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LABOR MARKET OUTCOMES OF NON-MIGRANT MEMBERS IN RESPONSE TO REMITTANCES: EVIDENCE FROM PROVINCIAL CAPITAL OF PUNJAB AND KHYBER PAKHTUNKHAWA (KPK)

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Abstract

This study analyses the effect of remittances on labor market outcome of non-migrant member of household living in two provincial capital cities of Pakistan. This study aims to expand the effect of remittances on labor supply of household's head and labor participation of non-migrant member of household. The labor participation of non-migrant member decompose in likelihood of participate in labor market and likelihood of participate in voluntary unemployment in response to remittances. For empirical analysis, this study used household survey conducted in Peshawar and Lahore. The sample size comprises 300 household having a migrant and data has been collected by using snowball sampling technique. This study uses Two Stage Least Square (2SLS) model due to potential endogenity in remittances. For this purpose, characteristics of the migrant use as instrument to determine the amount of remittances. Furthermore, this study also use Tobit model to estimate the unbiased and consistence estimates. The estimates of the 2SLS and Tobit model suggested that remittances have significantly negative effect on the labour supply of household's head. This indicate the dominance of income effect which state that household substitute work for leisure. Furthermore, this study shows that remittances decrease the likelihood of participation in labor market and increase the likelihood of participation in voluntary unemployment for non-migrant members. This implies that presence of migrant in the household increases the reservation wage which keeps the non-migrant member of the household out of labour force.

Keywords: Remittances, Labour Supply, Labour Participation, Voluntary Unemployment

JEL Classification: J22, C24, F24.

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1. Introduction

Remittance is a financial inflow to home country by the foreign migrant. It is an important source to transfer resources from developed to developing countries. In the developing countries remittance inflow is a major source of transfer resources as compared to Foreign Direct Investment (FDI) and Foreign Aid. Furthermore, it is a primary contributor of foreign reserves which helps to meet the deficit in foreign payment account. It is a reliable source of foreign finance in developing countries than other foreign receipts (Ratha, 2005).

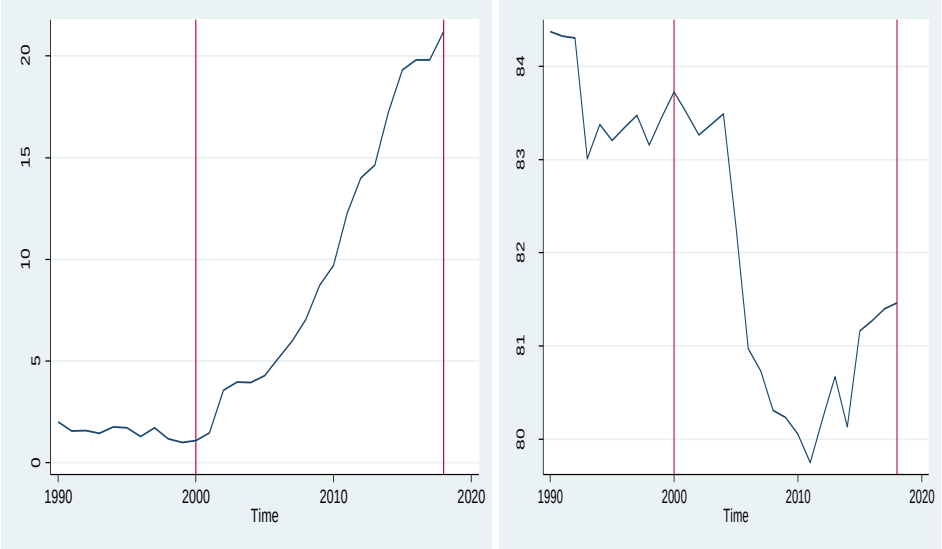
International remittances also contribute in development of underdeveloped and developing economies. According to Hussain and Anjum (2014), remittances inflow stabilise the Pakistan's economy and positively contribute in growth. The process of growth accelerates in a way when remittances are utilized at household level. In this context, recent studies highlight the importance of remittances at aggregate and household level. At macro level, inflow of remittances enhance level of foreign reserves which in turn effect exchange rate (Singer, 2010). Similarly, remittances also contribute in the economic growth and create investment opportunity in the resource country (Al Khathlan, 2010). On the other hand, at micro level remittances effect household' strategy i.e. consumption expenditure, credit constraint, human capital, health, and labour market outcome (see Acosta, 2006; Gorlich et al., 2007; Grigorian and Melkonyan, 2011).

The adverse side of remittances depicted that it cause Dutch disease in the source county by decreasing exports. Remittances enhanced foreign reserves in a country which cause in exchange rate appreciation and making exports relatively less competitive in international market (Makhlouf and Mughal 2013). Furthermore, the study of Cox-Edwards and Rodríguez-Oreggia (2009) suggested that remittances also negatively associated with labor force participation rate of Mexico. Therefore nowadays, recently concern regarding the remittances and labor supply has become a heating debate among researchers to find out the causes of remittances on labor market. It is said that migration of household's member improve the economic conditions of the household because on average individual can earn relatively more in abroad than in home country (Mughal and Makhlouf, 2013). Although, remittances improve the economic position of a household, but a massive amount of remittances increase the reservation wage ("minimum wage at which individuals are willing to participate in the labor market") of individual. So, a rise in the reservation wage effects in turn effect individual's decision to participate or not in labor market (Jadotte, 2009). Similarly, other income (rent, dividend, interest, royalties, lottery etc.) also effect reservation wage of the individual (Borjas, 2008).

The inflow of remittance to Pakistan after 9/11 incident increases definitely from $2 billion in 2000 to $21 billion in 2018. Interestingly, labor force participation rate depict sharp decline in 2000 from 84% to 79% in 2012 and then approaches to 81% in 2018. All these fact give an intuition to conduct a study to explore relationship between remittances and labor force participation. Unfortunately, there are few studies conducted on effect of remittances on labor force participation. According to best of our knowledge, available study in context of Pakistan are (for example Kozel and Alderman 1990; Mughal and Makhlouf, 2013). But these studies either using traditional econometrics approach or focused only effect of remittances on labor supply and ignoring individuals out of labor force. The present study try to fill this gap by using

modern econometric approach named Two Stage Least Square (2SLS) and Tobit model. Furthermore, this study also incorporate the presence of voluntary unemployment among male adults in response of remittances.

Figure 1. Pattern of Remittances and labor force participation rate over the time



Source: World Development Indicator (WDI, 2018)

This study examines the role of remittances on the labour market outcomes of non-migrant member by conducting survey at household level. The decision to participate in labor force is determine by demographic characteristics of individual and household. For this purpose, we collected data from capital of two major provinces of Pakistan named Punjab and Khyber Pakhtunkhawa (KPK). The importance of these two provinces emerges from the fact that they supply about 75% of the total migrants of Pakistan (BOEOE[1], 2019). For empirical analysis, the total effect of remittances decomposed in such a way that remittances effect labour supply of household's head and labour market participation of the non-migrant member of the household other than household's head.

On the empirical side, this study examines the effect of remittances on the labour supply by using simple Ordinary Least Square (OLS) model and finds strong evidence on the potential biasness in the estimate of OLS due to endogeneity in remittances. For this purpose, we instrument the remittances and use the Two Stage Least Square (2SLS) model. By comparing the coefficients of OLS and 2SLS, we notice downward biasness in magnitude of the OLS estimates. This study also truncates the dependant variable labour supply (weekly working hour) from the left and right side and applies the Tobit model. The results of Tobit model also give evidence on the biasness in the magnitude of OLS estimates. Moreover, effect of remittances on labour participation of non-migrant members other than household's head examined by using Logit Model.

[1]Bureau of Emigration & Overseas Employment. Government of Pakistan. 2019

The remaining part of the study is organized as follows: Chapter 2 presents complete description of the literature review; Chapter 3 describes the theoretical relationship between the variables and develops econometric methodology to estimate the effects of regressors. Chapter 4 explains data collection method and descriptive analysis of the variables. Chapter 5 gives the complete interpretation of the estimates. In the last chapter, we draw conclusion of the study and suggest policy recommendations.

2. Review of previous literature on the impact of remittances

The neo-classical model of labor leisure choice elaborates that every individual maximizes his or her utility with two goods "consumption" and "leisure". To maximize utility every individual must face constraint of time endowment regarding work and leisure. Due to this time constraint, an economic trade-off have to face in terms of work and leisure because to consume more goods one must work and give up some of our leisure. Contrary, one can increase the consumption of leisure with the rise in the non-labor income because presence of non-labor increase rise reservation wage of the individual which in turn divert individual's preferences towards leisure and keeps the individual out of labour force (Killingsworth, 1983). Remittances effect the reservation wage which in turn effect the labour participation. As investigate by Kim (2007) that remittances have relatively strong effect on labour participation than labour supply of remittances receiving individual. Similarly, Jadotte (2009) find out that labor supply is negative function of reservation wage and negative effect of reservation wage strong among the women.

The previous literature suggested that association between remittances and labour supply is ambiguous. For instance, the study of Funkhouser (2006) suggested that remittances has insignificant effect on labour supply. Author argued that migrants may increase their expenditure in the host country and failed to remit substantial amount of remittances. Contrary to insignificant effect, some studies suggest that remittances have negative effect on labor supply (see Itzigsohn, 1995; Kim, 2007; Airola, 2008; Grigorian and Melkonyan, 2011). It suggested that remittances divert the preferences of the household's member towards leisure and offering less hour of labor supply. Though remittances effect labour supply and labor participation of individual but presence of migrant in the household also increase likelihood to not participate in labor market.

Although remittances have insignificant effect on quantity of labor supplied but a substantial increase in the amount of remittances divert individual's preferences from wage employment to self-employment (Vadean et al., 2019). Similarly, study of Gorlich et al. (2007) find that migration of a family member increase likelihood of being in-active among the persons left behind. Authors argued that in the absence of participate in labor market, non-migrant members engaging in higher education, farming, childcare, and other household duties.

At macro level the study of Posso (2012) examined the association between remittances and labor supply by using panel data of sixty six developing countries. His study used labour force participation rate as proxy of labour supply and conclude that remittances positively associated with labor supply because remittances overcome the credit constraint and increase the employment opportunities. Supporting this conclusion, Akhter (2018) claim the association of labour productivity with remittances by using the time series data from 1974-2014. His finding suggested that remittances positively

associated with productivity because remittances significantly contribute in physical capital which in turn increase productivity and then labour supply. Whereas, Jackman (2014) analyse effect of remittances on unemployment rate of 19 developing countries in a region Caribbean and Latin America. His findings suggested that remittances have insignificant effect on unemployment rate because unemployment rate follow a non-linear relationship against remittances which indicate the presence of threshold. Nevertheless, presence of remittances below threshold has significantly positive effect on unemployment and above threshold it has significantly negative effect on unemployment.

The presence of remittances increase the income of household which in turn increase the life expectancy, primary/secondary school attainments, reducing infant mortality. The improvement in health, education, and living standard better the position of human development index (HDI) in low and middle income countries (Zhunio et. al., 2012). Contrary, remittances increase consumption but does not increase savings and investment. Moreover, remittances cause moral hazard problem which in turn create dependency and reduce economic growth in long run (Andersen et al., 2007).

The study of Kozel and Alderman (1990) for urban area of Pakistan suggested that remittances have negative effect on labor supply of non-migrant members. Because remittances allow the educated members of the household extend the job search time until they found as per their taste. Contrary, Mughal and Makhlouf (2013) argued that domestic and foreign remittances have not effect on quantity of labour supplied; however, an increase in remittances associated with lower likelihood of labor market participation. Likewise, remittances divert individual's preferences towards self-employment and cultivating one's own land than wage employment.

The objective of this study is to add some extent of labour market outcome in the existing literature. First, it decomposes the effects of remittances on labour supply of household's head and labour participation of non-migrant members other than household's head. In context of labour participation of non-migrant, this study analyses the effect of remittances on the likelihood of being employed and likelihood of being voluntary unemployed. Second, it decomposes the effect of remittances on labour supply on the basis of gender and region. Third, this study looks at the potential biasness in the magnitude of the OLS estimates due to endogeneity in the remittances. For the sake of consistence and unbiased estimate, this study used strong and valid Instrumental Variable (IV) for endogeneity in remittances. Furthermore, this study also captured the biasness in coefficient by using Tobit model and then compared the estimates of OLS with Tobit model. This type of biasness caused when most of observation in the dependant variable (labour supply) is zero (due to zero weekly working hour reported). Finally, this study is first to examine the effect of remittances on labour market outcome by using the primary data. The significance of primary data can be explained in such a way that in our questionnaire we cover a wide range of information on characteristics of household, household's head, migrant, and non-migrant members.

3. Methodology

3.1. Ordinary least square (OLS) Model

To estimate the effect of remittances on labor supply, we use simple functional form of Stern (1986) which derived from indirect utility function of the household's head and semi log labor supply equation:

$$H_i = \alpha + \beta_1 W_i + \beta_2 lnR_i + \beta_3 lnEXP_i + \beta_4 OI_i + \boldsymbol{\beta Z_i} + U_i \quad (1)$$

Where H_i is the weekly working hour of household's head in i[th] household, W_i is hourly wage rate, R_i is monthly remittances received, and OI_i is other income. Similarly, α, β_1, β_2, β_3, β_4, are coefficients, and $\boldsymbol{\beta}$ is a vector of coefficient and $\boldsymbol{Z_i}$ is a vector of variable which include household's head and household's characteristics. The household's head and household's characteristics include age, age square, gender, education, dummy of nuclear family, province, area, and household size respectively. The coefficients of baseline model can be estimate with simple Ordinary Least Square (OLS) method, but the coefficients of the OLS model might not consistent and show biasness in the presence of endogeneity in remittances. Therefore, transformation of OLS model into Two Stage Least Square (2SLS) model is imperative to obtain consistent estimates.

3.2. Two Stage Least Square (2SLS) Model

Our baseline equation is a structural equation because it has an endogenous variable on the right hand side. The potential reverse causality, unobserved heterogeneity, and omitted variable biased cause endogeneity in the variable. Similarly, unobserved characteristics of household's head and household can affect the remittances and labor supply jointly. Therefore, we need to modify our model to overcome the problem of endogeneity in remittances. For this purpose, number of studies suggested Two Stage Least Square (2SLS) model to instrument the remittances at first stage and then put the fitted value of remittances in the labour supply equation in the second stage (see Grigorian and Melkonyan, 2011; Mendola and Carletto, 2012; Funkhouser, 2006; Jadotte, 2009; Stanley, 2014; Dermendzhieva, 2008). To address the problem of endogeneity, baseline equation can transform into reduce form equation (the equation with all exogenous variable) as follow:

$$lnR_i = \pi + \boldsymbol{\mu I_i} + \boldsymbol{\lambda C_i} + V_i \quad (2)$$

Where $\boldsymbol{I_i}$ is the vector of instrumental variable and $\boldsymbol{C_i}$ is vector of control variable, and V_i is error terms. The equation (2) is first stage (reduce form) equation with all exogenous variables to determine the value of the remittances. In the second stage, insert the fitted value of remittances into the baseline equation to obtain the consistent coefficient.

$$H_i = \lambda + \gamma ln\hat{R}_i + \boldsymbol{\omega C_i} + \epsilon_i \quad (3)$$

Where H_i is weekly hour work, $\hat{R}_i$ is fitted value of remittances which determined in first stage with all exogenous variable and C_i is a vector of all the control variable of baseline regression.

3.2.1. Instruments and Control variables

Instruments play a vital role in determination of endogenous variable because presence of strong instrument in the model can increases the possibility of consistent estimates.

The instrument must maintain the assumption that it should be correlated with remittances and uncorrelated with the error terms because it may directly affect labor supply (Dermendzhieva, 2008). The previous literature suggested that some studies used instruments for migration decision (see Grigorian and Melkonyan, 2011). Furthermore, the study of Jadotte (2009) used instruments for migration decision and remittances as well. In our analysis whole data is taken from household having a migrant, so ignore the role of migration decision and instrument the amount of remittances.

The amount of remittances to a household depends upon the number of migrant in a household because a household with more than one migrant can received relatively more remittances (Jadotte, 2009). Similarly, frequency to visit home country in last five year is also determine the stable position of the migrant in the abroad which directly associated with higher amount of remittances (Schumann, 2013). Wealth is also an important determinant of remittances because a migrant from a wealthy family may remit substantial amount of remittances to maintain the standard of living. The wealth index is documented by Jadotte (2009) in his seminal work on international migration, remittances and labor supply. In addition, time period of staying abroad also used as an instrument to determine the amount of remittances, because a person who newly migrated has less opportunity, less familiar to the language and environment than a person migrated years ago. Therefore, the length of time period of staying abroad effect the earning profile of the person and the amount of remittances.

Finally, remittances can increase dependency ratio in a household because in developing countries it is a common belief that the migration of a family's member can improve the economic position of the household. Therefore, the amount of remittances are substantial to meet the expenses of household, so non-migrant members of household not need to participate in the labor market. In this context, remittances can lead to increase number of voluntary and involuntary unemployed person in household. Therefore, the presence of voluntary or involuntary unemployed person in the household pursue the migrant to remit substantial amount of remittances. For this purpose, we generate three dummy variables (i) coded 1 for the presence of unemployed person and zero otherwise; (ii) coded 1 for the presence of voluntary unemployed person and zero otherwise; (iii) coded 1 for the presence of person above 50 years old and zero otherwise[2].

The following control variable included in the regression which effect the labor supply of household's head: (i) labor income of household's head; (ii) non-labor income receipts other than remittances i.e. rent earning, interest earning, pension etc.; (iii) education level of household's head; (iv) age of household's head and it squared value for non-linear relationship; (v) household size; (vi) monthly expense of household; (vii) dummy for gender of household's head; (viii) dummy for relationship of migrant with household's head; (ix) dummy for province; (x) dummy for area.

3.3 Tobit Model

In the baseline model the coefficients of OLS will be inconsistent and biased because many household's head reported zero working hour. The biasness arises in OLS coefficients because we OLS model consider only non-zero value of dependant variable and omit the zero value in the dependant variable, so the assumption that E (U) =0 (mean

[2] Definition of instruments have been given in table no. 5 placed in Appendix

value of error terms is zero) did not meet. To overcome this type of problem Tobit Model proposed by Tobin (1958).

In the literature of remittances and labor supply Tobit model is used by; Hanson, (2007); Jadotte, (2009); Binzel and Assaad, (2011). In our analysis we shall do our data left and right censored; for this purpose, the more suitable model used by Henningsen (2010). Here we are defining the Latent variable:

$$L_i^* = x_i\beta + \varepsilon_i \tag{4}$$

$$L_i^* = \begin{cases} L_i = 0 & if\ \ L_i^* \leq 0 \\ L_i = \ L_i^* & if\ L_i^* > 0 \end{cases} \tag{5}$$

The subscript '*i*' show that no of observations, *L** is an unobserved Latent variable, x_i is the vector of explanatory variable and β is a vector of unknown parameter and ε_i is the disturbance terms.

Now we modify our standard Tobit model into the censored regression model which is normally used when dependant variables are censored into left and right. We can modify our equation (4) as:

$$L_i^* = x_i\beta + \varepsilon_i \tag{6}$$

$$Y_i = \begin{cases} a & if \quad L_i^* \leq a \\ L_i^* & if \quad a < L_i^* < b \\ b & if \quad L_i^* \geq b \end{cases} \tag{7}$$

Where a ≠ -∞ and b ≠ +∞ and 'a' is the lower limit and 'b' is the upper limit of the dependant variable.

3.3 Logit Model

After estimating the effect of remittances on the labor supply of household's head, next to analyse the effect of remittances on the labor force participation of non-migrant member of the household. In this context, Itzigsohn (1995) used simple OLS model to determine the effect of remittances on the number of people in the household who work. But in our analysis, we want to determine the non-migrant (other than household's head) member's probability to participate in the labor force, so we use Logit model as follow:

$$Pi = E\left(Li = 1 \left| Xi\right.\right) = \Lambda(Z) = \frac{e^z}{1 + e^z} \tag{8}$$

L_i is equal to one if household has employed person (other hand household's head) who is participating in the labor force, zero otherwise and Z = Xβ+U. X is a vector of independent variable which include wage rate and age of the household's head, log of remittances, other income, household expenses, dummy of province, dummy of area, number of male in the household and Λ(Z) is logistic cumulative distribution function. Furthermore, Logit model in equation (8) also used to estimate likelihood of voluntary unemployment among non-migrant members of the household in response to remittances by using the same control variable.

4. Data and Descriptive Analysis

For empirical analysis, data collected on characteristics of household, household's head, and migrant by interviewing the respondent. The structured interview method used in which questionnaire filled by researcher instead of respondent. In survey most of the respondent was the head of the household, but somehow the brother or son of the head was also the respondent.

We design questionnaire to obtain the information at household and individual level to cover the wide range of topics. The questionnaire consists on different sections and each section provides specific information on head of household, household's behaviour, and economic status. The section 1 comprise household's head characteristics, other source of income and their utilisation. On the other hand, sections 2 and 3 deal with characteristics of household, migrant, and family of migrant respectively.

We choose province Punjab and Khyber Pakhtunkhwa because they share about 75% of the total migrant (BOEOE 2019). Further, we choose capital of Punjab and Khyber Pakhtunkhwa named Lahore and Peshawar respectively. The choice of Lahore is logical in such a way to compare the behaviour of the habitant of developed city Lahore with relatively less developed city Peshawar. The selection of Peshawar getting importance because statistics shows that in Peshawar migration rate increase up to 4.4 times in 2019 as compared to 2005 (BOEOE 2019). Finally, to observe the household's behaviour in the region where migration rate is relatively high.

We used stratified sampling because in stratified sampling it is possible to split heterogeneous population into the different homogenous groups. We consider that characteristics of population in Lahore and Peshawar are heterogeneous, so we split it into two strata. Each strata contain Lahore and Peshawar and each strata has been further sub-stratified into urban and rural area.

Table 1. Definition of Variable

Variable Names	*Description*
Weekly Working Hour	The weekly working hour computed as number of hour work in a day multiply with weekly working day
Hourly Wage Rate	Monthly labor income of the household's head converted into hourly wage rate by monthly labor income divided weekly working hour *4.33
Log Remittances	Monthly remittances receive by household
Age	Age of the household's head
Age Square	Square the Age of household's head to check the non-linear relationship between age and weekly work
Male (HH head)	Dummy variable for gender to differentiate the labor supply of male and female headed household by coded 1 for male, 0 otherwise
Min. Education	Dummy variable for education to differentiate the labor

	supply of educated and illiterate person by coded 1 if household's head has basic education, 0 for no education (no year of schooling)
Nuclear family	Household reported relationship with migrant like brother, mother, father, son and wife, but we coded 1 for son or wife of the migrant and 0 for otherwise
Province	Dummy variable to differentiate the labor supply of habitant in developed and less developed city by coded 1 if head of the household from Lahore, 0 otherwise
Household Size	Total number of family member in the household excluding the migrant and guest
Area	Dummy variable coded 1 for urban and 0 otherwise.
Log Expense	Monthly expense includes the all expense incurred by the household over the month i.e. expense on education, non-durable goods, and on basic needs etc.
Log Other Income	Other income included the sum of the rental income, income from leasing the land for cultivation, pension, and income from another source. In the sample many of the household reported zero other income, so we added 100 rupees to every household as a gift from abroad which helpful to take the log of other income.
No. of Male	Total number of males in the household irrespective of their age
Employed person	Number of employed persons in the household excluding head of the family and migrant, converted into dummy dependant variable by coded 1 on presence of employed person in the household, 0 otherwise
Voluntary unemployed person	Number of male persons in the household who not willing to participate in the labor market and not studying above the age 18, converted into dummy dependant variable by coded 1 on presence voluntary unemployed person in the household, 0 otherwise

There was no public or private institute which maintain the record of the migrant at region level, so it was not easy to identify the household having migrant. We resolve this problem of identifying the household having migrant by choosing the area in which relatively more household have migrant. After choosing the area in which relatively more household have migrant, we applied snowball sampling technique to collect the data. The snowball sampling also known as chain referral sampling in which researcher asked the respondent to identifying the household with similar trait of interest.

In our sample we gave more weightage to rural area to capture the heterogeneity of work between the self-employed people. On the other hand, in the urban area most of the

people interlink with the public or private job and supply fixed hour of work. In such context, we expand our sample size 55 and 95 from the urban and rural area of Lahore respectively; similarly, 40 and 110 from the urban and rural area of the Peshawar. The description of the variable used in study has been given in the table 1.

Descriptive statistics of on demographic of household, economic status, and migration status has been given in table 2. Weekly working hour has been ranged from 0 to 105 and zero working hour indicate the person out of labor force. Similarly, hourly wage rate varied from 0 to 2,309 and zero hourly wage is belongs to a person out of labor force. There is greater disparities among remittance receiving household as depicted by standard deviation as well as the range (difference between minimum and maximum) of remittances. Similarly, age of household's head also show greater disparities.

Table 2. Descriptive Statistics

Variable	Mean	S.D	Min	Max
Weekly Working Hour	30.14	29.34	0	105
Hourly Wage Rate (HH head)	115.3	223.21	0	2309.47
Remittances	67811.67	65869.02	10000	600000
Age (HH head)	44.64	15.49	18	85
Male (HH head)	0.87	0.34	0	1
Min. Education (HH head)	0.83	0.37	0	1
Nuclear family	0.15	0.35	0	1
Province	0.5	0.5	0	1
Household Size	9.23	5.18	2	34
Area (urban)	0.32	0.47	0	1
Expense	52855	40685.63	10000	300000
Other Income	12996.67	30277.18	0	300000
No. of Male	4.71	2.98	1	19
Employed person	0.56	0.50	0	1
Voluntary unemployed person	0.13	0.33	0	1

In the sample about 87% household has been headed by male and 83% household's head has basic education but 17% reported no education. Among the household, 15% migrant are from nuclear family and 32% households are from urban area. Moreover, 56% household reported the presence of employed person in household, and only 13% reported the presence of voluntary unemployed person in household.

5. Results and interpretation

5.1. Labor supply of household's head

In table 3, the estimates of OLS and 2SLS are presented to compare the biasness in sign and magnitude. We applied Hausman test for the endogeneity of the variable (see appendix table 8), the p-value of the Hausman shows that we did not reject the null hypothesis "variable is exogenous". On the other hand, theoretical evidence of endogeneity in remittances was documented by case et. al.: Jadotte (2009), Grigorian and Melkonyan (2011). We applied Hensen test for the validity of instruments because valid instruments increase the likelihood of consistent estimates. The p-value of the Hensen test indicates that we did not reject the null hypothesis that "instruments are valid". Moreover, we also applied Sargan Test to test the strength of the instrument. The p-value of the Sargan test indicates that we did not accept the null hypothesis that "instruments are weak".

Following by Behrman and Taubman (1985) to test the biasness in the coefficient of remittances, we applied Wald test by using the standard error of the OLS model under the null hypothesis that "both coefficients are same". We did not reject the null hypothesis that both of coefficients are same. The coefficient of remittances in OLS model did not show biasness in sign rather it shows downward biasness in magnitude comparing with coefficient of 2SLS.

In our sample many of the observation consist of the zero working hour, so the presence of zero value in the dependant variable gives inconsistent estimate. To obtain the consistent estimates censored data left and right. We did 123 observation left censored reported zero weekly working hour and 19 observation right censored reported more than 85 weekly working hour. The purpose of the right censored is to avoid the leverage effect because weekly working hour vary from zero to 105.

We applied Tobit model and compared the coefficient with the OLS model. We found that coefficient of remittances in the Tobit model is more than double in magnitude than the coefficient of OLS. We applied simple Wald test using the standard error of the OLS model to test the biasness under the null hypothesis that "both of coefficients are same". The p-value of the test indicates that we rejected the null hypothesis that "both coefficients are same". The coefficient of remittances in the OLS model shows significantly downward biasness by comparing with coefficient of Tobit model.

In table 3 results of OLS, 2SLS, and Tobit model suggested that hourly wage rate has significantly positive impact on the labor supply of the head of household. The sign of the coefficient shows the dominance of the substitution effect of wage change. The presence of substitution effect states that an increase in the wage rate rises the opportunity cost of leisure which leads to decrease the consumption of leisure and work more.

Table 3.Determinants of Household's head Labor Supply (OLS, 2SLS, and Tobit Model)

Variable	(OLS)	(2SLS)	(Tobit)
Hourly wage	0.019**	0.019**	0.042**
	(0.009)	(0.009)	(0.018)
Log Remittances	-7.631**	-11.178*	-13.871***
	(2.946)	(6.128)	(4.917)
Age (HH head)	2.085***	2.074***	3.602***
	(0.554)	(0.541)	(1.035)
Age Square (HH head)	-0.024***	-0.023***	-0.041***
	(0.006)	(0.006)	(0.011)
Male (HH head)	20.274***	19.820***	41.006***
	(4.092)	(4.047)	(10.400)
Min. Education (HH head)	7.392***	6.784*	11.533
	(3.971)	(4.041)	(7.412)
Nuclear family (HH headed by children or spouse of migrant)	-15.522***	-15.266***	-34.250***
	(3.897)	(3.852)	(10.14)
Province (1 for Lahore)	14.677***	15.382***	27.032***
	(3.213)	(3.239)	(5.634)
Household Size	0.219	0.176	0.447
	(0.311)	(0.321)	(0.523)
Area (1 for Urban)	-4.035	-4.590	-6.044
	(3.309)	(3.366)	(5.698)
Log Expense	6.908**	9.640*	9.514*
	(3.416)	(5.529)	(5.654)
Log Other Income	-0.224	-0.257	-0.176
	(0.596)	(0.585)	(0.996)
F Stat/ Wald Chi	14.35	171.99	7.97
R Square	0.2939	0.2903	0.0627
N	300	300	300

Standard errors in parentheses * p<0.1, ** p<0.05, *** p<0.01

The coefficient of remittances show significantly negative relationship with labor supply which is consistence with previous findings. We converted the semi-log functional form equation's coefficient into the elasticity. The elasticity of weekly work w.r.t remittances is -0.253 which greater than the elasticity estimated by Airola (2008) which was -0.009. The magnitude of elasticity depicted that an increase in remittances by 10% is associated with decrease in weekly working hour by 2.5%. The negative association between remittances and labor supply can be interpreted in such a way that remittances soften the budget constraint of migrant household and allow the non-migrant member to engage in flexible job.

The coefficient of age suggest that an increase in age associated with increase in labor supply. Age can be used as a proxy of experience which indicates that an increase in years of experience associated with higher return from work. Although age has positive association with labor supply, but age squared has negative association with labor supply which state that labor supply increases with age but less than proportionally and follow inverted-U pattern.

The labor supply of male and female headed household are significantly different from each other. The male headed household supply more labor than the female because female specialized in the home production and male specialized in the market production. In a society with higher social fractionalization it is preferred for women to participate in a labor market where she either worked within the four walls of house or a part time flexible job. The strength of relationship between household's head and migrant also effect the labor supply. The head of household (son or wife of the migrant) from nuclear family, then it supplies significantly less labor hour supplied than a head from the non-nuclear family. It has been observed that per capita remittances to household headed by nuclear family higher than non-nuclear one. Hence, the presence of higher per capita remittances increases reservation wage of the wife and son of the migrant which in turn decrease labor supply or keep them out of labor force.

The head of the household with basic education significantly supply more labor than illiterate household who has no year of schooling. Since education is a key variable to determine the individual's preferences towards work because an educated person who receiving remittances and have basic knowledge about the opening of business can get incentive to be self-employed and increase working hour (Schumann 2013). Similarly, a person with higher level of education may get higher wage rate which in turn divert the individual's preferences towards work than leisure.

The geographical location also determines the labor supply of the individual because the coefficient of variable province indicates that labor supply of habitant of Lahore and Peshawar is significantly different. The head of the household from Lahore supply more labor hour because Lahore is more developed and secure than Peshawar. Because individual in Lahore has more opportunity to invest in new business and explore ideas by participating in modern labor market than Peshawar. The coefficient of monthly expenditure shows significantly positive effect on the labor supply of the household's head. It depict that in response to increase in household's expense; head of household should have to work more to earn more for the sake of filling the deficit between income and expense.

5.2 Remittances and Labor Supply of Non-Migrant Member

To estimate the work pattern of the non-migrant member of the household we asked in questionnaire about number of employed members in the household. We coded 1 on the presence of employed person and zero other wise to be convert our model into dummy dependant binary variable. We applied Logit model to find out the effect of remittances on the likelihood to participation of non-migrant member in labor market. The marginal effects of remittances on the labor participation are given in table 4 along with control variable like: labor income of the head, age of the head, province, area, log expense, log other income, and number of males in the household.

In table 4 variable of interest shows that an increase in monthly remittances by 10% leads to decrease in likelihood of participation in labor market by 8.6% for non-migrant employed person. The result suggested that remittances allow the member of the household to avoid unwanted job and extend the period of job search to obtain the job according to his taste. As point out by Itzigsohn (1995) that remittances allow the young member of the household to stay out of labor force and complete their education.

The age of household's head also determine the labor participation of the member of household. The result suggested that a rise in the age of the head of the family insist the member of the family to contribute in the household's income by participating in labor market to compensate the deficit in the household's income due to job retirement of the household's head. Furthermore, household's head with self-employed status will preferred that member of the household should look after and run his business as he got older.

Table 4. Remittances and Labor Participation of Non-Migrant Member of Household-Logit Model Estimation

	Employed	Voluntary Unemployed
Variable	Mfx	Mfx
Labor Income (HH head)	0.00014	0.002**
	(0.001)	(0.001)
Log Remittances	-0.863***	0.787**
	(0.289)	(0.369)
Age (HH head)	0.041***	-0.019*
	(0.010)	(0.011)
Province (1 for Punjab)	1.811***	0.005
	(0.315)	(0.378)
Area (1 for Urban)	-0.078	0.742*
	(0.305)	(0.402)
Log Expense	0.880***	-0.462
	(0.322)	(0.465)
Log Other Income	-0.056	-0.042
	(0.052)	(0.072)
No. of Male	0.261***	0.168***
	(0.077)	(0.059)
F Stat/ Wald Chi	53.90	24.35
Pseudo R Square	0.2121	0.1059
N	300	300

Standard errors in parentheses * p<0.1, ** p<0.05, *** p<0.01

The variable province shows that a person from Lahore has significantly more likelihood to participate in the labor force than a person from Peshawar. Because non-migrant member from more developed city like Lahore possess more skills and higher human capital as compare to a person from Peshawar. Therefore, in the presence of higher level of skills and human capital a person from developed city has more probability to get employment as per taste.

