Effect of Competition Law on Inflation and FDI: A Panel Data Analysis

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Abstract

Competition laws are adopted by countries for three main purposes. Firstly, to augment the state of competition in specific markets ensuring efficient allocation of resources and efficient production, i.e. bring prices closer to marginal cost; secondly, to reduce and control anti-competitive behavior of existing businesses through an incentive / disincentive mechanism; thirdly, to provide incentive for innovation. Inflation rate will decrease and foreign direct investment (FDI) will rise in a country that adopts competition law; however, the direction of causality is not clear. This paper explores the impact of adopting competition law on inflation rate and on FDI. To examine the impact of competition law, this study uses panel regression analysis with random effect for inflation and for FDI for 86 countries from 2005 to 2008. Of the 86 countries, 62 countries had passed competition law. The results indicate that adoption of a competition law has no impact on a country's inflation rate but has a positive impact on FDI. This implies that competition laws will not be effective in controlling the general inflation rate of a country but it works as an incentive for foreign investors who see the law as a shield that protects their investment from anti-competitive practices in a country.

Key Words: Competition Law, Inflation, Foreign Direct Investment, Panel Data.
JEL: K21, E31, F21

Introduction

Competition law focuses on reducing and controlling market dominating behavior of existing businesses and encourages entry of new firms and foreign direct investment (FDI). The main objective of a competition law is to make markets competitive, ensuring the efficient allocation of resources and efficient production with incentives for innovation. A country's inflation rate will reduce and FDI will rise in a country that adopts competition law; the direction of causality is not clear.

Competition laws have been adopted by 102 countries till 2008 (Kronthaler, 2008). "Multilaterally agreed equitable principles and rules for the control of anticompetitive practices" have encouraged most of these countries to adopt competition law. Not all countries that adopted this legislation have enforced it. For example, Colombia, which had enacted a competition law for the first time in 1959 (Edwards, 1967) had never enforced it; but the country, is considered to have a competition law. However, a country which is in the process of creating competition legislation, or has already finished its draft, is considered as having no competition law, for instance, Bangladesh.

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This study is a partial fulfillment of the requirement for the Master of Science in Economics at United International University, Dhaka. The author would like to express his sincere gratitude and deepest respect to his supervisor Dr. A. K. Enamul Haque, Professor, Department of Economics, United International University, Dhaka for his continuous guidance, valuable advice and encouragement throughout the study. The author considers it a great opportunity to work with him. The author also acknowledges his insightful knowledge that helped greatly in carrying out this work. The author, however, is fully responsible for the views expressed and any remaining errors in the paper.

Firstly, competition in the product market will reduce average inflation rate (Marcin Przybyla and Moreno Roma, 2005). In this context, this study will try to illustrate *whether there is any impact on inflation due to adoption of competition law in a country.* Secondly, competition law can enhance the attractiveness of countries regarding inflow of FDI (Franz Kronthaler and Johannes Stephan, 2007) and it strengthens the inflow of FDI given that the competition law provides a transparent and market-oriented framework which reduces transaction costs for the foreign investors (WTO, 1998). This paper tries to examine the effect of adopting competition law by a country on inflow of FDI to that country. More specifically, the question to answer is: does countries adoption of competition law influences FDI? To illustrate these objectives, this study uses panel regression analysis with random effect using data of 86 countries from 2005 to 2008.

The competition law is a very crucial in ensuring consumer welfare and measures should be taken in order to make businesses compete fairly by enforcing the legislation. An effective competition law should have a positive impact on the economy. Competition law is a broad topic and extensive time is needed to examine all minute aspects within the law. This study considers the competition law as a whole. The findings of this study would be helpful for future research in this subject matter.

This study introduces two models one for inflation and other for FDI. As explanatory variables, the model for inflation uses one period lag of inflation rate, real effective exchange rate, terms of trade adjustment in local currency unit (LCU), two period lag of competition law, developed country and the model for FDI uses competition law, real effective exchange rate, foreign reserves, net trade in goods and services (BoP, current US$) and employment to population ratio plus 15 (% of total). Of the explanatory variables competition law and developed country are dummy variables. All the variables are not found to contribute significantly in respect of enforcing the competition law.

Using empirical data, this study tests the validity of the theories that expect adoption of competition law to have impact on inflation rate and inflow of FDI. This study may influence further empirical analysis to test theories regarding competition law.

Objectives

The broad objective of this study is to find out the impact of competition law of a country on Inflation rate and on FDI. The specific objectives are as follows:

- To identify the impact of adoption of competition law on inflation rate.
- To identify the impact of adoption of competition law on FDI.

The paper is structured as follows: chapter 2 provides a brief overview of competition law. Chapter 3 discusses relevant literature regarding competition law. In chapter 4, the theoretical background of the factors that could influence the decision to adopt a competition law is described. This chapter also discusses the impacts of the competition law on inflation and FDI, from which testable hypotheses are derived in a deductive methodology, and it also discusses the data and methods used to test the hypotheses. Chapter 5 presents the estimation and results of the empirical analysis. A final chapter summarizes the findings and limitations of the study.

Background of competition law

To control or eliminate restrictive agreements or arrangements among enterprises, or mergers and acquisitions or abuse of dominant positions of market power, which limit access to markets or otherwise unduly restrain competition, adversely affecting domestic or international trade or economic development (UNCTAD, 2004). Competition law is known

as antitrust law in the United States (US), which promotes or maintains the market competition[2] by regulating anti-competitive[3] conduct. The main concern of a competition law is to make businesses compete fairly. It has three main elements such as prohibiting agreements or practices that restrict free trading and competition between businesses (i.e. cartel), exclusion of abusive behavior by a firm dominating a market or anti-competitive practices (i.e. predatory pricing, tying, price gouging, refusal to deal and etc) and supervising the mergers and acquisitions[4] of large corporations (i.e. some joint ventures). So it can be said that competition law is the underlying dynamic that drives the market-based commercial and economic system which best serves to create wealth and enhance living standards for the benefit of all.

In its 1997 World Investment Report, UNCTAD formulated the objectives of competition law in the following terms: "The main objective of competition laws is to preserve and promote competition as a means to ensure the efficient allocation of resources in an economy, resulting in the best possible choice of quality, the lowest prices and adequate supplies for consumers" (UNCTAD, 1997). In addition, the UNCTAD Model Law on Competition states that the main objectives of national competition law and policy are 'to control or eliminate restrictive agreements or arrangements among enterprises, or mergers and acquisitions or abuse of dominant positions of market power which limit access to markets or otherwise unduly restrain competition adversely affecting domestic or international trade or economic development' (UNCTAD, 1997).

The competition law aims to prevent private and public actors from restricting competition. It is generally known that competition law is based on one or various laws which prohibit collusive activities and abuse of market dominance as well as corporate mergers under certain circumstances that are legally defined. A particular organization which is called the Competition agency is established to apply the respective laws; "where competition legislation does not exist, the magnitude of possible restrictions depends on the obstacles that national and international competitors have to overcome in order to offer their products in the market."[5] (Baumol, 1982).

Different Types of Competition Law

Probably Edwards provides the first comprehensive survey of national competition laws around the world and indicates that up until the end of 1964, only 24 states were seriously engaged in controlling restrictive business practices by law (Edwards, 1974). A few years later, he stated that by 1973, only three more countries had adopted a competition law. He further suggests that, all countries that support competition have reached a high level of economic development and have a similar cultural identity (Franz Kronthaler and Johannes Stephan, 2005).

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[2] *Competition* in economics is a term that includes the notion of individuals' and firms' struggle for a greater share of a market to sell or buy goods and services.

[3] *Anti-competitive practices* are practices by business or government that prevent or reduce competition in a market, such as cartels, dumping, price fixing, entry barriers, predatory pricing, limit pricing, tying, price gouging, refusal to deal, coercive monopoly, government-granted monopoly, government monopoly and others.

