

# **Human Capital, Trade Openness and Informal Economy: Evidence from Pakistan**



By

Beenish Javed

Supervisor

Dr. Muslehuddin

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## CERTIFICATE

This is to certify that this thesis entitled: **“Human Capital, Trade Openness and Informal Economy: Evidence from Pakistan”** submitted by Ms. Beenish Javed is accepted in its present form by the Department of Economics, Pakistan Institute of Development Economics (PIDE), Islamabad as satisfying the requirements for partial fulfillment of the degree of **Master of Philosophy in Economics**.

External Examiner:

Dr. Anwar Shah  
Assistant Professor  
Quaid-i-Azam University  
Islamabad

Supervisor:

Dr. Musleh ud Din  
Professor  
PIDE, Islamabad

Head, Department of Economics:

Dr. Attiya Y. Javid  
Head  
Department of Economics  
PIDE, Islamabad

Dedicated to  
My Beloved Parents  
&  
Lee Min Ho

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## ABSTRACT

*Many countries around the world have an informal economy which operates outside government regulations. It is more widespread in developing than developed countries. Informal economy comprises of illegal activities as well as unreported income from legal activities either through barter or monetary transactions. Expansion of informal economy is on the rise in Pakistan. The growth rate of 5% has failed to improve the socio-economic indicators such as human capital and trade performance. Hence growing informal economy could be associated with the socio-economic indicators such as human capital, trade openness and economic growth. Therefore the study is conducted to examine the link between human capital, trade openness, growth and informal economy for Pakistan for the period 1975-2014. By using the ARDL approach, the study revealed that there exists a significant short-run and long-run relationship between the variables of interest. In other words, improvements in human capital index reduce informal economy in the long-run while it increases it in the short-run. In contrast, trade openness and growth expand the informal economy in the long-run and vice-versa in the short-run. The study also conducted a robustness analysis whereby Human Development Index (HDI) was used as an alternate proxy to human capital. The sensitivity analysis revealed the same results for the variable of human capital and growth but trade openness was statistically insignificant both in the short and long-run which can be attributed to high correlation between HDI and trade openness. Given these findings, the study suggests that the state should prioritize investment in human capital to make growth inclusive and sustainable as well as to enhance the competitive advantage of the domestic firms so as to control the expanding informal economy.*

**Keywords:** ARDL, Human Capital, Trade Openness, Economic Growth, Informal Economy

## **Chapter I**

### **INTRODUCTION**

Many countries around the world have an informal economy which mostly operates outside government regulations and consists of untaxed, unmeasured and unregulated economy. Informal economy comprises of illegal activities as well as unreported income from legal activities either through barter or monetary transactions (Schneider & Enste, 2000). Thus the informal economy consists of all the activities that could be taxed if these were reported to the taxation agency. Informal economy is more widespread in developing countries as compared to developed countries (Pratap & Quintin, 2006). The literature regarding the role of informal economy in attaining the objective of inclusive and sustained growth through its spillover effects on the formal economy is extensive with mixed findings.

The informal economy is affected by many factors and these can be classified into micro and macro factors. The micro factors include age, gender, place of residence, personal preference, moral values and citizen's perception of the role of government and the tax authority (see for instance, Renooy, 1990; Urdinola, 2012 and Traore, 2012). While the macro factors include tax burden, excessive rules and regulations, institutional quality, inflation, corruption, unemployment, government expenditure, innovations and Research & Development, economic liberalization, growth and human development (see for instance, Chen *et al.*, 1999; Rei & Bhattacharya, 2008; Macias, 2008; Maddah & Sobhani, 2014 and Elgin & Oztunali, 2014).



One of the macroeconomic factors is the trade liberalization. To begin with, economists usually see trade openness in emerging economies to be a positive factor. However, some policy makers are worried about the potentially negative effects on employment as a result of increased competition from international markets. The common fear is that workers will lose their jobs in the formal economy as a result of increased foreign competition and thus will find their way to the informal economy (Sinha & Kanbur, 2012; Heid, 2015). However there are 3 main theoretical views that describe the relationship between trade openness and informal economy precisely dualistic, legalistic and structuralist view. According to dualistic view only formal economy can engage in trade and there exists no direct link between formal and informal sector. While legalistic view asserts that the informal economy exists only because of rigid government regulations; and with trade openness as the regulation reduces, the informal economy shrinks. On the contrary, the structuralist view propagates that informal economy serves as a refuge for those who are excluded from the formal economy as a result of increased foreign competition (Sinha & Kanbur, 2012).

According to the endogenous growth theory, trade openness encourages the transmission of technology and knowledge thereby enhancing human capital which in turn fosters growth (Schultz, 1961; Jadoon et al., 2015). Moreover trade openness is not only about imports and exports but includes factors like foreign direct investment (FDI) that affects productivity and creates new jobs that serve as a means for growth. FDI also causes inflow of capital stock which facilitates the growth of trade (Ram & Zhang, 2002). However trade openness may adversely affect economic growth in the presence of poor quality institutions, lower level of human capital and when the exports comprise mainly of raw materials rather than finished products (Siddiqui &

Iqbal, 2005; Hye et al., 2014; Ali & Abdullah, 2015). Thus trade openness is likely to be related to informal economy, human capital and economic growth.

Another macroeconomic factor that may affect the informal economy is the economic growth. Growth may tend to have a contractionary impact on the informal economy if it is a pro-poor growth while it may have an expansionary effect if it is a high-tech or capital-intensive growth which increases the skilled labor demand in the service sector while reduces the demand for unskilled manufacturing jobs (Schneider & Enste, 2000; Carr & Chen, 2001; Heintz & Pollin, 2003). Furthermore, economic growth increases the resources needed for improving education and health in the economy and thus improves the state of human capital (Olimpia, 2013). Consequently, the incomes of individuals increase and so does the demand for imported goods. In other words, increased growth leads to increased exchange of goods and services i.e. increased trade volume and hence greater openness (Andersen & Babula, 2008). For these reasons, economic growth may be linked to the informal economy, trade openness and human capital.

Human capital may also impact the informal economy directly as well as indirectly through trade openness and growth. To begin with, formal economy generally employs high-skilled workers and thus the investment in human capital enhances the skills and provides better employment opportunities in the formal economy and reduces the size of informal economy (Docquier *et al.*, 2014). Moreover, according to Gerxhani and Werfhorst (2011) education plays a major part in formation of values and moral attitudes of individuals. It decreases tax evasion and individuals with greater tax morale are less likely to participate in the informal economy. Moreover, human capital has two effects on economic growth specifically level effect and rate effect. The former pertains to its effect on production via

increased labor productivity (Romer, 1990; Mankiw *et al.*, 1992). While the latter pertains to its contribution in increasing comparative advantage through technological diffusion and innovation which makes the exports competitive in the international market (Siggel, 2000; Pistorius, 2004 and Horwitz, 2005). The greater volume of exports itself may lead to export-led growth (Ahmed *et al.*, 2008). Consequently, human capital may be associated with informal economy, openness to trade and growth.

The expansion of informal economy is on the rise in Pakistan (Government of Pakistan, 2013). In 2007-08, the magnitude of the informal economy was approximately 91% of the formal economy (Kemal & Qasim, 2012). This estimate includes part of small-scale industries, transport, trade in retail and wholesale, construction in private sector, and social & personal services that are un-registered.<sup>1</sup> Even formal sector carries out certain activities that are part of the informal economy. For instance, sometimes the formal sector under-reports the output and number of employees in order to save some tax. The rising trend of the informal economy is no cause for celebration. Although the informal economy acts as an absorber of shock for an economy with slow income growth and sluggish jobs but its growth at the expense of the formal sector poses serious structural constraints for the country's socio-economic development.

Over the years the economy has witnessed a shift towards service sector and it also experienced high growth rates between 2002 and 2007 which was attributed to the increased share of service sector. However, the economic crisis of 2008 coupled with terrorism and energy crisis busted the bubble of consumerism and adversely affected the investment decisions. Consequently, growth slowed down and unemployment increased (Government of Pakistan, 2012). The increased

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<sup>1</sup> Kemal, M. Ali (2013), "*Debunking myths*" Money Matters, June 10, 2013.

unemployment is posing a threat as the absorption capacity of the formal sector is saturating due to lack of innovation and increased influx of new entrants into the labor force (Tahir & Tahir, 2013). Moreover, Pakistan ranks 118 out of 130 nations with respect to human capital index.<sup>2</sup> Expansion of informal sector could be a reason as to why the government's health and education expenditures are lowest among all South Asian countries. Since the informal sector evades taxes; the government is unable to increase tax collections which may result in reduced allocations for social sector development (health & education).

In addition to that, Pakistan's trade deficit amounted to \$11.92 billion as of January 2016.<sup>3</sup> Over the years in Pakistan little shift has been observed in the export pattern. In other words, the country has been unsuccessful in improving the value-addition of its exports and has failed to catch up with other Southeast Asian economies (Mahmood & Nishat, 2004). The possible reason for this could be the poor state of human capital and the expansion of informal economy which acts as a drain on resources. Furthermore, Pakistan's economic growth rate was 4.71 percent in 2015-16 but remains lower than 5-7% required to adjust new entrants into the labor force.<sup>4</sup> One possible reason for the low economic growth apart from poor state of human capital and poor trade performance could be the decline in investment as a result of increased tax burden on the formal sector. From this discussion, clearly a debate exists regarding the link amid the variables of interest. In context of Pakistan, could there be a relationship between informal economy, human capital, openness to trade and growth? Since theoretically all these variables are linked, the answer to this question is left to empirical investigation.

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<sup>2</sup> The Human Capital Report 2016, World Economic Forum.

<sup>3</sup> Pakistan Bureau of Statistics.

<sup>4</sup> Pakistan Economic Survey 2015-16.

## **1.1 Objectives of the Study**

The main objective of the study is to examine the link between human capital, trade openness, growth and informal economy for Pakistan for the period 1975-2014. In addition, the study also intends to conduct a sensitivity analysis by using an alternative proxy of human capital namely Human Development Index (HDI) in order to determine the robustness of results.

## **1.2 Main Findings**

The underlying study reveals that there exists a significant short-run and long-run relationship between the variables of interest. In other words, an improvement in human capital index contracts the informal economy in the long-run while it expands it in the short-run. In contrast, trade openness and growth lead to an expansion in the informal economy in long-run and vice-versa in the short-run. The study also conducted a robustness analysis whereby Human Development Index (HDI) was used as an alternate proxy to human capital. The sensitivity analysis reveals the same results for the variable of human capital (HDI) and growth but trade openness is statistically insignificant both in the short and long-run which is most likely due to high correlation between HDI and trade openness.

