euro area since the global financial crisis lies in the interaction of several factors; low interest rates resulting from the ECB's monetary policy, as well as longer-term structural factors, including demographic trends and population ageing. On the side of euro area banks, shrinking bank lending has been a byproduct of drying up the American wholesale market and the euro area sovereign debt crisis. Firms, therefore, turned to other financing sources other than bank credit, such as equity and corporate debt issuance. At the same time, the rise of shadow banking has been favored by the low level of interest rates in the wake of the financial crisis such as lower returns on bank deposits, falling risk premia and a recovery in a range of asset markets. (ECB Economic Bulletin, Issue 4 / 2016). Insurance companies and pension funds (ICPFs) represent the broadest and fastest growing funding base for investment funds. They held around €3,3 trillion in investment funds at the end of 2017, equal to 34% of pension fund and insurance business, compared to €2,0 trillion at the end of 2012.

In sort, the shadow banking system arose to fill the vacuum between the institutional cash pools preference to avoid unsecured exposure to banks even through insured deposits and on the other side the insufficient supply of short-term government guaranteed securities. In this vein, it's important to highlight the ongoing investment transition from risk aversion positions during the first years after the financial meltdown to more risky investments. In particular, due to lack of a single European deposit insurance scheme, institutional investors turned to high-quality short-term debt, rated by AAA rating agencies. Since 2013 the share of riskier corporate bonds, both financial and non-financial, in the total portfolio of pension funds, insurance and investment funds has increased, while it has decreased for banks (Exhibit 5).

An additional particularity of the EU shadow banking is a "double face" interconnectness. The "internal" one means that European banks remain highly interconnected with entities engaged in shadow banking activities. The share of euro area bank assets (loans and debt securities) for which the counterparty is a euro area entity included in the shadow banking rose steadily from 5.6% in 2006 to 8% in 2017. The other part of the "internal" interconnectedness is related to the wholesale funding provided to euro area banks by shadow financial entities. In 2017, wholesale funding provided to euro area banks by such entities grew by 2% compared with end-2016, reaching €2.2 trillion and marking the highest rate of growth since 2012 (European Systemic Risk Board 2018).

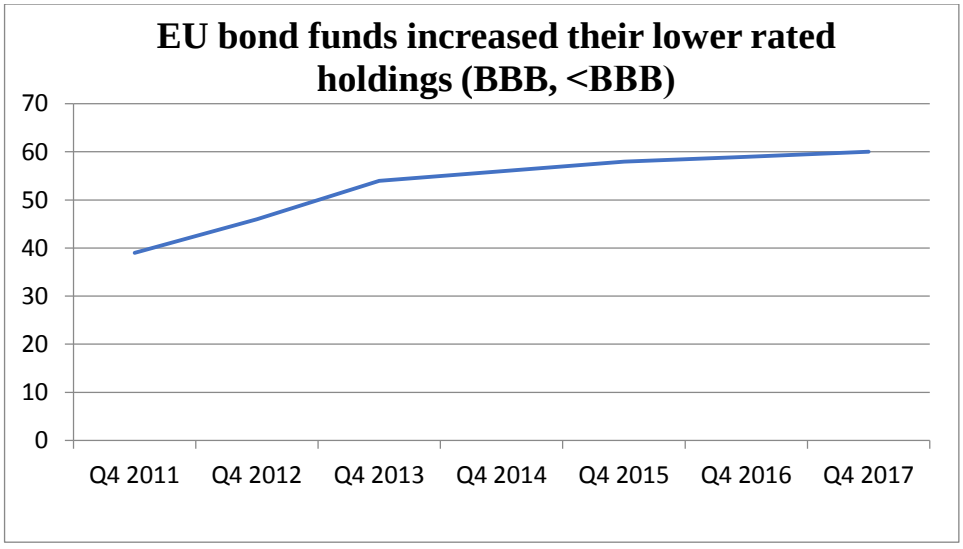
As far as the "external" interconectness, EU banks are most heavily exposed to finance companies US-domiciled shadow banking entities. During the course of 2015, the interest rate rise in the US with the introduction of a large asset-purchase programme in the Eurozone increased domestic and foreign demand for US assets. At the end 2015, 60% of EU banks' total exposures to shadow banking entities were towards non-EU domiciled entities (Adad et al. 2017).

Figure 4



Source: FSB

Figure 5



Source: FSB

7. Conclusion

The post-crisis regulatory burden for banks led shadow banking into expansion, despite an extensive regulatory interventionism by the governments due to the public sentiment against "deregulated capitalism". This trade-off effect raises serious questions on the effectiveness of the global regulations (Basel III). The central conclusion of this paper focuses on the global governance loopholes allowing financial capital to move towards less regulated areas. On the one side, cross border capital flows, reflecting global imbalances and taking advantage of the interest differential, contribute to the shadow banks expansion. That's the case of the interconectness between the US and European financial sectors. On the other side, specific domestic factors in each economy individually reinforce non-banking credit. In the US, the regulatory banking burden and the FinTech increase shadow lending. In Europe, specific macroeconomic conditions limit bank's credit channel. The Chinese state-driven model of financial capitalism has left also room for shadow credit into the private economy. These national diversities tell us that neither one size global regulations fits all nor is desirable. However, it is deniable that unregulated shadow banking development puts once again at risk domestic and global financial resilience.

Being so, a minimum of a multilateral cooperation is a crucial determinant for effective financial policies, guaranteeing not only financial stability, but also protection of the national diversities. Therefore, the aim of a "flexSecure" governance should be to immune domestic regulations from external pressure derived from the uncontrollable movement of the global capital cycle. In this vein, a multilateral cooperation needs to be applied system-wide to avoid regulatory leakages in order to enable supervisors to implement a mixture of quantitative and qualitative guidance on the credit direction. Thus, smoothing out the global financial cycles, a multilateral cooperation could prevent surges, entrenchments in capital flows, booms and busts in asset prices and crises. In this manner, we can achieve a well monitored macro-environment into which the national discretions could regulate flexibly the financial systems, according to their own political priorities, specific economic conditions, models of financial capitalism etc. Finally, a multilateral governance could be a satisfied condition to increase potential benefits of financial integration, without unilateral protectionist measures taken.

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DOES FOREIGN AID AFFECT ECONOMIC GROWTH IN PAKISTAN? A DISAGGREGATE ANALYSIS

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Abstract

Pakistan receives huge amount of aid flows every year like other developing countries but still stagnant and aid dependent. This reality forced a vigorous debate on effectiveness of aid. The objective of present study is to examine the effectiveness of foreign aid and other variables such as (bilateral aid, multilateral aid, inflation, trade openness, US aid, UK aid and Japanese aid) on economic growth of Pakistan over the period 1972-2014. When we disaggregate aid in terms of bilateral aid, multilateral aid, aid from United States, aid from UK and aid from Japan, all the aid sources showed insignificant relationship with the economic growth of Pakistan in the short run. Bounds test for Cointegration accepts the hypothesis that no long run relationship exists between the variables. So in the absence of long run relationship study takes the analysis towards short run relationship by using multivariate Granger Causality test. The causality test results showed that total foreign aid, bilateral aid, aid from United States and aid from UK does not causes economic growth significantly in Pakistan over the period 1972-2014. On the other hand multilateral aid and Japanese aid significantly causes growth. Granger Causality test results shows bi-directional causality between multilateral aid and economic growth. The study is useful for policy implications because results show that multilateral aid have significant relationship with economic growth in Granger Causality test. So authorities should give priority to multilateral aid over bilateral aid.

Keywords: Economic Growth, Bilateral aid, Multilateral aid, Inflation, Trade openness, ARDL, ADF, Granger Causality

JEL Classification: E31; O40; B22

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1. Introduction

In mostly developing countries foreign aid is considered as an essential source of foreign capital. It covers saving-investment gap and influences economic growth in aid recipient countries.

It is well-known fact that foreign aid plays an essential and effective role in the development of a country. Moreover, it serves as external source of capital accumulation in developing countries. Lack of capital is very common problem in mostly developing countries, in this scenario foreign aid helps developing countries to cope with shortage of capital and continue their development projects.

Foreign aid promotes productivity, employment, transfer of technology and reduces poverty in recipient countries (Morrissey, 2001). The results from the available literature on foreign aid and its link with economic growth are twofold First the studies for example, [Durbarry et al (1998); Moreira (2005); Karras (2006); Asteriou (2008); Burnside and Dollar (1997); Martinez (2015)] conclude that the impact of foreign aid on economic growth of the developing countries is positive, it increases growth rate by fulfilling capital requirement of country. Whereas there are several studies which show the opposite results the reasons quoted are inefficient use of aid, bad policies, government intervention and corruption in many developing countries [Khan and Ahmed (2007); Mallik (2008); Javid and Qayyum (2011); Ali (2013); Aboubacar et al. (2015)]. These studies concluded that foreign aid increases dependency of developing countries on donor countries and institutions. Large portion of aid is used for consumption purpose rather than production.

Foreign aid takes the form of loans or grants because it depends on intensions of donor countries or institutions. For economic, political and strategic motivations developed countries offer foreign aid to developing countries. Shah et al. (2005) categorized foreign aid into financial aid, united aid, grants, loans commodity aid, tied aid, technical aid, military aid and FDI. Developed countries provide aid to developing countries for humanitarian assistance, debt relief, balance of payment problem and reduction in poverty. Aid donors also finance particular projects like schools, hospitals, etc.

Pakistan is considered aid dependent country because it relies heavily on aid inflows to fill saving-investment and export-import gap. Domestic resources are not enough to cope with demand for foreign exchange. Like other developing countries, Pakistan receives huge amount of bilateral as well as multilateral aid but results are not fruitful in terms of economic growth. The main objective of aid is to reduce poverty, promote gender equality, improvement of health and educational sector but in Pakistan foreign aid is not playing effective role to achieve these targets.

Large body of research work has been done on the topic under consideration but this area of research is still debatable. Easterly (2001) concludes there exists no empirical connection between foreign aid, investment and economic growth. Stable macroeconomic policies is a prerequisite for a positive relationship between foreign aid on economic growth (Burnside and Dollar, 2000). In the study Hansen & Tarp (2001) find that foreign aid through capital accumulation contributes to

economic growth and it does not depend on good policy environment.

Lancaster (2007) argued that the actual outcome of foreign aid can be judged by taking into account the purpose of aid and donors motives behind aid allocation. Large amount of aid used for non-development expenditure so total amount of foreign aid should not be judged as contributing factor to economic growth. Donor's countries give bilateral aid mostly for their economic and strategic interests. Cultural, political or strategic affiliations between donors and recipient countries determine the allocation of bilateral aid.

Empirical findings of shows mixed results in case of Pakistan. For example, Shabbir and Mahmood (1992) concluded that foreign aid has positive impact on GDP growth of Pakistan. Ali (1993) explained that there is no significant link exists between foreign aid and economic growth. Khan (1997) find existence of negative relationship between aid and economic growth. Ishfaq and Eatzaz (2005) found negative and insignificant impact of foreign aid on economic growth. Khan and Ahmed (2007) concluded negative relationship among foreign aid and economic growth at aggregate and also on disaggregate level. They also find that domestic investment, foreign direct investment and export growth are significant factors for economic growth in Pakistan.