The variable monthly expense suggested that an increase in monthly expense by 10% lead to increase the likelihood to participate in labor market for non-migrant member of household by 8.8%. It has been observed that an increase in expense increase the burden

on the member of the household to participate in the labor market and shared in the household's income by participating in the labor market. Similarly, the direction of the variable other income is as expected but statistically insignificant. The variable number of males in the household positively associated with likelihood of labour market participation of non-migrant member of household. The coefficient suggested that a rise in the number of males in the household increase the man-power in the household which helpful in generating ideas to expand a business and increase the likelihood of labor market participation.

5.3 Remittances and Voluntary Unemployment

This study aimed to explore the effect of remittances on voluntary unemployment. For this purpose, we asked in questionnaire about the presence of the person in the household who is not willing to participate in labor market and not studying. We coded 1 on the presence of voluntary employed person and zero otherwise to convert our model into dummy dependant binary variable. We applied Logit model to find out the effect of remittances on likelihood of voluntary unemployment. The marginal effects of remittances on voluntary unemployment are given in table 4 along with control variable which we used to determine the labor participation of household's member in previous section.

In table 4 the variable of interest remittances show that an increase in remittances by 10% is associated with increase in likelihood to participate in voluntary unemployment by 7.8%. The result suggested that remittances generate voluntary unemployment because household with migrant received relatively higher per capita income than non-migrant household. Therefore, in the presence of higher income and asymmetric information to migrant about the state and structure of household, the non-migrant member of household can remit substantial amount of remittances to meets their ends and keep themselves out of labor participation. Similarly, non-migrant member of the household participates in the higher education, engaging in the childcare, subsistence farming, and other household duties (Gorlich et al., 2007).

The coefficient of labor income of household's head suggested that an increase in labor income of household's head by 10% is associated with increase in likelihood to participate in voluntary unemployment by 0.02%. It means that an increase in labor income of household's head also responsible for voluntary unemployment. This fact can be explained in such a way that remittances and labor income of household's head is substantial to meet the expense of household and keep the member of household out of labor force. The age of the household's head has significantly negative effect on the likelihood to participate in voluntary unemployment among non-migrant member of the household. The result suggested that an increase in age of household's head is push factor for non-migrant member of household to participate in labor market and contribute in household income after the retirement of household's head.

6. Conclusion

This study analyse the effect of remittances on labor supply of household's head and labor participation of non-migrant member of household by using the primary data collected from the capital of Punjab and KPK. We estimate the effect of remittances on labor supply by using the simple OLS model. We compare the coefficient of OLS with

the coefficient of 2SLS and Tobit model. We apply Wald test and find that there is no biasness in the sign of coefficient of remittances among all the model but biasness in magnitude while comparing with coefficient of Tobit model. The results suggest that remittances have significantly negative effect on labor supply of household's head. The negative association between remittances and labor supply can be interpreted in such a way that remittances soften the budget constraint of migrant household and allow the non-migrant member to engage in flexible job.

The results of Logit model for non-migrant members of household suggest that an increase in monthly remittances associated with decrease in likelihood of participation in labor market for non-migrant employed person. The result suggested that remittances allow the member of the household to avoid unwanted job and extend the period of job search to obtain the job according to his taste. Moreover, an increase in remittances associated with increase in likelihood to participate in voluntary unemployment. Because in the presence of higher income and asymmetric information to migrant about the state and structure of household, the non-migrant member of household can remit substantial amount of remittances to meets their ends and keep themselves out of labor participation.

To conclude, our study demonstrate that remittances have negative effect on the labor supply of the household's head. Furthermore, remittances make adult members in-activate by mentally preparing them not to participate in the labor force. From policy perspective an attention required to channelize the effect of remittance as source of job creation because remittance receiving household face relatively less budget constraint pressure which make them able to enhance human capital. Furthermore, mitigate impediment in establishing a self-employment work and improve the position of ease of doing business.

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Appendix

Table 5. Definition of Instrument

Variable Names	*Description*
Wealth	The wealth index calculated on the basis of Principal Component Analysis (PCA) by using 8 specific assets. These specific assets includes: presence of car, motorcycle, air conditioner, oven, laptop/computer, refrigerator, ownership of the house, and number of rooms in the household.
Abroad person	Dummy variable coded 1 for the household having more than one migrant, 0 otherwise.
Unemployed Person	Dummy variable coded 1 for presence of unemployed person in the household, 0 otherwise.
Voluntary unemployed	Dummy variable coded 1 for presence of voluntary unemployed person in the household, 0 otherwise.
Time period of staying abroad	Number of years migrant spend at abroad from first migration to till survey time, in case of more than one migrant we use mean value
Frequency of visit	After how many year migrant visit home country, in case of more than one migrant we use mean value
Above 50	Dummy variable coded 1 for presence of person above 50 year in the household, 0 otherwise.

Table 6. Summary of Instruments

Variable	*Mean*	*S.D*	*Min*	*Max*
Wealth	2.61	1.0	0	4.5
Abroad person	0.243	0.43	0	1
Unemployed Person	0.31	0.46	0	1
Voluntary unemployed	0.13	0.33	0	1
Time period of staying abroad	6.82	6.72	.25	40
Frequency of visit	1.3	1.14	0	6
Above 50	0.79	0.41	0	1

Table 7. Test of Biasness and Instruments

Test	*P-Value*	*Chi-Square/Zscore/F Stat*
Test for Biasness		
Wald test under the null hypothesis: $\beta_{ols} = \beta_{2sls}$	0.2296	1.45
Wald test under the null hypothesis: $\beta_{ols} = \beta_{Tobit}$	0.0350	4.49
Hausman test of endogeneity:		
Robust score	0.4933	0.469228
Robust regression	0.5047	0.446136
Test for valid instruments:		
Hensen Test	0.9874	0.94998
Test for weak instruments:		
Sargarn Test	0.0000	11.5338

Table 8. Reduced Form Equation of Remittances with All Exogenous Variable

Variable	*Coefficient*	*Variable*	*Coefficient*
Hourly wage	-0.0002*	Wealth	0.064*
	(0.0001)		(0.033)
Age (HH head)	0.0007	Abroad person	0.426***
	(0.0001)		(0.070)
Age Square (HH head)	0.00006	Unemployed Person	0.082
	(0.0001)		(0.062)
Male (HH head)	-0.097	Voluntary unemployed	0.255***
	(0.085)		(0.094)
Min. Education (HH head)	-0.116	Time period of staying abroad	0.004
	(0.070)		(0.004)
Nuclear family (HH headed by children or spouse of migrant)	0.032	Frequency of visit	0.046*
	(0.086)		(0.024)
Province (1 for Punjab)	0.196***	Above 50	-0.149**
	(0.053)		(0.073)
Household Size	-0.022***		
	(0.007)		
Area (1 for Urban)	-0.138**		
	(0.068)		
Log Expense	0.663***		
	(0.057)		
Log Other Income	-0.014		
	(0.011)		
F Stat/ Wald Chi		19.49	
R Square		0.5642	
N		300	
Standard errors in parentheses		* p<0.1, ** p<0.05, *** p<0.01	

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MSMEs AND COMPETITION LAW IN INDIA: VICTIMS OR PERPETRATORS

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Abstract

SMEs contribute around 35-40% of the GDP of India and are key to employment generation, sustainable development and poverty reduction. This sector is largely unorganised and vulnerable to the dynamic external business environment. On one hand, small size of the SMEs makes them vulnerable to anti-competitive acts of bigger enterprises including abuse of dominant position and on the other hand, cooperation agreements amongst SMEs assist them to compete with large enterprises. Competition Act, 2002 deals with anti-competitive agreements and abuse of dominant position, amongst other things. The Competition Act of India is size and type neutral. This paper thus, looks at whether SMEs are perpetrators or victims of anti-competitive conduct. This study analyses the recent anti-trust cases in India which involved SMEs and develops a typology of anti-competitive conduct and abuse of dominance activities employed by large corporations against SMEs and also anti-competitive conduct that SMEs may engage in.

Keywords: *SMEs, Competition Law, anti-competitive, large corporations*

JEL Classification: *K21, D22, D40*

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1. Introduction

Micro, Small and Medium Enterprises (MSMEs) are a considerable segment of the Indian economy and contribute about about 35-40 per cent of India's GDP. They enable balanced, inclusive and equitable economic growth and development by generating employment and assist in poverty reduction (OECD,2004). MSMEs help reduce rural-urban migration by providing employment opportunities in rural areas and promoting indigenous technologies . They are nursery of entrepreneurship and play a pivotal role in the economic and social development of the country by facilitating occupational mobility and by industrialisation of rural and remote areas thus reducing regional imbalances and promoting more egalitarian distribution of income. Further, MSMEs are complement the large industries as ancillary units and thus their importance in socioeconomic development of the country cannot be overemphasised (KPMG).

The MSME sector in India is highly heterogeneous with regard to the size of the enterprises, variety of products and services, and the levels of technology. A significant proportion of of SMEs in India are in the retail trade sector, basic machinery, leather and textile industry where they coexist with large enterprises. However, many small enterprise which choose to manufacture goods that can be mass-produced suffer from the existential crisis as businesses with large-scale operations can manufacture such products more efficiently by leveraging the economies of scale. MSMEs are thus at a disadvantage compared to large firms in situations where size is associated with regular advantages in purchasing, production, marketing and distribution.

The relationship between SMEs and large corporations can be on either side of the supply chain. On the one hand, SMEs are suppliers to large enterprises like the ancillary auto products etc. and on the other hand, they are dependent on large enterprises for their inputs or raw materials. Often SMEs reason that as a supplier they are abused by large corporations who delay payment for supply beyond the contract terms. Since SMEs are dependent on these large corporations for existence, they end up accepting the unfair terms. As a buyer of products of the large enterprise, these small firms face are high cost due to their weak negotiating/ bargaining power. Thus, these small enterprise claim disadvantage due to size.

Additionally, MSME sector faces a high credit cost, difficulty in hiring skilled manpower, and complex regulatory procedures. It seems to be a matter of concern that a sector with an overwhelming presence in the economy in terms of number of enterprises and potential to generate employment has not been able to grow in the country. This sector is mainly unorganised and vulnerable to dynamic external business environment. In the wake of rising competition from the new fourth industrial generations enterprises (digital/ Internet firms), it is vital to provide this sector with a level playing field to be able to sustain and thrive in the economy. Given the potential of MSMEs in contributing to equitable growth in the economy it is critical that their interests are protected and they are made aware of the legal and institutional mechanisms that are available in order to protect their interests.

This paper looks at whether the claim of the SMEs regarding anti-competitive practices of large corporations against them holds merit in the light of the Competition Act 2002. The paper is organised as follows, section 2 discusses the data and methodology, section 3 discusses the definition, organisation, structure, role of MSMEs in India and

examines/analyses different kinds of anti-competitive conduct and abuse of dominance activities, as per the Competition Act, that are employed by large corporations against MSMEs. It will also examine in detail the different kinds of anti-competitive conduct that SMEs engage in based on the cases and orders of Competition Commission of India (CCI).

2. Data and Methodology

The methodology for the study consists of review of existing literature, cases and orders of CCI and Competition Appellate Tribunal (COMPAT)[1] to understand the kinds of anti-competitive conduct that the SMEs are facing or indulging in.

3. Definition, Organisation, Structure, Role of MSMEs In India.

3.1 Definition

Chapter III of the Micro, Small and Medium Enterprises Development (MSMED) Act defines MSME in India on the basis of investment in plant and machinery separately for manufacturing and services sector.

In the case of the enterprises engaged in *the manufacture or production of goods* pertaining to any industry specified in the First Schedule to the Industries (Development and Regulation) Act, 1951, an enterprise is defined as-

i. A micro enterprise, where the investment in plant and machinery does not exceed INR 25 lakh;
ii. A small enterprise, where the investment in plant and machinery is more than INR 25 lakh but does not exceed INR five crore; or
iii. A medium enterprise, where the investment in plant and machinery is more than INR five crore but does not exceed INR ten crore;

In case of the above enterprises, investment in plant and machinery is the original cost excluding land and building and the items specified by the Ministry of Small Scale Industries vide its notification No.S.O. 1722(E) dated October 5, 2006[2]

In case of enterprises engaged in *providing or rendering of services*, is defined as-

i. A micro enterprise, where the investment in equipment does not exceed INR ten lakh
ii. A small enterprise, where the investment in equipment is more than INR ten lakh but does not exceed INR two crore; or
iii. A medium enterprise, where the investment in equipment is more than INR two crore but does not exceed INR five crore rupees.[3]

[1] *The Competition Appellate Tribunal (COMPAT) has ceased to exist effective 26 May 2017. The appellate function under the Competition Act, 2002 (Competition Act) would now confer to the National Company Law Appellate Tribunal (NCLAT). These amendments were brought about under the provisions of Part XIV of Chapter VI of the Finance Act, 2017. Accordingly, Sections 2(ba) and 53A of the Competition Act and Section 410 of the Companies Act, 2013 (CA 2013) have been appropriately amended and various other provisions of the Competition Act dealing with the COMPAT have been omitted.*
[2] Central Bank of India: Micro, Small and Medium Enterprises, page3
[3] Micro, Small and Medium Enterprises Development Act, 2006

These will include small road and water transport operators, small business, retail trade, professional & self-employed persons and other service enterprises. Table 1 summarises the definition of MSME in Manufacturing and Services sector based on the MSMED Act 2006.

Table 1: Definition of MSMEs in as per MSMED Act, 2006

Enterprise Description	Manufacturing Enterprise Investment	Service Enterprises – Investment in Equipment
Micro Enterprise	Up to INR 25 lakhs	Up to INR 10 lakhs
Small Enterprise	Above INR 25 Lakh and up to INR 5 Crore	Above INR 10 Lakh and up to INR 2 Crore
Medium Enterprise	Above INR 5 Crore and up to INR 10 Crore	Above INR 2 Crore and up to INR 5 Crore

Source: MSME Act 2006

The Parliamentary Standing Committee on Industry has suggested that the definition of MSME should be amended to make it more flexible. The report of the working group also points out that every enterprise in its infant years is an SME which should cover all start-ups. Moreover, the criterion of investment in plant and machinery stipulates self-declaration which in turn entails verification if deemed necessary and leads to transaction costs. In February 2018, the Union Cabinet chaired by the Prime Minister approved change in the basis of classifying Micro, Small and Medium enterprises *from 'investment in plant & machinery/equipment' to 'annual turnover'*. Section 7 of the Micro, Small and Medium Enterprises Development (MSMED) Act, 2006 will accordingly be amended to define units producing goods and rendering services in terms of annual turnover as follows:

- *A micro enterprise will be defined as a unit where the annual turnover does not exceed INR five crore;*
- *A small enterprise will be defined as a unit where the annual turnover is more than INR five crore but does not exceed INR 75 crore;*
- *A medium enterprise will be defined as a unit where the annual turnover is more than INR 75 crore rupees but does not exceed INR 250 crore.*

Additionally, the Central Government may, by notification, vary turnover limits, which shall not exceed thrice the limits specified in Section 7 of the MSMED Act. The proposed change is pending for approval in Lok Sabha.

It is pertinent to note that though within the meaning of MSMED Act 2006, MSMEs are identifiable as per laid down statutory definitions, SME are not easily identifiable by clear-cut criteria in orders of the CCI. The Competition Act, 2002 is size neutral. SME are not classified according to absolute size criteria but in relation to the remaining firms in the relevant market for the purposes of competition law enforcement. This implies that despite a substantial turnover, a firm may be classified as SME, because it is active in a market in which several other competitors record significantly higher turnovers. In a

different market a firm with the same turnover might be considered a large firm in comparison with competitors in that market. Therefore, for the Competition agency in India it is the market structure that is a decisive factor rather than the size of the firm.

4. Competition Act 2002

Competition Act 2002 lists down four overarching objectives it strives to achieve that is "*to prevent practices having adverse effect on competition, to promote and sustain competition in markets, to protect the interests of consumers and to ensure freedom of trade carried on by other participants in markets*"[4]. Chapter II of the Act lists down prohibitions put in place by the Act to achieve the above objectives. Under Chapter II, section 3 deals with prohibition of anti-competitive agreements, section 4 deals with prohibition of abuse of dominant position and section 5 and 6 concern regulation of combination.

Section 3 of the Act prohibits all anticompetitive agreements, both horizontal and vertical. Section 3(1) states "*No enterprise or association of enterprises or person or association of persons shall enter into any agreement in respect of production, supply, distribution, storage, acquisition or control of goods or provision of services, which causes or is likely to cause an appreciable adverse effect on competition within India*." Section 3(3) deals specifically with horizontal agreements. It states: *"any agreement entered into between enterprises or associations of enterprises or persons or associations of persons or between any person and enterprise or practice carried on, or decision taken by, any association of enterprises or association of persons, including cartels, engaged in identical or similar trade of goods of provision of services, which –*

> *(a) directly or indirectly determines purchase of sale prices;*
>
> *(b) limits or controls production, supply, markets, technical development, investment or provision of services;*
>
> *(c) shares the market or source of production or provision of services by way of allocation of geographical area of market, or type of goods or services, or number of customers in the market or any other similar way;*
>
> *(d) directly or indirectly results in bid rigging or collusive bidding, shall be presumed to have an appreciable adverse effect on competition."*

After it is established there is an agreement of any kind under Section 3(3), the agreement is presumed to have an appreciable adverse effect on competition and the burden of proof is on the alleged contraveners to demonstrate that such agreement did not lead to any appreciable adverse effect on competition.

Section 2(c) of the Act defines "cartel" to include an association of producers, sellers, distributors, traders or service providers who, by agreement amongst themselves, limit, control or attempt to control the production, distribution, sale or price of, or, trade in goods or provision of services. Section 19(1) provides for the various sources of information which can form the basis for initiating an inquiry– *suo motu*, upon receipt of information through an informant, or through a reference from Government or statutory authority. Section 19(3) provides a list of factors that the CCI shall consider during an

[4] Competition Act 2002, page 1.

inquiry into alleged anti-competitive agreements including cartels. Section 26 lays down the procedure for such an inquiry.

Very often association of enterprises involved in same trade or business provides an effective and reliable platform for enterprises to interact with each other and enforce cartel rules. Hence, it is important to understand that though the membership of industrial association is not *per se* illegal, enterprises can be held guilty if association is used to enforce cartel rules among its members. Despite having various pro-competitive effects, the trade associations due to their very nature are susceptible to anti-competitive behaviour. The Competition Act, 2002 does not deal with the trade associations differently, and it takes every anti-competitive act in to its account as in case of enterprises. Associations specially having members from the same market level are more likely to commit antitrust violation. As associations provide umpteen opportunities for the members to meet and discuss the concerns of common interest and during such meetings casual discussions relating to business conditions and prices lead to price setting and limiting supply. Sometimes associations may intentionally abuse their position and compel their members to take part in cartels.

The CCI stand against trade associations across sectors shows its reliance on direct and circumstantial evidence, such as circulars issued to members, minutes of trade association meetings, depositions of stakeholders and resolutions passed under the charter documents of the trade association in question. In many cases, the charter documents of these trade associations themselves enforced anti-competitive practices. In certain cases, even when the charter documents of the association revealed no such restrictions, circumstantial evidence revealed that the members were engaging in acts of market restriction and boycott. A trend assessment shows that the practice of CCI, in terms of standard of evidence, has remained largely consistent over the years.

Section 4 of the Act prohibits abuse of dominant position but having a dominant position in the market is not prohibited. Abuse of dominance takes several forms like price discrimination, margin squeezing and predatory pricing. However, before establishing abuse it is necessary to establish dominance. Enterprises practicing the said conducts but not having a dominant position in the market do not face the competition scrutiny. It is very rare to come across instances where a SME would be a dominant player in the relevant market and hence it is very unlikely that SMEs would be found guilty of abusing their dominant position. Nevertheless, it may be possible that select SMEs may get together and collectively dominant and subsequently abuse their dominant position.

An important feature of India's competition law is that it is size and type neutral that is there are no explicit provisions for safeguarding enterprises on the basis of their size and type of business they are into. All enterprises are equal in the eyes of the law unlike some other jurisdictions where SMEs or some type of businesses receive explicit (though not absolute) protection under the respective competition laws.

Therefore in the remaining section we look at the recent cases and orders of CCI to understand whether SMEs are victims or perpetrators under the Competition policy dispensation.

4.1 SMEs as Victims

It is an established fact that MSMEs facilitate more equitable economic growth and development of the nation (OECD, 2004). In a competitive market small players compete with all kinds of players, from big size players to players of their size. MSMEs face stiff competition from the hands of big players due to which margin for error in their business activity becomes minimum. Survival of MSMEs becomes is critical when big players start abusing their prevalent position.

In the Auto Parts case[5] the CCI held 14 car companies liable for abusing their dominant position in the relevant market of supply of spare parts and imposed a hefty amount of penalty amounting to INR 2544.65 Crores. Companies were found to be indulging in restrictive trade practices by not providing their original spare parts in the open market and also did not furnish other relevant information related to tools and technology required for carrying out repair. Therefore, it led to the denial of market access to the independent repairers, who are operating in the open market of servicing and spare parts.

In *Faridabad Industries Association (FIA) v. M/s Adani Gas Limited*[6], informant was 90 members of association consuming natural gas supplied by the Adani Gas Limited. Due to government policies Adani Gas Limited had obtained monopoly in the supply of natural gas in the relevant geographic area. An agreement was executed between members of Faridabad Industries Association and Adani Gas Limited to supply natural gas. Since, Adani was the only supplier of natural gas in the relevant geographic area, it compelled buyers to enter into one sided agreement. The CCI found that the conditions stipulated in the agreement such as penalty, rate of interest, delay in payment and non-performance was unilateral and heavily tilted in the favour of Adani Gas Limited. Hence, it was held to be the abuse of dominant position by Adani Gas Limited.

Sometimes dominant player in upstream market may compels the downstream market players to follow their recommended resale price and to ensure compliance by the small player, the dominant player may imposes certain punitive measures. Wuliangye, a Chinese Liquor Company signed agreements with more than 3,200 independent distributors to restrict the minimum resale price of its liquor. For those who did not implement the minimum price, Wuliangye adopted various punitive measures such as limiting their business, reducing supply, confiscating deposit money and imposing fines. Wuliangye even stopped supply to one supermarket chain in order to force the latter to comply with the RPM agreement. These agreements were found to be anti-competitive and penalty of RMB 202 million (about USD 32.6 million) was imposed upon Liquor Company.[7]

The case of *FIA v. M/s Adani Gas Limited*[8]shows that small firms are sometimes served with unconscionable terms and their position compels them to accept the adversarial offers as they don't have option other than dealing with the dominant player. Moreover, in case of non-performance MSMEs are often subject to various unreasonable penalty clauses but the same high penalty clauses do not apply to the dominant player. In vertical

[5] Case No. 03/2011 Competition Commission of India
[6] Case No. 71 of 2012. Competition Commission of India
[7] Competition law: Regulation and SME in Asia Pacific by Michael T. Schaper and Cassey Lee
[8] Case No. 71 of 2012. Competition Commission of India

agreements dominant player in the upstream market often compels players of the downstream market to undergo the unreasonable terms of the contract like the case of Auto parts case quoted earlier. Due to lack of bargaining power MSMEs in the downstream market left with no alternative other than accepting one sided terms of the contract viz unreasonably high prices, tie-in, bundling and to maintain minimum retail price.

4.2 SMEs as Perpetrators

Generally, MSMEs may not be able to abuse its position due its small size. However, there are instances whereby large number of MSMEs collectively created a dominant position and after attaining dominance they exploited their customers. Anti-competitive effect of cooperation amongst firms in the market depends upon the quality, nature and intensity of cooperation. It is difficult to determine whether and to what extent competition has increased or decreased because of a SME co-operation agreement. An initial evaluation may be based on the combined market share of the parties. We survey select Indian cases under Section 3(3) of the Act and discusses the impact that the trade associations of SMEs have had on the market.

In the case, *M/s Shivam Enterprises v. Kiratpur Sahib Truck Operators, Co-operative Transport Society Limited and Members of Kiratpur Sahib Truck Operators, Co-operative Transport Society Limited* it was observed that the opposite party gained the position of dominance and did not allow any except its members to provide freight transport services within the region. Furthermore, the rates imposed were inflexible and non-negotiable. Its members have also forcibly obstructing other truck operators in the market to execute their contract, resulting in denial in market. The CCI, thus, held the opposite party in violation of anti-competitive practices and abuse of dominant power (section 3 and 4) and imposed a penalty on the parties based on the average income of the last three financial years[9].

Many sectors such as film production and distribution, drugs distribution, etc. have been frequently reported to have been affected by cartel activity in India. The film and television sector is characterized by the presence of trade associations for all stakeholders, be it the artists, distributors, exhibitors, and sometimes the industry as a whole. Most of these associations have strict rules for members and members are not allowed to deal with non-members. In all these cases, the CCI has passed similar orders – finding the association guilty of restrictive practices under Section 3(3) of the Act and imposing penalties accordingly. The CCI has initiated and/or acted against enterprises active in this sector on twenty (20) occasions[10]. This sector has also seen one of the first substantive decisions on merits by the Supreme Court of India in *Competition Commission of India vs. Coordination Committee of Artists and Technicians of West Bengal Film and Television & Ors*.[11] (Bengal Artists Case). The defining characteristic of this sector is the control exercised by trade associations. Most aspects of this industry are unionised, and these associations and unions exercise significant influence on the way in which their constituent members carry on the business. By far, the largest chunk of cases under the Act have been because concerted action by trade associations.

[9] CCI order in Case no. 43 of 2013. Decision of COMPAT is not yet finalised
[10] CCI (2018)
[11] Ref. Case No. 01 of 2013

In the case of *Kerala Cine Exhibitor's Association (Informant) vs. Kerala Film Exhibitors Federation and Others*.[12], the informant was an association of 171 cinema theatre owners in Kerala with its members engaged in running theatres and exhibition of cinema under licenses. the member theatres of the informant, were not getting fresh releases due to anti-competitive practices adopted by Kerala Film Exhibitors Federation, Film Distributors Association (Kerala) and Kerala Film Producers Association. The three formed a cartel and were denying members of the Kerala cine exhibitors release of new films in their theatres. This conduct also deprived the viewers in far flung areas, where only the members of the Informant have theatres, of new films. It was held by the commission that the associations had transgressed their legal contours and indulged in collective decision making to limit and control the exhibition of films in the theatres other than the ones owned by the members of the opposition and that there is no rational justification for the same.

Similarly, in the case of Kannada Grahakara Koota (Informant) and Ors. vs. Karnataka Film Chamber of Commerce and Others., it was found that Kannada Film Producers Association), are involved in the practice of preventing the release and telecast of dubbed TV serials and films in Karnataka. The issue of restriction imposed by associations on the dubbed version of TV serials has been declared anti-competitive by the commission in many other cases as well. In the present case, the DG found out that in Karnataka, no TV serial or film that has been dubbed in Kannada has been released in the past 40-50 years. It may be concluded from the above decisions and from the evidence gathered in the present case that these lead to anti-competitive outcomes as it prevents the competing parties in pursuing their commercial activities. Also, all the opposite parties were associations of enterprise engaged in the production and exhibition of films and TV programs, to be engaged in similar or identical trade, and observed that any agreement between them would fall within the purview of section 3(3) of the Act. It was thus opined that any agreement or joint action taken by the opposition parties would attract the provisions of section 3(3) of the Act being a horizontal agreement and thus the commission ordered the opposition parties to stop indulging in such practices and opposition parties 1,2 and 4 were liable to pay a penalty.

This case highlights that sometimes SMEs form cartels. A common claim is that SME cartels are indispensable and help them to compete with larger enterprises. This has also been found by CCI in its 2018 study. CCI found that "*majority of the infringement findings of the CCI reveal certain striking characteristics that may be common across transitional economies: (i) an extremely strong trade association forms the fulcrum of the cartel; (ii) the participants of these association are often small or micro enterprises or individuals with a low business turnover; and (iii) these participants operate in the informal sector, with a high degree of self-regulation. The association culture in large number of cases may be an attempt at increasing bargaining power and creating a collective insurance policy by small, unsophisticated service providers".*[13]

MSMEs sometimes may also be compelled by the associations to become the part of cartel, failing which they would be unable to avail the services of the association. In the pharma sector in India most of the interventions of the CCI have been directed at the

[12] Case No. 45 of 2012
[13] CCI (2018)

pharmaceutical distribution chain and in particular at the All India Organization of Chemists and Druggists and various other state-level associations of chemists and druggists. In the case of *P.K. Krishna (Informant) vs. Paul Madhavana and Others*[14], the informant was engaged in distribution of medicines manufactured by pharmaceutical companies in Kerala and has a valid drug license. Informant alleged that Alkem Labs Ltd (one of the opposite parties) had denied his application to become a stockist as he did not receive a NOC from the All Kerala Chemists and Druggists Association. Subsequently, Alkem Labs stopped supplying drugs to informant without stating any reason. Upon careful observation of evidence, it was observed by the Commission that, appointment of stockists were being made with the approval of state/district units of the Association. Also, it was very clear from the evidence that was earlier submitted by Merck Ltd., which is a third party that, the association unanimously decided to boycott Merck Ltd. by requesting stockists to stop the supply and 95 per cent of the stockists complied with the request. This clearly shows that the association had been exercising influence and controlling the supply of medicines. This resulted in restricting provisioning of goods in the market and thus, in contravention of certain provisions of the act.

In the case of *Bengal Chemist and Druggist Association*[15], the CCI imposed a penalty of INR 18.38 crores on Bengal Chemist and Druggist Association (BCDA) for their anti-competitive conduct. This was a *suo motu* case by the CCI. In this case, the BCDA an association of wholesalers and retailers was engaged in fixing the price of the drugs in a concerted manner. BCDA directed the retailers to sell the drugs only at MRP determined by it because agreement entered amongst the members of the BCDA. Further, it also carried out vigilance operation to identify the retailers defying the directions given by it and forced the defiant members to close the shop as the punishment for not complying with the directions of the association. The CCI in this case not only penalized the association for its anti-competitive conduct but also additionally held 78 of its senior office bearers to be personally liable for taking part in such anticompetitive conduct of the association.

Thus, associations of SMEs formed with an objective of promoting the sector or improving the bargaining power of the enterprises have been found to abuse their power. Associations of SMEs in the informal sector helped to run a cartel effectively among hundreds of enterprises as it provides a cost-effective and robust platform to monitor defection and bring together non-defecting enterprises to penalize the defecting enterprise(s). Without association, though not impossible, it would have been very costly for enterprises to monitor behaviour of other enterprises taking part in a cartel.

Another anti-competitive practice that the SMEs have been following is bid rigging. Bid-rigging implies that enterprises collude and decide which enterprise(s) will win the bid. Usually the schemes are used in combination to make it superficially look like competitive process and ensure that competition is suppressed. Bid-rigging is a main concern for government departments which procure goods and services from the non-state enterprises. Bid-rigging is treated seriously under the Competition Act 2002 and it can be said that it is illegal per se for there cannot be any efficiency justifications for bid-

[14] CCI order in Case No. 28 of 2014
[15] CCI order in Case No 01

rigging. In 2013, CCI decided a bid-rigging case that involved 13 suppliers of CN containers which was used to manufacture 81 mm bomb by Ordnance factories for Defense Sector. As per the Order, the 13 suppliers many of whom were SMEs came together and agreed to have collusive bidding for the supply of CN containers in response to the bid floated by three ordnance factories based in Maharashtra. All the 13 suppliers quoted same bid prices despite difference in cost of their raw material. Ten out of 13 suppliers had members of the same family in decision making positions and had common directors. Further, several suppliers had submitted their bids from same fax number. A combined penalty of INR 3,02,78,300 was imposed on 13 colluding suppliers.

In *Re: Cartelization in respect of tenders floated by Indian Railways for supply of Brushless DC Fans*[16] and other electrical items, the CCI conducted a qualitative analysis of documentary (bid documents), oral (recorded statements) and forensic (call data records and e-mails) evidence. For instance, it compared prices shared through e-mail and prices quoted in the bid documents and corroborated the recorded statements with the call data records. The CCI passed a cease and desist order along with different monetary penalties for different parties. The CCI noted that Pyramid Electronics (Pyramid) was the first one to make a disclosure in the case by extending co-operation and made value addition in establishing the existence of cartel. Therefore, Pyramid's penalty was reduced by 75 per cent under the leniency regime and was fined only INR 16 lakhs instead of INR 62 lakhs.

In another case, the *Union of India through Secretary, Ministry of Health and Family Welfare*[17], invited bids for supply of pre-fabricated modular operation theatre to which six parties submitted. One of them, PES Installation's bid was favoured by the committee even though it had technical deficiency, it is reported that the three bidders - MPS, MDD and Unniss did not have the exclusive authorisation for integration of modular operation theatre. This fact was well known to both MDD and MPS but they still applied to help PES win the bid. Therefore, the acts and conduct of the three firms were found to be a part of overall agreement under which they had agreed to bid in a manner that they rotate bids among themselves in different hospitals. Since the Commission had already imposed penalty on the three parties in similar case (Case no. 43 of 2010) it did not feel the need to impose any further penalty[18].

5. Conclusion

This paper analysed the recent cases of CCI, involving MSMEs ,under section 3 and section 4 to understand and assess whether SMEs are only victims of anti-competitive behaviour, as defined by the Competition Act, 2002 or are they also perpetrators. The cases clearly demonstrate that the small size of the SMEs does make them vulnerable. In the case of FIA vs Adani Gas, the enterprises had to accept unfair and one-sided terms. In the Auto parts case, the SMEs were subjected to restrictive trade practices. However, the paper goes on to find that the small size of SMEs necessitates them to form associations and these trade associations have acted as a focal point and facilitated cartelisation in India. Apart from associations, one legacy business practice that SMEs

[16] CCI order in Suo Moto Case No.03 of 2014
[17] CCI order in Case No. 43 of 2010
[18] CCI Order in Case no. 40 of 2010.

have been following to ensure survival is bid rigging or bid rotation. Recent cases and orders of CCI shows evidence to this effect.

The anti-trust regime in India is relatively young and hence most trade associations and SMEs are unaware that the legacy practices which had become of a way of business for them are illegal. Going forward, the developing jurisprudence, coupled with the CCI's increased focus on outreach programmes will help to change attitudes among associations and increase compliance.

