

Trade Openness and Economic Growth: A Cross-Country Analysis

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BACKGROUND AND RESEARCH PROBLEM

The question of as to whether openness to international trade boosts long run economic growth is highly debated, and an enduring question in economies. Nowadays it can be seen that the objective of trade policies in most countries is to promote international trade. Countries continuously engage in trade negotiations with the aims of promoting international trade. The existing theories provide complicated answers to the question of whether international trade boosts economic growth or not. The traditional Ricardian model and Heckscher-Ohlin trade theories say that trade openness brings only a one time increase in the per capita output and does not contribute to any long run economic growth¹. But in the neoclassical growth model it says that the long run growth rate of per capita output is determined by the exogenous technology. Openness to international trade facilitates the transmission of technology by providing communication with other countries, effective usage of domestic resources and increases market size. Only the endogenous growth theories pay attention to implications of trade openness on long run economic growth. However these models do not correctly predict that

¹The Ricardian model uses the concept of opportunity cost and comparative advantage and Heckscher-Ohlin model says that factor skill differences are the reasons why countries engage in international trade because of the gains from specialization and income distribution effects.

trade openness leads to economic growth in all circumstances and for all countries. Whether trade openness causes long run growth depends on country specific conditions.

Therefore studying the relationship between trade openness and economic growth is an interesting empirical pursuit which has been investigated by cross country work dating back to the 1970s. At the beginning of the 1970s much attention was paid to the benefits of trade openness. During that period a number of empirical studies had been carried out to test the hypothesis of whether export oriented policies were necessary for economic growth. In the 1970s and 1980s the neoclassical production function has been used to investigate the effect of production function towards the economic growth. Until the late 1980s the Solow model represented that growth by exogenous factors². In other words, it attributed long term growth to technological progress.

From 1990s till recently, economists sought to make a precise model by including endogenous factors into growth models. These new endogenous growth theories pay attention to the implications of trade openness on long run economic growth. Trade openness led to accessing new technology in advanced economies, effective usage of domestic resources, and increase market size. Barro (2003) says in his study of determinant of economic growth in a panel of countries, that growth increases with favourable movements in terms of trade. He concluded in the same study that there is not enough evidence to conclude that international openness in trade stimulates economic growth.

With regards to the theoretical relationship between openness and economic growth most of the studies shows that trade openness affects economic growth positively. Economists Grossman and

²The Solow Growth Model is a model of capital accumulation in a pure production economy: that is, there are no prices because it is strictly interested in output = real income. Everyone works all the time, so there is no labor/leisure choice

Helpman (1991) and Barro and Sala-i-Martin (1995) have shown through their studies that countries which are more open have a greater ability to keep up with new technologies and innovations from leading economies. In addition several other researchers (Abdullahi et al., 2013; Harrison, 1996; Madsen, 2008; Nannicini and Billmeier, 2011) have shown through their studies that there exists a positive relationship between trade openness and economic growth. Though most of the existing literature shows a positive relationship between trade openness and economic growth there are some studies which show contradictory results on the hypothesis. Ulasan (2012) has concluded in his study that “trade openness does not matter for economic growth. However, it may be more reasonable to conclude that without building better institutions, maintaining conflict management along ethnolinguistic dimension, and following sound and stable fiscal policies, openness to international trade will not guarantee economic growth” (Ulasan, 2012, p.47). Shamsadini et al. (2010) have said in their study that only the rich and open countries experience real higher growth which is itself associated with a higher trade share. Therefore in order to answer this question, it is important carry out more empirical studies in this research area. However, in a nut shell it can be said that cross country analyses suffer from a lack of robust and convincing evidence on the trade openness and economic growth relationship, rendering research into the question at hand most interesting.

Objectives of the Study

The main objective of this study is finding empirical evidence to support the hypothesis that higher openness to international trade stimulates per capita GDP growth in an economy.

The other objectives are to find out the statistical significance of cross country growth determinants such as initial per capita GDP, secondary education enrolment ratio, life expectancy, population growth, government consumption, domestic and foreign investment ratios, inflation rate and government democracy.

Outline of the Study

In this research we revisit empirical evidence as to whether increase in trade openness stimulate long-run economic growth by selecting the sample period 1980-2012. The data was selected from over 103 countries from which data was available, having dropped some outliers because outlier countries may (arguably) determine the regression results. We carry out our empirical investigation by employing various measures: not only the trade openness measures but also other cross country growth determinants. The explanatory variables are initial per capita GDP, gross domestic investment ratio, secondary education enrolment ratio, population growth, life expectancy, government consumption ratio, inflation rate, rule of law index, foreign direct investment (FDI), total trade to GDP ratio, exports to GDP ratio and imports to GDP ratio whereas explained variable is per capita GDP growth. These measures are collected from three sources which are World Development Indicators, Penn World Tables version 8.0 and the World Governance Indicators.

The major advantage of carrying out cross section study is that it can overcome the lack of observations per country by increasing the number of country and also we can use even a single observation of a country. In the estimation we have used the cross country estimation method over the sample period. First we used sample averages of each measure except initial per capita GDP over the period from 1980-2012 and for this period we carried out nine different regression equations. Next we sub divided time period in to two, from 1980 to 2000 and from 2001 to 2012, and got period averages in order to get a better picture about the role of trade openness towards economic growth in different decades. The major reason to choose 2000 as the breaking point is we can see that after 2000 most economies moved towards the trade protectionism and slowed down liberalization. In both sample periods we employed eight models and observed the effect of not only trade openness measures but other growth determinants towards the per capita GDP growth.

In contrast to existing literature which indicates a strong positive correlation between trade openness and economic growth, the cross country empirical investigation in this study concludes that there is no statistically significant evidence to support the hypothesis that trade openness stimulate economic growth. Among other outcomes, regression results for all the models in all the time periods show that the existence of convergence property by giving negative coefficient on initial per capita GDP as predicted by neoclassical model. Among other explanatory variables we have found that gross domestic investment ratio, secondary education enrolment ratio, rule of law index, FDI and exports to GDP ratio provides positive effect towards the economic growth whereas the population growth, life expectancy, government consumption ratio, inflation rate and imports to GDP ratio negatively affect economic growth.

LITERATURE REVIEW

Barro (1996) has done a historically important analysis on economic growth across countries in order to capture the determination of growth by using the extended version of the neoclassical model. In his study he has included government policies, human capital and the diffusion of technology variables to the cross country analysis model. He has used roughly 100 countries over the period of 1960 to 1990 and finally concluded that growth is stimulated by greater starting levels of life expectancy and of male secondary and higher schooling, by lower fertility rates, and by improvement in the terms of trade.

Barro conducted another study (2003) on deteminants of economic growth in a panel of 113 countries over the period 1965 to 1995. In this study also he has used a set of quantifiable explanatory variables such as initial per capita GDP, variables which reflects human capital, policies, institutions and national characteristics. Ratio of exports plus imports to GDP has been used a measure of degree of international openness in his study and he has highlited in the study

that there is only weak statistical evidence to accept the hypothesis that greater international openness stimulates economic growth.

In order to find how robust the growth openness connection is Vamvakidis (2002) has carried out research using historical data from 1870 to 1990 with reference to not only the openness variables but also other growth determinants. In this study he has concluded that “positive correlation between openness and growth is only a recent phenomenon”.

Many of early empirical studies shows that trade volumes provide substantial support to the hypothesis that trade promotes growth through a number of channels such as technology transfer, scale economies and comparative advantage. Harrison (1996) has conducted a research on openness and growth and found that “greater openness is associated with higher growth” (Harrison, 1996, p.443). When Harrison conducted his research, existing literature at the time was still unresolved on the issue of causality. But the study found that the causality between openness and growth runs in both directions.

Nannicini and Billmeier (2011) has conducted a study to explore the effect of trade liberalization on growth in transition economies. They used a homogeneous group of countries, which was ideal to analyse and compare the impact of different economic policies and found through their study that trade liberalization mostly had a positive impact on economic growth in such economies.

Abdullahi et al. (2013) conducted a research to empirically examine the relationship between trade liberalization and economic growth in Sub-Saharan Africa using a panel data for the period of 1970 to 2010. According to its results they indicate that the trade liberalization and foreign direct investment have significant positive impact on the economic growth of Sub-Saharan Africa. Finally they conclude that since trade could serve as an engine of growth, countries should trade - especially among themselves - for mutual benefits.

Madsen (2008) has conducted an empirical study over the 1870 to 2006 period in order to test the influence of openness on Total Factor Productivity (TFP) growth for 16 industrialized countries. In his study he has used TFP as dependent variable and several openness measures as independent variables - especially the domestic stock of knowledge, foreign stock of knowledge, spill overs through the channel of imports, productivity adjusted innovative activity, domestic research intensity, foreign research intensity spill overs through the channel of imports, trade openness, product variety etc. He found that estimated coefficients of the interaction between the propensity to import and trade weighted research intensity were mostly highly significant and growth in foreign knowledge through the channel of imports was highly influential for productivity growth. Finally he concluded that interaction between the growth in the import of knowledge through the channel of imports and the propensity to import was influential for growth and openness was important for growth when conditioned on knowledge spill overs.

Shamsadini et al. (2010) have conducted research in order to examine the relationship between trade openness and economic growth in 19 Middle East and North African Countries (MENA) over the period from 1980 to 2005. He categorized the sample into four overlapping sub categories which are 'open', 'closed', 'rich' and 'poor', then conducted analysis by considering three alternative models : between effect model, country fixed effect model and the random effect model - same as done by the Madsen (2008). In this study they showed that only the rich and open countries reach higher growth associated with higher trade shares. This study was further expanded to analyze the time series study for individual country experience. The time series analysis has shown that only four countries have a significant positive relationship between trade openness and growth and that other countries have no significant long-term relationship.

Busse and Koniger (2012) have conducted a research in order to re-examine the empirical evidence between trade and growth. In their paper they argue that the effect of trade in dynamic panel estimations

depends crucially on the specification of trade. It is argued in this paper that the often used volume of exports and imports as a share of total GDP or “trade openness” ratio does not adequately capture the impact of trade on GDP per capita growth because of the causal linkage between trade and income. Therefore, several other trade measures were taken in to the empirical growth estimation it was argued that measure of the volume of exports and imports as a share of lagged total GDP avoids a potential bias. Selection of this measure for the empirical estimation is totally different from previous studies mentioned above, where the traditional trade openness ratio was considered the independent variable. Though the trade measure is different however finally they concluded that trade does indeed have a positive and significant impact on growth. Busse and Koniger (2012) conducted the same analysis for developing countries and confirmed the positive influence of trade on income growth for this sample also.

In order to measure the contribution of trade openness on economic growth in the case of Tunisia, Hassen et al. (2013) have conducted a research using OLS over the period 1975 to 2010. According to their study it was found that trade openness, foreign direct investment and human capital as well as financial development exert long-term positive and significant effects economic growth.

Kundu (2013) conducted a panel data analysis to test the validity of the “export-led hypotheses in the seven SAARC member countries over the period 1971-2011. He used six methods in his analysis of panel data to examine the relationship between GDP growth and export growth: the unit root test, cointegration test, pooled ordinary least squares, fixed effect approach, random effects approach and Hausman test methods. Fixed effects and random effects models have found no significant relationship between the size of GDP growth rate and export rate for these SAARC member countries. But panel unit root tests imply that there is strong evidence of stationary process for both GDP and export while the panel cointegration test indicates that there is a cointegrating relationship between exports

and GDP. Finally, Kundu (2013) has concluded that export could be seen as the 'engine' of growth in SAARC member countries.

