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# TRADE POLICY AND DEMOCRACY FOR DEVELOPMENT IN CENTRAL AFRICAN COUNTRIES

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## *ABSTRACT*

This article shows that trade policy and democracy positively affect economic development. A panel of 11 Central Africa economies with 176 observations from 1995 to 2010 is used to econometrically test this hypothesis. The use of Generalised Least Squares (GLS) shows that there is a link between economic development, captured using Human Development Indicators (HDI), democracy, imports, exports, inflation and regional integration. Inflation and exports negatively affect the well-being of the population. An increase in the inflation rate causes a reduction in purchasing power. An increase in the exports of commodities tends to decrease the quantity of goods available for the country of origin. Imports have a positive effect on HDI probably because this variable tends to increase the quantity of goods available. Imports and democracy have a positive effect on the level of development in Central African countries. The findings are important to policy makers Central Africa who seek to increase trade within, between and with other democratic countries.

**Contribution/Originality:** This study documents that trade policy and democracy contribute positively to economic development.

## 1. INTRODUCTION

For a long time, the contribution of trade policy to the improvement of different varieties of capitalism has largely been neglected. In developed countries, Hall and Soskice (2001) identify and use a certain number of institutional criteria. They have present two forms of capitalism: the liberal economies (United States and United Kingdom) and the coordinated economies (France, Germany and Japan), which differ not only in their institutional features but also in certain macroeconomic characteristics, notably comparative advantage and industrial specialization (Amable and Azizi, 2011).

African economies faced many tribulations such as variety of democracy, lack of trade policy, weak integration, diversity of development approaches and heterogeneous culture.

Democratization is more of an abstract venture. It is based on values like multi-party systems, individual and press freedom and national elections at regular intervals. Democratic processes have gradually settled in Central Africa during the last 20 years. At the same time, these countries have opened up to international free trade. They use foreign direct investment to capture resources for their economic development. For many African countries, democratization is the process of adapting to a more democratic political administration. It may be the transition from a dictatorial regime to a full democracy, a semi-democracy or a democratic political system. Democratization in Africa is influenced by many factors. These include variables such as raw materials, geographical position, history, existence of civil society, culture, social inequality, and the existence of middle class.

Trade leads to a greater interdependence among developed and developing economies, as well as democratic and non-democratic countries which are concerned by globalization. From Smith (1776) trade policy refers to the process whereby a country opens up its markets to international trade. It leads to increased rights for investors and pressures to privatize the economy. Trade policy can be a good thing in the right circumstances, if it intervenes at the right time in a developing economy. However, European Union countries have used institutions like the World Bank and International Monetary Fund conditions to promote trade deals like those negotiated at the World Trade Organization to force poor developing countries to liberalize their economies. Economic Partnership Agreements are part of this trend.

There is now sufficient evidence which shows that this liberalization agenda actually contributes to increase social inequalities and poverty, particularly when these measures are forced from outside and not driven by the objectives of developing economies and their agenda. These measures of trade cannot be easily implemented given the level of the democratization process in Africa. On the other hand, trade policy agreements in postcolonial states often lead to anti-democratic patterns. A gradual increase in access to information (free media and the electronic information boom) is in fact of large importance.

Democracy and the market economy are fundamentally linked (Mousseau, 2000). This link is generally based on the idea that democracy and market economy are simply two singular aspects of freedom. An extensive market economy culture may encourage norms such as individualism, consultation, concession, respect for the law, and equal opportunity. These are seen as helpful for democratization.

Using varieties of democracy, Coppedge and Wolfgang (1990) identify four innovations. First, rather than attempting to produce a single simple measure of "democracy", they capture six different conceptions of democracy: the pared-down, "minimalist" concept of *electoral democracy*, which is the foundation on which most of the other conceptions build; *liberal democracy*, which adds guarantees of basic civil and political rights and institutes checks and balances to guard against the tyranny of the majority; *majoritarian democracy*-partially at odds with liberal democracy which concentrates power in the hands of the majority; *participatory democracy*, which encourages the involvement of citizens in many stages of the political process; *deliberative democracy*, which requires governments to give reasoned and respectful justifications for their decisions; *egalitarian democracy*, which is inspired by the belief that political equality is unachievable without some degree of economic and social equality. Secondly, varieties of democracy completely disaggregate all these concepts.

