

## **Consumption Smoothing in Pakistan: Dynamics of Risk and Insurance**

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### **Abstract**

This study analyzes to which extent the distribution of consumption is affected by the relative wage movement among the birth cohorts and education groups. Our empirical design based on synthetic panel constructed through repeated cross sectional data from “Household Integrated Economic Survey of Pakistan.” To see the evaluation of change in income and consumption we measured growth by taking 6, 8 and 10 years difference respectively. The findings ascertained relatively higher consumption smoothing among the less educated people over the period of ten years. In the university education group, result reveals, in short time period, for instance in six and eight years difference, there is a lesser consumption smoothing. Study concludes the co-movements of consumption and income in short time period but in longer time period people tend to smooth the consumption.

**Keywords:** Insurance, Risk, Consumption Smoothing

**JEL Codes :** O12, E21

## 1. Introduction

Consumption insurance hypothesis is a long heated debate under economic literature since the last two decades. The question arises whether the income shock penetrates consumption or the consumption is well insured against the income shocks. Theorist investigated this phenomenon from simpler to complex dimension, however, little evidence is available for developing countries due to non-availability of longitudinal data sets.

We encounter with similar issues while working on consumption smoothing and choosing ideal dataset for Pakistan. Therefore, as a solution to this problem we used synthetic panel formulated through repeated cross section data. During the last one decade, Pakistan has experienced massive economic transformation coupled with few important shocks to its economy. Some of those shocks affected the between group inequality so both consumption and income were affected. To the best of our knowledge in recent years this is first attempt to capture the evolution of inequality in Pakistan.

This study incorporates the repeated cross sectional data to investigate the evolution of consumption across the age cohorts and education groups, and relates it to the changes in the distribution of wage. In other words we measured the effect of growth in hour wage with respect to cohorts and education groups on the distribution of household consumption. Basically, we build synthetic panel which is justified in the absence of longitudinal data. Since it is a cohort analysis, it is even justified on theoretical ground by Blundell and Preston (1998) as they argue consumption could be compared for individuals at the same point in their life cycle.

Previous research pertaining to risk sharing in consumption, stresses on the several formal and informal insurance mechanism which protects consumption from income shocks. Cochrane 1991; Mace 1991; Altonji, Hayashi, and Kotlikoff 1992; Townsend 1994; Kazianga and Udry 2006; Gertler, Paul, David, Levine and Moretti 2009 are the main contributors to this part of literature. They have exploited the theory of consumption allocation that under plausible restriction of preferences, delivers strong implications on consumption growth.

Earlier research pertaining to consumption smoothing focuses on publically unobserved income shocks or the focus mainly relies on the consumption behavior of individuals or their earning capacity. However, Attanasio and Davis (1996) examined the power of systematic, publicly evident swings in hourly wage structure on the distribution of household consumption. This

type of research design, like focusing on relative wage structure have quite a number of advantages in comparison to the traditional mechanism. For instance, one of the major benefits arises because relative wage movements across the group of workers are least likely to be correlated with idiosyncratic component of individual preference shift.

Changes in household preferences may affect the household marginal utility, thus, it may lead to false rejection of consumption insurance hypothesis. Moreover, inability to notice publically observable income shocks limits the scope of old studies, as their main focus remains on unobservable income shocks. Consequently such theories cannot be rationalized which stresses on the role of unobserved income shocks in an informationally constrained optimal consumption allocation. The mechanism of this study relies on publically observable income shocks as Attanasio and Davis (1996) in their paper focused on publically observable income shocks and how they affect the distribution of consumption as it enables us to see to which extent consumption is insured.

As discussed earlier one of the key objectives of this study is to document the growth of relative wages across the birth cohorts and education groups. But unlike Attanasio and Davis (1996) where college graduates were uniformly better-off during 1980 to 1990. In Pakistan the picture is slightly different, in fact it is more mixed. In particular, we observe for couple of years, and for some of the cohorts, better educated people are priced similar to the people with less education. Later on, we established the nexus by comparing the changes in relative income to changes in relative consumption. This part is interpreted as test of consumption insurance hypothesis.

In this paper section 2 presents detailed literature review. There we outline the evolution of literature pertaining to risk and consumption smoothing. In section 3, we provide the detailed mechanism through which we have constructed the synthetic panel and have run the regression for the desired residuals. Whereas, section 4 of this paper outlines the data section in which we discuss the key properties of our dataset. Descriptive analysis have been used to get better insights about the data. This helped us to see average trend and overall variation in the data across and within the cross sections. Section 5 is reserved for results and discussion in which we presented the results with the help of graphs. Finally in section 6, the conclusion and future recommendations are given.

## 2.0 Literature Review

There is an escalating amount of literature which documented the relative wage movement and consumption smoothing through various perspectives. Major contributions are accredited to developed countries due to better tracking and availability of datasets. However, in empirical research it remains underdeveloped area for developing economies. Cochrane (1991) was the first who tested whether the consumers are insured against idiosyncratic shocks to income and wealth. Considering the role of both formal and informal financial institutions and transfers, he concluded full insurance can be rejected for long illness or involuntary job loss but not for the spells of unemployment. Townsend (1994) further implemented the full insurance model on three Indian villages. One of the major findings of this paper was the co-movement of household consumption with village average consumption. He proved household consumption was not influenced by factors like idiosyncratic shocks, unemployment or illness, however, people with no land holdings were not well insured.

Attanasio and Davis (1996) further uplifted work as they implemented the test of Cochrane (1991) on synthetic panel. But they exploit the basic assumption maintained by Cochrane (1991) and Townsend (1994) that social planner can freely transfer the leisure across the households. They alter the need for this assumption by investigating the relative wage movements among the group of men with inelastic labor supply. This enables them to develop a better consumption insurance hypothesis test when the preferences are non-separable between consumption and leisure along with imperfect transferability of leisure across the households. Given their empirical design, low frequency movements were detected in the cohort and education structure of pre-tax hourly wages among men drove large changes in the distribution of household consumption.

Attanasio and Székely (2004) investigate the high volatility period in Mexico on similar research question. They presented the evidence of relationship between relative male wage and growth in consumption. They added four different types of expenditure categories and checked how they respond to income shocks. In some of the years, highly educated people were making less money in comparison to less educated people in Mexico for which they reason about peso crisis and decline in GDP per capita. Blundell et al. (2008) in their work analyzed the extent to which consumption is insured against income shocks. They combined two different panel datasets to observe the transmission of inequality from income to consumption. Study concludes that the people in US offset transitory shocks by greater insurance arrangements, whereas the degree of insurance varies across the demographic groups. Krueger and Perri (2006) used consumer expenditure survey and document despite of noteworthy increase in both,

between and within group of household income inequality in United States, there is moderate increase in consumption inequality.