Yeboah et al. (2012) have conducted a research in order to analyze the effect of trade openness on economic growth for 38 African countries from 1980 to 2008. In this study they have used a Cobb-Douglas production function to estimate the impact of FDI, exchange rate, capital-labor ratio and trade openness on GDP. The study has found that trade openness per capita exhibits a positive and significant impact on GDP per capita. However they concluded that effect of trade on productivity is much greater in outward-oriented economies than the inward-oriented nations.

Zeren and Ari (2013) have conducted a research to investigate the causality between trade openness and economic growth for the G7 countries between 1970 and 2011. Throughout the empirical result they have shown that there is bidirectional causality relationship. They say that "as advocated by theories of endogenous growth, as openness increases, growth increases in G7 countries and, subsequently, the increase in growth increases openness" (Zeren and Ari, 2013, p. 1). Seetanah (2012) studied the relationship between trade openness and economic growth in selected African countries, using annual data for the period 1990-2009. He found through his study the presence of a bi-directional causality between openness and economic growth, concluding that openness indirectly promotes growth through financial development and foreign direct investment.

Gries and Redlin (2012) has conducted a panel causality analysis on trade openness and economic growth and those results suggested that the long run causality between trade openness and growth runs in both directions which are in line with Zeren and Ari (2013) and Seetanah (2012) as mentioned above. That is more open trade policies precede higher growth rates. Gries and Redlin (2012) in his research the entire panel was subdivided into income related subpanels and the lower income subpanel showed a negative causality while higher

income countries exhibited a positive relationship between openness and growth. Desired growth led openness and openness led growth hypotheses could only be supported for industrialized countries.

Bajwa and Siddiqi (2011) conducted a research by selecting four south Asian countries over the period of 1972-1985 and 1986-2007 to investigate the casual link between trade openness and economic growth before and after the implementation of SAARC. They use panel cointegration technique and a panel based error correction model to find out this relation. They found that “there exists short run unidirectional causality running from GDP to openness but not vice versa in the time period of 1972-85, A negative relation exists between the two in the long-run, whereas, in 1986-2007 there exists short-run bi-directional causation between GDP and openness” (Bajwa and Siddiqi, 2011, p. 5). Finally they conclude that these countries should introduce export oriented policies to help in earning foreign exchange and rapid economic growth.

Sarkar (2007) conducted research to examine the relationship between trade openness and growth for 51 countries over the period 1981-2002. He has conducted cross country panel data analysis on various regions and groups which are under ‘open’, ‘close’, rich’ and ‘poor, overlapping categories. Given that in cross country analysis each and every country is implicitly given the same weight, it is difficult to justify how fair the conduct of time series analysis for the countries was. Accordingly, in cross country panel data analysis he concluded that for only 11 rich countries and highly trade dependent Least Develop Countries (LDCs) higher real growth is associated with a higher trade share which is similar to the findings of Gries and Redlin (2012). In a time series study of individual countries he concluded that a majority of countries covered in the sample including East Asian countries experienced no positive long-term relationship between openness and growth during the period. Finally he concluded that among various regions and groups only the middle income group exhibited a positive long-term relationship.

Many major studies have attempted to find out the relationship between trade restrictions and growth. Rodriguez and Rodrik (2001) has found that average tariff rates had a positive and significant relationship with total factor productivity (TFP) growth for a sample of 43 countries over the period 1980-1990. However by expanding the sample to 66 countries, imports duties became insignificant with a positive coefficient.

Yanikkaya (2003) conducted a research using a large number of openness measures which were of two types: trade volumes and trade restrictions. He says in his study that “all measures of trade barriers used in the study are significantly and positively correlated with growth except for restrictions on current account payments, which is negatively but insignificantly correlated with growth” (Yanikkaya, 2003, p. 84) contradicts the findings of earlier empirical studies. So in his study he provided considerable evidence for the hypothesis that restrictions on trade can promote growth, especially in developing countries under certain conditions. Also according to his regression results he concluded that trade volumes provide substantial support for the hypothesis that trade promotes growth through a number of channels such as technology transfers, scale economies, and comparative advantage.

Although many studies have shown that there is a positive relationship between trade openness and economic growth as we discussed earlier, Ulasan (2012) has shown in his studies completely the opposite result. Ulasan (2012) conducted a cross country empirical investigation on openness to international trade and economic growth and used openness measures under four broad categories, which is trade volumes, direct trade policy measures, deviation measures and subjective indexes. In order to find the relation between trade volumes and economic growth he carried out a regression with the dependent variable real GDP per worker between 1960 and 2000 and several independent variables. The regression results for economic growth and trade volumes confirm the findings

international trade on economic growth are not very important compared to the effects of comparative advantage and scale economies. Finally he concluded on no positive and significant association between trade volume and economic growth except real openness. He said that trade openness does not matter for economic growth. Then Ulasan (2012) investigated the openness-growth connection by employing direct trade policy measures, namely tariff rates, non-tariff barriers on imports and black market premium for exchange rate. Then he found that among the direct trade policy measures only tariff rates and black market premium are negatively and significantly correlated with economic growth. He concluded that without building better institutions, maintaining conflict management along ethno linguistic dimensions, and following sound and stable fiscal policies, openness to international trade will not guarantee economic growth.

Hepenstrick and Tarasov (2013) found through their studies that 40-50% of the variation in per capita income across countries can be explained by different endowments and remaining variation is attributed to exogenous differences in technology, whose nature remains at least partly a black box.

Consequently, the conclusion emerging from these studies is that there are contradictory results on trade openness and economic growth. So the main objective of this study is to carry out an appropriate model to explain the relationship between trade openness and economic growth.

ECONOMETRIC METHODOLOGY

In this study a cross sectional data analysis was used to examine the relationship between per capita GDP growth and the set of cross country growth determinants. To identify the suitable model for this analysis, by following empirical study by Barro (Determinants of

Economic Growth in a Panel of Countries, 2003), the following empirical framework has been used to investigate long-run economic growth:

$$Y_i = \beta_0 + \beta_1 PCGDP_{t-1} + \beta_2 X_i + \beta_3 Z_i + \varepsilon_i \text{-----Equation 1}$$

where $i = 1, 2, \dots, 103$ (Number of countries).

Here the variable Y represents per capita GDP growth rate of each countries, X is a vector which includes the cross country growth determinants, Z is a vector which includes countries openness measures and ε is the error term³.

The variable PCGDP represent the initial per capita GDP. The vector X includes the variables gross domestic investment ratio as the percentage of GDP, secondary education enrolment ratio, population growth, government consumption ratio as the percentage of GDP, life expectancy, inflation rate and rule of law index. Initial per capita GDP level is employed to assess the issue of conditional convergence and it is also possible to interpret it as a proxy for the initial stock of capital for a country. (Barro, Determinants of Economic Growth in a Panel of Countries, 2003), (Harrison, 1996), (Ulaşan, 2012), (Yanikkaya, 2003) and many other researchers have generally included the initial per capita GDP in their cross country growth regression. The vector Z includes the variables foreign direct investment (FDI), total trade as a percentage of GDP (i.e. exports plus imports as the percentage of GDP) which is very common proxy as the openness measure in the cross-country growth literature, exports as the percentage of GDP and imports as the percentage of GDP. The vector Z indicates the openness measures of the countries.

³ PCGDP_{t-1} is initial per capita GDP and t-1 indicates that if data is taken for the period average from 1980 to 2012 then PCGDP_{t-1} indicates the per capita GDP in 1980.

In order to check the classical linear regression model assumptions, tests were carried out to check the validity of each regression model. Three residual tests have been carried out: histogram normality test, heteroscedasticity test and variance inflation factor (VIF) test.

Data Analysis

Empirical investigation has been carried out under four sub topics. Before regression analysis a pair wise correlation between the variables was carried out to check whether the multi collinearity problem arises. The simple correlation between the variables which used in this study is reported in the Table 1.

The result shows that almost all the variables are not strongly correlated with each other whereas only few variables present correlations. Secondary education enrolment ratio and life expectancy, secondary education enrolment ratio and rule of law index, exports to GDP ratio and imports to GDP ratio show significantly high correlation coefficients according to the Table 2

The relationship between per capita GDP growth and initial per capita GDP shows negative relationship as expected by showing the conditional convergence property. The correlation between per capita GDP Growth to secondary education enrolment ratio, life expectancy, role of law index, FDI and total trade to GDP ratio shows weak positive relationship. The relationship between per capita GDP growth and the population growth shows strong negative relationship. However per capita GDP growth and the domestic investment ratio shows strong positive relationship and whereas the correlation between per capita GDP growth to inflation rate, government consumption, the exports to GDP ratio and the imports to GDP ratio shows weak negative relationship.

Table 2 : Correlation Coefficients between Variables: 1980-2012 Averages⁴

Variable	Per Capita GDP Growth	Per Capita GDP 1980	Secondary Education	Life Expectancy	Population Growth	Gov Consumption to GDP	Dom Investmen t to GDP	Inflation Rate	Rule of law index	FDI	Total Trade to GDP	Exports to GDP	Imports to GDP
Per Capita GDP Growth	1.00 ---												
Per Capita GDP 1980	-0.11	1.00											
	-1.13	---											
Secondary Education	0.16	0.63	1.00										
	1.59	8.26											
Life Expectancy	0.26	0.58	0.89	1.00									
	2.72	7.22	19.22										
Population Growth	-0.29	-0.06	-0.58	-0.53	1.00								
	-3.00	-0.63	-7.23	-6.21	---								
Gov. Consumption to GDP	-0.05	0.43	0.43	0.32	-0.17	1.00							
	-0.48	4.75	4.85	3.34	-1.69	---							
Dom. Investment to GDP	0.61	0.08	0.22	0.29	-0.11	0.25	1.00						
	7.69	0.83	2.27	3.00	-1.14	2.60	---						
Inflation Rate	-0.16	-0.11	-0.06	-0.13	0.03	-0.05	-0.17	1.00					
	-1.62	-1.12	-0.56	-1.36	0.31	-0.51	-1.71	---					
Rule of law index	0.24	0.68	0.83	0.77	0.53	0.52	0.25	0.24	1.00				
	2.52	9.38	15.08	12.23	-6.22	6.04	2.57	-2.43	---				
FDI	0.22	0.31	0.31	0.31	-0.79	0.12	0.10	-0.07	0.35	1.00			
	2.25	3.29	3.25	3.30	3.08	1.19	1.00	0.68	3.73	---			
Total Trade to GDP	0.07	0.08	0.15	0.10	0.01	0.38	0.27	-0.07	0.12	-0.07	1.00		
	0.69	0.85	1.47	0.96	0.05	4.19	2.83	-0.70	1.18	-0.72	---		
Exports to GDP	-0.05	0.49	0.39	0.36	-0.15	0.34	0.00	-0.13	0.40	0.11	0.46	1.00	
	-0.51	5.63	4.31	3.84	-1.50	3.69	0.03	-1.29	4.35	1.16	5.23	---	
Imports to GDP	0.02	0.15	0.23	0.22	0.21	0.27	0.09	0.13	0.22	0.01	0.41	0.80	1.00
	-0.24	1.51	2.43	2.30	-2.21	2.80	0.86	-1.31	2.29	0.10	4.49	13.47	---

⁴The top figures shows how simple correlation coefficients for averaged over entire time period: the bottom figures indicate the t-statistics of the test.

