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### Cohort risk sharing in Pakistan: Relative wage and consumption movements over time

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#### ABSTRACT

*This study analyzes to which extent the distribution of consumption is affected by the relative wage movement among birth cohorts and education groups. Our empirical design is based on a synthetic panel constructed using repeated cross-sectional data from "Household Integrated Economic Survey of Pakistan." We limit our analysis to persons aged between 26 to 50 years at the time of survey. To see the evolution of change in income and consumption we measured growth by taking 6, 8- and 10-years' difference respectively. The findings ascertained there is limited risk-sharing across cohort-education groups in Pakistan, but the measured extent of risk-sharing increases over longer horizons. Furthermore, we observe relatively higher consumption smoothing among the less educated people over the period of ten years. In the university education group, results reveal less consumption smoothing in the shorter, six- and eight-year time periods. The study concludes that the relative risk-sharing over a decade is better in Pakistan than the shorter growth horizon.*

#### Keywords

Insurance, Risk, Consumption Smoothing

#### JEL

Classification  
O12, E21

## 1. Introduction

Consumption insurance hypothesis has been a long-heated debate in the economic literature over the last two decades (Attanasio and Davis, 1996; Attanasio and Székely, 2004; Zheng and Lolips, 2018). The question arises whether an income shocks penetrate consumption or whether consumption is well insured against income shocks. Theorists 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 similar issues while working on consumption smoothing and choosing ideal dataset for Pakistan. Therefore, as a solution to non-availability of longitudinal data we used synthetic panel formulated through repeated cross section data. This paper aims to investigate the consumption smoothing in response to relative wage movement over time. We intend to provide estimates concerning consumption and income risk sharing over different education groups and cohorts.

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During the last decade, Pakistan has experienced massive economic transformation coupled with several important shocks to its economy. Such shocks primarily consist of huge energy crisis, terrorism, earth quakes, wheat shortages and massive flooding. Some of those shocks affected between group inequality and both consumption and income were affected. Although the effects of such shocks have been long heated debate in the empirical literature, but 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, discussed several formal and informal insurance mechanisms which protects consumption from income shocks. Cochrane 1991; Mace 1991; Altonji, Hayashi, and Kotlokov 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 consumption theory related with allocation that under reasonable restriction of preferences, brings sturdy implications on consumption growth such as role of microfinance or asset as buffer stocks in smoothing the consumption over time.

Earlier research pertaining to consumption smoothing relies on publicly 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 per hour wage structure on the distribution related with household consumption. This research design, focusing on relative wage structure has quite a number of advantages in comparison to the traditional mechanism where the research is more centered on individual shocks. For instance, one of the major benefits of this study 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 publicly 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 unseen income shocks in an informationally constrained

optimal allocation of consumption. The mechanism of this study relies on publicly observable income shocks as Attanasio and Davis (1996) in their paper focused on publicly 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 some years and cohorts, better educated people are priced similar to the people with less education. Later on, we establish 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 has 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. 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 well insured compared to 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) implemented the test of Cochrane (1991) on synthetic panel. But they exploit the basic assumption maintained by Cochrane (1991) and Townsend (1994) which basically states the ability of social planner to easily transfer or move leisure to the households. They alter the need for this assumption by examining the relative wage movements amongst a cluster of males with inelastic labor supply. This enables them to develop a better consumption insurance hypothesis test when preferences are non-separable among consumption and leisure along with imperfect transfer of leisure across the households. Given their empirical design, short frequency movements were detected in the cohort and education structure of pre-tax hourly wages amongst men troop large and substantial changes in the distribution of household consumption.

Attanasio and Székely (2004) investigate the high volatility period in Mexico using a similar research question. They presented 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 years, highly educated people earned less money in comparison to less educated people in Mexico. They attributed this to a peso crisis and decline in GDP per capita. Blundell et al. (2008) 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 the US offset transitory shocks by greater insurance arrangements, whereas the degree of insurance varies across demographic groups. Krueger and Perri (2006) used the 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 households having similar 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 between 1967 to 2006. They measured the different dimensions of inequality through market, choices and institutions. Findings reveal reasonable increase in income inequality before 1982, 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. Zheng and Lolips (2018) investigated the transmission of income risk and consumption in context of growing economy like China. They utilized a longitudinal panel for household income and consumption data. They concluded that consumption insurance declines as the economy progresses towards higher attainment of growth. Hence

the literature suggests important implications of income and consumption risk with multiple dimensions.