Krueger and Perri (2006) document the noteworthy increase in both, between and within group income inequality for the household having same characteristics, for instance, education and race. But they found consumption and income inequality were not coupled together as there was a moderate increase in consumption inequality. They held within group inequality, responsible for this dichotomy or divergence as inequality in income increased more than inequality in consumption. Heathcote, Perri and Violante (2010) used four different surveys to document cross sectional inequality in United States. They measured the different dimensions of inequality through market, choices and institution. Findings reveal reasonable increase in income inequality, whereas, taxes and transfers compress the inequality especially at the bottom of income distribution. Study concludes with the evidence that changes in distribution of hours worked generates income inequality.

### 3.0 Methodology:

To estimate whether the variation in consumption is affected by the income shocks, one must need the longitudinal data. But since we have repeated cross sectional data, we can use alternative mechanism which is through synthetic panel. We build synthetic panel from repeated cross sectional data after creating age cohorts and education groups. These age cohorts and education groups become our unique identifier and makes it a synthetic panel over the period of time.

As we discussed the advantage of using synthetic panel, but it is coupled with one disadvantage as well, as one focuses only on insurance across the groups. By taking averages over the member of groups, one cannot say anything about the extent of risk sharing within the group. Here is the method used by Attanasio and Davis (1996) in order to see if income shocks contributes to the consumption variation. As per consumption insurance hypothesis, both direct and indirect mechanism for sharing consumption risk equalize the growth rate in marginal utility of consumption across the individuals and the group of individuals. Given a fixed set of Pareto weights, such condition can be obtained through first order condition of central planner who allocates resources under uncertainty across individuals and time. Let's assume  $\xi_t$  represents the Lagrange multiplier related with the aggregate feasibility constraint at time  $t$ . Now we present planner's first order condition

$$(\theta^j)^t \lambda^j U_c(C_t^j, \delta_t^j) = \xi_t \quad j = 1, \dots, J, \quad (1)$$

For all the states of the world  $t$ ,  $C^j$  represents the consumption of individual  $j$ ,  $\delta^j$  implies arbitrary preference shocks,  $\Theta^j$  is a discount factor, and  $U_c(\cdot, \cdot)$  denotes the marginal utility function. Individual fixed effects are equivalent to  $\lambda^j$  which are time invariant Pareto weights and it is easy to eliminate them through the ratios of first order conditions at two points in time:

$$\Theta^j \frac{U_c(C_{t+1}^j, \delta_{t+1}^j)}{U_c(C_t^j, \delta_t^j)} = \frac{\xi_{t+1}}{\xi_t}, \quad j = 1, \dots, J. \quad (2)$$

As per equation (2) any variable which is in term of cross sections, uncorrelated with both preference variation and measurement error in consumption growth is also uncorrelated with cross sectional distribution of consumption growth. In measuring consumption, assuming iso-elastic utility with multiplicative shocks and multiplicative error which implies log linear form for equation (2). Specially, let

$U_c(C_t^j, \delta_t^j) = U_c(C_t^j, b_t^j \gamma_t^j) = b_t^j (C_t^j)^{1+\gamma^j} / 1+\gamma^j$ , and let  $\varepsilon_{t+1}$  represents the error in log consumption change, thus, equation 2 turn out to be

$$\log \left( \frac{C_{t+1}^j}{C_t^j} \right) = \frac{1}{\gamma^j} \left[ \log \left( \frac{\xi_{t+1}}{\xi_t} \right) - \log \left( \frac{b_{t+1}^j}{b_t^j} \right) - \log(\Theta^j) \right] + \varepsilon_{t+1}^j \quad (3)$$

Therefore, we see now, if a variable  $X_{t+1}^j$  is independent of preference variation and measurement error, in this case consumption insurance suggests  $X$  has no explanatory power for the cross sectional distribution of consumption growth. Shocks to individual's endowment and earning capacity becomes ideal candidate for  $X$  under interesting alternatives to consumption insurance null hypothesis.

Next we see households are portioned into groups and indexed by  $i$ , by taking logs in equation (1) and average over the sample of group  $i$  households at time  $t$  to get

$$\begin{aligned} \hat{O} &\equiv \frac{\sum_{j \in i(t)} \log[U_c(C_t^j, \delta_t^j)]}{\#i(t)} \\ &= \log \xi_t - t \frac{\sum_{j \in i(t)} \log \Theta^j}{\#i(t)} - \frac{\sum_{j \in i(t)} \log \lambda^j}{\#i(t)} \end{aligned} \quad (4)$$

Here  $\#i(t)$  signifies the number of households who were sampled at time  $t$ . So now we can rewrite sample average first order condition as

$$\hat{O} = \log \xi_t - t \bar{R}_i - \bar{I}_i + \varepsilon_{it}, \quad i = 1, \dots, I, t = 1, \dots, T, \quad (5)$$

In equation (5)  $\bar{R}$  and  $\bar{I}$  are population counterparts to the sample in equation (4) and the reason we error term in the equation is due to finite sampling from heterogeneous population. Moreover, it leads to a “level” regression on synthetic panel created from group average data, given the parameterization of preferences. To be specific if preference take iso-elastic form specified above, the sample mean  $\hat{O}$  converts to

$$\begin{aligned}\hat{O} &= \frac{\sum_{j \in i(t)} (b_t^j)}{\#i(t)} + \frac{\sum_{j \in i(t)} \gamma^j \log(C_t^j)}{\#i(t)} \\ &\equiv \bar{g}_{it} \hat{U} + \frac{\sum_{j \in i(t)} \gamma^j \log(C_t^j)}{\#i(t)} + v_{it}\end{aligned}$$

Combining it with equation (5) produces

$$\begin{aligned}\frac{\sum_{j \in i(t)} \gamma^j \log(C_t^j)}{\#i(t)} &= \log \xi_t - t\bar{R}_i - \bar{I}_i - \bar{g}_{it} + v_{it}, \quad (6) \\ i &= 1, \dots, I, t = 1, \dots, T.\end{aligned}$$

Now we are able to presents the regression of sample mean of log consumption on full set of time and group fixed effects, along with a variable  $X_{it}$  which captures time variation in relative group endowment.

$$\log c_{it} = \alpha_t + g_i + \beta X_{it} + e_{it}, i = 1, \dots, I, t = 1, \dots, T. \quad (7)$$

Consumption insurance implies  $\beta=0$ , if we compare equation (6) with (7), if and only if  $X_{it}$  satisfies list of auxiliary assumptions. For instance,  $X_{it}$  should be uncorrelated with measurement error in log consumption, group differences in the mean of time discount rate, group differences in the distribution of preference parameter  $\gamma^j$  and variation in the mean preferences disturbances  $\bar{g}_{it}$ . Similarly it is easy to find consumption insurance also suggests  $\beta=0$  in first difference regression specifications of the form

$$\begin{aligned}\log c_{it} - \log c_{is} &= \alpha_t + \beta(X_{it} - X_{is}) + e_{it} - e_{is}, \\ i &= 1, \dots, I, t = (t - s), \dots, T, \quad (8)\end{aligned}$$

For equation (8) it is also necessary to satisfy the statistical assumption as we discussed above for  $X_{it}$ .