However the existing higher correlation among some independent variables as mentioned above may cause the multicollinearity problem when estimating the ordinary least square (OLS) method in the analysis by violating the OLS assumption. Therefore in order to check whether model estimations violated the classical linear regression model assumption and gave a spurious result, variance inflation factor (VIF) tests were conducted for each and every regression analysis to verify the existence of the multicollinearity problem. According to Larose (2006) if the value of VIF is greater than 5 it is an indicator of moderate multicollinearity and if value of VIF is greater than 10 it is an indicator of severe multicollinearity.

In each regression, the constant error variance assumption was checked by employing the White test for heteroscedasticity. We have found in some regression analyses a heteroscedasticity problem. So we carried out a 'HAC' (Heteroscedasticity and Autocorrelation Consistent) Newey-West procedure (Whitney K. Newey and Kenneth D. West, May 1987) in order to correct this heteroscedasticity.

Table 3, Table 4 and Table 5 represent the empirical findings for a panel of 103 countries over three time periods. According to the regression result, initial per capita GDP, gross domestic investment ratio and the secondary education enrolment ratio are the significant variables for the per capita GDP growth of a country over the three sample period averages and the insignificant variables for the three time period averages are government consumption to GDP ratio and total trade to GDP ratio. The significance of other explanatory variables is changed over the time period to time period.

The negative coefficient of the initial per capita GDP which has entered in the system in logarithmic form was the interpretation of a conditional rate of convergence which predicts by neoclassical model. The estimated coefficient of the initial per capita GDP is highly significant at 1% significance level over the three sample period averages and it is similar to the findings of empirical study done by Barro (1996) by using around 100 countries from 1960 to

1990. But in Harrison's (1996) study he used 27 year average data and GDP in 1960 as the initial GDP to invest the openness and growth relation for developing countries and it can be seen that the initial per capita GDP is not a significant variable for the GDP growth.

Figure 2 shows the partial relation between the per capita GDP growth and the level of initial per capita GDP as implied by the model 9 of Table 3 which is for the time period 1980 to 2012. The x-axis plots the per capita GDP in 1980 and y-axis shows the corresponding growth rate of GDP after filtering out the parts explained by all explanatory variables other than initial per capita GDP. The negative slope in Figure 2 shows the conditional convergence relation which is the effect of logarithmic form of initial per capita GDP on the growth rate for given values of other explanatory variables. However this finding is similar to findings of Barro (1996).

Table 3 : Cross Sectional Estimation using 1980-2012 Averages⁵

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Constant	-6.82*** (-3.69)	-5.27*** (-2.73)	-0.65 (-0.29)	-5.23 (-0.77)	-8.38 (-1.52)	-4.45 (-1.51)	-4.15 (-1.36)	-4.22 (-1.42)	-3.07 (-1.40)
Log(Per Capita GDP in 1980)	-0.60*** (-4.54)	-0.56*** (-3.56)	-0.84*** (-6.70)	-0.88*** (-6.18)	-0.82*** (-5.49)	-1.00*** (-6.31)	-1.00*** (-6.14)	-1.04*** (-6.28)	-1.21*** (-7.02)
Log(Gross Domestic Investment % GDP)	3.17*** (4.36)	3.20*** (4.11)	2.81*** (3.95)	2.66*** (3.83)	2.78*** (4.16)	2.59*** (4.30)	2.56*** (4.14)	2.65*** (4.37)	2.68*** (5.27)
Log(Secondary Education)	0.84*** (2.87)	0.85** (2.47)	0.63* (2.13)	0.41 (1.04)		0.61* (1.91)	0.57* (1.85)	0.59* (1.84)	0.74** (2.47)
Log(Population Growth)	-0.40** (-2.27)	-0.38* (-1.91)	-0.08 (-0.45)	-0.06 (-0.37)	-0.10 (-0.59)	0.01 (0.09)	-0.00 (-0.04)	0.01 (0.07)	-0.10 (-0.57)
Log(Government consumption % GDP)		-0.64 (-1.44)	-1.02*** (-2.58)	-0.92** (-2.38)	-0.92** (-2.45)	-0.53 (-1.19)	-0.61 (-1.37)	-0.59 (-1.33)	-0.49 (-1.22)
Log(inflation rate)		-0.13 (-1.45)	0.02 (0.26)	0.03 (0.38)	0.08 (0.88)	-0.04 (-0.47)	-0.03 (-0.32)	-0.02 (-0.24)	-0.03 (-0.24)
Rule of Law Index			0.97*** (4.44)	0.95*** (4.21)	0.94*** (4.21)	0.78*** (3.23)	0.80*** (3.27)	0.80*** (3.34)	0.82*** (3.81)
Log(Life expectancy)				1.41 (0.78)	2.36* (1.67)				
Log(FDI)						0.23** (2.32)	0.23** (2.29)	0.22** (2.29)	0.18*** (2.75)
Total trade % GDP							0.23 (0.64)		
Exports % GDP								0.63 (1.33)	2.76*** (2.16)
Imports % GDP									-1.61** (-2.50)
No. of Observation	103	103	103	103	103	103	103	103	103
R ²	0.47	0.49	0.58	0.58	0.58	0.63	0.63	0.63	0.66

Note: ***, ** and * imply the significant at 1%, 5% and 10% level respectively.

⁵Dependent variable is per capita GDP growth rate. The bottom figures indicate the t-statistics of the test

Table 4 : Cross Sectional Estimation using 1980-2000 Averages⁶

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Constant	-7.95*** (-3.93)	-4.63* (-1.68)	0.43 (0.15)	-21.77*** (-3.06)	-7.28*** (-2.65)	-6.76** (-2.42)	-6.88** (-2.52)	-7.04*** (-3.01)
Log(Per Capita GDP in 1980)	-0.49** (-2.23)	-0.64*** (-2.90)	-0.94*** (-4.19)	-0.84*** (-3.77)	-0.83*** (-3.74)	-0.84*** (-3.64)	-0.90*** (-3.83)	-0.96*** (-4.06)
Log(Gross Domestic Investment % GDP)	3.70*** (5.44)	3.39*** (4.53)	3.07*** (4.51)	2.82*** (4.29)	3.27*** (3.78)	3.07*** (3.32)	3.31*** (3.73)	3.75*** (4.48)
Log(Secondary Education)	0.53 (1.53)	0.74** (2.07)	0.37 (1.06)	0.10 (0.23)	0.62* (1.85)	0.56* (1.67)	0.59* (1.68)	0.64* (1.83)
Log(Population Growth)	-0.77*** (-3.01)	-0.81*** (-3.00)	-0.42** (-2.11)	-0.75*** (-3.39)	-0.72*** (-2.88)	-0.78*** (-3.24)	-0.73*** (-2.98)	-0.81*** (-2.90)
Log(Government consumption % GDP)		-0.57 (-0.95)	-0.97* (-1.66)	-0.23 (-0.47)	-0.08 (-0.14)	-0.22 (-0.38)	-0.22 (-0.39)	-0.09 (-0.17)
Log(inflation rate)		-0.26** (-2.45)	-0.12 (-1.21)	-0.23 (-1.62)	-0.25** (-2.43)	-0.23** (-1.99)	-0.23** (-2.10)	-0.24** (-2.14)
Rule of Law Index			1.24*** (4.71)					
Log(Life expectancy)				5.25** (2.52)				
Log(FDI)					0.19* (1.70)	0.20* (1.76)	0.19* (1.74)	0.14 (1.19)
Total trade % GDP						0.60 (0.86)		
Exports % GDP							1.49 (1.21)	3.60* (1.85)
Imports % GDP								-2.10 (-1.50)
No. of Observation	103	103	103	103	103	103	103	103
R ²	0.50	0.52	0.61	0.56	0.57	0.57	0.58	0.60

Note: ***, ** and * imply the significant at 1%, 5% and 10% level respectively.

⁶Dependent variable is per capita GDP growth rate. The bottom figures indicate the t-statistics of the test.

Table 5: Cross Sectional Estimation using 2001-2012 Averages⁷

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Constant	-4.15 (-1.45)	-1.66 (-0.62)	-0.12 (-0.03)	-0.08 (-0.01)	-1.58 (-0.23)	-1.76 (-0.23)	-1.69 (-0.25)	-3.26 (-0.47)
Log(Per Capita GDP in 2001)	-0.79*** (-3.28)	-0.74*** (-3.83)	-0.87*** (-2.88)	-0.87*** (-2.78)	-1.03*** (-3.84)	-1.04*** (-3.84)	-1.05*** (-3.78)	-1.15*** (-4.01)
Log(Gross Domestic Investment % GDP)	2.63*** (2.75)	2.70*** (3.04)	2.60*** (2.75)	2.60*** (2.85)	2.31*** (3.75)	2.28*** (3.63)	2.32*** (3.73)	2.33*** (3.76)
Log(Secondary Education)	1.06** (2.14)	1.05** (1.99)	1.11** (2.08)	1.11* (1.92)	1.14* (1.90)	1.11* (1.81)	1.15* (1.90)	1.13* (1.88)
Log (Population Growth)	-0.13 (-0.58)	-0.21 (-0.79)	-0.19 (-0.67)	-0.19 (-0.67)	-0.17 (-0.72)	-0.18 (-0.75)	-0.16 (-0.70)	-0.28 (-1.13)
Log(Government consumption % GDP)		1.05** (-2.15)	1.25** (-2.55)	1.25** (-2.31)	0.96 (-1.57)	0.99 (-1.60)	0.95 (-1.56)	0.85 (-1.38)
Log(inflation rate)		-0.16 (-0.57)	-0.12 (-0.41)	-0.12 (-0.40)	-0.21 (-1.02)	-0.20 (-1.01)	-0.20 (-0.97)	-0.20 (-0.97)
Rule of Law Index			0.31 (0.68)	0.31 (0.68)	0.13 (0.36)	0.14 (0.39)	0.14 (0.38)	0.11 (0.30)
Log(Life expectancy)				-0.01 (-0.00)	-0.85 (-0.46)	-0.74 (-0.39)	-0.82 (-0.44)	-0.12 (-0.07)
Log(FDI)					0.31*** (3.40)	0.31*** (3.38)	0.31*** (3.37)	0.27*** (2.82)
Total trade % GDP						0.18 (0.32)		
Exports % GDP							0.10 (0.22)	1.62 (1.32)
Imports % GDP								-0.97 (-1.33)
No. of Observation	103	103	103	103	103	103	103	103
R ²	0.34	0.37	0.37	0.37	0.45	0.45	0.45	0.47

Note: ***, ** and * imply the significant at 1%, 5% and 10% level respectively.

⁷ Dependent variable is per capita GDP growth rate. The bottom figures indicate the t-statistics of the test

The gross domestic investment ratio is a highly significant variable with positive correlation which is significant at 1% over the three time periods represented in above tables. The coefficient of the gross domestic investment ratio is positive. This implies that domestic investment ratio is a key indicator for economic growth and the findings are similar to the study done by Adams (2009) to find the effect of FDI and domestic investment towards the economic growth. Also we can see that the coefficient for 1980 to 2000 is higher than the coefficient for 2001 to 2012 from which we can say that the effect of domestic investment towards per capita GDP growth is high during the former period than the latter. The study done by Vamvakidis (2002) on robustness of the growth-openness connection has also used a historical data set for the determinants of growth such as initial real per capita GDP, the average investment share, secondary school enrolment ratio, population growth and inflation rate ect. Vamvakidis (2002) also concludes in his study that the investment ratio has a positive impact on economic growth. The partial relation between the per capita GDP growth and the domestic investment ratio is shown in Figure 3 for the time period from 1980 to 2012.