Each conception is broken down into several "components"-more than thirty in all, including components like regular elections, competitiveness, legislative power, sub national autonomy, gender equality, and free media. These components are in turn broken down into 316 specific indicators, each of which is calculated separately. One of the key benefits of this degree of specificity is improved measurement reliability: one can judge more confidently whether any journalists were killed in a given year than what "level of media freedom" prevails. One can more reliably judge whether the legislative can ignore an executive veto than how tight "executive constraints" are. Thirdly, varieties of democracy are designed to have very large historical and geographic coverage.

As much as possible, it seeks to rate all former democracies and new democracies, such as colonies, from 1900 to the present. This long historical coverage is especially useful to scholars studying causal interactions because many of these relationships seem to unfold over decades rather than year to year or month to month. If scholars can develop a better understanding of the forces that create and sustain democracy, they will be better proficient to advice practitioners who seek to encourage it. Finally, this project is designed to give systematic estimates of the precision and reliability of its ratings. Other projects simply provide a score, such as "3,"with no indication of how accurate it is. Varieties of democracy would say that there is an 85 percent probability that such a score is a

3, for example, or that it is "3 ± 0.2". This does not mean that the existing indicators are more sure or exact. On the contrary, it means that we have no idea of how precise they really are. No other major democracy index provides such estimates of precision and dependability. Calculating this information and making it public is crucial for the responsible use of such data.

Development is defined as an upward movement of the whole social system (Myrdal, 1971). It involves increasing the standard of living of the population and providing them with employment. Development is considered here as well-being (material, social and security) enhancing and synonymous to a good quality of life. Some variables of well-being are: rate of poverty, peace, freedom, life expectancy at birth, adult illiteracy, access to health care services, access to safe water, access to sanitation, infant mortality rate, maternal mortality rate, prevalence of malnutrition, population estimates and Gross Domestic Product per capita (World Bank, 2008).

If there are systematic differences in trade integration between political regime types, this article contributes to the broader debate about linking trade policy, democracy and economic development. This study is based on theoretical and empirical findings. We particularly use the famous classical theory of international trade (Smith, 1776), we customs duties theories (Viner, 1950; Meade, 1956; Lipsey, 1957), new theory of international trade (Krugman, 1991;1996; Krugman and Obstfeld, 2006) the theory of regional integration (Hugon, 1993; Hettne, 2000), development theories (Perroux, 1961;1972; Stiglitz, 1998; Sen, 1999;2000) and theories that link democracy and development (Acemoglu and Robinson, 2006; Acemoglu *et al.*, 2008).

This study attempts to address the research question: Can trade policy and democracy help to promote development in the Central African region? The objective of the paper is to show how trade policy and democracy are working for economic development in Central African countries. We use a much larger data set and an updated empirical design to show that political regime differences in trade policy, while playing a role, cannot fully account for the observed differences in trade flows. The paper is organized as follows. We present literature review (section 2), followed by a specification of the methodology and data (section 3). We then analyze the empirical results (section 4) and conclude (section 5).

## 2. LITERATURE REVIEW

Throughout the 1960s and 1970s, most African countries built up, more often in a rather disorganized manner, highly interventionist and protectionist trade policies or regimes. The negative consequences of such trade regimes for both trade expansion and general economic growth eventually became quite clear. Hence, beginning from the early 1980s, many African countries started the painful process of rationalizing and liberalizing their trade regimes. Although progress across the countries involved has not been even, there is clear evidence that, by the early 1990s, protection of import substitutes by tariffs and non-tariff barriers in Africa as a whole had declined.

It is estimated that the level of protection fell by between 30% and 50% over the period from the mid-1980s to the early 1990s. In addition, most African countries have substantially reduced the number of imports subject to quantitative barriers while also moving from tightly controlled to more open importing systems. According to the World Bank (1995) the greatest progress has been achieved in replacing quantitative restrictions with lower and less dispersed tariff levels; more than half the countries now have average tariff rates of 15 – 20% with the highest rates set at 35-40% and the number of price list categories reduced to 4-5 (Oyejide, 1999).