#### 4.0 Data Section:

Household integrated income survey of Pakistan (HIES) has been conducted with some breaks since 1963. However, the survey was renamed as “Pakistan Social and Living Standard Measurement (PSLM) Survey” in 2004, and basic module of HIES remained intact. Since 2004, the survey is conducted in every alternate year. It’s a repeated cross sectional survey data which covers detailed information on consumption, education, income and employment. Individuals were asked about income and education status, however, consumption level data is obtained at household level. Households were asked simple questions pertaining to durable and non-durable consumption and we choose the reported total consumption on non-durable items.

The universe of this survey consist on all the rural-urban areas of Pakistan except Capital Territory Islamabad and military restricted areas. Every city or town have been divided into enumeration blocks consisting of 200 to 250 households identifiable through sketch map. Every sketch map have been classified into three classes of income groups for instance low, middle and high, keeping in mind the living standard of the majority of the people. A two stage stratified sample design has been adopted in this survey. Villages and enumeration blocks in rural or urban areas have been taken as primary sampling units (PSUs). Sample PSUs have been selected from strata/sub-strata with probability proportional to size (PPS) method of sampling. Whereas, households within the PSUs have taken as secondary sampling units SSUs. In every PSU of rural or urban areas 12 to 16 households are selected by using systematic sampling technique with a random start.

We restricted our sample to the male heads of the households having age between 26 to 50 years. Moreover we exclude those heads, who are currently enrolled in any educational institution at any level. It is well established economic fact that head of the household earns more and considered as the keeper of the house. Therefore, it is more important to observe the shocks in the income of the head, but for type of design problem appears in consumption as we don’t have consumption of the head of the household. Consequently, as a solution to this problem we used OECD scales to generate adult equivalent average consumption. This enabled us to study the shocks in the income of the head, and its impact on adult equivalent average consumption per household.

We categorize the data in five distinct age cohorts and three levels of educational categories. The youngest cohort in the data are those born in 1984-1988 and oldest cohort are those born

in 1954-1958. The lowest education group is “Junior Middle” followed by “Intermediate” and highest acquired education group is “University.” Since we are more focused on labor earnings hence it is hard to monitor the agriculture income therefore we limit ourselves to non-agricultural labor income. Lastly, we narrow down the focus on those heads who worked for at least ten months in a year with more than 20 days a month with paid employment. Age cohorts along with education groups become the unique identifier in the data which enables to formulate the synthetic panel from repeated cross sections.

In data, we assume working day implies working eight hour a day, this assumption provided us the cushion to compute the hourly wage for heads of the households. Possibility of outliers in the data have been removed by dropping the top and bottom 1% of the observations which makes the data ready to study relative wage movement and consumption distribution. Except table one all the analysis based on real values for which we have deflated the income and consumption by using the values of gdp deflator obtained from World Bank indicators.

In Table 1, we present the summary statistics of dataset as we can see consumption and wage are measured in terms of Pak Rupees. We have reported minimum, maximum, mean, 10<sup>th</sup>, 50<sup>th</sup> and 90<sup>th</sup> percentile in the data. The mentioned table reveals the distribution of our key variables, for instance, the difference between minimum and maximum value of monthly non-durable consumption and hour wage is more than double. Moreover, we see at 90<sup>th</sup> percentile people are having university education, so they are earning higher hour wage and consuming more. Furthermore, we observe that the youngest birth cohort in the data is 1988 and the oldest one is 1954, whereas, the median guy was born in 1970. In education, median person obtained intermediate education as we have classified education into the three different categories.

**Table 1: Summary Statistics**

	<b>Min</b>	<b>Max</b>	<b>P10</b>	<b>P50</b>	<b>P90</b>	<b>Mean</b>
<b>Consumption</b>	23.6663	67.4972	25.2636	34.2498	53.8943	38.0360
<b>Wage</b>	0.1649	0.70819	0.1973	0.3137	0.5522	0.34850
<b>Birth year</b>	1954	1988	1958	1960	1970	1970
<b>Education</b>	1	3	1	2	3	2

Source: Authors calculations

In Table 2, we have documented the average pretax real wage on yearly basis because it helps us to observe the evolution of average hour wage on yearly basis by cohort and education group. It is evident in general on an average basis people with University education or old cohorts are making more money relative to other categories.

**Table 2: Average Real Hourly Wage for Head of Household by Cohort and Education Group**

Year	<i>Five Years Birth Cohort</i>						
	1984- 1988	1979- 1983	1974- 1978	1969- 1973	1964- 1968	1959- 1963	1954- 1958
	<i>Junior Middle</i>						
2004	---	---	0.2444	0.2768	0.2808	0.31196	0.2999
2006	---	0.1789	0.1934	0.2122	0.2296	0.2390	0.2442
2008	---	0.1531	0.1703	0.2256	0.2143	0.1822	0.1790
2010	0.1751	0.2015	0.2218	0.2423	0.2310	0.2336	---
2012	0.1845	0.1953	0.2250	0.2414	0.2449	0.2401	---
2014	0.2054	0.2102	0.2450	0.2492	0.2640	---	---
	<i>Intermediate</i>						
2004	---	---	0.3048	0.3471	0.3822	0.4246	0.4213
2006	---	0.1885	0.2403	0.2736	0.3201	0.3572	0.3472
2008	---	0.2206	0.2376	0.2611	0.3334	0.3103	0.3218
2010	0.1883	0.2711	0.3241	0.3291	0.3603	0.3587	---
2012	0.2119	0.2534	0.2947	0.3292	0.3798	0.3659	---
2014	0.2378	0.2682	0.3156	0.3674	0.3946	---	---
	<i>University</i>						
2004	---	---	0.4412	0.4829	0.5497	0.6787	0.7081
2006	---	0.2941	0.4041	0.5014	0.5224	0.6479	0.7130
2008	---	0.2987	0.3817	0.4126	0.3957	0.4999	0.4388
2010	0.1061	0.4962	0.6173	0.6095	0.6320	0.7632	---
2012	0.3502	0.4399	0.4998	0.5626	0.6351	0.7189	---
2014	0.3910	0.4679	0.549	0.5374	0.7031	---	---

Source: Authors calculations

However, we observe in some of the years younger cohorts are making more money than the older ones. For instance in year 2012, within the intermediate education group, for cohort 1964-1968 average hourly wage was 0.3798 PKR, whereas, for cohort 1959-1963 average hourly wage was 0.3659 PKR. But this sort of situation is limited to couple of cohorts in less educated

people, thus, we see people with university education earns more money over the period of time. This was not the case in Attanasio and Davis (1996), but Attanasio & Székely (2004) encountered with similar trend in the data.

