

## Intellectual Property Rights (IPRs) and Economic Growth in Pakistan

PERVEZ ZAMURRAD JANJUA, GHULAM SAMAD, and NAZAKAT ULLAH

The strong protection of Intellectual Property Rights (IPRs) attract more investments and promote economic growth processes in developing countries. This study underlines the level of IPRs enforcement in Pakistan and consequently its implications for economic growth. The study confirms that enforcement at appropriate level of IPRs encourages economic growth in Pakistan. For data stationarity and long-run relationship between IPRs and economic growth Unit Root test and Johansen Cointegration tests are applied. The study uses Times Series data estimation techniques, namely Vector Error Correction Model (VECM) for a period of 1970–2010. The study concludes with policy recommendations for economic growth in understanding the form and nature of IPRs enforcements in Pakistan.

**Keywords:** Intellectual Property Rights (IPRs), Foreign Direct Investment (FDI), Research and Development, Patents, Human Capital, Invention and Innovation

### 1. INTRODUCTION

IPRs relate to the products of human mind. These products are intangible and valuable products and they can be used to fulfil diverse human need. They may include inventions, industrial designs, copy rights, literary or artistic works, programmes, trade marks and images used in trade, etc. IPRs can be traded, licensed or transferred similarly as the tangible products. IPRs are considered as factor which may, along with other factors, enhance economic growth. The channels of growth through IPRs can be internal as well as external. Internal channel includes all product of mind created in the domestic market, whereas external channel includes the products produced in external market. The predominance of a particular channel depends on the level of development of a country. IPRs through internal channel are dominant in developed countries and through external channel in developing countries. The range of products related to IPRs is very wide in developed countries. In developing countries, it is usually limited to a set of products through internal and external channels.

It is argued that enforcement of property rights as well as intellectual property rights encourage investments in research and development, which may lead to improve output through inventions and innovations [Maskus and Fink (2005) and Falvey, *et al.*

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(2006)]. Enforcement of intellectual property rights enables the inventors/innovators to produce invented/innovated products. The profit accrued out of the sale of invented/innovated products covers the costs of production and provides incentive or reward for invention/innovation. IPRs can promote economic growth through different channels. The most important channel is technology transfer and its positive spillover. Efficient protection of IPRs leads to technological innovation and improvement in total factor productivity which is most significant factor of economic growth [Rapp and Rozek (1990)].

A number of authors, although acknowledges the positive role of invention and innovation in economic growth, yet they are sceptical about the positive impact of enforcement of intellectual property rights on economic growth as a general rule [e.g. Nair-Reichert and Duncan (2002)]. Not only improvement in technology but also diffusion of technology plays an important role in the growth process. According to Yueh (2007) IPRs create an artificial monopoly to promote innovation but also make the technology diffusion costly, which increases the cost of production for developing countries and inhibit their ability to “catch up” developed countries in terms of economic growth. Some authors argue that the cost of innovation in relation with the cost of imitation of technology vary along with the level of development in different economies [Fink and Braga (2005); You and Katayama (2005); Falvey, *et al.* (2006)]. More specifically, in middle income countries like Pakistan, the cost of imitation is lesser than the cost of innovation. Therefore, in these countries enforcement of strong intellectual property rights may have negative impact on economic growth [Janjua and Samad (2007)].

The purpose of this study is to assess the nature of relationship between IPRs and economic growth in Pakistan. Specific objectives are to analyse whether the enforcement of IPRs in general and at different levels of per capita income in particular, has significantly impacted the economic growth in Pakistan? In addition, this study will develop a platform for future studies on IPRs and economic growth in Pakistan. We understand that the recommendations of this study will be more valuable not only for national but international policy-makers. Most of the studies have analysed the relationship between IPRs and economic growth by considering cross countries panel data. The significance of this study is that we are considering time series data to ascertain the relationship between IPRs and economic growth in Pakistan, which has not been used by any study to the best of our knowledge.

We applied a unique patent data set provided by Walter Park<sup>1</sup> on personal request. For data stationarity and long-run relationship between IPRs and economic growth Unit Root test and Johansen Cointegration tests are applied. The study uses Times Series data estimation techniques, namely Vector Error Correction Model (VECM) for a period of 1970–2010. The study confirms that enforcement at appropriate level of IPRs encourages economic growth in Pakistan.