[4] *Mergers and acquisitions* refer to the aspect of corporate strategy, corporate finance and management dealing with the buying, selling and combining of different companies that can aid, finance or help a growing company in a given industry grow rapidly without having to create another business entity.

[5] According to Baumol's usage, markets that have no entry and exit restrictions are defined as "contestable" markets. Exit barriers are those hurdles that a firm must overcome when it decides to withdraw from a market. See also William Baumol (1982). "Completely contestable markets" are free from competition restrictions.

Competition law history refers to attempts by governments to regulate competitive markets for goods and services, leading up to the modern competition or antitrust laws around the world today. The history of the competition law is divided into early history and modern history; a snapshot of these two is given bellow:

Early History

Governing competition laws are found in over two millennia of history which includes Roman legislation, middle ages, Renaissance developments and restraint of trade. The formal study of competition law began in true sense during the 18th century such as Adam Smith's "The Wealth of Nations". Different terms were used to describe this area of the law, including restrictive practices, the law of monopolies, combination acts and the restraint of trade.

The Roman law consist such periods i.e. early law and jurisprudence, pre-classical period (201 to 27 BC), classical Roman law (first 250 years of the current era), and post-classical law (middle of the 3rd century). The legislation middle ages in England to control monopolies and restrictive practices were in force well before the Norman Conquest (Wilberforce, Richard, Alan Campbell and Neil Elles, 1966). In 1561, a system of Industrial Monopoly Licensees, similar to modern patents had been introduced into England and parliament passed the Statute of Monopolies in 1623 which for the most part excluded patent rights from its prohibitions as well as the guilds. Then in 1684, East India Company decided that exclusive rights to trade only outside the realm which were lawful on the grounds that only large and powerful concerns could trade in the conditions prevailing overseas. In 1710 the New Law was passed to deal with high coal prices caused by a Newcastle Coal Monopoly. In the time of judge Coke in 17th century it was thought that general restraints on trade were unreasonable. Mainly, the English law of restraint of trade is the direct predecessor to modern competition law [6] (Wilberforce, Richard, Alan Campbell and Neil Elles, 1966). A restraint of trade is simply some kind of agreed provision that is designed to restrain another's trade.

Modern Competition Law

In the modern age, some competition laws are adopted that are discussed in the study such as US competition law, EU competition law, German competition law and International Enforcement. There are two large and highly influential system of competition legislation; they are the US competition law and the European competition law. In US the competition policy is known as anti-trust law. "There are two basic antitrust laws in the United States – the Sherman Act and the Clayton Act; both are enforceable either by the Antitrust Division of the Department of Justice, the Federal Trade Commission or private persons alleging economic injury caused by violation of either of them" (Rubin, 2001). So it can be said that the status of anti-trust is administered by the organizations such as Sherman and Clayton Acts, a variety of federal competition and consumer protection laws.

The European Competition law is also the part of Sherman Act and Clayton Act. The main aims of creating the law was to established the single market stated in the articles 85 and 86 of Treaty on the Functioning of the European Union (TFEU). According to the Council Regulation (EC) No 1/2003 of 16 December 2002, it was passed that the National Competition Authorities (NCA) and National Courts of the member state would be the heart of the enforcement of Acts 101 & 102 and finally enforced the competition law. To maintain

[6] "The modern common law of England [has] passed directly into the legislation and thereafter into the judge-made law of the United States." Wilberforce (1966) p.7

properly they created European Competition Network (ECN); it is still working although with some improvements or changes.

In January 1, 1958 the German competition law came into force (Feldenkirchen, 1992). In the second amendment in August 3, 1973, "merger control was introduced that had been rejected by Parliament on enactment of the law in 1957. In addition, control of abuses over market dominating enterprises was tightened once more"

Nowadays the competition law has been substantially internationalized. The main reasons of internationalizing of the competition law are increasing the activities of the UNCTAD and the Organization for Economic Co-operation and Development (OECD). The UNCTAD and OECD are prone to making neo-liberal recommendations about the total application of competition law for public and private industries (Prosser, 2005) which also help to increase the international enforcement of the competition law. "It seems unlikely at the current stage of its development that the WTO will metamorphose into a global competition authority" (Whish, 2003). As a result it is easily comprehensible that due to the recent activities of these international organizations the prospect of competition law enforcement is moving up to a global level.

Literature Review

The paper reviews the earlier studies of the competition law and objectives of related articles. Most of these studies illustrated the impacts and effectiveness of adopting competition law in broad aspect by using various explanatory variables. In the light of these studies, it is logical to identify the impacts of the competition law on inflation and on foreign direct investment, as there is an inadequacy of literatures of such kinds of study.

To illustrate the competition law and liberalization with respect to welfare Kronthaler *et al*. (2007) presents that, the competition law and trade liberalization play complementary roles in promoting efficiency, consumer welfare, growth and development. In particular, the adoption of a competition law is often seen as a tool against anti-competitive behavior and a competition law may be seen as necessary to protect domestic enterprises from possible abuses of market power by international enterprises and cartels. On the other sense Kronthaler (2008) describes, empirical evidence has proved that, the significance of effective law enforcement is unavoidable in the specification of economic development and growth, economic and political realities which are important factors in a economy.

To examine the relationship between competition and inflation Janger and Dengler (2010) has found that the general relationship between competition and inflation by analyzing international data on a less highly disaggregated level. Increases in final consumer prices can either be caused by cost-push inflation[7] or market power inflation[8]. When compounded with cost-push effects, profit-push effects will precipitate wage-price spiral inflation[9]. Crowley (2010), Klein and A Kyei (2009) present that there is a positive relationship between inflation and one period of lag inflation, that is lag period of inflation is highly positively correlated with inflation.

By analyzing an exchange rate-based approach to inflation targeting, Restrepo and Garcia (2009) suggest, it may work well in lowering volatility of the exchange rate, but that may come at a high price in terms of inflation and output volatility if the economy is particularly exposed to demand and cost-push shocks and the framework could be prone to speculative

[7] *Cost-push inflation* occurs when rising costs of production factors (labor, raw materials, etc.) are passed on to consumers via consumer prices.

[8] *Market power inflation* occurs when enterprises exploit monopoly positions or a lack of market competition, or when they collude with competitors to improve profit margins by raising prices (profit-push inflation).

[9] *Wage-price spiral inflation* induced wage hikes cause companies to raise prices, which in turn creates pressure for further wage increases.

pressures in advance of periodic resets of the exchange rate, resulting in high interest rate volatility and pressure on foreign exchange reserves or both.

Moreover Catao and Chang (2010) represent that terms of trade will depend on the exogenous relative world price which reflects the need for relative price changes to accommodate the increased production where imperfect international competition gives the possibility for the domestic policy maker to gain from an appreciation of the real exchange rate. It is seen that the antitrust law involves not just the regulation of anti-competitive behavior, but also an important deterrence effect (Seldeslachts *et al.* 2007). Buccirossi *et al*. (2009) investigated the effectiveness of competition law by estimating its impact on Total Factor Productivity (TFP) growth for 22 industries in 12 OECD and found a robust positive and significant effect of competition law as measured by newly created indexes.

To explain the relation with FDI Kronthaler *et al. (*2007) mention that competition law could negatively affect the inflow of FDI, whilst others argue that competition law could enhance the attractiveness of countries to FDI. And this contradictory speech is valid for some particular developing countries. Walsh and Yu (2010) refer that a weaker real exchange rate might be expected to increase vertical FDI as firms take advantage of relatively low prices in host markets to purchase facilities. On the other side Froot and Stein (1991) has found evidence of the relationship: a weaker host country currency tends to increase inward FDI within an imperfect capital market model as depreciation makes host country assets less expensive relative to assets in the home country.