In cross country growth regression estimation literature Barro (1996), Vamvakidis (2002), Ulaşan (2012) and several other researchers have used the secondary education enrolment ratio as an independent variable in cross country growth regression and found that there exists a positive impact on economic growth. The secondary education enrolment ratio is used as proxy for human capital across countries. This cross country regression result also found that the secondary education enrolment ratio is statistically significant for all three time periods and the coefficient is positive. The coefficient is higher for 2001 to 2012 than 1980 to 2000. The reason for this difference may be that from 2001 to 2012 growth was driven by. Education enhances economic growth as a highly skilled labour force absorbs new technology, displaying competitive and comparative advantages. The partial relation between the per capita GDP growth

and the secondary education enrolment ratio is shown in Figure 4 for the time period from 1980 to 2012.

Other than secondary education enrolment ratio two more explanatory variables are used as proxy variables for human capital - population growth and life expectancy.⁸ Here it can be seen that population growth is negatively related to the economic growth as Vamvakidis (2002) and Barro (1996) found and the variable is only significant to the time period from 1980 to 2000 which is significant at 1% level. In Barro (1996)'s study he has used fertility rate instead of population growth. We can assume that the increasing population growth affects per capita GDP growth negatively because the increasing population may increase the consumption of resources which can be used for production purposes. As well it can be said that if the population increases then the economy has to invest capital for new labourers rather than increasing the capital per labourer. Barro (1996) concluded in his study that "although population growth cannot be characterized as the most important element in economic progress, the results do suggest that an exogenous drop in birth rates would raise the growth rate of per capita output" (Barro, 1996, p. 18). The variable life expectancy is negatively related but not statistically significant with the per capita GDP growth and therefore this variable has appeared only in model 3 of the Table 3 as we have dropped this variable from the regression equation in 1980-2012 and 1980-2000 since it returns a multicollinearity problem with high VIF values. Life expectancy is not only a proxy for health status but also it indicates the quality of human capital. However in Barro's study a relation was found between per capita GDP growth and the life expectancy. The research done by Acemoglu and Johnson (2007) to investigate the effect of life expectancy on economic growth concluded that "there is no evidence that the large exogenous increase in life expectancy led to a significant increase in per capita economic growth" (Acemoglu and Johnson, 2007, p. 925). Partial relation between per capita GDP growth and the population growth

⁸The variable life expectancy is indicator of health states.

over the period 1980-2012 and partial relation between per capita GDP and life expectancy over the period 2001-2012 is shown in Figure 5 and 6 respectively.

The variable government consumption ratio has a negative relation with per capita GDP growth (Barro has shown this relation) over all time periods and none of them are statistically significant. However the variable is significant with a negative coefficient in the absence of openness variables which are FDI, total trade to GDP ratio, exports to GDP ratio and imports to GDP ratio. The reason for this negative relation can be assumed to be government spending on nonproductive sectors decreasing per capita GDP growth. The partial relation between per capita GDP growth and the government consumption ratio is illustrated in Figure 7.

The relation between inflation rate and the per capita GDP growth shows a negative relation over the three time periods which is similar to the findings of Barro (1996) and Vamvakidis (2002). According to the result the variable is significant only for the time period 1980-2000. Barro (2013) has carried out a study in order to investigate the relation between inflation and growth using 100 countries over the period 1960-1990 and concludes in his research that “an increase in average inflation by 10 percentage points per year is a reduction of the growth rate of real per capita GDP by 0.2-0.3 percentage points per year” (Barro, 2013, p. 121) which is similar to the findings in this regression analysis. The partial relation between per capita GDP growth and the inflation rate is shown in Figure 8 for the regression result over the time period 2001-2012.

The rule of law index interprets the quality of governance provided by each economy. The results indicate that there is a positive association between per capita GDP growth and the rule of law index by supporting the findings of Barro (1996). Maintaining proper governance is very important for a country to efficiently engage in economic activities using both physical and human capital. Therefore

it can be concluded through this interpretation that maintainance of the rule of law index is favourable for economic growth. Partial relation between per capita GDP growth and rule of law index is shown in Figure 9 for the period 1980-2012.

Considering openness measures we can see that FDI has a positive effect on growth whereas it is statistically significant over the period 1980-2012 and 2001-2012. However in the absence of exports to GDP ratio and imports to GDP ratio FDI becomes a significant variable for the period 1980-2000 also. The study of Laura et al. (2010) has found that “increases in the share of FDI or the relative productivity of the foreign firm leads to higher additional growth in financially developed economies compared to those observed in financially under-developed ones, and other local conditions such as market structure and human capital are also important to generate a positive effect of FDI on economic growth” (Laura et al., 2010, p. 242). So that it can be concluded that the since market structure and human capital are favourable and financial markets have developed during 2001-2012 than 1980-2000 makes the coefficient significant for growth during 2001-2012 than in previous period. The partial relation between per capita GDP growth and the FDI is shown in Figure 10 for the period from 1980 to 2012.

When considering the exports to GDP ratio it can be seen that the effect is positive for all time periods and is strongly statistically significant for the time periods 1980-2012 and 1980-2000. Yanikkaya (2003) and Ulaşan (2012) have found same results for periods 1970-1990 and 1960-2000 respectively in their studies: coefficients are positive and significant. When comparing the periods 1980-2000 and 2001-2012 we can see that rather than the coefficient is also higher in value for the time period 1980-2000 than in 2001-2012. After World War II global economy has focused on trade liberalization by reducing the trade barriers. This resulted in multilateral and bilateral trade agreements among countries and an increase in trade share. However, when it comes to the past decade we can see that the trade liberalization strategy has slowed down and

countries moved towards trade protection mechanism. the present global economy focuses on trade in services rather than merchandise. These may be the reasons why exports to GDP have become significant with larger coefficients during the period 1980-2000 than 2001-2012. The trade openness measure which is imports to GDP ratio shows a negative effect on per capita GDP growth over the three time periods and the variable is statistically significant during 1980-2012. It cannot find any literature which supports this regression result. Partial relation between exports to GDP ratio and imports to GDP ratio over the period 1980-2012 is shown in Figure 11 and Figure 12 respectively.

When considering trade openness, total trade to GDP ratio is not statistically significant in any model or time period but has a positive coefficient. Harrison (1996) has also found same result in his study for the regression result of cross section estimation when using 27 years averages. But when using the lagged values of trade share Harrison (1996) and Yanikkaya (2003) both have found that there is a positive and statistically significant relation between trade share and GDP-growth. Similarly Ulaşan (2012) has found that trade ratios are significantly and positively correlated with economic growth. However, results in this study do not provide enough evidence to support the hypothesis that open economies grow faster than closed economies as the correlation in this study, although positive, is not statistically significant. A similar result was shown by Barro (2003) using the ratio of exports plus imports to GDP as measure of the degree of openness. He pointed out that “the estimated coefficient on the openness variable is positive but only marginally significant: 0.0080(0.0046). Hence, there is only weak statistical evidence that greater international openness stimulates economic growth”, (Barro, 2003, p. 251), similar to the argument in this study. The sample period in this study starts from 1980 and it can be argued that most of the countries may already open during this period and so the effect of trade openness towards economic growth may not be captured when using this period. Another argument is that total trade to GDP ratio may be a poor indicator to capture the effect of trade openness

towards economic growth. Partial relation between per capita GDP growth and the total trade to GDP (trade openness) is shown in Figure 13 over the period from 1980 to 2012.

CONCLUSION AND DIRECTIONS FOR FURTHER RESEARCH

Most of the previous literature found that there is a positive and significant impact exerted by trade openness towards economic growth, and few studies have shown that there is no perceptible positive impact. Through this research we have revisited the empirical evidence on the relationship between trade openness and economic growth over the sample period 1980-2012 across 103 countries. The paper also used several growth determinants as explanatory variables rather than trade openness measures which provided useful conclusions in cross country growth estimations.

The results of this research show that the trade openness variable which is measured as exports plus imports to GDP ratio, has a positive coefficient in growth regression but is not statistically significant over the three sample periods. Therefore the final conclusion we can arrive at is that we do not have enough statistical evidence to support the hypothesis that greater openness through international trade stimulates economic growth.

The trade openness measure exports to GDP ratio has become significant in the presence of imports to GDP ratio as an explanatory variable both in 1980-2012 and 1980-2000. This implies that the statistical significance of this correlation depends on other explanatory variables of the regression and also the proxy variable for openness. Therefore, this underscores the importance of developing a better openness measure.

Though we have dropped the outlying countries in the regression analysis here we did not categorize the countries initially along the lines of developed and least developed economies or 'open' and 'closed' economies. This may be a major limitation in our study which allows the assumption that that these results may be driven by some major economies. Therefore carrying out this empirical analysis for different categories of economies such as 'rich', 'poor', 'open' and 'close' may give a different, clearer picture as to whether trade openness accelerates economic growth.

The research has focused on period averages to identify the determinants of long run economic growth. However using these period averages may hide significant variance in individual economic performance and therefore considering the time series effect it is important to opt for panel data analysis rather than cross country regression which will give a more robust answer on the openness growth relation.

The effect of trade openness on economic growth may not be instant. It may take some time to affect economic growth through the effective usage of intermediate and investment goods and also through spill over of new technology and skills. Therefore it is important to further extend this research by considering the lag when carrying out regression analysis to find the determinants of growth.

Throughout this research we have considered only trade volume measures and did not try to include the effect of trade policy measures towards the economic growth. Therefore adding trade policy measures such as tariff rates, non-tariff barriers, black market premium etc. as explanatory variables in our regression analysis may give additional value to our conclusion.

In sum, we can conclude that this empirical research does not provide statistically significant evidence to support the hypothesis that trade openness stimulates economic growth.

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APPENDIX

Figure 2: Partial Relation between Per Capita GDP Growth and Initial Per Capita GDP