Our study brings novel insights about Pakistan's economy in context of publicly observable income and consumption shocks since we build a synthetic panel. Furthermore, this study helps us to analyze the role of education in response to income shocks and consumption readjustments.

### 3. Methodology

To estimate whether the variation in consumption is affected by income shocks, we need longitudinal data. But since we have repeated cross sectional data, we can use an alternative mechanism which is through synthetic panel. We build our 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 creates a synthetic panel over the period of time.

The advantages of using a synthetic panel are coupled with one disadvantage as one focuses only on insurance across the groups. By taking averages over the members of groups, one cannot say anything about the extent of risk sharing within the group. This is the method developed and used by Attanasio and Davis (1996) and here are details of economic environment of his model along with equations in order to see if income shocks contribute to consumption variation. As per consumption insurance hypothesis, both direct and indirect mechanism for sharing the consumption risk matches the growth in consumption related marginal utility among various individuals and group of individuals. If we have a fixed set of Pareto weights, it is important to note this sort of condition can be obtained through central planner's first order condition. As it is clear, across individuals and time, the central planner assigns resources under uncertainty. Let's assume  $\xi_t$  represents the langrage multiplier related with the aggregate or overall feasibility constraint at time  $t$ . Now we present the planner's first order condition.

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

Now considering all the states in the world  $t$ ,  $C_j$  represents the consumption of concerned individual  $j$ ,  $\delta_j$  implies "arbitrary preference shocks,"  $\Theta_j$  is representing a "discount factor," and  $U_c(., .)$  signifies the marginal utility function. Individual fixed effects are equivalent to  $\lambda_j$  which are time invariant Pareto weights and can easily be eliminated 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, not correlated with the variation in preferences and the measurement error related with consumption growth is also not correlated to cross-sectional distribution of consumption related growth. In measuring consumption, we assume iso-elastic utility through 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 becomes

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

Therefore, we see now, if a variable  $X_{jt+1}$  is independent of variation in preferences and measurement error, in this case consumption insurance suggests  $X$  has nothing in context of explanatory power related to cross-sectional distribution of growth in consumption. About the shocks related with bequest or the individual’s endowment and earning size becomes an ideal candidate for  $X$  under interesting substitutions to consumption insurance null hypothesis. Next, households are portioned into groups and indexed by  $i$ . By taking “logs in equation” (1) and averaging over the sample of group “ $i$ ” households at time “ $t$ ,” we 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 particular time “ $t$ ”. Now we can rewrite the first order condition of sample average as

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

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

$$\frac{\sum_{j \in i(t)} \gamma^j \log(c_t^j)}{\#i(t)} = \log \xi_t - t\bar{R}_i - \bar{I}_i - \bar{g}_{it} + v_{it}, \quad (6)$$

$$i = 1, \dots, I, t = 1, \dots, T.$$

Now we are able to present the regression of the sample mean of log consumption on the full set of time and group fixed effects, along with a variable “X<sub>it</sub>” which captures time variation in relative group endowment.

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

Consumption insurance implies  $\beta=0$ , if we compare equation (6) with (7), if and only if “X<sub>it</sub>” satisfies the set of auxiliary assumptions. For instance, X<sub>it</sub> should be not be correlated with the error in the log consumption, group differences related to the mean of time discount rate, group differences related to distribution of preference parameter  $\gamma^j$  and variation in the mean preferences disturbances  $\bar{g}_{it}$ . Similarly, it is easy to find that consumption insurance also suggests  $\beta=0$  in first difference regression specifications of the form

$$\widehat{\log c}_{it} - \widehat{\log c}_{is} = \alpha_t + \beta(X_{it} - X_{is}) + e_{it} - e_{is}, i = 1, \dots, I, t = (t - s), \dots, T, \quad (8)$$

For equation (8) it is also necessary to satisfy the statistical assumption discussed above for X<sub>it</sub>.