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INVESTIGATING DE FACTO AND DE JURE EXCHANGE RATE REGIMES

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Abstract

Exchange rate regimes have evolved a lot of the years, specifically the past century, right from the Gold standard to the Bretton Woods era that led to the creation of the International Monetary Fund (IMF) and Post Bretton Woods periods that have seen the emergence of currency unions and a whole range of hybrid and more sophisticated exchange rate regimes. This evolution has led to the emergence of de jure and de facto exchange rate regimes. This discrepancy can be very misleading and pervasive for monetary policy and stability. In this paper, we combine an empirical econometric approach to develop an algorithm that will classify the de facto regimes that countries are practising by modelling exchange rate bands and the behaviour of a particular currency towards an anchor. The sample is representative of the globe. We believe the algorithm performs well and may be adopted by monetary authorities and international bodies like the International Monetary Fund.

Keywords: Exchange rate regime, algorithm

Jel Classification: F33

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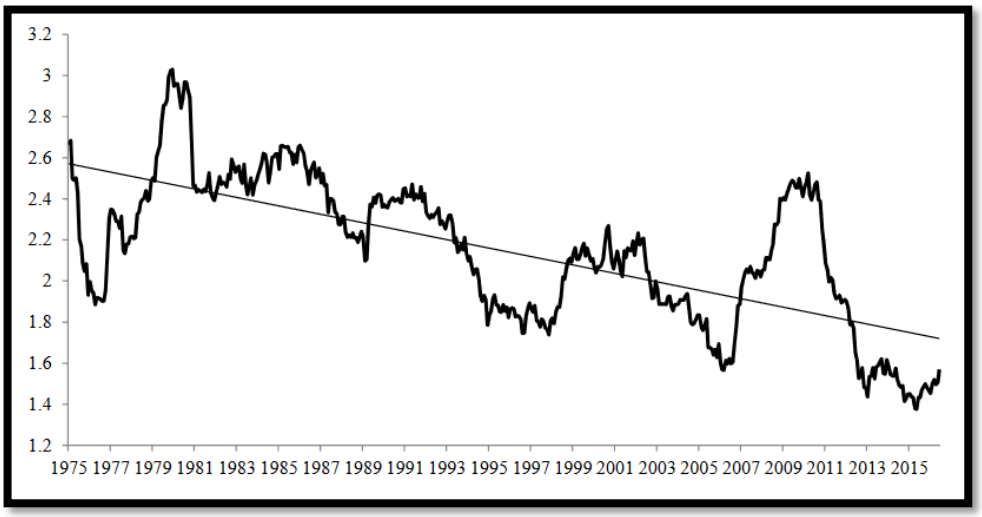
1. Introduction

As stated by Svensson (1992), the exchange rate as conventionally defined is the domestic price of foreign exchange, that is, the number of domestic currency units per foreign currency unit. Generally, exchange rate regimes can be classified as fixed, floating and managed floating. Researchers have developed techniques that characterize the regimes based on certain variables and clustering the candidates for a certain regime accordingly. Their studies have resulted in classifications of up to ten or even more exchange rate regimes. It is thus the responsibility of the monetary authorities to deploy an exchange rate regime policy or mechanism that may seek to maintain this exchange rate or allow it more flexibility as and when they deem fit. The exchange rate regime employed by a country has macroeconomic effects on the economy through inflation, price, capital flows, economic growth and a number of other variables. Ghosh et al. (1997) shows that inflation is lower and more stable under the pegged regime and more pronounced output volatility. Some studies have linked the fixed exchange rate regime and/or monetary union to more growth, trade and less exchange rate volatility. Furthermore, Ghosh et al. (2015) show that macroeconomic vulnerabilities are significantly greater under less flexible regimes including hard pegs compared to floats. This is only a highlight of how important the regime employed by a country is for the economy as a whole.

In the integrated and globalised world of today, economies are intertwined thus the risk of financial and currency crises are very high and thus monetary policy management must consider effects of currency attacks and shocks coming from external sources. Ohno (1999) states that financial markets operate through expectations whose dynamics are not very well understood; this has come into surface as evidenced by the recent global financial crises. Exchange rates remain a pillar of macroeconomic stability and avoiding mis-valuation of a currency is an important step that is usually a predictor of an impending currency attack.

The main variables used in exchange rate classification are the exchange rate volatility, reserve volatility, interest rates and the behaviour of the exchange rate towards an anchor or reference currency. The more advanced economies especially those practising the inflation targeting mechanism have witnessed a drop in the exchange rate volatility over the years as opposed to the emerging market economies that have experienced more volatility and have more intervention in the markets.

Figure 1: The declining volatility of the US Dollar-Deutschmark/Euro exchange rate



Source: Ilzetzki et al. 2017

A number of scholars have tried to classify the regimes being practised by countries and find a clear discrepancy in the de facto and de jure regimes. This discrepancy between the de facto exchange rate regimes, the regimes that countries actually follow and the de jure exchange rate regime, that is the regimes that countries claim to officially follow and report to the International Monetary Fund (IMF) and other similar institutions, can be very misleading and pervasive, this, according to Frankel and Wei (2008).

Ilzetzki et al. (2017) in their classification study of 195 countries (or territories) using monthly data on core exchange rate and inflation over the period 1946 to 2016, find that 80% of all countries covered are biased towards a less flexible exchange rate arrangement. They add that almost 40% of all countries under the inflation targeting framework adopt somewhat limited flexibility arrangements like crawling pegs. Thus, it is not right to assume that all inflation targeting countries adopt a floating regime. This is a re-enforcement of the same finding by Mishkin (2004). There is thus a markedly lower incidence of bi-polar or corner solutions; there is instead a marked increase in the adoption of intermediate regimes.

The evolving inconsistencies between the de facto and de jure exchange rate regimes have forced the IMF to move from a de jure classification that it focused on in the 1990s to an additional classification as well to avoid misalignment of monetary policy and economic decisions.

In this study, we develop a hybrid algorithm that combines within the band approach and a regression based approach to classify exchange rate regimes. The algorithm performs well and re-enforces and/or compliments the findings of previous Researchers.

2. Literature Review

2.1 Brief History of the international monetary system

The classical gold standard (1870-1914)

Britain was the sole member at the beginning of this era, using gold as its trading currency, this forced her trading partners like Germany and the US to adopt this metallic standard currency form. By 1900, a number of countries had adopted gold as a form of exchange with only a few sticking to silver. Bordo (2003) adds that by 1900, most nations had switched away from silver and bimetallic standards and adhered to the gold standard. Fiat money and floating was considered to be a radical departure from fiscal and monetary stability and was only acceptable in case of global emergencies like wars and financial crises. Countries like Spain and Austria-Hungary that adopted fiat money and permanently floated were viewed with disfavour. Over this period, central banks were willing to convert paper currencies into a pre-determined amount of gold thus ensuring stable exchange rates in terms of gold. A country could not simply alter its money supply without experiencing gold flows since currencies were backed by gold. Sir John Swanwick Bradbury, a British Economist and official of the treasury in the 20th century put it, the gold standard was knave-proof characterised by low interest rates, price stability and increased world trade.

The gold standard collapsed in 1914 mainly due to World War I (1914-1918), countries needed a source to finance their war debts and gold was an inconvenience. In addition, this was a scarce metal. Governments resolved to printing more money and issuing bonds. There was a brief attempt by advanced economies to return to gold after the war but this was not fruitful. Britain attempted to return to the standard at the pre-war parity in 1925 in order to please its creditors and this left the Pound 10% overvalued against the US Dollar due to the inflation gap since 1914. To a certain extent, the gold standard is blamed for the 1929 Wall Street crash.

Bretton Woods (1945-1971)

The agreement at Bretton Woods introduced a new era in monetary policy management. This resulted in the creation of the International Monetary Fund, the World Bank, the international gold-exchange standard and others. This was seen as an opportunity to correct the mistakes that led to the great depression of the 1930s and help rebuild after World War II (1939-1945). During this era, a number of countries pegged their currencies to the US dollar at specified parities, which in turn was convertible into gold at a fixed rate of $35/oz; this characteristic defined the fixed exchange rate regime period preceding the 1970s. This only applied to Dollars held by central banks and Governments, not private persons. Central banks had to intervene in markets to fix their exchange rates against the Dollar, which in turn was pegged to gold. According to Bordo (2003), the agreement allowed narrow bands of 2.5% around parity and the right to change parity in the event of a fundamental misalignment thus fixed but adjustable. It was supposed to combine the advantages of the gold standard (sound money) with those of floating (flexibility and independence). The system was purposely meant to overcome the weaknesses characterised by the classical gold standard. A number of nations had difficulties in finding parities consistent with their balance of payment positions setting the stage for the collapse of the Bretton Woods. In addition, the re-alignment of parities

led to a number of crises in the early years of the Bretton Woods system. The IMF was responsible for bailing out countries with balance of payments problems.

Demise of the Bretton Woods (1971-1973)

Like all economic systems, the Bretton Woods had its weaknesses, some of which led to its demise. The US was at the centre of the Bretton Woods given its large influence and dominance in international trade, gold stock and global finance. This influence inclined the US to run chronic trade deficits (that are still present today) allowing Americans to live beyond their means. A number of countries were angered by this and threatened to liquidate their Dollar reserve balances into gold. In addition, the US was characterised by high inflation rates in the 1960s due to the expansionary fiscal policy, something that a number of European countries feared would be imported into their economies. This was caused by the Dollar fight where a number of countries especially in Western Europe were converting their Dollars into gold. For fear of depletion of American gold, President Nixon closed the US Fed's gold window effectively suspending the commitment to provide gold to foreign central banks at any rate. Also, the demise of the Bretton Woods was caused by a failure by countries to find parity rates that are consistent with and favour balance of payments; this eventually led to the debate between the choice of a fixed or flexible regime.

According to Kawai and Akiyama (1998) in their account of the evolution of exchange rates, before the suspension of the convertibility of the US Dollar to gold by President Richard Nixon in 1971, exchange rate fluctuations of most IMF member countries had been limited to +/-1% around par values set in terms of gold or the US Dollar. After the Nixon shock, these countries moved towards the floating exchange rate regime. The year 1973 saw the European Community countries sever the link between their currencies and the US Dollar. Some countries feared the risk of the true floating regime era and decided to maintain a peg to the currencies of major industrialised economies. Western European countries limited their exchange rate fluctuations within margins of +/-2.25% with each other and a band of 4.5% against the Dollar. This was referred to as the 'snake regime', eventually forming the European Monetary System in 1979. This saw the emergence of the Deutschmark as the dominant currency in Europe and many countries began to mimic the monetary policies of the Bundesbank. Germany being the most stable and developed economy in the region made this inevitable; other countries in the region anchored their inflation rates to that of Germany which was the lowest in Europe. The French Franc also had considerable influence coupled with its CFA zone prevalently in West and Central Africa. Eventually these two blocks (Franc and DM) merged to form the Euro Area in 1999.

In the 1970s, the numeraire or reference currency which was the US Dollar was connected or linked to the supply and value of gold. Today, the numeraire is connected to the supply of US goods and services, in general terms, the performance and the value that the globe attaches to the US economy (fiat currency). There have been outcries from a number of nations both in emerging and advanced economies for a return to the Gold Standard based currency, a time of exchange rate stability and capital mobility, sacrificing monetary independence. It takes a lot for a shift in the international monetary system, sometimes a serious financial crisis or even a world war. However, it is hard to predict when the next shift shall come, thus we wait.

2.2 Classification of Exchange Rate Regimes

Frankel (1992) pioneered a technique aimed at recovering the weights assigned to currencies in order to determine whether a regime is fixed or floating. This technique has been used and extended over the years and remains a very strong model till today.

Levy-Yeyati and Sturzenegger (2005) in their paper, Deeds vs Words, covering all IMF-reporting countries over the period 1974-2000 revealed that pure floats are associated with minor nominal exchange rate volatility and that there has been an increase in the number of dirty floats over the years, supporting the fear of floating phenomenon. Furthermore, they point out that countries that appear to behave according to a de jure regime during tranquil times may be tempted to change their course of action once the regime is under stress. Levy-Yeyati and Sturzenegger (2016) extend their earlier studies through 2014 to cover the financial crisis period and increasing the sample size. They report that there was a growth in the number of floaters over the financial crisis period. Pegs remained the preferred regime for low income countries. Also, the number of countries which run a fixed regime without stating that they do (fear of pegging) has increased remarkably. Their findings further revealed that fixed regimes are characterized by relatively low nominal exchange rate volatility (with an average absolute change of 0.60% per month as opposed to 1.59% in the case of floats), and high volatility in reserves (19.15% against 5.66% for floats).

Calvo and Reinhart (2002) using monthly data over the period 1970-1999 for 39 countries across all continents tried to compare what countries say and what they do, focussing on whether countries that claim to float are indeed doing so, whether countries are moving further towards corner solutions as they say. Analysing the behaviour of exchange rates, foreign exchange reserves and interest rates, they find that these countries had a volatility of these variables somewhat similar to those with a pegged regime. They show that the volatility in these variables of de jure floaters differs to a much greater extent from true floaters. Concluding that countries that say they allow their exchange rate to float mostly do not, there seems to be an epidemic case of fear of floating. Schnabl (2003) tries to replicate the technique identified by Calvo and Reinhart (2002) on Central and Eastern countries with some augmentations and finds that all the four countries in the study classified as fixed regimes show very low exchange rate volatility against the Euro and Dollar, particularly the Euro. And, among the de jure floaters, three countries pegged their currencies to the Euro.

Reinhart and Rogoff (2004), in a classification covering 153 countries over the period 1946-2001 that takes into account exchange rates in parallel markets has been used by a number of researchers in the areas of macroeconomics and finance. They develop an algorithm; in what they call a natural classification algorithm allowing for up to fourteen categories of exchange rate regimes ranging from a strict peg to a dysfunctional freely falling or hyper-float. Some of their findings revealed that de facto floating was common during the early years of the Bretton Woods era of fixed exchange regimes. Many de jure floats of the post 1980s turned out to be de facto pegs, crawling pegs or narrow bands to an anchor currency. Important to note in their findings, 53% of the countries listed in the IMF classification as managed floats turned out to be de facto pegs, crawls, or narrow bands to an anchor.

According to Frankel (1999), most countries classified by the IMF as fixed regimes have in fact had re-alignments and most of those listed as floaters in fact intervene in the foreign exchange markets frequently.

Shambaugh (2004) while examining the effect of the fixed regime on monetary autonomy, uses a sample of over 100 developing and industrial countries from 1973 through 2000, creating a de facto coding system that focusses on the volatility of the exchange rate, dividing countries into pegs and non-pegs. He finds that his classification technique disagrees with the reported IMF de jure status about 12% of the time. He finds that most countries that claim to float do so to some degree and some are mislabelled.

Ghosh et al. (1997) in their investigation of whether the regime matters for macroeconomic performance, argue that the de jure classification captures the formal commitment of the central bank to intervene in the foreign exchange market while the de facto classification obviously has the advantage that it captures actual behaviour. They therefore adopt a technique that combines the de jure and de facto classifications in their study. They define a pegged regime as one with frequent and infrequent adjusters, the former being defined as regimes with more than one change per year in either parity or, for basket pegs, in the weights. They divide the regimes into three; pegged, intermediate and floating. They further find that a pegged regime is associated with lower inflation.

Kawai and Akiyama (1998) examining officially reported and empirically observed exchange rate arrangements of more than 100 countries over the period 1970-1996 find that most countries especially in Asia, Latin America and the Middle East attempt to peg their exchange rates particularly to the US Dollar, forming somewhat a Dollar block. The researchers further report that the role played by the Japanese Yen remains rather less significant.

Ilzetzki et al. (2017) in a comprehensive study of 194 countries over the period 1946-2016 state that the often-cited post-Bretton Woods transition from fixed to floating exchange rate regimes is overstated and emphasise that regimes with limited flexibility still remain preferred and in the majority. The US Dollar still scores as the world's dominant anchor currency and by a very large margin with a much wider use today than 70 years ago and the global role of the Euro seems to have stalled , may be for now. Some scholars argue that the world is headed towards a multi-polar system especially with the rise of China in the global economy, this will undermine the influence of the US Dollar and increase the weight of the Chinese Renminbi. Eichengreen (2011) re-iterates that it is very likely that the Euro will be the anchor currency in Europe, the US Dollar in the Americas leaving the emerging Renminbi anchoring in Asia, a role that the Japanese Yen has failed to take on to date. It is difficult to quantitatively disaggregate the influence of the Chinese Renminbi on its own since it has had a long history of being pegged to the US Dollar.

2.3 The Choice of the Exchange Rate Regime

The choice of an exchange rate regime may depend on a number of factors, some on the level of development of a country. Advanced economies literally have the capacity to defend their exchange rates against any speculative attack. Obstfeld and Rogoff (1995) add that if their commitment to use those resources lacks credibility with markets, the costs to the broader economy of defending a regime against speculative attacks could be

very high. A major disadvantage of this regime is that the central bank loses control of domestic money supply thus monetary independence and cannot use monetary policy for stabilisation purposes in case of economic shocks.

Frankel (1999) classifies regimes as; Fixed arrangements (currency unions, currency boards and truly fixed arrangements), Intermediate arrangements (adjustable pegs, crawling pegs, basket pegs and target zones) and Floats (managed and free floats). Managed floats are also known as dirty floats defined as a readiness to intervene in the foreign exchange market, without defending any particular parity and most intervention is intended to lean against the wind; buying the currency when it is rising and selling when it is falling.

A number of countries especially emerging market economies are within the intermediate regimes like target zones and crawling pegs. According to Bordo (2003), exchange rate regimes have evolved a lot over the past 100 years; the advanced economies seem to get it right while the emerging markets try to emulate and may get the choice right occasionally. The regimes range from pure floats to the hard pegs of currency boards, dollarization and currency unions.

Of course, the regime employed by a country would also depend heavily on macroeconomic variables like inflation rates, reserves, financial market development and the general macroeconomic direction desired by the monetary authorities.

According to the IMF Annual Report on Exchange Rate Arrangements and Restrictions 2017, the de jure regimes are classified as indicated below;

No separate legal tender; The currency of another country may circulate as the sole legal tender. Some countries have become dollarized, substituting their currencies with the US Dollar, these include Ecuador and El Savador in Latin America and Zimbabwe in Africa. This form of arrangement involves the complete surrender of a nation's monetary policy independence. Currency unions for this matter are classified based on the arrangement governing the joint currency. The Euro for example is classified as a floating currency.

Currency Board; A currency board arrangement is a monetary arrangement based on an explicit legislative commitment to exchange domestic currency for a specified foreign currency at a fixed exchange rate, combined with restrictions on the issuing authority to ensure the fulfilment of its legal obligation. This implies that domestic currency is usually fully backed by foreign assets, eliminating traditional central bank functions such as monetary control and lender-of-last-resort and leaving little scope for discretionary monetary policy. According to Chang and Velasco (2000), under a currency board, the amount of base money in circulation is exactly equal to the foreign reserves of the central bank at all times. Hence there cannot be a balance of payments crisis. it stands ready to exchange Dollars for Pesos at a fixed exchange rate and, in addition, it is committed not to create or destroy Pesos in any other way.

Conventional Peg; The country formally pegs its currency at a fixed rate to another currency or basket of currencies, where the basket is formed, for example, from the currencies of major trading or financial partners and weights reflect the geographic distribution of trade, services, or capital flows. The anchor currency or basket weights are public or notified to the IMF. The country authorities stand ready to maintain the fixed parity through direct intervention (that is, via sale or purchase of foreign exchange

in the market) or indirect intervention (for example, via exchange rate related use of interest rate policy, imposition of foreign exchange regulations, exercise of moral suasion that constrains foreign exchange activity, or intervention by other public institutions). There is no commitment to irrevocably keep the parity. the exchange rate may fluctuate within narrow margins of less than ±1 percent around a central rate or the maximum and minimum value of the spot market exchange rate must remain within a narrow margin of 2 percent for at least six months.

Stabilized Arrangement; This entails a spot market exchange rate that remains within a margin of 2 percent for six months or more (with the exception of a specified number of outliers or step adjustments) and is not floating. The required margin of stability can be met either with respect to a single currency or a basket of currencies, where the anchor currency or the basket is ascertained or confirmed using statistical techniques. Classification as a stabilized arrangement requires that the statistical criteria are met and that the exchange rate remains stable as a result of official action (including structural market rigidities). The classification does not imply a policy commitment on the part of the country authorities.

Crawling Peg; The currency is adjusted in small amounts at a fixed rate or in response to changes in selected quantitative indicators, such as past inflation differentials vis-à-vis major trading partners or differentials between the inflation target and expected inflation in major trading partners. The rate of crawl can be set to generate inflation-adjusted changes in the exchange rate (backward looking) or set at a predetermined fixed rate and/or below the projected inflation differentials (forward looking). The rules and parameters of the arrangement are public or notified to the IMF. Obstfeld and Rogoff (1995) state that the crawling peg is common among high-inflation developing countries in which the Government announces a schedule of small, discrete devaluations in order to prevent inflation differentials from cumulating, thereby necessitating a single large devaluation.

Crawl-like Arrangement; The exchange rate must remain within a narrow margin of 2 percent relative to a statistically identified trend for six months or more (with the exception of a specified number of outliers) and the exchange rate arrangement cannot be considered as floating. Normally, a minimum rate of change greater than allowed under a stabilized (peg-like) arrangement is required. However, an arrangement will be considered crawl-like with an annualized rate of change of at least 1 percent, provided that the exchange rate appreciates or depreciates in a sufficiently monotonic and continuous manner.

Pegged exchange rate within horizontal bands; This involves the confirmation of the country authorities' de jure exchange rate arrangement. The value of the currency is maintained within certain margins of fluctuation of at least ±1 percent around a fixed central rate, or the margin between the maximum and minimum value of the exchange rate. It includes arrangements of countries in the ERM of the European Monetary System (EMS), which was replaced with the ERM II on January 1, 1999, for those countries with margins of fluctuation wider than ±1 percent. The central rate and width of the band are public or notified to the IMF.

Other managed arrangement; This category is a residual and is used when the exchange rate arrangement does not meet the criteria for any of the other categories. Arrangements characterized by frequent shifts in policies may fall into this category.

Floating; A floating exchange rate is largely market determined, without an ascertainable or predictable path for the rate. In particular, an exchange rate that satisfies the statistical criteria for a stabilized or a crawl-like arrangement will be classified as such unless it is clear that the stability of the exchange rate is not the result of official actions. Foreign exchange market intervention may be either direct or indirect, and such intervention serves to moderate the rate of change and prevent undue fluctuations in the exchange rate, but policies targeting a specific level of the exchange rate are incompatible with floating. Indicators for managing the rate are broadly judgmental (for example, balance of payments position, international reserves, parallel market developments). Floating arrangements may exhibit more or less exchange rate volatility, depending on the size of the shocks affecting the economy.

Free Floating; A floating exchange rate can be classified as free floating if intervention occurs only exceptionally and aims to address disorderly market conditions and if the authorities have provided information or data confirming that intervention has been limited to at most three instances in the previous six months, each lasting no more than three business days. If the information or data required are not available to the IMF, the arrangement will be classified as floating. Detailed data on intervention or official foreign exchange transactions will not be requested routinely from member countries, but only when other information available to the IMF is insufficient to resolve uncertainties about the appropriate classification.

Monetary Policy Framework

Also according to the IMF, the monetary policy frameworks employed by central banks are as follows;

Exchange rate anchor; The monetary authority buys or sells foreign exchange to maintain the exchange rate at its predetermined level or within a range. The exchange rate thus serves as the nominal anchor or intermediate target of monetary policy. These frameworks are associated with exchange rate arrangements with no separate legal tender, currency board arrangements, pegs (or stabilized arrangements) with or without bands, crawling pegs (or crawl-like arrangements), and other managed arrangements. Common anchor currencies include the US Dollar, Euro or a composite consisting of two or more currencies as an anchor.

Monetary aggregate target; The intermediate target of monetary policy is a monetary aggregate such as M0, M1, or M2, although the country may also set targets for inflation. The central bank may use a quantity (central bank reserves or base money) or price variable (policy rate) as an operational target.

Inflation-targeting framework; This involves the public announcement of numerical targets for inflation, with an institutional commitment by the monetary authority to achieve these targets, typically over a medium-term horizon. Additional key features normally include increased communication with the public and the markets about the plans and objectives of monetary policymakers and increased accountability of the central bank for achieving its inflation objectives. Monetary policy decisions are often

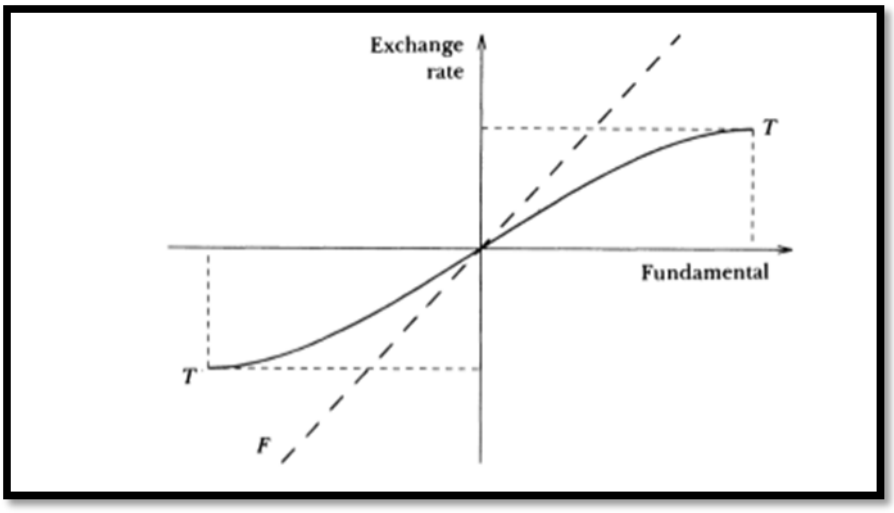
guided by the deviation of forecasts of future inflation from the announced inflation target, with the inflation forecast acting (implicitly or explicitly) as the intermediate target of monetary policy.

2.4 Within the Band Regimes

Krugman (1991) , using a basic monetary model, developed an elegant fundamental model of exchange rate behaviour under a target zone exchange rate regime. The main result shows that the expectation that monetary policy will be adjusted to limit exchange rate fluctuation affects the exchange rate behaviour even when the exchange rate lies inside the target zone and is thus not being defended actively. Most scholars have provided a modification or an extension of this model one way or the other. A target zone should not be confused with a fixed exchange rate regime; a target zone may allow the exchange rate to fluctuate around a fairly wide predetermined reference rate. It could be 10% or any other reasonable rate on either side of the central rate. It is argued that countries may adopt a target zone regime since it does not require a lot of monetary policy action compared to the strictly pegged regime whose defence is a full time job.

The Krugman (1991) model is based on two critical assumptions; the target zone is perfectly credible, market agents believe the lower and upper edges of the band will remain fixed forever and the exchange rate will forever stay within the band. Secondly, the exchange rate is defended with minimal interventions by the monetary authorities, money supply remains constant and no interventions as long as the exchange rate remains within the band. These assumptions are re-iterated by Svensson (1992).

Figure 2: The Krugman model of exchange rate target zones



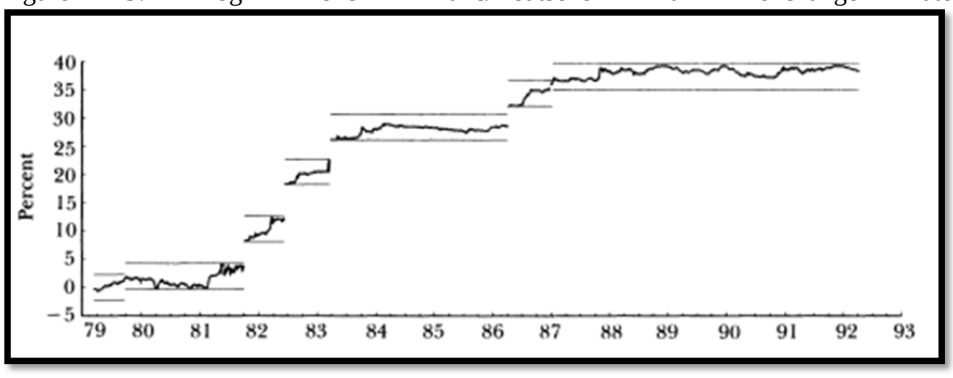
Source: Svensson (1992)

The model predicts the S-shape non-linear relationship between the exchange rate and its fundamental determinants as shown by the curve TT. The line F represents the equilibrium exchange rate in the free-floating regime. The assumption is that the exchange rate depends linearly on macroeconomic fundamental and the expected future

value of a currency. Within the fundamental, there are two components, that is, velocity and domestic money supply where velocity is exogenous and stochastic while the money supply is changed or altered by the central bank from time to time to control and manage the exchange rate. As long as the exchange rate lies within the band, the money supply remains unchanged. The stochastic process is assumed to follow a Brownian motion without drift. The main results from the Krugman model are the honeymoon effect and smooth pasting. As revealed in literature by Svensson (1992), if the exchange rate is higher and closer to the upper edge of the exchange rate band, the probability that it will reach the upper edge is higher. Thus, the probability that there will be future intervention to reduce money supply and strengthen the currency is higher. The target zone exchange rate is less than the free-float exchange rate for a certain level of the fundamental. He further adds that the slope of the target zone exchange rate function is zero at the edges of the band thus the exchange rate at this point is insensitive to changes in the fundamental; this is smooth pasting. The honeymoon effect implies that a perfectly credible target zone has the stabilization effect and smooth pasting implies the exchange rate is a non-linear function of is fundamental determinants and insensitive to these fundamentals at the edge of the exchange rate band.

A further concept to the target zone literature is the time varying re-alignment risk which occurs when the exchange rate band is allowed to shift over a period. Bertola and Svensson (1993) pioneered interest in this area and were the first to present an exchange rate target zone model with time varying re-alignment risk. The introduction of time varying re-alignment risk changes the process by which the interest rate differentials are determined and the interpretation of interest rate differentials against exchange rate plots. The interest rate differential is now equal to the sum of the expected rate of currency depreciation within the band and the expected rate of re-alignment. The diagram shows the log of the French Franc/Deutschemark exchange rate from the start of the European Monetary System in March 1973 through to 1992 with a band of +/-2.25% around a central rate. There were re-alignment shifts in September 1979, October 1981, June 1982, March 1983, April 1986 and January 1987 with the Franc being devalued against the Mark, that is, the number of francs per mark increased.

Figure 3: Log French Franc/Deutsche Mark exchange rate



Source: Svensson (1992)

Hurley et al. (1993) in their study of the appropriate level of required to defend an exchange rate target zone found that; for the case of Ireland, reserves were approximately optimal for most of the 1980s but significantly below optimal during 1989 and 1992. Furthermore, the authors concluded that foreign exchange reserves should at least be kept above 25% of domestic credit.

2.5 Optimal Currency Area (OCA)

Frankel (1999) defines an optimum currency area as a region for which it is optimal to have its own currency and its own monetary policy. Mundell (1961) defines an OCA as a currency area for which the costs of relinquishing the exchange rate an internal instrument of adjustment (within the area) are outweighed by the benefits of adopting a single currency or a fixed exchange rate regime. The registered success of the Eurozone has of recent re-ignited studies in the optimum currency area and its applicability. Fleming (1971) and Ricci (2008) stress that the similarity of pre-union inflation rates across countries may be considered as an important factor determining the OCA. Countries may have different Phillips curves and thus by imposing a unique level of inflation by adopting a common currency will automatically generate some costs. The OCA theory was fast put forward by Mundell (1961) where he develops a simple two-entity model which could be regions or countries initially at full employment and balance of payments equilibrium and introduces asymmetric shocks to output and an adjustment mechanism. He asks the question whether countries intending to form common markets and economic unions should allow each of their national currencies to fluctuate or form a single currency area. He argues that the subject of flexible exchange rates can be separated into two distinct questions. The first is whether a system of flexible exchange rates can work effectively and efficiently in the modern world economy. For this to be answered, it must be demonstrated that: (1) an international price system based on flexible exchange rates is dynamically stable after taking speculative demands into account; (2) the exchange rate changes necessary to eliminate normal disturbances to dynamic equilibrium are not so large as to cause violent and reversible shifts between export and import-competing industries; (3) the risks created by variable exchange rates can be covered at reasonable costs in the forward markets; (4) central banks will refrain from monopolistic speculation; (5) monetary discipline will be maintained by the unfavourable political consequences of continuing depreciation, as it is to some extent maintained today by threats to the levels of foreign exchange reserves; (6) reasonable protection of debtors and creditors can be assured to maintain an increasing flow of long-term capital movements and (7) wages and profits are not tied to a price index in which import goods are heavily weighted. The second question he answers is how the world should be divided into currency areas; the stabilization argument for flexible exchange rates is valid only if it is based on regional currency areas. If the world can be divided into regions within each of which there is factor mobility and between which there is factor immobility, then each of these regions should have a separate currency which fluctuates relative to all other currencies. This carries the argument for flexible exchange rates to its logical conclusion. However, if labour and capital are insufficiently mobile within a country then flexibility of the external price of the national currency cannot be expected to perform the stabilization function attributed to it, and one could expect varying rates of unemployment or inflation in the different regions. A key weakness of the Mundell (1961) model is that he assumed that economic

agents did not incorporate expectations about future movements in the price level, interest rates, exchange rates and Government policy.

Symmetry in business cycles has been put forward by some scholars as a condition for the OCA. Symmetry in the business cycle is defined as a positive co-movement between the two countries' output; the shocks or disturbances affect the countries in a much similar way thus symmetric. The existence of highly correlated business cycles is a signal that the two countries can almost form an OCA with a common monetary policy. Asymmetric shocks on the other hand tend to come along with inflationary pressures for the country that has gained from this sort of shock, monetary expansion is still possible though. Asymmetric shocks are caused by differences in financial and tax systems, structural differences in labour markets and institutions. Shocks could come from shifts in demand as described in the model by Mundell (1961). It is important to note that the actions of monetary policy have an effect on the exchange rates if not handled carefully (appreciation and depreciation). In relation to this, Ricci (2008) states that the exchange rate between two areas is an effective instrument of short-run adjustment if the following conditions hold; (1) the two areas face asymmetric shocks, so that an adjustment of the relative price of the goods produced in the two countries is required; (2) domestic prices are not fully flexible that is prices do not adjust immediately to shocks (price stickiness); (3) pass-through is not large therefore a relative price change due to exchange rate change is not immediately neutralised by domestic price movements.