## **1.3 Significance of the Study**

The current study will assist the policymakers in fulfilling the vision 2025 and other growth strategies. That is because it would enable them to make evidence-based decisions regarding developing human capital, achieving sustained and inclusive growth and developing competitive knowledge economy through value addition so as to boost the competitiveness in the international market. Moreover, the sensitivity

analysis would guide the policymakers regarding the usage of distinct measures of human capital and whether or not it makes a difference in the policy analysis.

#### **1.4 Contribution of the Study**

Studies about informal economy are scarce in comparison to the literature on growth. Furthermore, the above analysis reveals that the nexus between human capital, trade openness, growth and informal economy has received scant attention in the literature. Moreover, the studies conducted on investigating the link between human capital and informal economy have proxied human capital by either health or education indicators. The skills and development of the labor cannot be adequately captured by these proxies alone. The present study aims to use a relatively broader measure of human capital namely Human Capital Index (HCI) that is based on the weighted average of educational returns as suggested by Psacharopoulos (1994) and schooling years calculated by Barro and Lee (2012). It is comparatively a new measure that captures and tracks the development of human capital. The Human Capital Index allows for a more effective comparison across time, regions and income groups given its wide coverage of years and countries. Unlike the Human Development Index (HDI), Human Capital Index reflects the short-term achievements in human development. Thus the present study aims to fill the gap in literature by investigating the link between human capital, openness to trade, growth and informal economy using the new measure of human capital. It also aims to conduct a sensitivity analysis to find how the results change when a different proxy for human capital is used namely Human Development Index (HDI).

The remainder of the study is organized as follows: Chapter 2 gives the overview of Informal Economy in Pakistan for the period 1975-2014, while Chapter 3 presents review of existing literature. Furthermore, Chapter 4 shows the methodology

and data employed to achieve the objectives of the study. Results and Discussion are presented in Chapter 5 while Chapter 6 concludes the study with some policy recommendations.

## Chapter II

### OVERVIEW OF INFORMAL ECONOMY IN PAKISTAN

Informal economy is the part of the economy whose activities fall outside the government imposed regulations, observation and taxation, in other words its income is untaxed and undocumented. In Pakistan, the size of the informal economy was approximately 91 percent of the formal economy as of 2007-08 (Kemal and Qasim, 2012). Gross Domestic Product (GDP) of Pakistan has increased by almost 5% per annum over the last decade.<sup>5</sup> Nonetheless the rate of GDP growth has failed to improve the socio-economic indicators. Growing informal economy is one of the constraining factors in the socio-economic development of the country. This is because of the fact that it competes with the formal economy for the scarce resources. Moreover, tax evasion by the informal economy results in reduced allocations for the social sector development.

The size of the informal sector is increasing overtime partially because the Federal Board of Revenue (FBR) has failed to document potential sectors such as wholesale, retail and agriculture. Simultaneously, complicated and harsh ways of recovering taxes have made the individuals reluctant to pay taxes.<sup>6</sup> The extent of the informal economy can be gauged from a number of factors. Firstly, informal jobs to total employment ratio has increased to 76.1 percent.<sup>7</sup> Secondly, formal manufacturing industries such as leather, iron & steel, wood, chemicals and coke & petroleum have experienced negative growth rates of 17.97, 7.48, 58.09, 2.20, 0.32 percent respectively which indicates stagnant output and employment in these industries (Government of Pakistan, 2016). Thirdly, cash transactions in the economy

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<sup>5</sup> World Bank, World Bank Open Data, retrieved from <http://data.worldbank.org/>

<sup>6</sup> <http://fp.brecorder.com/2016/05/2016051345400/>

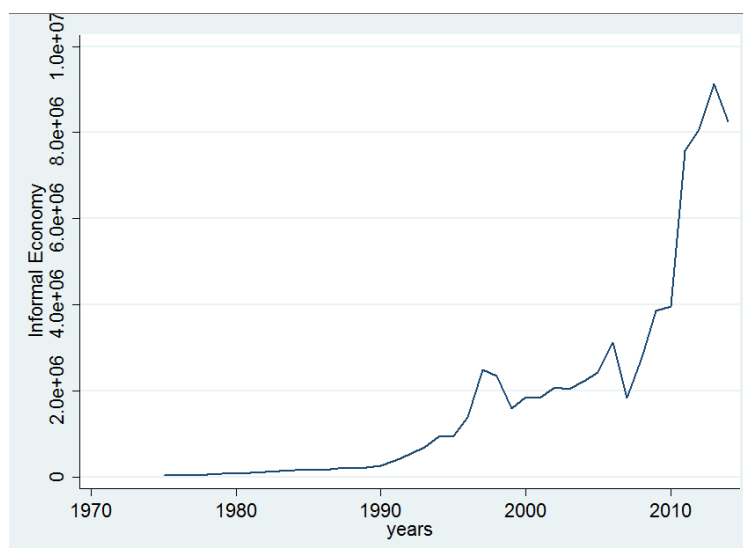
<sup>7</sup> Labor Force Survey 2014-15, Pakistan Bureau of Statistics.



have also increased overtime by Rs.216.5 billion (6.5 percent)<sup>8</sup> together with the tax gap that increased by Rs. 3200 billion<sup>9</sup>. Fourthly, the firm-level attitude also signals the underlying trend of the informal economy. The listings on stock exchanges have reduced and the de-listings have increased (163 companies de-listed between 2004-16).<sup>10</sup> Thus all these factors indicate an expanding informal economy.

Figure 2.1 below shows the trend of the informal economy in Pakistan over the period 1975-2014. The informal economy started to emerge in Pakistan during the late 1960s when tax rates were quite high. The super tax and corporate tax rate were 30 percent during that period while the income tax was 75 percent. The higher taxes reduced the disposable income and discouraged the investment in human capital. Consequently, the low skilled workers found their way in the informal sector.

**Figure 2.1: Informal Economy of Pakistan 1975-2014**



Source: Ashraf (2014) “Exploring the determinants of underground economy of Pakistan.”

However in 1980s these taxes reduced gradually and hence the growth of informal sector remained almost stagnant between 1975 and 1990 as evident in the figure. But after 1990 it started to increase till 1997 after which a decline was witnessed till the

<sup>8</sup> Pakistan Economic Survey 2016-17.

<sup>9</sup> <http://fp.brecorder.com/2017/07/20170711196740/>

<sup>10</sup> <http://www.ksestocks.com/OldCompanies/Delisted>

end of 1999. The pace of expansion increased from 2000 and continued till 2006 after which a sharp decline was seen in 2007. Nonetheless after 2007 the informal economy sharply expanded during the remaining period under analysis reaching its peak in 2013 after which it started to shrink.

Many factors are responsible for such a trend for instance; during late 1980s trade liberalization strategy was adopted in the country. The increased foreign competition faced by the inefficient producers and workers resulted in displacing them into the informal sector. In addition, the industrialization or the shift towards the manufacturing and service sector increased the demand for the skilled labor thereby forcing the less skilled individuals to move to the informal sector. Even though many taxes have been reduced overtime in order to facilitate the investment and business environment but these are still considered high by the old as well as new businesses. Thus in order to evade taxes many businesses moved to the informal sector. Another factor responsible for expanding the informal economy is the high unemployment rate which has been ranging between 5-6% from past decade. The education system in the country is producing non-technical graduates which fail to fit in the technical fields or industry. Hence these unemployed individuals resort to self-employment which falls in the informal sector (Ashraf & Hosain, 2013 and Hussain, 2015). Furthermore, the inadequate trust in the government institutions overtime has caused the individuals to avoid the rules and regulations set by the state and hence operate in the informal economy (Yosuf & Nauman, 2015).

Pakistan adopted a more liberal regime since the early 2000s so as to facilitate global competition and reduce state spending. This led to an increased flow of remittances and consumerism. As a result the economy experienced growth however the commodity producing sector shrank. On the other hand the state spending on

social sector has been falling. The social security and employment based income provisions are insufficient. Hence the failure of the state to establish a long-term strategy to exploit the potential of the labor force has resulted in the expansion of the informal sector. Approximately 22 million of the employed labour force is working in streets however the government has no record of it (Tahir & Tahir, 2012).

## Chapter III

### REVIEW OF LITERATURE

Quite a few studies have examined the relation between human capital and informal economy and trade openness and informal economy. Thus it is necessary to have a clear idea about the present development in literature regarding the link between human capital, openness to trade, growth and informal economy.

#### 3.1 Human Capital & Economic Growth

Large body of literature emphasizes human capital as a major driver of growth (Lucas, 1988, Mankiw *et al.*, 1992, Riley, 2012). Human capital has two effects on economic growth namely level effect and rate effect. The former pertains to its impact on output through increased productivity of labor (Romer, 1990; Mankiw *et al.*, 1992) while the latter refers to its contribution in increasing comparative advantage through technological diffusion and innovation (Siggel, 2000, Pistorius, 2004, Horwitz, 2005). In other words, human capital leads to the accumulation of other factors that contribute to growth namely physical capital and innovation (Nelson & Phelps, 1966; Lucas, 1990; Popescu & Diaconu, 2008). With the use of increased amounts of physical capital and labor real GDP increases; while innovation or technological improvements enhance the ability of a country to produce greater output from given inputs. On the contrary, growth also affects human capital. The reason being that, economic growth increases income and skilled labor demand; hence the investment in human capital increases as the payoff increases (Mincer, 1981). For instance, Schultz (1961) found out that the growth of output surpassed the growth of inputs such as physical capital and employment thus indicating that investment in human capital was responsible for this gap. Aka and Dumont (2008) examined the long-term relation and

causal links between human capital and growth of USA for the period 1929-1996. Health and education were used as human capital variables. The study revealed that the association between growth and human capital is that of a cause and effect. Similarly, Olimpia (2013) investigated human capital accumulation as an input and output of growth for 17 countries with fastest growth rates during the period 1960-2010 and found significant two-way causality between growth and human capital. The notion that human capital development is an output of growth is also supported by the findings of McGrath (2016) who investigated the link between growth and human capital of Ireland for 1980-2012. The study concluded that economic prosperity leads to improvements in human capital and that the causality is not from human capital to growth rather vice versa. In contrast, Abbas (2000) investigated the role played by human capital in Pakistan and India's growth between 1970-1994. The study concluded the existence of generally a positive relation between growth and human capital investment. Furthermore, it was found out that human capital served as a subordinate to physical capital. In other words, human capital acted as an agent in attracting physical capital investments.