The rest of the paper is organised as follow. In Section 2, we described IPRs and policy environment in Pakistan. We then presented the literature review in Section 3. The methodological framework is presented in Section 4. Econometric methodology are outlined in Section 5. Section 6 presents the conclusion and recommendations of the study.

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## **2. IPRs AND POLICY ENVIRONMENT IN PAKISTAN**

The enforcement of IPRs in Pakistan has been very slow. After independence the share of IPRs products in total output was negligible. However, its share increased over time. In the year 2000 alone copyright industries contributed about 4.45 percent to the GDP. Irrespective of this contribution the demand for copyright products in the domestic market is far greater than the supply, therefore Pakistan was net importer of copyright based products to the tune of 787 million US\$ in the year 2007-2008 [WIPO (2010)].

A relatively low contribution of IPRs in national output has been caused by different factors. Firstly, level of literacy in the country has been very low. Secondly, the role of innovation in economic growth was not generally recognised. Thirdly, producers and investors were interested to maximise profits through traditional and import-substitution products due to incentives created by the policy-makers. Fourthly, a mechanism of reward and punishment to protect IPRs was not effectively evolved due to low level of good governance. Fifthly, growth of corporate business in Pakistan has been very slow which is usually considered as an engine of research and development as well as innovation and growth.

The Government of Pakistan took various measures to protect IPRs. The Patents and Designs Office was established in Karachi in 1948 under Patents and Design Act of 1911. The office accepts applications for registration and renewal of patents, industrial designs and layout designs of integrated circuits. In the last 25 years the office dealt with 25000 patent cases and 15000 cases of industrial designs. Similarly, Trademarks Registry Office was established in Karachi in 1948 under the Trade Marks Act 1940. The registry deals with trademarks and geographical indications and publishes a trademarks journal. The examination of applications usually took 30 months which are now reduced to 3 months after automation but still 18-24 months period is required for the issuance of registration certificates. The Copyright Office was established in Karachi in 1963 under the Copyright Ordinance 1962 and later on a branch office was opened in Lahore in 1984. The office registers IPRs including literary and artistic works, cinematographic works, music, publishing and computer programmes. Till 2009 the office registered 20124 cases including 14249 cases for artistic works, 4728 for literary works, 1040 for recorded works and 107 for cinematographic works [IPO (2009)].

Effective protection of IPRs can attract more investment, promote export, protect consumers and improve prospect for economic growth. Protection of IPRs can be secured through effective management of technology that include creation, transfer of technology. Therefore, Intellectual Property Rights Organisation (IPO) of Pakistan was established in 2005 to achieve this goal. IPO identified following IPRs for Pakistan [IPO (2009)]:

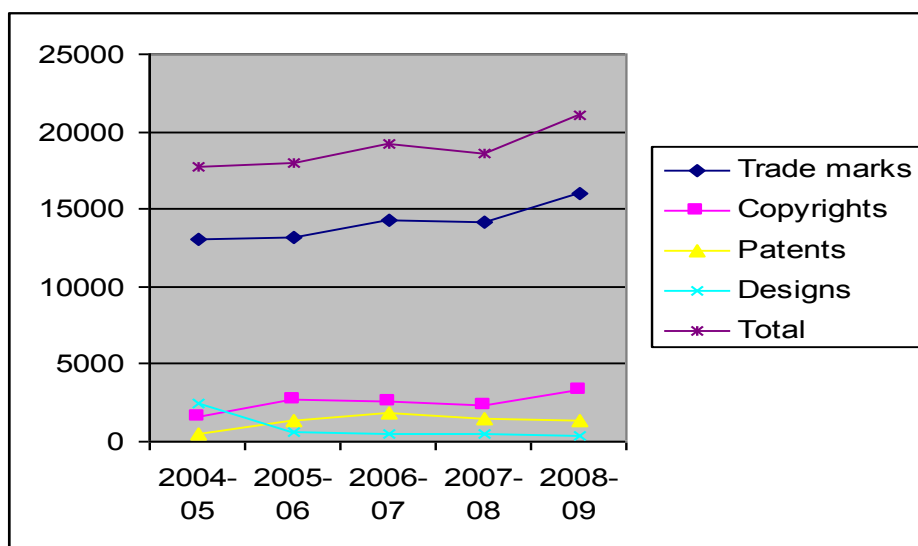
- (1) Patents: Right of researchers and innovators to exclude others from commercialisation of certain innovated products. They encourage innovation and enable public access to innovation.
- (2) Trade marks: These are signs and words that distinguish products of one business from others. They are useful to promote quality products. These rights encourage competition and protect business from counterfeiting.
- (3) Copyrights: Exclusive rights of the inventors to copy their works or products. They include literary and artistic works, computer programmes, data bases, paintings, films, music, sculptures, etc.