Bayoumi and Eichengreen (1998) in a study that takes into consideration the exchange rate regimes employed by the advanced economies find that the OCA variables have an explanatory power towards the variations in exchange market pressures and thus exchange rate behaviour. The OCA variables affect the bilateral exchange rates through market conditions and intervention with asymmetric shocks being the main source of exchange market pressures and proxies for deterioration in the transactions value of money due to floating provide the main motivation for intervention.

2.6 Why countries float or peg and anchor currencies

Levy-Yeyati and Sturzenegger (2005) findings support the fact that countries may declare a regime and behave differently in order to avoid speculative attacks on their currencies. In this regard, fixers may declare a more flexible regime, the concept of hidden pegs. Their findings further reveal that intermediate regimes like crawling pegs and bands have reduced in number over the years. Furthermore, they find that de facto floats are characterized by small amounts of exchange rate variability thus a large number of these countries intervene in the markets in order to maintain a certain exchange rate. This is in opposition to the textbook definition of a floating regime, confirming the concept of fear of floating introduced by Calvo and Reinhart (2002).

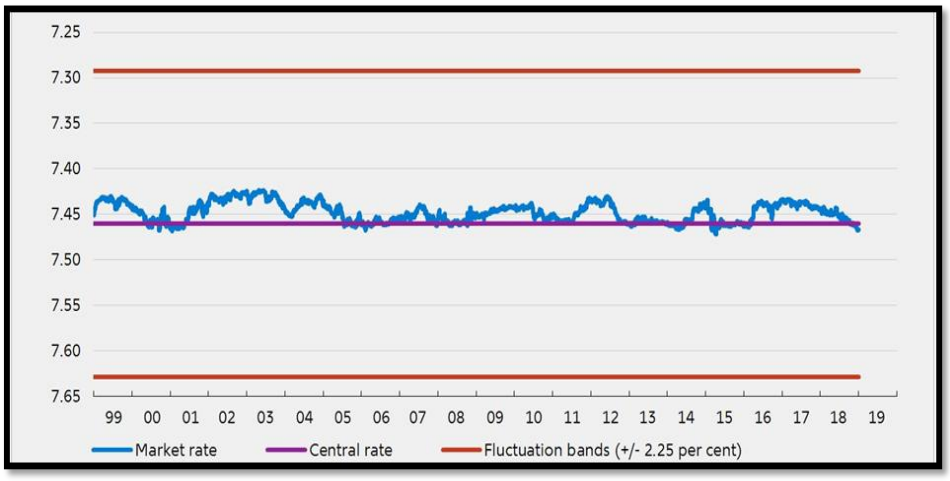
Ilzetzki (2017) emphasize that the reserve currency composition is a good indicator of whether a country may be inclined to intervening in the markets to defend its exchange rate value against the currency whose share of the reserve composition is higher. For instance, if the euro takes a bigger share of the reserve composition in relation to other currencies, this country is likely to choose the euro as an anchor. The historical colonial relationship between two countries may also play a part when it comes to choosing an anchor currency. By default, emerging economies are to a greater extent peg their currencies to that of their colonial masters. Countries facing macroeconomic instabilities

like high inflation rates tend to choose as an anchor the currency of a country whose performance they want to mimic.

Many scholars have argued that a fixed exchange rate regime is associated with less exchange rate volatility and thus likely to increase trade. A country whose foreign trade is mostly with Eurozone countries and invoices in Euros is likely to deploy the Euro as an anchor currency. Mussa (1986) argues that the real exchange rates show greater volatility under floating regimes than they do under the fixed regime. Kenen and Rodrik (1986) argue that the volatility of the real exchange rate depresses trade and thus a fixed regime is pro-trade. Aristotelous (2001) contradicts this result and reveals that the regime employed by a country has no effect on the export volume. Bacchetta and Van Wincoop (2000) introduce a new perspective altogether, adding that, adopting a fixed regime does not necessarily lead to more trade, the volume of trade will depend on how the regime is implemented. Rose (2000) argues that countries in a currency union trade more with each other than they do with countries outside a union, approximately 3.35 times more with each other. This finding is further supported by Adam and Cobham (2007).

Under The Maastricht Treaty signed in 1992 by members of the European Community to further European integration, countries within the union and candidates to adopt the Euro currency are required to peg their currencies to the Euro over a band for a period of at least 2 years. This pegging enables the EU gain a credible mechanism for evaluating potential Eurozone members. The Danish Krone is the only currency in the ERM II stage, thus pegging its exchange rate to the Euro. According to the European Central Bank, the Danish Krone fluctuates within a band of +/-2.25% against the Euro. However, the standard ERM II fluctuation band is +/-15%. This inconsistency is simply because of the existence of an already high degree of convergence of the Danish Krone against the Euro.

Figure 4: Exchange rate of the Krone/Euro



Source: Danmarks Nationalbank

A number of countries have foreign currency denominated debt in anchor currencies like the US Dollar and Euro, thus, find it wise to peg to these currencies and avoid destabilising fluctuations while it services its foreign debt.

Theoretical grounding reveals that the floating exchange rate regime acts as a shock absorber to internal and foreign macroeconomic shocks, enabling the economy to adjust accordingly by adjusting interest rates, this with the assumption of capital mobility. These could include inflationary shocks, financial crises, commodity price shocks and business cycles with booms and depressions (output or unemployment shocks). Fixed exchange rate regimes are linked to financial crises since the monetary authorities have to constantly defend the exchange rate regime which may not be possible at times due to inadequate reserves and underdeveloped capital markets. This was evident during the Asian financial crisis of 1997, the Mexican crisis of 1995 and the Russian crisis of 1997. McKinnon (2000) uses high frequency (daily) data to test for the weight of the Dollar versus the Yen and notes in his study that by keying to the Dollar, the macroeconomic policies of the Asian crisis economies were loosely tied to each other. Some of the countries affected by the 1997 crisis subsequently switched to an inflation targeting regime that is primarily characterised by a floating exchange rate regime. Baig (2001) in a study examining the daily exchange rate behaviour of 5 East Asian currencies before, during and after the Asian crisis of 1997 found that these countries maintained a de facto peg to the US Dollar over the pre-crisis period, however, he adds that this result may not be reliable given that the results from the regressions of de jure floaters or the control group exhibited large and significant coefficients similar to those of the Asian crisis countries. Mishkin (2004) points out that countries employing inflation targeting as a monetary policy framework are not necessarily targeting only inflation but the exchange rate as well thereby intervening in the foreign exchange markets to defend a regime, an act that contradicts the inflation targeting model.

The pegged system especially to a recognised anchor currency like the US Dollar is a good practise to attract foreign investors, investors are able to evaluate their returns on investment over time easily with less fluctuations. In addition, the currency that comprises the biggest percentage of a country's reserves is a good indicator that the country in question pegs its exchange rate to that currency. Pegging to low inflation currency has the advantage of reducing domestic inflation pressures.

2.7 Regimes and Crises

According to Calvo and Mishkin (2003), a number of countries choose an intermediate path when it comes to exchange rate regimes; that is an exchange rate is often stabilized by the central bank, but might sometimes shift, often known as a "soft peg." However, in the aftermath of the macroeconomic crisis across East Asia in 1997–1998, a view emerged that this exchange rate regime was in part responsible for the depth of the macroeconomic crisis. The governments of Thailand, Malaysia, South Korea and other nations in that region had kept exchange rates fixed, closely following the US Dollar. Frankel (1999) argues that contrary to what is always claimed that Mexico, Thailand, Indonesia, Korea, Russia or Brazil were formally pegged to the dollar when their crises hit, they actually were following varieties of bands, baskets, and crawling pegs. This remains open to debate as other scholars have found a rather different result.

Chang and Velasco (2000) provide a detailed and impressive model of the relationship between financial fragility and the exchange rate regime, comparing currency boards, fixed rates, and flexible rates, with and without a lender of last resort. They note that under a currency board the exchange rate is fixed and the central bank does not issue domestic credit and thus is vulnerable to bank runs and not currency crises. A fixed exchange rate regime is more prone to bank runs, exchange rate crises and balance of payments crises. A flexible rate system implements the social optimum and eliminates runs, provided that the exchange rate and credit policies of the central bank are appropriately designed. They argue that the abilities of the currency boards have been observed in the successes registered by Hong Kong and Argentina over a turbulent period in the recent past when financial institutions came under intense pressures globally.

Aghion et al. (2001) while developing a model of currency crises driven by the interplay between the credit constraints of private domestic firms and the existence of nominal price rigidities and examining the impact of various shocks including expectations shocks, argue that currency crises can occur under both the fixed and flexible exchange rate regime since the primary source of the currency crisis is identified as the deteriorating balance sheet of private firms. They add that an initial regime may be able to maintain a stable exchange rate when the economy is hit my small shocks, however, if the shock is large, then the initial regime has little influence in preventing a currency crisis. The regime employed thus becomes irrelevant.

Haile and Pozo (2006), using a broad sample of 35 countries, test whether the exchange rate regime employed by a country has an impact on the vulnerability of the countries to currency crisis using an extreme value theory technique, constructing an exchange market pressure index and a Hill Estimator/Tail Index to identify exchange market crises. The index is constructed as the weighted average of nominal exchange rate depreciation, change in domestic and foreign interest rates differential and decrease in foreign exchange reserves. In their words, 'we find that the actual or de facto exchange regime plays no role in determining currency crisis periods. Fundamentals and contagion instead appear to be the main determinants of currency crises. We find, however, that while the de facto exchange regime fails to explain currency crises, the declared exchange regime does play a role with declared pegs increasing the likelihood that a nation experiences a currency crisis. Our results are consistent with the idea that soft pegs are easy targets for speculators and as such have a higher probability of resulting in a currency crisis with the peg turning into a float.'

Calvo and Mishkin (2003) state that one danger of a hard exchange rate peg is the risk of being locked into a misaligned exchange rate, defined as a sizable difference between its actual level and the one which fundamentals would dictate. They further note that neither the fixed nor the freely floating regimes has an unblemished record with regard to crises and that no exchange rate regime can prevent macroeconomic turbulence. The choice of the regime should be chosen to match the characteristics of the economy in question. The authors state in their paper that the regime chosen is of second-order importance. Of primary importance is the need for reforms; more regulation for the financial sector, fiscal constraint and developing a predictable monetary policy and more trade openness, these reforms will help emerging market economies be more immune to currency crises.

2.8 The testing, estimation and classification models

Frankel (1992), Frankel and Wei (1994), Ohno (1999) and McKinnon (2000) use a technique that recovers the weights that countries assign to certain anchor currencies or currency baskets, containing currencies that countries may claim to peg to. If the weight assigned to an anchor currency is close to one, then a peg or fixed regime is identified. In all studies, the researchers find that the coefficients estimated for the Asian economies are close to one for the US Dollar indicating a close peg. Ohno (1999) extends and/or modifies this technique by incorporating the real effective exchange rate and using simulations, constructing multiple currency baskets containing currencies of three industrial blocks, that is, Yen, US Dollar and Euro. He adds that there is a high risk associated with using high frequency data when evaluating exchange rate performance. He finds that there were no risky pre-crisis exchange rate misalignments among the worst hit countries of the 1997 Asian crisis.

As earlier stated Calvo and Reinhart (2002) test for the de facto exchange rate regimes using three criteria; monthly percentage exchange rate changes, monthly percentage changes of official foreign reserves and monthly absolute changes in nominal short-term interest rate, estimating the probability that a variable falls within a predetermined bound that defines a certain exchange rate regime. For instance, if a bound is set at 2.5% then the probability that the monthly exchange rate change falls within the 2.5% band will be greatest for the fixed regime and lowest for the freely floating regime. They follow the same procedure to examine the behaviour of reserves and interest rates that are used by Governments as monetary policy tools.

Levy-Yeyati and Sturzenegger (2005, 2016) define exchange rate regimes according to the behaviour of three variables; changes in the nominal exchange rate, volatility of these changes and the volatility of international reserves . Fixed exchange rate regimes are characterised by more changes in international reserves aimed at reducing the volatility in the nominal exchange rate, and flexible regimes are characterized by substantial volatility in nominal rates with relatively stable reserves. The researchers develop clusters, the clusters with high volatility of reserves and low volatility of nominal exchange rate are fixers while those with low volatility in international reserves and substantial volatility in the nominal exchange rate identify as flexible. They note that reserves are notoriously hard to measure and there is a large difference between changes in reserves and interventions. Their approach uses a cluster analysis to identify the exchange rate regimes based on the classification variables. This is a multivariate approach used to identify homogeneous observations, according to similarities between data points along certain identified dimensions.

Ilzetzki et al. (2017) stress that any classification algorithm must simultaneously determine both an anchor currency, if any, and its degree of fixity or flexibility. They go ahead and develop an anchor or reference currency classification algorithm emphasizing that this can prove to be a heavy task given that there is a great degree of flexibility in exchange rates globally and some anchor or reference currencies may not be declared by monetary authorities.

Frankel and Wei (2008) propose an extension to the original regression based technique that incorporates an exchange market pressure variable defined as a percentage increase in the value of the currency plus the percentage increase in reserves. This answers the

question as to what extent the authorities allow the increase in international demand for a currency to show up as an appreciation in the currency and to what extent as an increase in reserves.

3. The Model

We construct a +/-2.5% for our local currency of interest against the four chosen anchors in our study to determine the extent to which the probability of the jumps against these anchor currencies are within this chosen band. A high probability within the band against a particular anchor is a sign of pegging. According to Ilzetzki (2017) and by intuition, the chosen anchor currencies display a much tighter link and less variation to the currency of the country under scrutiny than other potential anchors, that is to say less volatility.

We apply the regression in equation 1 below, and further augment it with a market pressure variable, defined in equation 2.

$$\Delta Ln(\frac{LCY}{CHF})_t=\beta_1+\beta_2\Delta Ln(\frac{USD}{CHF})_t+\beta_3\Delta Ln(\frac{EUR}{CHF})_t+\beta_4\Delta Ln(\frac{JPY}{CHF})_t+\beta_5\Delta Ln(\frac{GBP}{CHF})_t+\varepsilon_t \ldots\ldots\ldots 1$$

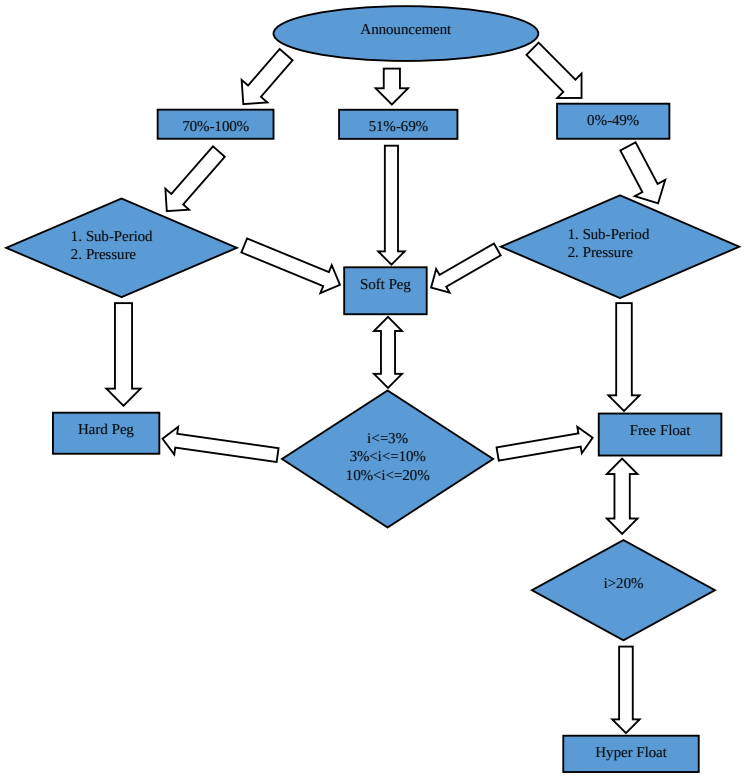
$$\Delta LnMP_t=\Delta LnRes_t\ \Delta Lni_t \ldots\ldots\ldots 2$$

Where LCY is the domestic currency of the country under study, USD is the US Dollar, EUR is the Euro, JPY is the Japanese Yen, GBP is the British Pound and finally CHF is the Swiss Franc, the numeraire. Furthermore, MP, Res,and i represent the Market Pressure, Reserves and Interest rate respectively. The technique aims to recover the weights, βs, that are assigned by each country to the potential anchor currencies. A β close to one and statistically significant shows a sign of pegging and a β close to zero and not significant is a sign of a floating regime.

With these regressions in mind, we further break down the data into sup-periods, that is, pre-crisis, crisis and post crisis periods to check whether the regime is switching between anchors.

Given the previous discussions, we move further and develop the classification algorithm shown below.

Figure 5: The Algorithm



The algorithm is briefly described as follows; (1) Apply the +/-2.5% band to discern categorise regimes as hard pegs, softs pegs and floats. (2) Ask the questions whether the regime is responding to the Market Pressure variable and switching between anchors. If the answer is yes to both then the regime qualifies to take the free float route and if the answer is no to both then the regime qualifies to take the hard peg route. If the regime fails either one or both criterion at this stage, then it takes the soft peg route where it is then subjected to an inflation(i) test. (3) i<=3% (Hard Peg), 3%<i<=10% (Soft Peg), 10%<i<=20% (Free Float) and i>20% (Hyper Float).

It is important to note that a different category of strictly pegged regimes are identified by simply running equation 1 and if the weight on the preferred anchor is equal to 1 then this currency is exactly tracking the chosen anchor at each and every time period.

Monthly data on 70 countries to best represent the globe is collected. These countries are; Europe; Albania, Armenia, Bulgaria, Czech Republic, Denmark, Hungary, Iceland, Norway, Poland, Romania, Russia, Sweden, Turkey and Ukraine.

Americas; Argentina, Aruba, Barbados, Bahamas, Brazil, Canada, Chile, Colombia, Jamaica and Mexico

Asia and Middle East; Bahrain, China, Hong Kong, India, Israel, Malaysia, Oman, Philippines, Qatar, Saudi Arabia, Singapore, South Korea, Thailand and United Arab Emirates.

Oceania; Australia, Fiji and New Zealand.

Africa; Algeria, Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Congo, Côte d'Ivoire, Egypt, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Ghana, Guinea-Bissau, Kenya, Mali, Morocco, Niger, Nigeria, Rwanda, Senegal, Seychelles, South Africa, Tanzania, Togo, Tunisia, Uganda and Zambia.

It is tempting to use the Chinese Renminbi as a possible anchor currency in equation 1 given its recent inclusion to the SDR basket and increased share in global GDP, however, this will not be a good idea given that it has for a long period of time been known to be pegged to the US dollar and this would obscure or confound to a great extent the integrity of the findings of this study.

We use the Swiss franc as a numeraire currency to express the value of all currencies in terms of a common currency. The Swiss Franc is our preferred choice because it is a freely floating currency of an advanced economy. In addition, the volume of trade between Switzerland and the countries chosen in the sample is quite minimal. A significant volume of trade would encourage pegging to reduce the exchange rate risk associated with exchange rate fluctuations.

Furthermore, the Swiss Franc is considered a safe haven currency. The stability of the Swiss Government, sound macroeconomic stability and developed financial system makes it a good candidate as a numeraire. Switzerland is independent of the European Union, to a greater extent, this shields the country from negative occurrences and pressures from the EU and Euro area. However, the currency periodically faces an upward pressure due to increased demand given that it's a safe haven; this could result in an overvalued currency.

4. Discussion and Results

From the descriptive statistics results expressed per Swiss Franc in Table 1-Table 5, it is clear from the tail behaviour, skewness and kurtosis, that there are strong signs of pegging.

The tail behaviour of the Euro and a number of currencies particularly in Europe exhibit similar behaviour. The Danish Krone, Bulgarian Lev and West African Franc mimic the behaviour of the Euro almost perfectly. Moving on to the US Dollar, the American, African and Asian currencies tend to peg to the Dollar, particularly Middle East currencies like the Omani Rial follow the US Dollar very closely. The descriptive statistics do not reveal significant evidence that currencies included in the sample are pegged to the Japanese Yen and British Pound.

The +/-2.5% band is constructed for each of the currencies to determine the probabilities that the jumps stay within the band against the chosen anchors. Table 6 shows the results for some of the currencies against the anchors. Figure 6 shows the idea behind the bands

for the Danish Krone and Ukrainian Hryvnia against the Euro. The red lines indicate the upper and lower bounds. It is evident that for the Danish Krone, the jumps are 100% of the time within the band compared to the Ukrainian Hryvnia with a probability of 65.351%.

Regressions are run for the local currencies against the candidate anchors as shown in Table 7-Table 11, clearly showing all the currencies by continent. The regressions clearly bring out the results obtained from the descriptive statistics, showing the preferred anchor per currency in the sample. Countries in Europe, with the exception of Armenia and Ukraine, attach a much higher weight to the Euro compared to the other candidate anchor currencies. This same analogy applies to Oceania, with the exception of Fiji. Moving on to the other continents, the US Dollar is predominantly the preferred anchor currency in Africa, Americas and Asia. Africa, however, has a great Euro preference in the West and Central regions that anchor their Franc currency to the Euro. In addition to this, the periphery North Africa and South Africa countries namely Tunisia, Morocco and South Africa attach a higher weight to the Euro too. These regression results are robust and remain more or less the same when the numeraire is changed to the New Zealand Dollar.

Figure 7 shows a summary of the distribution of the two preferred anchor currencies across the globe. Generally, most countries prefer to peg to a basket of currencies (Dollar and Euro) rather than peg to a single currency.

Table 12 and Table 13 show some of the responses of currencies in the sample to the market pressure variable. This variable is statistically significant for some countries but rather with a low magnitude in value.

Table 14, Table 15 and Table 16 show the switching behaviour among anchor currencies over 3 sub-periods for the Norwegian Krone, Hong Kong Dollar and Colombian Peso. Regressions of the type from Table 12-Table 16 are important in the application of our regime classification algorithm.

Using the proposed algorithm in Figure 5, we are able to classify the regimes being practised by monetary authorities into 5 different categories shown in Figure 8.

We find rather uninteresting results for strictly pegged regimes particularly from the Gulf and the Middle East region whose regression results produce perfect pegs to the US Dollar, a weight of 1 indicating that they are exactly tracking the US Dollar. The same regression result apples to the West and Central African Franc that is strictly pegged to the Euro. The Pound Sterling and Japanese Yen are rather unpopular, only a single currency, the Seychellois Rupee attaches a higher weight to the Pound Sterling compared to other candidate anchors.

All de jure peggers turned out to be de facto peggers showing that there is no fear of pegging but rather a fear of floating as a number of floaters somewhat turned out to be peggers to some extent. A comparison of a sample of the results is indicated in Table 17.

As seen in Figure 9, pegs formed the biggest proportion of the sample while floats only took a small share. The only hyper float in the sample turned out to be the Argentine Peso and this is no surprise given the high inflation rates registered in the country over the recent years, this is rather a dysfunctional economy.

We go further and ask ourselves whether the Bretton Woods period really mattered. The Bretton Woods period is defined as one characterised by US Dollar pegging, and the US Dollar was further pegged to Gold. To do this, we use the French Franc as the local currency and run the regression in equation 1 using the Deutschmark (DM) as a proxy for the Euro. The data is also split into the Bretton Woods period and post-Bretton Woods period. The Bretton Woods period is characterised by a high weight attached to the US Dollar and then there is a switch from the US Dollar to the DM in the post-Bretton Woods period. This is shown in Table 18. In addition, the graphs in Figure 10 shows the exchange rate relationship between four currencies and the US Dollar, splitting the periods into three, the Bretton Woods and the post-Bretton Woods period which includes the Euro period. There is pictorial evidence that indicates a regime shift from the fixed to floating period. This result is further re-enforced by the exchange rate volatility graphs shown in Figure 11, there is more volatility in the post-Bretton Woods period, one characterised by floating.

Figure 12 and Figure 13 show the change in reserves held by the Euro area, Ukraine, Bulgaria and Norway in US Dollars. There is a theoretical grounding that more volatility in reserves implies more intervention in the financial markets by monetary authorities to defend an exchange rate regime, indicating that this regime could be a fixed type and less volatility implies less intervention and thus the regime is more inclined to be a floating type. Figure 13, shows to a greater extent that our results are consistent with the theoretical grounding. The behaviour of Ukraine's reserves which is classified by the algorithm as a free float is behaving more like the Euro area that is a de jure float. Bulgaria and Norway that are classified as hard pegs are behaving exactly as pegs should be, this is consistent with the algorithm classification.

Figure 14 simply shows how the emerging markets have been tracking the inflation of the advanced economies over time. There has been significant drop in inflation rates of emerging markets and this could probably be attributed to currency pegging by emerging market economies.

5. Conclusion

This paper investigates the de jure and de facto exchange rate regimes being practised by a number of monetary policy authorities using data extracted from the IMF database spanning mostly the period 2000-2018. This investigation developed an algorithm that adopts a regression and within the band approach to classify an exchange rate regime. It is our belief that the algorithm performs quite well despite the fact that some short-comings may be identified including among others that it might be hard to identify basket pegs though the regressions to a greater extent try to solve this weakness. Findings show that there is indeed a difference between the de jure and de facto regimes, however, there is more evidence of fear of floating than fear of pegging as first sighted by Calvo and Reinhart (2002). There also seems to be a major preference for particular anchor currencies within different regions, re-enforcing the findings of Eichengreen (2011), with the Euro being predominantly preferred in Europe, some parts of Africa and Oceania while the US Dollar, the rest of the world with strictly pegged regimes in the Gulf and the Middle East region that exactly track the US Dollar, essentially eliminating volatility against this particular anchor currency. There is also evidence of some authorities preferring a 1:1 parity with their anchor currency of choice. From this paper,

it is evident that currencies like the British Pound and Japanese Yen have lost popularity over the years especially with the emergence of the Euro and the unity that comes with it. In conclusion, we find that most countries are inclined towards a pegged regime with over 70% in the sample practising some kind of pegged regime.

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TIME PREFERENCES AND THE PROPERTY RIGHTS PARADIGM

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Abstract

Capitalism relies heavily on property rights to resolve conflicts over the use of scarce resources. Property rights are defined in the literature as the expected ability of an economic agent to use an asset (Allen 1999; Barzel 1997; Lueck and Miceli, 2005; Shavell, 2002). A systematization of the economic analysis of property rights is due to Demsetz (1967) and Alchian and Demsetz (1973), whose 'property rights paradigm' has become, among contemporary economists, the 'classical view' on property rights and economic incentives. According to Alchian and Demsetz private property rights represent always a social institution that creates incentives to efficiently use assets, and to maintain and invest in assets. In particular private property rights allows for the internalization of the externality existing in the communal right system, where any owner cannot exclude the others from enjoying the fruits of her effort and hence no one has any incentive to use inputs that have a future payoff. This view has a strong appeal among contemporary economists (see for example Glaeser and Schleifer, 2002; Djankov et al, 2003). As a consequence, the role of the State in codifying and enforcing the property rights on productive assets is generally considered as crucial to promote investment and growth, even if it may entail some public costs. In this work I question the conclusion that (private) property rights security, defined as the expected ability of an economic agent to use an asset, has always a positive effect on investment incentives. Time preferences matter. I develop an analytical framework to analyse the interactions of property rights and investment incentives grounding on the model of quasi-hyperbolical discounting originally proposed by Phelps and Pollak (1968) in the context of intergenerational altruism and then used by Laibson (1994, 1997) to model time-inconsistency within an individual. Moreover, I adopt a general solution concept called 'perception-perfect strategy' proposed by O'Donoghue and Rabin (1999, 2000). In this setting I show that while the expected ability to enjoy the benefits from the investment (what we call property rights security on investment) always affects positively investment incentives, the expected ability to use an asset (what we call property rights security on asset) has a non-negative effect on investment incentives only under the hypothesis that investors are time-consistent exponentially discounters. Instead we show that, under the more general and empirically supported hypothesis of hyperbolic discounting, property rights security on investment but property rights insecurity on asset maximize investment incentives.

Keywords: *Assets, Investment, Property Rights, Time Preferences*

JEL Classification: *A12, C70, D21, D23, D92.*

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1. Introduction

Property rights consist in the expected ability of an economic agent to use an asset (Barzel, 1997; Lueck and Miceli, 2005). A seminal contribution about the economic effects of property rights is due to Blackstone. In his "Commentaries on the Laws of England" (1765-1769), the author emphasizes the economic virtues of private property rights on land as it turned out in England: "*And the art of agriculture by a regular connexion and consequence, introduced and established the idea of a more permanent property in the soil, than had hitherto been received and adopted. It was clear that the earth would not produce her fruits in sufficient quantities, without the assistance of tillage: but who would be at the paints of tilling it if another might watch an opportunity to seize upon and enjoy the product of his industry, art and labour*? (Blackstone, 1765-1768, Book II, Ch. 1). The systematization of the above intuition is due to Demsetz (1967) and Alchian and Demsetz (1973), whose approach became, among contemporary economists, the "classical view" about the economic incentives of property rights. It can be summarized as follows. Consider the simple case of a utility-maximizing individual who has to decide whether or not to undertake a certain investment on an asset, leading him to incur in an immediate cost and enjoy some expected future benefits. Suppose that property rights are not fully guaranteed, meaning that there exists a positive probability that in the future some other agent embezzles the fruits of the investment. This risk of expropriation represents a random tax on the benefits of the investment which, *ceteris paribus*, lowers the expected value of the investment and hence the incentives to invest. Alchian and Demsetz derive from the previous reasoning the following conclusion: private property rigths security *always* represent an institution that creates incentives to efficiently use assets, and to maintain and invest in assets. This view is largely shared among contemporary economists. As pointed out by Kaplow and Shavell (2002), "*Today the virtues of property rigths seem to be taken for granted or are only casually asserted*". In this paper we discuss the generality of this conclusion focusing our attention on how some subjective characteristics of individuals, in particular their time preferences, can have an impact on the role exercised by the institution of property rights.

Time preferences represent crucial determinants of investment behaviour. As discussed by Irving Fisher (1930), impatience is more than a rare behavioural trait of investors: "*Generally speaking, the greater the foresight, the less the impatience and vice versa…This is illustrated by the story of the farmer who would never mind his leaking roof. When it rained he could not stop the leak, and when it did not rain there was no leak to be stopped! Among such person, the preference for immediate gratification is powerful because their anticipation of the future is weak*" (Fisher, 1930, p.81). Recent empirical and experimental evidence (for a survey see Frederick, Lowenstein and O'Donoghue 2002) has shown how impatience (present-biased preferences) is a widespread and standard behavioural characteristic and not an exception. For this reason the more recent literature on time preferences (Phelps and Pollak, 1968; Laibson, 1997) maintains that Samuelson's model (1937) of time preferences, based on exponential discounting, must be seen as a particular case of a more general form (quasi-hyperbolic discounting), where individuals may be present-biased. Notice that impatience, differently from exponential discounting, implies the propensity to change preference orderings at different points in time, i.e. time-inconsistency. A contemporary

example of such a behaviour can be seen in Brazilian landlords facing movements such as Movement of Sem Terra which occupies unused lands: why do landlords not make them productive or do not sell them?

The main point of this paper is that if we assume the possibility of present-biased preferences of investors the role of property rights must be re-discussed in a broader way. In order to analyse in a rigorous way this feature, we construct a framework where we can discuss the impact of property rights on investment incentives under different time preferences. In this model we use two different variables to capture property rights on used assets, i.e. as asset on which an investment has made, and property rights on unused assets, i.e. an asset on which an investment has not been made (yet). The conclusions we draw from our model are twofold. First, property rights security on used assets always positively affects investment incentives for any investor regardless her time preferences; second, property rights security on an unused asset, i.e. the ability to make the investment on a certain asset in future periods, has no impact on the behaviour of a time-consistent investor but plays a role of disincentive for present-biased investors: indeed since these investors may delay or even procrastinate (i.e. continuously delay and never make) a profitable investment simply because of impatience, a higher security in the future control of the asset can discourage the investment itself. In this case, then, the virtue of property rights cannot be taken as granted.

The paper is organized as follows. In order to discuss the relationship between time preferences, property rights and investment, in paragraph 2 we build a model of land investment and formalize the solution "perception-perfect strategy" (0'Donoghue and Rabin, 1999; 2000). In paragraph 3 we explore the relationship between property rights security and investment incentives under alternative time preferences. Finally, in section 4, we draw some concluding remarks.

2. The Model

2.1 The Basic Setting

Consider an infinitely living landowner who faces the decision of whether or not to undertake a certain feasible investment[1] on a field (asset) of size $0 < \bar{L} < \infty$. In each time $t = 1,2, \ldots$ the landowner makes a schedule specifying the share of the field she will invest on in each period from t onwards. Let $0 \leq L_t \leq \bar{L}$ the share of the field on which the investment is made at time t. I assume that, for a given level of investment L_t, the individual bears a cost $C(L_t)$ in time t and reaps an infinite stream of benefits $B(L_t)$ from period $t+1$ onwards. The landowner is credit-constrained[2]: she bears the cost of the possible investment by reducing her consumption and/or leisure.

[1] In this setting there is one and only one investment which may be undertaken. We can think of any kind of investment on land such as planting, fertilizing, introducing a technological innovation, but also selling a piece of land in presence of transaction costs. In this paper I do not enter the issue of how time preferences may affect the choice of optimal investment when a menu of alternatives is faced.

[2] The hypothesis that the landowner is credit-constrained is crucial in our analysis. Indeed, the possibility to have access to the credit may be a way to overpass not only the liquidity problem, but also self-control problem due to present-biased preferences. We leave to further research the aim to study the interaction between time preferences, credit and investment incentives. However we could say that the majority of small and medium in low-income countries landowners are credit-constrained.

Property rights on land may be partially insecure. For the sake of my purpose, I consider and model separately the expected ability to enjoy the benefits from investment on land (what I call *property rights on investment*) and the expected ability to invest on the still unused asset (*property rights on unused asset*).[3] I assume that, in each time $t \geq 1$, the investor faces a probability $0 < p \leq 1$ that in each future period she will keep enjoying the benefits stemming from past investment and a probability $0 < q \leq 1$ she will keep the possibility to undertake the investment on the still unused land. Correspondingly, in each time $t \geq 1$ the investor faces a probability $0 \leq 1 - p < 1$ that in each future period she will be expropriated of the benefits from past investment and a probability $0 \leq 1 - q < 1$ to be expropriated from the unused land. For the sake of simplicity and without loss of generality, I make the simplifying assumption that the investor is risk-neutral and that if the rights to enjoy the benefits from past investment or to invest on the unused land are interrupted, they are interrupted forever.