This study aims at examining the relationship between foreign aid and economic growth by using annual data for the period 1972-2014 in the context of Pakistan. The contribution of the study to the literature is that it eaxmines the relationship between forein aid and economic growth by decomposing the foreing aid into different categories in terms of its sources and checks the effect of each source on the growth of Pakistan separately. The results will help to determine that which source of foreign aid is more effective determinant of economic growth. The study addresses two questions. (1) Does foreign aid affect economic growth of Pakistan? (2) Does bilateral aid or multilateral aid serves as the main source of economic growth in Pakistan?

2. Literature review

Different studies have been carried out on foreign aid and its resulting impact o n economic growth and the findings of the studies show foreign aid may affect economic growth positively or negatively.

Gounder (2001) examined aid-growth nexus by employing neo classical production function and concludes that in foreing aid to Fiji contributes to the economic growth of the country significantly. Similarly, Fasanya and Onakoya (2012)'s results on aid and economic growth in case of Nigeria were found to be significant. The long run impact of foreign aid on growth is found to be positive while the short run ones seem to be insignificant because aid has been mainly used to finance investment which has long growth period Setargie (2015). Moreover, aid affects growth positively but conditional to good policy environment (Burnside and Dollar, 1997). Durbarry et al. (1998) concludes that aid affects growth positively via stable macroeconomic policies in aid recipient countries. However, according to Ram (2004) there is slight empirical indication to encourage the well-established view that disbursement of aid to countries with good policy management or good institutional environment results in more

economic growth and reduction in poverty level of the developing countries. The long run impact of an aid program and its transitional dynamics based significantly on (1) the elasticity of substitution in production, (2) foreign aid is restricted to investment or not, (3) how the aid-receiving country wants to response to the flow of foreign aid, and (4) nature of foreign assistance program (permanent or temporary) (Chatterjee and Turnovsky, 2005). Foreign aid affect growth extensively, positively and significantly (Karras ,2006). According to Minoiu and Reddy (2009), development aid fosters economic growth, C.Basnet (2013) foreign assistance contributes in growth positively but have negative impact on domestic savings. Buying growth with aid is expensive and inefficiency but economic restructuring and trade liberalization enforced by aid donors may help to enhance economic growth in aid recipient countries Martinez (2015).

Mavrotas (2002) composition of aid is important to get conclusive results about effectiveness of aid. Aid in the form of foreign loans and grants can be mutually interchangeable between public investment and public consumption (Quazi, 2005). Foreign aid effects growth insignificantly [(Khan & Rahim (1993); Kolawole (2013)]. Khan & Ahmed (2007) finds foreign aid at aggregate level as well as at disaggregate level does not influence GDP growth in Pakistan. Domestic investment, export expansion and the inflow of FDI serve as the essential components for growth. The effect of multilateral aid is insignificant in short run while that of bilateral aid is significant (Javid and Qayyum, 2011). Foreign aid negatively affected governments' fiscal responsibility (Butt and Javid, 2013). Loans seem to be bringing more responsible fiscal behavior as compare to grants (Quazi, 2005). Foreign aid considered substitute to domestic savings rather than mobilizing domestic savings (Mallik, 2008 & C. Basnet, 2013). Development aid supports long run growth (Minoiu and Reddy, 2009).

3. Theoretical Framework

Our main focus is to capture the effect the inflow of foreign aid on economic growth of Pakistan. According to the Dual Gap Model developed by (Chenery and Strouts, 1966), foreign aid leads to growth by closing the saving-investment and export-import gap. Mostly developing countries face shortage of savings and foreign capital due to limited resources. These countries cannot overcome shortage at their own so they have to depend on foreign capital flows in order to achieve growth targets. Aggregate foreign aid is subdivided into bilateral and multilateral aid in order check the effect of strategic and economic concerns of donors on usefulness of aid.

Different researchers have adopted different models for evaluating the foreign aid effectiveness for economic growth. For example, Khan and Ahmed (2007) find that foreign aid has an insignificant negative effect on growth at the aggregate level and report same results for disaggregate levels in Pakistan by using Auto Regressive Distributed Lag (ARDL) model for empirical analysis.

On the basis of empirical studies, such as Khan and Ahmed (2007) and Javid and Qayyum (2011), we specify a model exploring the impact of aid on economic growth in the following way;

$$LnRGDP_t = \alpha_o + \alpha_1 LnAID_t + \alpha_2 INF_t + \alpha_3 LnTO_t + u_{1t} \ldots\ldots\ldots\ldots\ldots (1)$$

Following Ram (2003), we subdivided foreign aid into two segments: first one is bilateral aid and other is multilateral aid on the basis of their attributes. Bilateral and multilateral aid can be distinguished from each other due to three main reasons, which are donor's attentions, conditions and relationship with recipient country.

$$LnRGDP_t = \gamma_o + \gamma_1 LnBAID_t + \gamma_2 INF_t + \gamma_3 LnTO_t + u_{2t} \ldots\ldots\ldots\ldots\ldots (2)$$

$$LnRGDP_t = \delta_o + \delta_1 LnMAID + \delta_2 INF_t + \delta_3 LnTO_t + u_{3t} \ldots\ldots\ldots\ldots\ldots (3)$$

$$LnRGDP_t = \beta_o + \beta_1 LnBAID_t + \beta_2 LnMAID_t + \beta_3 INF_t + \beta_4 LnTO_t + u_{4t} \ldots\ldots\ldots\ldots (4)$$

in equation 1, $LnRGDP_t$ represents log of Real Gross Domestic Product at time t, $LnAID_t$ represents log ratio of total aid inflow to gross domestic product, INF represents consumer prices annual percentage and $LnTO_t$ represents log of trade openness(exports plus imports ratio to GDP). In equation 2 and 3 $LnBAID_t$ represents ratio of bilateral aid to GDP and $LnMAID_t$ represents ratio of multilateral aid to GDP.

3.1 Data Description

I employed annual data from 1972-2014 to explore whether foreign aid affect economic growth in pakistan or not. Secondary data is used from World Development Indicator (2014) and OECD's International Development Statistics (IDS) online data base. Variables used in the estimation, their measurement, definition and sources are depicted in appendix table 1.

4. Methodology

Autoregressive Distributed Lag (ARDL) model developed by Pesaran, et al. (2001) is going to be employed in this study for investigating the long run relationship between the variables under consideration. The ARDL has some advantages over other techniques, such as it not only covers short run dynamics but also long run dynamics. Similarly, it does not take into account the order of integration of the variables. Furthermore, for small samples, ARDL is an appropriate technique. However, this technique is not valid for I (2) variables so pretesting for the order of integration is required. Estimation procedure depends on two steps. First step is computing the F-statistic for the detection of long run relationships between variables, if long run relationship is witnessed by F-statistic, then ARDL method is used for estimation of parameters (short run and long run).

Let Y_t be LnGDP and X_t be LnBAID, LnMAID, INF and LnTO. The Unrestricted

Error Correction Model (UECM) can be expressed as:

$$\Delta Y_t = \alpha_o + \sum_{i=1}^{n_1} \alpha_{1i} \Delta Y_{t-i} + \sum_{i=0}^{n_2} \alpha_{2i} \Delta X_{t-i} + \beta_1 Y_{t-1} + \beta_2 X_{t-1} + u_t \ldots\ldots\ldots\ldots\ldots\ldots (5)$$

In above equation Differenced variables show short run effects while level variables represent long run effects.

4.1 Co-integration test

To detect Co-integration following hypothesis will be tested;

$H_o : \beta_1 = \beta_2 = 0$ (No Co-integration)

$H_1 : \beta_1 \neq \beta_2 \neq 0$ (Co-integration)

H_0 indicates non-existence of the co-integrating relationship between concerned variables. To check the existence of co-integration between concerned variables, F-test is conducted for joint significance. The null hypothesis is rejected if the F-statistics lies outside the upper and lower bounds, otherwise it is accepted.
If c-ointegration is detected then we formulate Error Correction Model (ECM) to examine short as well as long run dynamics. The Model is specified as follows;

$$\Delta Y_t = \alpha_o + \sum_{i=1}^{n_1} \alpha_{1i} \Delta Y_{t-1} + \sum_{i=0}^{n_2} \alpha_{2i} \Delta X_{t-i} + \lambda ECM_{t-1} + v_t \ldots\ldots\ldots\ldots\ldots\ldots (6)$$

If co-integration is not detected in bounds test then in the absence of long run relationship we takes the analysis towards short run. For short run analysis model is specified as follows;

$$\Delta Y_t = \alpha_o + \sum_{i=1}^{n_1} \alpha_{1i} \Delta Y_{t-i} + \sum_{i=0}^{n_2} \alpha_{2i} \Delta X_{t-i} + v_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (7)$$

5. Results and Discussion

5.1 Unit root Tests

Before the application of the bounds test for co-integration, the Augmented Dickey Fuller unit root test is applied to check the stationarity of the variables. The results of ADF test are given in Table 1.

Table 1 : Test of Non-Stationarity of Variables

Variables	Constant/Trend	Level	First Difference	Order of Integration
LRGDP	Constant	-2.62 (0)***	-9.99(0)**	I(0)
LRTAID	Constant	-2.50(0)	-7.35(1)**	I(1)
LRTBAID	Constant	-2.89(0)***	-9.04(0)**	I(0)
LRTMAID	Constant	-3.46(0)**	-9.12(0)**	I(0)
INF	Constant	-3.29(0)**	-7.78(0)**	I(0)
LTO	Constant	-3.39(0)**	-7.24(0)**	I(0)
LRUS_AID	Constant	-3.28(0)**	-6.47(0)**	I(0)
LRUK_AID	Constant	-2.49(0)	-6.25(0)**	I(1)
LRJAP_AID	Constant	-3.14(0)**	-8.82(0)**	I(0)
*,** and *** indicates level of significance at 1%, 5% and 10% respectively				
At constant Mackinnon (1996) critical values are -3.597, -2.93 and -2.60 at 1%, 5% and 10% level of significance respectively.				

The ADF test provides mixed results as can be seen from table 1, two variables (i.e. ratio of total aid and ratio of UK aid) are non-stationary at the levels and turns to be stationary after taking first difference, and all other variables i.e. real GDP, ratio of total multilateral aid, ratio of total bilateral aid, inflation, trade openness, US aid and Japanese aid are stationary at levels, i.e. I(0).

Therefore, mixed results of the unit root justifies that ARDL is the best approach to fulfill the objectives of the study.

5.2 Lag Selection Criterion

The appropriate lag length must be chosen for the unrestricted error correction model (UECM) before application of bounds test of co-integration. For lag length selection, many criterion are used in the studies. For example, Akaike Information criterion (AIC), Schwarz Bayesian Criterion (SBC) and Hannan-Quin Criterion (HQC) mostly used in the studies. However, AIC shows a better fit of data, thus we used AIC for lag selection in this study. Based on the AIC, the appropriate lag length of order one is selected (see Table 2).

Table 2: Lag Selection Criteria

Lag	**AIC**	**SC**	**HQ**
0	3.201818	3.372440	3.263036
1	0.720925*	1.574033*	1.027013*
2	1.027658	2.563254	1.578617
3	1.292753	3.510835	2.088581
4	0.834013	3.734582	1.874713

* indicates lag order selected by the criterion

5.3 Bound testing

The long run relationship between the variables of interest (RGDP, TAID, TO, INF, BAID, MAID, US aid, UK aid and Japan aid), F-test for joint significance by applying zero restriction on variables of first order. The value of F statistic shows that there exists long run relationship. Results of bound test depicted in table 3.