- (4) Industrial designs: These rights protect specific ornamental and aesthetic aspects of articles having two or three dimensional features.
- (5) Geographical indications: These rights are used to protect certain names or signs due to their geographical origin. These rights may encourage preservation of high quality traditional products.
- (6) Integrated circuits: They are microcircuits or microchips which are used in electronic equipments. These rights are similar to patents.
- (7) Plant breeder rights: These rights are used to protect the breeders for the development of new breeds (plants). These rights encourage innovation and improve farm productivity.
- (8) Genetic resources: These rights refer to any material of plants, animal, microbial or other origin having functional units of heredity.

(The above defined different types of IP rights 1-8 are governed under certain Acts and Ordinances. Since the focus of the study is mainly on the enforcement of IPRs, so include all those articles which support the objective the study).

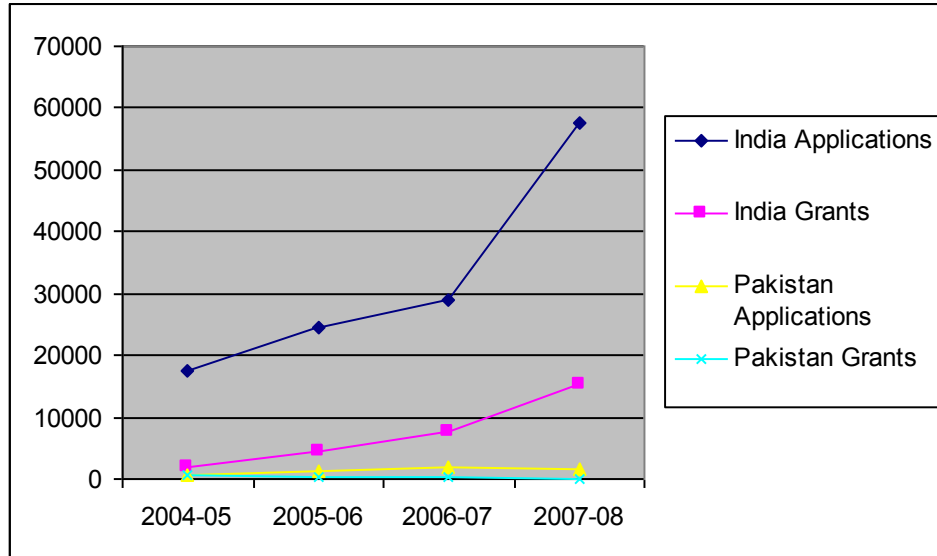
IPO aims to ensure integrated management of technology and enforcement coordination of all types of IPRs which were previously under the domain of different ministries and registries. Moreover, Federal Investigation Agency (FIA) was empowered to eliminate piracy by including copyright legislation in the FIA Act 1974. Similarly, Pakistan Customs was activated to control counterfeiting and piracy. Thus, IPO Pakistan has developed data base and it is registering, updating and displaying IPRs in its official gazette, journal and website. Recently, it has introduced E-Filing & Receipt System for prompt and transparent acknowledgement of IPRs applications and renewal of IPRs within a specified time limit.

IPO is showing increasing trends for registration of IPRs for trademarks and copyrights but for patents and industrial designs the figures show declining or stagnant trend in recent past:



Source: IPO Pakistan, Annual Report 2009:30-31.

The sluggish scenario of development of IPRs in Pakistan becomes evident, if we compare the numbers of applications received and sanctioned for patents in Pakistan and India:



Source: IPO Pakistan, Annual Report 2009:30-31; IP India, Annual Report 2009-10:6.