I model the investor's intertemporal preferences in terms of "quasi-hyperbolic discounting" (Phelps and Pollak, 1968; Laibson, 1997), to capture the possibility of present-biased and time-inconsistent preferences. Let u_t be the instantaneous utility at time t and Eu_τ the expected utility at the generic future period τ. The inter-temporal utility perceived at time t by a risk-neutral individual is represented by the following utility function: $EU^t(u_t, u_{t+1}, \dots) = u_t + \beta \sum_{\tau=t+1}^{\infty} \delta^{\tau-t} Eu_\tau$, where the parameter $0 < \delta < 1$ is a long-run discount factor and $0 < \beta \leq 1$ represent time-inconsistent preferences for immediate gratification. Notice that, for $\beta = 1$, the standard form of exponential and time-consistent preferences is obtained. If, instead, $\beta < 1$, the investor is characterized by short-term impatience, i.e. she has an extra bias for the present over the future.

In this setting, assuming that costs and benefits enter linearly the utility function, a landowner who is characterised by a long-run discount factor $0 < \delta < 1$, deals with impatience attitudes $0 < \beta \leq 1$, faces a degree of property rights security on investment p and who invests L_t at time t will enjoy an expected utility from this investment equal to[4]: $-C(L_t) + \beta \frac{\delta p}{1-\delta p} B(L_t)$[5]. In order to analyse the optimal investment behaviour over time, I need to make some assumptions on how the investor perceives her own future preferences. Let $\hat{\beta}$ the investors's belief about her future impatience attitudes β. A present-biased investor (characterized by $\beta < 1$) is called "naïve" if she believes that in the future she will be time-consistent $\hat{\beta} = 1$, whereas she is "sophisticate" if she exactly predict her future preference for immediate gratification ($\hat{\beta} = \beta$). The intermediate case is represented by a partially naïve investor (O'Donoghue and Rabin, 2001), who knows that in the future she will have a preference for immediate gratification but she underestimates their magnitudes ($\beta < \hat{\beta} < 1$).

[3] In this simple model property rigths security on investment coincides with property rights security on the used asset, i.e. on the part of the asset on which the investment has been made. Notice that no further investment can be made.

[4] Notice that property rights security on investment enters the utility function simply by lowering the long-run discount factor. Instead property rights security on unused asset does not affect the expected utility perceived from the investment (the profitability of the investment) but only the optimal timing in making the investment.

[5] We are assuming that costs and benefits enter linearly the utility function.

2.2 Solution Concept

A compact solution form for the intra-personal game spelled out in the previous paragraph is provided by O'Donoghue and Rabin (1999, 2001) and it is called *perception-perfect strategy*. This solution requires that, at each time t, the investor chooses the level of investment L_t which maximizes her current preferences given *dynamically consistent beliefs*. Within my specific setting, it can be formalized as follows. Let $0 \leq h_t = \sum_{\tau=1}^{t-1} L_t \leq \bar{L}$ be the history at time t. In words, in a given period t the investor faces a history represented by the part of the field on which the investment has been made in previous periods. Moreover, let $A_t \equiv [0, \bar{L} - h_t]$ be the set of actions available in each period t following history h_t. An action $L_t \in A_t$ corresponds to undertaking in time t the investment on a fraction of land of size L_t. I describe individual behaviour by a strategy $s = (L_1, L_{2,}, \dots)$ which specifies for each time t, given history h_t, an action $s(h_t, t) \in A_t$. Moreover let s^0 be the strategy $s = (0,0, \dots)$ and set $\tau(s) \equiv min\{t/L_t \neq 0\}$, where $\tau(s) = \infty$ if $L_t = 0$ for all t. Let us now define as V^t the individual preferences in period- t over current actions and given history h_t, conditional on following the strategy $s = (L_{t+1}, L_{t+2}, \dots)$ from time $t+1$ onwards:

$$V^t = B(h_t) - C(L_t) + \beta \sum_{\tau=1}^{\infty} \left[\delta^\tau p^\tau B(h_t) + \delta^\tau \left(\sum_{i=1}^{\tau} q^{i-1} p^{\tau+1-i} B(L_{t+i-1}) \right) - \delta^\tau q^\tau C(L_{t+\tau}) \right]$$

The expected utility of an investor in time t depends on her instantaneous utility and on the future discounted expected utility from period $t+1$ onwards. The instantaneous utility is given by the benefits reaped in time t from past investment, $B(h_t)$, minus the cost of the investment made in time t, $C(L_t)$. The future utilities depend on the level of past, present and future investment, on the cost and benefit functions, respectively $C(\cdot)$ and $B(\cdot)$, on the short-run and long-run discount factors β and δ and on the degree of property rights security on investment (p) and on unused asset (q).

Let us now define within this framework the concept of dynamically consistent beliefs and perception-perfect strategy.

Definition 1. A strategy $\hat{s}$ represents $\hat{\beta}$-dynamically consistent beliefs if

$$\hat{s}(t, h_t) = arg \max_{L_t \in A_t} V^t\left(C(\cdot), B(\cdot), \bar{L}, h_t, \widehat{\beta}, \delta, p, q\right) \text{ for all } t \geq 2 \text{ and } h_t.$$

Dynamically consistent beliefs are characterized by two forms of consistency. First, *internal consistency*: for all contingencies, strategy $\hat{s}$ specifies a sequence of investment which is optimal given the beliefs for the levels of investment in the future periods. Secondo, *external consistency*: at all times $t < \tau$, the investor has the same belief about her behaviour in period τ following history h_τ. This means that the beliefs of an investor can be simply represented by the vector of her frst period beliefs on the levels of investment in all subsequent periods: $\hat{s} = (\widehat{L_2}, \widehat{L_3}, \dots)$.

I can now provide a formal definition of perception-perfect strategy. In addition to the equilibrium condition stated by O'Donoghue and Rabin (2001), I also require the feasibility of the strategy given the constraints represented by the asset endowment $\bar{L}$.

This constraint to land investment is captured by the set of actions available in each period t.

Definition 2. A strategy s^{pp} is a perception-perfect strategy if there exist $\hat{\beta}$-consistent beliefs $\hat{s}$ such that $s^{pp}(h_t, t) = arg \max_{L_t \in A_t} V^t\,(C(\cdot), B(\cdot), \bar{L}, h_t, \hat{s}, \beta, \delta, p, q)$ for all $t \geq 2$ and h_t.

A perception-perfect strategy $s^{pp} = \left(L_1^{pp}, L_2^{pp}, \ldots\right)$ represents the actual sequence of investment of an investor who maximizes her current preferences given dynamically consistent beliefs.

Finally, I provide here an additional definition which is useful in the following steps.

Definition 3. A level of investment $0 < L_t \leq \bar{L} - h_t$ is β −worthwhile in t if and only if $-C(L_t) + \beta \frac{\delta p}{1-\delta p} B(L_t) \geq 0$.

In other terms a level of investment L_t is β −worthwhile if the investor perceives in t a non- negative expected utility from this investment.

2.3 Equilibria

In this setting two relevant questions exist about the behaviour of a certain investor; first: when, if ever, does she undertake a positive investment? Second: which amount of land does she invest on? Since in this paper I aim at focusing on the first problem, I make here a simplifying assumption which allows to obtain a simple solution of the second problem without compromising the qualitative analysis of the first one.

Assumption 1. $C(L_t) = cL_t$ and $B(L_t) = bL_t$, where $c > 0$ and $b \geq 0$.

Assumption 1 implies that in this setting there are constant returns to scale from the investment. Given this hypothesis, a feasible positive level of investment $0 < L_t \leq \bar{L} - h_t$ is β −worthwhile in t if and only if $-c + \beta \frac{\delta p}{1-\delta p} b \geq 0$. Therefore either *any* positive level of investment is β −worthwhile or no positive level of investment is β −worthwhile.

Lemma 1 and 2 will prove that, given this assumption, at any time either the investment is taken on the overall asset $\bar{L}$ or no investment is undertaken. Therefore this framework allows to abstract from any problem concerning the optimal smoothing of a profitable investment across different periods. Let us now provide some insights about the first problem, i.e. the timing of the investment. Intuitively, as I will prove in Lemma 2, if no positive level of investment is β −worthwhile, a person prefers to never undertake the investment simply because her expected utility from the investment is not positive given her time preferences and the degree of property rights on investment she faces[6]. Moreover, in this setting, an investor may never undertake a positive investment even if it is β −worthwhile because of *procrastination*, i.e. a continuous delay.

[6] Notice that the degree of property rights security on unused asset (captured by the parameter q) does not affect the profitability of the investment; instead, as I will show further on, it affects the decision of "when" undertaking a profitable investment.

Consider for a moment a simplifying case in which the only feasible level of investment corresponds exactly to $\bar{L}$: at each time a landowner either invests on $\bar{L}$ or does not invest at all[7]. Suppose that $\bar{L}$ is β −worthwhile for a certain investor given her time preferences and the degree of property rights security on investment she faces. This investor has a maximum tolerable delay d^* such that, for any $d > d^*$, she prefers making the investment $\bar{L}$ today rather than in d periods. In particular, an investor characterized by self-control problems β, long-run discount rate δ, degree of property rights security on investment p and degree of property rights security on unused asset q will tolerate a maximum delay given by:

$$d^*(\beta) \equiv max\left\{d \in \{0,1,\dots\}: -c\bar{L} + \beta\frac{\delta p}{1-\delta p}b\bar{L} \leq \beta(\delta q)^d\left[-c\bar{L} + \frac{\delta p}{1-\delta p}b\bar{L}\right]\right\}$$

Notice that, since production opportunities are characterized by constant returns to scale, $d(\beta)$ does not depend on the level of investment $\bar{L}$ but only on the parameters identifying time preferences (β and δ), production opportunities (c and b) and property rights security (p and q).

In case $d^*(\beta) = 0$, the investor cannot tolerate any delay and she undertakes the β −worthwhile investment $\bar{L}$ immediately. If instead $d^*(\beta) > 0$, the investor might delay the β −worthwhile investment, depending on her beliefs about when in the future she would undertake the investment $\bar{L}$. Consider the case of an investor with self-control problems $\beta < 1$ and fully sophisticated ($\hat{\beta} = \beta$), meaning that the investor perfectly predicts her future behaviour. In this case, at each period t, when the investor plans to undertake the investment, it must be that delaying would imply a total delay of $d^*(\hat{\beta}) + 1 = d^*(\beta) + 1$ periods: hence she will plan to undertake the investment $\bar{L}$ exactly every $d^*(\beta) + 1 = d^*(\hat{\beta}) + 1$ periods and there are $d + 1$ perceptions perfect strategies (i.e. multiple equilibria). If, for example, $d^* = 2$, there are three perception-perfect strategies: $(\bar{L}, 0,0, \dots)$, $(0, \bar{L}, 0, \dots)$ and $(0,0, \bar{L}, \dots)$.

Consider now the case of a partially naïve investor characterized by self-control problems $\beta < 1$ and by perceptions of future self-control problems $\hat{\beta}$, where $\beta < \hat{\beta} < 1$. Given the definition of $d^*(\beta)$, it must be that $d^*(\hat{\beta}) \leq d^*(\beta)$. A partially naïve investor believes that, if she delays now she will tolerate a delay of at most $d^*(\hat{\beta}) + 1$ periods. Therefore, if $d^*(\hat{\beta}) + 1 \leq d^*(\beta)$, the partially naïve investor perceives that, if she delays now, she will undertake the investment $\bar{L}$ within a tolerable number of periods and she delays. However, since the same reasoning is iterated at each period, the investor will infinitely delay and never undertake the profitable investment $\bar{L}$, i.e. she procrastinates it. Finally, a fully naïve investor (with $\beta < 1$ and $\hat{\beta} = 1$) believes that if she does not undertake a β −worthwhile investment $\bar{L}$ now, she will undertake it the next period., Therefore she procrastinates the profitable investment $\bar{L}$ as long as $d^*(\beta) > 0$.

[7] Lemma 2 proves that, given our assumptions, this result holds without any other restriction.

We now provide a formal characterization of dynamically consistent beliefs (Lemma 1) and perception-perfect strategies (Lemma 2)[8].

Lemma 1. Any dynamically consistent belief ŝ must satisfy: for each $t \geq 2$, *either* $\widehat{L_t} = 0$ *or* $\widehat{L_t} = \bar{L}$. *If* $\bar{L}$ *is not* $\hat{\beta}$*-worthwhile,* $\widehat{L_t} = 0$ *for all* $t \geq 2$. *If* $\bar{L}$ *is* $\hat{\beta}$*-worthwhile and* $d(\hat{\beta}) = 0$, *then* $(\widehat{L_2}, \widehat{L_3}, \dots) = (\bar{L}, 0, 0, \dots)$. *If instead* $\bar{L}$ *is* $\hat{\beta}$*-worthwhile and* $d(\hat{\beta}) > 0$, *there are multiple dynamically consistent beliefs.*

Lemma 1 states that the only fraction of land one can expect to possibly invest on in the future is the overall land $\bar{L}$, provided that this level of investment is $\hat{\beta}$-worthwhile. Whenever $\bar{L}$ is $\hat{\beta}$-worthwhile and $d(\hat{\beta}) > 0$, the first date of completion is indeterminate and any dynamically consistent beliefs must be cyclical. Hence there are multiple dynamically consistent beliefs: the investor will expect to undertake the $\hat{\beta}$-worthwhile investment exactly every $d(\hat{\beta}) + 1$ periods. If instead $\bar{L}$ is $\hat{\beta}$-worthwhile and $d(\hat{\beta}) = 0$, the first date of completion is not indeterminate: the investor expects to undertake the investment exactly in the second period.

Lemma 2 characterizes formally the set of perception-perfect strategies.

Lemma 2. Any perception perfect strategy s^{pp} *must satisfy: for each* $t \geq 1$, *either* $L_t^{pp} = 0$ *or* $L_t^{pp} = \bar{L}$. *If* $\bar{L}$ *is not* $\hat{\beta}$*-worthwhile or* $\bar{L}$ *is* $\hat{\beta}$*-worthwhile but* $d(\hat{\beta}) + 1 \leq d(\beta)$, *then* $S^{pp} = \{s^0\}$. *If* $\bar{L}$ *is* $\hat{\beta}$*-worthwhile and* $d(\beta) = d(\hat{\beta}) > 0$, *there are multiple perception perfect strategies. If instead* $\bar{L}$ *is* $\hat{\beta}$*-worthwhile and* $d(\beta) = d(\hat{\beta}) = 0$, *the unique perception-perfect strategy is* $s^{pp} = (\bar{L}, 0, 0, \dots)$.

Lemma 2 provides a complete answer to the following question: if an investor decides to undertake a positive investment, which amount of land will she invest on? The answer is clear-cut: given assumptions 1 and 2, if an investor decides to undertake a positive investment, she will invest on all the available land $\bar{L}$ (this is true regardless time preferences). Moreover Lemma 2 provides some answers to the question: when, if ever, does the investor undertake the investment $\bar{L}$? Whether or not she will undertake the investment $\bar{L}$ is fully determined: if $\bar{L}$ is not β-worthwhile, the investor does not undertake the investment simply because it is not profitable given her time preferences. If instead $\bar{L}$ is β-worthwhile and $d(\beta) + 1 \leq d(\hat{\beta})$, the investor does not undertake the profitable investment because she *procrastinates*: she prefers to delay the investment $\bar{L}$ thinking that in the future she will undertake it, but in fact she will not. If instead $d(\beta) = d(\hat{\beta})$, the person must in some period perceive an intolerable delay and will undertake the investment $\bar{L}$. However when exactly she undertake $\bar{L}$ is indeterminate because it depends on her dynamically consistent beliefs, which are multiple. Therefore the model fully determines *which level of investment* the landowner will possibly undertake, *whether or not* she will undertake it and, for the case $d(\beta) = d(\hat{\beta})$, it provides a range of periods within which she will make the investment $\bar{L}$. Notice that, given Lemma 2, we can study the perception-perfect strategies of my model by simply considering that the investor has to decide in each period whether or not making a one-shot investment $\bar{L}$.

[8] All proofs are in Appendix.

3. Property Rights and Investment Behaviour

In this section I study how property rights affect investment behaviour.

3.1 Property Rights and Time-Consistent Behaviour

Consider the specific case $\beta = \hat{\beta} = 1$: the investor has no bias towards the present and she is perfectly time-consistent. This is the traditional assumption made in the literature on property rights and investment incentives. In this case, the optimal planning made of the investment made at the first time coincides with the optimal planning made in each subsequent period and determines the actual strategy followed by the investor. The following proposition holds:

Proposition 1. For time-consistent investors:

(1.1) $s^{pp} = (\bar{L}, 0, 0, \dots)$ *is the unique perception perfect strategy if and only if* $\bar{L}$ *is* $\beta -$ *worthwhile,*

otherwise $S^{pp} = \{s_0\}$.

(1.2) Property rights security on investment (p) positively affects investment incentives.

(1.3) Time-consistent investors are neutral to property rights security on unused asset.

Proposition 1 points out that the relationship between property rights and investment incentives under the hypothesis of time-consistent preferences. A time-consistent investor immediately undertakes the investment $\bar{L}$ as long as it is profitable given her long-run discount factor, the production opportunities described by the parameters c and b and the degree of property rights security on investment she faces. If instead the investment is not profitable, a time-consistent investor plans to never undertake it and actually never undertakes this investment. In other terms a time-consistent investor never delays a profitable investment: indeed, since she does not have any bias towards the present utility, delaying a profitable investment would simply mean to enjoy lower expected benefits (in terms of utility now) because of long-run discounting. Proposition 1 also points out the effects of property rights security on investment on the behaviour of time-consistent investor: a lower property rights security would mean to reduce the expected benefits of the investment and hence its profitability. Instead, property rights security on unused asset does not affect the incentives faced by a time-consistent investor. Intuitively the reason is the following: the degree of property rights insecurity on unused asset captures the risk of expropriation of a certain asset on which the investment has not been made. For time-consistent investor, the only reason explaining the fact that an investment has not been made is that this investment is not profitable; but if the investment is not profitable, a time-consistent investor plans to never undertake it and actually never undertakes it. Therefore for a time-consistent investor property rights security on unused asset is not binding. Since the standard view on property rights and economic incentives assumes exponential discounting and time-consistency, the only kind of property rights that matters are those on investment and the only effect of their security on investment incentives is positive. However, as we discuss in the next paragraph, when we consider a more general form of time preferences the situation

changes and the distinction between property rights on investment and property rights on unused asset becomes necessary.

3.2 Property Rights and Present-biased Behaviour

Let us now explore the behaviour of present-biased and time-inconsistent landowners. The following proposition holds:

Proposition 2. For present-biased investors:

(2.1) A β-worthwhile investment $\bar{L}$ may be delayed or procrastinated.

(2.2) Property rights security on investment (p) positively affects investment incentives.

(2.3) Property rights security on unused asset (q) has a negative effect on investment incentives. In particular it increases the delay in undertaking a β-worthwhile and boots the propensity to procrastinate of naive and partially naïve investors.

Proposition 2 highlights the effect of impatience on investment behaviour. While time-consistent investors never delay a profitable investment, present-biased investors may delay a finite number of periods and even procrastinate a β-worthwhile investment $\bar{L}$. Obviously, when $\bar{L}$ is not β-worthwhile no investment is made simply because it is not profitable for the investor given her preference for immediate gratification and the degree of property rights security on investment she faces. If instead the investment is β-worthwhile, a present-biased investor plans to undertake the investment $\bar{L}$ because she deems it profitable. However her preference for immediate gratification tends to lead her to delay the investment. When the present-biased investor will undertake the investment depends on her actual maximum tolerable delay, $d(\beta)$ and the maximum tolerable delay she believes to have in the future, $d(\hat{\beta})$. If $d(\beta) = 0$ the investor cannot tolerate any delay and she will undertake the investment $\bar{L}$ in the first period. If instead $d(\beta) > 0$, two cases are possible. If $d(\hat{\beta}) = d(\beta)$, the investor will undertake the investment within $d(\beta)$ periods, but when exactly this occurs is indeterminate because there are multiple perception-perfect strategies. If instead $d(\hat{\beta}) + 1 < d(\beta)$, the investor procrastinates and thus never undertakes the β-worthwhile investment $\bar{L}$ because of a systematic delay due to underestimation of future self-control problems.

Part (2.2) points out the effect of property rights security on investment, represented by the parameter p, on investment behaviour of a present-biased investor. This effect is positive since if affects the profitability of the investment.

Part (2.3) of Proposition 2 points out how property rights security on unused asset shapes investment incentives of present-biased investors. Property rights security on unused asset, represented by the parameter q, does not affect the profitability of the investment. Instead, it affects the propensity to delay an investment as long as it is profitable. Suppose that the investment $\bar{L}$ is β-worthwhile. As shown in Appendix, when a present-biased investor is sophisticated (i.e. $\beta = \hat{\beta} = 1$), for given production opportunities and time preferences there always exists a unique value $\tilde{q}$ of property rights security on unused asset such that if (and only if) $q \leq \tilde{q}$, $d(\beta) = d(\hat{\beta}) = 0$ and the unique perception-perfect strategy consists in undertaking the profitable investment in the first period. Instead, for $q > \tilde{q}$, there are multiple perception-perfect strategies: what is

determined in the model is that the investment is undertaken within $d(\beta) = d(\hat{\beta})$ periods, where $d(\beta) = d(\hat{\beta})$ is non decreasing in q: the lower is q, the shorter is the maximum delay for a present biased and sophisticated investor to undertake the profitable investment $\bar{L}$.

Let us now discuss the case of partially naïve and fully naïve investors. Also in such a case, a unique value $\tilde{q}$ always exists such that, given the other parameters, $d(\beta) = d(\hat{\beta}) = 0$ if (and only if)) $q \leq \tilde{q}$, and the unique perception-perfect strategy consists in undertaking the investment in the first period. When $q > \tilde{q}$, two cases are possible: either $d(\hat{\beta}) + 1 \leq d(\beta)$, and the investor procrastinates the investment $\bar{L}$, or $d(\beta) = d(\hat{\beta})$, and the investor undertakes the investment $\bar{L}$ within $d(\beta) = d(\hat{\beta})$ periods. In Appendix I prove that lower values of q have a positive effect on the propensity to invest: indeed weaker property rights security on unused assets may imply a shorter delay for the investment and it may lead a present-biased and (partially) naïve investor to undertake the profitable investment $\bar{L}$. That otherwise, with stronger property rights security on unused asset, they would procrastinate.

I summarize as follows the basic intuition for such a result. Suppose that a certain investment on an asset is profitable. When property rights security on unused assets is weaker, delaying the investment means to incur the risk to lose in the future the control of the asset and the possibility to undertake the profitable investment. Therefore property rights insecurity on unused asset reduces the expected returns of delaying without any effect on the profitability of the investment.

4. Concluding Remarks

This paper presents a model of land investment in order to explore the interplay between property rigths and investment incentives when investors' time preferences are described in form of quasi-hyperbolic discounting, whose the standard form of exponential discounting is a particular case. While investors who exponentially discount immediately undertake a profitable investment, individuals characterized by a bias towards present utility may delay or even procrastinate (i.e. continuously delay and never undertake) a profitable investment. For this reason property rights can have an impact on investment incentives not only by affecting the profitability of the investment, but also the *timing* of the investment and this is a totally unexplored field in the literature.

The two major theoretical findings obtained through the analysis of the model we have proposed are the following: 1) the expected ability to get the benefits from a used asset has a non-negative (positive or null) effect on investment incentives of any investor (whatever his time preferences are); 2) the expected ability to undertake a certain investment in future periods (*property rigths security on unused asset*) has a non-positive (negative or null) effect on the investment incentives faced by any investor: while it does not affect investment incentives of time-consistent investors, it strengthens the propensity to delay or procrastinate a profitable investment of time-inconsistent investors.

In this paper we do the crucial assumption of investors credit-constrained, which is a strong assumption which is necessary in order not to make the model too complex but we think that it is a plausible assumption among small and medium landowners in low

income countries. In any case, it seems that also big landowners such as Brazilian landowners, who would have probably the possibility to sell the land or to ask credits to invest on it, tend to be present-biased (indeed they continuously receive occupations of unused land by Sem terra Movement, that only police can avoid). These findings suggest that a more comprehensive view about property rights is necessary in order take in account the most recent indings of behavioural economics.

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Appendix 1 – Proofs of Lemmas and Propositions

Proof of Lemma 1

For any $c, b, \bar{L}, \hat{\beta}, \ \delta, p, q$,

(1) if $\bar{L}$ is not $\hat{\beta}$-worthwhile, then $\widehat{L_t} = 0$ for all $t \geq 2$. Indeed if $\bar{L}$ is not $\hat{\beta}$-worthwhile, no positive investment is $\hat{\beta}$-worthwhile since, $\forall L > 0$, $-cL + \hat{\beta}\frac{\delta p}{1-\delta p} bL < \hat{\beta}[\delta p]^{\tau}\left[-cL + \frac{\delta p}{1-\delta p} bL\right]$ $\forall \tau \in \{1,2, \dots\}$. The latter inequality implies: $arg \max_{L_t} V^t(c, b, \bar{L}, L_t, h_t, \hat{s}, \hat{\beta}, \delta, p, q) = 0$ for all $t \geq 2$, hence $\widehat{L_t} = 0$ for all $t \geq 2$.

(2) if $\bar{L}$ is $\hat{\beta}$-worthwhile and $d(\hat{\beta}) > 0$, $\exists \tau \in (2,3, \dots, d(\hat{\beta}) + 2)$ such that $\widehat{L_t} = \bar{L}$ if and only if $t \in \{\tau, \tau + d(\hat{\beta}) + 1, \tau + 2(d(\hat{\beta}) + 1), \dots\}$ and $\widehat{L_t}$ otherwise. Indeed if $\bar{L}$ is β-worthwhile and $d(\hat{\beta}) > 0$, given the definition of $d(\hat{\beta})$, for any $d' \in \{1, \dots, d(\hat{\beta})\}$, if $\widehat{L_t} > 0$ and $\widehat{L_{t-d}} = 0$ $\forall d \in \{1, \dots, d' - 1\}$, then $arg \max_{L_t \in A_t} V^{t-d'} = 0$. For $d' = d(\hat{\beta}) + 1$, if $\widehat{L_t} > 0$ and and $\widehat{L_{t-d}} = 0$ $\forall d \in \{1, \dots, d' - 1\}$,, then $arg \max_{L_t \in A_t} V^{t-d'} = \bar{L}$: indeed, if $-c + \beta\frac{\delta p}{1-\delta p} b > 0$, $\bar{L}$ is the unique $arg \max_{L_t \in A_t} V^{t-d'}$. If instead $-c + \beta\frac{\delta p}{1-\delta p} b = 0$, any $L > 0$ is $arg \max_{L_t \in A_t} V^{t-d'}$ but *assumption Q* holds: hence $\hat{s}$ must have $\widehat{L_t} = \bar{L}$ every $d(\hat{\beta} + 1)$ periods and $\widehat{L_t} = 0$ otherwise. This condition can be satisfied only if $min\{t \in (2,3, \dots)/\widehat{L_t} = \bar{L}\} \in \{2, \dots, d(L/\hat{\beta}) + 2\}$.

(3) If $\bar{L}$ is $\hat{\beta}$-worthwhile and $d(\hat{\beta}) = 0$, it is straighforward that the unique dynamically consistent beliefs is $(\widehat{L_2}, \widehat{L_3}, \dots) = (\bar{L}, 0, 0, \dots)$.

Proof of Lemma 2

For any $c, b, \bar{L}, \beta, \hat{\beta}, \ \delta, p, q$,

(1) if $\bar{L}$ is not β-worthwhile, then $S^{pp} = \{s^0\}$. Indeed, if $\bar{L}$ is not β-worthwhile, for any $L > 0$, for any $\hat{s}(\hat{\beta}, \delta)$ and for all t, $V^t(L, \hat{s}(\hat{\beta}, \delta), \beta, \delta) < 0 \leq V^t(0, \hat{s}(\hat{\beta}, \delta), \beta, \delta)$, hence $S^{pp} = \{s^0\}$.

(2) if $\bar{L}$ is β-worthwhile and $d(\hat{\beta}) + 1 \leq d(\beta)$, $S^{pp} = \{s^0\}$ (*procrastination*). Indeed, suppose that $\bar{L}$ is β-worthwhile and $d(\hat{\beta}) + 1 \leq d(\beta)$. $\bar{L}$ is also $\hat{\beta}$-worthwhile, so that for any $\hat{s}(\hat{\beta}, \delta)$ and for all t, $V^t(0, \hat{s}(\hat{\beta}, \delta), \beta, \delta) = \beta[\delta q]^d\left[-c\bar{L} + \frac{\delta p}{1-\delta p} b\bar{L}\right]$ for some $d \in \{1,2, \dots, d(\hat{\beta}) + 1\}$. This implies that , $V^t(0, \hat{s}(\hat{\beta}, \delta), \beta, \delta) \geq \beta[\delta q]^{d(\hat{\beta})+1}\left[-c\bar{L} + \frac{\delta p}{1-\delta p} b\bar{L}\right]$ for all t. Since $V^t(\bar{L}, \hat{s}(\hat{\beta}, \delta), \beta, \delta) = -cL + \frac{\delta p}{1-\delta p} b$, a positive investment L can be $argmax\, V^t(L, \hat{s}(\hat{\beta}, \delta), \beta, \delta)$ only if $-cL + \beta\frac{\delta p}{1-\delta p} bL \geq \beta[\delta q]^{d(\hat{\beta})+1}\left[-cL + \frac{\delta p}{1-\delta p} bL\right]$. But since the definition of $d(\beta)$ implies that, for all $L > 0$, $-cL + \beta\frac{\delta p}{1-\delta p} bL < \beta[\delta q]^d\left[-cL + \frac{\delta p}{1-\delta p} bL\right]$ for all $d \leq d(\beta)$, hence $d(\hat{\beta}) + 1 \leq d(\beta)$ implies $-cL + \beta\frac{\delta p}{1-\delta p} bL < \beta[\delta q]^{d(\hat{\beta})+1}\left[-cL + \frac{\delta p}{1-\delta p} bL\right]$ for all $L > 0$. Therefore, if L is β-worthwhile but $d(\hat{\beta}) + 1 \leq d(\beta)$, for any $\hat{s}(\hat{\beta}, \delta)$, $S^{pp} = \{s^0\}$ (*procrastination*).

(3) If $\bar{L}$ is β-worthwhile and $d(\beta) = d(\hat{\beta}) > 0$, $s^0 \notin S^{pp}$ and any perception perfect strategy $s^{pp} \in S^{pp}$ must satisfy: $L^{pp} = \bar{L}$ for $t \in \{\tau(s^{pp}), \tau(s^{pp}) + d(\beta) + 1, \tau(s^{pp}) + 2(d(\beta) + 1), \dots\}$ and $L_t^{pp} = 0$ otherwise, where either $\tau(s^{pp}) = 1$ or $\tau(s^{pp}) = \tau(\hat{s})$. Indeed suppose that L is β-worthwhile and $d(\beta) = d(\hat{\beta}) > 0$: L is $\hat{\beta}$-worthwhile, so $\hat{s}$ must have $\widehat{L_t} = \bar{L}$ every and $d(\hat{\beta}) + 1$ periods and $\widehat{L_t} = 0$ otherwise. The definition of $d(\beta)$, the hypothesis of constant returns to scale and *assumption Q* imply that $s^0 \notin S^{pp}$ and that for any $\hat{s}(\hat{\beta}, \delta)$, the associated perception perfect

strategy must satisfy: $L_t^{pp} = \bar{L}$ if and only if $min\{d \in \{1,2,\dots\}/\hat{L}_{t+d}(\beta,\delta) = \bar{L}\} = d(\beta) + 1 = d(\hat{\beta}) + 1$ and $L_t^{pp} = 0$ otherwise. Hence $\tau(s^{pp}) = min\{t \in \{1,2,\dots\}/min\{d \in \{1,2,\dots\}/\hat{L}_{t+d}(\beta,\delta) = \bar{L}\} = d(\hat{\beta}) + 1\}$. This means that $\tau(s^{pp}) = 1$ when $\tau(\hat{s}) = d(\hat{\beta}) + 2$ and $\tau(s^{pp}) = \tau(\hat{s})$ otherwise.

(4) If $\bar{L}$ is β-worthwhile and $d(\beta) = d(\hat{\beta}) = 0$, the unique perception perfect strategy is $s^{pp} = (\bar{L}, 0,0, \dots)$. Indeed if $\bar{L}$ is β-worthwhile and $d(\beta) = d(\hat{\beta}) = 0$, the unique dynamically consistent belief is $(\hat{L}_2, \hat{L}_3, \dots) = (0,0, \dots)$. Since a one-period delay is not profitable, it is straighforward that the unique perception perfect strategy is $s^{pp} = (\bar{L}, 0,0, \dots)$.

Proof of Proposition 1

Consider $0 < \delta < 1$ and $\beta = \hat{\beta} = 1$.

(1) If $-c + \frac{\delta p}{1-\delta p} b < 0$, Lemma 2 proves that $S^{pp} = \{s^0\}$. Suppose that $-c + \frac{\delta p}{1-\delta p} b \geq 0$. Since $d(\beta = 1) = 0$, the unique perception perfect strategy is $s^{pp} = (\bar{L}, 0,0, \dots)$.

(2) Given b, c, δ , if $-c + \frac{\delta}{1-\delta} b < 0$, then $-c + \frac{\delta p}{1-\delta p} b < 0$ for any $0 < p \leq 1$, hence $S^{pp} = \{s^0\}$. If instead $-c + \frac{\delta}{1-\delta} b \geq 0$, let $0 < \tilde{p} = \frac{c}{\delta(b+c)} < 1$. If $p \geq \tilde{p}$, $-c + \frac{\delta p}{1-\delta p} b \geq 0$ and the unique perception perfect strategy is $s^{pp} = (\bar{L}, 0,0, \dots)$. If instead $p < \tilde{p}$, $-c + \frac{\delta p}{1-\delta p} b < 0$ and $S^{pp} = \{s^0\}$.