Blonigen (1997) argues that exchange rate depreciation in host countries tend to increase FDI inflows but on the other hand, a stronger real exchange rate might be expected to strengthen the incentive of foreign companies to produce domestically that is the exchange rate is in a sense a barrier to entry in the market that could lead to more horizontal FDI. Jaumotte *et al*. (2008) described that in developing countries, the bulk of FDI goes into low-end manufacturing and natural resource sectors, increasing employment opportunities for those who have higher skills as well as outward FDI in developed economies predictably tends to increase inequality by reducing employment opportunities in relatively lower skill sectors. Asare (2005) seems that the flow of FDI (even in larger volumes) is not a panacea of employment problems rather depends on the sectors where the FDI flows into and employment impact of FDI would best be realized if it flows into sectors such as export trade, tourism, manufacturing, agriculture and building and construction rather than mining.

Babecky *et al*. (2012) present the evidence on the relationship between FDI and the real exchange rate is mixed and over time, the increasing FDI-to-GDP ratio corresponds to an improving trade balance in some definite sample countries and to either a worsening or unchanged trade balance in the others.

Franz Kronthaler (2008) used competition law as the explained variable and the explanatory variables GDP, economic freedom index, foreign direct investment, industry share, Government consumption expenditure, imports of goods and services, corruption perception index, international monetary fund credit, regional trade agreements and time of the law's enactment to find out how effective the enforcement of the competition law is. Similarly, Franz Kronthaler and Johannes Stephan (September 2007) uses export duties and import duties along with these variables to identify and discuss the possible factors that influence the decision to enact a competition law. But this study used inflation and foreign direct investment as the explained variables to find out what the impact of competition policy is on these two variables.

The literature review part of this study is prepared with respect to related issues and concepts of the concerned topic and here the author has focused out on the generalization of competition law as well as the relationship with some important economic factors by considering the empirical proofs.

Theoretical Background

This study addresses the following questions: *is there any impact on inflation due to adoption of competition law* and *what factor influences foreign investors to increase FDI?* The related theoretical background is explained below:

Firstly, the competition law may have an impact on inflation or may have impact on the prices of a specific bundle of commodities. In this context, this study considers some influencing factors of inflation such as *one period lag of inflation, real effective exchange rate, terms of trade adjusted in LCU*, and *developed country* (as dummy variable). The study adds the competition law as dummy variable along with these influencing factors of inflation. Here, inflation is considered as the explained variable and competition law along with the discussed influencing factors are considered as the explanatory variables.

One of the important influencing factors of inflation is real effective exchange rate which is expected to be positively related to the dependant variable as found in other literatures. If exchange rate increases, i.e. if the currency of a country depreciates, inflation will increase. Terms of trade adjustment (constant LCU) is another consideration as an independent variable of the model which is also expected to be positively related to the inflation. One period lag of inflation is expected to be positively related to inflation which is also considered in this study as an influencing factor of inflation. The dependent variable, inflation, is expected to be negatively related to the independent dummy variable (developed country), i.e. as a country develops, the rate of inflation of that country reduces; so it's an important influencing factor for the model. Competition law, a dummy variable, is the most important variable put in the right hand side as an independent variable to examine the desired result. In the model not only the dummy variable of current competition law has been used but also a two period of lag of competition law has been used to find out the impact on inflation.

Secondly, the study also finds out the influencing factor of increasing the foreign direct investment. In an ideal situation, the home country motivation to enforce the competition law should be based on benefits and costs of the policy itself, and should be free from the intervention of other countries or donors or etc. This paper considered the foreign direct investment as the explained variable and some other explanatory variables which are mainly the influencing factor of FDI such as *real effective exchange rate, foreign reserve, net trade in goods and services and employment to population ratio plus 15 years (% of total)*. To examine the fact, the study considered the variable real effective exchange rate as an independent variable. There is a negative relationship between the foreign direct investment and real effective exchange rate. As the real effective exchange rate increases, the foreign direct investment reduces due to the depreciation of the currency of the home country. The foreign currency deposits and bonds held by central banks and monetary authorities is an important influential factor of the foreign direct investment. If the foreign reserve increases by one unit then the FDI must be increases at some point due to both are positively related. So the foreign reserves raise the FDI. The study also considers the independent variable net trade in goods and services which is positively related to the foreign direct investment and as the net trade rises then the foreign direct investment also rises due there is an environment of trade which attracts the foreign investors. Another consideration of this paper as an independent variable is the employment to population ratio plus 15 years (% of total) that is negatively related to the foreign direct investment. If the country can reduces his unemployment that means that country is capable enough to expand the country's economy which depresses the foreign investors to invest. As a result, the foreign direct investment reduces. To illustrate the desired result, the study also considered the dummy variable competition policy as an independent variable and put it to the right hand side along with the other independent variables.

Data and Method

To examine the hypotheses, the panel regression analysis with random effect including a cross-section and time-dimension to determine the impact of competition policy on general inflation and on FDI is applied. Alternatively, two basic models could be estimated to examine for the two different cases - the case of the relationship between the competition law and inflation and also the relationship between competition law and FDI.

Data

This study is mainly based on the secondary data. The overall sample used to test the hypotheses in this study comprises data from 2005 to 2008. Of the 86 countries 62 countries had passed a competition law. This data is used to proxy the factors to determine the pass of competition law i.e. if the country has passed competition law then "1" and if the country has not passed competition law then "0". There is a dummy variable for developed country i.e. if the country is developed then "1" and if the country is not developed then "0"[10]. Of the 86 countries 29 countries are developed. All the respective data for all the countries are not available. So, due to those data limitations, several countries cannot contribute to the testing of the hypotheses. All the data have been collected from the World Bank database "WDI online" for 2005 to 2008. The respective data are described below.

Explained Variable

Inflation, GDP deflator (annual %)

Inflation as measured by the annual growth rate of the GDP implicit deflator shows the rate of price change in the economy as a whole. The GDP implicit deflator is the ratio of GDP in current local currency to GDP in constant local currency. The source of data is World Bank national accounts data and OECD National Accounts but it is collected from the World Bank data base from 2005 to 2008. It is known that inflation can lead the uncertainty about the future profitability of investment projects (especially when high inflation is also associated with increased price variability). This leads to more conservative investment strategies and ultimately leading to lower levels of investment and economic growth. Inflation may also reduce a country's international competitiveness by making its exports relatively more expensive thus impacting on the balance of payments (BoP). Moreover, inflation can interact with the tax system to distort borrowing and lending decisions. Firms may have to devote more resources to deal with the effects of inflation (for example, more attentive monitoring of their competitors' prices to see if any increases are part of a general inflationary trend in the economy or due to more industry specific causes).

Foreign direct investment, net (BoP, current US$)

Foreign direct investment is net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments. This series shows total net, that is, net FDI in the reporting economy from foreign sources less net FDI by the reporting economy to the rest of the world. Data are in current U.S. dollars from 2005 t0 2008 and the source is International Monetary Fund, Balance of Payments Statistics Yearbook and data files. The foreign direct investment (FDI) plays an extraordinary and growing role in global business. For a host country or the foreign firm which receives the investment, it can provide a source of new technologies, capital, processes, products, organizational technologies and management skills, and as such can provide a strong impetus to economic development. In the past decades, FDI has come to play a major role in the

[10] *Developed country* is considered according to the report HDI 2010 where the HDI of 0.788 and over countries are included in the developed country list.

internationalization of business. Reacting to changes in technology, growing liberalization including trade policy and tariff liberalization of the national regulatory framework governing investment in enterprises and changes in capital markets profound changes have occurred in the size, scope and methods of FDI. New information technology made the management systems of foreign investments far easier than in the past by reducing the global communication costs.