Table 3: Results of Cointegration Test

Dependent variables	**F-statistic**	**I(0) Bound**	**I(1) Bound**	**Outcome**
F_y(RGDP/RTAID,INF,TO)	1.478822	2.37	3.2	No Cointegration
F_y(RGDP/RTBAID,INF,TO)	1.626614	2.37	3.2	No Cointegration
F_y(RGDP/RTMAID,INF,TO)	1.548465	2.37	3.2	No Cointegration
F_y(RGDP/RTBAID,RTMAID,INF,TO)	1.545981	2.2	3.09	No Cointegration
F_y(RGDP/RUS_AID,INF,TO)	2.290181	2.37	3.2	No Cointegration
F_y(RGDP/RUK_AID,INF,TO)	1.534858	2.37	3.2	No Cointegration
F_y(RGDP/RJAP_AID,INF,TO)	1.034429	2.37	3.2	No Cointegration

Note: The critical values are taken from Pesaran, et al. (2001).

Cointegration test results presented in Table 3 indicates that in each specification aid growth relationship F-statistic accepts the null hypothesis because the values of F-statistics lies within the bounds tabulated F-statistics.

Cointegration among variables of interest not detected in the bounds test, so in the absence of long run relationship we take the analysis towards short run relationship by using Granger Causality test. Results of Autoregressive Distributed Lag (ARDL) are given in appendix. Diagnostics test results are also given in appendix.

5.4 Multivariate Short Run Analysis

The literature on foreign aid and growth shows that different researchers find mixed results when analyzing the relationship between aid and growth. In Pakistan, Ishfaq and Ahmed (2005) found that the impact of foreign assistance is negative and insignificant on the left hand side variable. Another study by Ali (1993) concludes that negative relationship exists between aid and growth. Our findings are consistent with these studies. Since there is no long run relationship among the variables which takes the

analysis towards short run estimation, therefore we examine the short run relationship by using Granger Causality test.

5.5 Multivariate Causality Analysis between Total Aid and Growth

Table 4 presents the aid-growth model which includes real GDP, ratio of total aid, inflation and trade openness.

Table 4 Multivariate Causality Analysis

Dependent Variables	**Independent Variables**			
	LRGDP	**∆LRTAID**	**INF**	**LTO**
LRGDP	-	0.23 [0.64]	0.16 [0.69]	2.42 [0.12]
∆LRTAID	0.00 [0.95]	-	0.02 [0.87]	0.47 [0.49]
INF	0.36 [0.55]	0.06 [0.81]	-	0.02 [0.90]
LTO	3.79 [0.05]**	1.03 [0.31]	0.04 [0.84]	-

Notes: ** represent significance at 5% level where figures in parentheses represent the probabilities

Results suggest that total aid does not causes economic growth. Similar results are found by Bhandari et al. (2007), Khan and Rahim (1993), Khan and Ahmed (2007), Rajan and Subramanian (2008), Javed and Qayyum(2011) and Ram (2003). Many factors are responsible for this result like instable macroeconomic policies, political instability, corruption and aid fungibility. Foreign aid considered substitute to domestic savings rather than mobilizing domestic savings (Mallik, 2008), that could be the reason of ineffective functioning of foreign aid for the GDP growth. The bulk of external assistance diverted into unproductive use such as to finance budget deficit, Butt and Javid (2013) also concluded that foreign aid negatively affected government's fiscal responsibility. Foreign aid given for infrastructural development in the country is either draws off or diverted into unproductive use that's why it has no effect on real growth (Kolawole, 2013). The short run effect of foreign aid effect is insignificant because aid has been used investment purpose which takes long time for growth (Setargie, 2015).

It can be seen from the results that inflation does not cause economic growth which is consistent with the results of Bruno and Easterly (1996), they report no causal relationship among inflation and economic growth. They argued that there is no permanent loss to growth from distinct high inflation crunches, as countries have a tendency to restore their pre-crunch growth rates. The reason behind no causality between inflation and growth may be a continual increase in the general price level is

harmful for economic growth in Pakistan (Ayyoub et al., 2011). The other reason could be that high inflation causes low savings and investment in the economy therefore economic growth reduced by inflation.

Results also show that trade openness does not causes economic growth, these results supports the findings of Yanikkaya (2003) and also consistent with the findings of theoretical growth and development literature. The reason could be imports of Pakistan are consisting of capital goods while exports are primary goods and Specialization in primary products not causes growth (Dowrick and Golley, 2004). Din, et al.(2003) concludes that short run disparities in openness and growth rates may be conquered by business cycle fluctuations with no obvious casual trend in the short term. On the other hand, growth causes trade openness significantly; these findings are consistent with the (Frankel and Romer, 1999). Those countries who achieve high growth with other factors except openness engage in more international trade.

5.6 Multivariate Causality Analysis between Bilateral Aid and Growth

Table 5 reports the model which includes real GDP, ratio of total bilateral aid, inflation and trade openness.

Table 5: Multivariate Causality Analysis

Dependent Variables	**Independent Variables**			
	LRGDP	**LRTBAID**	**INF**	**LTO**
LRGDP	–	2.24 [0.13]	0.13 [0.72]	1.68 [0.19]
LRTBAID	4.12 [0.04]**	–	5.38 [0.02]**	8.41 [0.00]*
INF	2.18 [0.14]	0.07 [0.79]	–	1.12 [0.29]
LTO	3.03 [0.08]***	0.45 [0.50]	0.19 [0.66]	–

Notes: *, ** and *** represents 1%, 5% and 10% significance level where figures in parentheses represent the probabilities

It can be seen from the results that bilateral aid does not causes GDP growth; the role of bilateral aid in GDP growth is insignificant. Many factors are responsible for these results for example donor's political, strategic and economic interests. According to

Maizels and Nissanke (1984), most of the time bilateral aid is allocated for donors' economic, political and security interests. According to Javed and Qayyum (2011) donor's motives and interest may the reason behind the ineffectiveness of foreign aid in development process of Pakistan. McGillivary (2003) concluded that bilateral aid donors allocate aid among recipients on the basis of their own interests. The aid expected on the basis of geopolitical factors does not have an effect on growth (Rajan and Subramanian, 2008). Aid may not only utilized for economic interest of donors but also serve to get political support from aid beneficient countries (Alesina and Dollar, 2000 & Alesina and Weder, 2002). The results also indicate that GDP growth causes bilateral aid significantly, the findings are consistent with the results of Berthelemy (2007). He concludes that donor countries provide more aid to recipients with high growth performances. Boon (1996) concluded that aid increases (government) consumption but had no significant impact on investment.

5.7 Multivariate Causality Analysis between Multilateral Aid and Growth

Table 6 presents model which includes variables real GDP, multilateral aid, inflation and trade openness.

Table 6: Multivariate Causality Analysis

Dependent Variables	**Independent Variables**			
	LRGDP	**LRTMAID**	**INF**	**LTO**
LRGDP	-	5.89 [0.02]**	0.16 [0.68]	0.60 [0.81]
LRTMAID	2.78 [0.095]***	-	0.25 [0.61]	0.07 [0.79]
INF	3.67 [0.06]***	0.35 [0.55]	-	1.44 [0.23]
LTO	1.13 [0.28]	4.33 [0.04]**	0.09 [0.76]	-

Notes: ** and *** represent 5% and 10% significance level where figures in parentheses represent the probabilities

Results show that aid from multilateral institutions significantly affect economic growth and economic growth also significantly causes multilateral aid, there is two-way relation between multilateral aid and economic growth. The findings confirm the results of Headey (2005), Senbet and Senbeta (2007), Alvi and Senbeta (2012) and Wamboye, Adekola and Sergi (2013). Headey (2005) concludes that there exist significant positive effect of multilateral aid on growth both before and in the aftermath of the cold war. Minoiu and Reddy (2007) reports direct significant relationship between multilateral aid and economic growth. The reason could be that historically multilateral institutions were able to impose conditionalities over their aid.

5.8 Multivariate Causality Analysis between Bilateral, Multilateral Aid and Growth

Table 7 represents model which includes real GDP, ratio of bilateral aid, ratio of multilateral aid, inflation and trade openness.

Table 7 : Multivariate Causality Analysis

Dependent variables	**Independent variables**				
	LRGDP	**LRTBAID**	**LRTMAID**	**INF**	**LTO**
LRGDP	-	1.18 [0.27]	4.65 [0.03]**	0.00 [0.93]	0.56 [0.45]
LRTBAID	3.74 [0.05]**	-	0.10 [0.75]	5.35 [0.02]**	8.11 [0.00]*
LRTMAID	0.79 [0.37]	2.24 [0.13]	-	1.18 [0.27]	0.93 [0.34]
INF	2.39 [0.12]	0.15 [0.69]	0.43 [0.51]	-	0.71 [0.39]
LTO	2.15 [0.14]	1.36 [0.24]	5.23 [0.02]**	0.59 [0.44]	-

Notes: * and ** represent significance at 1%, 5% significance level where figures in parentheses represent the probabilities

Results in table 5.7 indicate that bilateral aid does not cause economic growth while multilateral aid significantly causes economic growth. These findings are consistent with the results of Senbet and Senbeta (2007), they found that foreign aid (both bilateral and multilateral) had significant positive relationship with public spending. But large portion of bilateral aid is used for government current consumption and multilateral aid is used for investment in development projects which sho that multilateral aid is mostly development oriented.

Alesina and Dollar (2000) conclude that bilateral aid may work effectively for promotion of donors strategic interests but it has very weak connection with poverty, democracy and good policy. In developing countries large portion of aid is used to finance government budget deficit rather than development purpose, the correlation between bilateral aid and public consumption is strongly positive (Burnside and Dollar, 1997).

Younas (2008) argues that all bilateral donors mostly give aid to recipient countries who imports machinery and transportation equipment from them in which they have comparative advantage. For example, Germany, France and Canada sanction more aid to countries importing basic manufactured goods from them. Donors provide aid to

maintain their influence in recipient countries, so political interests of donors take over their objective of enhancing development via aid in recipient countries.

Foreign aid channeled through multilateral organizations considered developmental in nature. For example Headey (2007) concluded that multilateral aid less depends on strategic factors as compare to bilateral aid.

Results also show that trade openness significantly causes bilateral aid; the findings of Osei et al. (2004) supports our results. There results suggest that share of import is the important factor in the aid allocation decision of donors.

5.9 Multivariate Causality Analysis between US Aid and Growth

Table 5.8 presents model which includes real GDP, ratio of US Aid, inflation and trade

Table 8: Multivariate Causality Analysis

Dependent Variables	**Independent Variables**			
	LRGDP	LRUS_AID	INF	LTO
LRGDP	-	0.74 [0.39]	0.06 [0.81]	2.47 [0.12]
LRUS_AID	1.59 [0.21]	-	5.20 [0.02]**	2.39 [0.12]
INF	2.15 [0.14]	0.32 [0.57]	-	1.43 [0.23]
LTO	2.99 [0.08]***	1.05 [0.31]	0.26 [0.61]	-

Notes: ** and *** represent 5% and 10% significance level where figures in parentheses represent the probabilities

It can be seen from the results that US aid does not cause economic growth, the reason could be United States provide aid on the basis of political and strategic interests in Pakistan. Rutten (1996) and Zimmermann (1993) conclude that US government frequently used aid as a significant tool for achievement of foreign policy objectives.