**Table 3: Average Real Consumption for Head of Household by Cohort and Education Group**

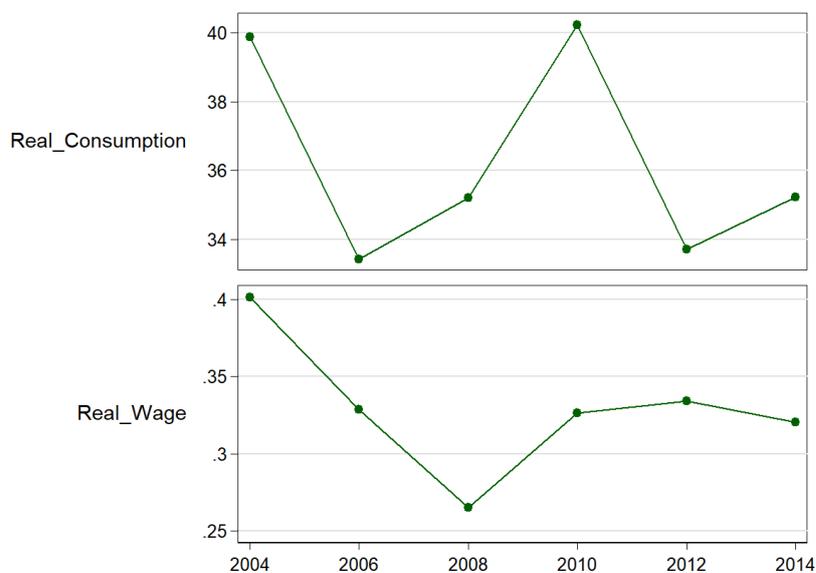
Year	<i>Five Years Birth Cohort</i>						
	1984-1988	1979-1983	1974-1978	1969-1973	1964-1968	1959-1963	1954-1958
	<i>Junior Middle</i>						
2004	---	---	30.7638	30.928	28.8463	30.5317	29.9717
2006	---	23.6663	23.8473	23.9125	24.7859	25.0600	25.0108
2008	---	26.7830	24.5410	29.0237	30.9255	24.3115	28.8305
2010	25.9362	28.2912	29.6621	29.5170	31.9105	32.7330	---
2012	24.5443	23.9703	24.9468	25.1834	27.1800	27.5366	---
2014	26.0949	26.3300	27.6141	27.7845	30.8667	---	---
	<i>Intermediate</i>						
2004	---	---	35.9491	38.9695	39.1120	41.7763	39.0028
2006	---	27.557	29.1672	30.0009	31.7300	35.9817	36.3239
2008	---	32.7482	34.5104	35.5961	36.5188	45.2793	38.3048
2010	30.9797	35.5648	40.5093	39.7500	39.2518	42.8678	---
2012	30.0662	30.6529	32.3272	32.7494	35.9109	33.2192	---
2014	31.9842	33.4639	35.3683	37.3314	39.9968	---	---
	<i>University</i>						
2004	---	---	49.5925	49.9373	53.7658	60.04717	60.0334
2006	---	30.0324	45.6930	48.5953	47.3523	55.0256	57.2592
2008	---	45.2432	45.9092	51.3861	49.2820	62.9737	56.5886
2010	44.6402	53.8513	69.6926	66.6436	63.0003	78.3772	---
2012	34.7618	47.6504	51.8958	49.8831	49.9002	53.7790	---
2014	48.5662	51.7343	50.7679	49.8437	57.5022	---	---

Source: Authors calculations

In addition to this, we observe an overall decline in wage for year 2006 across the education groups. However, from 2008 onwards we notice a notable increase in wages. It is evident in the table that people with University education are relatively better off. Intuitively economic slow-down in Pakistan which started in year 2006 could be argued as one of the reasons for sudden decline in real wage as it begin with energy crisis and food inflation.

We see average real monthly consumption of non-durable items in table 3 crossed with cohorts and education groups. Non-durable items in our data mainly consist on food, textile and miscellaneous expenditures. In food expenditures we have items like staple crops, eatables, pulses, oil, tea, and other bakery items, in addition to this, textile expenditures consist on expenses occurred on clothing, embroidery and sewing. Lastly in miscellaneous part we have expenses on religious or festive occasion and house rent. As we can see for cohort 1974-1978, people with junior middle education, on an average basis were spending 30.7638 PKR in 2004 and in 2006 it went down to 23.8473 PKR. During the same period in table 1, there is decline in real wage as well. In all the cohorts with junior middle education there is a sudden decline in real consumption for year 2012. There is an overall decline in consumption for year 2006, just like we see in table 1 for real wages, there is an upward trend in consumption for later years especially for people with intermediate and university education. Furthermore, this table reveals that older cohorts consumed more in comparison to the younger cohorts or in other words it can be further classified in accordance to education as well.

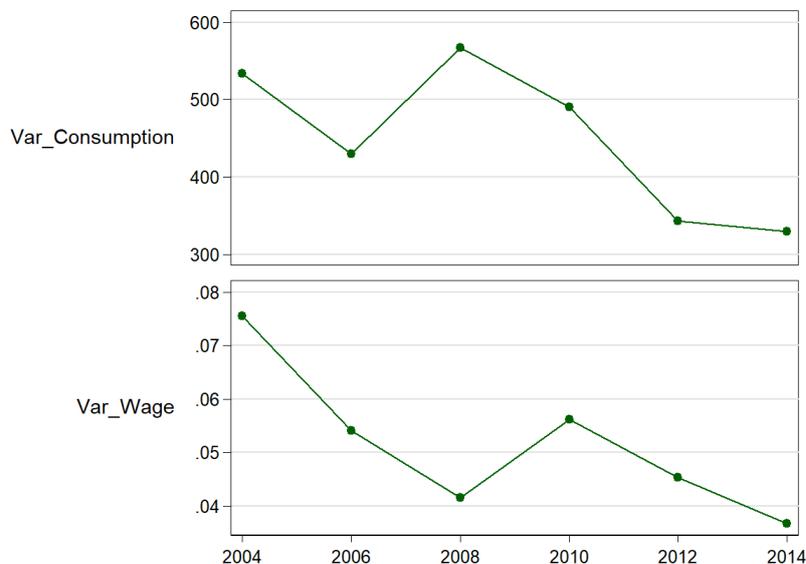
**Figure 01: Trend of Average Real Consumption and Real Wage**



Source: Authors calculations

This implies education and age are one of the key determinants of consumption here in this dataset. Before we proceed to main results it is important to understand how average wage and consumption evolve over time as we can see in the figure 1. In the lower panel it shows increasing tendency of average real hourly wage from 2008 to 2012, which can be further break down in such a way, for instance, from 2008 to 2010 it increased at increasing rate, but from 2010 to 2012 it increased at decreasing rate. Production of staple food increased remarkably in 2006-07 with surplus supplies to export, but in 2008 wheat crisis in Afghanistan affected Pakistan resultantly spiked food inflation in “regional food prices” by World Bank (2009). Explanation for this increase remains intuitive in nature because it is hard to establish, among many factors, if these were the sole reasons for increased or decreased averages in the dataset.