Explanatory Variable

Competition law

The explanatory variable is a binary variable and measures whether a country has a competition law and when this was adopted. The variable assumes a value of "1" for the time period a country has a competition law, otherwise it is set equal to "0". More specifically, e.g. India had enacted a competition law for the first time in 2008. In such cases, the independent variable is set equal to "1" only at the point of time when a new competition act came into force. Similarly, for countries which had a competition law under construction or passed only the drafts but not yet enforced it, is set equal to "0" i.e. country that do not have competition law, like Bangladesh.

Real effective exchange rate index (2000 = 100)

Real effective exchange rate is the nominal effective exchange rate (a measure of the value of a currency against a weighted average of several foreign currencies) divided by a price deflator or index of costs. The source of data is International Monetary Fund, International Financial Statistics but it is collected from the World Bank data base from 2005 to 2008.

Terms of trade adjustment (constant LCU)

The terms of trade effect equals capacity to import fewer exports of goods and services in constant prices. Data are in constant local currency. The source of data is World Bank national accounts data and OECD National Accounts data files from 2005 to 2008.

Developed country

According to the Human Development Index the latest article November 4, 2010 with an HDI at or above 0.788 and are considered as developed countries. Here we take only 29 developed countries among the 44 developed countries. We consider the developed country as dummy variable if the country is developed then "1" otherwise "0".

Foreign reserves (months import cover, goods and services)

Foreign reserve refers to the foreign currency deposits and bonds held by central banks and monetary authorities. The source of data is International Monetary Fund, Balance of Payments Statistics Yearbook and data files from the year 2005 to 2008.

Net trade in goods and services (BoP, current US$)

Net trade in goods and services is derived by offsetting imports of goods and services against exports of goods and services. Exports and imports of goods and services comprise all transactions involving a change of ownership of goods and services between residents of one country and the rest of the world. Data are in current U.S. dollars. The source of data is International Monetary Fund, Balance of Payments Statistics Yearbook and data files from the year 2005 to 2008.

Employment to population ratio plus 15 years (% of total)

Employment to population ratio is the proportion of a country's population that is employed. Ages 15 and older are generally considered the working-age population. The source of the date is International Labor Organization, Key Indicators of the Labor Market database from the year 2005 to 2008.

Method

The term panel data refers to multi-dimensional data. A panel data has a cross-section (entity or subject) variable and a time-series variable. There are multiple entities, each of which has repeated measurements at different time periods. A panel has the form,

$$X_{it},\ i = 1,\ldots..,N \text{ and } t = 1,\ldots..,T$$

Where *i* denote for country dimension and *t* denote for time dimension. A general panel data regression model is written as $Y_{it} = \beta_0 + \beta_1 X_{it} + \mu_{it}$

Where Y is the explained variable, X is the explanatory variable, all β's are parameters, μ is error term and *i* and *t* are denote for countries and years, respectively. The error μ_{it} is very important in this analysis. Panel data models examine fixed and/or random effects of entity (individual or subject) or time. In a fixed effects model, μ_{it} is assumed to vary non-stochastically over *i* or *t* making the fixed effects model analogous to a dummy variable model in one dimension. In a random effects model, μ_{it} is assumed to vary stochastically over *i* or *t* requiring special treatment of the error variance matrix.

The random effect models are used in the analysis of hierarchical linear model[11] or panel data; when there assumes no fixed effects. A random effect model is estimated by generalized least squares (GLS) when the Ω matrix, a variance structure among groups, is known. The feasible generalized least squares (FGLS) method is used to estimate the variance structure when Ω is not known. The random effects are examined by the Lagrange Multiplier (LM) test (Breusch and Pagan 1980).

This study uses random effect model, where the explanatory variables are not constant over time and assume that the unobserved effect is uncorrelated with all explanatory variables. Hausman specification test shows the significant result and Breusch and Pagan lagrangian multiplier test also failed to reject the null hypothesis, conclude that, random effect is not appropriate for model 1 with given the data set. So the study sues simple panel regression for the model 1. On the other hand, Hausman specification test shows $Prob > Chai^2$ = 0.3603, i.e. insignificant and the null hypothesis is rejected using the Breusch and Pagan lagrangian multiplier test and conclude that the random effect is appropriate for the model 2 with given the data set.

To begin with the unobserved effects model as,

$$Y_{it} = \beta_0 + \beta_1 X_{it1} + \ldots\ldots + \beta_k X_{itk} + a_i + \mu_{it}$$

Where explicitly include an intercept to make the assumption that the unobserved effect, a_i, has zero mean. The above model becomes a random effect model by assuming the unobserved effect a_i is uncorrelated with each explanatory variable:

$$\text{Cov}(X_{itj}, a_i) = 0,\ \text{t} = 1,2,\ldots\ldots\ldots,\text{T};\ \text{j} = 1,2,\ldots\ldots\ldots,\text{k}.$$

It can be define, composite error term as $\nu_{it} = a_i + \mu_{it}$ then the random effect model can be written as

$$Y_{it} = \beta_0 + \beta_1 X_{it1} + \ldots\ldots + \beta_k X_{itk} + \nu_{it}$$

Since inflation rate and foreign direct investment are designed as the explained variable for each different model, a panel regression analysis with random effect is employed to test the hypotheses. There are two panel regression models such as following:

[11] Hierarchical linear model is a more advanced form of simple linear regression and multiple linear regressions.

Model 1:

$$(\mathbf{infl})_{it} = \boldsymbol{\beta}_0 + \boldsymbol{\beta}_1\,(\mathbf{competiton})_{it1-2} + \boldsymbol{\beta}_2(\mathbf{infl})_{it2-1} + \boldsymbol{\beta}_3\,(\mathbf{xchrreal})_{it3} + \boldsymbol{\beta}_4\,(\mathbf{totadjustlcu})_{it4} + \boldsymbol{\beta}_5\,(\mathbf{developed\_country})_{it} + \mu_{it}$$

Where, infl = Inflation rate, competition = Competition Law, xchrreal = Real Effective Exchange Rate, totadjustlcu = Terms of Trade Adjustment (constant LCU), developed_country = Developed Country. All β's are parameters and μ is error term and i denote for country, and t denote for year.

Model 2:

$$(\boldsymbol{FDI})_{it} = \boldsymbol{\beta}_0 + \boldsymbol{\beta}_1\,(\mathbf{competiton})_{it1} + \boldsymbol{\beta}_2(\mathbf{xchrreal})_{it2} + \boldsymbol{\beta}_3\,(\mathbf{fornreserve})_{it3} + \boldsymbol{\beta}_4\,(\mathbf{nettrade})_{it4} + \boldsymbol{\beta}_5\,(\mathbf{emp15pluspc})_{it5} + \nu_{it}$$

Where, FDI = Foreign Direct Investment, competition = Competition Law, xchrreal = Real Effective Exchange Rate, nettrade = Net Trade in Goods and Services (BoP, current US$), emp15pluspc = Employment to population ratio plus 15 years (% of total). All β's are parameters and μ is error term and i denote for country, and t denote for year.

The study tries to illustrate the desired result using the random effect of GLS regression (Gaussian test and the Wald test) to evaluate the overall significance of the model, whereby it is suggested that the model is significant when the null hypothesis is rejected. Both tests are asymptotically equivalent, but could differ in particular for small samples. Besides these measures, the comparison of correct and incorrect predictions of the model is considered useful as goodness-of-fit indicator (Greene, 2003). To calculate this indicator, the predicted probabilities have to be defined as 1 if the probability exceeds a specified threshold, otherwise 0. The threshold value to choose under normal conditions is 0.5.

To examine the significance of these models, the study also tests its elasticity and the marginal effect after the random effect GLS regression. In the GLS regression analysis also examine the results of sigma_u and sigma_e which are estimates of the standard deviation of nu and epsilon and rho is the share of the estimated variance of the overall error accounted for by the individual effect u_i. In addition, the study also tests the Breusch and Pagan Lagrangian multiplier test, Hausman specification effect test, log likelihood test, correlation matrix and the Cross-sectional time-series FGLS regression. These entire tests used to establish the significance of the estimated results.