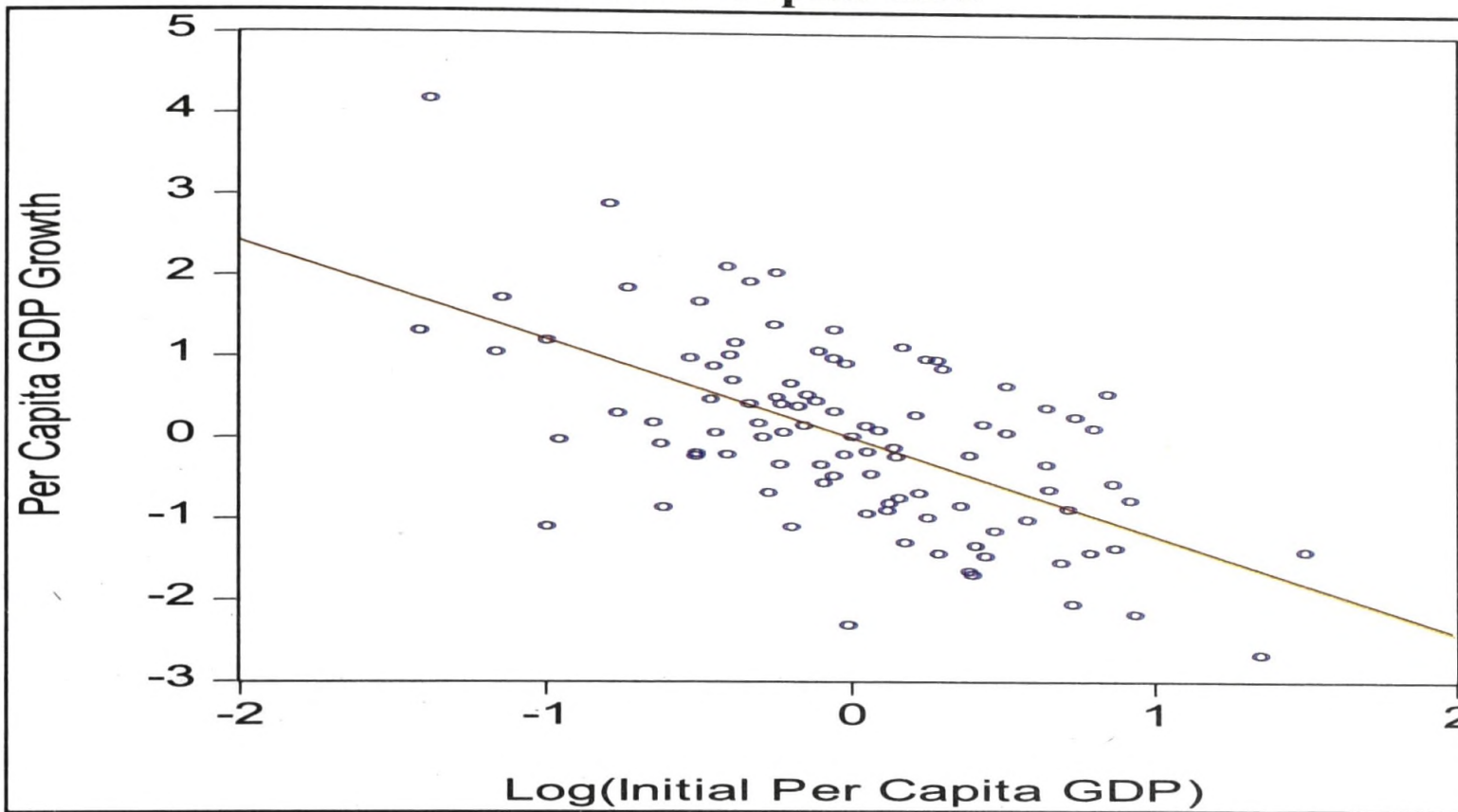


Figure 3 : Partial Relation between Per Capita GDP Growth and Gross Domestic Investment Ratio

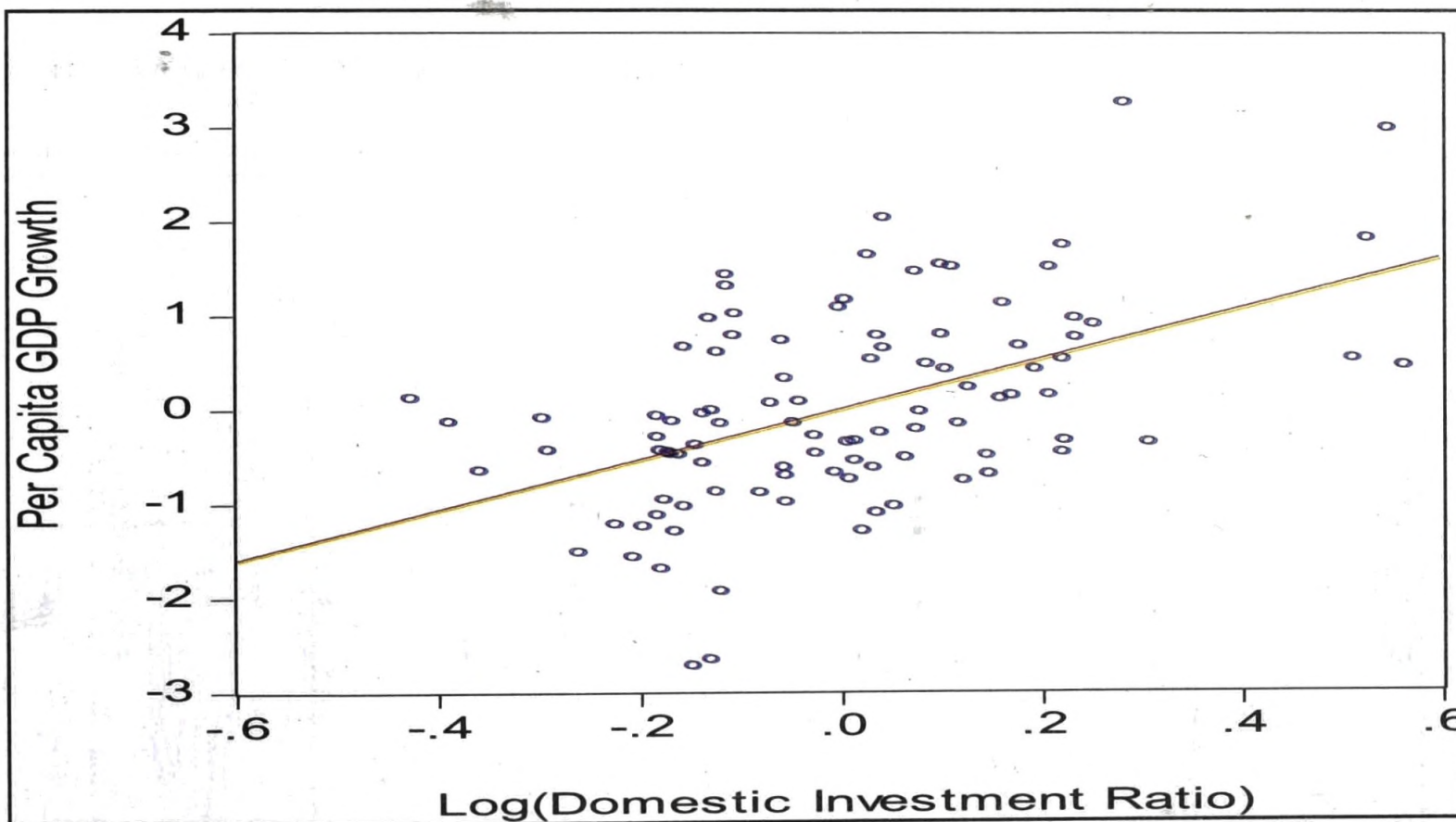


Figure 4 : Partial Relation between Per Capita GDP Growth and Secondary Education Enrolment Ratio