#### 4. Data section

The Household Integrated Income Survey of Pakistan (HIES) has been conducted with some breaks since 1963. The survey was renamed as “Pakistan Social and Living Standard Measurement (PSLM) Survey” in 2004, but the basic module of HIES remained intact. Since 2004, the survey is conducted in every alternate year. It’s a repeated cross-sectional survey 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 the 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 consists on all the rural-urban areas of Pakistan except Capital Territory Islamabad and military restricted areas. Every city or town has been divided into enumeration blocks consisting of 200 to 250 households identifiable through sketch map. Every sketch map has been classified into three classes of income groups: 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 are chosen as the primary sampling units (PSUs). Sample

PSUs have been selected from strata/sub-strata with probability proportional to size (PPS) method of sampling. 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 a systematic sampling technique with a random start.

We restrict 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 usually earns more and is usually considered as the keeper of the house (Blumberg, 1988; Charles and James, 2005; Treas and Ruijter, 2008). 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 education group is "University." Since we are more focused on labor earnings, and it is difficult to monitor agriculture income, we limit ourselves to non-agricultural labor income. Lastly, we narrow the focus to those heads who worked for at least ten months in a year with more than 20 days per month with paid employment. Age cohorts along with education groups become the unique identifier in the data which enables us to formulate the synthetic panel from repeated cross sections.

In data, we assume working day implies working eight hour a day, this assumption allows us 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 in Table 1.1, all the analysis is based on real values for which we have deflated the income and consumption by using the values of the GDP deflator obtained from World Bank indicators.

**Table 1.1 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 1.1, we present the summary statistics of the dataset. Consumption and wages 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 distribution of our key variables shows that the difference between minimum and maximum value of monthly non-durable consumption and hour wage is more than double. Moreover, at the 90<sup>th</sup> percentile, most people have a university education, so they earn higher hourly wage a and consume more.

**Table 1.2 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

Furthermore, we observe that the youngest birth cohort in the data is 1988 and the oldest one is 1954, whereas, the median man was born in 1970. In education, the median man obtained intermediate education as we have classified education into three categories such as junior middle, intermediate and university education.

In Table 1.2, we document the average pre-tax real wage on a yearly basis because it helps us to observe the evolution of average hourly wage on yearly basis by cohort and education group. It is evident in general that, on average, people with University education or old cohorts earns more relative to other categories. However, we observe in some of the years younger cohorts earn more 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 a couple of cohorts in the less educated group, thus, we see men with university education earn more over the period of time. This was not the case in Attanasio and Davis (1996), but Attanasio & Székely (2004) encountered a similar trend in their data.

In addition, we observe an overall decline in wage for year 2006 across the education groups. However, from 2008 onwards we see a noteworthy increase in wages. It is evident from Table 1.2 that people with University education are relatively better off. Intuitively the economic slow-down in Pakistan which started in year 2006 could be one of the reasons for the sudden decline in real wages as it began with an energy crisis and food inflation.

We see average real monthly consumption of non-durable items in Table 1.3 crossed with cohorts and education groups. Non-durable items in our data mainly consist of 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 of expenses on clothing, embroidery and sewing. Lastly, expenses on religious or festive occasion and house rent fall into the miscellaneous category. As we can see for cohort 1974-1978, people with junior middle education, on an average basis spent 30.7638 PKR in 2004, which fell to 23.8473 PKR in 2006. During the same period in Table 1, there is a 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 1.1 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, and higher educated men consumed more than lower educated men.

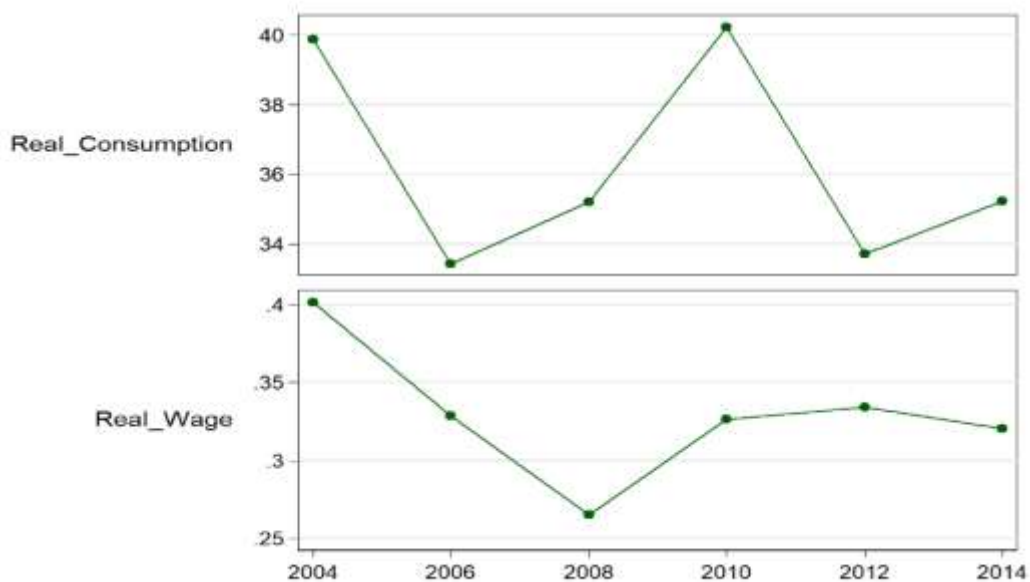
**Table 1.3 Average Real Consumption for Head of Household by Cohort and Education Group**