The most common are McFadden's- R^2, the Gaussian test and the Wald test. McFadden's-R^2, could be regarded as analogous to the R^2, of a conventional regression model. It is defined between 0 and 1, and it is suggested that with an increasing value, the fit of the model improves. However, as the value could increase with an increasing number of regressors, McFadden's - R^2, did not become as important as the R^2, for linear regressions. As the study uses the random effect GLS regression, analysis also examines the results for all R^2 such as R^2-within (i.e. the $R^2$from the mean-deviated regression, i.e. the ordinary r^2 from running OLS on the transformed data), R^2-between (i.e. first, this computes the fitted values using the fixed-effects parameter vector and the within-individual means of the independent variables. Then calculates the r^2 as the squared correlation between those predicted values and the within individual means of the original y variable) and R^2-overall (i.e. first, this computes the fitted values using the fixed-effects parameter vector and the original, untransformed independent variables. Then calculates the r^2 as the squared correlation between those predicted values and the original, untransformed Y variable).

Hypotheses

In this section discussed the expected signs on the coefficients of the explanatory variables included in the estimation of the discussed functions. Hence the consideration of the null hypotheses as following:

Hypotheses 1: There is an impact of competition law on inflation rate.
Where literature suggests, one period lag of inflation, real effective exchange rate, terms of trade adjustment in LCU, have a positive effect on inflation and expected, two period lag of competition law and developed country have negative effect on inflation.
Hypotheses 2: There is no impact of competition law on FDI.
Where literature suggests, real effective exchange rate, foreign reserves, net trade, have a positive effect on FDI but employment to population ratio plus 15 years (% of total) has a negative effect on FDI and expected, competition law has a positive effect on FDI.

Estimation and Results

This chapter presents the estimation results of the panel regression analysis in terms of the hypotheses raised above. The results of the panel regression for model 1 are described in the table 1 as follows:

Table 1: Estimation results of impact of competition law on inflation

Explained Variable : Inflation Rate				
Explanatory Variable	**Coefficients (Std. error)**	**Z statistic**	**P>|z|**	**Elasticity**
Two period lag of competition law (dummy)	0.841 (0.688)	1.22	0.222	0.061
One period lag of inflation	0.707 (0.095)**	7.42	0.000	0.633
Real effective exchange rate	4.20e-10 (1.78e-10)**	2.36	0.018	0.019
Terms of trade adjustment in LCU	6.82e-14 (3.99e-14)**	1.71	0.088	0.008
Developed country (dummy)	- 2.636 (0.886)**	- 2.97	0.003	- 0.156
Constant	3.110 (0.899)**	3.46	0.001	
No of country	65			
No of observation	128			
R squared:				
Within	0.041**			
Between	0.859**			
Overall	0.734**			
Wald test	144.68**			
Log likelihood	- 335.535			
Rho	0.172**			

** Significant at the 5%-level

According to the Table 1, R-squared (between) is 86%, imply that the repressors' combined together can explain 86% of the variations at 95 percent confidence interval. The Wald chi squared is nonnegative that means the variables are normally distributed and the model is also correctly specified according to the Hausman test (annex B.3) and Breusch and Pagan lagrangian multiplier test (annex B.2). In the annex B.4, the Cross-sectional time-series FGLS regression shows that the model has no autocorrelation and the panel is homoscedastic. Amongst the explanatory variables, one period lag of inflation, real effective exchange rate, terms of trade adjustment in LCU, developed country, and terms of trade adjusted in LCU are statistically significant. But, it should mention that terms of trade adjusted in LCU has some

type I error, which is considered to be tolerable (the p value of Z statistics is 0.088). As a result, each of the explanatory variables lead to reject null hypothesis 1, i.e. there is an impact of competition policy of inflation. All of these explanatory variables, except developed country, are positively related to inflation. It can be said that there is no impact on inflation on the adoption of competition law, as the null hypotheses is rejected. The coefficients demonstrate the marginal impact of each of these statistically significant explanatory variables on inflation, meaning, they represent the impact on inflation of an increase of one unit of these variables.

At the 95% confidence level, the *z* value of developed country (an explanatory variable) is [-4.375, -0.898]. So the value of zero is excluded from this interval. In this case, it can be said that the impact on average change of inflation due to developed country is not zero. In other words, a country becoming developed may reduce the inflation rate of that country. On the other hand, the 95% confidence interval of one period lag of inflation and real effective exchange rate are [0.520, 0.893] and [7.17e-11, 7.69e-10] respectively. Both are positive. This means that the impact on the average change in inflation due to real effective exchange rate and one period lag of inflation is positive and statistically significant.

Table 1 also shows the elasticities of the explanatory variables after the panel regression of model 1. The elasticity of one period lag of inflation, real effective exchange rate terms of trade adjustment in LCU and develop country are inelastic [0.63], [0.019], [0.008] and [-0.156], respectively. But the one period lag of inflation influences the inflation rate much more than the real effective exchange rate and terms of trade adjustment in LCU. More specifically, 1% increase in one period lag of inflation explains 63% of the increase in current inflation rate but 1% increase in real effective exchange rate or terms of trade adjustment in LCU explains only about 2% and 1% of the increase in current inflation, respectively. So it can be concluded that the competition law has no significant impact on inflation. But, it may have an impact on specific commodity prices, which is not investigated in this study. It implies that adoption of competition law may not be effective to control the general inflation rate.

According to the Annex B.6, one period lag of inflation is highly positively correlated and real effective exchange rate is also highly positively correlated to inflation. As a result, current inflation will increase if one period lag of inflation and real effective exchange rate increases. On the other hand, the variable developed country is highly negatively correlated to the variables inflation.

To examine to the hypothesis 2, the estimation results of model 2 is described in Table 2 as following:

Table 2: Estimation results of impact of the competition law on FDI

Explained Variable : Foreign Direct Investment				
Explanatory Variable	**Coefficients (Std. error)**	**Z statistic**	**P>|z|**	**Elasticity**
Competition Law (dummy)	1.931 (0 .987)**	1.96	0.050	0.153
Real effective exchange rate	- 0.047 (0 .040)	-1.17	0.240	- 0.668
Foreign reserves	0.257 (0.096)**	2.67	0.008	0.196
Net trade in goods and services	1.55e-12 (7.42e-12)	0.21	0.835	0.000

Employment to population ratio plus 15 years (% of total)	- 0.167 (0.088)**	-1.89	0.059	- 1.276
Constant	19.103 (6.344)**	3.01	0.003	
No of country	59			
No of observation	231			
R squared:				
Within	0.02 **			
Between	0.21 **			
Overall	0.15**			
Wald test	15.69**			
Log likelihood	- 778.479			
Rho	0.664**			

** Significant at the 5% level

Table 2 shows the result of the random effect GLS for the numeric matrix Z (Z returns a real matrix containing the real part of Z) with the R squared at 21% which implies that the regressors' combined together can explain 21% of the variations at 95 percent confidence interval. Wald test shows that the variables of the model are normally distributed since the Wald chi squared is positive. Model 2 is correctly specified according to the estimation of the Hausman test (annex C.3) and Breusch and Pagan lagrangian multiplier test (annex C.2). The cross-sectional time-series FGLS regression shows that there is no autocorrelation in the model and the panel is homoscedastic (annex C.4). Here the model 2 dropped the dummy variable developed country due to the variable is not statistically significant and there is no impact on FDI.