**Figure 02: Trend of Variance in Real Consumption and Hour Wage**



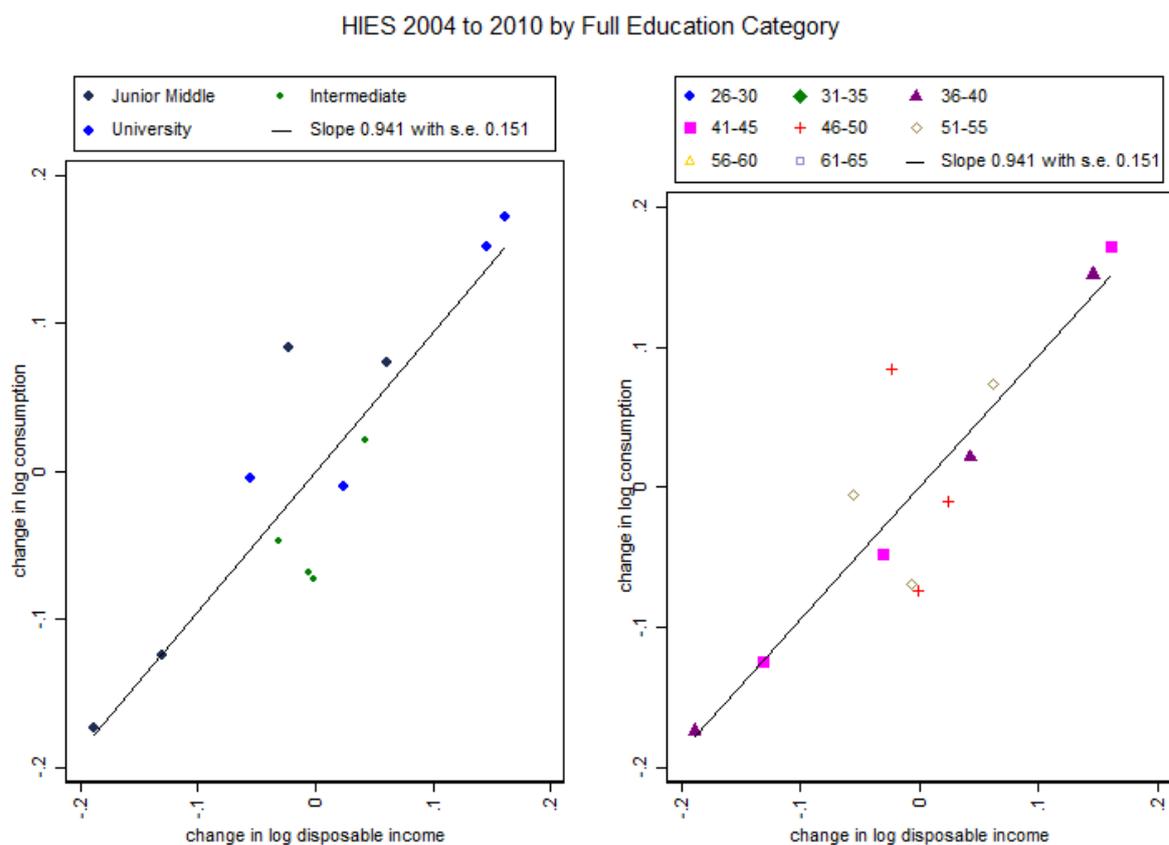
Source: Authors calculations

Figure 2 presents the result of variance in real consumption and real wages. It reveals sharp decline in the variance of hour wage in year 2006 but moderate increase from 2008 till 2010. As discussed before this was the period of great uncertainty in Pakistan due to economic and political crisis. Thus, we notice similar fluctuations in consumption and wage but there is greater variation in wage in comparison to consumption. As we see in table 1 and 2 for real wage and consumption that there was a sudden decline in both of them for year 2006, hence, we see the similar trend here in this figure. In last two years variance of wage declined sharply but there is not much difference in the variance of consumption.

## 5.0 Results and Discussion

This section outlines the results and discussion on synthetic panel for Household integrated economic survey of Pakistan. As discussed earlier we check whether the shocks to income drill through the consumption or not. Evidence suggested in all the growth specifications except ten years growth difference, consumption is susceptible to income shocks and we observe smaller variation in income derives larger variation in consumption. One of the biggest advantage of our empirical design that it enabled us to capture the evolution of the slope of the growth, in different growth specification like 6, 8 and 10 years.