### **3.2 Trade Openness & Economic Growth**

Vast amount of literature highlights the importance of trade openness for growth. However, debate still exists regarding the direction of effects. The arguments supporting international trade date back to the times of Adam Smith. From then onwards the benefits of liberalized trade in the form of productivity enhancement have been analyzed extensively in literature (Bhagwati & Srinivasan, 1978; Krueger, 1978). Trade openness promotes technological development (Mankiw, 2004). It also increases market size and directs the resources towards Research & Development

(R&D) (Rivera-Batiz & Romer, 1991; Grossman & Helpman, 1991). Openness to trade leads to increased specialization and economies of scale which in turn enhances productivity. This generates a competitive advantage in the form of reduced costs for the exporting country in the long-run thus leading to export-led growth (Ahmed *et al.*, 2008). In addition to that trade openness also leads to capital accumulation and foreign exchange which allows the country to import necessary inputs for exports (Asafu-Adjaye & Chakraborty, 1999). Trade is not only about imports and exports rather other factors like foreign direct investment (FDI) acts as a means for growth through job creation (Ram & Zhang, 2002). In turn, growth increases the income of individuals and thus increases demand for imported goods. In other words increased growth leads to increased exchange of goods and services i.e. increased trade volume due to rising incomes (Andersen & Babula, 2008). These theoretical links are also being justified empirically. For instance, Sun & Heshmati (2010) examined the effect of liberalization of trade on 31 provinces of China from 2002-2007. The study found that trade openness allowed the Chinese economy to reap static and dynamic benefits thus fostering growth. Furthermore, the two-way association between international trade and economic growth was also tested by Shan & Sun (1998) who examined the hypothesis of export-led growth for China between 1987-1996. The findings suggested a two-way relation between industrial output and exports. On the same lines, Ghartey (1993) investigated the link between growth and exports for US, Japan and Taiwan respectively. It was concluded that US growth promoted exports but the opposite held true in case of Taiwan and the causality was two-way in case of Japan. Chaudhry *et al.* (2010) investigated the link between openness to trade, growth and human capital in Pakistan between 1972-2007. The study revealed the existence of short as well as long-term relationships among variables and that the causality runs from openness to

trade and human capital to growth. In contrast, Hye *et al.* (2013) analyzed the effect of economic liberalization (financial & trade liberalization) on Pakistan's growth for 1971-2011. The study concluded that although economic liberalization favorably affected growth in the short run, trade liberalization adversely affected growth in the long-term. The notion that trade liberalization negatively affects growth is also being supported by the findings of Ali and Abdullah (2015) as well as Siddiqui and Iqbal (2005). On the other hand, Umer (2014) investigated the impact of openness to trade on Pakistan's growth for 1960-2011 but found no significant short-run relationship among the variables of interest.

### **3.3 Human Capital & Trade Openness**

According to the theory of endogenous growth, liberalization of trade encourages transmission of technology and knowledge and thereby enhances human capital (Schultz, 1961; Lucas, 1988; Rivera-Batiz & Romer, 1991). Conversely, improvements in human capital enhance labor quality which in turn, increases labor productivity and encourages exports (Stokey, 1991; Chuang, 2000; Costinot, 2009). Various studies have suggested that accumulation of human capital promotes trade and vice-versa. For instance, Lai (2010) investigated the effect of openness to trade on human capital of 41 developing nations over the period 1980-2002. Human capital was measured by net enrollment in secondary school. Countries were divided in 2 groups precisely nations with high and low literacy rates. It was found that openness of trade led to relatively greater improvements in human capital in countries with high literacy rate than otherwise. Similarly Jadoon *et al.* (2015) analyzed the effect of trade openness on growth and human capital for 8 Asian nations for the time period 1981-2012. Countries were divided into high and low income nations. Human capital was proxied by enrollment in secondary school. By using fixed effect estimation

technique, the study concluded that trade openness significantly and positively affected human capital in developed/high income nations while the result was insignificant in case of developing/low income nations. In contrast Waugh (2008) investigated the link between human capital, product quality and bilateral trade for 77 countries by developing a model in which firms choose the quality of their inputs such as labor quality. The choice thus affects the firm's ability to produce goods domestically and internationally which in turn shapes the bilateral trade pattern. The results suggested that 90% of the bilateral trade variation is because of differences in human capital. In other words, countries with high human capital import less and export more as compared to countries with low human capital. Haq and Luqman (2014) explored the effect of international trade on growth and human capital of 9 Asian economies for 1972-2012. It was deduced that trade increases accumulation of human capital and contributes to economic prosperity.

### **3.4 Trade Openness & Informal Economy**

There are three theoretical views as to how trade openness affects informal economy namely dualistic, legalistic and structuralist view. According to the dualistic view, there exists no direct link between formal and informal sector and only formal sector can engage in trade. On the other hand, legalistic view suggests that rigid state regulations give rise to the informal sector where the small firms operate in this sector in order to avoid the costs of registration. The structuralist view in contrast asserts that trade openness leads to increased foreign competition which displaces the workers from formal into informal sector and thus the informal sector acts as a refuge for these displaced workers (Sinha & Kanbur, 2012). The reason being that trade openness causes a reduction in tariffs which lowers the price of imported goods as a result the



consumers substitute the cheap imported goods for the relatively expensive domestic goods which lowers the demand for the domestic goods and causes the firm to fire its workers as a result of demand fluctuations. Thus trade openness may reduce the number of formal workers and lead to the growth of informal economy (Goldberg & Pavcnik, 2003). Conversely, expansion of informal economy reduces number of tradable firms/sectors which negatively affects trade openness. In other words, expansion of informal sector increases employment in the retail sector which is non-traded and thus reduces the number of large tradable retailers (Njoda & Pamen, 2016).

Most studies conducted for the developing countries have supported the structuralist view whereby trade openness causes the informal sector to expand (Bosch & Maloney, 2010; De pinto, 2013). For instance, Ghosh and Paul (2008) investigated the impact of trade liberalization of trade on the informal sector growth in 18 Soviet Union (SU) and Central Eastern European (CEE) economies for the period 1990-1995. They found that liberalization of trade increased the informal sector growth in all 18 countries. Likewise Fugazza and Fiess (2010) tested the empirical relationship between informal sector and trade liberalization for 32 countries for the period 1990 to 2004. Three different measures of informal sector were used. The study revealed that the macro data supported the view that trade openness increases the size of informal economy but micro data did not. Although informal output increased; informal employment fell with trade liberalization. Furthermore, Bairagya (2010) examined the link between trade liberalization, informal and formal sector for India for the period 1970-2006. The study found that trade openness results in increasing the absolute magnitude of informal sector but in relative terms it declines. Likewise Paz (2012) investigated the effect of trade openness on labor markets and wages in informal sector of Brazil for the period 1989-

2001. The study concluded that a decline in tariffs on imports raises the informality by 0.09% while informal wage increases on average by 0.06%. In contrast, Soares (2005) analyzed the effect of trade openness on Brazil's informal sector for the period 1981-1999 but found no evidence regarding the notion that trade openness causes a fall in the number of registered workers. Similarly Goldberg and Pavcnik (2003) examined the response of informal sector of Brazil and Colombia to trade liberalization for the period 1987-1998 but found no proof of a relationship between informal sector and trade liberalization in Brazil. In contrast, such a link did exist in Colombia however for a short duration only prior to labor market reforms.

### **3.5 Human Capital & Informal Economy**

The decision to join the informal economy depends on 2 groups of factors namely structural and opportunity factors. The structural factors include socio-psychological (such as personal preference, moral values and citizen's perception of the role of the state) and financial factors (availability and ease of access to credit). On the other hand, opportunity factors include contacts, living situation, skills and education (Renooy, 1990). One of the opportunity factors is the human capital; formal sector employs high-skilled workers and thus the investment in human capital increases the chances of getting into formal sector (Docquier *et al.*, 2014). In addition to that more educated individuals tend to assign greater importance to fringe benefits especially in the formal jobs while less educated individuals prefer more monetary rewards; the workers with greater skills are more productive in the formal economy while the lower skilled individuals are more productive in the informal economy (Elgin & Solis-Garcia, 2015). Hence it is by preference that educated individuals would work in the formal part of the economy while the less educated ones are

satisfied with their choice of informal economy. Alternatively part of the informal economy adversely affects the abilities, behavior and activities of a nation's workforce.<sup>11</sup> Since the individuals working in the informal sector have low income thus they have less resources and motivation to invest in human capital. This in turn affects the human capital development (Ciutiene *et al.*, 2015).

The empirical studies also tend to confirm the aforementioned views. For instance, Ela (2013) investigated the relation between the informal sector and the level of education in Turkey for the period 2002-2006. The study found out that the increase in education level reduced informal employment. Similarly, Nikopour and Habibullah (2011) investigated the presence of shadow economy in various stages of development for 162 countries for the period 1999-2007 and found that factors like human capital and social capital contribute significantly in reducing the size of informal economy. On the same lines Dell'Anno (2009) investigated the impact of Human Development and Institutions on the informal economy of 17 Latin American countries for the period 1994-2005. The study investigated the effect of 2 kinds of capital namely social capital and human capital. Social capital was proxied by institutional framework whereas human capital by HDI. The findings revealed the existence of a negative relation between informal sector and human capital for countries with higher level of human development while the opposite held true for countries with lower levels of human development. Likewise Gibson (2005) examined the link between human capital, informal sector and poverty for USA. By using a structuralist CGE framework, it was deduced that increased investments in human capital enhance the competitiveness of exports and contribute to the reduction of informal sector and vice-versa.

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<sup>11</sup> Part of informal economy that engages in illegal activities such as tax evasion and production of illegal goods affects the moral values and hence the social capital adversely.

### 3.6 Informal Economy & Economic Growth

The link between informal economy and economic growth is bidirectional (Heintz, 2012). Growth may tend to have a contractionary impact on the informal economy if it is a pro-poor growth while it may have an expansionary effect if it is a high-tech or capital-intensive growth which increases the skilled labor demand in the service sector while reducing the demand for unskilled manufacturing jobs (Carr & Chen, 2001). However the dominant view is that the informal economy tends to shrink during periods of economic growth and expand during recessions (Schneider & Enste, 2000; Heintz & Pollin, 2003; Loayza & Rigolini, 2006). Growth leads to greater employment opportunities in formal sector and also increases the investment in human capital thereby reducing the size of informal economy (Schneider and Enste, 2000; Nikopour and Habibullah, 2011). While Kemal (2007) shows positive link between underground economy (significant part of hidden informal economy) and documented economy. On the other hand, development of informal economy is believed to impede growth in many developing countries.<sup>12</sup> The reason being that informal sector not only leads to a wasteful usage of public utilities but rather also reduces their availability for the rest of the economy. In addition, it also limits the fiscal revenue which adversely affects government spending on developmental projects thus hampering growth (Loayza, 1997).