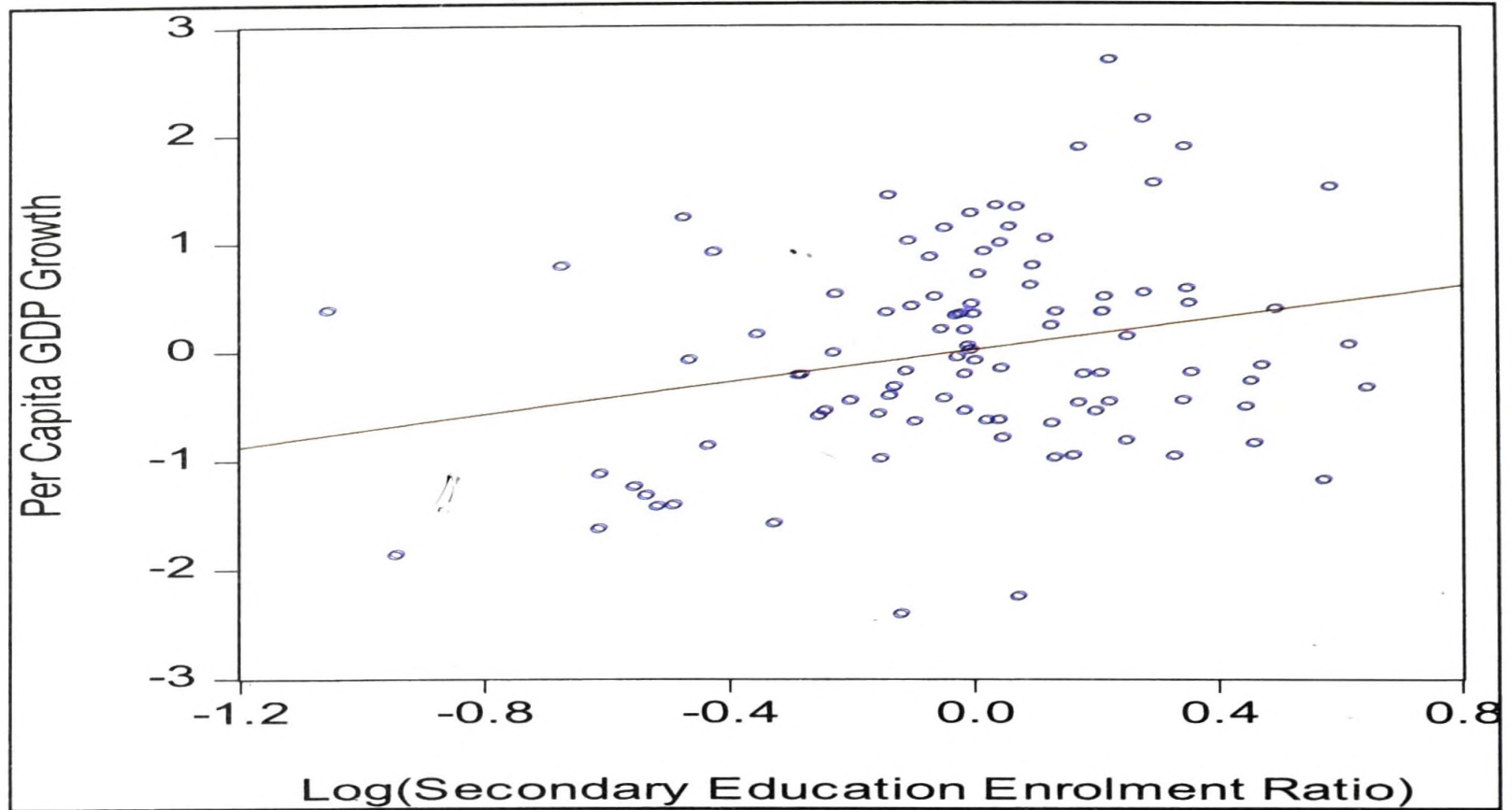


Figure 5 : Partial Relation between Per Capita GDP Growth and Population Growth

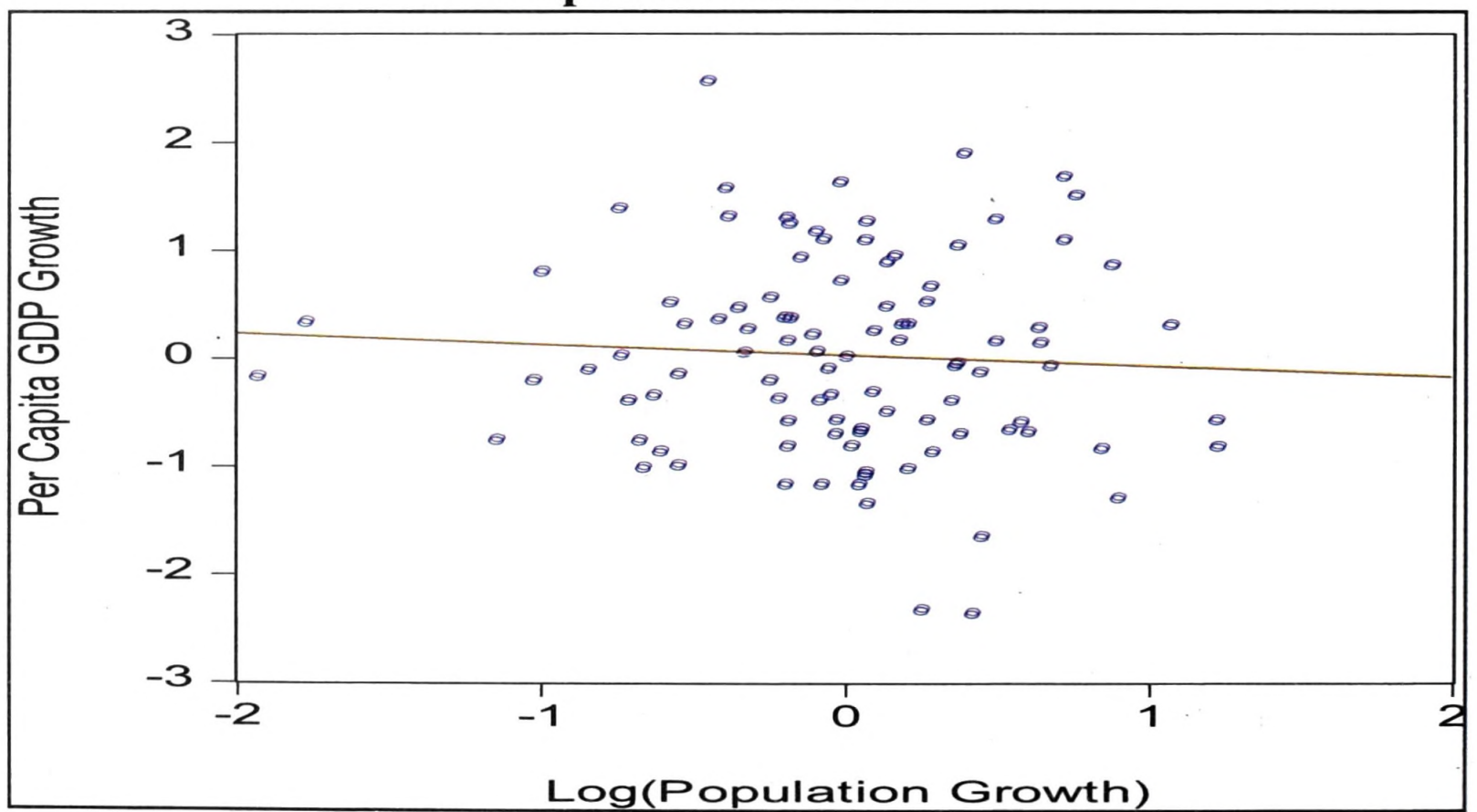


Figure 6: Partial Relation between Per Capita GDP Growth and Life Expectancy

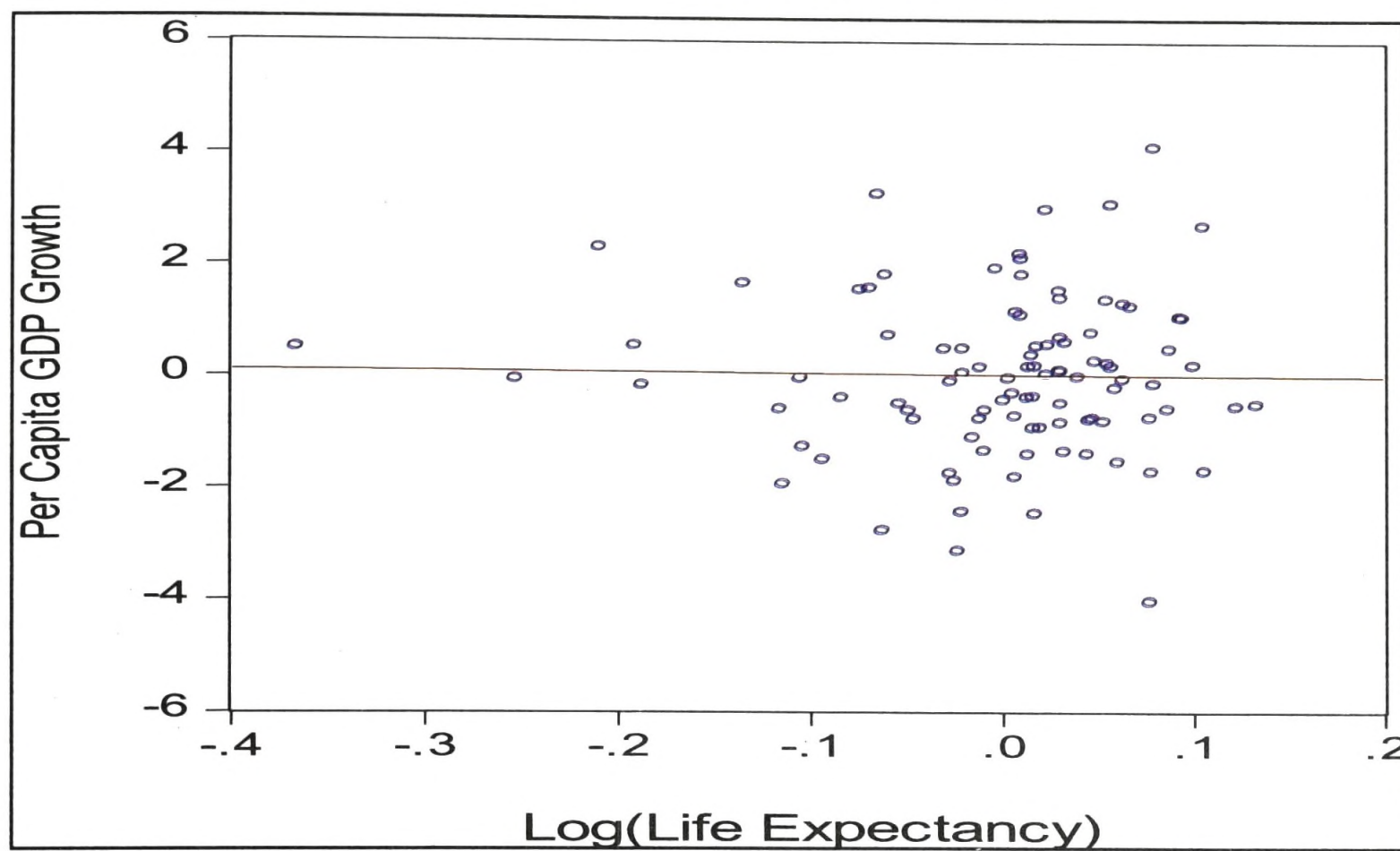


Figure 7: Partial Relation between Per Capita GDP Growth and Government Consumption Ratio

