

Intangible Capital Investment & Its Effects on Economic Growth: An Evidence from Asian Nations

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Abstract: The research is an attempt to describe the impact of intangible capital and its effects on economic growth using a panel analysis from 1995-2013 in 37 Asian economies. The analysis proves that increasing investment in different forms of intangible capital and its injection to business activities enhances growth pattern of the economy and higher profits in the long run. With the enrichment in human capital with education it helps the countries to absorb new and better technology which flow with FDI easily for value creation and competitiveness in goods and services.

Keywords: Capital, FDI, Technology, Investment, Growth, labor
JEL Classification: R11, O16, D24, J21.

1. Introduction

Following Hall (1992) proposal “intangibles” are considered as “assets” that is, intellectual property rights, trademarks, certain information technology such as data bases, networks, etc., and “skills”, i.e., capabilities and competencies, such as the human capital. Approximately, 78% of the world’s wealth is attributed to intangible capital (World Bank, 2005). In developing nations, intangible capital is attributed to 59% of the wealth, where as in OECD countries the share is approximately 80%. Economic transformation of the economies to knowledge based and innovative ideas need the incorporation of trained human capital and intangible capital in different activities triggering economic growth of the country. The recent economic structure has changed the growth stimulus to the intangible capital investment. Physical or financial resources are no longer keys for competitiveness. These are necessary but not sufficient conditions for a competitive economy (Loureiro & Castelo, 2012).

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The key for achieving competitive edge in the world is by investing more in the intangible capital treated i.e. new technology, R&D, education, investment in human capital. Intangible capital basically is an idea putting into an activity for more value creation. Due to globalization and increased competition pressure on companies and economies is increasing and, by targeting successful area and regions. Flexibility can be increased by increasing investment on human capital, which increases the ability to immediately adapt to market developments, are the earmarks of this new era.

Witnessing the current scenario, there is increasing interest in analysis of intangible capital which affects growth. There is profound literature available on human capital, innovation and technology. However, there are some hurdles in the way for the proper analysis of intangible capital and its impact on growth. The factors, process and mechanism which contribute to the creation and development of knowledge i.e. competition and cooperation among firms the role of research and development, universities and global actors, it is identified that they are not connected, which is important to know the process of knowledge creation and its outcome.

The present research explores the injection and importance of intangible capital in the growth of the economy to catch up with more knowledge intensive technologically advanced countries of the world and for maintaining a competitive advantage in goods and services. The main base of the research is tied to the fact that, as in any investment decision, benefits and sacrifices must be compared in order to support a particular action under the economic rationality paradigm. Further public investment in the line of enhancing human capital through injection of more funds and training programs (labor training, organizational structure, education, R&D and public decision of channeling funds as a percentage of GDP for the support of these programs) is also analyzed. Another very important factor which bring in to the economy new designs, technology, ideas and knowledge is FDI (foreign direct investment) in Asian economies for which the former factors has to have a strong base for better absorption of these

factors in market for capturing more benefits for the growth of the economy.

The uniqueness of this research is its emphasis on the role played by intangible capital in the economic growth and development. This study states that the intangibles are already considered to be a significant resource of growth, market segmentation, knowledge creation, value addition, competitiveness in product and services, job opportunities and especially increases labor productivity in the region which On the other hand, the level of productivity is very low as compared to that in the developed countries, which creates a larger space for more development.

Despite the significance of the role of intangible capital in the developing countries; there are only few empirical studies in this regard. Conversely, the more recent restructuring from goods-producing to service-producing activity has not enjoyed the same broad recognition as a contributor to economic growth.

2. Literature Review

Ark *et al.*, (2009) discussed measuring intangible capital and its impact on economic growth keeping focus on current international comparison available using data on eleven advanced economies for the measure of intangibles including computerized information, innovative property and economic competencies. The result of intangible investment intensity and intangible capital deepening shows a large impact on growth with a variable growth pattern in EU countries. Suggesting that higher growth rates GDP per capita could be obtained with higher rates of investment in intangible as a share of GDP along with technology transfer and positive technological diffusion.

Bartuseviciene and Sakalyte (2014) tried to assess the patterns of intangible asset investment in OECD and Baltic countries. Concluding that USA, Japan, United Kingdom and other advanced economies' use the approach of computerized information, intellectual property and economic competencies. Accordingly investment in R&D shows slow

growth as share of Gross Domestic Product but it's the only factor affecting the economic growth.