The empirical findings also confirm the aforementioned view. For instance, Schneider and Hametner (2013) investigated the effect of shadow economy on economic growth of Colombia for the period 1980-2012. The study revealed that shadow economy negatively effects the growth of formal economy. Moreover according to a study of OECD, the informal sector competes with the formal for

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<sup>12</sup> The Economist, 2004.

resources and impedes its growth.<sup>13</sup> In contrast Raihan (2003) examined the effect of informal sector on poverty and growth of Bangladesh. By using the CGE framework the study concluded that the formal sector growth resulted in increasing the informal sector in absolute terms as the demand for informal goods and services and intermediate input increased. However in relative terms the informal sector shrank. Similarly Elgin and Oztunali (2014) examined the link between institutions, economic development and informal economy for 141 nations for the period 1984-2009. The study deduced that increased GDP per capita is linked with smaller size of informal sector in economies with good institutions while in economies where the institutional quality is poor increased GDP per capita is linked with bigger informal sector. Likewise Biau (2011) analyzed the effect of informal sector on growth and investment for 22 developing economies between 1995-2006. The study found that the association between informal sector and GDP per capita is non-monotonic. In other words, in low income countries informal sector positively effects growth but as the countries become richer the effect becomes negative. In addition to that the relationship between informal sector and domestic investment is that of an inverted U-shape. In contrast, the informal economy can favorably impact formal sector growth. For instance, Schneider (2009) carried out an empirical study for Germany and Austria and revealed that the major portion of income earned through the informal sector was spent on the products and services of the formal sector thereby boosting economic growth.

The review of the theoretical and empirical literature indicates that human capital, openness to trade, economic growth and informal economy are related. Most studies have shown a negative link between human capital development and informal

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<sup>13</sup> Informal Employment and the Economic Crisis: a study by OECD.

economy and a positive link between trade liberalization and informal economy. As far as the relationship between growth and informal economy is concerned, the studies have shown mixed results. However, the analysis of the empirical literature indicates that the link between human capital, trade openness, growth and informal economy has received little attention in the literature. Moreover, the empirical research conducted on analyzing the relationship between human capital and informal economy has defined human capital in terms of either health or education indicators. Skills and development of labor cannot be captured by these indicators alone. Lastly, none of the studies reviewed in this regard have conducted a sensitivity analysis by using alternative proxies of human capital. Thus, the present study aims to fill this gap in literature for Pakistan. It attempts to examine the relationship between human capital, trade openness, growth and informal economy in context of Pakistan by employing a broader measure of human capital namely Human Capital Index (HCI). It also aims to test the robustness of results by using an alternative proxy of human capital namely Human Development Index (HDI).

## Chapter IV

### METHODOLOGY AND DATA

This chapter presents the methodology and data employed to examine the relationship between human capital, trade openness and informal economy. Section 4.1 presents the econometric methodology and model specification used to achieve the objectives of the study while Section 4.2 discusses the data and variables.

#### 4.1 Econometric Methodology and Model Specification

The present study examines the relationship between human capital, openness to trade, and informal economy for Pakistan for the time period 1975-2014 by using Autoregressive Distributed Lag (ARDL) approach. In order to avoid the specification bias, economic growth is also included in the model as a control variable.<sup>14</sup> Different studies have utilized different econometric techniques to examine the relationship between the variables of interest such as Johansen maximum likelihood approach, Generalized Method of Moments (GMM) and Autoregressive Distributed Lag (ARDL) (see for instance, Yaoxing, 2010; Zakaria, 2011; Belloumi, 2014; Sulaiman *et al.*, 2015; Dar *et al.*, 2016). Each approach has its own strengths and weaknesses. For instance, since the Johansen maximum likelihood approach is a VAR based technique less concern is needed over whether the regressors are endogenous or exogenous. That is, in a VAR based technique all variables become endogenous thus addressing the issue of endogeneity. Furthermore, it can also be used for Granger Causality testing. In spite of its theoretical advantages, the Johansen approach has certain limitations. Firstly, in the presence of serial correlation the estimates would be

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<sup>14</sup> Growth variable has been extensively used in the empirical literature as an important determinant of informal economy see for instance, Heintz and Pollin (2003); Galli and Kucera (2003); Loayza and Rigolini (2006).

biased if the sample size is small. Secondly, identification issue arises if there is more than one cointegrating relationship (Granger, 1986).

On the other hand, ARDL has several advantages over Johansen approach. Firstly, ARDL approach does not require all the variables to be integrated of the same order. Secondly, Johansen approach is sensitive to the sample size but ARDL can be used for small sample (30-80 observations) in which the set of critical values were developed by Narayan (2004). Thirdly, even when some of the regressors are endogenous ARDL generally provides unbiased estimates of the long-run model and valid t-statistics (Pesaran & Shin, 1999; Harris & Sollis, 2003; Odhiambo, 2009; Odhiambo, 2010).<sup>15</sup> This is because one of the prerequisite of the ARDL model is that the errors should be Independently and Identically Distributed (IID). Since in the ARDL model the regressors are typically lagged levels or lagged differences, the errors are unlikely to be correlated. Thus the endogeneity issue is unlikely to arise when the errors are serially independent.<sup>16</sup> Hence appropriate specification of lags of the regressors is sufficient to tackle the endogeneity issue as well as the problem of serial correlation (Pesaran & Shin, 1999; Arby *et al.*, 2010).

In contrast, the Generalized Method of Moments (GMM) introduced by Hansen (1982) is mostly used for panel data studies (Hansen & West, 2002). Its major advantage is that it can allow for heteroscedasticity and serial correlation (Hansen, 1982; Cragg, 1983) and utilizes instrumental variables to tackle the endogeneity problem. Moreover, no distributional assumption is required such as normality. However, it has certain shortcomings; for instance, slight changes in the weight matrix, instrument choice or specification can have major impact on p-values and the

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<sup>15</sup> The econometric derivation of how ARDL tackles the endogeneity issue has been explained by Binder and Georgiadis (2010).

<sup>16</sup> <http://davegiles.blogspot.com/2014/06/some-questions-about-ardl-models.html>



estimates (Hansen & West, 2002). In addition, GMM produces large biases and has low precision in the presence of weak instruments (Arellano and Bover, 1995). Furthermore, in case of small samples the finite sample bias in GMM estimators becomes an issue (Wooldridge, 2001). Hence, the ARDL approach has better small sample properties as compared to the Johansen and Juselius (1990) co-integration approach and the General Method of Moments (GMM). Consequently, the approach is considered suitable given the small sample of the present study and it has been increasingly used in empirical research in recent years due to its aforementioned advantages over other approaches. However ARDL technique is not appropriate if any variable is integrated of order two i.e.  $I(2)$ . Hence it is wise to test for unit roots before proceeding. The Augmented Dickey-Fuller (ADF) test (1979) is used to determine the stationarity of the underlying variables.

In order to achieve the objectives of the study, the functional relationship for this present study has been partially adopted from Ntlhola (2010) and Fasanya and Onakoya (2012). The model is presented as follows:

$$INECO_t = e^{\alpha_0} HCI_t^{\alpha_1} RGDP_t^{\alpha_2} TO_t^{\alpha_3} e^{\varepsilon_t} \quad (1)$$

Taking natural logarithm on both sides yields the standard log-log model given by:

$$LINECO_t = \alpha_0 + \alpha_1 LHCI_t + \alpha_2 LRGDP_t + \alpha_3 LTO_t + \varepsilon_t \quad (2)$$

where;  $LINECO_t$  stands for natural log of informal economy as a percentage of GDP,  $LHCI_t$  represents the natural log of human capital index<sup>17</sup>,  $LRGDP_t$  is the natural log of real gross domestic product used as a measure of economic growth,  $LTO_t$  is the

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<sup>17</sup> Ali *et al.* (2016) used log of human capital index as a proxy for human capital in their study. For robustness analysis another proxy of human capital i.e. Human Development Index (HDI) is used.

natural log of trade openness and  $\varepsilon_t$  denotes the error term of regression. An ARDL representation of equation (2) is given as follows:

$$\begin{aligned} \Delta LINECO_t = & \beta_1 + \sum_{i=1}^v \delta_{1i} \Delta LINECO_{t-i} + \sum_{i=0}^w \theta_{1i} \Delta LHCI_{t-i} + \sum_{i=0}^x \pi_{1i} \Delta LR GDP_{t-i} \\ & + \sum_{i=0}^y \sigma_{1i} \Delta LTO_{t-i} + \gamma_1 LINECO_{t-1} + \gamma_2 LHCI_{t-1} + \gamma_3 LR GDP_{t-1} + \gamma_4 LTO_{t-1} + \varepsilon_{1t} \end{aligned} \quad (3)$$

Whereby,  $\Delta$  is the first difference operator, optimal lag length is represented by  $v$ ,  $w$ ,  $x$  and  $y$  and  $\varepsilon_{1t}$  depicts random error term.

The first step in the ARDL approach is to estimate Equation (3) through the Ordinary Least Square (OLS). The second is to check for the existence of cointegration. That is, the null hypothesis of no cointegration ( $H_0: \gamma_1 = \gamma_2 = \gamma_3 = \gamma_4 = 0$ ) is tested against alternative hypothesis of cointegration ( $H_1: \gamma_1 \neq \gamma_2 \neq \gamma_3 \neq \gamma_4 \neq 0$ ) through an F-test. The critical values reported by Narayan (2004) are used which are suitable for small sample size (30-80). The test uses asymptotic critical value limits, which depend on whether the variables are integrated of order zero, one or mixed. Two sets of critical values are generated; one for integrated of order zero (lower limit) and one for integrated of order one (upper limit). The  $H_0$  is rejected if F-statistic exceeds the upper limit which implies that cointegrating relationship exists and vice-versa. The conclusion is indecisive if the value falls between the two limits. If there exists a long-run relationship between the variables then the following long-run (Equation 4) and short-run (Equation 5) models will be simultaneously estimated:

$$\begin{aligned}
LINECO_t = & \beta_2 + \sum_{i=1}^v \delta_{2i} LINECO_{t-i} + \sum_{i=0}^w \theta_{2i} LHCI_{t-i} + \sum_{i=0}^x \pi_{2i} LRGDP_{t-i} \\
& + \sum_{i=0}^y \sigma_{2i} LTO_{t-i} + \varepsilon_{2t}
\end{aligned} \tag{4}$$

$$\begin{aligned}
\Delta LINECO_t = & \beta_3 + \sum_{i=1}^v \delta_{3i} \Delta LINECO_{t-i} + \sum_{i=0}^w \theta_{3i} \Delta LHCI_{t-i} + \sum_{i=0}^x \pi_{3i} \Delta LRGDP_{t-i} \\
& + \sum_{i=0}^y \sigma_{3i} \Delta LTO_{t-i} + \varphi ECT_{t-1} + \varepsilon_{3t}
\end{aligned} \tag{5}$$

Whereby;  $\varphi$  in Equation (5) is the coefficient of the Error Correction Term (ECT). The coefficient of adjustment  $\varphi$  shows how much disequilibrium is corrected in the previous period. The term  $ECT_{t-1}$  is important as it depicts the extent of the error correction in the short-run to the long-run equilibrium as a result of random shocks. Its statistical significance and size are thus important. For the existence of a long-run relation between the variables, the coefficient of adjustment  $\varphi$  must be statistically significant, negative and less than one. In order to examine the efficiency and reliability of the estimates various diagnostic tests are also conducted.