Why should a country in an early stage of development (Rostow, 1960) accept democracy instead of authoritarianism? Different samples and periods have a tendency to support the Washington Consensus (Williamson, 1990). Is democracy economically advantageous for developing economies? Is this in addition to its intrinsic qualities? If we turn to Central Africa, is there little empirical evidence to prove that recently open policies have helped to improve economic conditions (Feng, 1996; Serieux, 1999; Van De Walle, 1999).

From 1981 to 1996, Central African countries experienced significant episodes of ferocious conflict between government and opposition parties. By 1998, some people lost their lives as a direct result of this democratic political confrontation, others became refugees. In illegitimate or quasi legitimate states, the state's own security forces often contest the internationally recognized leadership. During the 1980s, many successful or unsuccessful military takeovers were recorded, affecting Central African countries and Central Africa economic integration.

However, it is important to note that the region is not monolithic. Significant differences exist in democratic political institutions and practice. Moreover, none of the data shows that the fledgling democracies do worse in the economic arena compared to rival systems. Given democracy's inherent value, that itself is a strong argument for abiding to favor political liberalization in Africa. In the new development strategy, trade plays an important mission, although not through the mechanisms that economists have traditionally used (Stiglitz, 1998). The magic of relative advantage is that a poor country benefits from trade. Even if, in absolute terms, its productivity is lower than its trade partners' across the complete range of goods.

However, some authors have pointed to the gaps between the standard Hecksher-Ohlin trade model and what is observed in practice (Romer, 1994; Sachs and Warner, 1995). Evidently, something is missing from the standard story. The most important gains from trade policy may come from the increased variety of goods to which an open trading system offers access (Rodriguez-Clare, 1996; Stiglitz, 1997).

That is, rather than just reducing the price of goods that are already accessible internally, trade also offers access to many goods that simply were not available at any price under autarky. The new inputs bring down costs and stimulate innovation in the importing economy.

The issue of development and better distribution of world resources have long been components of the world trading system. It is broadly documented that there is a strong nexus between trade and development (Kwa, 2007; Wade, 2008). Meanwhile, it is hard to disprove the fact that trade policy can be a powerful engine for a country's economic development. The exact nature of the link between trade and development is continuously a subject of controversy within the ranks of academics and policy makers (Arnfred and Utas, 2007).

Over time, the trade policy and development paradigm have shifted and this is reflected in the changes in the debate in the General Agreement on Tariffs and Trade and subsequently the World Trade Organization (WTO). Regarding the relationship between democracy and economic growth, Brunetti and Weder (1995) review twenty earlier empirical studies. Three studies find a positive relationship and five others a conditional relationship between democracy and growth. Ten cross-national studies fail to find any significant relationship. Only two of the studies conclude that democracy affects economic growth negatively.

Goldsmith (2001) looks at twelve supplementary studies on the same topic using more advanced methods, they are even more favorable for representative government. Only one of these studies finds a negative link between democracy and growth or development (Gasiorowski, 2000). The other eleven find a positive or uncertain link (Przeworski and Limongi, 1997; Fedderke and Klitgaard, 1998; Nelson and Singh, 1998).

None were l by Burkhart and Lewis-Beck (1994). Inconclusive or mixed outcomes were found by Helliwell (1994); Mbaku (1994); and Durham (1999).

Analyzing the following questions: Is there a relationship between economic and political liberalization? Does a country's political regime methodically influence its contribution to policy trade? According to Aidt and Gassebner (2010) the first question has recently received much attention. Related studies are on the determinants of democracy (Barro, 1999; Acemoglu *et al.*, 2008) on economic freedom (Boockmann and Dreher, 2003; Dreher and Rupprecht, 2007) and on the relationship between democracy and economic freedom (Sturm and Haan, 2003; Giavazzi and Tabellini, 2005).

Regarding the second question, research is insufficient (Morrow *et al.*, 1998; Mansfield *et al.*, 2000). In this regard, Daumal (2008) finds that federalist systems boost trade policy. Milner and Kubota (2005) studying the relationship between political regime type and trade policy in a sample of developing countries. They show that democratic political institutions are linked with liberal trade policy. Other researchers have argued that trade policy encourages democratization (Li and Reuveny, 2003; Rigobon and Rodrik, 2005; López-Córdova and Meissner, 2008).