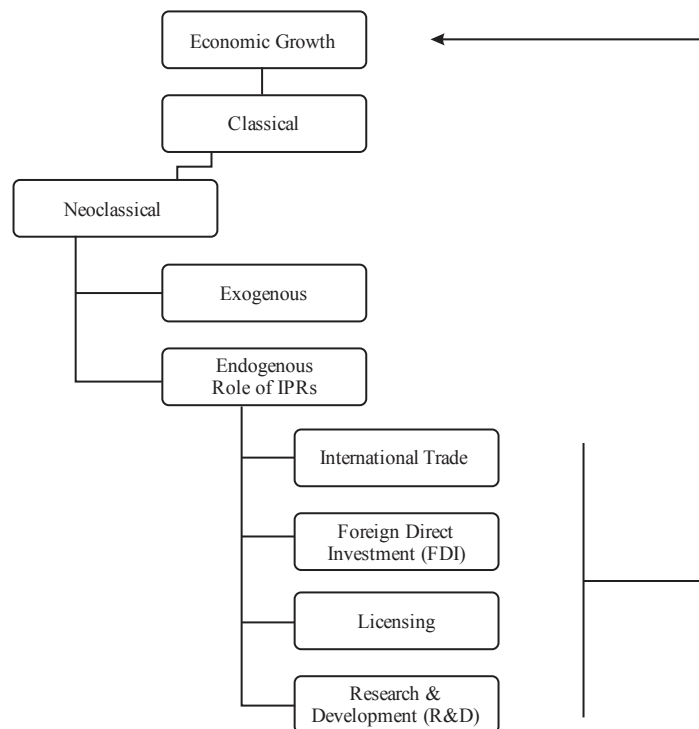
Pakistan is signatory to the Berne Convention (1886), Universal Copyright Convention (1952), Rome Convention (1961) and it has signed the Trade Related Intellectual Property Rights (TRIPS) Agreement with the World Trade Organisation (WTO) in 1994. Thus, it is obliged to protect IPRs through comprehensive legislative and management related mechanism. Reorganisation of integrated IPRs management is a positive step, yet most of the operative systems for the protection of patents, designs, trademarks and copyrights, are still limited in space and scope. Although IPO is operating on self-finance basis and it is expanding in physical and financial terms, yet its basic purpose is neither to generate revenues nor to get international recognition, but to create incentives for investments and innovation, which may lead the country to a higher level of economic growth. Therefore, the question remains to be answered is how far the integrated management of IPO has contributed towards attracting more investment for economic growth of Pakistan?

### 3. REVIEW OF LITERATURE

Like classical economists, neoclassical authors acknowledge the positive role of saving, population growth and technological progress to raise productivity that leads to economic growth [Solow (1956)]. However, Solow considered technology as an exogenous factor of economic growth (reference). In contrary, the proponents of endogenous growth theory emphasise on productivity that can be raised through development of human capital and innovation. According to Romer (1986) positive growth rates can be achieved through investment in knowledge creation and technology growth.

Lucas (1988) and Barro and Sala-i-Martin (1995) broadened the neoclassical model of economic growth from physical to human capital. Becker (1993) defined human capital as “embodied knowledge and skill”. Human capital can affect economic growth directly as a factor of production and indirectly through accelerating the rate of accumulation of other productive factors. Benhabib and Spiegel (1994) conclude that changes in schooling capital are related to technological growth. A number of authors discussed various channels of technological growth including the protection of intellectual property rights, stimulation of invention and innovation, market deepening, quality enhancement, diffusion of knowledge as well as research and development [Zipfel (2004); Maskus and Fink (2005) and Favelly, *et al.* (2006)].

The linkage between intellectual property rights (IPRs) and economic growth is illustrated in the following figure [Janjua and Samad (2007)]:



The above illustration and this paper mainly consider the linkage of first 4 IPRs identified by IPO Pakistan, because these IPRs are traditionally well recognised in most countries including Pakistan. The combined effect of protection of IPRs stimulates research, invention, innovation, trade and investment through internal and external channels that accelerates economic growth [Janjua and Samad (2007)].