Fukao *et al.*, (2007) found that investment in intangible assets has grown in Japan however, the growth rate declined in 1980 to 1990 but despite of that the contribution of intangible capital to economic growth remained same. The service sector has to be more intangible assets intensive to overcome the slow productivity growth in Japan.

Haskel (2012) explained that there is need to document investment in human and tangible capital, because intangible capital is traded in ideas and not treated typically in the markets. Future, investment will comprise more on intangible and that is important for growth of the economy too. Paper urges to suggest that only the policy should have the flexibility to affect intangible spending as various products and market restrictions might retard the investment in intangibles.

Sokhom (2012) demonstrated the contribution of least understood intangible human capital to assess its impact on economic development of less developing countries studying the case of Cambodia using t-test as a method with a total sample of 272 using psychological methods (self-esteem and political efficiency) finds out that intangible capital have contribution in economic growth.

Gomez and Vargas (2012) focused on manufacturing firms adopting new advanced technology for increasing profit explaining The link between technology adoption and competitive advantage with new diffusion patterns as all the technologies are not related to the firm resource structure. It also explains the idea of firm's movement from epidemic models once the uncertainty in innovation is reduced. It supports the idea that R&D investment increases the chances for adopting new technology with partial provision for human capital and advertisement.

Loureiro and Castelo (2012) gave the relation of three components important for the management of intangible on SME growth (human,

structural and relational capital. It also through light on the fact that physical and financial resources are no longer the main keys for competition rather it the intangible. SMEs are enterprises with limited resource and innovative capabilities which highlights that SMEs are not meeting their required demand of innovation. There is need for increasing he ratio of technology transfer and diffusion d medium terms. This will increases growth in long and medium terms.

Haskel and Wallis (2013) found for UK market sector if publically financed R&D has correlation for private sector productivity role, argues that return has fallen due to trebled in the research budget. Dulal and Foa (2008) explained that social institutions are main components of national wealth and shoes that intangible capital is fundamental for development. Main hurdle for developing countries are the low stock of intangible capital and ability to convert human and social capital into revenue generating and cost savings and other tangible benefits. The cross country differences in stock of the capital are due to social and human capital.

Roth and Elisabeth (2010) using cross-sectional panel analysis for fifteen EU countries found a positive relation between intangible capital in business and its effect on labor productivity. By inclusion of business intangible on the asset side changes the rate of output per worker and it also explains the significant international variance in labor productivity. Country associated with high intangible capital deepening growth has higher labor productivity growth rates.

Chen *et al.*, (2014) using data of 10 EU countries explained that productivity growth was observed in industries which used intensively information and communication technologies, countries with high intangible capital investment which developed countries mostly relies on this source of growth.

Teece (1998) captured the idea of organizational capital important for value creation as knowledge and other intangible capital becomes the key drivers in developed nations. According to author the key drivers of growth and wealth creation are intellectual property, technological

know-how, brands and better goods and services and their commercialization. Role of management is quite considerable for business organization for the focus on strategic analysis must change to convert intangibles and knowledge for better product and societal growth.

Amin *et al.*, (2014) examined the intellectual capital impact on pharmaceutical industry of Pakistan using quantitative data from 2009-2013 to measuring financial assets, return on assets, return on equity and earnings per share are used. Partial least square technique is used for the analysis. The results of the estimation shows that path coefficients values (β) reject the null hypothesis supporting H_1 reflecting that IC (intellectual capital) has very positive impact on financial performance of the pharmaceutical companies of Pakistan. This makes it fruitful for decision makers of pharmaceutical companies.

Moreno, (2011) gave a summary on intangible asset and its impact on regional economic growth focusing on intangibles for which data was available i.e. knowledge capital, human capital, social capital and entrepreneurship capital. Geographic Macro and Regional approach is applied for regression to measure the impact on GDP of FP6 EU over the period 2003-2007 to analyze the contribution of R&D and intangible assets. The social externality embodied in human relationships facilitates the creation, acquisition and diffusion of useful knowledge. The influence of human capital and R&D efforts on innovation increases with growing levels of social capital. They further argued that an entrepreneurial identity results from an individual's socialization a positive relationship between productivity and entrepreneurship capital, entrepreneurial activity, i.e. the rate of self-employment, and entrepreneurial attitude, and knowledge and productivity.