In 2001 after terrorist attacks Pakistan become front line partner of USA for war against terrorism and received $0.8 billion per annum from 2001 to 2003 (Mullick, 2004). But this alliance has come with a heavy price tag for Pakistan. After three months of announcement of alliance with USA, according to Pakistani president, Pakistan has bared a loss of $1.8 billion which included decline in net exports and business optimism (Khan 2001).

The findings of Dreher et al. (2008) suggest that US aid has definitely bought voting compliance, general budget support and grants used to induce recipient countries to vote in the favor of United States.

So we can say that due to influence of political consideration US aid does not play effective role in economic growth of Pakistan.

5.10. Multivariate Causality Analysis between UK Aid and Growth

Table 9 reports the model which includes real GDP, ratio of UK aid, inflation and trade openness.

Table 9: Multivariate Causality Analysis

Dependent Variables	**Independent Variables**			
	LRGDP	**∆LRUK_AID**	**INF**	**LTO**
LRGDP	-	2.23 [0.13]	0.47 [0.49]	2.92 [0.09]***
∆LRUK_AID	0.23 [0.63]	-	0.92 [0.34]	1.16 [0.28]
INF	0.46 [0.49]	0.23 [0.62]	-	0.05 [0.82]
LTO	3.08 [0.08]***	0.50 [0.48]	0.00 [0.95]	-

Notes: *** represent 10% significance level where figures in parentheses represent the probabilities

The results in table 5.9 shows that aid from United Kingdom does not cause economic growth, the reasons could be political and economic motives. According to Berthelemy (2007) United Kingdom is known for frequently tying assistance. Tied aid imposes condition on recipient country to use aid for purchase of goods and services produced in the donor country. Britain has been tying their aid allocations much more close to export orders (Maizels and Nissanke, 1984).So in this case amount of funds available for development reduced and aid cannot play any role in growth of recipient country. Britain's interest behind sanctioning aid is essentially political rather than economic (Mckinlay and Little, 1978).

Mostly developing countries use foreign aid to reduce fiscal gap, Franco-Rodriguez et al. (1998) argues that half of aid has used for government consumption in Pakistan and it has negative effect on tax effort.

Results suggest that there is bi-directional relation among trade openness and growth which confirms the findings of Iqbal & Zahid (1998) and Frankel & Romer (1999) who found that trade openness is beneficial for economic growth in case of Pakistan.

5.11. Multivariate Causality Analysis between Japan Aid and Growth

Table 5.10 reports the model which includes real GDP, Japanese aid, inflation and trade openness.

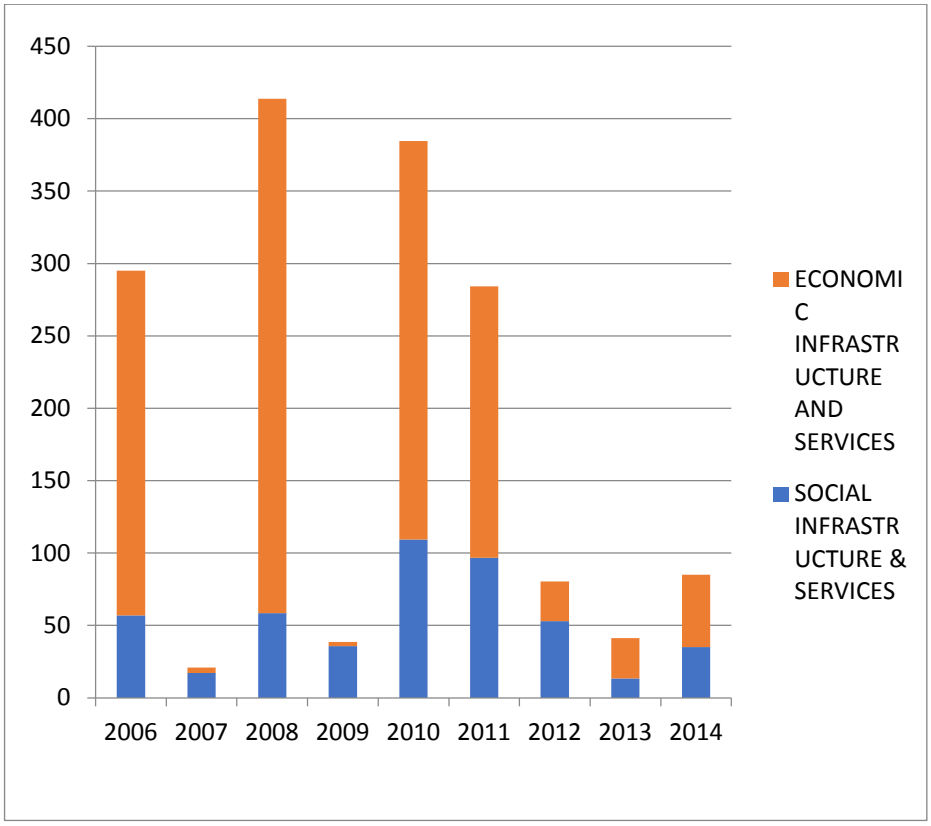
Table 10: Multivariate causality analysis

Dependent Variables	**Independent Variables**			
	LRGDP	**LRJAP_AID**	**INF**	**LTO**
LRGDP	-	4.09 [0.04]**	0.71 [0.39]	0.00 [0.92]
LRJAP_AID	0.51 [0.47]	-	0.00 [0.94]	0.59 [0.44]
INF	3.14 [0.08]	1.72 [0.19]	-	0.87 [0.35
LTO	3.04 [0.08]***	2.30 [0.12]	0.39 [0.53]	-

Notes: ** and *** represent 5% and 10% significance level where figures in parentheses represent the probabilities

Results in table 5.10 suggest that Japanese aid significantly causes economic growth, the reason could be large portion of Japanese aid consist of economic aid. Foreign aid disbursed for economic development is more helpful for GDP growth. Figure 5.1 depicts that Japanese aid for economic infrastructure and services consists large portion as compare to social infrastructure and services.

Figure 1 ODA from Japan (USD millions) spent on economic infrastructure and social infrastructure in Pakistan 2006-2014



Source: OECD.stat 2014

6. Conclusion

The empirical analysis proposed that economic growth cannot be stimulate by foreign aid in case of Pakistan. Our findings are consistent with Bhandari et al. (2007), Khan and Ahmed (2007), Mallik (2008), Kolawole (2013), Aboubacar et al. (2015) and Setargie (2015). Bilateral aid also does not cause economic growth but multilateral aid significantly causes economic growth. Results show two-way causality among multilateral aid and economic growth. The reason could be two-fold: one could be large amount of bilateral aid for the purpose of reducing debt and grants to the countries on the humanitarian basis. Second, aid from the multilateral institutions mostly is used for improving economic and social infrastructure (OECD.stat 2014).

Estimated results indicate that aid from UK and US also does not cause economic growth in Pakistan. But Japanese aid significantly causes economic growth, the reasons could be that United States and United Kingdom provides aid on the basis of political and strategic motives. Japan spent large portion of aid on economic infrastructure and

services, so we can say that in this way Japanese aid contributes to economic growth of Pakistan.

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PARADOX OF THE ABUNDANCE: HUMAN DEVELOPMENT AND EXTRACTIVISM AT GLOBAL LEVEL 2010-2015

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Abstract

Since the nineties some econometrics studies had realized about the relationship between the abundance of natural resources and human development, where some authors depending of the variables have categorized it as a curse while others as an opportunity. In this research project, analyze a balanced short panel of 142 countries for the period 2010-2015, taking as a dependent variable the Inequality-adjusted Human Development Index (IDHI), and as a proxy variable of extractivism the Total Natural Resources Rents as a percentage of the Gross Domestic Product (GDP), in addition to other control variables. The series was transformed into first differences, resulting in a significant relationship with negative slope among the variables of interest. Hence, there is a curse of abundance at global level.

Keywords: Paradox of the abundance, Human Development, Extractivism, Panel Data, Inequality.

JEL Classifications: C23, F63, L72, O15

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1. Introduction

Throughout history, various attempts have been made to explain the poor performance of countries, which are rich in natural resources. Thus, at the end of the 20th Century, an attempt has been made to empirically demonstrate their relationship by using econometric models, Sachs and Warner (1995) being the first to do so using a cross-sectional model, where it has been shown that there is an inverse relationship between economic growth and natural resources.

This was the starting point for various researchers to expand the study relating development and growth with GDP per capita. According to Fernández (2005, pp. 96-99), in this line of research, various investigations have been carried out using the per capita GDP growth as an independent variable, such as Sala-i-Martin and Subramanian (2003), Mehlum Moene and Torvik (2002), with cross-section data. While in panel data, Fernández (2005, pp. 96-99) cites the study by Manzano and Rigobon (2001).

It is considered that the increase in GDP per capita from the traditional view of development is associated with sustained growth. However, restricting development in this approach excludes factors that contribute to social welfare, such as: health, education, equity and environment. Causing the conclusions to be erroneous or overestimated from the broader vision of development.

Firstly, this article aims to expand this vision of development under the sustainable development approach by taking a sample of 142 countries in the period 2010-2015 for the construction of a balanced panel. Secondly, the Human Development Index Adjusted for Inequality (IDHI) calculated by the United Nations Development Program (UNDP) was identified as a dependent variable. Thirdly, to measure the extractivism, the Total Income of Natural Resources as a percentage of GDP was considered a proxy variable. It is worth mentioning that for the study only oil, mining and forestry activities are considered because these considered activities generate greater social and environmental conflict in the world, and their revenues generate controversy because they are linked to acts of corruption, but in turn they can be used by countries to reverse the curse. Additionally, control variables were incorporated into the model within the framework of the IDHI dimensions.

As a result, the curse hypothesis of natural resources is accepted being significant and with negative slope, in this way the results obtained from the econometric model of short panel data applied to the first differences of the series of the 142 countries in the period 2010- 2015, reaffirm the paradox of the abundance or curse of natural resources.

The present investigation is divided into four sections with the following structure. In the first section, an allusion is made to the studies that were made regarding the paradox of abundance and a review is made of the concepts needed to understand the proposed econometric model. In the second section, the methodology used is presented with its scope and limitations. In the third section the results obtained are presented. Finally, in the fourth section the conclusions are stated based on the empirical evidence.

2. Review of Literature

2.1. State of the art curse of natural resources

Since the nineties, econometric models have been used to contrast the curse hypothesis of natural resources. In the first instance, the empirical evidence showed that most of the countries in which their economy was based on the extraction of natural resources, "have succumbed in deep economic crises" (Sachs & Warner, 1995). This model used as a dependent variable the average growth of the Gross Domestic Product (GDP) per capita 1971-1989, while the independent variable related to the abundance of natural resources was the proportion of exports of the primary sector against GDP.

Several researchers developed the line of empirical study of the curse of resources, carrying in a general way the classical conception of development as the GDP per capita growth. Fernández (2005, pp. 96-99) mentions that preliminary studies have been carried out that used GDP growth per capita as a dependent variable and as a proxy for extractivism to exports of primary products with respect to GDP, Sala-i-Martin and Subramanian (2003), Mehlum Moene and Torvik (2002), through a cross section data methodology found that the variables have a significant relationship with negative slope.