The regression result shows that the explanatory variable competition law is statistically significant and also shows has a positive significant relationship to foreign direct investment which leads to the rejection of null hypothesis 2. This result illustrates that there is a positive impact of competition law on foreign direct investment which influences foreigners to invest. It may have another conclusion, adopting the competition law will make the market more competitive which may reduce the market uncertainty. As a result, competitive markets encourage foreign investors to increase FDI. The explanatory variable foreign reserve e is positively related to foreign direct investment and is also statistically significant, thus the null hypothesis 2 is rejected. As a result, the foreign reserves raise the foreign direct investment by 0.257 to an increase of one unit of foreign reserve. Finally, the explanatory variable employment to population ratio plus 15 (% of total) is statistically significant which also rejects the null hypothesis 2. Employment to population ratio plus 15 (% of total) is negatively related to foreign direct investment and it may be concluded that there is an impact of employment to population ratio plus 15 (% of total) on the foreign direct investment; the increase in this ratio may lessen the foreign direct investment.

According to the Table 2, the explanatory variable competition law shows a positive value of z statistic though the 95% confidence interval is [- 0.003, 3.865]. So it is statistically significant and the average change of competition law on foreign direct investment is positive which influences the foreign investors to increase investment. The value of the z statistic of the explanatory variable foreign reserve is 2.67 and the 95% confidence interval is [0.068, 0.445] which excludes the zero. So the effect of the average change of foreign reserve on foreign direct investment is positive, which means as foreign reserves increase, the foreign direct investment also increases. On the other hand, the explanatory variable employment to population ratio plus 15 (% of total) has a negative impact on the foreign direct investment as the z statistic is –1.89 and the confidence interval is [-0.340, 0.006]. The increase of employment to population ratio plus 15 will reduce the foreign direct investment. All these

three explanatory variables are statistically significant at the 95% confidence interval and capable enough to reject null hypothesis 2.

Table 2 also shows the elasticity of explanatory variables of model 2. The elasticity of the explanatory variable competition law is inelastic [0.153] which shows a less than proportionate impact on foreign direct investment. As a result, adopting the competition law increases foreign direct investment. Similarly, foreign reserve is also inelastic [0.196] which has an impact on foreign direct investment, meaning that a one unit increase in the foreign reserves will bring a less than proportionate change in foreign direct investment. But employment to population ratio plus 15 is elastic [-1.276] which shows a more than proportionate impact on foreign direct investment. As the increase of the employment to population ratio, there may occurs a significant rise of the foreign direct investment.

In the annex C.5, tries to illustrate the marginal effect after the panel regression. It shows that there is no fixed effect within the country but there is a fixed effect between the countries.

According to the annex C.7, the correlation matrix shows that the explanatory variables may positively or negatively related to each other but none of the explanatory variables is highly positive or highly negative correlated to each other. So the profitability of raising the multicollinearity is less.

Conclusion

The study illustrates the impact of competition legislation on inflation and on foreign direct investment. The study uses the panel regression analysis with random effect using data of 86 countries from 2005 to 2008 where 62 countries have adopted a competition law and 29 are developed countries. In the light of literature review, two models have been established to analyze the impact of competition law on inflation and another on FDI. As explanatory variables, the model for inflation uses one period lag of inflation, real effective exchange rate, terms of trade adjustment in LCU, two period lag of competition law, developed country. The model for FDI uses competition law, real effective exchange rate, foreign reserves, net trade in goods and services (BoP, current US$) and employment to population ratio plus 15 years (% of total) as explanatory variables . Of the explanatory variables competition law and developed country are dummy variables. In two hypotheses, *there is an impact of competition law on inflation rate* for model 1 and *there is no impact of competition law on FDI* for model 2.

According to the estimation of model 1, competition law has no significant impact on inflation i.e. adopting a competition does not influence the country's inflation rate. So the adoption of competition law may not affect policy to control or reduce the country's inflation rate. The study also finds that the one period lag of inflation, real effective exchange rate and terms of trade adjustment in LCU have a positive significant impact on inflation, which corresponds to the literature. The level of increase of these variables leads to a higher rate of inflation. So adoption of the competition law may not be the appropriate policy to control the country's inflation rate, since this study finds that there is no significant impact.

According to the literature, competition law adoption increases foreign direct investment. This study also agrees with the statement and finds that there is a positive significant relationship between the two variables in the model 2. But there is a little divisive factor that arises in the case of the decision of adopting the competition law. Generally, the home country enforces the competition law considering all the advantages and disadvantages of the law in order to make an informed decision. This study finds that the adoption of competition law is likely to raise foreign direct investment due to various reasons such as the market becoming more competitive and more certain, more profitable and easy to invest in for the foreign investors. The competition law is more beneficial for the foreign investors as the scope of business widens if the law is adopted, however the country also becomes beneficiary

as a result of increase in FDI. That's why the foreign investors may push the country to adopt the competition law to expand the economy. On the other hand, enforcing the competition law will make the business compete fairly. A new way of expanding the country's economy opens up. So adopting the competition law increases the FDI which leads to raise the level of GDP. As a result, adopting the competition law will be beneficial for the country as well as the economy.

Finally, especially given its empirical approach, this work also corresponds to the literature that states the nonexistence of a relationship between the competition law and inflation, and the positive link between the competition law and foreign direct investment.

Given the conclusions of this paper, adoption of a competition law may not be the appropriate policy to control or stabilize the country's inflation rate but it may be appropriate to work as an incentive for foreign investors who see the law as a shield that protects their investment from anti-competitive practices in a country which may boost the economy.

Limitations of the Study:

The concept of the paper is to illustrate the effect of the competition law on inflation rate and on foreign direct investment. Although, to prepare this study the author faces the following impediments.

- This study considers only 86 countries due to the lack of required information. However, of the 86 countries all the data for each variable are not found.
- Scarcity of updated data.
- Though the study reviewed the updated articles, the insufficiency of updated data this paper uses data up to the year 2008. Moreover, few of the data of very few of the countries may found but that are not sufficient to carry out the results which may influenced the original effect of competition law on inflation and FDI. The author also considers it as a limitation of the study.

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ANNEX

Annex A 1: Definition

Key Terms	Description
Dumping	Selling goods in a foreign country at a price which is local producers regard as unfairly low. This may mean selling at less than the long run average costs of production plus transport costs; charging a lower price in export markets than is charged for comparable goods in home markets; or simply selling at a price with which producers in importing country cannot compete.
Exclusive dealing	An agreement between the producer and a distributor of certain goods that one will trade only with the other. This may apply generally, or within a particular country or district. In some cases this means that a retailer agrees to stock only one manufacturer's brands; in other cases manufacturer agrees to sell through only one outlet in a given area.
Refusal to deal	"Refusal to deal" includes any agreement which restricts, or is likely to restrict, by any method the persons or classes of persons to whom goods are sold or from whom goods are bought.
Dividing territories	Dividing territories (also market division) is an agreement by two companies to stay out of each other's way and reduce competition in the agreed-upon territories. It is one of several anti-competitive practices outlawed in the United States.
Limit Pricing	A price policy an incumbent from of discouraging entry to its markets by charging low enough prices for entry to appear unprofitable to others firm. This is constructed with a policy of short-rue profit maximization, where the price is high enough to attract entry, which will lead to a gradual loss of sales, as customers come to know of alternative suppliers. There is thus a trade-off between large but temporary and smaller but more sustained profits.
Product Tying	Tying refers to the situation where a firm makes the purchase of one of its products conditional on the purchase of another of its products. According to the leverage theory, tying "provides a mechanism whereby a firm with monopoly power in one market can use the leverage provided by this power to foreclose sales in, and thereby monopolize, a second market" (Whinston 1990)
Resale price maintenance	Resale price maintenance (RPM) specifies the final price that retailers charge consumers. Variants of this restriction include specifying only a price ceiling or a price floor. Practices that encourage the maintenance of resale prices but that do permit price competition, e.g., non-binding "recommendations" for a retail price or a price floor, and recommended prices advertised by the upstream firm, are generally not considered to be RPM.
Predatory pricing	Pricing low at which the intention of driving rivals out of a market or preventing new firms from entering. This is good for consumers in the short run, but may be bad in the long run if a firm which has used predatory pricing to establish a monopoly position then raises its prices.
Barriers to entry	Laws, institutions or practices which make it difficult or impossible for new firms to enter some markets or new workers to complete for certain forms of employment.
Coercive monopoly	A coercive monopoly is a business concern that prohibits competitors from entering the field, with the natural result being that the firm is able to make pricing and production decisions independent of competitive forces.
Absorption of a competitor or competing technology	Absorption of a competitor or competing technology, where the powerful firm effectively co-opts or swallows its competitor rather than see it either compete directly or be absorbed by another firm.
Subsidies	A payment by the government to consumers or producers which makes the factor cost received by producers greater than the market price charged by producers. Subsidies may be given on grounds of income distribution, to improve the incomes of producers or consumers.
Regulation	A rule individuals or firms are obliged to follow; or the procedure for deciding and enforcing such rules. Modern societies abound in regulations
Protectionism	The use of trade policy to raise profits and employment in industries liable to competition from imports. Protection may be via tariffs, import quotas, or voluntary export restraints (VERs) and other non-tariff barriers to trade.