New studies indicate that political regimes can influence the involvement in trade policy. In fact, Aidt and Gassebner (2010) find that autocracies trade less than democracies. The theoretical and empirical debates into areas of trade and peace are still unproductive (Polachek, 1980;2007; Barbieri, 1996;2003; Oneal and Russett, 1999;2003; Long, 2008; Martin *et al.*, 2008).

According to Draper (2010) and Tchouassi (2011;2013) it is important to contextualize the debate on the role of African states in the development of their economies and the "good governance" agenda. Ohno (2009) define democratic developmentalism as "a political regime in which a developmental party remains in power for a long time by consecutively winning free elections which permit multi partism, and in which policies that punish rent-seeking and encourage productive investment are implemented with a strong state guidance".

Arnfred and Utas (2007) shows that the difficulties of regional integration have long been accepted in Africa's political circles. Many decades ago, Nkrumah forcefully stated the case for regionalism in Africa. While different integration mechanisms have been successfully launched by other regions to increase their economic welfare, Africa lags behind with regards to economic growth and general living standards.

Among the features of the discourse on regional integration (Dzaka-Kikouta and Tchouassi, 2012) in Africa there is the absence of political constituencies in the trade and labor movements that move regional integration forward. However, it is very clear that what African leaders have not achieved internally through sound economic development policies would be difficult to achieve regionally. This is why new methodology and data are used to analyze how trade policy and democracy impact development in Central Africa.

## 3. METHODOLOGY AND DATA

Firstly, we specify the empirical model to be used followed by the data sources. The specification of the empirical model is based on the gravity equation (1). The gravity equation is based on a related concept from physics. The idea is that two objects draw each other because of their size and their distance (Isard, 1954; Tinbergen, 1962). The gravity equation has the basic form:

$$Tie = \beta 0 Yi \beta 1 Ye \beta 2 Die \beta 3 \qquad (1)$$

where $Yi$ and $Ye$ are the masses of objects $i$ and $e$ or Gross domestic product (GDP) of two countries and D$ie$ the actual distance between two objects or two countries. The gravity model assumes that there is attraction between the GDP of two countries $i$ and $j$, the same for attributes $i$ and $e$. Attraction can be interpreted as dependence between two variables.

The practical implication is that there is no need to construct summary variables containing the information for country $i$ and $e$. From Aidt and Gassebner (2010) we approximate the relationship between a country's political regime and its involvement in international trade by testing (i) the effective trade distortion is higher in autocracies than in democracies and, as a consequence, autocracies trade less with the rest of the world than do democracies and; (ii) for given official trade policy, autocracies trade less with the rest of the world than do democracies because of differences in red tape and other unofficial trade distortions. In this model the dependent variable is imports of country $i$ from country $e$ in year $t$ rather than total trade flows between pairs of countries.

This choice avoids what Baldwin (2006) calls the "silver-medal of gravity mistakes"-that is, the sizable upward bias that regressions with average bilateral trade flows as the dependent variable are subject to when trade is unbalanced. This follows from the fact that the log of the average is not equal to the average of the logs if the import and export flows are not identical in importance. For a formal evidence, refer to Baldwin (2006). More specifically, the baseline specification is the following dynamic panel model adapted from Aidt and Gassebner (2010):

$\ln(\text{import}_{iet}) = \beta_1 \text{regime}_{it-1} + \beta_2 \text{regime}_{et-1} + \beta_3 \ln(\text{GDP}_{it}) + \beta_4 \ln(\text{GDP}_{et}) + \beta_5 \ln(\text{GDPp.c.}_{it}) + \beta_6 \ln(\text{GDPp.c.}_{et}) + \beta_7 \ln(\text{WTO}_{it}) + \beta_8 \ln(\text{WTO}_{et}) + \beta_5 \ln(\text{regional}_{iet}) + \gamma_{ie} + \delta_t + \varepsilon_{iet}$
(2)