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>							
<b>2004</b>	---	---	30.7638	30.928	28.8463	30.5317	29.9717
<b>2006</b>	---	23.6663	23.8473	23.9125	24.7859	25.0600	25.0108
<b>2008</b>	---	26.7830	24.5410	29.0237	30.9255	24.3115	28.8305
<b>2010</b>	25.9362	28.2912	29.6621	29.5170	31.9105	32.7330	---
<b>2012</b>	24.5443	23.9703	24.9468	25.1834	27.1800	27.5366	---
<b>2014</b>	26.0949	26.3300	27.6141	27.7845	30.8667	---	---
<i>Intermediate</i>							
<b>2004</b>	---	---	35.9491	38.9695	39.1120	41.7763	39.0028
<b>2006</b>	---	27.557	29.1672	30.0009	31.7300	35.9817	36.3239
<b>2008</b>	---	32.7482	34.5104	35.5961	36.5188	45.2793	38.3048
<b>2010</b>	30.9797	35.5648	40.5093	39.7500	39.2518	42.8678	---
<b>2012</b>	30.0662	30.6529	32.3272	32.7494	35.9109	33.2192	---
<b>2014</b>	31.9842	33.4639	35.3683	37.3314	39.9968	---	---

<i>University</i>							
<b>2004</b>	---	---	49.5925	49.9373	53.7658	60.04717	60.0334
<b>2006</b>	---	30.0324	45.6930	48.5953	47.3523	55.0256	57.2592
<b>2008</b>	---	45.2432	45.9092	51.3861	49.2820	62.9737	56.5886
<b>2010</b>	44.6402	53.8513	69.6926	66.6436	63.0003	78.3772	---
<b>2012</b>	34.7618	47.6504	51.8958	49.8831	49.9002	53.7790	---
<b>2014</b>	48.5662	51.7343	50.7679	49.8437	57.5022	---	---

Source: Authors calculations

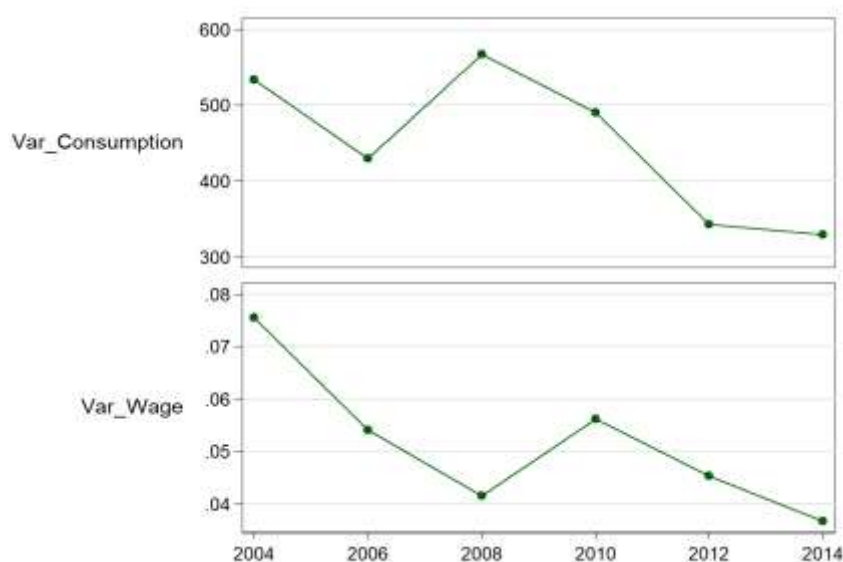
This implies education and age are key determinants of consumption here in this dataset, which is a well-established economic result. Before we proceed to main results it is important to understand how average wage and consumption evolve over time as shown in Figure 1.1. The lower panel shows increasing pattern 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 a wheat crisis in Afghanistan affected Pakistan resulting in spiked food inflation in “regional food prices” (World Bank, 2009).