## 4.2 Data and Variables

The study employs annual data for trade openness, human capital index, economic growth and informal economy. Openness to trade is computed by summing total real imports and exports of goods and services and dividing it by the real GDP. It is a popular measure as data for it is readily available for most countries and it also allows for comparability across different studies and therefore is commonly used. The data for trade openness is taken from World Development Indicators. Two proxies are used for human capital specifically, human capital index and human development index. Human capital index per person is computed by Feenstra *et al.* (2013) based on

schooling years as used by Barro and Lee (2012) and educational returns as suggested by Psacharopoulos (1994). There are limited number of observable characteristics through which human capital can be measured, mainly through the formal schooling. Another important dimension of human capital is the educational quality (Caselli, 2005; Hanushek & Woessman, 2012). However, the most frequently used human capital measure is the average schooling years because of its broad coverage of countries and years. Feenstra *et al.* (2013) used the dataset of Barro & Lee (2012), to be exact, data version 1.3 that covers the time period 1950-2014 for 134 countries in Penn World Table 9.0. They let the human capital be a function of average schooling years  $sy$  as given below:

$$hc_{it} = e^{\varphi sy(it)} \quad (6)$$

They used average schooling years for the population aged 15+. The function  $\varphi(sy)$  from equation (6) is selected in the similar manner as in prior studies. Evidence suggests that early schooling years have a higher return in terms of wages than the later years (Psacharopoulos, 1994; Caselli, 2005). Cross-country Mincerian wage regressions were used to base these findings on. Hence following linear function was used with the rates of return based on Psacharopoulos (1994):

$$\varphi(sy) = \begin{cases} 0.134 \cdot sy & \text{if } sy \leq 4 \\ 0.134 \cdot 4 + 0.101(sy - 4) & \text{if } 4 < sy \leq 8 \\ 0.134 \cdot 4 + 0.101 \cdot 4 + 0.068(sy - 8) & \text{if } sy > 8 \end{cases}$$

This yielded index of human capital that is comparable over time and across countries. The data for human capital index is taken from Penn World Table 9.0. Alternatively, Human Development Index (HDI) is used whose data is taken from

United Nation's Human Development Report (HDR, 2015). Since continuous data for HDI is not available hence extrapolation and interpolation has been done to get a continuous series.<sup>18</sup> Moreover, the data for real GDP is obtained from World Development Indicators to measure economic growth.<sup>19</sup>

As far as informal economy is concerned, estimates through monetary approach/currency demand approach are used. Under this approach the currency ratio is regressed on the tax variable to obtain currency in circulation that is tax-induced which is the legal currency and the remaining part constitutes the illegal currency (Ashraf, 2014). Other approaches to estimate informal economy include electricity consumption approach and Multiple Indicators and Multiple Causes (MIMIC) approach. The electricity consumption approach considers electricity consumption as the indicator for overall economic activity (formal and informal) while the MIMIC approach focuses on the causes and the effects of the informal economy. The electricity consumption approach is easy to use however it has been subject to certain criticisms. Firstly, not all of the informal economic activity relies on electricity, other sources of energy can also be used. Secondly, electricity consumption becomes more efficient as a result of technological advances overtime. Thirdly, the electricity to GDP elasticity may differ over time. Thus it may over or under estimate the size of informal economy. On the other hand, the MIMIC approach is quite comprehensive. However, it requires huge amounts of data, which is not often readily available thus making this approach inapplicable (Schneider & Buehn, 2016). Thus the monetary approach is one of the most widely used approaches for estimating the informal

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<sup>18</sup> The HDI data is available after every 5 years starting 1980. Since the value of HDI lies between 0 and 1 hence taking its log is not possible thus the HDI series have been scaled by multiplying it with 100 making it feasible to take its log.

<sup>19</sup> Tahir (1995) used log of GDP as a measure of economic growth for Pakistan in his work titled "Defence Spending and Economic Growth: Re-examining the Issue of Causality for Pakistan and India" published in The Pakistan Development Review.

economy due to its strengths over other approaches. Firstly, this approach is relatively easy to use as the information required for it is readily available as compared to the MIMIC approach. Secondly, many factors that affect the informal economy can be modeled giving a relatively better estimate of the magnitude than the electricity consumption approach. However it has been subject to criticism on the following grounds: 1) Not all transactions in the informal economy are carried out in cash, 2) Same velocity of money is assumed in the formal and informal economy which might be true only if income elasticity is one and 3) The assumption of no informal economy in a base year is also open to criticism (Davidescu, 2013).

The monetary approach assumes that wealth is stored and transactions are carried out using currency and that high taxes result in the expansion of informal economy. In other words, currency is the only medium of exchange in the informal economy and that some transactions escape tax authorities. Hence higher the currency holding; higher would be the tax evasion and thus the informal economy (Cagan, 1958; Tanzi, 1980). The estimates of informal economy through monetary approach are obtained from the work of Ashraf (2014). The data for all variables are taken from secondary sources specifically World Development Indicators (WDI, 2014), Penn World Table 9.0 (PWT 9.0), Human Development Report (HDR, 2015) and Ashraf (2014). All the secondary sources measure the data in annual frequency. Furthermore, all variables are taken in logarithmic form based on the hypothesized functional relationship. The study covers the time period from 1975-2014 and the selection of time period is subject to availability of data. The descriptive summary of the variables is given in Table 4.1:

**Table 4.1: Descriptive Summary of the Variables**

<b>Variable</b>	<b>Observations</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Minimum</b>	<b>Maximum</b>
LINECO <sub>t</sub>	40	3.701257	0.306283	3.048843	4.627513
LHCI <sub>t</sub>	40	0.395023	0.139141	0.207760	0.587633
LHDI <sub>t</sub>	40	3.752181	0.192301	3.417727	4.046554
LRGDP <sub>t</sub>	40	29.16970	0.553156	28.13719	29.99535
LTO <sub>t</sub>	40	3.467215	0.122156	3.264591	3.798627

## Chapter V

### RESULTS AND DISCUSSION

In this chapter the relationship between human capital, trade openness, growth and informal economy has been empirically estimated. The rest of the chapter is organized as follows: Section 5.1 presents the results of unit root test; Section 5.2 presents results of ARDL model with human capital index as a proxy to human capital while Section 5.3 presents the sensitivity analysis with human development index as a measure of human capital.

#### 5.1 Results of Unit Root Test

For the application of ARDL technique, it is important to test for unit roots since the approach is not appropriate if any variable is integrated of order two i.e.  $I(2)$ . Hence the study makes use of the Augmented Dickey-Fuller (ADF) test to check for the order of integration (Dickey and Fuller, 1979). The results of the ADF test are presented in Table 5.1. The results reveal that all the variables are non-stationary at conventional levels of significance but are stationary at first difference and therefore are integrated of order one i.e.  $I(1)$  which makes it suitable to apply ARDL.

**Table 5.1: Result of Augmented Dickey-Fuller (ADF) Test**

Variables	Level	First Difference	Conclusion
LINECO <sub>t</sub>	-2.210	-6.466***	$I(1)$
LHCI <sub>t</sub>	-1.243	-7.215***	$I(1)$
LTO <sub>t</sub>	-2.081	-6.383***	$I(1)$
LRGDP <sub>t</sub>	-2.533	-3.944***	$I(1)$
LHDI <sub>t</sub>	-1.237	-5.480***	$I(1)$

Note: The \*\*\* show rejection of null hypothesis at 1 percent level of significance.



## 5.2 ARDL Results

In order to determine the existence of a long-run relationship between the variables, the bounds test approach is used. Under this approach the null hypothesis of no cointegration is tested against alternative hypothesis of cointegration through an F-test. The test uses asymptotic critical value limits, which depend on whether the variables are integrated of order zero, one or mixed. Two sets of critical values are generated; one for integrated of order zero (lower bound) and other for integrated of order one (upper bound). The null hypothesis is rejected if calculated F-statistic exceeds the upper critical bound which implies that cointegrating relationship exists and vice-versa. The critical values reported by Narayan (2004) are used which are suitable for small sample size ( $n=30-80$ ). However before pursuing the bounds test approach, optimal lag length for the model (with human capital index as a proxy to human capital) has been selected using Akaike Information Criterion (AIC). The criterion suggested lags 4, 2, 5, 5 for informal economy, human capital index, trade openness and economic growth respectively. Table 5.2 shows the results of the ARDL bounds test. Since the F-statistic exceeds the upper critical bound at 1 percent level of significance, we conclude that there exists a significant long-run association between the variables of the model.

**Table 5.2: The Bounds Test Result**

Model	F-Statistics	Level of Significance	Bounds Test Critical Values	
			I(0)	I(1)
F(LHCI <sub>t</sub> , LTO <sub>t</sub> , LRGDP <sub>t</sub> )	13.002***	10%	2.618	3.532
		5%	3.164	4.194
		1%	4.428	5.816
k = 3				
n = 35				

Note: Dependant variable is *LINECO<sub>t</sub>* (informal economy), I(0) and I(1) represent lower and upper bounds respectively. k is the number of regressors and n is the number of observations. The \*\*\* show rejection of null hypothesis of no cointegration relationship at 1 percent level of significance.

Now that the long-run relationship between the variables is confirmed, the long-run and short-run estimates are obtained using the ARDL method. Table 5.3 (Panel A and Panel B) shows the long-run and short-run estimates respectively.