where import$_{iet}$ is imports of country $i$ from country $e$ in year $t$; regime$_{it-1}$ and regime$_{et-1}$ are lagged values of measures of regime type (democracy or autocracy) of the importing and exporting country (to be discussed below); GDP$_{it}$ and GDP$_{et}$ are real GDP of the importing and exporting country; GDP p.c.$_{it}$ and GDP p.c.$_{et}$ are GDP per capita of the importing and exporting country; WTO$_{it}$ and WTO$_{et}$ are dummy variables indicating whether the importer or exporter country is a member of the General Agreement on Tariffs and Trade/World Trade Organization (WTO); and regional $_{iet}$ is a dummy variable taking the value of 1 if both the importer and the exporter are members of the same regional trade agreement. All regressions include fixed effects for the trading pair, $\gamma_{ie}$, as well as year fixed effects, $\delta_t$. $\varepsilon_{iet}$ represent the error term. The Human Development Index (HDI) is a composite statistic of life expectancy, education, and income indices used to rank countries into four tiers of human development (UNDP, 2012). We use Human Development Indicators to capture development defined here as well-being. So the dependent variable here HDI can be written as follow:

$\text{HDI}_{it} = \beta_1 \text{Regime}_{it} + \beta_2 \text{Import}_{it} + \beta_3 \text{Export}_{it} + \beta_4 \text{Pop}_{it} + \beta_5 \text{Inflat}_{it} + \beta_6 WTO_{it} + \beta_7 \text{Regional}_{it} + \delta_t + \varepsilon_{ijt}$
(3)

where HDI$_{it}$ is real HDI of the country $i$ at the time $t$; Pop$_{it}$ is population of the country $i$ at the time $t$; Inflat$_{it}$ is the inflation rate of country $i$ at the time $t$. Democracy is represented here by Regime $_{it}$ which is a dummy variable taking 1 if the political regime in the country $i$ is free and 0 if not at the time $t$. Import$_{it}$ and Export$_{it}$ are respectively imports and exports of the country $i$ at the time $t$. Regional$_{it}$ is a dummy variable that takes 1 for CAMC and 0 for ECGL. $\delta_t$ and $\varepsilon_{ijt}$ are respectively the specific time effect and the error term. And $t = 1, 2, \ldots, 16$ years is time from 1995 to 2010, $i = 1, 2, \ldots, 11$ countries. The different monetary values here are in current US Dollar. In the current application, estimations using regression analysis with fixed effect and random effect models are done to evaluate the impact of democracy (political regime), importation, exportation, population, inflation, WTO and regional integration on Human development indicator.

The panel measured in this study is balanced and made up of 11 Central African countries with 176 observations. Since independence, eleven developing countries in Central African region (Angola, Burundi, Cameroon, Central African Republic, Chad, Congo Republic, Democratic Republic of Congo, Equatorial Guinea, Gabon, Rwanda, Sao Tomé and Principe) experienced regionalism (the Central African Economic Community-CAEC, Central African Monetary Community-CAMC, and the Economic Community of the Great Lakes-ECGL).

Significant episodes of democratic political parties and multi-party systems with violent conflict between government and resistance groups were observed. Data used for this study is obtained from UNDP (2010); IMF (2012) and Freedom House (2010). Collier (2007) formulates four development traps observed in the Central African region: the conflict trap (Angola, Central African Republic, Chad, Congo Republic, Democratic Republic of Congo), the natural resources trap (Angola, Cameroon, Central African Republic, Chad, Congo Republic, Democratic Republic of Congo, Equatorial Guinea), the trap of being landlocked (Burundi, Central African Republic, Chad, Rwanda) with bad neighbors, and the bad governance trap (the eleven Central African countries).

## 4. EMPIRICAL RESULTS

The model (3) is estimated using fixed effects and random effects models. Results obtained from the estimations of the above models (fixed effects and random effects) are summarized in the Tables 1 and 2 as follow: Table 1 presents the results of the regression analysis using fixed effects. Using fixed effects model, ordinary least square (OLS) estimators will be efficient. Because of co-linearity (the property of lying on a single line, aligned), the variables Regime, Regional and WTO are dropped. The R-square within is 0.2492 and the overall R-square is 0.2073 showing that there is a relationship between HDI, inflation, importations and exports.