Kumlu (2014) put an effort to know the intangible capital impact and export performance of Turkish SMEs and ME companies. Sample of 271 was used and analyzed through the SPSS statistical packet

program and the proposed relations were tested through regression analyses. Results of the paper show that all forms of the intangible resource and competitive export strategies play an important role in contributing towards perceive export performance. Companies which inject all possible intangible assets and combination of differentiation and cost leadership strategies at the same time reach at the best of export performance.

Malik and Ali (2013) examined that whether the investment in intangible capital is procyclical or not, firms preferences for intangible investment and its response to the transitory and productivity shock. Dynamic general equilibrium model agents work in competitive environment producing output using capital, labor and intangible capital which makes it different from typical business cycle model. Application of the model proves that investment of intangible is procyclical and it produces endogenous movement in productivity. As a result of both transitory and permanent shock there is increase in the investment of intangibles however it reduces the firm's current profit but the investment leads to higher profit in the long run.

Khan and Haider (2015) attempted to highlight the hidden GDP growth drivers (health and education) using time series data from 1972 to 2014 of 43 years for Unit root tests, ADF, Phillip Perron test and ARDL tools. The research proves that education improves abilities, labor market segmentation, reward, profits, youth employment, social class and all of these leads to economic growth and development.

3. Theoretical Framework

The main focus on technical change is by increasing the activities of R&D. But this idea was more refined in recent work done by Pavitt (1984), Dosi (1984) and Freeman (1986) in which it is argued that innovation process has more consideration in recombination of existing knowledge than creating new one. Firms usually go through complex learning process where the priority of knowledge through is important along with funding and R&D activities.

Human capital emphasis on skilled human capital considering them asset like financial and physical assets. Human capital act as investors and invest in their training and education. Further the idea of human capital as explained in two points by Mincer (1989), he summarized the role of human capital in economic growth as 1). It's a productive factor which is treated as a stock of education and skill which helps in the production of final good. 2).cause of innovation which is a source of innovation in the form of accumulated knowledge. The concept Of" intangibles" is explained by this human capital theory due to the second reason.

4. Data and Sources

Panel data has been used for regression analysis of 34 countries for the time period of 1995 to 2013. Panel data are also known as cross sectional time series data or longitudinal data. Data has been collected from world development indicators 2013.

5. Methodology

In order to check the relationship for cross section analysis pooled OLS estimation technique has been used, as it is the most restrictive model which specifies constant coefficients.

$$Y_{it} = a + BX_{it} + U_{it} \quad (1)$$

Pooled linear regression model estimable by Ordinary Least Squares (OLS) procedure:

$$y = + \sum x + e = 2 \beta_1 \beta \quad (2)$$

Where $i = 1, 2, \dots; N$; refers to a cross-sectional unit; $t = 1, 2, \dots; T$; refers to a time period and $k = 1, 2, \dots; K$; refers to a specific explanatory variable. Thus, it y and it x refers dependent and independent variables. Pooled model differ in the assumption of U . If the regressors are uncorrelated with the error term and model is

correctly specified then Pooled OLS can be used for estimation analysis.

6. The Model

The econometric technique employed in this study is the POOLED OLS regression analysis. A general linear model for panel data permits intercept and slope coefficients to vary both over time and over individual.

The general empirical model is as follows:

$$\text{Growth}_{i,t} = \alpha_{it} + \beta_{1i,t} \text{ foreign direct investment} + \beta_{2i,t} \text{ Govt Exp on Edu} \\ + \beta_{3i,t} \text{ Public Spending on Edu} + \beta_{4i,t} \text{ Gross Capital Formation} + \\ \beta_{5i,t} \text{ Labor} + \varepsilon_{i,t} \quad (3)$$

Dependent variable is Growth which is estimated as GDP per capita as annual percentage. The growth in any economy is estimated with the help of change in the volume of its production or in the real incomes of its inhabitants. It is defined as the sum of value added calculated at constant prices, by governments, industries and the households functioning in that particular economy.

Independent variables are foreign direct investment, government expenditure on education, public spending on education, gross capital formation and labor to see the effect of these variables on growth GDP of the Asian economies.