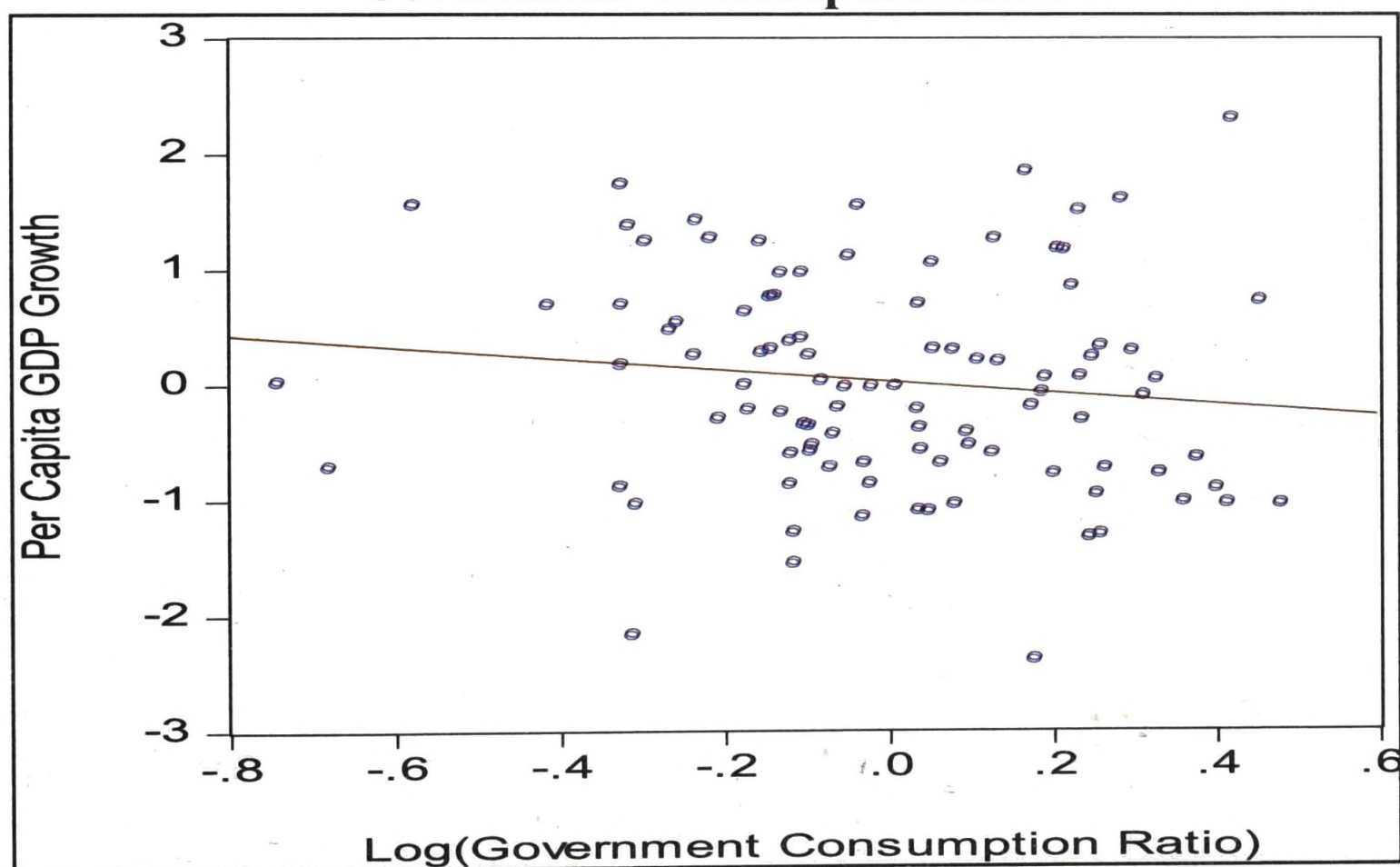


Figure 8: Partial Relation between Per Capita GDP Growth and Inflation Rate

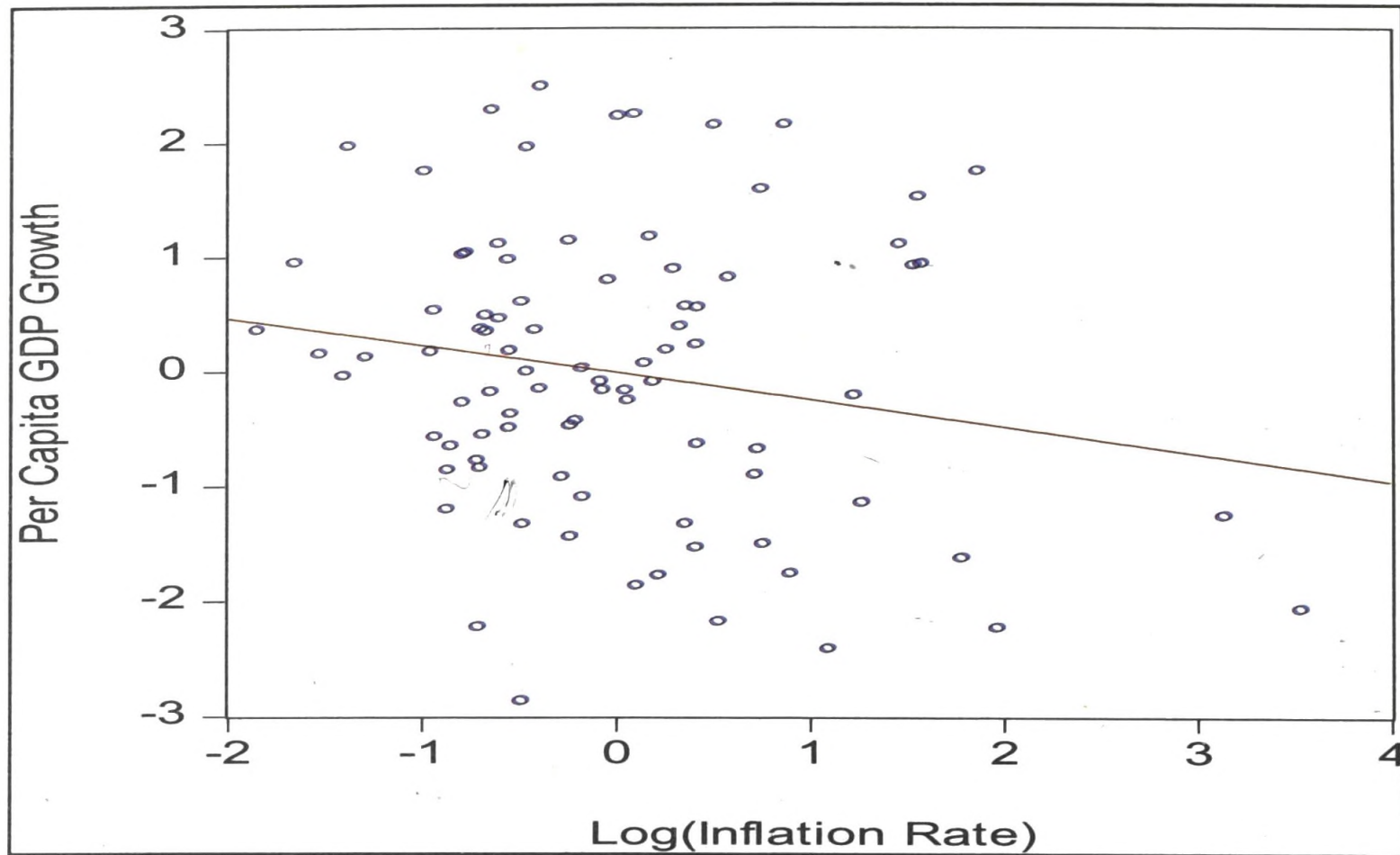


Figure 9 : Partial Relation between Per Capita GDP Growth and Rule of Law Index

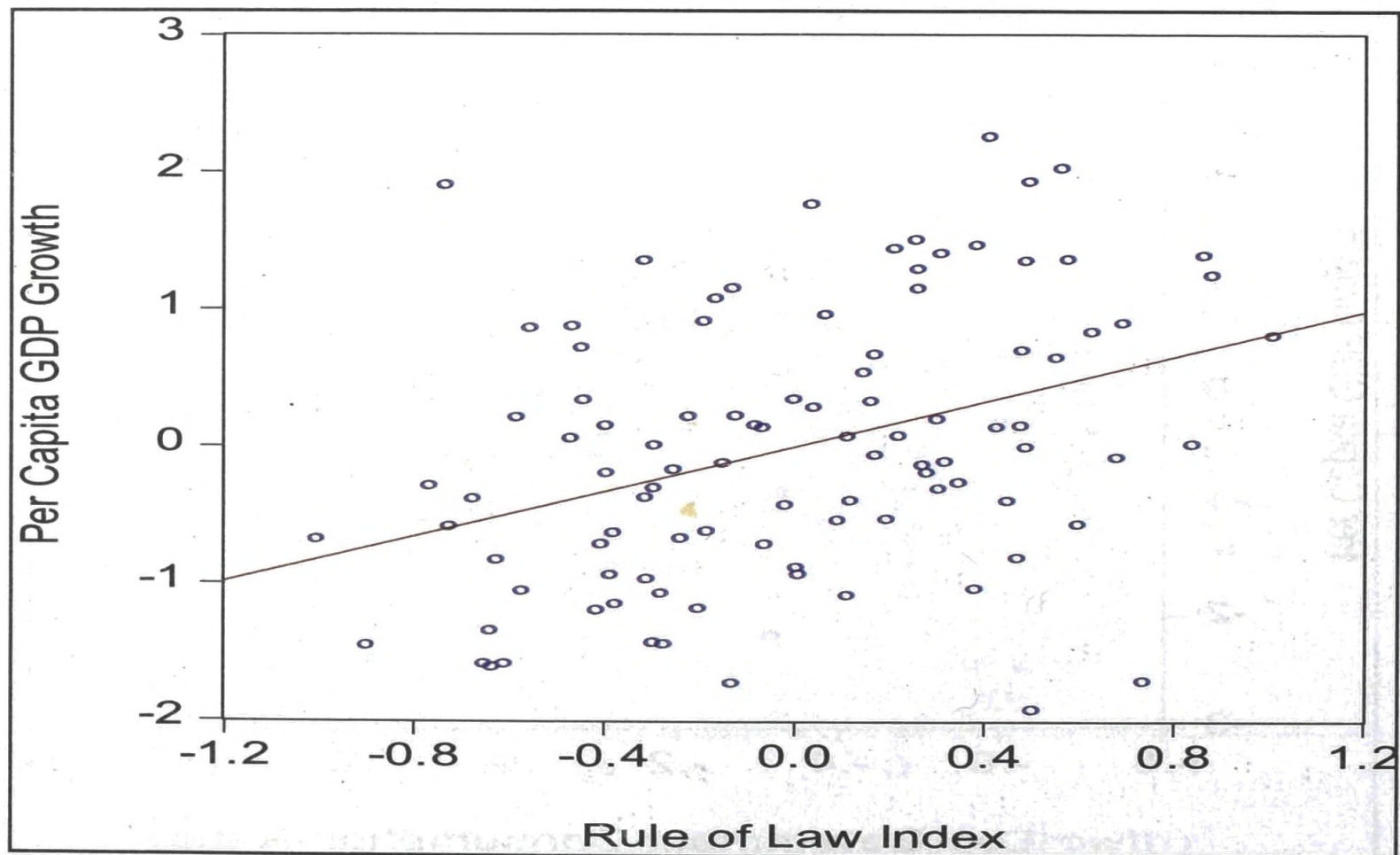


Figure 10 : Partial Relation between Per Capita GDP Growth and FDI

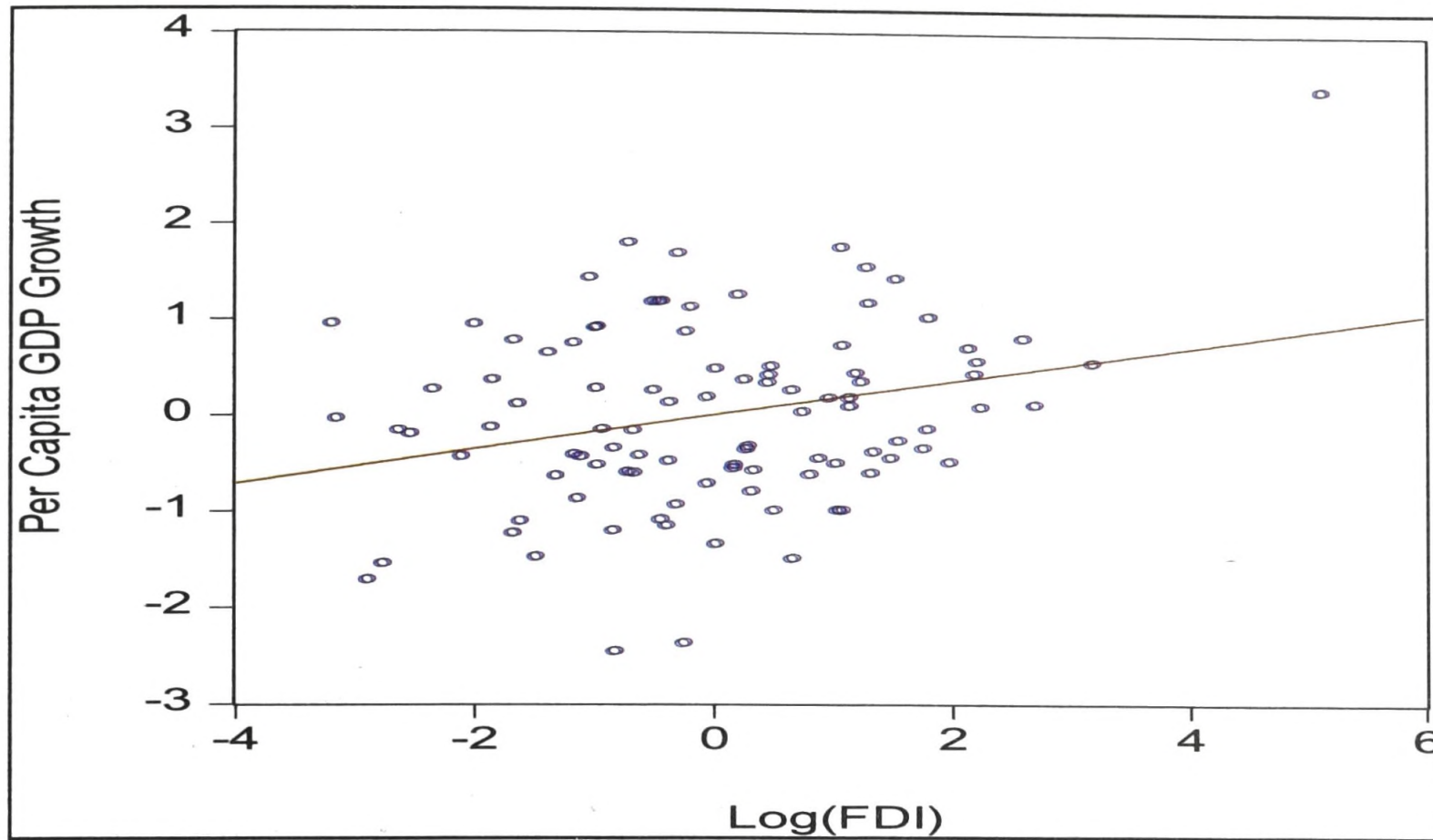
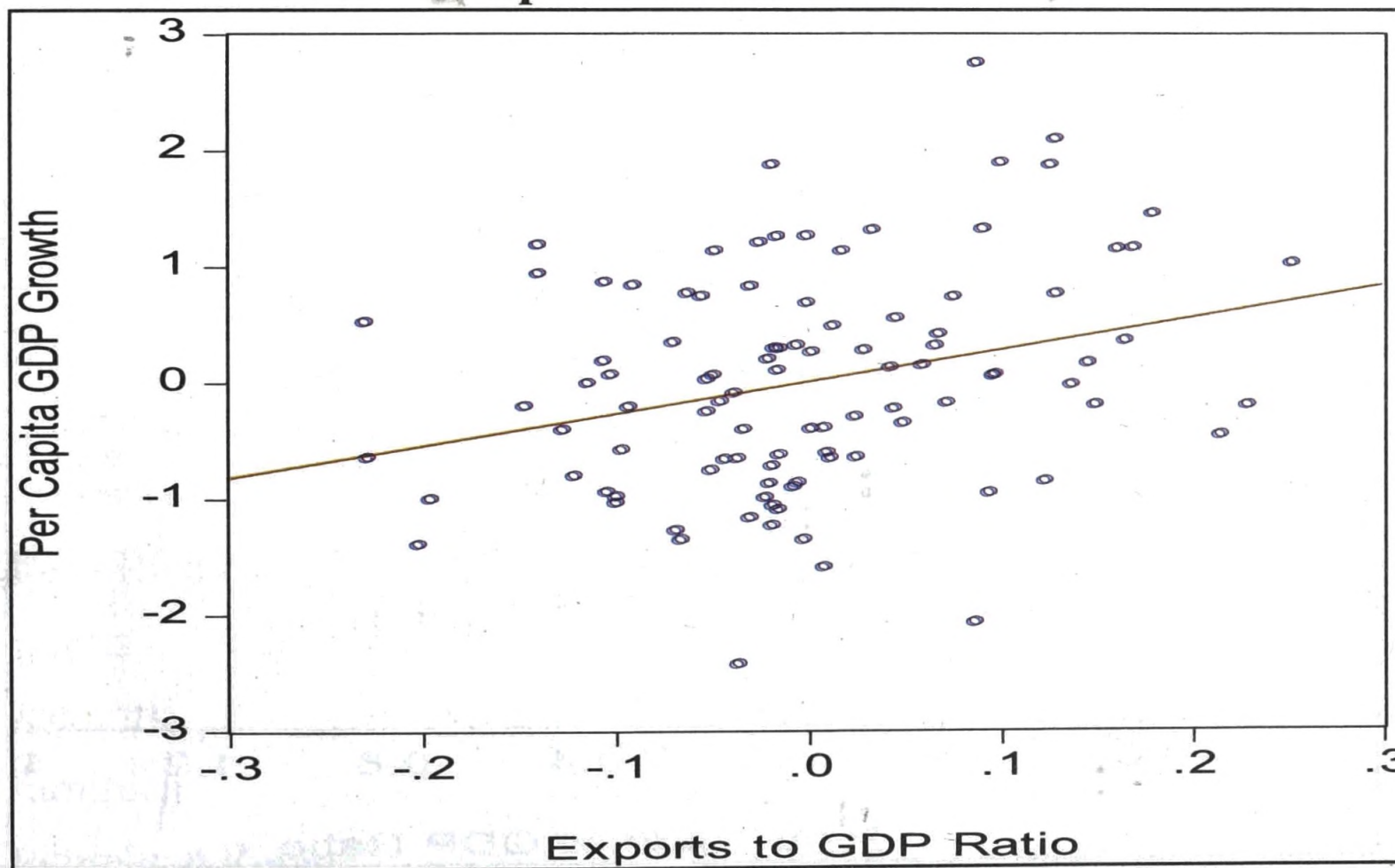
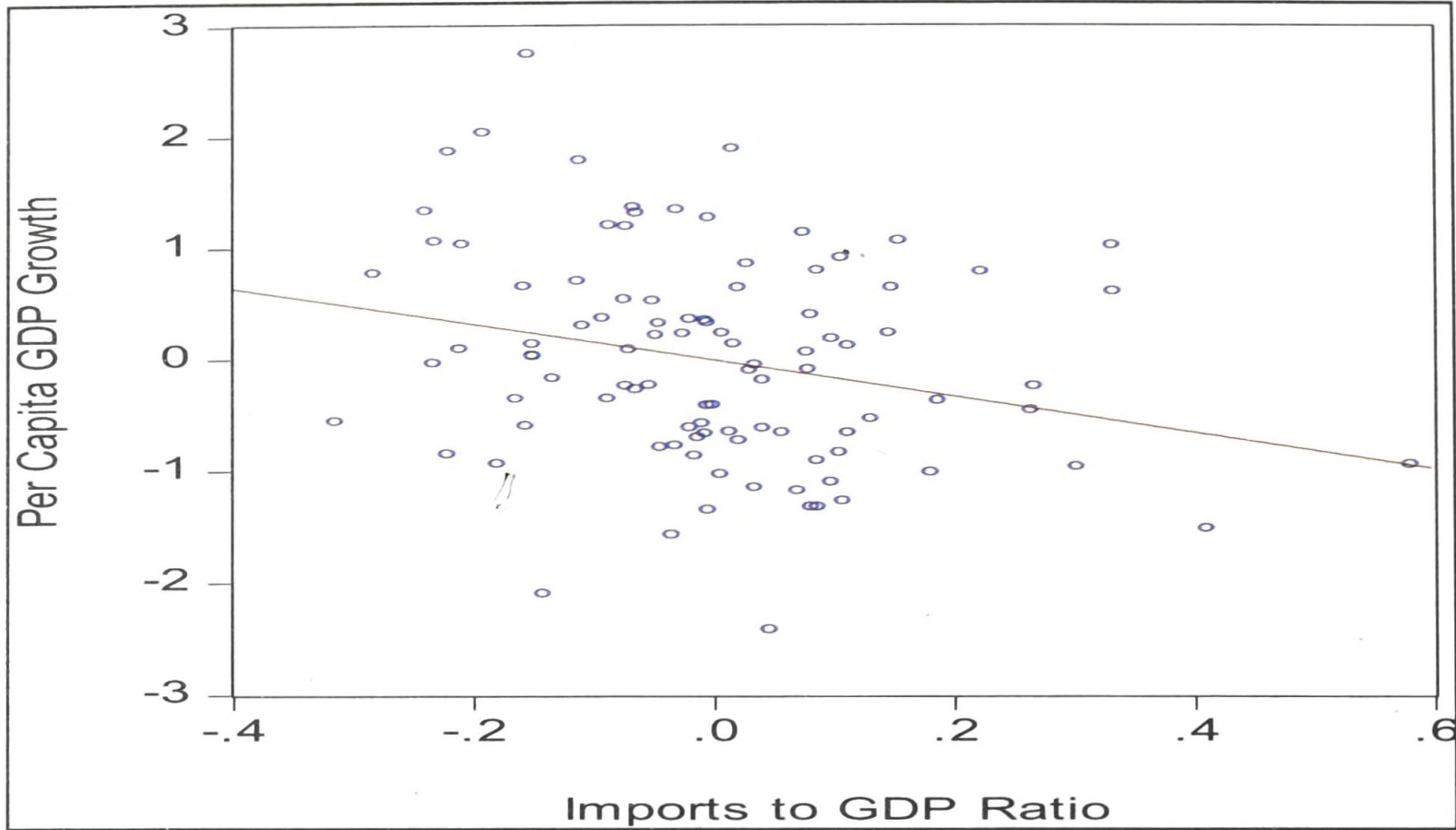


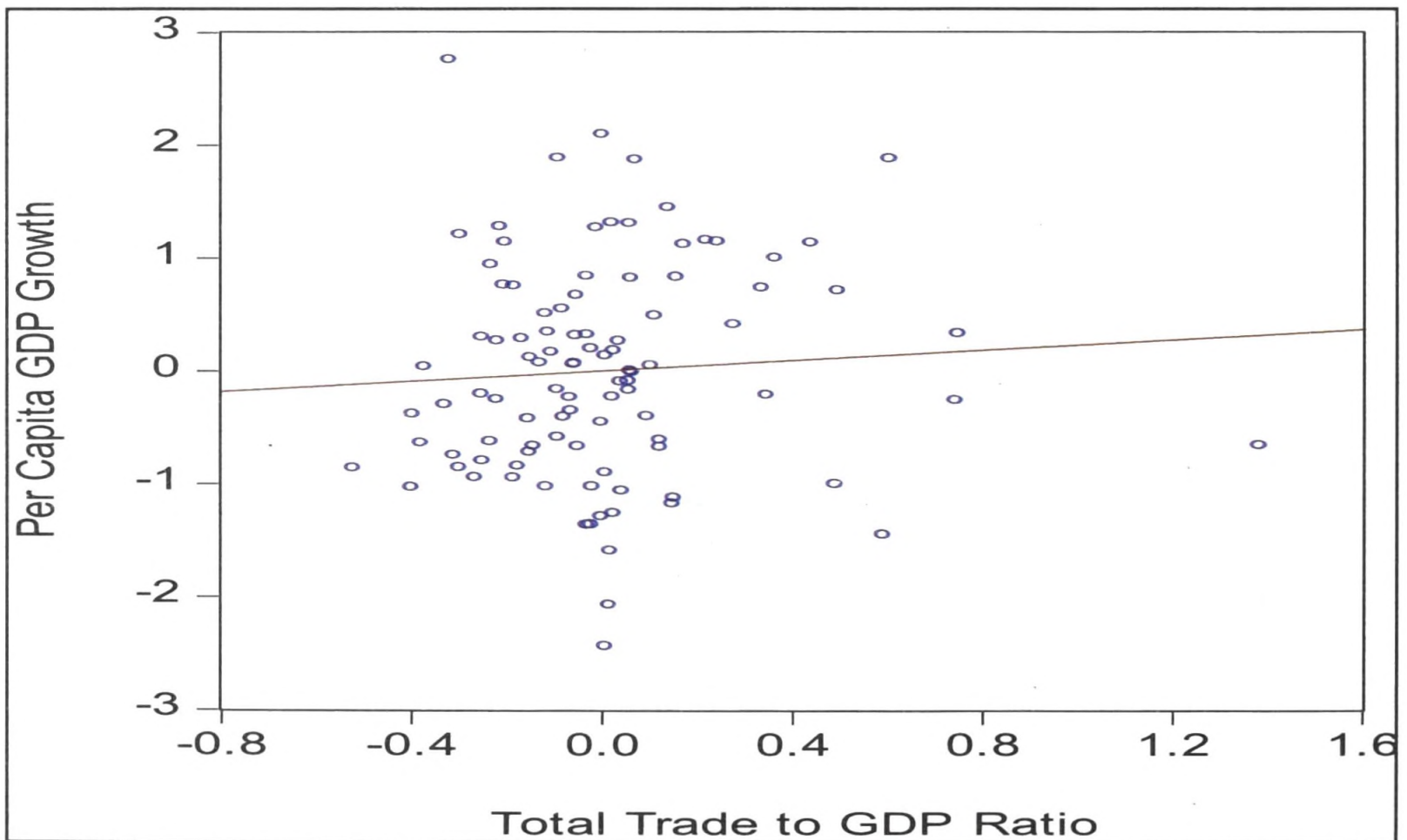
Figure 11 : Partial Relation between Per Capita GDP Growth Exports to GDP Ratio



**Figure 12 : Partial Relation between Per Capita GDP Growth
Imports to GDP Ratio**



**Figure 13 : Partial Relation between Per Capita GDP Growth
and Total Trade to GDP Ratio**



List of Countries

Antigua and Barbuda	Kuwait
Australia	Lesotho
Austria	Liberia