**Table 5.3: The Estimated Long-Run and Short-Run Coefficients Based on AIC**

Dependent Variable, LINECO <sub>t</sub> : Regressors	Coefficients	P-Value
<b>Panel A: Long-run results</b>		
LHCI <sub>t</sub>	-2.834***	0.000
LTO <sub>t</sub>	2.268***	0.002
LRGDP <sub>t</sub>	2.796***	0.001
<b>Panel B: Short-run results</b>		
ΔLINECO <sub>t-1</sub>	0.040	0.802
ΔLINECO <sub>t-2</sub>	-0.074	0.659
ΔLINECO <sub>t-3</sub>	0.144	0.364
ΔLHCI <sub>t</sub>	0.102	0.988
ΔLHCI <sub>t-1</sub>	3.470***	0.001
ΔLTO <sub>t</sub>	0.547	0.178
ΔLTO <sub>t-1</sub>	-2.936***	0.001
ΔLTO <sub>t-2</sub>	-2.317***	0.002
ΔLTO <sub>t-3</sub>	-1.627***	0.007
ΔLTO <sub>t-4</sub>	-1.126**	0.011
ΔLRGDP <sub>t</sub>	0.046	0.701
ΔLRGDP <sub>t-1</sub>	0.099	0.664
ΔLRGDP <sub>t-2</sub>	1.064	0.547
ΔLRGDP <sub>t-3</sub>	-1.292*	0.094
ΔLRGDP <sub>t-4</sub>	-1.520**	0.033
Constant	28.367***	0.001
ECT(-1)	-0.821***	0.000
R <sup>2</sup>	0.827	
Adj R <sup>2</sup>	0.609	
<b>Panel C: Diagnostic Tests</b>		
Breusch-Godfrey LM Test	0.011	0.915
LM ARCH Test	0.141	0.707
Ramsey RESET Test	0.850	0.492
Skewness-Kurtosis Test	1.213	0.216

Note: ECT denotes the error correction term. The \*, \*\* and \*\*\* indicates significance at 10, 5 and 1 percent level respectively.

The long-run results reveal that human capital, trade openness and economic growth significantly affect the informal economy. The signs of the variables are according to the theoretical provisions. To be specific, human capital is negatively related with the informal economy in the long-run. That is, as human capital index improves by 1 percent then the informal economy reduces on average, by 2.8 percent assuming other variables as constant and the coefficient is significant at 1 percent level of significance. This is because improvements in human capital enhance the productivity and skills of the individuals and provides better employment opportunities in the formal economy which in turn may reduce the size of the informal economy (Docquier *et al.*, 2014). In addition to that, improvements in human capital tend to improve the tax morale of the individuals and individuals with greater tax morale are less likely to participate in the informal economy. The less participation by the educated individuals in the informal economy would mean greater documentation of the formal economy since more individuals are now tax-payers (Gerxhani & Werfhorst, 2011). This result is in accordance with the findings of previous studies (see for instance, Ela, 2013; Nikopour & Habibullah, 2011; Gibson, 2005). Ela (2013) found that the increase in education level reduces the informal employment in Turkey. Similarly, Nikopour & Habibullah (2011) found that improvements in human capital and social capital contribute significantly in reducing the size of informal economy. Likewise, Gibson (2005) concluded that increased investments in human capital enhance the competitiveness of exports and contribute to the reduction of informal sector.

On the other hand, trade openness has a positive link with the informal economy in the long-run. That is, as trade openness increases by 1 percent, the informal economy increases on average, by 2.2 percent assuming other variables as

constant. This coefficient is statistically significant at 1 percent level of significance. The result is in accordance with the structuralist view whereby trade openness causes the informal sector to expand. The reason being that, trade openness leads to increased foreign competition which may displace the inefficient firms and workers from formal into informal sector (Sinha & Kanbur, 2012). To put it differently, trade openness causes a reduction in tariffs which lowers the price of imported goods; as a result the consumers may substitute the cheap imported goods for the relatively expensive domestic goods. This in turn may lower the demand for the domestic goods and cause the firm to fire its workers as a result of demand fluctuations. The fired workers may then find their way into the informal sectors. This is evident from the fact that Pakistan maintained a link between tariff exemptions and local content requirements (the deletion programme in the engineering sector) in a number of industries, which was eliminated in 2000. As a result of eliminating the deletion programme, the manufacturing industry was faced with increased foreign competition that displaced many workers from formal to informal sectors. Furthermore, trade liberalization negatively impacted the employment of both skilled and un-skilled labor in 18 large-scale manufacturing industries such as beverages, drugs & medicines, leather & footwear etc. The negative impact of trade was due to the past restricted trade policy of Pakistan when high protection was given to these industries. With trade openness, these firms had to face competition from foreign companies which resulted in displacement of labor to the informal sector (Iqbal et al., 2014).

Moreover, trade openness may encourage the development and diffusion of skill-biased technologies and therefore may increase the demand for high skilled workers (Bacchetta *et al.*, 2009; Bas & Berthou, 2016). Thus it may lead to a worker selection effect where the firms demand high-skilled workers because of the

technologically advanced imported inputs and the low-skilled ones lose their jobs and hence find their way to the informal sector (De pinto, 2013). This is evident from the fact that the government in Pakistan formulated a Technology Up-gradation Fund (TUF) Scheme to facilitate the textile sector. The facility of duty free import of textile machinery was made possible as a result of liberalization measures. However, this measure ended up making low-skilled workers in the textile industry lose their jobs because of inadequate skills to operate the textile machinery. In addition to that, trade openness makes an economy more vulnerable to external shocks (such as worldwide economic slowdowns) which may contribute to the displacement of workers from formal to informal sectors.<sup>20</sup> This result is in line with the findings of Paz (2012) and Ghosh & Paul (2008). Paz (2012) concluded that a decline in tariffs on imports expands the informal sector of Brazil. On the same lines, Ghosh and Paul (2008) revealed that the liberalization of trade increases the informal sector growth.

Similarly, there is a positive long-run relationship between economic growth and informal economy. In other words, as growth increases by 1 percent then, on average, informal economy expands by 2.7 percent assuming other variables as constant. The coefficient of growth is statistically significant at 1 percent. This could be because growth in Pakistan is non-inclusive in the sense that it is coming mostly from the service and industrial sector which employs less proportion of labor force as compared to the agriculture sector (Tirmazee & Haroon, 1993; Ahmed & Ahsan, 2011). In other words, the agriculture sector employ bulk of the labor force i.e. 44.7 percent followed by the service sector which is 35.2 percent and industrial sector employs only 20.1 percent.<sup>21</sup> Moreover, agriculture sector contributes 19.53 percent in

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<sup>20</sup> The worldwide economic slowdown is causing concerns and hurting Pakistan's textile and leather industries and employees.

<sup>21</sup> World Bank, (2014). World Development Indicators.

GDP; industrial sector contributes 20.88 percent while the service sector accounts for 59.59 percent of GDP (Government of Pakistan, 2016). Thus only a small proportion of labor force is the source and beneficiary of this growth and therefore in this sense the growth is non-inclusive. Consequently, workers move from agriculture to service (retail & trade, transportation, community/social and personal services and construction) and industrial sector (informal part) to be part of this beneficiary group (Ahmed & Ahsan, 2011). Thus such a growth ultimately causes the expansion of the informal economy in the long-run. In Pakistan, service sector growth absorbs excess labor from the agriculture sector since it provides jobs which vary in nature such as unskilled, semi-skilled, skilled and high skilled. The informal employment in retail & trade, transportation as well as personal and social services have increased overtime thus indicating a rise in informality. In addition, the economic growth may increase the demand for goods and services and intermediate inputs of the informal economy thereby causing it to expand (Carr & Chen, 2001). This result substantiates the findings of Elgin and Oztunali (2014), Kemal (2007) and Raihan (2003). Elgin and Oztunali (2014) inferred that increased GDP per capita is linked with bigger informal sector in economies with poor institutions. Likewise, Kemal (2007) found a positive link between underground economy (significant part of hidden informal economy) and documented economy. Similarly, Raihan (2003) concluded that the formal sector growth results in increasing the informal sector in Bangladesh.

We now discuss the short-run results which are provided in Panel B of Table 5.3. In contrast to the long-run estimates, the short-run results indicate that the human capital is positively associated with the informal economy but with a lag; that is, as human capital index improves by 1 percent then informal economy expands by 3.4 percent on average. The coefficient is statistically significant at 1 percent. The reason

behind such a short-run finding maybe due to the fact that the education system of the country is producing non-technical graduates who are unable to find the jobs in the formal sector immediately due to lack of work experience and skills (Hussain, 2015). Hence they find employment in the informal part of the economy until more appropriate economic opportunities become available in the formal economy.<sup>22</sup> This is evident from the fact that 57% of the individuals with 12 years and more of education are working in the informal economy of Pakistan (Shehryar, 2014). Additionally, despite the improvements in human capital, the credit constraints and fixed costs in the short-run cause the expansion of the informal sector because not all individuals can afford to enter the formal sector. Since, human capital is a variable that is unlikely to have an immediate impact on the informal economy hence the affect comes with a lag. This result is in accordance with the findings of some other studies that reveal that workers with higher education, skill and experience bag higher wages in their informal work, and therefore higher level of education does not necessarily imply transformation to the formal economy atleast in the short-run (see for instance, Khan, 1983; Burki & Khan, 1990).

The contrast between our short-run and long-run result is not surprising since other studies have also found variation between short-run and long-run results. For instance, Arby *et al.* (2010) revealed that in the short-run, education reduces the size of informal economy in Pakistan; nonetheless, the effect is insignificant in the long-run. Moreover, the difference in the short-run and long-run results is not uncommon in cointegration literature (see, for instance, Andersson, 1999; Nasir & Rehman, 2011; Umer, 2014 and Jilenga *et al.*, 2016). The reason for the difference in the short-run and long-run impact of human capital on informal economy could be due to the

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<sup>22</sup> According to FEG (planning commission, 2011) Pakistan ranked 92 out of 133 countries in a university-industry linkages index. Thus indicating poor university-industry linkages which are responsible for the expanding informal employment.

aggregation bias that arises when indices are used. Since human capital index is used which is based on the weighted average of returns to education and schooling years, it neglects the individual differences in terms of skills, productivity and returns to education. In other words, the aggregation bias concludes that what holds for the highly educated individuals also holds for the individual with primary or secondary education such as same average returns to education (Shumway & Davis, 2001). Hence rendering the short-run effect different from the long-run effect.

Conversely, trade openness contracts the informal economy in the short-run but with lags and the coefficients are significant at 1 and 5 percent level of significance. This could be because with trade liberalization as the rules and regulations reduce, initially the exports may increase which would increase the demand for the inputs. As a result, greater economic and employment opportunities may become available for the firms and workers in the formal sector thereby causing the informal economy to shrink in the short-run.<sup>23</sup> If firms in the informal sector have to participate in the international trade, they have to be registered as potential exporter/importers. This registration would ensure the documentation of the informal firms thereby reducing the size of the informal economy in the short-run. However, the new firms and workers that enter into the formal sector in the short-run may not necessarily be efficient in the long-run. Thus, they may move out of the formal sector into informal sector when faced with increased competition thus substantiating the findings in the long-run.<sup>24</sup>

This finding in the short-run is in line with the legalistic view which asserts that the informal economy exists mainly because of barriers and rigid government

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<sup>23</sup> Free trade has motivated Pakistan to produce labor-intensive goods and make use of its comparative advantage in the textile sector thus opening up economic opportunities for the firms and workers in the formal sector (Yasmin & Khan, 2005).