(3) It is straighforward since, as it is evident in (1), the parameter q does not affect perception perfect strategies.

Proof of Proposition 2

If $0 < \delta < 1$ and $\beta < 1$:

(1) if $-c + \frac{\delta p}{1-\delta p} b < 0$, $S^{pp} = \{s^0\}$; if instead $-c + \frac{\delta p}{1-\delta p} b \geq 0$, when $d(\hat{\beta}) + 1 \leq d(\beta)$, $S^{pp} = \{s^0\}$ (*procrastination*); when $d(\hat{\beta}) = d(\beta)$, $S^{pp} \neq \{s^0\}$ and in particular if $d(\hat{\beta}) = d(\beta) = 0$, $s^{pp} = (\bar{L}, 0,0, \dots)$ whereas if $d(\hat{\beta}) = d(\beta) > 0$, there exist multiple perception perfect strategies (see Lemma 2).

(2) Given b, c, δ, β, if $-c + \frac{\delta}{1-\delta} b < 0$, it is straighforward that, for any $0 < p \leq 1$, $-c + \frac{\delta p}{1-\delta p} b < 0$. Hence, for any $0 < q \leq 1$ and any $\hat{\beta}$, $S^{pp} = \{s^0\}$. If instead $-c + \frac{\delta}{1-\delta} b \geq 0$, let $0 < \tilde{p} = \frac{c}{\delta(b+c)} \leq 1$. If $p < \tilde{p}$, $-c + \frac{\delta p}{1-\delta p} b < 0$ and, for any $0 < q \leq 1$ and any $\hat{\beta}$, $S^{pp} = \{s^0\}$. If instead $p \geq \tilde{p}$, $-c + \frac{\delta p}{1-\delta p} b \geq 0$ and $S^{pp} \neq \{s^0\}$ if and only if $d(\beta) = d(\hat{\beta})$.

(3) By definition $d(\beta) = max\left\{d \in \{0,1,\dots\}/-c + \beta \frac{\delta p}{1-\delta p} b < \beta(\delta q)^d \left[-c + \frac{\delta p}{1-\delta p} b\right]\right\}$. Hence $d(\beta) = 0$ if and only if $-c + \beta \frac{\delta p}{1-\delta p} b > \beta\delta q \left[-c + \frac{\delta p}{1-\delta p} b\right]$, i.e. if and only if $q < \frac{-c+\delta pc+\beta\delta pb}{\beta\delta(-c+\delta pc+\delta pb)} \equiv \tilde{q}$. We know from Lemma 2 that if $-c + \frac{\delta p}{1-\delta p} b \geq 0$ and $d(\beta) = 0$, the unique perception perfect strategy is $s^{pp} = (\bar{L}, 0,0, \dots)$. If instead $q > \tilde{q}$, $d(\beta) > 0$ and Lemma 2 suggests that there are $d(\beta) + 1$ perception perfect strategies, where any perception perfect strategy $s^{pp} \in S^{pp}$ must satisfy: $L^{pp} = \bar{L}$ for $t \in \{\tau(s^{pp}), \tau(s^{pp}) + d(\beta) + 1, \tau(s^{pp}) + 2(d(\beta) + 1), \dots\}$ and $L_t^{pp} = 0$ otherwise, where $\tau(s^{pp}) \leq \tau(\hat{s}) \leq d(\beta) + 1$. Given the definition of $d(\beta)$, it is straighforward that $d(\beta)$ is non decreasing in q and thus also in $\tau(s^{pp})$.

Suppose now $-c+\beta\frac{\delta p}{1-\delta p}b \geq 0$ and $\beta < \hat{\beta} \leq 1$ (naif or partially naif investor). Given b, c, δ, p, β, let $\tilde{q} = \frac{-c+\delta pc+\beta\delta pb}{\beta\delta(-c+\delta pc+\delta pb)}$. For any β and $\hat{\beta}$ such that $\beta < \hat{\beta} \leq 1$, $d(\beta) = 0$ if and only if $q \leq \tilde{q}$, i.e. $s^{pp} = (\bar{L}, 0,0, \dots)$ if and only if $q \leq \tilde{q}$. If instead $q > \tilde{q}$, $d(\beta) > 0$ and if $d(\hat{\beta}) + 1 \leq d(\beta)$, $S^{pp} = \{s^0\}$ (*procrastination*), whereas if $d(\hat{\beta}) = d(\beta)$, any $s^{pp} \in S^{pp}$ must satisfy: $L_t^{pp} = \bar{L}$ for $t \in \{\tau(s^{pp}), \tau(s^{pp}) + d(\beta) + 1, \tau(s^{pp}) + 2(d(\beta) + 1), \dots\}$ and $L_t^{pp} = 0$ otherwise, where, given the definition of $d(\beta)$, $d(\beta)$ is non decreasing in q and also in $\tau(s^{pp})$. Suppose now that there exists $\ddot{q} > \tilde{q}$ such that $S^{pp} \neq \{s^0\}$, meaning that $d(\beta) = d(\hat{\beta})$. Hence $\forall q \in (\tilde{q}, \ddot{q})$, $S^{pp} \neq \{s^0\}$. Indeed by definition: $d(\beta) = max\left\{d \in \{0,1, \dots\}/(\delta q)^d > \frac{\frac{1}{\beta}(-c+\delta pc)+\delta pb}{-c+\delta pc+\delta pb}\right\}$ and $d(\hat{\beta}) = max\left\{d \in \{0,1, \dots\}/(\delta q)^d > \frac{\frac{1}{\hat{\beta}}(-c+\delta pc)+\delta pb}{-c+\delta pc+\delta pb}\right\}$. Let call $\frac{\frac{1}{\beta}(-c+\delta pc)+\delta pb}{-c+\delta pc+\delta pb} \equiv A$ and $\frac{\frac{1}{\hat{\beta}}(-c+\delta pc)+\delta pb}{-c+\delta pc+\delta pb} \equiv B$, where $B \geq A$. If, for $q = \ddot{q}$, $d(\beta) = d(\hat{\beta}) = \check{d}$, this means that $(\delta\ddot{q})^{\check{d}} > B \geq A$. Consider now any $q \in (\tilde{q}, \ddot{q})$. Since $d(\beta)$ is non decreasing in q, it must be that $d(\beta) \leq \tilde{d}$ and $d(\hat{\beta}) \leq \tilde{d}$. If $d(\beta) = \check{d}$, also $d(\hat{\beta}) = \tilde{d}$ and $S^{pp} \neq \{s^0\}$. Consider instead $d(\beta) = d' < \tilde{d}$; this means that $(\delta\ddot{q})^{\check{d}} \leq (\delta\ddot{q})^{d'+1} \leq A$. Since $B \geq A$, it must be that $(\delta\ddot{q})^{\check{d}} \leq (\delta\ddot{q})^{d'+1} \leq B$ and hence $d(\hat{\beta}) = d(\beta)$.

Suppose now that there esists $\bar{q} > \tilde{q}$ such that $S^{pp} = \{s^0\}$ (*procrastination*). Hence there exists q^*, where $\tilde{q} \leq q^* < \bar{q}$ such that $S^{pp} \neq \{s^0\}$ for any $q \leq q^*$. Indeed $S^{pp} = \{s^0\}$ means that $d(\hat{\beta}) + 1 \leq d(\beta)$. Since both $d(\beta)$ and $d(\hat{\beta})$ are non decreasing in q, it may be (depending on the parameters) that there exists $q^* > \tilde{q}$ such that $d(\beta) = d(\hat{\beta})$, which would imply that $S^{pp} \neq \{s^0\}$ for any $q \leq q^*$, where $q^* > \tilde{q}$. If instead for any $q^* > \tilde{q}$ I have that $d(\hat{\beta}) + 1 \leq d(\beta)$, we know that for any $q \leq \tilde{q}$ the unique perception perfect strategy is $s^{pp} = (\bar{L}, 0,0, \dots)$.

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THE INTER-RELATIONS BETWEEN CHINESE HOUSING MARKET, STOCK MARKET AND CONSUMPTION MARKET

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Abstract

Recent years have witnessed a dramatic increase in real estate prices in mainland China. Current research mainly takes the Chinese housing market as an independent market and focuses on potential future growth or the increasing asset bubble in this market. This research, however, studies the short- and long-run interrelationship between the housing market and two other major markets in mainland China - the stock market and the domestic consumption market - from 2005 to 2019. In addition, the codependency between China's economy and the real estate market is also examined. After detecting the structural breaks in the time series of property price index by using the recursive CUSUM test, the whole examining period is divided into sub-periods. In each sub-period, the variance decomposition and Granger causality tests are used to identify the time-varying short- and long-run interdependencies between these markets. Results indicate that there is time-varying relation between property prices and stock indexes, and the correlation between property prices and stock indexes becomes weaker over time. In terms of housing market and the domestic consumption market, a weak relation between these two markets is observed over the whole period. These findings are of vital importance for China domestic investors to help them understand and diversify the risk of their portfolios, which are mainly composed by property and stock assets. In addition, these results offer new insight into the impact of the housing market on the domestic consumption market within Chinese context. This further aids the Chinese government in regulating these three markets more efficiently and avoiding any unwanted "domino effect" between them.

Keywords: Variance decomposition, Stock market, Property market, Domestic consumption market, China.

JEL Classification: C12, R21, R31.

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1. Introduction

A sharp increase in real estate prices combined with an extraordinary lending growth in China during 2009 has led to increasing scholarly attention on the Chinese housing market (Ahuja et al., 2010). The changes in housing prices may have an important spillover effect on the economic and financial stability of the public, especially when housing prices are clearly out of line with the fundamentals (Hilbers et al., 2008). However, most existing researches are limited to only two aspects, i.e., identifying the driving factors behind the skyrocketing housing prices, and quantifying the risk or "bubble" of the housing market. In terms of identifying the driving factors, speculative capital inflow, the expansionary monetary policy, changes in fundamental factors like wage income, land supply and construction costs and other important ratios, e.g., price to rent ratio and price to income ratio, are believed to have accelerated the subsequent home price growth (Guo and Huang, 2010; Xu and Chen, 2012; Wu et al., 2012; Wang and Zhang, 2014). The research of Wu et al. (2016) delivers a comprehensive overview of the driving factors behind the rise in housing prices in China. The other research area, i.e., identifying and quantifying the housing market bubble in China, has attracted even more scholarly interest, as bursting real estate bubbles has traditionally done great harm when they are closely associated with financial crises (Glaeser et al., 2017; Zhao et al., 2017). Most scholars claim that there is no evidence of a real estate bubble at the national level, but that it exists at the regional level (Ahuja et al., 2010; Ren et al., 2012; Dreger and Zhang, 2013; Feng and Wu, 2015, Glaeser et al., 2017).

Traditionally, both houses and stocks are considered as investment alternatives, and the causal correlation between stock market and property market is either due to the wealth effect or the credit effect or both. The wealth effect is observed when unexpected gains in stock prices take place. The increasing proportion of stocks in investment portfolios and the perceived change in wealth can motivate households to rebalance their portfolios by investing in or consuming more housing services. The credit price effect, on the other hand, suggests a reverse causation from house prices to stock prices (Kapopoulos and Siokis, 2005; Ibrahim, 2009). From the perspective of risk diversifications, the interrelationship between property and the stock market, and especially the magnitude of this relationship, is a crucial topic in real world investment, as it can shed light into the strategies retail investors use in portfolio optimization (Hui et al., 2009a,b; Hui and Yu, 2010; Hui et al., 2011; Hui and Ng, 2012). From the perspective of investment decision making, the correlation, and especially the causality of this correlation, between these two markets yields a number of insights that can aid investors and speculators in forecasting future performance from one market to the other (Okunev et al., 2000). According to Credit Suisse Global Wealth Databook (2017) and the China Family Wealth Survey Report (2017), the Chinese middle class comprises of around 385 million individuals, with 66% and 11% wealth from their property and financial investment respectively. Therefore, the relation between the housing market and stock market is crucial for Chinese retail investors in diversifying their portfolio and making their investment decisions. This is further of vital importance for the stability of Chinese middle-class and needs to be more fully understood.

It is a widespread empirical finding that house prices and levels of consumption are synchronized (Browning et al., 2013). The most accepted explanation is that changes in house prices affect household consumption. According to the Permanent Income

hypothesis (Friedman, 1957) and the Life-Cycle Analysis hypothesis (Modigliani and Brumberg, 1954; Modigliani and Ando, 1957), households make consumption decisions based on the latest information about the changes of their lifetime wealth. As housing is normally the most determined source of households' private wealth, any unexpected changes in housing price may affect households' consumption decisions. China used to rely heavily on exports for economic growth. However, in late 2008, following a sharp decline in overseas demand, China switched its focus to boosting domestic consumption to shore up the economy (Chen et al., 2009). In the year of 2019, the total domestic retail sales of consumer goods was 41.2 trillion RMB and was responsible for 57.6% of the total economic growth in China. Six years in a row, the domestic consumption has been the most important driving factor behind economic growth in China. However, China's property prices are volatile and are believed to be overestimated. Thus, understanding the impact of housing prices on consumption is of great interest for policy makers in China trying to stimulate domestic consumption.

The present paper seeks to provide a new perspective on the China's housing market by examining the interrelations between the property market and two other important markets, the stock market and the domestic consumption market. As shown in the literature, movements in housing prices have a significant impact on the other two markets, meaning that shock from the property market can be strongly transmitted to other markets in short- to medium-run. Besides, in the long-term, the interrelationship between these markets might be not stable. Any structural break in the examining time series can lead to changes in the relationship between the markets. Furthermore, due to the unstable relationship between these markets, the causal relation between them can be also time-varying. This research will shed light on the interaction between the Chinese property market and stock market and domestic consumption market within this context.

This study proceeds as follows: Section 1 is the introduction. Section 2 presents a literature review of previous studies on relations between residential property prices, the stock index and domestic consumption. In Section 3, the econometric techniques and the dataset are described. Section 4 reports and discusses the research findings. Conclusions are drawn in Section 5.

2. Literature review

The relation between property market and stock market and domestic consumption market are studied by a number of researches. However, the results are mixed due to the differences in data, data frequency, econometric methods and geographically researched areas.

As to the correlation between property market and stock market, two research areas are under focus. The first one is whether there is a co-movement between these two markets. Ibbotson and Siegel (1984) using annual data find the correlation between U.S. housing market and S&P 500 is -0.06. However, based on quarterly data, Hartzell (1986) detects the correlation coefficient to be -0.25. Worzala and Vandell (1993) estimate this correlation in U.K. to be 0.039. Newell and Chau (1996) use a simple correlation method and show a low positive correlation exists between these two markets in Hong Kong. In the same year, Eichholtz and Hartzell (1996) find that the correlation between these two markets is negative in Canada, the United Kingdom, and the United States. Quan and Titman (1999) also conduct an international study and find, by contrast, a low significant

positive relation between stock returns and changes in commercial real estate values. Fu and Ng (2001) estimate a moderate correlation (0.44) between these two markets in Hong Kong using Present-Value Approach. Berg et al. (2007) reveal that there are time-varying correlations between residential property price indexes and S&P 500 index.

The second research filed concerns the causal relations, i.e., wealth effect or credit price effect, between property and stock markets. Okunev et al. (2000) show a strong unidirectional non-linear causal relationship from the stock market to the real estate. Chen (2001) examines causal relation between the two asset prices for Taiwan and suggests the existence of wealth effect. Sutton (2002) also finds the wealth effect existing between housing and stock markets in six advanced economies. Kakes and Van den End (2004), as well as Kapopoulos and Siokis (2005), detect the causal relation from stock market to property market in their researches. Sim and Chang (2006), by contrast, find that property prices Granger-cause stock prices in South Korea. Also in Asia, Ibrahim (2010) using VEC model, however, indicates the existing wealth effect in Thailand. Anderson and Beracha (2012) find the effect of property price on stock pricing, but this effect is strongly time-varying. Aye et al. (2013) employ a non-parametric co-integration test to identify a long-term bidirectional causal relationship between the two markets.

In terms of the interplay between housing market and domestic consumption market, researchers mainly focus on the nature and strength of the correlation between them. However, the division of opinions is huge. Early research by Elliott (1980) indicates that there is no effect of housing wealth upon consumption. This finding is questioned by Peek (1983) and Bhatia (1987) in terms of the methods used in the research. Case (1992) finds the effect of change in housing price on consumption by examining the data used in Elliott's study but with different method. Using the individual household data, many researchers find small but significant impact of housing wealth on consumption behavior of household (Skinner, 1989; Sheiner, 1995; Engelhardt, 1996). This result is, again, challenged by serval researchers (Thaler, 1990; Hoynes and McFadden, 1997; Levin, 1998). They argue that there is no significant influence of housing price on consumption. In the 20th century, Bradbury et al. (2001), Case and Quigley (2008), Gan (2010), Carroll et al. (2011) and Simo-Kengne (2015) continue arguing that there exists wealth effect of housing on consumption, while Lettau and Ludvigson (2001, 2004), Chen (2006), Iacoviello (2011) and Browning et al. (2013) believe in vanishing of this effect. This topic is also discussed in China, and the results are quite similar that increasing in housing wealth positively affect the consumption (Zang, 1994; He, 2000; Song, 2007; Lai and Bai 2008). However, the methodology used in these works are questionable as argued in Lettau and Ludvigson (2004).

3. Data and Methodology

This section will describe the data and the methodology used in this study. The data is collected from various online open sources databanks, and the statistical analysis is conducted in R using different packages.

3.1. Data

Inconsistences between China's residential property price indices published by different institutes can lead to controversial results as mentioned beforehand in the literature

review. Therefore, in this study the data for housing price is collected from an international official data source so as to avoid the "book cocking" of the institute from mainland China in reporting property price and control the data quality. For the Chinese housing price (CHP), the China Nominal Residential Property Price Index from 2005Q2 to 2019Q2 is obtained from Bank for International Settlements. This price index, different from many other price indices that only report certain cities housing price, is a China national wide housing price index on quarterly base. In the same period, the quarterly SSE Composite Index collected from the Shanghai Stock Exchange is used for the Chinese stock market index (CSMI). The Total Retail Sales of Consumer Goods in RMB, published monthly by National Bureau of Statistics of China (NBSC), is collected to represent the chronological situation of the Chinese domestic consumption market (CDCM).

In order to better explore the interaction between the property market and the other two markets in China, as well as the market fundamentals, two additional macroeconomic variables are included in this study - firstly, the Chinese inflation rate represented by monthly CPI, and secondly, China's nominal GDP in RMB as economic indicator. Both variables are obtained from the NBSC for the period from 2005Q2 to 2019Q2.

As the data on CDCM and CPI is on a monthly basis, in order to stay in line with the data frequency of CHP, the monthly values of these two variables are converted to quarterly values. In total, the examining period is from 2005Q2 to 2019Q2 on a quarterly base with 5 variables, i.e., CHP, CSMI, CDCM, CPI and GDP, with the sample size being 57.

3.2. Methodology

The methods to study the interaction between the housing market, stock market, domestic consumption market, as well as other economic factors in China, follow those used by Ng & Hui (2012). Firstly, the existence of structural breaks in the examined housing price time series is tested by using recursive CUSUM (Chow, 1960; Brown et al., 1975; Ploberger and Krämer, 1992; Hansen, 2001; Hjort, and Koning, 2002; Zeileis, 2006). This test, with the null hypothesis that there is no structural break in the time series, generally examines the stationarity of the focused variable. The test result is crucial for the next-step variance decomposition and Granger causality test, since any undetected structural breaks in the time series can lead to a huge forecasting error (Hansen, 2001). If structural breaks are detected in the China's property price time series, they are used as separate points by which to divide the whole sample period into sub-samples. In each sub-period, the short- and long-run causal relation are tested between different markets to deliver more accurate results.

Since both variance decomposition and Granger causality tests require the tested data series to be stationary, the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test with two specifications, i.e. level stationarity and trend stationarity, is deployed beforehand to test the existence of the unit root of the all the time series under research (Kwiatkowski et al., 1992; Hobijn et al. 2004). The KPSS test has the null hypothesis of the stationarity against the alternative hypothesis of non-stationarity. If the null hypothesis cannot be rejected, the time series can be considered as stationary. Any examined non-stationary data series are stabilized using first level difference. After all the data series being

stationary on the same level, the data is ready for the short- and long-run causality testing.

In terms of identifying the short-run relation between the housing market, stock market and domestic consumption market in China, the method used in this study is the spillover index approach proposed by Diebold and Yilmaz (2009, 2012, and 2014) with the core idea of variance decomposition built on the Vector Autoregressive (VAR) model. As to the long-run causal relation, the Granger causality test based on Wald-test is deployed to identify a relatively long run relationship between the housing market, stock market and domestic consumption market, respectively (Granger, 1969 and 1980).

4. Results and Discussion

In order to systematically study the causal relationship between these three entities, the following test procedures will be utilized:

4.1. Overview and Descriptive Statistics

To deliver a first impression of the trends in the China's housing market, stock market and domestic consumption market during the study period, the courses of these three markets with 2005Q2 as the basis of 100% are plotted in Figure 1. In addition, Table 1 summarizes the descriptive statistics of all the studied variables for the whole research period.

Table 1. Descriptive Statistics of the Variables

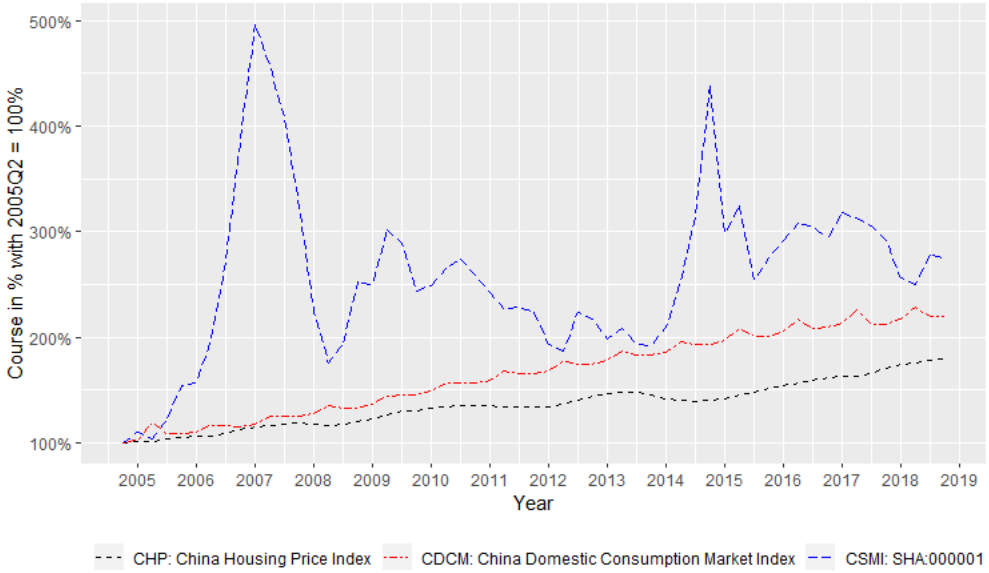
Variables	Min	Median	Mean	Max	SD
CHP (in %)	100.00	135.30	136.20	179.70	21.24
CSMI	1060.00	2688.00	2724.00	5258.00	850.61
CDCM (in 100 Mio RMB)	14498.00	50415.00	53806.00	106688.00	27463.73
GDP (in 1 Bn RMB)	4479.30	245289.60	292926.70	768653.10	226124.70
CPI (in %)	-1.30	0.69	0.61	3.10	0.97

Source: Bank for International Settlements, Shanghai Stock Exchange and National Bureau of Statistics of China

As seen in Figure 1, housing prices and the domestic consumption index increased gradually from 2005Q2 to 2019Q2, while the stock index fluctuated strongly during the same period. From 2005 to 2007, the Chinese stock index represented by the SSE Composite Index was on a strong upward trend. In October 2007, the SSE Composite Index reached its historical high at 6124.04, increasing by over 500% since 2005. While the stock market in China was obviously over-heated in this period, both the housing and domestic consumption markets showed a mild upward tendency. In 2007Q4, the People's Bank of China raised its benchmark interest rate and China's stock index started to crash from 6124.04 to 1644. From 2010 to 2014, the stock market was generally bearish in China. However, during the same period, both the housing and

domestic consumption markets followed an accelerated upward trend. As the stock market once again started to boom from 2014 to 2015, both the housing and domestic consumption market showed a clear decline. Starting from 2016, housing price resumed its upward trend, while both the domestic consumption market and stock market entered into fluctuation period. Different from stock market, in this period, the fluctuation of consumption market seemed to come from a significant seasonality effect. In general, during the whole period, China's housing market shared a slowly rising tendency with the domestic consumption market, while the tendency of stock market deviated strongly from it of property market.

Figure 1. Trends of Housing Price, Stock Index and Domestic Consumption Index



Source: Bank for International Settlements, Shanghai Stock Exchange and National Bureau of Statistics of China

4.2. Structural Breaks in the Chinese Housing Market

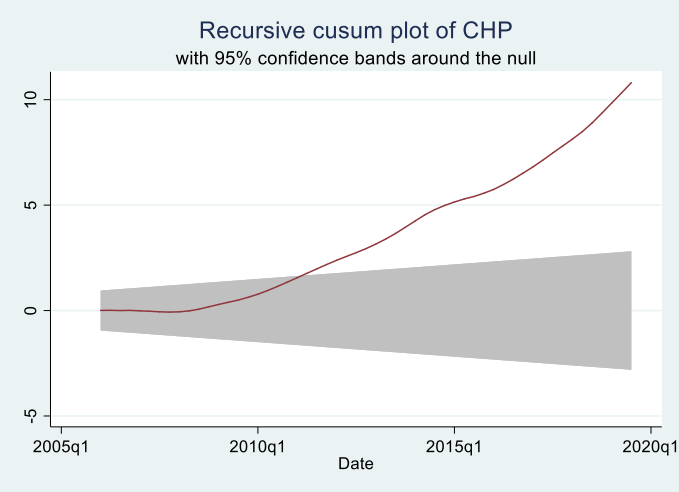
Since a causal relationship can only exist between two objects, to study the relationship between the housing market and other two markets, two research pairs are defined. The housing market together with the stock market and the other macroeconomic factors, i.e. GDP and CPI, constitute the first studied pair. The second analysis pair is the housing market, domestic consumption market and the two market fundamental factors.

In order to obtain reliable causal relationship test results in both the short- and long-run, the structural break must first be detected in each analyzed pair. If, for example, a structural break exists in the analysis pair of the housing market and stock market, the original equilibrium between these two markets before the structural break point is replaced by a new one after this point. Then it is inappropriate to just take the total sample period as one research period, since the period prior to the structural break should have a different causal relation between the two markets than the period post to the structural break.

As shown in Figure 1, the housing price deviated significantly from the stock market after 2011 suggesting in this analysis pair there exists a structural break in year 2011. The clearly shared trend between property market and domestic consumption market during the whole period indicates that there might be no structural break in the housing price time series of this research pair.

To statistically test the structural break in both research pairs, the recursive CUSUM is applied in each pair. As shown in Figure 2, the recursive CUSUM of housing price is within the 95% confidence area before 2011Q2, and then goes across the 95% confidence band. This suggests that there exists a structural break in housing price time series locating in the time point 2011Q2. Therefore, the whole sample period is divided into two sub-samples, i.e., 2005Q2-2011Q1 and 2011Q2-2019Q2, to identify the possible time-varying short- and long-run causal relationships.

Figure 2. Recursive CUSUM Test for Housing Market and Stock Market



Note: the grey area is the 95% confidence level, the red line is the recursive CUSUM of China's housing price (CHP).

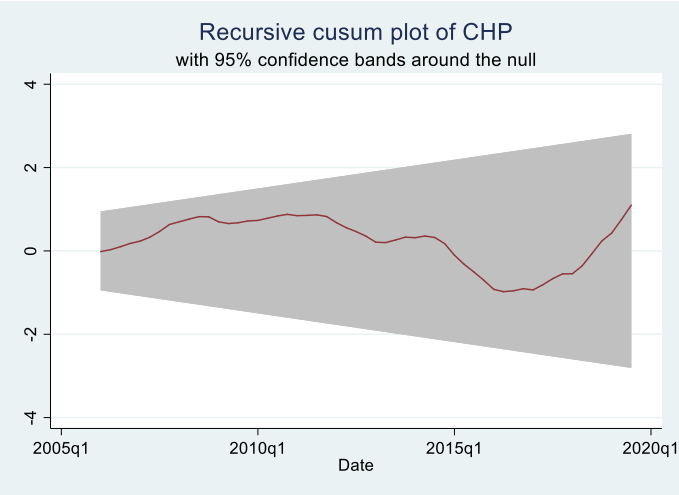
Pearson correlation tests are also conducted for these two sub-samples, the results of which are summarized in Table 2. It is clear that there is an observable difference between correlation coefficients between the housing market and stock market in these two periods.

Table 2. Pearson Correlation Coefficients among the Variables for Both Sub-sample Periods

Variables	**CHP**	**CSMI**	**CDCM**	**GDP**	**CPI**
Period 1: 2005Q2-2011Q1					
CHP	1.00	0.63	0.95	0.93	0.25
CSMI	0.63	1.00	0.47	0.67	0.52
CDCM	0.95	0.47	1.00	0.92	0.21
GDP	0.93	0.67	0.92	1.00	0.23
CPI	0.25	0.52	0.21	0.23	1.00
Period 2: 2011Q2-2019Q2					
CHP	1.00	0.35	0.87	0.90	-0.12
CSMI	0.35	1.00	0.54	0.52	-0.15
CDCM	0.87	0.54	1.00	0.98	-0.20
GDP	0.90	0.52	0.98	1.00	-0.20
CPI	-0.12	-0.15	-0.20	-0.20	1.00

For the research pair housing market and domestic consumption market, no structural break is detected in the period from 2005Q2 to 2009Q2, as seen in Figure 3. This result is expected, since these two markets generally shared the same trend in the whole sample period. Therefore, there is no need to split the total sample into sub-samples to study the causal relation. The causal relation between housing market and domestic consumption market is stable over the whole sample period.

Figure 3. Recursive CUSUM Test for Housing Market and Domestic Consumption Market



Note: The grey area is the 95% confidence level, the red line is the recursive CUSUM of China's housing price (CHP).

4.3. Stationarity Test of the Variable

Before conducting short- and long-run causal relationship test using variance decomposition and the Granger causality test, the stationarity of all the tested variables is examined by the KPSS test. The KPSS test has the null hypothesis of stationarity against the alternative hypothesis of non-stationarity.

In terms of the housing market and stock market, since the whole sample period is divided by the identified structural break into two sub-samples, the KPSS stationarity test for all the variables in each period must be conducted. Before testing the stationarity of the variables, the natural logarithm is taken for the variables China's housing price (ln(CHP)), stock market index (ln(CSMI)), domestic consumption market (ln(CDCM)) and GDP (ln(GDP)) to stabilize the data series. The results for 2005Q2-2011Q1 and 2011Q2-2019Q2 are summarized in Table 3. As shown in Panel A and Panel B, after the first difference (I(0)) the null hypothesis of all the variables cannot be rejected. This result indicates that all the variables are stationary in both periods and ready for the variance decomposition and Granger causality test.

Table 3. KPSS Test for Variables Stationarity for Test Pair Housing Market and Stock Market in Two Sub-sample Periods

Variable	Null Hypothesis	*p*-Value	Null Hypothesis	*p*-Value
Panel A: 2005Q2-2011Q1				
I(0)				
ln(CHP)	Level	<0.01	Trend	>0.1
ln(CSMI)	Level	>0.1	Trend	<0.05
ln(CDCM)	Level	<0.01	Trend	>0.1
ln(GDP)	Level	<0.01	Trend	<0.05
CPI	Level	>0.1	Trend	>0.1
I(1)				
ln(CHP)	Level	>0.1	Trend	>0.1
ln(CSMI)	Level	>0.1	Trend	>0.1
ln(CDCM)	Level	>0.1	Trend	>0.1
ln(GDP)	Level	>0.05	Trend	>0.05
CPI	Level	>0.1	Trend	>0.1
Panel B: 2011Q2-2019Q2				
I(0)				
ln(CHP)	Level	<0.01	Trend	<0.05
ln(CSMI)	Level	<0.05	Trend	>0.1
ln(CDCM)	Level	<0.01	Trend	<0.01
ln(GDP)	Level	<0.01	Trend	<0.01
CPI	Level	>0.1	Trend	>0.05
I(1)				
ln(CHP)	Level	>0.1	Trend	>0.1
ln(CSMI)	Level	>0.1	Trend	>0.1
ln(CDCM)	Level	>0.05	Trend	>0.05
ln(GDP)	Level	>0.05	Trend	>0.05
CPI	Level	>0.1	Trend	>0.05

Note: KPSS test tests the unit root with null hypothesis of stationary against alternative hypothesis of non-stationary.

As to the stationarity test for the research pair of the housing market and domestic consumption market, the stationarity of the same variables for the whole sample period is tested. Similarly to before, the natural logarithm is also taken for CHP, CSMI, CDCM and GDP to stabilize the data series. The results reported in Table 4 indicate the stationarity of all the variables after the first difference.

Table 4. KPSS Test for Variables Stationarity for Test Pair Housing Market and Stock Market in Whole Sample Period

Variable	**Null Hypothesis**	***p*-Value**	**Null Hypothesis**	***p*-Value**
I(0)				
ln(CHP)	Level	<0.01	Trend	>0.01
ln(CSMI)	Level	>0.1	Trend	>0.1
ln(CDCM)	Level	<0.01	Trend	<0.01
ln(GDP)	Level	<0.01	Trend	<0.01
CPI	Level	>0.1	Trend	>0.1
I(1)				
ln(CHP)	Level	>0.1	Trend	>0.1
ln(CSMI)	Level	>0.1	Trend	>0.1
ln(CDCM)	Level	>0.01	Trend	>0.1
ln(GDP)	Level	>0.05	Trend	>0.05
CPI	Level	>0.1	Trend	>0.1

Note: KPSS test tests the unit root with null hypothesis of stationary against alternative hypothesis of non-stationary.

4.4. Short-run Causal Relation

To identify the short-run causal relation, the spill-over index approach developed by Diebold and Yilmaz is adopted. The measurement of the spillovers of the housing market onto the other two markets is the variance decomposition based on vector autoregressive (VAR) models. This technique allows the aggregation of spillover effects across markets, and distills vital information into a single spillover measure (Diebold & Yilmaz 2009). Therefore, the variance decomposition enables the quantification of a causal relationship between markets.