7. Estimated Results

Table 1 illustrates the summary statistics of per capita GDP, indicators of service sectors like financial and insurance services, computer and communication services, travel services and transport and tourism services as well as governance indicators like political stability, control of corruption, government effectiveness regulatory quality and rule of law. This research uses balanced panel dataset to estimate these statistics.

In order to do the estimation of results in Asian economies, OLS regression models are applied individually for each model in order to explore the nature of relationship between services sector and growth as well as the relationship of growth with institutions. F test has also been applied for each model so as to check the time effects and country effects and the results supports the Pooled OLS as overall there were no time effects as well as country effects

Table1: Summary Statistics

Y	Coefficients values	Std. Err.	T-
FDI	.1790 0.000***	.03015	5.94
GEE	.0630 0.069*	.05703	2.11
PEE	-.1037 0.003**	.0347	-2.98
GCF	.0894 0.000***	.0096	9.26
L	5.04e-09 0.000***	1.20e-09	4.20
Cons	4.6915 0.000***	.5858	8.01

*, **, *** show 10%, 5% and 1% level of significance respectively.

The results of the Table 1 shows different estimator variables that are associated in intangible capital investment in a regression equation along with the economic growth as a dependent variable for the time period of 1995 to 2013 for the panel of 34 Asian Economies. These results indicate that investment in all form of the intangible capital *expenditure on education and *public spending on education (proxy for training programs, new technology) will increase the value of output in the country. The parameter for α (constant) (4.6915) specifies the association when all explanatory variables are equal to zero. The β parameter illustrates the average change in GDP per capita that is linked with each unit increase in the explanatory variables. The estimation results shows that there is positive relation of FDI with GDP and keeping all other variables constant a 1% increase in the FDI will led to 17 percent raise in the GDP growth. The relation of GEE (government expenditure on Education) with GDP is also positive indicating that keeping other variables constant if there is 1% increase in the GEE GDP growth increases by 6 percent. GCF (government capital formation) also has a positive relation with GDP and a 1 % increase in the GCF, GDP growth increase by 8 percent. Labor in the research is used trained and educated population in the work force of the economy, which is showing positive sign and the estimation results shows that, 1% increase in the trained and educated labor will increase the GDP growth of the economy. However, the variable PEE (public expenditure on education) showing a negative sign to but the variable is significant.

As all the T-statistic is greater than 2 and the probability value of them is less than 0.1, so it shows that we should reject the null hypothesis of non-significance. Hence all variables are significant.

Table 2: OLS Results

Number of obs	627
F(5, 621)	35.06

Prob > F	0.0000
R-squared	0.2202
Adj R-squared	0.2139
Root MSE	4.1326

Number of total observation used in the regression analysis of Asian countries are 627. The value of R-squared of .2202 means that only 22 percent of the variation in economic growth (GDP) is explained by all the explanatory variables. To check whether the problem of heteroskedasticity is present or not we test it through Breusch-Pagan / Cook-Weisberg test for heteroskedasticity results are given below:

Table 3: Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

chi2(1)	0.23
Prob > chi2	0.6351

The result in Table 3 shows that there is no problem of heteroscedasticity in estimation of the results of the said model.

Table 4: Ramsey RESET test

F(3, 618)	0.76
Prob > F	0.3567

Ramsey has proposed a general test of specification error called RESET (regression specification error test). As the probability value of F is greater than 0.1, so we should not reject our null hypothesis of no omitted variables. Hence the estimated model is a good fit model.

8: Conclusion and Policy Recommendations

Using data on intangible capital (government expenditure on education and public spending on education) investment within across-sectional and panel analysis from 1995-2013 in 34 Asian countries, the analysis detects a positive and significant relationship between intangible capital and overall economic growth. The result indicates that a country with a high intangible capital deepening growth rate is associated with a higher labor productivity growth rate along with efficient absorption of technology inflow through FDI. These findings suggest that the Governments should divert their focus on capital expenditure which includes spending on education, health sector and R&D departments for accelerating growth.