<sup>24</sup> Cheap imports from the Far East have shut many of our factories rendering jobless thousands of our workers.



regulations. Thus with trade openness as the barriers and regulations reduce, the entry into formal sector becomes feasible for the firms. Since informal economy's response to trade liberalization is slow thus the effect comes with a lag. This short-run finding is in contrast with the long-run result. However, other studies have also found asymmetric short-run and long-run relationship between trade openness and informal economy. For example, Soares (2005) found that trade liberalization strategies decrease the proportion of un-registered workers (informal workers) and thereby reduces the size of informal economy in the short-run while the opposite holds true in the long-run; a finding similar to ours. Other studies have also found similar short-run result such as Cisneros-Acevedo (2016), Matthew (2011) and Bairagya (2010). Cisneros-Acevedo (2016) found that in the short-run, trade liberalization reduces informal sector in Peru. In other words, trade openness opens up employment and business opportunities for the individuals and firms thus reducing the informal sector. Similarly, Matthew (2011) concluded that trade liberalization does not increase the proportion of un-registered workers in Nigeria. In other words, it does not expand the informal economy in the short-run. On the same lines, Bairagya (2010) revealed that trade liberalization reduces the relative size of the informal sector in India.<sup>25</sup>

As far as economic growth is concerned, it reduces the informal economy with lags and the coefficients are significant at 5 and 10 percent level. This is because growth leads to greater economic and employment opportunities for the workers and firms that move into those formal sectors that are experiencing the growth (Schneider & Enste, 2000). Movement of workers and firms in the growth-experiencing sectors would mean that now more firms are registered and more workers' income is taxed thus ensuring the documentation of the informal activity. However, the labor market

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<sup>25</sup> The long-run results of these studies is similar to their short-run findings.

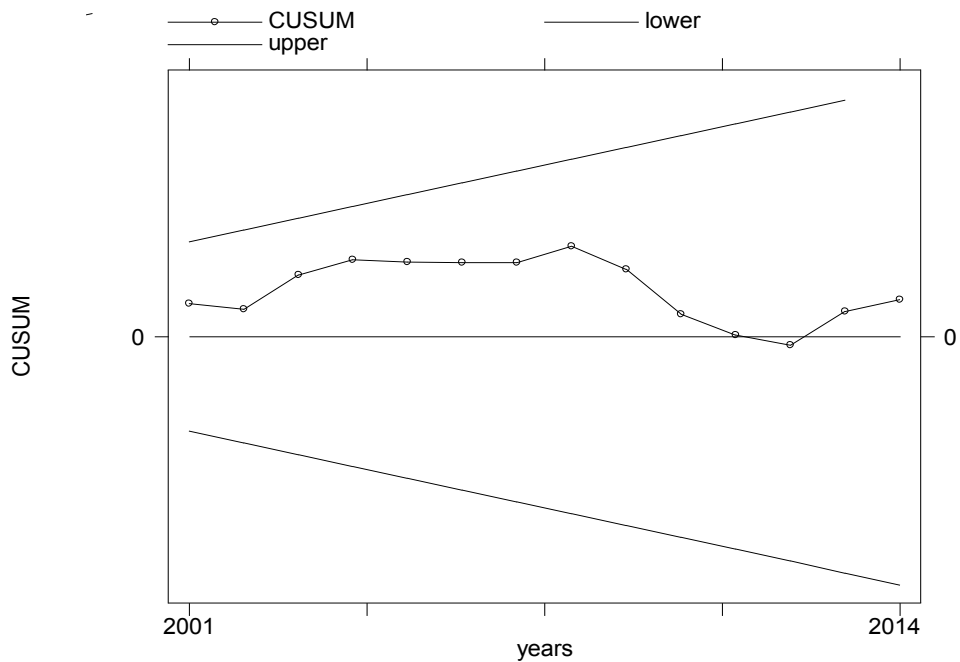
rigidities may slowdown the mobility of the workers from informal to formal economy in the short-run thus explaining the slow response of the informal economy to growth (Choudhary *et al.*, 2016). The short-run finding is consistent with the theoretical provisions whereby informal economy shrinks during periods of economic growth (Schneider & Enste, 2000). Moreover, other studies have also shown similar result such as Elgin and Oztunali (2014), Heintz and Pollin (2003) and Ihrig and Moe (2000). Elgin and Oztunali (2014) found that higher GDP per capita leads to a smaller informal sector in countries with good institutions. On the same lines, Heintz and Pollin (2003) revealed that high growth rate results in reducing the size of informal economy. Likewise Ihrig and Moe (2000) concluded that a negative correlation exists between measured rates of informalization and the level of per capita GDP.

The observed difference between the short-run and long-run results could be due to the market rigidities which are present in the short-run that limit the mobility of the individuals and firms between formal and informal sector. This could also explain the lagged response of the informal economy to changes in human capital, trade openness and growth in the short-run (Ahmed *et al.*, 2013; Choudhary *et al.*, 2016). Moreover, the ECT coefficient substantiates the long-run relationship among the variables and shows the speed of adjustment towards the long-run equilibrium. It is significant at 1 percent level. It shows that 82 percent of the total divergence is corrected in the first year. In the second year, 82 percent of the remaining disequilibrium is adjusted and so on. The reported  $R^2$  and adjusted  $R^2$  show that the model is a good fit.

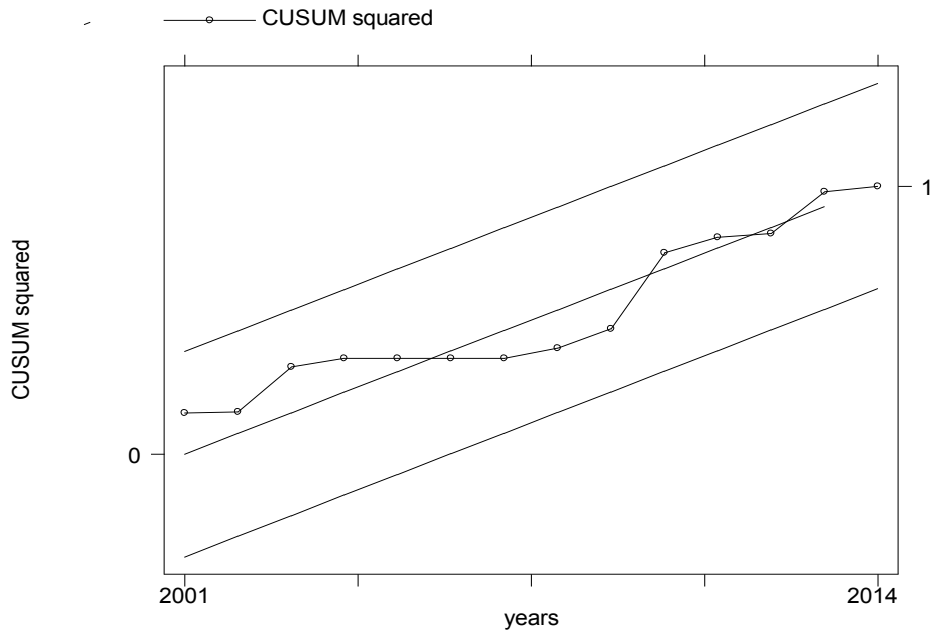
Panel C of Table 5.3 shows the results of various diagnostic tests. Breusch-Godfrey LM test for autocorrelation, LM test for autoregressive conditional heteroscedasticity (ARCH), Ramsey RESET test for omitted variables and

Skewness/Kurtosis tests for normality have been used. The results confirm that the model is free from the issue of serial correlation, autoregressive conditional heteroscedasticity, omitted variable bias and non-normality.

Lastly, Cumulative Sum of Recursive Residual (CUSUM) and Cumulative Sum of Squares of Recursive Residual (CUSUMQ) techniques are applied in order to check the stability of the model. The straight lines in both Figs. 5.1 and 5.2 below represent critical bounds at 5% level of significance. It is evident that the plots of both CUSUM and CUSUMQ statistics fall well within the critical bounds which indicate the stability of all coefficients in the model.



**Fig. 5.1: Plot of cumulative sum of recursive residual**



**Fig. 5.2: Plot of cumulative sum of squares of recursive residual**

### 5.3 Sensitivity Analysis

For the purpose of robustness, human development index is used as an alternative proxy for human capital. The Akaike Information criterion suggested lags 0, 4, 1, 4 for informal economy, human development index, trade openness and economic growth respectively. The results of the bound test in table 5.4 reveal the existence of a significant long-run relationship between the variables of this model at 5 percent level of significance.

**Table 5.4: The Bounds Test Result**

Model	F-Statistics	Level of Significance	Bounds Test Critical Values	
			I(0)	I(1)
F(LHDI <sub>t</sub> , LTO <sub>t</sub> , LRGDP <sub>t</sub> )	4.872**	10%	2.618	3.502
		5%	3.170	4.160
		1%	4.480	5.700
k = 3				
n = 36				

Note: Dependant variable is  $LINECO_t$  (informal economy),  $I(0)$  and  $I(1)$  represent lower and upper bounds respectively.  $k$  is the number of regressors and  $n$  is the number of observations. The \*\* show rejection of null hypothesis of no cointegration relationship at 5 percent level of significance.