**Figure 1.1 Trend of Average Real Consumption and Real Wage**

Figure 1.2 presents the result of variance in real consumption and real wages. It reveals a 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 crises. Thus, we notice similar fluctuations in consumption and wage, but there is greater variation in wage in comparison to consumption. Table 1.1

and Table 1.2 showed a sudden decline in both real wage and consumption 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.



**Figure 1.2 Trend of Variance in Real Consumption and Hour Wage**

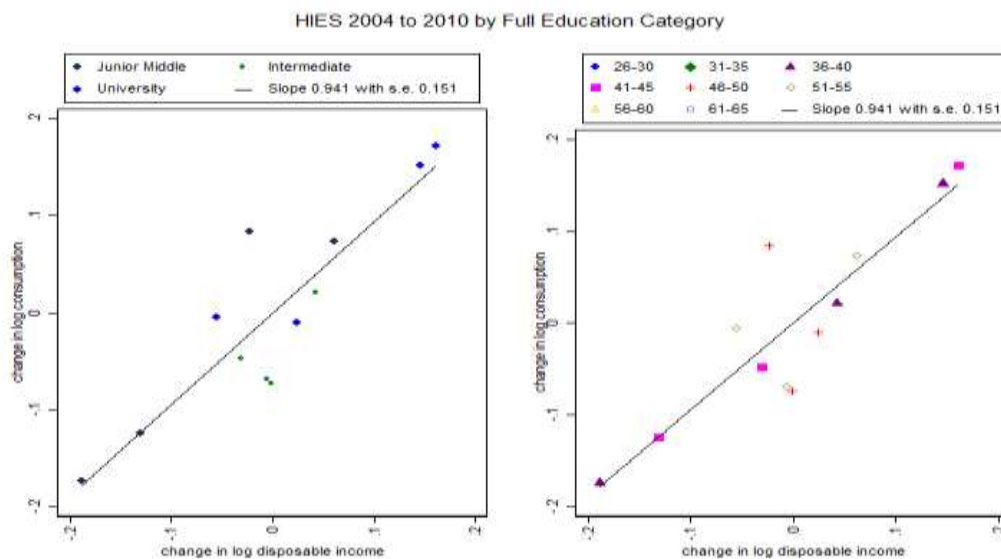
Source: Authors calculations

## 5. Results and discussion

This paper examines whether the shocks to income drill through the consumption or not. Evidence from all the growth specifications except ten years growth shows consumption is susceptible to income shocks and we observe that a smaller variation in income results in a larger variation in consumption. This finding implies that, in Pakistan relative risk sharing is better over longer time horizon than a shorter one. Zheng and Lolips (2018) also argued that over a longer time horizon, risk sharing in developing countries is better in comparison to developed countries. Therefore, we conclude people in Pakistan usually share the income risk and smooth consumption over a longer time horizon which could be argued to be a consequence of the existence of strong social insurance and family bonding. One of the biggest advantages of our empirical design is that it enabled us to capture the evolution of the slope of the growth in different growth specifications for 6, 8 and 10 years.

For instance, in the majority of our six-year growth specifications 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. Attanasio and Davis (1996) concluded failure of consumption insurance in the long run, but we conclude that people tend to smooth more over the longer period of time; hence, our empirical findings substantially differ in the context of Pakistan. In Figure 1.3 we visualize the change in log disposable income and change in log consumption over the period of six years in the similar way as it was visualized by Attanasio and Davis (1996). We observe equal variation