The paradox of abundance presents two considerations. On the one hand, most financial institutions and researchers accept the curse hypothesis of resources, although not necessarily as an insurmountable condition. On the other hand, this condition in turn causes pathologies of a political nature as well as limited development. There is an increase in the deterioration of the terms of trade, collaterally multinational companies repatriate the benefits instead of using them in the country from which they come.

In addition, "several studies show that the abundance of natural resources is associated with low levels of democracy" (Varela, 2010, page 143). Wantchekon (1999, page 20) concludes that its results show that countries whose economies are based on the rent of natural resources increase the incumbency, that a party induces violence for political power, affecting governance and political stability. Ross (2001, page 356) finds a relationship in the export of commodities with states with less democracy.

The paradox of abundance today has been studied with more sophisticated techniques, but in some cases maintaining the essence of the initial studies. Fernández (2005, pp. 115-116), analyzing a group of twenty-six Latin American countries between 1980 and 2000, concludes that there is evidence of a negative effect of natural resources and economic growth. Natural resources were measured as the gross value added of the primary sectors with respect to GDP.

Some recent models have used the Human Development Index as a dependent variable. This is a measure that created the United Nations Development Program, which incorporates three dimensions: health, education and standard of living. Gómez and Rodríguez (2014, page 86) using a three-stage ordinary least squares model for a sample of 142 countries conclude that the curse of resources is not met using the natural capital variable. Additionally, a positive relationship between social welfare and natural resources is observed.

2.2. How to evaluate the paradox of abundance: variables used

The Index of Human Development adjusted by Inequality (IDHI) as a proxy variable to the study is composed of three dimensions: long and healthy life, knowledge, and a decent standard of living. Although this index is more complete by the dimensions that it covers, it keeps implicit the problem of not considering inequality. That is to say, the results obtained by the HDI show the potential human development if in the society the GDP was distributed equitably. So the index is adjusted in the three dimensions, and if the inequality is high in the country, it can fall in the calculated ranking. In that sense, that measurement would explain in an approximate way several dimensions of sustainable development, having as a limitation the non-consideration of environmental variables. That is why the model includes CO2 emissions per capita in tons as an environmental variable, which represents the variations and trends of the changes in CO2 in the atmosphere.

As a proxy dependent variable to extractivism, the Total Income of Natural Resources is considered as a percentage of the Gross Domestic Product (RT), according to the World Bank it includes "the sum of the oil rent, the rent of the natural gas, the income of the coal (hard and soft), mineral income and forest income "(2018). The rent is calculated as the value of the production minus its total cost, so it takes into account the price of the commodity and the average of the costs including the normal return of capital, the unit rent is multiplied by the physical amount of extraction from each country and divided for GDP. It is expected that the countries that have higher income from natural resources present a lower level of development.

Additionally, control variables are included in the econometric model according to the dimensions of the HDI to avoid errors by omission of relevant variables. So it includes: the GDP per capita in international dollars of Purchasing Power Parity (PPA) expressed in constant prices of the year 2011, series obtained from the World Bank; Life expectancy at birth measured in years, according to the World Bank (2013) "refers to the number of years that a newborn would live if the mortality patterns in force at the time of birth do not change over the life of the newborn. infant"; Arithmetic mean between the expectation of years of study and average of years of study presented by the population, calculated based on the data obtained from UNDP; and, Coefficient of Human Inequality (arithmetic mean of inequalities in the three dimensions), obtained from the UNDP.

3. Methodology

In the present study, a sample of 142 countries is used worldwide that forms a balanced panel in the period 2010-2015. In general terms, there are 42 countries in Africa, 27 in the Americas, 30 in Asia, 39 in Europe, and 4 in Oceania. Similarly, according to the classification of the Human Development Index (HDI) for 2015 of the 142 countries to be analyzed, 27% of the IDH group is very high, 26% of the HDI high, 23% of the HDI average and 23 % HDI low. In this sense, a group of countries that contain diversity regarding their degree of economic and social development is analyzed. In this sense, the criteria for selecting countries consists in comparing the group of variables and countries so that the data panel is balanced. For which the different databases were compiled, identifying each country with a unique three-digit code taken from the World Bank, and the bases were compiled.

When crossing the series of variables for the model, there is a limitation that there are countries with missing data, most of the African continent. In the case that these countries are eliminated from the study sample, they would become part of the error of the model, assuming that the excluded data have similar characteristics to the complete ones and that they were excluded in a random manner, if these conditions are not met. Estimators can be biased. So to avoid these problems a simple data imputation is made for: IDHI, RT and CI.

According to the IDHI, an imputation was made for those countries that present at least three missing data. Under the assumption that inequality does not vary drastically in the period of time studied, an average of the inequality loss (IDH-IDHI) of each year is calculated, and the HDI is subtracted from the years that do not present data, such as is expressed in the formula [1]. Under these considerations, a missing value was charged for 6 countries, two values for 3 countries and three for 15 countries.

$$IDHI_{it}{}^{*} = IDH_{it} - \left[\frac{(IDH_{it1} - IDHI_{it1}) + (IDH_{it2} - IDHI_{it2}) + \cdots (IDH_{it} - IDHI_{it})}{n}\right] \qquad (1)$$

The variable RT only presented two countries with a missing data each (Iceland and Venezuela). So the following formulas were applied to impute data [2], [3], respectively:

$$RT_{it}{}^{*} = \frac{RT_{it-1} + RT_{it-2}}{2} \qquad (2)$$

$$RT_{it}{}^{*} = \frac{RT_{it+1} + RT_{it+2}}{2} \qquad (3)$$

To conclude with the simple imputation technique, for the case of CI the following criteria were followed: i) if the series of data of the country presents a single value of repeated (constant) inequality for all years and presents is replicated for the data missing; ii) if there is one or more missing data in the middle, all the data of the extremes is averaged and the fields are filled; iii) if one or more missing data is present and there is only one end (either on the left or right with full fields), it is averaged with the following or previous data and the series is completed.

With the balanced panel we proceed to apply the methodology to select the appropriate estimators in short panel data described, among other authors, by Cameron and Trivedi (2009) and Álvarez, Perdomo, Morales and Urrego (2013). It should be mentioned that, for short panel data where the number of entities observed tends to infinity while the time is fixed, there are regular intervals of time where the errors of the econometric model are usually correlated in time, and fixed effects can be identified. Observables and treat heterogeneity through fixed effects models, additionally, estimates of dynamic models can be made, including lags, among other characteristics.

In the analysis of econometric models of short panel data, the letter is used as a subscript to denote the entities studied and the letter t that identifies the time, in addition the subscript k is included to express that the estimators differ depending on the explanatory variable. In general, the letter y is used to identify the dependent variable, X for the independent ones, β for the slopes of the model, α for the intercepts of the model, and ε for the error.

There are different types of models detailed in the following equations: Ordinary Least Squares (OLS) grouped [4]; Random Effects Model (EA) [5] where the component θ _i

is estimated by means of [6]; Fixed Effects Model (EF) [7] calculated in the STATA program that presents the large means of $\bar{y}$, $\bar{X}$, $\bar{\varepsilon}$; Average Population Estimator or pooled FGLS (AR1) [8] with autoregressive process of first order described in [9].

$$y_{it} = \alpha + \beta_k X_{it}^{'} + (\alpha_i - \alpha + \varepsilon_{it}) \qquad (4)$$

$$(y_{it} - \widehat{\theta_\iota}\bar{y}_i) = (1 - \widehat{\theta_\iota})\alpha + (X_{it} - \widehat{\theta_\iota}\bar{X}_\iota)'\beta_k + \{(1 - \widehat{\theta_\iota})\alpha_i + (\varepsilon_{it} - \widehat{\theta_\iota}\overline{\varepsilon_{it}})\} \qquad (5)$$

$$\theta_i = 1 - \sqrt{\frac{\sigma_\varepsilon^2}{(T_i\,\sigma_\propto^2 + \sigma_\varepsilon^2)}} \qquad (6)$$

$$(y_{it} - \bar{y}_i + \bar{\bar{y}}) = \alpha + \left(X_{it} - \bar{X}_\iota + \bar{\bar{X}}\right)'\beta_k + (\varepsilon_{it} - \overline{\varepsilon_{it}} + \bar{\bar{\varepsilon}}) \qquad (7)$$

$$y_{it} = \alpha + \beta_k X_{it}^{'} + (\alpha_i - \alpha + \mu_{it}) \qquad (8)$$

$$\mu_{it} = \rho_1 \mu_{it-1} + \varepsilon_{it} \qquad (9)$$

The grouped OLS model assumes that there is no unobserved heterogeneity (invariant component over time, but variant in individuals) includes variations within (for an individual over time) and between (for all individuals in a single time), the estimators are consistent if EF prevails over EA. For the case of AD, the invariant component over time can be treated as if it were random and is exogenous (it is not related to the regressors), the estimators are consistent if EA prevails over EF. The EF model assumes that the invariant component generates heterogeneity since it is related to the regressors, so it is eliminated through the calculation of means, the estimators are consistent if EF prevails over EA. Finally, AR1, being a variation of grouped MCOs, generates consistent estimators if EA prevails over EF, in this case an autoregressive process of first order errors is defined since they depend on their first lag.

To select the indicated model that allows calculating the best estimators for a short panel, according to Álvarez, Perdomo, Morales and Urrego (2013, page 374) one must start by performing the Breusch and Pagan test that allows choosing between grouped OLS and EA or EF. As a null hypothesis it is established that there is no evidence of constant components (invariant in time) in the error, if the hypothesis is accepted, the estimators obtained by grouped OLS are more adequate than those obtained by EA or EF. Under this scenario, if errors also present a significant first lag, AR1 prevails over grouped OLS.

However, it is common that the hypothesis of the aforementioned test was rejected, so it is pertinent to identify whether the invariant component over time causes endogeneity in the model. In this sense, the Hausman test is applied, which states as a null hypothesis that there is no endogeneity in the model since the estimators obtained by EA and EF do not vary enough, there are no systematic differences. If the null hypothesis is accepted, the EF model prevails over EA.