Tariff	A scale of charges, for example in a restaurant. In economics a tariff was originally a schedule of taxes on imports; it now refers to the actual import duties. A specific tariff is set a percentage of the price of the goods imported and does not depend on its prices.
Quota	A quantitative allocation. This may be set as a minimum or a maximum.
Patent misuse and copyright misuse	Patent misuse and copyright misuse are both equitable defenses which primarily although not exclusively focus on the unclean hands of the patent and copyright owner. Neither form of misuse is the result of the statutes which define the patent and copyright rights. Rather, misuse is a defense when a patent or copyright owner steps over the statutory bounds established by Congress to promote the progress of science and the useful arts
Digital rights management	Digital rights management (DRM) is a term for access control technologies that are used by hardware manufacturers, publishers, copyright holders and individuals to limit the use of digital content and devices.

Source: Oxford Dictionary of Economics, Journals, reports and internet.

Annex B.1: Random-effects GLS Regression of Model 1

Dependent variable: inflation

```
Random-effects GLS regression                   Number of obs      =       128
Group variable: concode                         Number of groups   =        65

R-sq:  within  = 0.0410                         Obs per group: min =         1
       between = 0.8587                                        avg =       2.0
       overall = 0.7343                                        max =         2

Random effects u_i ~ Gaussian                   Wald chi2(5)       =    144.68
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0000
```

infl	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
competition						
L2.	.8412178	.6881878	1.22	0.222	-.5076056	2.190041
infl						
L1.	.7065775	.0952256	7.42	0.000	.5199387	.8932162
xchrreal	4.20e-10	1.78e-10	2.36	0.018	7.17e-11	7.69e-10
totadjustlcu	6.82e-14	3.99e-14	1.71	0.088	-1.00e-14	1.46e-13
developed_~y	-2.636241	.8869065	-2.97	0.003	-4.374546	-.8979361
_cons	3.110342	.8998722	3.46	0.001	1.346625	4.874059
sigma_u	1.1884528					
sigma_e	2.6073722					
rho	.17201958	(fraction of variance due to u_i)				

Annex B.2: Breusch and Pagan Lagrangian Multiplier Test for Random-effects of Model 1

```
Breusch and Pagan Lagrangian multiplier test for random effects

        infl[concode,t] = Xb + u[concode] + e[concode,t]

        Estimated results:
                     |         Var     sd = sqrt(Var)
             ---------+-----------------------------
                infl |    42.28258        6.502506
                   e |     6.79839        2.607372
                   u |     1.41242        1.188453

        Test:   Var(u) = 0
                             chi2(1) =      1.57
                          Prob > chi2 =      0.2108
```

Annex B.3: Hausman Specification Test of Model 1

	Coefficients (b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
L2.competi~n	2.993161	.8412178	2.151943	1.10845
L.infl	-.4038612	.7065775	-1.110439	.1381972
xchrreal	1.47e-09	4.20e-10	1.05e-09	2.89e-09
totadjustlcu	6.74e-13	6.82e-14	6.06e-13	3.00e-13

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(2) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 74.47
Prob>chi2 = 0.0000

Annex B.4: Cross-sectional Time-series FGLS Regression of Model 1

Dependent variable: Inflation

Coefficients: generalized least squares
Panels: homoskedastic
Correlation: no autocorrelation

Estimated covariances = 1
Estimated autocorrelations = 0
Estimated coefficients = 6

Number of obs = 128
Number of groups = 65
Obs per group: min = 1
avg = 1.969231
max = 2
Wald chi2(3) = 197.71
Prob > chi2 = 0.0000

infl	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
competition						
L2.	.5962192	.6249259	0.95	0.340	-.6286131	1.821051
infl						
L1.	.7887752	.0868434	9.08	0.000	.6185653	.9589851
xchrreal	3.18e-10	1.59e-10	2.00	0.045	6.61e-12	6.30e-10
totadjustlcu	5.91e-14	3.74e-14	1.58	0.114	-1.42e-14	1.33e-13
developed_~y	-2.171708	.793305	-2.74	0.006	-3.726557	-.6168586
_cons	2.559792	.8097671	3.16	0.002	.9726779	4.146907

Annex B.5: Elasticities after Panel Regression of Model 1

Elasticities after xtreg
y = Xb (predict)
= 7.1347506

variable	ey/ex	X
L2.competition	.0607944	.515625
L.infl	.6331009	6.39281
xchrreal	.0185377	3.1e+08
totadjustlcu	.0075042	7.9e+11
developed_country	-.1558799	.421875

Annex B.6: Correlation Matrix of Model 1

(obs=128)

	infl	L2. compet~n	L. infl	xchrreal	totadj~u	develo~y
infl	1.0000					
competition L2.	-0.0070	1.0000				
infl L1.	0.8439	-0.0175	1.0000			
xchrreal	0.5263	-0.1299	0.5876	1.0000		
totadjustlcu	0.2195	0.0944	0.1708	-0.0125	1.0000	
developed_~y	-0.5533	0.1949	-0.5549	-0.1076	-0.1727	1.0000

Annex B.7: ML Estimation of Model 1

Dependent variable: Inflation

```
Iteration 0:   log likelihood = -335.53453

Generalized linear models                         No. of obs      =        128
Optimization     : ML                             Residual df     =        122
                                                  Scale parameter =   11.62153
Deviance         =  1417.826296                   (1/df) Deviance =   11.62153
Pearson          =  1417.826296                   (1/df) Pearson  =   11.62153

Variance function: V(u) = 1                       [Gaussian]
Link function    : g(u) = u                       [Identity]

                                                  AIC             =   5.336477
Log likelihood   = -335.5345282                   BIC             =   825.8786
```

infl	OIM Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
competition						
L2.	.5962192	.6401085	0.93	0.352	-.6583704	1.850809
infl						
L1.	.7887752	.0889532	8.87	0.000	.6144301	.9631204
xchrreal	3.18e-10	1.63e-10	1.95	0.051	-9.62e-13	6.37e-10
totadjustlcu	5.91e-14	3.83e-14	1.54	0.123	-1.60e-14	1.34e-13
developed_~y	-2.171708	.8125784	-2.67	0.008	-3.764332	-.5790834
_cons	2.559792	.8294404	3.09	0.002	.9341188	4.185466