Intellectual property rights affect international trade through the movement of knowledge based products and the trade has a strong relationship with economic growth [Maskus and Fink (2005)]. Patents not only promote competition among businessmen but the patent holders have to compete each others to improve invention and innovation. The

net impact of patents on trade depends on market expansion effect and market power effect. Trade flows may decrease in case of dominant market power effect. However, market expansion effect as an outcome of strengthened IPRs may lead to increase trade. [Raffiquzzaman (2002)].

Many economists emphasise the important role of foreign direct investment (FDI) and licensing in the economic growth process. These international flows enable access to technological and managerial assets and expertise of multinational concerns [Yang and Maskus (1998)]. Protection of IPRs and level of development in a country may influence foreign direct investment and economic growth [Mansfield and Lee (1996); Seyoum (1996)]. In his empirical analysis Javorcik (2004) provided evidence that the extent of IPRs protection in a host country affect the composition of FDI. Weak IPRs may divert FDI projects from manufacturing to service sector. Maskus and Fink (2005) ascertained that the level of FDI depends on the nature of technology available in the host country. Foreign investments in low technology spheres (e.g. textile, assembly, distribution, etc.) depend little on strong IPRs regime rather more on input factors cost. However, FDI can be enhanced through factors like liberalisation, deregulation, technology development and competition.

A vast literature is found to advocate the positive role of research and development (R&D) in the growth process [Soete (1981)]. Social returns to research and development are substantially higher than private returns. These returns not only explain us the role of R&D in growth process, but also provide us justification for governmental subsidy to research and development [Griffith (2000)]. Economic theory and empirical studies provide us ample evidence about significant positive effect of research and development on total factor productivity (TFP) and economic growth [Coe and Helpman (1993); Easterly and Levine (2000)].

The welfare impact of stronger protection of intellectual property rights depends on the level of development of an economy. In a country with limited capacities for innovation and production higher protection of IPRs may improve welfare if it allows to access products which were not possible to access without protection of IPRs. However, in a country with greater capacities for imitation and production but with limited capacities for innovation through research and development, stronger protection of IPRs would likely to repel domestic producers, raise prices and transfer rent from domestic consumers and producers to foreign titleholders resulting in a negative welfare impact [Fink and Braga 2005]. Empirical studies provide evidence that in middle income countries strong enforcement of IPRs may negatively affect economic growth process [e.g. Janjua and Samad (2007)].

In a recent study Sattar and Mahmood (2011) ascertained a positive significant relationship between IRPs and economic growth for a panel of 38 countries. The impact is most effective in high income countries, it is more effective in upper middle countries than in lower middle income countries and it is least effective in low income countries.

Most of the studies have ascertained a positive relationship between IPRs and economic growth. Some authors are of the view that enforcement of IPRs create monopoly powers and increase the cost of technology diffusion. Other authors argue that the positive relationship between IPRs and economic growth depends on the level of development of a country. Therefore, the literature on the relationship between IPRs and economic growth is not conclusive.

#### 4. METHODOLOGICAL FRAMEWORK

##### 4.1. Data and Its Sources

This study uses time series annual data from 1970 to 2010. We intended to decompose data on 5 years' basis in three distinct periods for the purpose of analysis. The first 30 years' data (1970-2000) represent first period with traditional disintegrated system of IPRs management and low level of per capita income in Pakistan. In second period data between 2000 and 2005 reflects Pakistan with same IPRs management but during this period Pakistan achieved the status of middle income country. In the third period the data between 2005 and 2010 represent an integrated IPRs management system in Pakistan being a middle income country. However, irrespective of this categorisation we are considering the level data from 1970 to 2010 due to limited availability of data for time slots from 2000 to 2005 and from 2005 to 2010 for time series analysis.

The data of GDP, FDI, trade to GDP and population growth rate are taken from World Banks's World Development Indicators (2010).<sup>2</sup> The data of Secondary School Education is obtained from Barro and Lee (2010)<sup>3</sup> Intellectual Property Right data is collected from Ginarte and Park (2010).<sup>4</sup> Economic Freedom of the World data has been collected from Gwartney, *et al.* (2015).<sup>5</sup>

##### 4.2. Selection of Variables

The economic variables selected for the study are presented in the following table:

<i>Definitions of Economic Variables Used in the Study</i>	
GDP	Growth rate of Gross Domestic Production is the market values of all the final goods & services produced within a given period in Pakistan.
IPR	The IPR index [Ginarte and Park 1997]) is based on extent of coverage of patents, duration of protection, duration of membership in international patents agreements, provisions for loss of protection and enforcement mechanisms. Each category has score between 0, 1 and sum of all categories constitutes IPR index which ranges between 0 and 5.
FDI	Foreign direct investment is the investment made by foreign companies in Pakistan.
EFW	Economic Freedom of the World is the index which measure the security of private property right, rule of law, taxes, monetary policy, labour and business regulation etc. EFW index ranges from 0 to 7.
TRADEOP	Trade to GDP is the average ratio of import plus export to GDP.
P <sub>opGrowth</sub>	Population growth is the over time change in population.
SYR <sub>15</sub>	SYR15 is the average year of secondary education for people over 15 years of age in Pakistan used as a proxy for human capital.
GDI	Gross domestic investment is the worth of attainment of new or existing fixed assets by the business, government and household sector.

<sup>2</sup> <http://data.worldbank.org/data-catalog/world-development-indicators>

<sup>3</sup> <http://www.barrolee.com>

<sup>4</sup> This data is available on the request from the authors.

<sup>5</sup> [http://www.freetheworld.com/datasets\\_efw.html](http://www.freetheworld.com/datasets_efw.html)



#### 4.3. Modelling IPRs and Economic Growth

The general form of our model is as follows;

$$\text{GDP} = \beta_1 + \beta_2 \text{IPR} + \beta_3 \text{FDI} + \beta_4 \text{EFW} + \beta_5 \text{TRADEOP} + \beta_6 \text{PopGrowth} + \beta_7 \text{SYR}_{15} + \beta_8 \text{GDI} + U_i \quad \dots \quad (1)$$

### 5. ECONOMETRIC TECHNIQUES AND ESTIMATIONS

#### 5.1. Unit Root Test

To check the stationarity of all variables we are applying Augmented Dickey-Fuller test and Phillips Perron tests. The results of the tests are demonstrated in Table.1. In time series analysis the linear combination of two or more non-stationary series becomes stationary which is called cointegration in order to avoid spurious results. The objective of Johansen Cointegration test is to trace whether such non-stationary linear combination of variables are cointegrated or not. The presence of cointegration among the variables provides basis for the application of Vector Error Correction Model. The main objective of the stationarity test is to find that how many times the variables are differentiated to induce the stationarity. If the variables are integrated of the same order then we apply Johansen cointegration test.

The table exhibits that time series variables, i.e. Intellectual Property Rights (IPRs), Foreign Direct Investment (FDI), Gross Domestic Product (GDP), Economic Freedom of the World (EFW), Trade Openness (TRADEOP), Population Growth (POPGROWTH), Human Capital (SYR15) and Gross Domestic Investment (GDI), are non-stationary at level and become stationary at I(1).

Table1

*Unit Root Test*

Variables	Trace Statistics	Critical Value (5%)	Conclusion
IPR	-8.79	-3.56	I(1)
FDI	-6.61	-2.93	I(1)
GDP	-6.56	-2.93	I(1)
EFW	-3.08	-2.93	I(1)
TRADEOP	-3.38	-2.93	I(1)
POPGROWTH	-5.74	-2.93	I(1)
SYR15	-3.48	-2.96	I(1)
GDI	-2.00	-1.95	I(1)

#### 5.2. Lag Selection Criteria

We started with the lag length of 5 and checked the Akaike Information Criterion (AIC) and Schwarz Criterion (SC). At first instance the AIC suggested for 5 lags which are optimal but the SC is fine with one lag. As we reduce the lag length from the maximum to minimum, we selected the AIC for lag length of 5. At lag length of one the values of both the AIC and SC resemble with each other and give minimum values. To have more significant justifications for the analysis we selected the one lag length criteria.