Panel A and Panel B of Table 5 summarize the variance decomposition test of the housing market and stock market for both sub-periods. In the first period from 2005Q2 to 2011Q1, China's housing market prices from the short- to medium-run (1 quarter to 1 year) are strongly affected by previous prices. China's stock market also has a strong impact on the housing market in the same period, accounting for 39.44% of the shock that the housing market receives. Regarding the stock market in China, the housing market has the second strongest effect (29.93%) after the stock market's previous course

(64.40%) over the 1-year horizon. After the structural break in 2011Q2, a different situation is found for the housing market and stock market. Both housing prices and the stock index in China are strongly influenced by their own previous courses. Only 7.20% variation of housing prices can be explained by the shock from the stock market, and the shock from the housing market can induce 14.95% course variation of the stock market. All in all, the stock market and housing market have strong bilateral impacts and can mainly explain the movements of each other, but these impacts diminish over time. By contrast, the impact of GDP and CPI on the housing market and stock market are negligible in both period. Furthermore, a significant difference between both periods is clearly observed.

Table 5. Variance Decomposition for the Test Pair Housing Market and Stock Market

Period	**Variables**			
(in Quarter)	**CHP**	**CSMI**	**GDP**	**CPI**
Panel A: 2005Q2-2011Q1				
Variance Decomposition of China Housing Price Index (CHP)				
1	100.00	0.00	0.00	0.00
2	62.30	29.38	6.85	0.47
3	48.81	38.66	9.03	3.50
4	48.83	39.44	8.30	3.43
Variance Decomposition of China Stock Market Index (CSMI)				
1	37.89	62.11	0.00	0.00
2	21.93	71.17	5.83	1.08
3	27.43	67.24	4.50	0.83
4	29.93	64.60	4.60	3.43
Panel B: 2011Q2-2019Q2				
Variance Decomposition of China Housing Price Index (CHP)				
1	100.00	0.00	0.00	0.00
2	91.43	7.71	0.01	0.85
3	91.29	7.06	0.46	1.18
4	91.20	7.20	0.48	1.12
Variance Decomposition of China Stock Market Index (CSMI)				
1	2.57	97.43	0.00	0.00
2	11.48	83.93	2.28	2.31
3	11.79	81.49	4.47	2.25
4	14.95	77.45	4.91	2.70

In terms of the housing market and domestic consumption market, since there is no structural break detected, the whole sample period is taken to conduct the variance decomposition test. As seen in Table 6, in a 1-year time span, the housing market does not receive a strong impact (1%) derived from the domestic consumption market, with over 95% property prices being explained by itself. Similarly, the domestic consumption market is also almost insensitive to the housing market, since the shock from the housing market can only explain 3.44% to 5.68% volatility of the domestic consumption market. This finding indicates a weak correlation between both markets from the short- to medium-run. On the contrary, CPI can largely explain the variation in domestic consumption market, with 31.64% received shock. The GDP does not play an important role in explaining the variation in housing prices and the domestic consumption market index.

Table 6. Variance Decomposition for the Test Pair Housing Market and Domestic Consumption Market

Period	**Variables**			
(in Quarter)	**CHP**	**CDCM**	**GDP**	**CPI**
Variance Decomposition of China Housing Price Index (CHP)				
1	100.00	0.00	0.00	0.00
2	98.33	0.63	0.01	1.04
3	96.71	1.02	0.08	2.19
4	96.55	1.00	0.28	2.16
Variance Decomposition of China Domestic Consumption Market Index (CDCM)				
1	4.90	95.10	0.00	0.00
2	5.68	90.67	0.73	2.92
3	3.81	70.82	0.91	24.46
4	3.44	63.88	1.03	31.64

Since variance decomposition tests are only able to inform us of the general relationship between different variables with the corresponding strength, in order to understand the directions of the transmission of shocks, the Granger causality test is used to find the shock transmission channels between markets.

4.5. Long-run Causal Relation

After using variance decomposition to study to short-run relation between markets as well as other important macroeconomic factors, the long-run causal relation is examined by adopting the Granger causality test based on Wald-test.

Table 7 Panel A indicates that according to the Granger causality test results for the research pair of the housing market and stock market for the period 2005Q2 to 2011Q1, China's housing market seems to Granger-cause the stock market. This result is in line

with the short-run causal relation tested by variance decomposition. As reported in Table 5, the housing market can largely explain the stock index variation in a one quarter to one year short to medium time span. The capital gain from transacting properties and wealth effect derived in possessing increasingly valuable real estate together increase the demand for stock in this period. Therefore, as shown in Figure 1, the stock market and property market follow the same upward trend during this period. In Panel B which shows the period from 2011Q2 to 2019Q2, the Granger causality appears to disappear. However, the macroeconomic variable GDP Granger-causes China's housing market and CPI. This result indicates that Chinese economic growth in recent years leads to an increase in housing prices, and housing prices is reflective to the economic fundamentals in China.

Table 7. Granger Causality Test for the Test Pair Housing Market and Stock Marke

Variables	CHP	CSMI	GDP	CPI
Panel A: 2005Q2-2011Q1				
CHP	NA	→*	-	-
CSMI	-	NA	-	-
GDP	-	-	NA	-
CPI	-	-	-	NA
Panel B: 2011Q2-2019Q2				
CHP	NA	-	-	-
CSMI	-	NA	-	-
GDP	→.	-	NA	→*
CPI	-	-	-	NA

Note: "***", "**", "*" and "." denote 99.9%, 99%, 95% and 90% significant levels.

In terms of the housing market and domestic consumption market in China, Table 8 shows that there is no Granger-causality observed between them. This finding within the Chinese context puts the Permanent Income hypothesis and Life-Cycle Analysis hypothesis into question, since the observed price increase in housing over the whole period cannot stimulate expenditure in consumer goods. The continually raised domestic consumption volume is mostly due to the GDP and CPI and vice versa, which confirms the fact that domestic consumption is the driving factor behind the Chinese economy in the recent years.

Table 8. Granger Causality Test for the Test Pair Housing Market and Domestic Consumption Market

Variables	CHP	CDCM	GDP	CPI
CHP	NA	-	-	-
CDCM	-	NA	→***	→**
GDP	-	→***	NA	→***
CPI	-	→**	→*	NA

Note: "***", "**", "*" and "." denote 99.9%, 99%, 95% and 90% significant levels.

5. Conclusion

In this paper, the interrelation between the property market and two other important markets in China, i.e., the stock market and consumption market, are examined using various econometric techniques. As indicated in the literature, the housing market is usually correlated with both the stock market and the domestic consumption market. However, by examining the Chinese context, this study reveals different facts.

In the short- and medium-run causal relationship, the strong correlation between the housing market and stock market vanishes after the structural break in 2011Q2. Furthermore, the correlation between the housing market and domestic consumption market stays weak over the whole sample period. In the long-run, the housing market can Granger-cause the stock market from 2005Q2 to 2011Q1, indicating a credit price effect. However, after the structural break, this causal relation disappears, inferring a time-varying causal relationship. In terms of the housing market and domestic consumption market, no Granger-causality between these markets is detected.

The finding regarding the causal relation between the housing market and stock market has important implications for Chinese investors. This vanishing correlation between the housing market and stock market indicates a better portfolio risk diversification condition for Chinese investors who hold both property and stock in their investment portfolio. Since China's middle-class investors generally lack in investment vehicles, most investors only have real estate and stock in their portfolio. If there is a strong correlation between these two heavily weighted investments, the systematic risk of the portfolio is high and cannot be diversified. This undiversified systematic risk can cause severe losses to Chinese retail investors and eventually threaten the stability of the China's middle-class.

Results also show a weak correlation between the housing market and the domestic consumption market, indicating a different spending and saving behavior of the Chinese compared to the one provided by the Permanent Income hypothesis and Life-Cycle Analysis hypothesis. For Chinese policy makers, this is good news that the boom of China's domestic consumption market is not attributed to an increase in housing prices. This enables new policy to be issued regarding the real estate market to restrain any future irrational housing price growth, and deal with the existing price bubbles without hurting the domestic consumption market, which plays a vital role in China's economic growth.

In summary, the findings in this study are contrary to those of most existing studies, and delivers valuable implications for both Chinese retail investors and policy makers in

terms of dealing China's housing market, stock market and domestic consumption market.

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INVESTMENT-CASH FLOW SENSITIVITY AND FINANCING CONSTRAINTS: A STUDY OF PAKISTANI BUSINESS GROUP FIRMS

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Abstract

A large discrepancy exists on the use of the investment–cash flow sensitivity as a measure of financing constraints of firms. We examine this discrepancy by considering business group affiliated firms in Pakistan. The study includes 58 group affiliated firms and 32 non-group affiliated firms listed on the Karachi Stock Exchange during 2006-2010. Results of OLS and 2SLS shows a positive investment-cash flow sensitivity for business group affiliated firms and negative investment cash flow sensitivity for non-group affiliated firms. Additional tests accordingly express that investment-cash flow sensitivity of Pakistani group affiliated firms is significantly lower to non-group affiliated firms.

Keywords: Investment-Cash flow, 2SLS, Financing constraints, Pakistani Business group Firms

JEL Classification: M13, M21.

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1. Introduction

1.1. Background of the study

Since many years it is the bone of contention among financial scholars that in what relation the investment, financial variables and cash flows are connected to each other. This delicate issue has faced many arguments but still the bottle neck lies as it is. According to the Carpenter and Guariglia (2008) as well as Hovakimians (2009), their research generated the results that the impact of cash flow over firm's financial investment especially in the capital markets was not very satisfactory. Compared to the study of Modigliani & Miller's (1958) according to which they assumed that due the present financial market condition which are facing the existing inadequacy, it's not only important for the firm to keep an eye on its investment possibilities but also important to check that whether the firm has its own intrinsic finances so that they can make appropriate investments. This argument was buck up by many other scholars presenting many articles and papers favouring the positivity and strength of the relationship among the spending of investments and cash flow. According to another study by Fazzari, Hubbard & Petersen (1988) says that whether the organization faces hindrances regarding their finances or not there is always difference in the assumed investments and the actual investments of the organization. And the company facing financial hurdles does not mean that they are going to affect their internal asset accumulation but in fact they will attack the proper distribution of resources and efficiency of distributing those resources.

From quite a long time the researchers are continuously working on the issue of considering the investment as an embraced or reliant towards the financial pragmatism as well as the link between cash coming in and out and how much the cash is being used for the firm's expansion. The tension between them has generated a new look as displaying the finance idols. To judge the taste of what the firm has cooked(production) and its ingredients used(investment) one should figure out those minor detail which change the colour of ingredients used to cook means affect the essence of dear investment.

Financial constraints have been one of the serious affairs in the business world. This issue comes up when a company must go for financing being opted for either internal financing or external financing. Often internal financing is preferred over external financing. Experts propose that for this, most part depends upon the structure and nature of the business and the economic conditions of the country. Financing constraints can explain why firms don't take abilities of lucrative funding. The results of financing constraints on organization's investment and financing behaviours have been exciting for economists and policy makers for a very long time. The occurrence of financing constraints in general means a state where a windfall increases in cash flow-a variation which tells us that additional data regarding incoming gains and opportunities to put in money has no affect or cannot be linked with money spend for expansion (Bond and Van Reenen, 2007).

1.2. Introduction

Financing constraints depict that how the firms can properly allocate resources in order to get maximum output by making investment in profitable projects to enlarge business. Cash flow is the salient factor to determine the investment opportunities. Along with cash flow sensitivity firm productivity can also be taken as a positive tool to control investment opportunities. Moreover, evidence is provided that elaborates the own assessment and separate the effects of financing constraints from firm-specific effects in another more direct test. Several reasons are provided with justifications for the firms being constrained or unconstrained, the factors that lead to a firm being constrained or unconstrained, and the pros and cons of firms being constrained or unconstrained.
Investment of a firm is well related to its cash flows. It says that quoted organisations are much more likely to be sensitive to cash flow as compared to the unquoted firms. But this doesn't not seem to be happen true since many of the researches have proved that it's been faced by many unquoted firms as well. Danger is more when hindrances outside firm affecting it are more than hindrances inside. Several studies have shown that financing constraints are more appearing in firms of developing financial market countries like Asia.

When the financial market is not perfect and external finance is more costly as compared to within the firm, firm's expansion faces hindrance in that situation become more money spend to handle outside issue mean less money inside the firm to expand. Due to which a variable such as cash flow or liquidity is considered important to Investment decision as a proxy for internal financing. The last two decades indicate the story of a concentrated debate appeared showing that whether financing constraints effect the decision of investment by the firms or not. Some firms obtain external funds so that their investment expenses can be covered. Firms face the problem of under investment because of lack of information problems in financial markets. Investment cash flow sensitivity is related to two things that are under investments and overinvestment. External capital and cash flows are positively correlated to each other (Hovakimian 2009)

Fazzariet al (1988) pioneer researcher generated result that the firm is more dependent on the assets inside the firm because the firm will need money to invest from within the organization means that cash flow inside is more touchy then the external factors but on the other side of the when the firms can easily use the external funds then from inside then the risk decreases from inside to outside.

Sai Ding et al (2010) uses panel data of over 116000 firms from different sectors, registered on Chinese Stock exchange, for the time period 2000-2007. They concluded that those organizations labelled through excessive working capital indicates excessive sensitivities of funding in working capital to cash glide and low sensitivities of investment in fixed capital to cash drift. David and Valeriy (2010) found that the marginal price of investment is higher for constrained firms; nevertheless, high cash holdings are linked with greater ranks of investment for each constrained and unconstrained organisation.

Toni M. Whited (2006) while in his study of US firms have found that the real investment decisions are being prejudiced by the external financial constraints. Guariglia, A. (2005) studied the panel on 24,184 UK firms over a period of 1993-2003 studies the relation of investment and cash flow relation including all the hindrances involved, which resulted that when there's broaden in the cash flow it impacts the investment in the equal method displaying an expand in investment equal to cash flow. Another study by Zhabgkai Huan (2002) shows that the affiliation among cash flow sensitivity, investment, and financial constraints is curvilinear.

1.3 Business Groups

Business groups are known for establishing informal business web throughout the map .They were widely known and considered important for their social networks, links, their vertical and horizontal hierarchy and business dealings .These business groups are distributed wide across the globe from Asia to Europe as well as South America, "keiretsu" and "chaebol" from Japan and Korea are the highlighted one. All of them have gained all lot of fame among different economies.

Guillen (2001) after his extensive study on the business groups concluded that business groups help the countries to develop and the top most business groups have increases countries GDP to the large extent .Taiwan is at the top most having GDP greater than a hundred percent whereas countries like South Korea, India, México, Spain and Indonesia have 40,38,36,35 and 34 percent respectively.

In contrast to the isolated firms, business groups gained much more importance as they minimize the danger of financial defects as well as rules and regulation of the state not matching the firm. Business groups when united they manage to eliminate financial gaps among all the member companies. Distribute the assets of all belonging to each so that States orders can be coped and decrease the risk of financial hurdles. And if the problem occurs the distribution of danger is lower among each then standing alone. In fact, of having many pros it has some cones that having too many shareholders is a problem and when the investment is made at the roots of the companies many managers get involved.

1.4 Business groups in Pakistan

The business groups in Pakistan referred to as *'families'* where the corporate is run by the family members, are growing. The title of shareholders is leading among the family members. In these business groups one or more family members hold more than one designation. This raises the issue of financing constraints in an economy of less developed financial market (Ghani and Ashraf, 2004).

Business communities of Pakistan and India are almost same forcing them to make business groups. The study on Pakistan business groups' starts from 1974 which calculated the output of 43 business families who were playing the essential part is Pakistan development since 1964 to 1968 and Pakistan's economy builders. Large ratios of these groups who are part of KSC are related to famous business families and some of them have access to the personal property of the shareholders (Zaidi 2006).

Pakistani business groups are the outcome of family business who got permission to legally operated there business independently. These businesses are headed by the families linked by blood and practice the same religious background. Top positions are

handled by the family which started the business and other junior posts are handled by the distant family members. (Waqar et al, 2010). Ghani et al. (2002) studies business groups and their influence on corporate governance for the period of 1998-2002. Fahad et al (2011) studied the effect of group and family ownership performance; Muhammad Azam and Anum Shah (2011) have studied both internal external financial constraints, and choice for investment.

2. Literature Review

2.1 Financial Constraints

There are numerous definitions of financial constraints. Kaplan and Zingales (1995) defines financial constraint as: "A firm is considered to be financially constrained if the cost of availability of external funds averts the organization from making an investment it would have chosen to make had internal funds been available". Furthermore, Kaplan and Zingales (1997) gives this definition; "A firm is viewed extra financially constrained because the resort between cost of its internal and outside funds increases". Almeida et al. (2003) also defines fiscal constraints as if an organization has unrestricted access to outside capital, the firm is financially unconstrained and there is no must preserve towards future investment desires and corporate liquidity turns into beside the point. Consistent with Korajczyk and Levy (2003) financially constrained businesses are defined as "firms that should not have enough money to undertake funding opportunities and that face extreme agency expenses when gaining access to economic markets." an additional definition given via Lamont, Polk and Saá-Requejo (2001) describe financial constraints as "frictions that preclude the firm from funding all preferred investments." These financial constraints could arise as a result of "credit constraints or lack of ability to borrow, inability to drawback equity, dependence on bank loans or illiquid assets."

The crux of the matter is that fluctuations in finances do act as a friction. Many examples can be given e.g. problems faced by the companies in getting loan etc. Funds within and outside the organization unless not balanced properly can cause problems because unless and until the organization will not get self-sufficient, they cannot go for investment. Many scholars including Fazzari et al (1988) discussed the same fact and shared their point of view regarding the sensitivity between the investments and cash flows of the organization. They argued that the organization will only go for issuing of debts and share when they will have their own tummy full. So, the strong bonding between investment and cash flow cannot be ignored in fact it should be considered as a serious matter and should be handled with care.

From huge literature hub it has been generated that investment and cash flow do change the financial hindrances of the firm. After the analyses done by Fazzari et al (1988,2000) specified that businesses which undergoes investment decision while the firm faces financial hindrances then it also faces problems of funds availability internally.

A high-quality literature has been accomplished on this hassle to estimate the influence of financial constraints on the investment approach of the firms (Fazzari, Hubbard and Petersen (1988).

Size, capital structure and dividend payouts are the factors that determines that whether financial constraints are sensitive to the flow of internal funds. Firms are said to be highly financially constrained if they are highly sensitive to the cash flows. Studies have

also exposed the consequences of financial factors on investment decisions by the firms. Some researchers have adopted traditional units of company investment to confirm the firm's investment decisions. In market imperfections, firm investments are sensitive to the internal cash flows.

Initial researches highlighting the names like Fazzari, Hubbard and Petersen who presented that sensitive affiliation between investment and cash flow are the most important statistic of financial variations in the organization .But it faced argument by Kaplan and Zingalas (1997) that this is not the only fact that id responsible for the financial problems occurring in the organization there can be many more.

Cleary (1999) selected some important internal variables effecting internal funds of the organization like liquidity measurement ratio and the coverage ratio, to examine whether the firm is financially strong or not and in 2004 resulted that with respect to investment the following internal hindrances can be focused i-e investment depends on internal funds more funds more investment and the other important hindrance is capital market imperfection. Cleary et al (2007) and DeMarzo and Fishman (2000) after their extensive research have found that the organization going for a specific project only focus on the consequences related to it e.g. how much money is required for the project .Although they give special attention to the unsatisfying funds within the organization and funds to be borrowed externally but it don't affect the organizations projects unless and until they are at high levels.

To study the effects of financing constraints, different tests are conducted which mainly consider market value of the firm to avail investment benefits. Among all most significant and dependable tests are established on investment-cash flow considerations, (Fazzari et al. 1988). In which they have found that it is not the financial structure but the internal net worth of a firm that helps in taking an investment decision. But on the contrary several studies have pointed out drawbacks with the average assessments for the presence of financing constraints on investment-cash flow sensitivities. (Cleary 1999, Kaplan and Zingales 1997, Moyen 2004, Gomes 2001, Alti 2003).

Kaplan and Zingales (1997, 2000), disputed on this test based on theoretical grounds which explains the difference in opinion regarding financial situations between the econometricians and the financial managers of the firms. The strategy adopted by Olley and Pakes (1996) be contingent on the fact that investment stands over the role of efficiency and capital. In this approach financial variable, i.e. cash flow is not considered which is very important.

It is clear and understood after a long journey of investigation and studies that researcher that for larger firms more investment is required and for small firms' small investment is required. (Kadapakkam Rajan Palani et.al, (1998) many other firms some time not only use the internal funds for expansion by sometimes to retain the existing financial position of the firm (Zhangkai Huang (2002).

The company while paying the dividends must concentrate that their decision of paying the dividends may affect their investment (Zhangkai Huang. Z (2002). The relationship between the investments and paying dividend is negative and is of considerable importance (Kadapakkam Rajan Palani*et.a*l, (1998).

The above presentation is most favoured by dividing the firm into constrained and less constrained companies' .The companies having low relationship among dividend and income is more likely to be constrained, from this it is suggested that cash flow relation is important for both constrained and non-constrained firms in taking important financial decisions (Allayannis and Mozumdar 2004), (Cleary 1999). Return to capital is significantly greater for firms which believe that financing is a major issue for their business, while the returns are not literally different from zero for the other firms, Cull et al. (2007). This is how the category of constrained and unconstrained firms can also be identified. If the credit is main problem for the entrepreneur, then the firm is constrained and if not, then the firm is unconstrained. The battle of thoughts among cash flow and investment relationship is still open and it is stated that the firm constraints are not only dependent on firms spending in the market but also the firm's capacity to invest i.e. how much investment a firm can put in to the market to cater the opportunities available to invest.

2.2 Cash flow and investment relationship in Business groups

Recent studies have shown that business groups are more efficient in developing countries as in comparison with developed countries. Khanna and Palepu (1997, 2000) argue that business groups in constructing nations can impersonator invaluable functions of various market mechanism which are presented only in developed economies. In special conditions where the usage of a specific market mechanism is either constrained or no longer well developed, the structure of the business group can enhance worth by offering member firms with an unconventional way to overcome the missing functions of this mechanism. For example, when the external capital market shouldn't be healthful developed, the operation of an internal capital market within business groups can permit firms to avoid the external capital market, in so doing decreasing informational asymmetry problems between managers and external investors (Myers and Majluf, 1984).

2.2.1 Business groups

Business groups in some countries are the most mature and insistent form of organization. They exist in a variety of types, ranging from hierarchical groups with a pyramidal structure to associative groups pursuing their common interest through a more informal system of coordinated decision making. Business groups play a major role in lots of developed and establishing countries. A business group allows firms to reduce their costs, rise above market imperfections and increase their performance (Williamson 1975, Khanna and Pelepu 2000). Business groups have some negative aspects as well (Scharfstein and Stein 2000). Firms associated with business groups are less sensitive to cash flow than those of unaffiliated firms (Perotti and Gelfer 2001). Formation of business groups is associated with axes of social combination such as ethnicity, kinship, region political party and religion, (Granovettor, 1994). This idea was developed by Thompson (1971), identifying this issue with 'moral economy'. Continuing with this business groups are developed based on interpersonal trust (Leff, 1978).Scholars from all over the world have signal the business groups as the market which is expanding day by day and the comparison is made with respect to it with the performance of the firm, business development etc by its relationship with the cash flow is not been noticed at the eye-catching levels. (Khanna and Rivkin 2001, Singh and Gaur 2009)

All over the globe the business groups follow the same business strategies headed by the same board of directors. Claessens et al (2006). It has been studied that the business groups follow the same strategies and is was figured out the 8 out of 9 countries lying in Asian zone had 15 top business groups having their paws on 20% of the assets of the corporate. And in Europe 13 out of 10 had greater the 45% asset control headed by the same business groups Faccio and Lang (2002).

Leff (1978) considered developing economies while studying these institutional factors where business groups happen to exist, he found less efficient capital market and there is absence of market information for risk and uncertainty. These indicators increase transaction cost and the purpose is not achieved efficiently. Lack of these institutional factors causes information asymmetry increasing transaction cost called agency cost, (Jensen and Meckling, 1976).

The performance of business groups varies with different economies. Perotti and Gelfer (1999), conducted a research on business groups in Russia. Keister (1998), studied the performance of business groups in china. Similar research was carried out by Khanna and Rivkin (1999) in the growing economies of Asia, South Africa and Latin America. The outcomes of these researches were that the performance of business groups was seen positive in countries of emerging and transition economies.

Business groups are somehow preferred over non-grouped businesses because of one or the other reason. Primarily business groups are thought to take better investment decisions as the executives and financial managers are family member and are well alert of firm's internal issues, and thus can plan better decisions for long term investments. Secondly the principle agent problems are reduced in business groups because of family management and the agency cost is reduced eventually in the favor of the firm, (Jensen and Meckling, 1976), (Tarziján, 1999).

In business groups the number of major stockholders is insiders i.e. the family members and outsiders are minority. Due to this huge difference in number the minority shareholders can be exploited, Shliefer and Vishny (1997) and Villalonga and Amit (2006).

Business groups can also be encouraged to compete with the market failure. It is the general view that group firms are long lasting in nature and enjoys a goodwill and reputation. Another reason in support of business group is that the leaning firm can finance other firms in case of any failure as there is a chain of firms in the pyramid, (Villalonga and Amit 2006; Wang, 2006; Sraer and Thesmar, 2007; and Maury, 2005).

One very interesting investigation is by Anderson and Reeb (2003) in which he demonstrated that business group firms perform, if not more, at least equivalent to other firms not affiliated to any group. The profits of the firm are even greater when the CEO's of the firm are the family members because the family members are being attached to the firm work more efficiently and with serious dedication.

Johnson et al (2000) found that there is a hierarchy followed throughout the business groups that is they have one CEO heading by the board of directors and rest of the groups. Hierarchal pyramid is made functional following the SOP's at every stage of the pyramid. And this is made by credential transmission as well as related to submission of prices creating problem, co investment, and asset. Following a pyramid increases the

positive repute of the business groups in the market with respect to family business and it's always better to hire a manager who is not a relative because it has been found the manager from the family has not shown any good results.

According to some studies a noteworthy part of a firm's value belongs to the individual who has control rather than ownership of the firm, Alexander Dyck and Luigi Zingales (2002).If the control rights are greater than the cash flow rights then the funds are diverted and value of the firm decreases, La Porta et al. (2002) and Claessens et al. (2003). The principle of cash flow sensitivity is applied here that affects the investment opportunities. In business groups the control and ownership are within the pyramidal structure that decides the value of the firm. But again, it has some drawbacks regarding flow and direction of funds. The fundamental earnings are not compared with the actual earning but changes in the fundamental earnings are observed in a time period. By comparing these changes, the performance of the pyramidal structure is measured, (Mullainathan et al (2000)

2.2.2 Business Groups in Pakistan

Business groups have expanded itself in emerging markets, but they cannot be properly interrogated. They play a vital role in different emerging markets. The most pleasing advantage of working with the business firm is that they reduce the risk of income flow of the member firm and help in smooth and steady flow of money from one firm to another member firm.

After the partition between Pakistan and India in 1947, some of the business families, who were already running their businesses in India, have been migrated to Pakistan to begin their business in Pakistan. This is one of the reasons that Pakistani and Indian business communities have many similarities, and like Indians, Pakistani business communities have formed many business groups.

Pakistani business groups are the outcome of family business who got permission to legally operated there business independently. These businesses are headed by the families linked by blood and practice the same religious background. Top positions are handled by the family which started the business and other junior posts are handled by the distant family members.

As the business groups are headed by single authority so all the rules are followed by the Asian businesses following the hierarchy. As far as Pakistan's businesses it is being headed by most of the family business which are imputing the true essence of hierarchal business by their cultural ingredients (Ghani and Ashraf, 2004).

There are few families in Pakistan which are playing the most vital role towards Pakistan's economy (Zaidi 2006). All those companies which are registered with Karachi stock exchange approximating 80% enlist belongs to the same business families. But few have the keys to personal assets. These business groups are tackling with the changes occurring across the globe reflecting the business environment as well as their families effectively and efficiently. (Afghan 2007)

It was analysed by Dr. Mahboob in 1968 that most of the wealth lies among the 22 richest families having 66% control over industries of Pakistan and 87% share of the insurance and business pie chart. He also reported that these businesses only invested

more in those businesses in which they can inculcate their polished skills at max. In late 1960's Pakistan was one of the emerging business among the countries under development. As Omer said in the Ayub Khan's era the 22 families created many success stories and they had a remarkable expansion and captured almost all the market. In 1971, when the war ended between Pakistan and India, Z.A became the owner of the state. He forced the prominent 22 families to let their hold over 10 shipping ,13 banks, 12 insurance companies, and 2 petroleum companies for the national people to get jobs and to break the jagirdarri of the famous families leaving behind the textile industry in their hands.(Hussain, Dilawar, daily Dawn, December 9, 2007).During the regime of Nawaz Sharif, who showed liberal and friendly attitude towards these famous 22 families by returning back some units which were nationalized by Z.A in 1980s, at that time some new business families were caught by the eyes as the existing ones expanded their wings more and more in cement and automobiles as well .In the presidential ship of Musharaf same continued.

In 1964-1968 there is not as such differences found between the family business and others with respect to profits, size, control and other things in Pakistan. This was concluded after examining the 43 business companies more than half had directly link with the business families and others were private firms acting in Pakistan. Nishat group, Hashoo group, House of Habib, The Saigols, Cresent group, Saif group, Dewan group etc. are some of the well knower business groups running currently their business in Pakistan.

2.2.3 Relationship with business group affiliated firms of investment /cash flow.

From different point of views, it has been figured out that most of the countries show highly sensitive relationship between investment and cash flow like Japan while on the other hand Korean companies don't show such relationship or very low if existed only in group affiliated companies. Showing that financial problems are more in unaffiliated groups in the case of Investments. While other researches show that there is a high relationship between investment and cash flow even in unaffiliated business and some countries show that even member firms don't favor any relationship between cash utilized for expansion and cash coming in and out the firm. These differences occurred from country to country. (Deloof (1998) and Perotti and Gelfer (2001)

Japanese companies are more relaxed being affiliated with groups showing more investments with respect to non-affiliated businesses because they show strong financial relationship with banks having reduced stress of liquidation. As far as non-affiliated firm the risk of investment decision making is more. (Hoshi et al. (1991)

There are different findings that investment and cash flow relation with financial hindrances do affect affiliated business groups as well as non-business affiliated groups. Mainly due to difference of economies, geographical location of the countries and investment trends by the firms. In the light of above discussion, it has been cleared that the studies conducted by different researchers on business groups around the globe show ambiguous link between financial hindrances faced by the firm with relation to investment and cash flow.

3. Methodology

3.1 Q model

Most of the researchers in their study have used different investment models to measure the investment-cash flow sensitivity of a firm. Most commonly used models from researchers in previous studies are Q model of investment and Euler Equation model of investment. Both the models have their own advantages and disadvantages. Among these two models Q model has been widely used by the researcher (Aggarwal and Zong, 2006; Shen and Wang, 2005). In this study we have used only Q model because the Q model has the abilities that it makes use of know-how from capital market hence enabling direct of expected worth of future profitability. The result of the Q model is more enriching as compared to Euler equation and other investment models. Q model reveals that the investment of a firm is determined by means of anticipations of future profit opportunity, gauged through the constituent of the market value of assets to its replacement value (Agca and Mozumdar, 2008) and Regie et al. (2011).

In order to comprise the accessibility of internal funds as supplementary factor of investment, we have used the same adjusted Q model of Regie et al. (2011) which is written as follows:

$$\left(\frac{I}{K}\right)_{it} = \beta_0 + \beta_1 Q_{it} + \beta_2 \left(\frac{CF}{K}\right)_{it} + \sum it \qquad (1)$$

Where,I represent Fixed Asser Investment (FAI) of the firms K is used for Capital Stock of the firm (beginning) Q denotes ratio of the market value of capital of a firm to its replacement value. CF is for cash flow of the firm i and t are for firm and time period
$\sum$ denotes error term. In most of the previous studies, researchers distributed the full sample of the firm across different sectors in order to examine whether, coefficient of cash flow is diverse across the group of the businesses. For this purpose, they have first anticipated the model for entire sample of the firm and then use dummy variable interaction with the cash flow variable of the firm, representing the same characteristics of the firm. Throughout our study we have used this direct approach which has been used by the previous researchers.

The regression description we practise to investigate the precise outcome of business group distinctive is as follows:

$$\left(\frac{I}{K}\right)_{it} = \beta_0 + \beta_1 Q_{it} + \beta_2 \left(\frac{CF}{K}\right)_{it} + \beta_3 \left(\frac{CF}{K}\right)_{it} * Group + \beta 4\ Group + \delta X^{it} + \sum it \qquad (2)$$

In equation (2), we have used some control variable like age, industry, size of the firms. These control variables are represented by X_{it}.

3.2 Data Analysis

The data used in this study is analyzed by using two different methods which are;

a) OLS Method

The models used in this study are first assessed by using the ordinary least squares (OLS) technique (also called the method of least squares). OLS is used to measure the true relationship between dependent and independent variables. Monica Marina and Greg Niehaus (2011) runs both OLS and 2SLS techniques for their research studies in order to examine the determination of cash holdings and hedging, and their relationship with cash flow. Their results confirm the firms having a positive sensitivity of cash holding and cash flows are more likely to be financially constrained.

b) 2SLS Method

As we desired to safeguard our outcomes from OLS method from any estimate biasness, we have used the generalized instrumental variables estimation procedure. In order to remove estimation biasness from our results and to deal with the problem of heteroskedasticity and autocorrelation in our econometric model, we have used 2SLS method. For this purpose, we used lagged standards of existing period repressors as instruments. According to Verbeek (2004) the 2SLS estimation method is a distinctive case of the Generalized Method of Moments (GMM) method. The 2SLS technique has been widely used in previous research studies. While reexamining the investment-cash flow sensitivity as measure of financing constraints, Regie et al (2011) in his research has used 2SLS method for both business group affiliated and non-business group firms of India, to ensure that their findings from OLS method are free from any biasness. Anais Hamelin (2012) uses both OLS and 2SLS methods in order to measure the control of family ownership on small business growth in France and found that family ownership have a negative control on small business economic growth he also found that this negative relationship is not due to limit financing capacity by the family ownership. Abdullah et al. (2011) used 2SLS method in order to measure the effect of group and family owner ship on firm performance in Pakistan.