References

- Amin, S., Aslam, S. and Makki, M. A. A. 2014. "Intellectual Capital and Financial Performance of Pharmaceutical Firms in Pakistan". *Pakistan Journal of Social Sciences (PJSS)*, 34 (2), 433-450.
- Chen, W., Niebel, T. and Saam, M. 2014. "Are Intangibles More Productive in ICT-Intensive Industries? Evidence from EU Countries". *Centre for European Economic Research (ZEW)*, 1-22.
- Dosi, G. 1984. "Technical Change and Industrial Performance, MacMillan, London".
- Dulal, H. B. and Foa, R. 2008. "Can Difference in the Social Institutions and Social Capital Explain Cross Country Environmental Performance?". *World Bank*, 1-32.
- Eustace, C. 2000. "The Intangible Economy Impact and Policy Issues". *Report of the European High Level Expert Group on the Intangible Economy, European Commission*.
- Roth, F. F. and Elisabeth, T. A. 2010. "Does intangible capital affect economic growth?". *CEPS Working Document No. 335*, 1-34.
- Freeman, C. 1986 Ed. "Design, Innovation and Long Cycles in Economics Development". *St Martin's Press, New York*.
- Fukao, K., Hamagata, S., Miyagawa, T. and Tonogi, K. 2007. "Intangible Investment in Japan: Measurement and Contribution to Economic Growth". *RIETI Discussion Paper Series 07-E-034*, 1-20.

- Gomez, J. and Vergas, P. 2012. "Intangible resources and technology adoption in manufacturing firms". *Research Policy*, 41, 1607–1619.
- Hall, B. 1992. "Investment and Research and Development at the Firm Level: Does the Source of Financing Matter?". *NBER Working Paper 4096*.
- Haskel, J. 2012. "Growth, Innovation and Intangible Investment". *LSE growth commission Institute for Government*, 1-11. Available at: <https://fr.scribd.com/document/348906821/KINA25765ENN-002-pdf>
- Haskel, J. and Wallis, G. 2013. "Public support for Innovation, Intangible Investment and Productivity Growth in the UK Market Sector". *Economics Letters*, 119 (2), 195–198.
- Khan, A. and Haider, I. 2015. "Intangibles and Nationwide Economic Affluence of Pakistan – Returns to Health and Education". *European academic Research*, 2(12), 15521-15543.
- Kumlu, O. 2014. "The effect of Intangible Resources and Competitive Strategies on the Export Performance of Small and Medium sized Enterprises". *Procedia - Social and Behavioral Sciences*, 150, 24 – 34.
- Loureiro, G. M. and Castelo, J. P. 2012. "A model for assessing the contribution of innovative SMEs to economic growth: The intangible approach". *Economics Letters*, 116(3), 312–315.
- Malik, K. Z. and Ali, S. Z. 2013. "Intangible Capital in a Real Business Cycle Model". *LUMS Economics working paper no.13-08*, 1-24.
- Mincer, J. 1989. "Human Capital Responses to Technological Change in the labor Market". *NBER Working Paper No. 3207*.

- Moreno, J. S. Y. 2011. "The role of intangible assets in the regional economic growth". *Investigaciones Regionales*, 20, 165-193.
- Pavitt, K. 1984. "Sectoral Patterns of Technical Change. Toward Taxonomy and a Theory". *Research Policy*, 6(13), 343-373.
- Ahmad, S. A. A. and Jawad, S. N. 2010. "Intellectual Capital and Business Performance in the Pharmaceutical sector of Jordan". *Management Decision*, 48(1), 105-131.
- Sokhom, S. 2012. "How Does Intangible Human Capital Impact Economic Growth in Less Developed Countries: Cambodia as a Case Study. Available at: aei.pitt.edu/14978/1/WD335_Roth_and_Thum_Innodrive_final_report.pdf.
- Teece, J. D. 1998. "Capturing Value from Knowledge Assets: New Economy, Markets for know-how, and Intangible Assets". *California Management Review*, 4(3), 55-79.
- World Bank. 2006. "Where is the Wealth of Nations? Measuring Capital for the 21st Century". *World Bank, Washington, D.C.*
- World Bank. 2005. "Where is the wealth of Nations? Measuring capital for 21st century. Explaining the Intangible Capital Residual". *The Role of Human Capital and Institutions*, 87-98.
- World Bank. 1993. 'Global Economic Prospects and the Developing Countries'. *Washington, D.C.: World Bank 1993.*