Applying random effects model, ordinary least square (OLS) estimators will not be efficient and the suitable method of estimation will be the generalized least squares (GLS). GLS are techniques employed for estimating the unknown parameters in a linear regression model. In this case ordinary least squares are statistically inefficient. The GLS is used here because the variances of the observations are unequal, and there is a certain degree of correlation between the observations.

Table 2 presents the results of the regression analysis using random effects. Because of co-linearity, the variable WTO is dropped. The overall R-square is 0.0325 showing that there is a relationship between HDI, democracy, regional, importations, exportations and inflation.

The random effects is efficient and should be used (over fixed effects) if the assumptions underlying it are believed to be satisfied. This can be tested by running random effects, then fixed effects, and doing a Hausman specification test. Using Hausman test (Table 3 appendix), the random effects is inconsistent under alternative hypothesis (Ha) and efficient under null hypothesis (Ho). The fixed effect is consistent under null hypothesis and alternative hypothesis.

Inflation and exports negatively affect the well-being of the population. An increase in inflation rate causes a reduction in purchasing power. An increased in exports commodities tends to decrease the quantity of goods available for the country of origin. Imports have a positive effect on the Human Development Indicators (HDI) probably because this variable tends to amplify the quantity of goods available. So importation is one of the mechanisms of trade liberalization driving well-being of populations and economic development in Central Africa. The variable democracy (capture here by regime) has a positive effect on the Human development indicators. This implies that democratic political system positively affects the level of development. Political regime is one of the main channels driving development in the Central Africa Region.

Aidt and Gassebner (2010) find that autocracies trade less than democracies. Their analysis shows that autocracies import less and export less. This effect is driven not only by differences in trade policy but also by systematic differences in political accountability and good governance program.

A democratic country trades more with the rest of the world because democratically elected politicians are less tempted to use trade taxes to extract rents. Other explanations are also consistent with the results. For example, rulers must cater to powerful domestic elites who have a special interest in trade protection in many autocracies, as they often have a substantial stake in import competing sectors. However, lobbying by special interests groups for trade defense is also ordinary in democracies.

It is, therefore, unclear if this line of reasoning leads to systematic regime differences in trade flows. Instead of the existence of varieties of democracy and varieties of development the notion of democratic countries is inextricably linked to the concept of freedom. However, the constant term is positive. This means that in countries with other types of political system the Human development indicators are still positive. This result can be explained by the existence of varieties of democracy in the Central African region and by the fact that a democratic political system is not a necessary and sufficient condition for economic development.

## 5. CONCLUSION

Previous studies established that there is a relationship between political regime, trade policy and economic growth. This article contributes to the existing literature by empirically answering the research question: can trade liberalization and democracy help to enhance development in the Central African region. The study examines the effects of trade liberalization and democracy on economic development during the period 1995 – 2010. A Random effects model is used to analyze the relationships. Results obtained from the empirical model show that variables import and democracy have a positive effect on the Human development indicators. Policy suggestion corroborates arguments that autocratic countries are less integrated in world trade than democratic countries.

Our findings are similar to Aidt and Gassebner (2010). Trade policy and democracy are seen as drivers of economic development. Lessons learn from this are that trade policy, democracy and regional economic integration must be viewed as important for driving Central Africa's human development. This is possible by instituting credible interdependent free trade policies among the countries.

The formation of democratic developmentalism region results in economic growth, through attracting human and capital resources, and democratic technology innovation to transform economies, increase trade creation (opposite to trade diversion), expand economies of scale, reduce the cost of doing business, and promote regional peace and security. In the Central Africa region, many countries inadequately develop a framework that links policy trade and democracy to build human well-being because of the lack of accountability and good governance.

This is why the capacity building on "good governance agenda" fostered by many international institutions is a very important program used to counterbalance the negative impact that the variety of democracy regimes have on the regional economic integration in Central Africa and on economic growth. This articles' findings are important to Central Africa policy makers towards creation and increasing trade within, between and with other democratic countries. Using other methodologies, cross-sectional approach for example, can help to capture more specific effect of political regime and trade liberalization on economic development to extend this study.