**Figure 03**

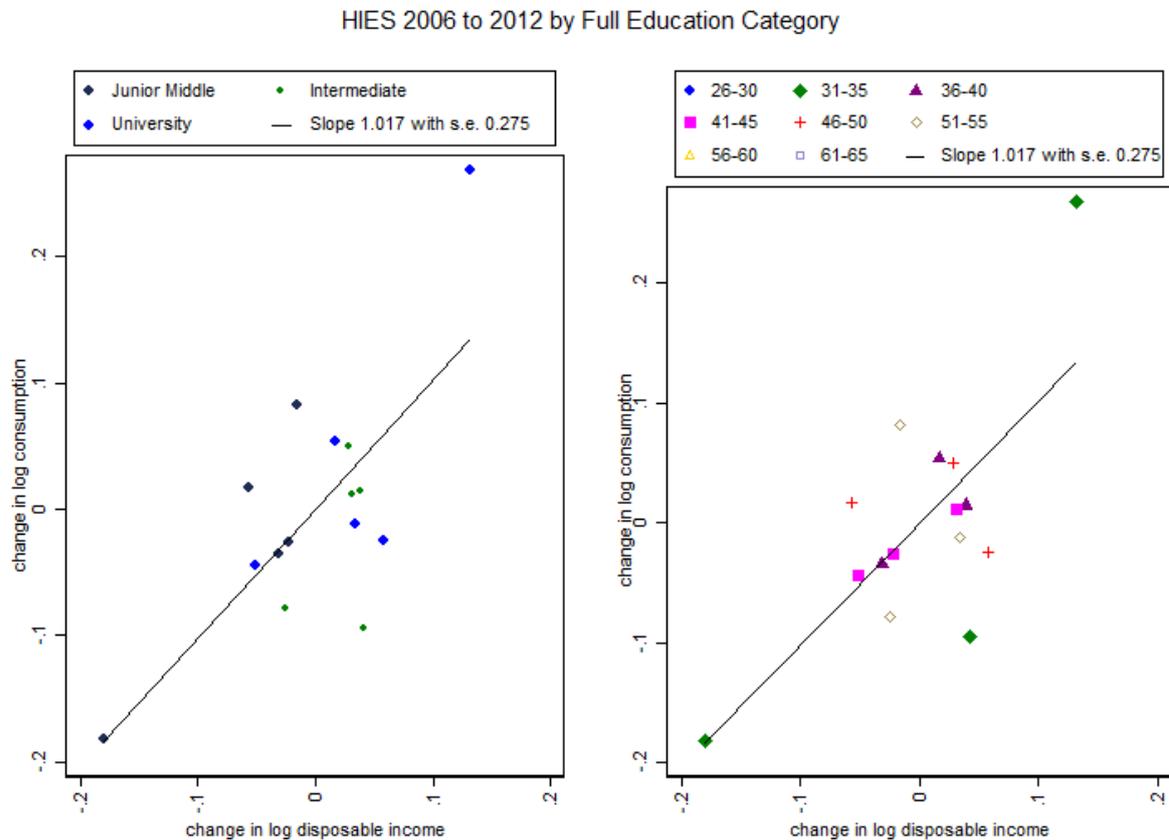


*Adult equivalent household consumption vs. man's wage (head of the household), 2004-2010 log change residuals. Groups are defined by three different types of education crossed with 5 years birth cohorts. Plotted values are residuals from regression on cubic age.*

For instance in majority of our six years growth specification we observed that slope varies around 1, but when we increased the time period from six to ten years we see the slope declines to 0.254 which is in accordance with economic theory. People tend to smooth more over the longer period of time, hence, our empirical design differs from Attansio and Davis (1996).

Figure 3 shows change in log disposable income and change in log consumption over the period of six years. In this figure our results are very similar to the mentioned paper as we observe there is equal variation in income and consumption for people with university or junior middle education. But for with intermediate education there is not much variation in income.

**Figure 04**



*Adult equivalent household consumption vs. man's wage (head of the household), 2006-2012 log change residuals. Groups are defined by three different types of education crossed with 5 years birth cohorts. Plotted values are residuals from regression on cubic age.*

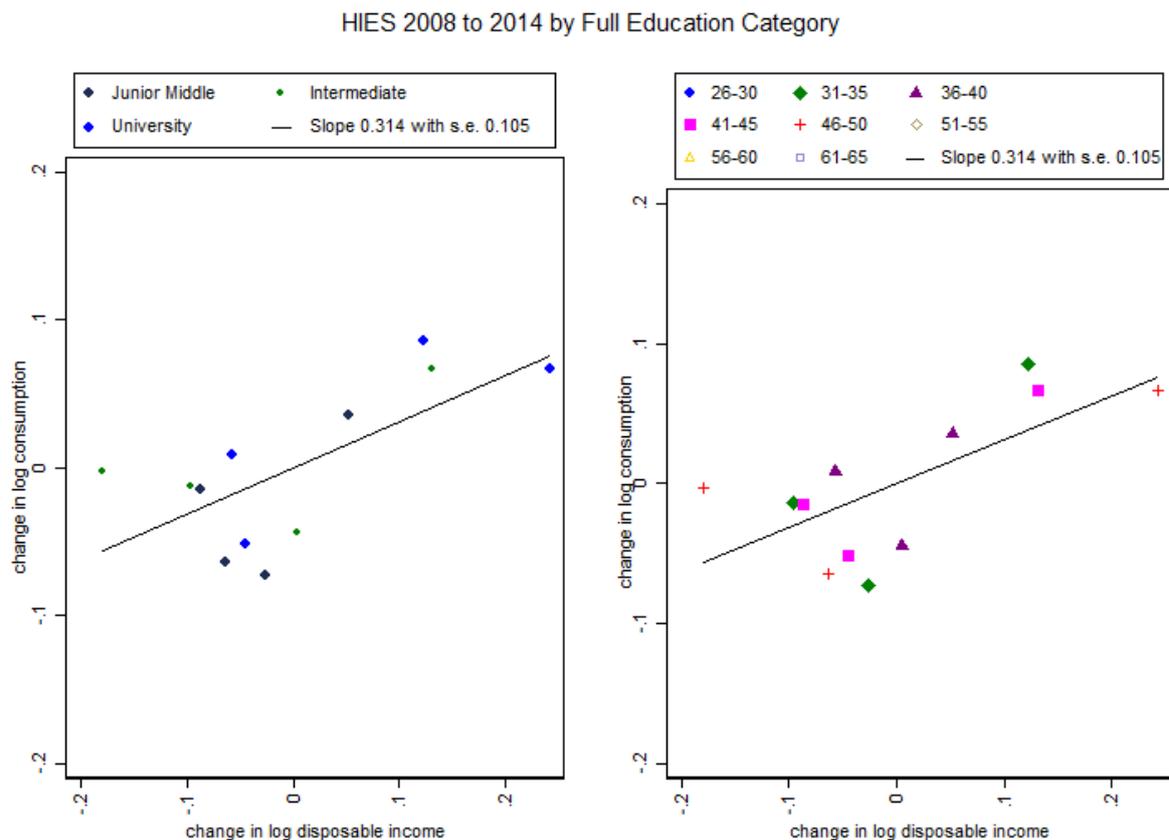
Income variation significantly pass through the consumption as we see in the slope and standard error, therefore, there is not much consumption smoothing in this figure. In terms of age cohorts, we see the youngest cohort in the right hand panel of figure 3, is 36 to 40 years of age. We notice closer movement of change in income and change in consumption for people with 41-45 and 36 to 40 years of age.

In figure 4 we observe the similar slope but majority of the observations are clustered together. However, for one of the observations pertaining to university education we see higher growth in consumption than income. There is a negative growth in income for people with junior middle education but there is not equal variation in income. Thus, there is a greater consumption

smoothing observed for this education group during the mentioned time period. Similarly in the right hand panel of this figure, cohorts are clustered together but we observe similar variations in income and consumption.

In Figure 5 we document the last plot of six years difference for change in income and consumption with respect to education group age-cohorts. It suggest higher growth in income and consumption remains low for least educated people during this period, however, university and intermediate education groups realized significant fluctuations in income and consumption growth. There is not much change in consumption even in the right hand panel where we present the growth with regard to cohorts.