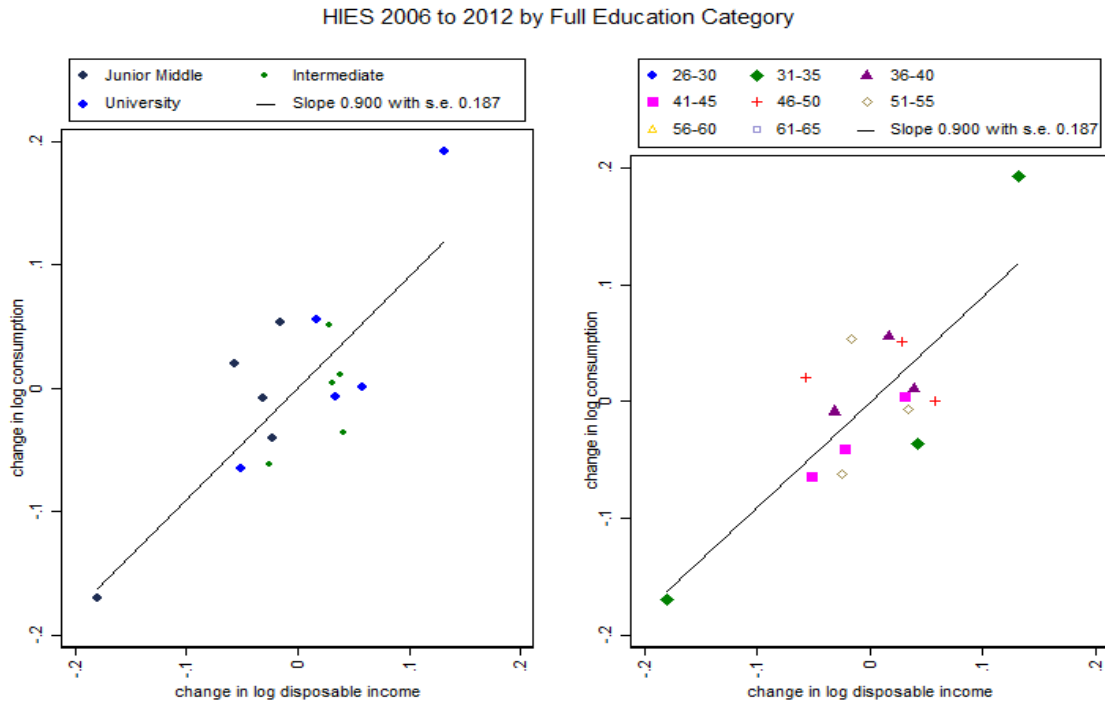
in income and consumption for people with university or junior middle education. But for men with intermediate education there is not much variation in income for six years growth horizon.



**Figure 1.3 Change in income and consumption by education groups and cohorts**

*“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.*

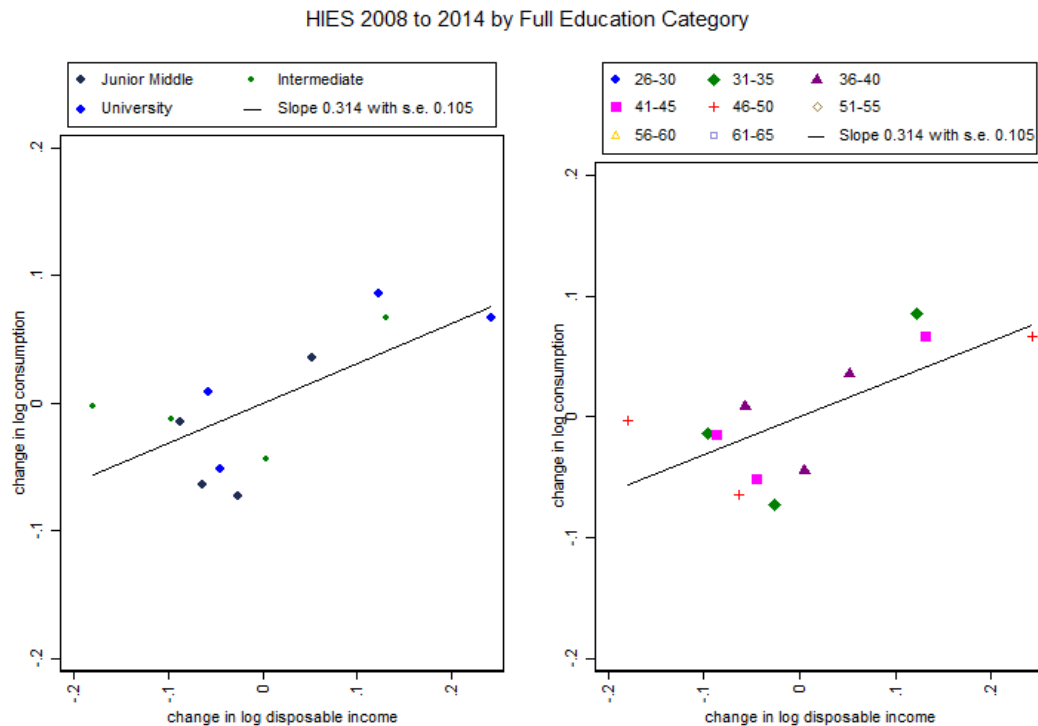
Income variation significantly passes through to consumption as we see in the slope and standard error, therefore, there is not much consumption smoothing in this figure. In terms of age cohorts, we see the youngest cohort in the right-hand panel of Figure 1.3, is 36 to 40 years of age. We notice closer movement of change in income and change in consumption for people with 41-45 and 36 to 40 years of age. Therefore, people belonging to these particular age groups tend to smooth less. It is important to understand as Lagakos et al., (2018) argued that earning peaks are usually realized in the later part of one’s career. Since these age groups are right in the middle of their working life and they share a lot of family responsibilities including financial burden, they are more susceptible with limited income and higher consumption risk.