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## APPENDIX

**Table-1.** Results from fixed effects model

| | |
|---|---|
| **Fixed-effets (within) regression** | **number of obs = 176** |
| Group variable: State | number of group = 11 |
| R-Square: Within = 0.2492 | obs per group min = 16 |
| between = 0 .2455 | avg = 16.0 |
| overall = 0.2073 | max = 16 |
| Corr(u_i, Xb) = - 0.7908 | F(4, 161) = 13.36 |
| | Prob > F = 0.0000 |

| **hdi** | **coef.** | **Std. Err** | **t** | **P>\|t\|** | **[95%** | **Conf. Interval]** |
|---|---|---|---|---|---|---|
| wto | (dropped) | | | | | |
| regional | (dropped) | | | | | |
| regime | (dropped) | | | | | |
| inflation | -.0000114 | 5.55e-06 | -2.05 | 0.042 | -.0000223 | - 4.13e-07 |
| population | .0049607 | .0008462 | 5.86 | 0.000 | .0032897 | .0066317 |
| export | -.0000575 | .000039 | -1.47 | 0.142 | -.0001345 | .0000195 |
| import | .0000778 | .0000785 | 0.99 | 0.323 | -.0000772 | .0002329 |
| _cons | .3516499 | .0096732 | 36.35 | 0.000 | .3325471 | .3707527 |
| sigma_u | .17544559 | | | | | |
| sigma_e | .02455805 | | | | | |
| rho | .98078342 | (fraction of variance due to u_i) | | | | |

F test that all u_i=0: F(10, 161) = 259.75 Prob > F = 0.0000

**Table-2.** Results from random effects model

| | |
|---|---|
| Random-effects GLS regression | Number of obs = 176 |
| Group variable: state | Number of groups = 11 |
| R-sq: within = 0. 2486 | Obs per group: min = 16 |
| between = 0. 0288 | avg = 16. 0 |
| overall = 0. 0325 | max = 16 |
| Random effects u_i ~ Gaussi an | Wald chi2(6) = 50. 67 |
| corr(u_i, X) = 0 (assumed) | Prob > chi2 = 0. 0000 |

| hdi | Coef. | Std. Err. | z | P>\|z\| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| regional | . 1279116 | . 0898253 | 1. 42 | 0. 154 | -. 0481427 | . 303966 |
| regime | . 135838 | . 1003511 | 1. 35 | 0. 176 | -. 0608466 | . 3325225 |
| inflation | -. 0000122 | 5. 56e-06 | -2. 19 | 0. 028 | -. 0000231 | -1. 30e-06 |
| population | . 0044924 | . 000821 | 5. 47 | 0. 000 | . 0028832 | . 0061015 |
| export | -. 0000568 | . 0000391 | -1. 45 0 | . 146 | -. 0001335 | . 0000199 |
| import | . 0000856 | . 0000787 | 1. 09 | 0. 277 | -. 0000686 | . 0002399 |
| -const | . 2500575 | . 0702459 | 3. 56 | 0. 000 | . 1123781 | . 3877369 |
| Sigma_u | .14528969 | | | | | |
| Sigma_e | .02455805 | | | | | |
| rho | .97222308 | (fraction of variance due to u_i) | | | | |

**Table-3.** Results from the test of difference in coefficients

| ---- Coefficients ---- | | | |
|---|---|---|---|
| (b) (B) | (b-B) | sqrt (diag(V_b-V_B)) | |
| eq1. | Difference | S.E. | |
| inflation | -.0000114 -.0000122 | 8.12e-07 | . |
| population | .0049607 -.0044924 | .0004684 | .0002047 |
| export | -.0000575 -.0000568 | -6.38e-07 | . |
| import | .0000778 -.0000856 | -7.80e-06 | . |
| b = consistent under Ho and Ha; obtained from xtreg | | | |
| B = inconsistent under Ha, efficient under Ho; obtained from xtreg | | | |
| Test: Ho: difference in coefficients not systematic | | | |
| chi2(4) = (b-B)'[(V_bV_B)^(-1)](b-B) = 5.21 | | | |
| Prob>chi2 = 0.2661 | | | |
| (V_b-V_B is not positive definite) | | | |

**Source:** Author's calculation