Since there is an evidence of a long-run relationship between the variables of the model, the long-run and short-run estimates are obtained using the ARDL method. Panel A and B of Table 5.5 shows the long-run and short-run estimates of the model respectively. Broadly, the long-run and short-run results of the robustness analysis are similar to the ones in Table 5.3. However, there are a couple of notable differences; firstly, the coefficient of human development index is greater in size than the coefficient of human capital index in the long-run. This could be because human development index is a broader measure of human capital as compared to the human

**Table 5.5: The Estimated Long-Run and Short-Run Coefficients Based on AIC**

Dependent Variable, $LINECO_t$ : Regressors	Coefficients	P-Value
<b><i>Panel A: Long-run Results</i></b>		
LHDI <sub>t</sub>	-3.353***	0.007
LTO <sub>t</sub>	0.107	0.890
LRGDP <sub>t</sub>	0.536*	0.060
<b><i>Panel B: Short-run Results</i></b>		
$\Delta LHDI_t$	-0.300	0.491
$\Delta LHDI_{t-1}$	0.486	0.294
$\Delta LHDI_{t-2}$	0.877**	0.039
$\Delta LHDI_{t-3}$	0.929**	0.059
$\Delta LTO_t$	0.045	0.888
$\Delta LRGDP_t$	-2.410	0.182
$\Delta LRGDP_{t-1}$	-1.155	0.519
$\Delta LRGDP_{t-2}$	0.374	0.825
$\Delta LRGDP_{t-3}$	-3.929**	0.022
Constant	21.326**	0.023
ECT(-1)	-0.420***	0.003
$R^2$	0.688	
Adj $R^2$	0.539	
<b><i>Panel C: Diagnostic Tests</i></b>		
Breusch-Godfrey LM Test	1.532	0.119
LM ARCH Test	1.419	0.233
Ramsey RESET Test	1.230	0.323
Skewness-Kurtosis Test	1.600	0.448

Note: ECT denotes the error correction term. The \*, \*\* and \*\*\* indicates significance at 10, 5 and 1 percent respectively.

capital index (Bergheim & Schneider, 2006). It covers three dimensions of human development that is, education, health and living standard.<sup>26</sup> On the other hand, human capital index is based on the weighted average of returns to education and years of schooling therefore the impact of human development index is twice as much in the long-run. Furthermore, in the short-run the size of the coefficient of HDI is smaller than the short-run coefficient of HCI. The reason being that human development index is relatively slow changing variable as compared to human capital index. In other words, it comprises of long-term human development outcomes such as life expectancy, living standards etc. Thus it may not measure accurately human development achievements in the short-term.<sup>27</sup> Therefore its impact on the informal economy is smaller in the short-run as compared to human capital index. Secondly, long-run and short-run coefficients of trade openness are statistically insignificant. This may be due to high correlation between HDI and trade openness.<sup>28</sup>

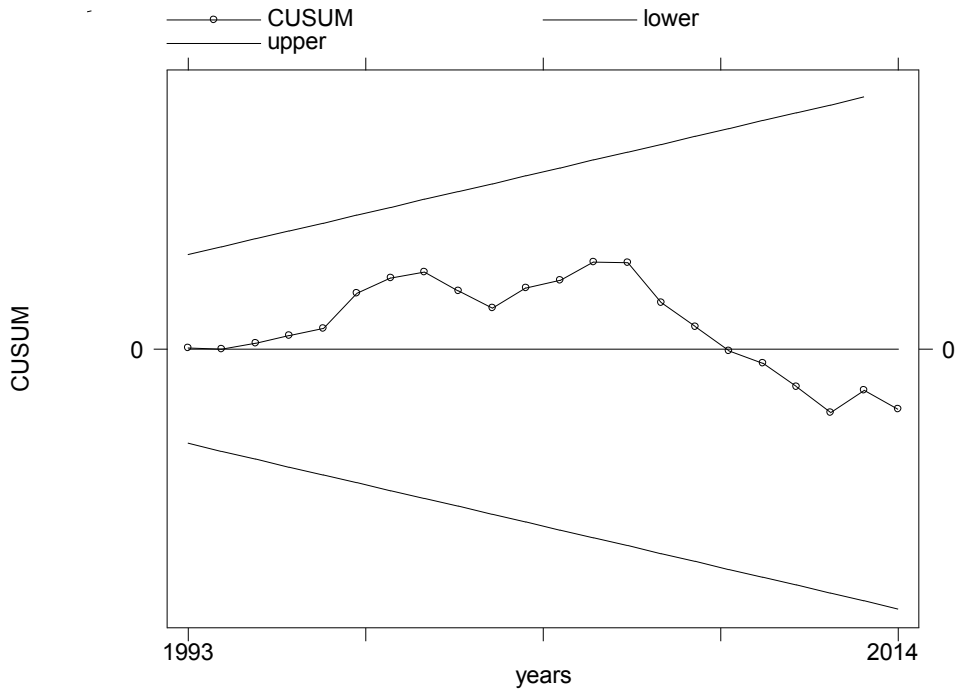
Panel C of Table 5.5 shows the results of various diagnostic tests. The results confirm that the model is free from the issue of serial correlation, autoregressive conditional heteroscedasticity, omitted variable bias and non-normality. Moreover, figs. 5.3 and 5.4 show the plots of Cumulative Sum of Recursive Residual (CUSUM) and Cumulative Sum of Squares of Recursive Residual (CUSUMQ) which indicates the stability of all coefficients in the model.

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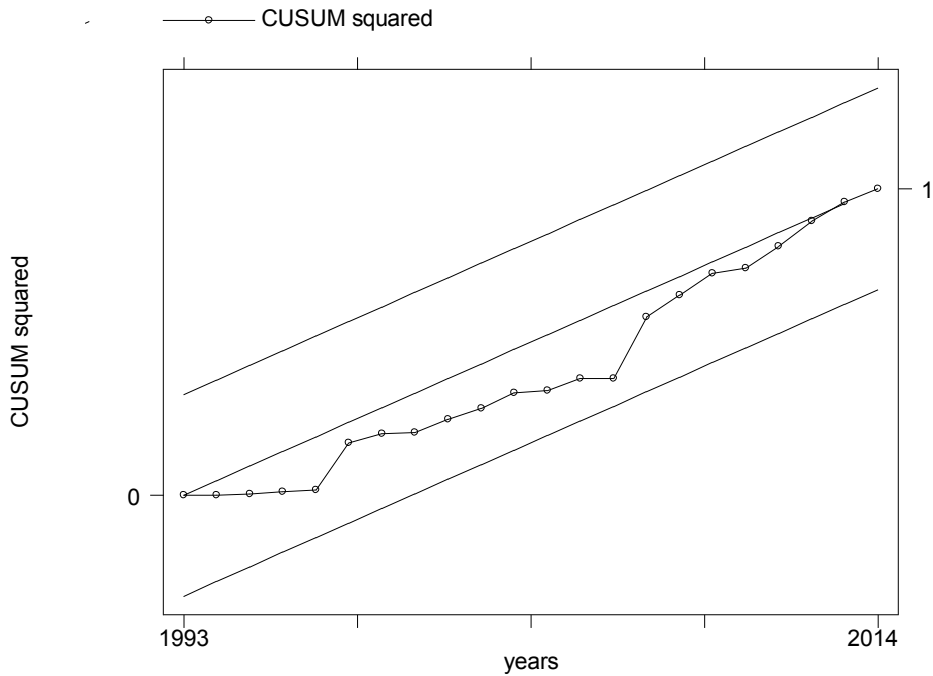
<sup>26</sup> The Human Development Report (2016), 'Human Development for Everyone'.

<sup>27</sup> Selim Jahan, Director of the Human Development Report Office.

<sup>28</sup> Correlation is found to be 0.61.



**Fig. 5.3: Plot of cumulative sum of recursive residual**



**Fig. 5.4: Plot of cumulative sum of squares of recursive residual**

From the above results it can be concluded that there exists a statistically significant relationship between human capital, trade openness, growth and informal economy in the short-run and long-run, both. Furthermore, the sensitivity analysis reinforces the

robustness of initial results whereby; a significant link exists between human development index, growth and informal economy. However, trade openness has no impact on the informal economy in the short-run and long-run both due to high correlation between HDI and trade openness. Based on the results of the sensitivity analysis, use of Human Capital Index (HCI) as a measure of human capital is preferred over Human Development Index (HDI) because even though the HDI is a broader measure of human capital, continuous data for it is not available.



## Chapter VI

### CONCLUSION

Many countries around the world have an informal economy which mostly operates outside government regulations and consists of untaxed, unmeasured and unregulated economy. The informal economy is linked with many factors such as taxation system, institutional quality, human capital development, trade liberalization, economic growth etc. However, the current study aimed to examine the link between human capital, trade openness, and informal economy in case of Pakistan for the period 1975-2014. The study also conducted a robustness analysis by utilizing alternative proxies of human capital specifically human capital index and human development index. In order to prevent specification bias, economic growth was also included in the model. Auto-regressive Distributed Lag (ARDL) approach was utilized to obtain short-run and long-run results given the small sample of the study. Prior to the estimation, the time-series characteristics were examined using the Augmented-Dickey Fuller (ADF) test. The stability and robustness of the results were confirmed using various diagnostic tests.

The bounds test validated the existence of long-run association among the variables. The long-run results reveal that human capital, trade openness and economic growth have a statistically significant impact on informal economy. The coefficients of the respective variables have the expected signs. However, in the short-run although the coefficients are statistically significant but the signs are reversed. That is, coefficient of human capital is positive while that of trade openness and growth is negative. The observed difference between the short-run and long-run results could be due to the market rigidities that affect the mobility of firms and

workers in the short-run. Moreover, the error correction term is correctly signed and is significant thus indicating the stability of the model. The sensitivity analysis confirms the robustness of the initial results with a notable difference in terms of the size of the coefficient of human capital index and human development index. In other words, the human development index has a greater impact on informal economy in the long-run as compared to human capital index and vice-versa in the short-run. This is because human development index is a broader measure of human capital and a relatively slow changing variable as compared to the human capital index. Therefore the impact is more pronounced in the long-run than in the short-run. Furthermore, the sensitivity analysis reveals that trade openness has no impact on informal economy in the short-run and long-run. This may be due to high correlation (0.61) between HDI and trade openness.

The important findings of the main model of the study are that the human capital reduces informal economy through skill and productivity enhancement. Moreover, trade openness expands informal economy through the foreign competition as well as the development and diffusion of skill-biased technologies that increase the demand for high-skilled workers and displaces the low-skilled workers into the informal sector. Likewise, growth tends to expand the informal economy by increasing the demand for the goods & services and intermediate inputs of the informal sector and by being non-inclusive in nature. In other words, the growth is coming mostly from the service and industrial sector which employs relatively smaller proportion of labor force than the agriculture sector. Hence such type of non-inclusive growth causes the workers to move from agriculture to low-skilled manufacturing and service sector jobs (such as transport and retail & trade) to be part of the beneficiary group thereby expanding the informal economy. Thus, given these

findings, the study suggests that the government should invest in human capital development which should not only focus on expanding the infrastructure for health and education but also on its quality improvement. Moreover, the university-industry linkages are weak in the country hence state needs to formulate policies in order to strengthen those linkages so as to minimize the worker-selection effect brought about by trade openness. This can be achieved by providing vocational and technical training programs in the educational institutes so as to equip the labor force with the skills required in the formal sector of the economy.

Lastly, the current study also pinpoints some potential areas for future research. The study is restricted in the sense that the mechanism of how human capital, trade openness and informal economy are related at the microeconomic level has not been explored. This would require a detailed investigation of the households' and firms' decision making regarding going informal or not. Hence the future research should focus on this microeconomic aspect by taking into account factors such as tax burden. Moreover, the future research should also focus on the reasons as to why some informal sectors are flourishing more at a particular region of the economy than others.

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