In the event that the hypothesis is rejected, the fixed-effect model is adequate. If additional autoregressive problems arise, it is possible to perform a transformation to the model variables, to analyze the first differences. So the following equation is defined [10], as we observe the intercept of the model is eliminated, however, if the constant is

significant, it implies that the original model presents a time trend described in equation [11] where δ must be included in equation 10.

$$(y_{it} - y_{it-1}) = (X_{it} - X_{it-1})'\beta_k + (\varepsilon_{it} - \varepsilon_{it-1}) \quad (10)$$

$$\delta t - \delta(t-1) = \delta \quad (11)$$

Under these specifications, the following model is analyzed [12] where IDHI is the Human Development Index Adjusted for Inequality, LNRT is the Natural Logarithm of the Total Income of Natural Resources as a percentage of GDP, LNRPIBper is the Natural Logarithm of the Gross Domestic Product per capita measured in international dollars constant PPA 2011, ES is the Life Expectancy at birth measured in years, ED is the arithmetic mean between the expectation of years of study and the average years of study of the population, LNCI is the Natural Logarithm of the Human Inequality Coefficient, and LNCO is the Natural Logarithm of CO2 Emissions per capita in tons.

$$\begin{gathered}(IDHI_{ij} - IDHI_{ij-1}) = \\ \beta_1(LNRT_{ij} - LNRT_{ij-1}) + \beta_2(LNPIBper_{ij} - LNPIBper_{ij-1}) + \beta_3(ES_{ij} - ES_{ij-1}) + \\ \beta_4(ED_{ij} - ED_{ij-1}) + \beta_5(LNCI_{ij} - LNCI_{ij-1}) + \beta_6(LNCO_{ij} - LNCO_{ij-1}) + \\ (\mu_{ij} - \mu_{ij-1})\end{gathered} \quad (12)$$

Para simplificar la nomenclatura se reescribe la ecuación [12] como la siguiente [13]:

$$D\_IDHI_{il} = \beta_1 D\_LNRT_{il} + \beta_2 D\_LNPIBper_{il} + \beta_3 D\_ES_{il} + \beta_4 D\_ED_{il} + \beta_5 D\_LNCI_{il} + \beta_6 D\_LNCO_{ij} + D\_\mu_{il} \quad (13)$$

4. Results

4.1. Results of the Econometric Model of short panel data

As a summary, when executing the econometric model in the Stata version 14.0 program without transforming the model into first differences. There is evidence of one (or several) components that vary between individuals, but not in the time present in the error, which implies that there is heterogeneity not observed in the model. Therefore, the fixed effects and random effects models prevail over the grouped MCO model. In addition, through the Hausman test it is observed that the appropriate model that provides better estimators is the Fixed Effects. However, because the series have a unit root, that is, they are stationary (variance and constant average over time) in first differences, it is necessary to transform them to avoid spurious regressions (finding false relationships due to trend factors).

In that sense, an estimate of fixed effects is made by first differences, subtracting the first lag in time to each panel observation and estimating by OLS. When transforming the variables, the interpretation of the estimators changes, such that, for example, the coefficient of D_LNRT in the grouped OLS model expresses how much the difference (in two consecutive years) of the IDHI (β_1 / 100) changes when increases in 1% the difference of the natural logarithms (percentage variation) of the total rents of natural resources with respect to GDP. That is, it approaches the impact of a percentage variation that has the weight of the rents towards the variation in units of the IDHI. For

the variables that do not present logarithm, it is considered as a change in the increase in units against a change of the same type.

This is because in general terms the estimators are explained as follows [14] and [15]:

$$\beta_k = \frac{\Delta E\left(\frac{y}{x}\right)}{\Delta \ln(x)} \approx \frac{\Delta E\left(\frac{y}{x}\right)}{\frac{\Delta x}{x}} \qquad (14)$$

$$\frac{\beta_k}{100} \approx \frac{\Delta E\left(\frac{y}{x}\right)}{100 * \frac{\Delta x}{x}} \qquad (15)$$

If the process of selecting better estimators and analysis of invariant component over time is replicated, there is no evidence of constant effects in the model. Therefore, MCO and FGLS prevail over fixed or random effects. Additionally, to verify if the estimators are appropriate, it is evidenced in the Hausman test with a confidence level of 95% that the random effects prevail in first differences. Giving the green light, to the analysis of the estimators obtained by MCO and FGLS.

Table 1. Econometric model results in first differences.

Variable	MCO1	MCO2	EA	EF	AR1
D_LNRT	-0.00225874***	-0.00283018***	-0.00225874***	-0.00182891*	-0.0023863***
D_LNPIBper	0.03924341***	0.04320574***	0.03924341***	0.03569143***	0.03993007***
D_ES	0.00118802*	0.00239404***	0.00118802*	-0.00200161	0.00166028***
D_ED	0.01531526***	0.01657023***	0.01531526***	0.01557564***	0.01631815***
D_LNCI	-0.12204844***	-0.12260749***	-0.12204844***	-0.12294369***	-0.12285915***
D_LNCO	0.00518019**	0.00461045**	0.00518019**	0.00209871	0.00594765**
_cons	0.00094882***		0.00094882***	0.00209925***	0.00074197***
r2	0.79422393	0.83203204		0.79156729	
r2_b			0.83419958	0.75419641	
r2_w			0.78874806	0.79156729	

*Notes: *, ** and *** significant 10%, 5% and 1% respectively. The results obtained from the econometric data model of short panel in Table 1 applied to the first differences of the series of the 142 countries in the period 2010-2015, reaffirm the paradox of the abundance or curse of natural resources. In all the models, the percentage growth rates of the relationship between natural income and GDP negatively affect the growth of the IDHI. Being significant at 5% for OLS grouped with constant term (trend), and significant at 1% if a first order autoregressive process (AR1) is applied. Source: World Bank, United Nations Development Program and CDIAC. Elaboration: Authors*.

Following the methodological scheme, Table 1 is presented as a comparative summary, where the results of the regressions are shown in: i) OLS grouped with cluster errors; ii) MCO grouped without constant with cluster errors; iii) Random effects with cluster errors; iv) Fixed effects with cluster errors; v) Grouped FGLS estimation or estimator of the average population with first order autoregressive process (AR1) and robust errors. Additionally, cluster or robust errors are established, depending on the case, by evidence of heteroscedasticity in the model described in the following subsection. This type of error is used since there is evidence of heterocedasticity in the model, as seen in the previous section due to the distribution of the data.

Table 1 shows the signs and expected significance of the econometric model of short panel data applied to the first differences of the series of the 142 countries in the period 2010-2015. Where the paradox of abundance of natural resources is identified. It can be seen that in all D_RT models it is significant, for example in 5% for OLS grouped with

constant term, and 1% if a first order autoregressive process (AR1) is applied. In the same way, in all the models, the r2 is greater than 0.79, expressing that the variability of the X explains in a good way the variability of Y. Additionally, the analysis is consistent with economic theory, since the percentage growth of the GDP per capita PPP at constant prices positively affects the growth of the IDHI. Both the change in the years of schooling and in the years of life expectancy positively affect the growth of the IDHI, although life expectancy varies its level of significance depending on the model.

On the other hand, compared to a percentage increase in the coefficient of human inequality, the growth of the IDHI is negatively affected. This variable being the most significant. Finally, the variations of the per capita emissions of C02 positively affect the IDHI variations, that is, the countries increase their development at the cost of negative impacts on the ecological environment. Table 2 presents the interpretation of the betas for the grouped MCO model.

Table 2: Interpretation of the BSO grouped model in first differences.

Variable	**Nomenclature B**	**Significant in:**	**Value B**	**Interpretation**
D_LNRT	β_1	5%	-0.00226	In contrast to a 1% increase in the differences in LNRT, it is expected that, on average, the IDHI differences will decrease by 0.000023.
D_LNPIBper	β_2	1%	0.03924	In contrast to an increase of 1% in the differences of LNPIBper, it is expected that, on average, the IDHI differences will increase by 0.000392.
D_ES	β_3	10%	0.00118	In contrast to a unitary increase in the ES differences, it is expected that, on average, the IDHI differences will increase by 0.00118.
D_ED	β_4	1%	0.01531	In contrast to a unitary increase in ED differences, it is expected that, on average, IDHI differences will increase by 0.01531.
D_LNCO	β_5	5%	0.00518	In contrast to a 1% increase in the LNCO differences, it is expected that, on average, the IDHI differences will increase by 0.000052.
D_LNCI	β_6	1%	-0.12204	In contrast to a 1% increase in the LNCI differences, it is expected that, on average, the IDHI differences will be decreased by 0.00122.

Note: The results in Table 2 show that the variable D_IDHI is more sensitive to percentage changes in the difference of the natural logarithm of the Human Inequality Coefficient (CI), and more susceptible to unit changes in the difference of years of education than the years of life expectancy. Additionally, although there is a significant and negative relationship between extractivism, its impact is not so representative, leaving open the possibility that countries will reverse this situation. Source: World Bank, United Nations Development Program, CDIAC. Elaboration: Authors.

Table 3 shows the results of different tests applied to the econometric model. According to Ramsey's omitted variables test, the null hypothesis that the model has no omitted variables is accepted. It is important to point out that it does not necessarily refer to variables not considered in the model, but that they can also be the same regressors

expressed in different powers. The test was obtained after the OLS regression grouped with constant term and cluster errors. When the presence of heteroscedasticity in the model is evaluated, after running a regression of fixed effects, by means of the Wald test, we obtain that the model presents heterocedasticity, that is, different sigma squared for each individual. Because of this, it is essential to apply robust standard errors or clusters so that the inference is not wrong. If the Wooldrifge test that evaluates the first-order autocorrelation to the panel data is applied, the null hypothesis is rejected, showing that this type of autocorrelation exists. Therefore, the estimation by FGLS with process AR1 is the most appropriate.

Table 3: Test applied to the model in first differences.

Test	**Null hypothesis (Ho)**	**Prob>"Estadístic"**	**Result**
Test Ramsey	Model does not have omitted variables	0.2206	Ho is accepted
Test de Wald	Sigma (i) ^ 2 = Sigma ^ 2 for all i	0.0000	Ho is accepted
Test Wooldridge	No first-order autocorrelation	0.003	Ho is accepted
Test Breusch y Pagan	Var(u)=0	1.000	Ho is accepted
Test Hausman	Non-systematic difference in the coefficients	0.0717	Ho is accepted

Note: The results in Table 3 show that the Ho is accepted that the model does not present omitted variables, it is accepted that the model presents problems of heteroscedasticity, so it is used in the estimations cluster or robust errors, it is accepted that the model presents autocorrelation in first-order errors, so an autoregressive process must be applied, Ho of the Breusch Test and Pagan is accepted, so that MCO prevails over EF or EA, and Ho of the Hausman test is accepted. Estimators obtained by EA are more suitable than those of EF. Source: World Bank, United Nations Development Program, CDIAC. Elaboration authors.

Collaterally, Table 3 shows the result of the Breusch and Pagan test where the null hypothesis is accepted that there is no unobservable component invariant in time that generates heterocedasticity. Therefore, estimation prevails by grouped OLS, rather than fixed or random effects. To verify the validity of the estimators, the Hausman test is performed, in which, against a confidence level of 95%, the random effects model prevails over the fixed effects model.

To verify that there is not high collinearity between the regressors, the inflation factor of the variance applied is calculated after running the regression of OLS grouped with constant terms. An inflation greater than 10 implies that said variable generates collinearity. As the values border on 1, the non-existence of collinearity is intuited. To complement the analysis, we present the correlation matrix of the regressors Table 4, which shows that for all cases, the correlation does not exceed 0.26 between CO2 emissions and GDP per capita. So, it corroborates the non-existence of strong collinearity.

Table 4: Correlation matrix of the regressors.

	D_LNRT	**D_LNPIBper**	**D_ES**	**D_ED**	**D_LNCI**	**D_LNCO**
D_LNRT	1.000					
D_LNPIBper	0.0994	1.000				
D_ES	0.1659	0.0656	1.000			
D_ED	0.0245	0.0270	0.0030	1.000		
D_LNCI	-0.0732	-0.0285	-0.0515	0.0418	1.000	
D_LNCO	0.0474	0.2583	0.1115	0.0334	0.0152	1.000

Note: Table 4 shows that the independent variables do not have a strong correlation with each other, being the highest between D_LNCO and D_LNPIBper of 0.26. Source: World Bank, United Nations Development Program, Carbon Dioxide Information Analysis Center (CDIAC). Elaboration authors.