Annex C.1: Random-effects GLS Regression of Model 2

Dependent variable: FDI

```
Random-effects GLS regression                     Number of obs      =       231
Group variable: concode                           Number of groups   =        59

R-sq:  within  = 0.0187                           Obs per group: min =         2
       between = 0.2127                                          avg =       3.9
       overall = 0.1502                                          max =         4

Random effects u_i ~ Gaussian                     Wald chi2(5)       =     15.69
corr(u_i, X)       = 0 (assumed)                  Prob > chi2        =    0.0078
```

fdi	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
competition	1.931181	.986709	1.96	0.050	-.0027329	3.865095
xchrreal	-.047178	.0401644	-1.17	0.240	-.1258988	.0315429
fornreserve	.2569012	.0961912	2.67	0.008	.0683699	.4454324
nettrade	1.55e-12	7.42e-12	0.21	0.835	-1.30e-11	1.61e-11
emp15pluspc	-.1667723	.0884381	-1.89	0.059	-.3401077	.0065631
_cons	19.10281	6.343654	3.01	0.003	6.669476	31.53614
sigma_u	5.9394097					
sigma_e	4.2240097					
rho	.66410682	(fraction of variance due to u_i)				

Annex C.2: Breusch and Pagan Lagrangian Multiplier Test for Random-effects of Model 2

```
Breusch and Pagan Lagrangian multiplier test for random effects

        fdi[concode,t] = Xb + u[concode] + e[concode,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+------------------------------
                     fdi |    59.43448        7.709376
                       e |    17.84226         4.22401
                       u |    35.27659         5.93941

        Test:   Var(u) = 0
                                 chi2(1) =   131.61
                              Prob > chi2 =   0.0000
```

Annex C.3: Hausman Specification Test of Model 2

	Coefficients (b) fixed	(B) .	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
competition	1.418237	1.931181	-.512944	.6352822
xchrreal	-.0267026	-.047178	.0204754	.0184514
fornreserve	.1480212	.2569012	-.10888	.0963644
nettrade	1.16e-11	1.55e-12	1.01e-11	1.80e-11
emp15pluspc	.0121748	-.1667723	.1789471	.3990383

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_b-V_B)^(-1)](b-B)
= 4.35
Prob>chi2 = 0.3603

Annex C.4: Cross-sectional Time-series FGLS Regression of Model 2

Dependent variable: FDI

Coefficients: generalized least squares
Panels: homoskedastic
Correlation: no autocorrelation

Estimated covariances = 1
Estimated autocorrelations = 0
Estimated coefficients = 6

Number of obs = 231
Number of groups = 59
Obs per group: min = 2
avg = 3.915254
max = 4
Wald chi2(4) = 44.16
Prob > chi2 = 0.0000

fdi	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
competition	2.614277	.9664548	2.71	0.007	.7200605	4.508494
xchrreal	-.1351827	.0499633	-2.71	0.007	-.2331091	-.0372564
fornreserve	.3348591	.0721429	4.64	0.000	.1934616	.4762566
nettrade	-1.36e-14	4.54e-12	-0.00	0.998	-8.91e-12	8.89e-12
emp15pluspc	-.1529815	.0526975	-2.90	0.004	-.2562668	-.0496963
_cons	26.56226	5.981648	4.44	0.000	14.83845	38.28608

Annex C.5: Marginal Effects after Panel Regression of Model 2

Marginal effects after xtreg
y = Xb (predict)
= 7.3636611

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.]		X
compet~n*	1.931181	.98671	1.96	0.050	-.002733	3.8651	.584416
xchrreal	-.047178	.04016	-1.17	0.240	-.125899	.031543	104.311
fornre~e	.2569012	.09619	2.67	0.008	.06837	.445432	5.62771
nettrade	1.55e-12	.00000	0.21	0.835	-1.3e-11	1.6e-11	1.7e+09
emp15p~c	-.1667723	.08844	-1.89	0.059	-.340108	.006563	56.3346

(*) dy/dx is for discrete change of dummy variable from 0 to 1

Annex C.6: Elasticities after Panel Regression of Model 2

Elasticities after xtreg
y = Xb (predict)
= 7.3636611

variable	ey/ex	Std. Err.	z	P>|z|	[95% C.I.]		X
compet~n	.1532678	.08029	1.91	0.056	-.004105	.310641	.584416
xchrreal	-.6683034	.57429	-1.16	0.245	-1.7939	.457291	104.311
fornre~e	.1963377	.0767	2.56	0.010	.046001	.346674	5.62771
nettrade	.0003655	.00175	0.21	0.835	-.003067	.003798	1.7e+09
emp15p~c	-1.275868	.69129	-1.85	0.065	-2.63078	.07904	56.3346

Annex C.7: Correlation Matrix of Model 2

(obs=231)

	fdi	compet~n	xchrreal	fornre~e	nettrade	emp15p~c
fdi	1.0000					
competition	0.1490	1.0000				
xchrreal	-0.1203	0.1977	1.0000			
fornreserve	0.2927	0.0198	0.0385	1.0000		
nettrade	0.0583	-0.0899	0.0923	0.3118	1.0000	
emp15pluspc	-0.1835	-0.0500	-0.0141	-0.0085	0.0161	1.0000

Annex C.8: ML Estimation of Model 2

Dependent variable: FDI

Iteration 0: log likelihood = **-778.47855**

Generalized linear models — No. of obs = **231**
Optimization : **ML** — Residual df = **225**
Scale parameter = **50.8314**
Deviance = **11437.06509** — (1/df) Deviance = **50.8314**
Pearson = **11437.06509** — (1/df) Pearson = **50.8314**

Variance function: **V(u) = 1** [**Gaussian**]
Link function : **g(u) = u** [**Identity**]

AIC = **6.792022**
Log likelihood = **-778.4785516** — BIC = **10212.52**

fdi	OIM Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
competition	2.614277	.9792561	2.67	0.008	.6949705	4.533584
xchrreal	-.1351827	.0506251	-2.67	0.008	-.2344062	-.0359593
fornreserve	.3348591	.0730985	4.58	0.000	.1915887	.4781295
nettrade	-1.36e-14	4.60e-12	-0.00	0.998	-9.03e-12	9.00e-12
emp15pluspc	-.1529815	.0533955	-2.87	0.004	-.2576349	-.0483282
_cons	26.56226	6.060878	4.38	0.000	14.68316	38.44137

Annex D.1: List of the countries (among the 86 countries) with a competition law till 2008

Country*	Competition Law**
Algeria	1995
Armenia	2000
Australia	1974
Bulgaria	1991
Cambodia	2002
Cameroon	1998
Canada	1889
Chile	1973
China	1993
Costa Rica	1994
Croatia	1995
Cyprus	1989
Czech Republic	1991
Denmark	1955
Ethiopia	2003
Fiji	1992
Finland	1958
France	1953
Gabon	1989
Georgia	1996
Germany	1958
Greece	1977
Guyana	2006
Hungary	1990
Iceland	1993
India	2008
Indonesia	1999
Ireland	1978

Israel	1959
Italy	1990
Japan	1953
Luxembourg	1970
Macedonia, FYR	1999
Malawi	1998
Moldova	1992
Morocco	2000
Netherlands	1958
New Zealand	1958
Nicaragua	2006
Norway	1953
Pakistan	1970
Papua New Guinea	2002
Poland	1990
Portugal	1993
Romania	1996
Russian Federation	1991
Saudi Arabia	2004
Singapore	2005
Slovak Republic	1994
South Africa	1979
Spain	1989
Sri Lanka	1987
Sweden	2008
Switzerland	1964
Trinidad and Tobago	1996
Tunisia	1991
Ukraine	1992
United Kingdom	1948
United States	1890
Uruguay	2000
Venezuela, RB	1992
Vietnam	2004
Zambia	1994

* A country is taken to have a competition law till 2008 (of 86 countries) if a law exist that addresses one or all kinds of anti-competitive behavior which is normally part of a competition law, such as monopolies, cartels, mergers, predatory pricing and etc.

** The year indicates when a country enacted its first competition law.

Source: Internet and literature search, Global Competition Forum, UNCTAD.