**Figure 05**

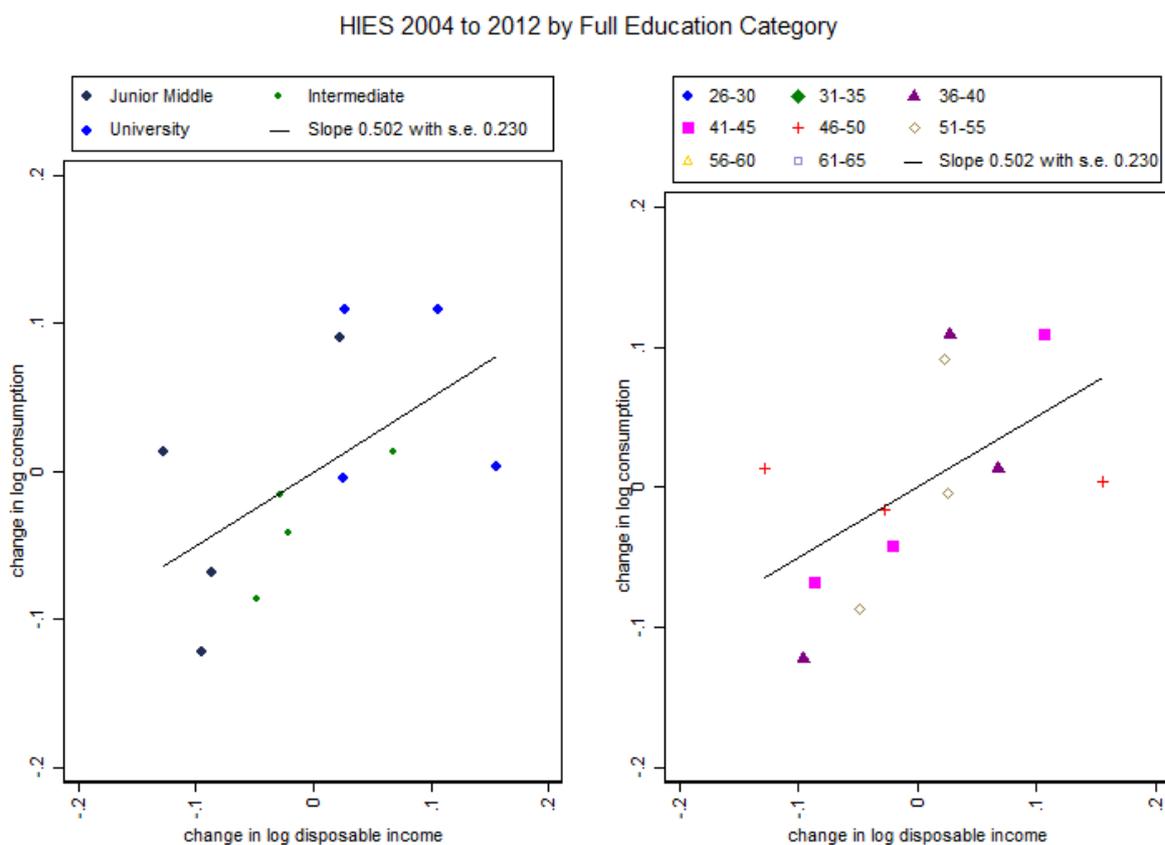


*Adult equivalent household consumption vs. man's wage (head of the household), 2008-2014 log change residuals. Groups are defined by three different types of education crossed with 5 years birth cohorts. Plotted values are residuals from regression on cubic age.*

Slope of the line is much lower in contrast to figure 3 and figure 4, as we have seen in the figure 1 and figure 2, there are a lot of variation in 2008 due to economic crisis, and here we see much variation at wage side instead of consumption. During this period somehow consumption is better insured against income shocks as we see much lower slope but still it is significant.

In Figure 06 we see 8 years difference design for change in consumption and change in change in income from 2004 to 2012. We observe reasonable departure from consumption insurance hypothesis as slope is significant and in accordance with economic theory we see there a decline in slope relative to majority of six years specifications. Since we increase the time period so the slope comes down, thus people do more smoothing in longer time period. But we see change in consumption for people with University education is much smoother in comparison to the rest of observations. In terms of cohort it has been ascertained that people between of 36 to 40 years realize the greater change in consumption given the change in income.

Figure 06

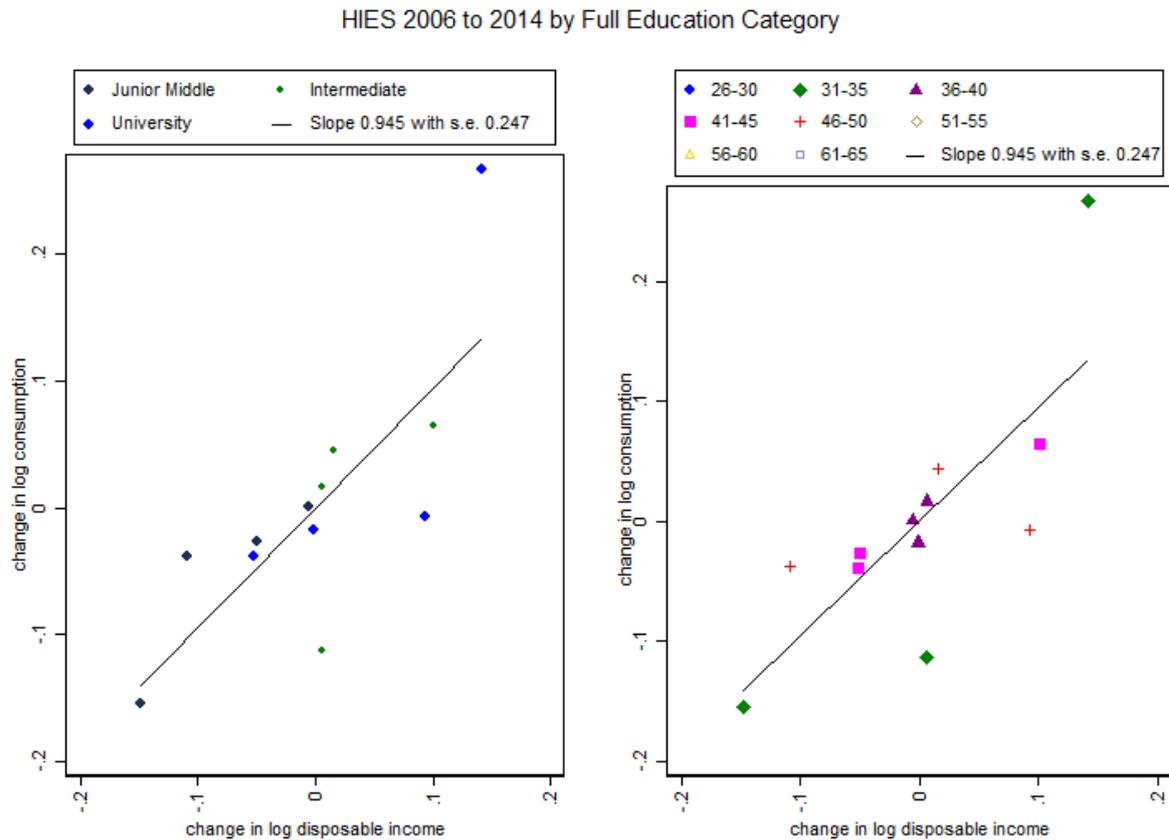


*Adult equivalent household consumption vs. man’s wage (head of the household), 2004-2012 log change residuals. Groups are defined by three different types of education crossed with 5 years birth cohorts. Plotted values are residuals from regression on cubic age.*

Figure 07 presents the last result of our eight years difference design which shows the slope is still significant but much higher relative to the previous figure. For some of the observations we see greater change in consumption is realized through the change in income for instance people with university and junior middle education. Besides this we see greater consumption

smoothing for people intermediate education. In the right hand panel of this figure we see greater change in consumption than income for one of the observations of 31 to 35 years cohort.