4.2. Descriptive analysis of the study variables.

When relating the averages of the IDHI and total rents of the natural resources (RT) as a percentage of GDP, there is a negative relationship between the variables. In Figure 1, it can be seen that European countries are in the upper left with higher levels of development and lower RT, while as the income of natural resources increases, the IDHI is lower (except for Norway) , this happens in most countries in Africa, America and Asia, with their different exceptions.

The majority of countries in Africa are below the average of IDHI and above the average of RT, that is, they show a paradox of abundance of natural resources. In Asian countries such as Kazakstan and Azerbaijan the relationship becomes diffuse, having a large weight of extractive exports but at the same time counting on an above-average development. In Central America, the exception is Trinidad and Tobago, while in America, Chile presents a behavior different from the trend.

It can be seen that the relationship between the variables can be better estimated through a logarithmic rather than a linear form. Evidence that is addressed for the implementation of the econometric model and its functional form, discussed in the next section. In general, it can be observed that there is a negative relationship but little accentuated. Moreover, if only the countries of the Asian continent were considered, the relationship would be positive, that is to say, although there is a strong dependence on natural resources, development processes are promoted, but this exceptionality is due to the development policies endogenous carried out since the decade of the 60s.

Figure 1: Relationship between IDHI and RT 2010-2015

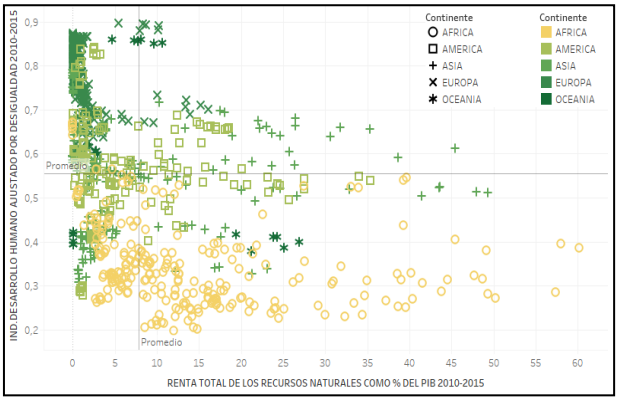


Figure 2: Relationship between IDHI and PIBper 2010-2015

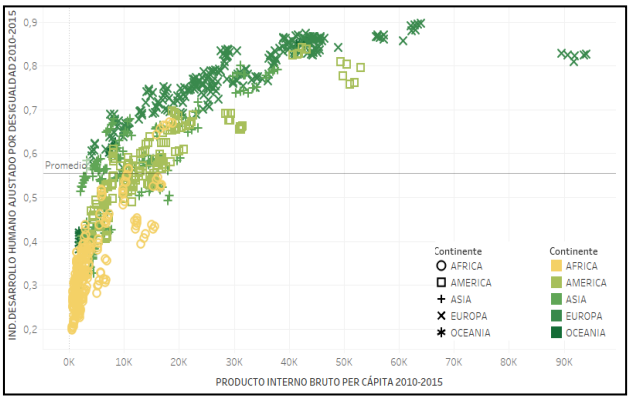


Figure 3: Relationship between IDHI and ES 2010- 2015

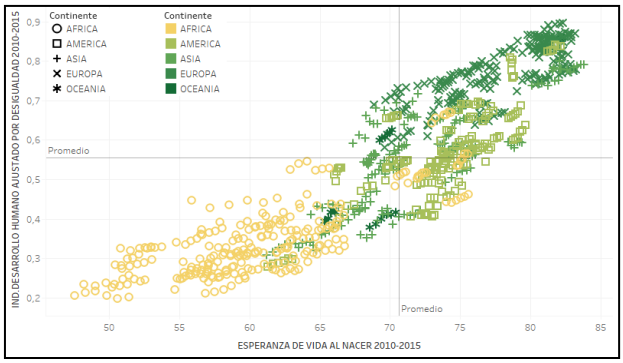


Figure 4: Relationship between IDHI and ED 2010-2015

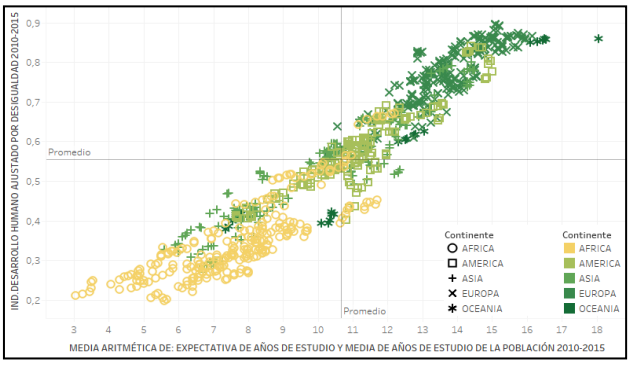


Figure 5: Relationship between IDHI and CI 2010-2015

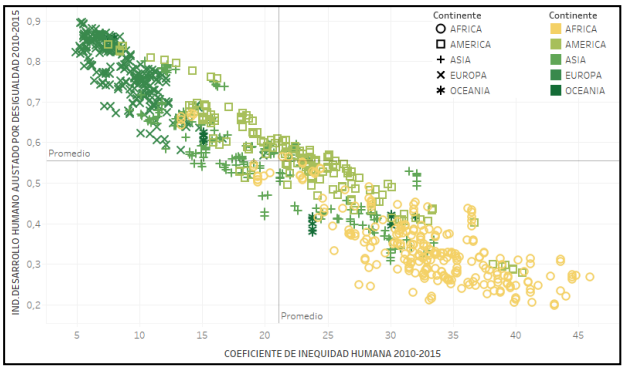
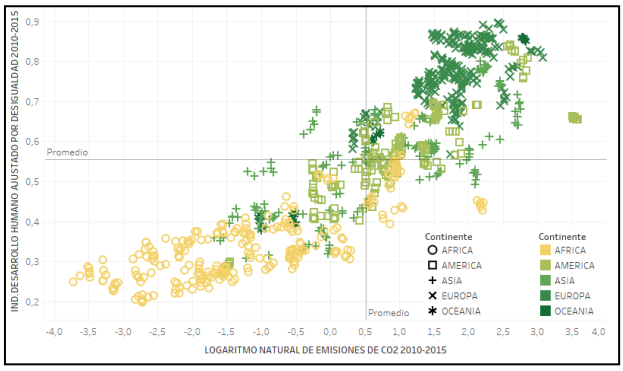


Figure 6: Relationship between IDHI and CO 2010-2015



Note: In Figures 1, 2, 3, 4, 5 and 6 the relationship between the dependent variable IDHI and all the independent variables for all the years of the study are presented graphically. It is observed that the IDHI has a negative relationship with RT and CI, while the relationship is positive for PIBper, ES, ED and CO, additionally, a logarithmic functional form for RT and PIBper is evidenced. It is worth mentioning that in order to graph per capita CO2 emissions, a logarithmic scale was used due to the significant data variation caused by the United States and China. Source: World Bank, United Nations Development Program, Carbon Dioxide Information Analysis Center (CDIAC). Elaboration authors.

When examining the relationship between the IDHI and GDP per capita PPP constant prices, (Figure 2), it is observed as a general rule, as higher levels of GDP per capita correspond to a higher rate of human development adjusted for inequality. This is due to the fact that people and the government having more income can allocate a higher proportion of them to health and education spending, which are dimensions of the HDI. In addition, it can be seen that African countries are below the average GDP per capita, as well as certain countries in Asia and America. While the countries of the center, such as Europe, have a higher GDP per capita. Additionally, it is observed that the dispersion of data at the country level can be treated through a logarithmic form.

The IDHI variable is directly related to the Life expectancy at birth, that is, the higher the IDHI, the higher the life expectancy at birth, as can be seen in Figure 3. Europe has more life expectancy at birth, where Czechoslovakia, Iceland, Norway and Germany have on average 83, 83, 82 and 81 years respectively. Followed by Asia where Japan, Israel and Korea stand out on average 84, 82 and 82 years respectively. It is observed that the dispersion between countries can be captured by means of a linear relationship between the variables.

Figure 4 shows that as the arithmetic mean increases in the expectation of years of study and average of years of study of the population, the IDHI value is higher. This series presents less dispersion in the data than the previous relationship and could be expressed in a linear relationship. Similar results are observed at the continent level, where the countries of Africa have a lower average in the education indicator and the European countries have higher levels. Additionally, Australia is against the trend of Oceania

presenting high levels of education. Collaterally, the countries of America and Asia are located in the middle of the relationship, except in special cases.

The coefficient of human inequality expresses the average of inequality in the three dimensions of the HDI. So, its relationship with the IDHI is inverse. That is, the greater the inequality, the IDHI presents lower values (see Figure 5). It can be seen that the data show a distribution consistent with the results presented in the previous subsections. That is, African countries have higher levels of human inequality while European countries have less inequality. At the same time, there are countries in America and Asia that are located by the average of the relationship.

Figure 6 shows the relationship between the averages of the IDHI and the annual emissions of C02 per capita. Due to the fact that there are countries with very high emissions such as the United States and countries with low emissions, the graph is presented in logarithmic scale of base 10. It is observed that as countries present higher C02 emissions in turn corresponds to higher levels developmental. African countries, due to their limited productive structure, with low industrialization, present lower levels of emissions. Followed by countries of America and Asia, where the United States is located as the largest emitter of C02. To some extent, this implies a critique of the prevailing development model worldwide, where despite trying to find a sustainable framework, the reality implies that pollution increases to improve people's well-being. At the same time, it demonstrates the limitations that the human development index has when it does not include an ecological dimension in its calculation.

4.3. Comparative analysis of the paradox of abundance in countries of extremes

To visualize the paradox of abundance in the country level, Table 5 is presented, which expresses a comparison of the following countries: Congo and Liberia, countries with the highest average total income of natural resources as a percentage of GDP of the entire sample; Norway, Switzerland and Denmark are considered because they have the highest IDHI average in the sample.

From Table 5 several conclusions are obtained. In the first instance it is evident how the countries with the highest average total income of natural resources belong to the African continent and at the same time have a lower level of development. In the same way, the percentage of exports of fuels and minerals with respect to the total exported is excessively high. C02 emissions per capita are lower compared to the rest of the selected countries.

Table 5: Comparative paradox of abundance in selected countries (2010-2015).

N°	Country	IDHI average	RT average	Average weight of X (minerals and fuels)	Average Emissions C02 per capita
1	Congo	0,410	45,74	72,4%*	0,50
2	Liberia	0,275	45,04	-	0,22
3	Noruega	0,889	8,49	71,1%	10,95
4	Suiza	0.867	0,01	5,8%	4,71
5	Dinamarca	0.862	1,24	9,2%	6,81

*Note: * Averages for the period 2010-2014. The countries with the highest average total income of natural resources as a percentage of GDP have a strong dependence on mineral and fuel exports, their levels of human development are below the world average and their CO2 emissions are reduced. Otherwise, it happens with the countries that present greater human development, with the exception of Norway. Source: World Bank, United Nations Development Program, CDIAC. Elaboration authors.*

The countries with the highest level of development are located in Europe, with Switzerland and Denmark presenting indicators according to the paradox of abundance, since their natural resource income does not exceed 2% of GDP and their fuel exports do not exceed 10%. % of the total, while its development is above the world average. Norway is a special case, a country that has managed to counteract the curse of abundance and present high levels of development despite having a representative average of income from natural resources and extractivist oil and mining exports. In turn, the countries of Europe have greater pollution expressed in higher levels of CO2 per capita, which implies that they present a higher degree of industrialization.