### 5.3. Johansen Cointegration Test

The cointegration test confirms the long run relationship among IPR and FDI, GDP, EFW, TRADEOP, POPGROWTH, SYR15 and GDI. The lag length one is chosen which confirm the lowest value for AIC and SC. The summary of the cointegration test is given in the following table:

Table 2

#### *Unrestricted Cointegration Rank Test (Trace)*

Hypothesized No. of CE(s)	Maximum Eigenvalue	Trace Statistic	5% Critical Value	Prob.**
None *	0.921885	299.0933	159.5297	0.0000
At most 1 *	0.810957	199.6601	125.6154	0.0000
At most 2 *	0.642494	134.6947	95.75366	0.0000
At most 3 *	0.626583	94.57920	69.81889	0.0002
At most 4 *	0.513516	56.16188	47.85613	0.0068
At most 5	0.329766	28.06037	29.79707	0.0782
At most 6	0.222472	12.45535	15.49471	0.1364
At most 7	0.065490	2.641580	3.841466	0.1041

Trace test indicates 5 cointegrating eqn(s) at the 0.05 level.

\*denotes rejection of the hypothesis at the 0.05 level.

\*\*MacKinnon-Haug-Michelis (1999) p-values.

We used both the Eigenvalue and Trace Statistic to determine whether cointegration between variables exists or not. In our summary table there are five cointegrated vectors which are confirmed by the critical value of 5 percent or the P-value of probability. The presence of the cointegration among the variables provides the basis of Vector Error Correction technique.

### 5.4 . Vector Error Correction Model

The long run relationship between the set of variables normalised with respect to GDP can be written as:

$$\text{GDP} = 121.76\text{IPR} + 0.06\text{FDI} + 33.04\text{EFW} + 0.01\text{TRADEOP} + 131.90\text{PopGrowth} + 22.15\text{SYR15} + 0.004\text{GDI}$$

The analysis clearly depicts that the enforcement of IPR index by one unit would significantly cause to increase the GDP by 121.76 units. Similarly, foreign direct investment, economic freedom of the world and human capital would positively affect the GDP by 0.06, 33.04 and 22.15 units, respectively. Moreover, 1 percent population growth would positively affect GDP by 131.90 units. However, the effects of gross domestic investment and trade openness on GDP are insignificant. The reason may be that the enforcement of IPRs may attract more foreign trade and investment which may consequently erode domestic investment and its impact on economic growth.

Following table presents the full set of adjustment coefficients in the VECM.

Table 3  
*Adjustment Coefficients in VECM*  
*(Standard Error in Parentheses)*

D(GDP)	0.028724 (0.01701)
D(IPR)	0.001287 (0.00056)
D(FDI)	5.895342 (1.31742)
D(EFW)	-0.000622 (0.00082)
D(TRADEOP)	0.021149 (0.01144)
D(POPGROWTH)	0.000646 (9.7E-05)
D(SYR15)	-0.000259 (0.00161)
D(GDI)	21.00418 (6.45007)

The results indicate that the short run response of GDP to changes in IPR is also positive and the GDP increases with IPR.

## 6. CONCLUSIONS AND POLICY RECOMMENDATIONS

The results of our investigation confirm the hypothesis that enforcement of intellectual property rights promotes economic growth in Pakistan. The positive impact of IPRs on growth is confirmed at different levels of economic development.

The need to enforce intellectual property for economic growth arises on many grounds. First, protection of IPRs promotes innovation which consequently enhances productivity and growth. Second, the international demand is increasing for value added products that can be produced through advanced production technology. It means brand names recognition, reputation for quality and product innovation, is playing important role to satisfy this demand. Third, high growth sectors including information and computer technology, entertainment, genetics and biotechnology, support innovation for processed foods, clothing and household products, highly depend on IPRs. Fourth, domestic entrepreneurs acknowledge that their access to frontier technologies depend on the protection of intellectual property rights.

Establishment of intellectual property rights provides both opportunities and challenges. The opportunities are given in the forms of conducive environment for innovation, technology transfer, investment flows, product development and access to global market. On the other hand challenges are given by diverting resources from informal to formal activities, coping with higher costs of imitated products and technologies, and absorbing the costs of IPRs management.

The strong enforcement of IPRs is a necessary but not sufficient condition to achieve the purpose of economic growth. For effective IPRs and economic growth a set of policy measures is required including trade and investment liberalisation, promotion of innovation, commercialisation of technologies, enrichment of human capital for research and development and regulation for effective competition. The real challenge for policy-makers is to transform the static and short run loss of imitation into a dynamic and long run gain of innovation and development through IPRs enforcement.

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