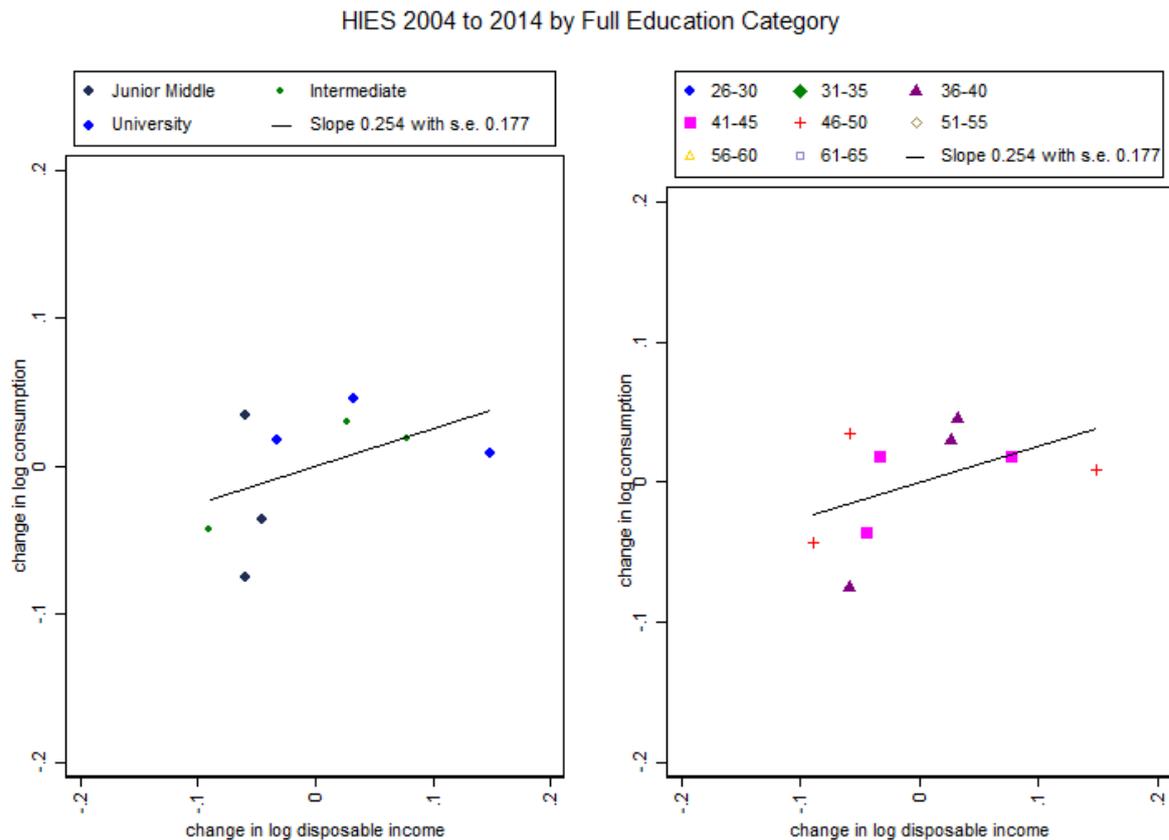
**Figure 07**



*Adult equivalent household consumption vs. man's wage (head of the household), 2006-2014 log change residuals. Groups are defined by three different types of education crossed with 5 years birth cohorts. Plotted values are residuals from regression on cubic age.*

Figure 08 shows ten years difference plot from 2004 to 2014 and it shows consumption is more insured over decade with respect to relative wage movements. Unlike 6 and 8 years difference growth, here we see different trend as the slope is insignificant, implying the existence of insurance mechanism for consumption. It is evident here bigger variations in wage drawing very small variations in consumption for instance we observe regardless of negative growth in real wage, people with junior middle education tends to maintain the consumption or there is a lesser decline in consumption growth than wage. Similarly, in the right hand panel we observe, for cohort 46 to 50 years of age, consumption does not commove with wage hence implying the consumption smoothing. This contrast we see, highlights the advantage of our empirical design.

Figure 08



*Adult equivalent household consumption vs. man's wage (head of the household), 2004-2014 log change residuals. Groups are defined by three different types of education crossed with 5 years birth cohorts. Plotted values are residuals from regression on cubic age.*

By drawing on cross-sectional datasets to build long synthetic panel, we can detect the persistent components of relative wage movements causing relative consumption movements.

## 6.0 Conclusion

We started researching on this issue as we observed Pakistan's economy underwent definite and persistent movements in the structure of relative wages since 2004. We outline that the relative wage movements across the birth cohorts and education groups bring noteworthy changes in distribution of adult equalized household consumption. As we discussed earlier after directly observing from the results that for more less educated people, there is greater variation in relative wage in comparison the consumption. In six years difference specification we observe, for all the education groups there is a clear evidence that adult equalized real

consumption commove with hourly real wage which goes to prove the rejection of consumption insurance hypothesis.

In addition to this, under eight years difference design, we observe, for some of the observation, higher growth in relative wages are for more educated people in comparison to people with junior middle education. For them, it is evident that consumption was relatively smoother which goes to prove the existence of insurance arrangements. For young cohorts, we see there is greater variation in income in comparison to older cohorts. Overall results suggest that university education group and junior middle education group are susceptible to transmission of relative wage shocks into adult equalized household consumption.

Our ten years difference design proves the existence of consumption insurance, which means food security, clothing and housing are insured against income variations which negates the earlier research by Attansio and Davis (1996). However, in lesser duration, our result documents the significant departure from consumption insurance hypothesis. Since the magnitude of covariance between consumption growth and income growth is similar in 6 years and 8 years growth design. Therefore, it is right to say both commove in short period together but in longer duration people tends to smooth the consumption. For future, this research could be extended to check if these results hold for developing economies especially in South Asia. It is ideal to see risk and insurance from different spectrum as in the developing economies repeated cross section data is easily available than longitudinal panel due to higher tracking. Moreover, inclusion of endowment shocks could be more useful for getting better insights. Another interesting expansion of this research could be to breakdown the consumption into different bundles. In order to see which type of consumption is more affected from income shocks.

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