One of the limitations of the study lies in using all the dimensions of sustainable development for the analysis of the paradox of the abundance of natural resources. In the development of the previous chapter, an attempt was made to incorporate governance and ecological variables into the study, which were not significant for the IDHI but relevant if analyzed in comparison to the HDI. Under this antecedent, Table 6 presents indicators for the countries of the extremes that broaden the spectrum of study and are relevant for the analysis.

Table 6 incorporates into the analysis the ecological footprint and biocapacity measured in gha (biologically productive hectares) per person. Where it is observed that the average ecological footprint (biologically productive land required by the population to produce the resources required for consumption) is lower for less developed countries and increases the number of hectares required per person if a higher level of development is presented. In turn, the biocapacity (capacity of the biosphere to regenerate and provide natural resources for life) of the countries with lower IDHI is greater than developed countries, except in the case of Norway. If the ecological footprint is subtracted from biocapacity, it can be seen that African countries are surpluses while European countries are deficient, so they need their resources to satisfy their needs.

Table 6: Comparative ecological and governance variables in selected countries (2010-2015).

N°	Country	Average Ecological Footprint (gha) per cápita	Average Biocapacity (gha) per cápita	Average perception of corruption	Average perception of political stability
1	Congo	1,16	11,07	-1,17	-0,42
2	Liberia	1,21	2,59	-0,66	-0,55
3	Noruega	5,84	7,58	2,21	1,27
4	Suiza	5,19	1,10	2,11	1,35
5	Dinamarca	6,59	4,36	2,33	0,98

Note: Table 6 expands the spectrum of study to descriptive level including variables that contribute in this type of analysis but in the model were not significant. Regarding ecological sustainability, it is observed that the countries with the greatest extractivism require fewer hectares to produce their resources needed for consumption that is expressed in the ecological footprint, while their levels of governance have a negative perception. On the other hand, European countries have better levels of governance but require greater natural resources for their subsistence. Source: World Bank, Global Footprint Network. Elaboration authors.

Additionally, variables corresponding to the governance dimension were incorporated. The data was obtained from the World Bank, and corresponds to the perceptions of the population, a measure that can vary between -2.5 and 2.5 because it is normalized. It can be seen that, on average, the perception of corruption and political stability is lower in countries with greater rents of natural resources and consequent less development. While the perceptions are favorable for the cases, in which the development of the countries is higher.

4.4. Strategies to overcome the curse of abundance

The State has a fundamental role to overcome the "curse of resources", thus optimizing the creation of an inclusive and decentralized State. As Acosta and Schuldt put it, "It is not the State that defines the role of society and its organizations, but it is these that must define the role of the State" (2000, page 264). Therefore, it is necessary for it to rethink policies in society and in the market in order to achieve a sustained and equitable development.

In a timely manner in the case of abundance paradox, according to OXFAM (2009, pp. 4-5) states that to overcome the curse of natural resources countries that have abundant endowment must: a) establish legal and fiscal regulations for the sector extractivist in favor of the interests of the population; b) encourage mechanisms of participation of civil society in the decision-making of the extractive industry; c) transparently publish the resources obtained from the industry; present in detail the destination of the income received by the state for these activities; among others.

Following the case of Norway as one of the countries that has managed to reverse the curse of resources, Wirth and Ramírez (2017, page 240) indicate that the success of the country is due to four instruments applied: a) training of Norwegian human talent, b) privilege to the state oil extraction company c) preference to local suppliers for granting future licenses, and d) research and development agreements with academia and industry.

Collaterally, policies in favor of development in general must be applied. Acosta and Schuldt (2000, pp. 265-266) mention that it is necessary to carry out: i) an agrarian and urban reform to promote production, consider the environmental factor, and avoid the concentration of land; ii) an educational reform must be carried out to ensure and promote access to education; iii) tax reform, to improve fiscal autonomy with a progressive approach; iv) constant combat against corruption.

5. Conclusion

To contribute to the current debate on the relationship between human development and extractivism, it was proposed to broaden the vision of development overcoming the traditional analysis of per capita GDP growth. In this sense, the sustainable development approach is proposed, with the limitation of finding an indicator that encompasses all its dimensions. In spite of that, the selection of the Index of Human Development adjusted by inequality (IDHI) managed to collect effects of a social nature, having as restrictions its reduced time series and not considering ecological aspects.

To perform the econometric analysis on short panel data it was necessary to transform the variables into first differences. Following the accepted conventional methodology, it is observed that the model in first differences does not present an unobserved component invariant in time, so the OCO group estimate prevails before that of fixed or random effects. Additionally, we accept the hypothesis that the random effects prevail over the fixed ones, so that it is verified that the OLS estimators are adequate. In this sense, the econometric model applied to the 142 countries of the study indicates that extractivism has a negative and significant relationship with human development worldwide in the 2010-2015 period.

In the econometric model of panel data with the variables transformed into first differences, it was found that the most representative variable that explains the Human Development Index Adjusted by inequality is the coefficient of human inequality with a higher level of significance. The results are in tune with the economic literature of paradox of abundance.

Through the descriptive analysis it was shown that European countries have better results in the selected indicators, so that their high levels of development correspond to high levels of GDP per capita, life expectancy at birth, years of schooling and expectation of study, lower coefficient of human inequality, and consequent lower participation of total rents of natural resources. Otherwise, the countries of the African continent in all the analyzed variables presented worse indicators below the average in those that contribute to well-being and above the average in the share of incomes and inequity.

If the analysis is taken to the study of specific cases of countries, it can be observed how the curse of resources affects negatively at the individual level, where when incorporating ecological and governance variables, the results are consistent. Being the countries with more income of natural resources with respect to their GDP and less developed those that have greater perception of corruption and political vulnerability. In addition, it is observed that there may be exceptional cases that break the trend, leaving as a long-term challenge to counteract the curse of natural resources, through improving the institutions and mechanisms of collective participation in the countries.

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ANNEXES

Annex 1: Descriptive statistics of the selected countries.

Variable	Obs	Media	Desv. Est.	Min	Max
IDHI	852	0,555	0,192	0,198	0,897
RT	852	7,80	10,49	0,00	60,12
PIBper	852	15.278,24	15.546,59	593,06	94.088,59
ES	852	70,61	8,49	47,56	83,79
ED	852	10,66	2,97	3,05	18,05
CO	852	3,95	4,79	0,02	36,04
CI	852	21,10	10,58	4,90	45,90

Source: World Bank, United Nations Development Program, CDIAC. Elaboration: Authors.

Annex 2: List of countries selected for the study.

N°	Country	Code	N°	Country	Code
1	Afganistán	AFG	45	Estonia	EST
2	Albania	ALB	46	Ethiopia	ETH
3	Angola	AGO	47	Fiji	FJI
4	Argentina	ARG	48	Finland	FIN
5	Armenia	ARM	49	France	FRA
6	Australia	AUS	50	Gabon	GAB
7	Austria	AUT	51	Georgia	GEO
8	Azerbaijan	AZE	52	Germany	DEU
9	Bahamas	BHS	53	Ghana	GHA
10	Bangladesh	BGD	54	Greece	GRC
11	Belarus	BLR	55	Guatemala	GTM
12	Belgium	BEL	56	Guinea	GIN
13	Belize	BLZ	57	Guinea-Bissau	GNB
14	Benin	BEN	58	Guyana	GUY
15	Bhutan	BTN	59	Haiti	HTI

16	Bolivia (Plurinational State of)	BOL	60	Honduras	HND
17	Bosnia and Herzegovina	BIH	61	Hungary	HUN
18	Botswana	BWA	62	Iceland	ISL
19	Brazil	BRA	63	India	IND
20	Bulgaria	BGR	64	Indonesia	IDN
21	Burkina Faso	BFA	65	Iran (Islamic Republic of)	IRN
22	Burundi	BDI	66	Iraq	IRQ
23	Cabo Verde	CPV	67	Ireland	IRL
24	Cambodia	KHM	68	Israel	ISR
25	Cameroon	CMR	69	Italy	ITA
26	Canada	CAN	70	Jamaica	JAM
27	Central African Republic	CAF	71	Japan	JPN
28	Chad	TCD	72	Jordan	JOR
29	Chile	CHL	73	Kazakhstan	KAZ
30	China	CHN	74	Kenya	KEN
31	Colombia	COL	75	Kiribati	KIR
32	Comoros	COM	76	Korea (Republic of)	KOR
33	Congo	COG	77	Kyrgyzstan	KGZ
34	Congo (Democratic Republic)	COD	78	Lao People's Democratic Republic	LAO
35	Costa Rica	CRI	79	Latvia	LVA
36	Croatia	HRV	80	Lebanon	LBN
37	Cyprus	CYP	81	Lesotho	LSO
38	Czechia	CZE	82	Liberia	LBR
39	Côte d'Ivoire	CIV	83	Lithuania	LTU
40	Denmark	DNK	84	Luxembourg	LUX
41	Dominican Republic	DOM	85	Madagascar	MDG

42	Ecuador	ECU	86	Malawi	MWI
43	Egypt	EGY	87	Mali	MLI
44	El Salvador	SLV	88	Mauritania	MRT
89	Mauritius	MUS	116	Slovakia	SVK
90	Mexico	MEX	117	Slovenia	SVN
91	Moldova (Republic of)	MDA	118	Solomon Islands	SLB
92	Mongolia	MNG	119	South Africa	ZAF
93	Montenegro	MNE	120	Spain	ESP
94	Morocco	MAR	121	Sri Lanka	LKA
95	Mozambique	MOZ	122	Suriname	SUR
96	Nepal	NPL	123	Sweden	SWE
97	Netherlands	NLD	124	Switzerland	CHE
98	Nicaragua	NIC	125	Tajikistan	TJK
99	Niger	NER	126	Tanzania (United Republic of)	TZA
100	Nigeria	NGA	127	Thailand	THA
101	Norway	NOR	128	Togo	TGO
102	Pakistan	PAK	129	Trinidad and Tobago	TTO
103	Panama	PAN	130	Tunisia	TUN
104	Paraguay	PRY	131	Turkey	TUR
105	Peru	PER	132	Uganda	UGA
106	Philippines	PHL	133	Ukraine	UKR
107	Poland	POL	134	United Kingdom	GBR
108	Portugal	PRT	135	United States	USA

109	Romania	ROU	136	Uruguay	URY
110	Russian Federation	RUS	137	Uzbekistan	UZB
111	Rwanda	RWA	138	Venezuela (Bolivarian Republic of)	VEN
112	Sao Tome and Principe	STP	139	Viet Nam	VNM
113	Senegal	SEN	140	Yemen	YEM
114	Serbia	SRB	141	Zambia	ZMB
115	Sierra Leone	SLE	142	Zimbabwe	ZWE

Source: World Bank. Elaboration: Authors.