3.3 Variables construction

Dependent variable

- I/K = Investment over capital ratio of the firm.

Independent Variables

- CF/K= Cash flow over capital ratio of the firm
- Q = (Market value of equity + book value of total debts/book value of total assets)

Control variables

- Firm Specific-Total Sale of the firm, Total debt of the firm, Total assets of the firms, size and age of the firm
- Ownership structure of a firm- Percentage of shares owned by Corporations, Financial Institutions and directors and family members of the firm.

3.4 Research Hypotheses:

H1: There is a positive relationship between Cash-Flow and Investment.
H2: There is a positive relationship between Q and Investment.
H3: There is a negative relationship between Cash-Flow and individual firms.

H4: There is a positive relationship between Cash-Flow and Business groups affiliated firms.
H5: There is a negative relationship between Investment and Individuals firms.
H6: There is a positive relationship between Business groups affiliated firms and investment.

3.5 Sample Selection and Data Sources
The initial data for this study is obtained primarily from the publicly available database maintained by the firms and Karachi Stock Exchange (KSE). The data set consists of group and non-group affiliated firms listed on KSE. Sample of the study consists of 90 firms that are traded in Karachi Stock Exchange (KSE) from year 2006 to 2010 after eliminating financial firms (that are Banks, Modaraba companies, Insurance companies etc). Out of 90 sample firms, 58 are classified as group affiliated firms whereas 32 are classified as non-group affiliated firms. The sample firms are distributed across 12 different sectors.

In order to see the effect of ownership structure of a firm on investment cash flow sensitivity we gather data for ownership structure from both business group affiliated firms and non-group affiliated firms. To achieve this purpose, we divided ownership structure into three different categories (I) Corporate ownership (2) Financial institution ownership and (3) Directors and family members ownership.

4. Results and Discussion

4.1 Descriptive study

We have shown the descriptive analysis of different variables in Table 1. As we wanted to create the investment-cash flow relationship of Pakistani business group and non-business group affiliated firms, we have divided the entire sample according to group affiliation. We have shown the mean, median and standard deviation values of both business group and non-business group affiliated firms in Panel A. Mean values of business group affiliated firms and non-group affiliated firms based on size has been shown in Panel B.

The main aim of the study is the comparison of investment-cash flow sensitivity of group affiliated and non-group firms of Pakistan. The selected sample firms have been divided in to two 2 groups named as Panel A & B. Panel A elaborates the mean, median and standard deviation of group affiliated and non-group affiliated firms. Panel B shows the mean values of both groups affiliated and non-group affiliated firms based on size categorization. These values differentiate between large and small firms. Our descriptive statistics findings are different for each sector due to different level of investment by these sectors in Pakistan.

Table 1 (Panel A)

Summary
Statistics

Panel A: Business Group and Non-Group firms

	Business Group			*Non- Group*			
	Mean	***Median***	***Std. Dev.***	***Mean***	***Median***	***Std. Dev.***	***Mean***
I/K	0.322	0.09	1.51	0.322	0.09	1.51	0.322
CF/K	0.593	0.178	1.19	0.593	0.178	1.19	0.593
Q	827.854	581.432	912.062	827.854	581.432	912.062	827.854
TA	13669208	7936815	16228408	13669208	7936815	16228408	13669208
TS	14376974	7061056	24778289	14376974	7061056	24778289	14376974
TS/K	7.217	2.357	21.1	7.217	2.357	21.1	7.217
D/K	1.284	0.309	14.796	1.284	0.309	14.796	1.284
AGE	34.71	29	17.84	34.71	29	17.84	34.71
COR	46.63	52.09	28.99	46.63	52.09	28.99	46.63
FIN	15.2	13.11	11.72	15.2	13.11	11.72	15.2
INS	9.99	2.02	16.88	9.99	2.02	16.88	9.99

The descriptive statistics shown in Panel A indicate that there exists significant difference between means of investment to capital ratio (I/K) and cash flow to capital ratio (CF/K) of group affiliated and non-group firms. The mean, median and standard deviation of business group affiliated firms is higher than those of non-group affiliated firms. Higher values of both (I/K) and (CF/K) of group affiliated firms shows that group affiliated firms invested more in healthy projects and in return their profit margin is also high, on the other hand the investment of non-group affiliated firms is low due to which they are less profitable as compared to group affiliated firms.

The values of Q ratio for business group affiliated firms are smaller than those of non-group affiliated firms except median values. The result shows that in business group affiliated firms the cost to replace a firm's assets is greater than the value of its stock. This indicates that the stock of group affiliated firms is undervalued. Conversely, a high Q values for non-group affiliated firms shows that a firm's stock is more expensive than the replacement cost of its assets, which indicates that the stock is overvalued. This measure of stock valuation is the driving factor behind investment decisions in Tobin's model.

Focusing on the size of firms, the size of the firms is measured based on total assets and total sale volume. The results indicate that mean, median and standard deviation values of total assets (TA) and total sales (TS) of group affiliated firms is lesser than the mean, median and standard deviation values of non-group affiliated firms. This means that non-group affiliated firms are bigger than group affiliated firms. The level of leverage of a firm depends on many factors such as strength of operating cash flow, availability of

deposit, and tax treatments. Thus, investors should be careful about comparing financial leverage between companies from different industries. The median and standard deviation values of leverage (D/K) for non-group affiliated firms is significantly greater than business group affiliated firms, whereas the mean values of leverage (D/K) for business group affiliated firms is slightly higher than that of non-group affiliated firms. In Pakistan non-group affiliated firms are normally older than those of business group affiliated firms; the reason is that mostly non-group affiliated firms are under the Government control which starts operating soon after the independence in 1947. The mean age of non-group affiliated firms is 44.4 years compared 34.7 of group affiliated firms

Finally, we have found that there is significant difference in the ownership structure of Pakistani business group affiliated and non-group affiliated firms. The results of our finding show that COR (the mean percentage of shares held by other companies) of business group affiliated firms is larger than that of non-group affiliated firms. Which shows that within the same group the stakes held by domestic corporations can be considered as equivalent to insider holdings. These corporate owners play a significant role in the investment and financing decision-making of business group affiliated firms. The results of descriptive statistics also show that the mean percentage of shares FIN (% of shares held by financial institutions) in business group affiliated firms and non-group affiliated firms is almost same, mean, median and standard deviation values of business group affiliated firms and non-group affiliated firms are slightly different. This means that the financial institution plays an important role in financing both groups affiliated and non-group affiliated firms in Pakistan. As most of the non-group affiliated firms are owned by the Government of Pakistan but financial institutions are privately owned in which government holds lesser influence and they are financing equally to both groups affiliated and non-group affiliated firms. The average INS (% of shares held by directors and family members of the firm) ownership stake is higher in non-group affiliated firms and less for business group affiliated firms.

Panel A indicate that there exists significant difference between average values, median and standard deviation of each selected variables of group and non-grouped affiliated firms. Though the size and age of non-group affiliated firms are lesser as compared to non-group affiliated firms, but their investment, cash flow, margin of profit is higher.

Table 1 (Panel B)
Panel B: Mean values of business group and non-group affiliated firms based on size categorization

Business group firms		***Non-Group firms***	
Large	**Small**	**Large**	**Small**
0.529	0.113	0.089	0.143
0.725	0.46	0.229	0.29
838.039	817.597	598.265	1418.021
24041948	3223421	82292207	2000205
8.656	5.768	8.117	3.266
2.275	0.285	0.505	0.424
38.24	31.16	43.57	45.28
47.16	46.1	33.8	35.05
15.77	14.63	12.14	10.59
9.45	10.53	13.11	28.85

Panel B shows the categorization and classification of business group affiliated and non-group affiliated firms' size, determined based on mean values of the firms as well as total assets. We further classified the sample firms into large and small sub-categories in order to see the difference in firm size within the category of both business group affiliated and non-group affiliated firms. The size subsamples classifications are based on the median values of the total assets of each category of firms. We considered those firms as large whom total assets value is greater than or equal to the median value of the sample. Whereas the firms whom value of total assets are smaller than the median of total sample is considered as small firm. The findings shown in Panel B of Table 1imply that for most of the variables, the mean values of large firms are higher from those of small firms. Within the same group, large and small variable has very small difference in most of the variables. On the other hand though large firms of business group affiliated firms has higher values as compared to large firms of non-group affiliated firms, but still there are some variables whom mean values under large category for both business group affiliated and non-group affiliated firms are almost same, same is the case under small category firms for both business group affiliated and non-group affiliated firms. The (I/K) and (CF/K) values of large size in group affiliated is higher than the (I/K) and (CF/K) values of large size firms of non-group affiliated firms, whereas the (I/K) and (Q) values of small firms of non-group affiliated firms are higher than the same variables of group affiliated firms which shows that small firms of non-group affiliated firms performance is better than the small firms of group affiliated firms.

4.2 Regression analysis

Regression results for the Q model.

	Table 1: OLS estimation		Table 2: 2SLS estimation	
	Model (1)	**Model (2)**	**Model (3)**	**Model (4)**
Intercept	**-2.195*(-4.39)**	**-1.339*(-3.12)**	**-2.528*(-2.19)**	**-0.092*(-0.08)**
Q	**0.0002*(5.18)**	3.140(0.83)	**0.0002*(4.54)**	4.770(1.14)
Cash Flow	**0.382*(7.02)**	**1.635*(17.10)**	**0.377*(6.67)**	**1.657*(17.50)**
Cash Flow*				
Group dummy		**-1.610*(-15.10)**		**-1.598*(-15.20)**
Group dummy		**0.544*(6.141)**		**0.432*(3.370)**
Size	**0.139*(5.4)**	**0.053*(2.5)**	**0.138*(5.291)**	**0.054*(2.45)**
Age	-0.041 (-0.47)	0.042(0.58)	0.059 (0.18)	-0.304 (-1.01)
Time & Industry dummies	**Yes**	**Yes**	**Yes**	**Yes**
Adj. R^2	0.28	0.54	0.28	0.52

*Table 1 show the regression results where OLS is used as the estimation method while table 2 presents the regression results where 2SLS is used as estimation method. Investment to capital ratio is used as dependent variable in both the tables. Q is the ratio of (Book value of total debt of firm+ Market value of equity of a firm)/Book value of total assets of firm). Cash flow is for cash flow to capital ratio of a firm. The value of group dummy variable is 1 if the firm belongs to any business group and is 0 if it belongs to non-group affiliated firm. For size and age, natural log of total assets and number of years since incorporation has been used respectively. The heteroskedasticity and autocorrelation corrected absolute "t" values are stated in parentheses. The total number of firm year observations is 450. Significance level at 1%, 5% and 10% levels are represented by *, ** and***, respectively.*

The relationship between cash flow and investment of a firm for business group and non-business group affiliated firms is anticipated by using several alternative model specifications. Several specifications of the Q model in Eq. (2) for regression results have been shown in Table 2. Time and industry dummies are used to present the results. We include these dummies in order to control certain time varying macroeconomic factors. To check whether the phenomenon of business group affiliation affects the investment cash flow relationship of a firm we used interacting cash flow variable with group affiliation dummy variable.

First looking at the results presented in Table 1, the results indicate that there is a positive and statistically significant relationship between investment and Q in model (1) and there is a positive relationship between investment and Q in model (2). The results of the models of table 1 show different level of the estimated coefficient. The explanatory power of regressions is varying from 29% to 54% and is consistent with previous studies. Obtaining the results for cash flow variable, we observe that the estimated coefficient is positive and statistically significant in both model specifications of Panel 1. It indicates that cash flows are strongly related to investments for all firms. We also observe that the estimated cash flow coefficient in model (2) is greater than the

estimated cash flow coefficient in model (1). The interaction coefficients of cash flow and group dummy variable in models (2) is negative (-1.61) but statistically significant. This finding is contrary to R. George et al. (2011) who found a positive relationship between investment to capital ratio and interaction coefficients of cash flow with group dummy variable.

In order to ensure that our findings are free from any biasness we used 2SLS technique. The same specifications have been estimated using 2SLS technique. The results eliminated using 2SLS specification is presented in table 2. The result shows that the coefficient of Q is found to be positive and statistically significant for model (3) and is positive for model (4) while the coefficient of cash flow is positive and statistically significant in both the models of table 2. Our findings are opposite to what many researchers expect for less financially constrained firms. Hoshi et al. (1991) while examining the Japanese has found that the investment cash flow sensitivity for group firms is less. Like Table 1, in Table 2 we have found that the coefficient of cash flow interacting with business group dummy in model (4) is negative but statistically significant. We have noticed that our results of less constrained business group affiliated firms, who are not revealing lower investment cash flow sensitivity, is not only the characteristic of Pakistani business groups alone, while studying the investment cash flow sensitivity between constrained and unconstrained firms of US economy, Allayannis and Mozumdar (2004) also do not observe any significant difference.

Both OLS and 2SLS results demonstrate that Q has insignificant coefficient in model (2) and (4) whereas Cash Flow has higher strong significant coefficient which clearly expresses that as a proxy for internal fund, Cash Flow explains more of the variation in investment than does Q, which certainly supporting the Fazzari, Hubbard & Peterson (1988) argument. Generally, the variable Q is the ratio of the market value of total assets to book value of total assets of a business firm. As capital markets in Pakistan are relatively underdeveloped, group affiliated, and non-group affiliated firms always suffer from un-even market competition. Hence it could be better to consider sales as their investment opportunity instead of Q which is the general trend of the firm level recent empirical research on investment cash flow sensitivity.
The regressions analysis we presented in Table 2 is based on the full sample comprising of all firm year observations. Although for the time period of our study we considered large economic growth, but similarly at the same time there are certain economic crises which also influence our research like the financial crisis of 2007–2008, also known as the global financial crisis. In 2008, after the General Elections, uncertain political environment, rising militancy along western borders of the country, and mounting inflation and current account deficits resulted in the steep decline of the Karachi Stock Exchange. As a result, the corporate sector of Pakistan has declined dramatically in recent times.

Major reasons for the slow performance of the various sectors in Pakistan are global economic crisis, energy crisis, declining security situation in Pakistan, the flood situation and political instability which are still a big challenge for the government and are not under control yet.

Table 3: Regression results for examining overinvestment of both groups affiliated and non-group affiliated firms

	OLS		2SLS	
	Group	**Non-Group**	**Group**	**Non-Group**
Intercept	**-4.109*(-5.78)**	-0.155(-1.04)	**-5.047*(-2.70)**	- 0.149(-0.27)
Q	**0.007*(9.03)**	-1.100(-1.07)	**0.007*(8.91)**	-1.060(-0.81)
Cash Flow	**0.517** (1.82)**	-0.050(-1.06)	0.405(1.154)	-0.049(-0.82)
Cash Flow *High Q	-0.367(-1.29)	0.049(0.84)	- 0.278(-0.86)	0.040(0.63)
Size	**0.225*(6.17)**	-0.008(-1.18)	**0.222*(5.10)**	-0.009(-0.27)
Age	0.030(0.24)	**0.113*(4.10)**	0.324(0.62)	**0.117* (4.13)**
Time and Industry Dummies	Yes	Yes	Yes	Yes
R^2	0.45	0.11	0.44	0.11
Adj.R^2	0.44	0 .08	0.43	0.08
No. of Obs.	285	165		

*Table 3 shows the regression results where OLS and 2SLS are used as estimation method. Investment to capital ratio is used as dependent variable in both the tables. Q is the ratio of (Book value of total debt of firm+ Market value of equity of a firm)/Book value of total assets of firm). Cash flow is for cash flow to capital ratio of a firm. High Q is an indicator variable that is equal to one if business group affiliated or non-group affiliated firm's Q is greater than or equal to the corresponding medians, and zero otherwise. For size and age, natural log of total assets and number of years since incorporation has been used respectively. The total number of firm year observations is 450. Significance level at 1%, 5% and 10% levels are represented by *, ** and***, respectively.*

We performed further sensitivity analysis of our results. The Q theory on investment implies that Higher the Q, the level of investment should be high, as stock values more highly present value of new capacity. Hoshi et al (1991) has demonstrated in his research work that the strong investment cash flow sensitivity of business group affiliated firms can be accredited to over investment made by the business group affiliated firms that has poor growth prospects. To study this phenomenon, we follow previous studies by using Q as a proxy for a firm's growth prospects. We divided our sample into High Q and Low Q firms based on the median values of these firms. Over investment by the business group affiliated firms can be the reason for higher sensitivity. Firms with meagre growth prospects (Low Q) should be more sensitive to their investment than the cash flows of firms with high growth prospects (High Q). Alti (2003) presents a model where the link between investment and cash flow is stronger for high growth firms because managers adjust current investment in response to cash flow realizations, which reflect current growth opportunities. The results of the analysis are presented in Table 3. The results show that the cash flow interacting with High Q for group affiliated firms is negative and for non-group affiliated firm it is positively related to investment. It is believed that the business group affiliated firms have more access to the financial resources as compared to non-group affiliated firms, our findings indicated that the investment cash flow sensitivity is not a reliable source of measuring the financing constraints of the firm, thus contradiction the expectations.

The influence of firm characteristics on investment cash flow sensitivity. In Table 1 of descriptive study, we have seen that the firm characteristics such as age, leverage, owner structure and size of business group affiliated firm is different than those of non-group affiliated. One can argue that whether investment cash flow sensitivity for business group affiliated firms and non-group affiliated firms are affected by these characteristics. Therefore, we perform additional analysis by dividing the total sample of business group affiliated and non-group affiliated sample into sub-sample in order to check whether these firm characteristics affects the investment cash flow sensitivity.

Size of firm

When the total assets of the firm are greater than their corresponding median value, we consider those firm as large and vice versa. The size of a firm may have effect on the investment cash flow sensitivity of the firm. Generally, it is believed that large size firms face less capital market imperfections as compared to small size firms, because in large size firms' lenders of funds must bear low screening and monitoring costs. Therefore, large size firms expected to reveal low investment cash flow sensitivity.

In large and business group affiliated firms, size has a significantly positive influence over investment made by them. It means when investments made by large size firms are larger as compared to small size firms. If the size of firm is large then the size of investment made by them is also large and vice versa confirming the findings of Palani et.al, (1998). The findings of Gertler and Gilchrist (1994) and Gilchrist and Himmelberg (1995) demonstrate that small firms are more sensitive to cash flow than larger firms. The theoretical argument to support these empirical results is that when the size of the firm is larger, they have easy access to external finance from financial institutions and banks.

Large firms are most likely to exploit economies of scale and enjoy higher negotiation power over their client and suppliers (Serrasqueire and MacasNunes 2008, Mansfield 1962, Singh and Whittington 1975) In addition they faces less difficulty in getting access to credit for investment, and many broad pools of qualified human capital and may achieve greatest strategic diversification (Yang and Chan 2009). To distinguish the investment cash flow sensitivity between business group-affiliated and non-group affiliated firms we add an interactive group dummy variable.

Table 4
Regression analysis for the size sub-samples.

	Large firms	Small Firms	Group affiliated	Non-Group
Intercept	**-2.213*(-2.37)**	-0.325(-1.46)	**-4.096*(-5.13)**	**-0.371** (-1.82)**
Q	**0.003*(4.23)**	-1.280(-1.12)	**0.007*(9.26)**	-1.400(-1.31)
Cash Flow	**1.433*(9.50)**	0.018(0.27)	**-0.302*(-2.54)**	0.018(0.30)
Cash Flow*				
Group dummy	**-1.419*(-9.42)**	0.020(0.27)		
Group dummy	**0.599*(3.84)**	-0.032(-0.91)		
Cash Flow*Size dummy			**0.608*(4.63)**	-0.055(-0.80)
Size dummy			**-0.521*(-3.06)**	-0.064(-1.17)
Size	**0.090*(1.90)**	0.017 (1.21)	**0.530*(14.70)**	0.007(0.59)
Age	0.043(0.36)	**0.060*(2.12)**	0.087(0.72)	**0.111* (4.07)**
Time & Industry dummies	Yes	Yes	Yes	Yes
R^2	0.63	0.05	0.49	0.12
Adj.R^2	0.62	0.02	0.48	0.08
No. of Obs.	225	225	285	165

*The table 4 presents the ordinary least squares regression results Investment to capital ratio is used as dependent variable in both the tables. Q is the ratio of (Book value of total debt of firm+ Market value of equity of a firm)/Book value of total assets of firm). Cash flow is for cash flow to capital ratio of a firm. The value of group dummy variable is 1 if the firm belongs to any business group and is 0 if it belongs to non-group affiliated firm. Size dummy is variable that is equal to one if the size of business group or non-group affiliated firm is larger than or equal to median values, and zero otherwise for size and age, natural log of total assets and number of years since incorporation has been used respectively. The total number of firm year observations is 450. Significance level at 1%, 5% and 10% levels are represented by *, ** and***, respectively.*

We performed additional analysis in order to measure the impact of various firm specific characteristics of both business group affiliated and non-group affiliated firms on investment cash flow sensitivity of firms.

Our first categorization is made based on size of the firm. The results of Table 4 show that in the sub sample of large firm the coefficient of cash flow with interacting group dummy is negatively significant while in sub sample of small firms it is positive. These findings are opposite to the findings of Azam and Shah (2011) that invested 52 listed firms in Karachi Stock Exchange and found a positive relationship between investment and size of the firm. We further examine our analysis by dividing our sample into business group affiliated and non-group affiliated firms. We used size dummy which is equal to 1 when the value of total assets of a business group affiliated group (non-group affiliated) firms are higher than the median, and zero otherwise. The results presented in the last two columns of Table 5 shows that the investment cash flow sensitivity from large non-group affiliated firm is negative, while it is positive and statistically significant for large business group-affiliated firms.

Age of firm

It is generally considered that age of the firm plays a key role in the financing constraints of the firm. Generally, it is believed that younger firm's faces higher financial constraints and older firm faces fewer financial constraints, one of the main reasons is that older firms have better credit record, information asymmetric, and less default chances. On the other hands younger firms are less likely to obtained external finance, and investment made by them are more opaque and riskier. Similarly, these firms were unable to win investors' confidence. We examine whether the differences in age (number of years since incorporated) of the firm affects the investment cash flow sensitivity of business group affiliated and non-group affiliated firms. The findings of our research are presented in Table 6. We split the full sample into business group affiliated and non-group affiliated firms. In Table 6, in addition to the earlier used explanatory variables, we used the interacting cash flow variable with a dummy variable which identifies older or younger firms. The result indicates that cash flow has a negative relationship with Investment for business group-affiliated firms and is positive for non-group affiliated firms; in both the cases the results are insignificant. But the interaction coefficients are negatively significant for group-affiliated firms only.

Leverage of firm

The amount of leverage can also affect the investment cash flow sensitivity of a firm. It is generally observed that those companies (either business group affiliated, or non-group affiliated) having high leverage value, faces more difficulty in obtaining additional external funds from the capital market, and therefore they are expected to be more financially constrained than those having low leverage values.

In Table 6 we presented results for age and leverage characteristics of a firm for both business group affiliated firms and non-group affiliated firms. The result shows that for business group-affiliated firms, the investment cash flow sensitivity is negative for those firms which are highly leveraged and is positive to low leveraged firms. Similarly, the leverage interaction variable is negative and statistically significant for group-affiliated firms and is negative and insignificant for non-group firms. When a firm has high leverage then it is difficult for them to obtain additional fund and thus high investment cash flow sensitivity is expected.

Table 5: Regression analysis for the age and the leverage sub-samples.

	Age of firm		Leverage of firm	
	Group affiliated	**Non-Group**	**Group affiliated**	**Non-Group**
Intercept	**-4.010*(-4.39)**	-0.244(-1.21)	**-2.157* (-2.99)**	-0.115(-0.71)
Q	**0.008*(9.62)**	-7.100 (-0.70)	**0.006*(7.850)**	-1.1
Cash Flow	**-0.536*(-2.74)**	0.005(0.08)	**-0.154*(-1.84)**	0.031(0.52)
Cash Flow*Age dummy	**0.762* (3.83)**	-0.032(-0.44)		
Age dummy	-0.407(-1.51)	-0.023(-0.44)		
Cash Flow*Leverage dummy			-0.127(-0.82)	-0.060(-0.90)
Leverage dummy			**0.109*(2.67)**	0.047(1.18)
Size	**0.207*(5.73)**	-0.008(-1.10)	**0.391* (10.70)**	-0.013(-1.51)
Age	0.165(0.70)	**0.139*(2.89)**	0.063(0.56)	**0.119* (4.28)**
Time & Industry dummies	Yes	Yes	Yes	Yes
R^2	0.47	0.10	0.58	0.11
Adj.R^2	0.46	0.07	0.57	0.08
No. of Obs.	285	165	285	165

*The table 5 presents the ordinary least squares regression results Investment to capital ratio is used as dependent variable in both the tables. Q is the ratio of (Book value of total debt of firm+ Market value of equity of a firm)/Book value of total assets of firm). Cash flow is for cash flow to capital ratio of a firm. The Age dummy and leverage dummy are equal to one if the resultant values are greater than or equal to the business group and non-group affiliated medians, and zero otherwise. For size and age, natural log of total assets and number of years since incorporation has been used respectively. The total number of firm year observations is 450. Significance level at 1%, 5% and 10% levels are represented by *, ** and***, respectively.*

The interacting cash flow with Age dummy shows significant positive impact on investment cash flow for business group affiliated firms; the result shows that older firms have an established reputation in the market, which facilitates their access to external finance, mainly because their relationships with creditors settled within a longer time span. The results are going in the favour of Kashanipoor et al (2010) who found a positive relationship between investment-cash flow sensitivity and age. However, it has insignificant impact on non-group affiliated firms the result implies that the investment in fixed assets is made by the company when they are younger but with the passage of time, as company tends to grow older, they decrease the investment in fixed assets decreases when the company grows older. Our finding goes in the favour of Azam and Anum (2011) and Lin et al (1999) who found negative relationship between investment and age of firm.

Those companies who have high leverage are considered more financially constrained because they face difficulties in obtaining additional external funds from the capital market and vice versa. In case of non-group affiliated firm high investment, cash flow sensitivity is expected. The results presented in Table 6 shows that in case of business group-affiliated firms, there is no difference in the investment cash flow sensitivity of love leveraged and high leveraged firms, similarly the cash flow interacting dummy with leverage is negative for both business group affiliated and non-group affiliated firms.

Ownership structure of firm

In Pakistani capital market almost 60% of the firms have affiliation with large business groups and are owned by the family members, due to which major portion of shares are either held by family members or by the managers of the firms. Ashraf.J. and Ghani (2004) and Attiya. Y. Javed (2012) have describe that the Pakistani firms have a pyramid and cross holding ownership structure which tends to agency conflict and the outsiders especially in case of business groups it is difficult to understand the ownership structure. Organizations authoritative hierarchy has its effect on the sensitivity of investment and cash flow by the quality of command and control of the shareholder. What policies the head implements and what resources he brings in for business expansion. The efficiency of the shareholders' command and control is expected to reduce the risk of mismanagement and irregularity of data. As it's properly controlled from the top so the expected problems at the lower end can be reduced to a great extent. Due to which the sensitivity of investment and cash flow can be reduce to a great extent so as financial hindrance creating factors. Different shareholders implement different monitoring style so its impact should be studied separately.

Authority is distributed according to the shares the shareholders have within the organization to the outstanding shares in total(Rozeff 1982;Al-Malkawi,2007) If the firm is strong from inside then it will automatically become strong from outside and this can only be done by excellent command and control that why authority holder play vital role in firms progress and aligning the management and shareholders interest towards firm's goal and ultimately decreasing the requirement to pay high dividends. Hence negative relationship between inside authority and dividend policy is figured out. (Jensen and Meckling 1976, Rozeff 1982, Jensen et al 1992)

Table 6: Regression results for the ownership structure sub-samples of firms

	COR Ownership		**INS Ownership**		**DIR Ownership**	
	B. Group	**Non-Group**	**B. Group**	**Non-Group**	**B. Group**	**Non-Group**
Intercept	**-3.491* (-5.21)**	-0.147(-0.97)	**-3.038*(-4.42)**	-0.112(-0.74)	**-3.217*(-4.76)**	**-0.378*(-2.16)**
Q	**0.006*(8.22)**	-4.790(-0.49)	**0.006*(7.91)**	-1.150(-0.99)	**0.006*(5.50)**	-1.001(-0.99)
Cash Flow	**0.541*(6.21)**	0.011(0.25)	**-0.184** (-2.13)**	-0.013(-0.21)	**0.792*(7.37)**	-0.031(-1.01)
Cash Flow*	**-0.742*(-6.74)**	-0.059(-1.01)	**0.715*(3.70)**	0.0007(0.01)	**-0.886* (-7.61)**	0.104(1.39)
Ownership dummy						
Ownership dummy	0.162(1.15)	-0.037(-1.13)	-0.177(-1.25)	-0.048 (-1.51)	**0.698*(5.059)**	0.056(1.56)
Size	**0.171*(4.97)**	-0.007(-0.94)	**0.166* (4.72)**	-0.007(-1.11)	**0.128*(3.54)**	2.510(0.03)
Age	0.105(0.91)	**0.110* (4.07)**	0.038(0.32)	**0.107* (3.80)**	0.120(1.06)	**0 .128* (4.68)**
Time & Industry Dummies	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
R^2	0.53	0.13	0.52	0.12	0.55	0.15
Adj. R^2	0.52	0.09	0.51	0.08	0.54	0.12
No. of Obs.	285	165	285	165	285	165

*The table 7 presents the ordinary least squares regression results Investment to capital ratio is used as dependent variable in both the tables. Q is the ratio of (Book value of total debt of firm+ Market value of equity of a firm)/Book value of total assets of firm). Cash flow is for cash flow to capital ratio of a firm. Ownership dummy is equal to one if the resultant ownership values are greater than or equal to the group or non-group sample median, and zero otherwise. For size and age, natural log of total assets and number of years since incorporation has been used respectively. The total number of firm year observations is 450. Significance level at 1%, 5% and 10% levels are represented by *, ** and***, respectively.*

Finally, we analyse the investment cash flow sensitivity with respect to firm's ownership structure. It is commonly observed that when large shareholders have active monitoring on investment decision of the firm, it will reduce the managerial discretion and information asymmetry, resulting in reducing the firms financing constraints. We observe that corporate ownership has a negative impact on business group affiliated and non-group firms. These findings are opposite to the findings of Regie. Et al (2011) who while examining business group and non-group affiliated firms of India has found that corporate ownership did not affect the investment-cash flow sensitivity of business group affiliated firms and has positive effect on non-group affiliated firms. Institutional Ownership has significant positive relationship impact on group affiliated firm and positive relationship impact on non-group affiliated firms. While the insider ownership has significant negative relationship impact on group affiliated firm and positive impact on non-group affiliated firms. These results are in favour that firms having higher level of insider shareholders expecting lower investment-cash flow sensitivity.

5. Conclusion

Financial constraints have been one of the serious affairs in the business world. This issue comes up when a company must go for financing being opted for either internal financing or external financing. Often internal financing is preferred over external financing. The pioneers of the researchers who studied and used the investment and cash flow as the sensitivity measurement indicator of the firm's financial hindrances says that it's not always the investment and cash flow increase together equally sometimes it collapses in the case of cost which firm can handle and the cost of production and its function. The purpose of the research is to find out the touchy financial factors which create the different in investment and cash flow highlighting the Pakistani affiliated and non-affiliated business groups. Previous research suggested that since business group affiliated firms helps in reducing their financial constraints, these firms should face lower investment-cash flow sensitivity. On the other hand, non-group affiliated firms are more at risk and face more changing threats that's why study is more emphasized on affiliated business and non-business groups of Pakistan.

For investment and cash flow sensitivity of Pakistani business group-affiliated firms we have found statistically significant and positive results but for non-group affiliated firms the results are negative which contradicts with the findings of previous researches in which positive results were found even in non-affiliated groups. Our findings show a positive relationship between Q, cash flow and investment of a firm for business group-

affiliated firms under both OLS and 2SLS estimation while we have found a negative relationship between Q, cash flow and investment for non-group affiliated firms. These results show that business group affiliated firms in Pakistan are less financially constrained as compared to non-group affiliated firms.

We have also found that for both group- affiliated and non-group firms' value of Q and cash flow shows positive and statistically significance results with respect to relationship with investment, on the other hand interacting group dummy shows negative relationship with investment. Group dummy shows positive relationship with investment. It was further pointed out that for group affiliated firms, relationship between Q and investment and investment and cash flow is positive and statistically significant even if the firm goes for over investment, while the same relationship is negative for non-group affiliated firm which is very supportive to the study's outcomes.

We have further examined several firm-specific characteristics such as age, size, leverage and ownership structure of the firm. Several robustness checks using alternative estimation stipulation and methodologies were used. The findings of our research show that age of the firm is significant and is positively related with investment for non-group affiliated firms while it is negative for business group affiliated firms the reason is that the non-group affiliated firms are mainly under the government control and they started their business earlier as compared to business group affiliated firms. On the other hand, group affiliated firms are having higher leverage as compared to non-group affiliated firms. The larger the size of the firm the positive is the relationship of the investment and it goes with more investment as compared to small groups and it shows negative relationship with the non-group affiliated firm. It is so because the hierarchy in group affiliated firm is taller than non-group affiliated firms.

Our final findings are ownership structure of the firms. We use three ownership structure of the firm in order to measure financial constraints of the firm. Number of shares held by the corporations, number of shares held by the financial institutions and the number of shares held by directors and family members of the firms. Our results show that corporate ownership is positively related to investment for business group affiliated firms and is negatively related to investment for non-group affiliated firms. Institutional ownership is negatively related to both business group affiliated and non-group affiliated firms, while the insider ownership is positively significant with investment for business group affiliated firms and is negatively related to investment for non-group affiliated firms.

The findings of our study have shown that in Pakistan business group- affiliated firms are less financially constraint as compared to non-group affiliated firms which implies that government of Pakistan should provide good governance and healthy investment scenario in a country that attract foreign investors. Most of the non-group affiliated firms are under the control of local government and their performance is poor in terms of investment and cash flow sensitivity. Government should have to modify their investment plans in order to meet the cash flow on time.

This research study includes only 12 sectors out of 32 Listed Business Sectors registered on KSE. This research study did not include any Financial Institutions (that are Banks,

Modaraba companies, Insurance companies etc). Among various investment models we have used only Q model which is used to measure investment –cash flow sensitivity indicator with respect to financial constraints of the firm.

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