Bahrain	Luxembourg
Bangladesh	Madagascar
Barbados	Malawi
Belgium	Malaysia
Belize	Maldives
Benin	Mali
Bhutan	Malta
Bolivia	Mauritania
Botswana	Mauritius
Bulgaria	Mexico
Burkina Faso	Morocco
Burundi	Mozambique
Cameroon	Namibia
Canada	Nepal
Central African Republic	Netherlands
Chad	New Zealand
Chile	Niger
China	Nigeria
Colombia	Norway
Comoros	Oman
Costa Rica	Pakistan
Cyprus	Panama
Denmark	Paraguay
Dominica	Peru
Dominican Republic	Philippines
Ecuador	Portugal
El Salvador	Qatar

Fiji	Rwanda
Finland	Senegal
France	Sierra Leone
Gabon	South Africa
Germany	Spain
Ghana	Sri Lanka
Greece	Suriname
Grenada	Swaziland
Guatemala	Sweden
Guinea-Bissau	Switzerland
Honduras	Thailand
Hungary	Togo
Iceland	Trinidad and Tobago
India	Tunisia
Indonesia	Turkey
Ireland	Uganda
Israel	United Kingdom
Italy	United States
Jamaica	Uruguay
Japan	Zambia
Jordan	Zimbabwe
Kenya	