**Figure 1.4 Change in income and consumption by education groups and cohorts**

*“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.*

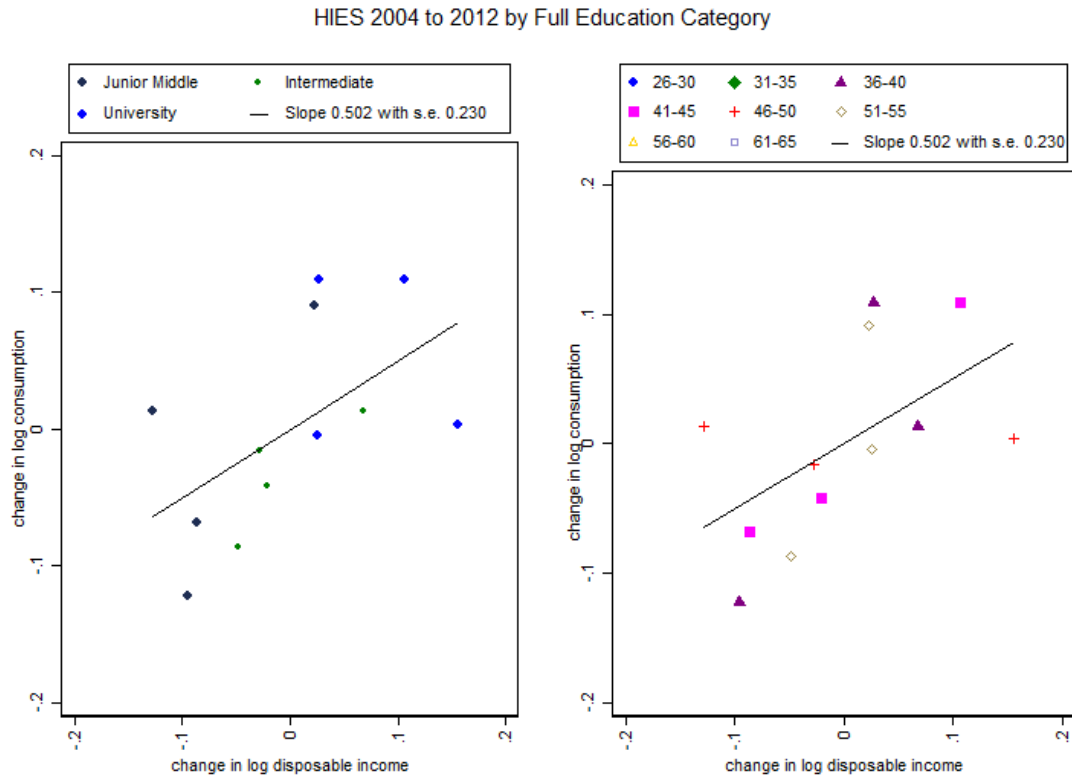
In Figure 1.4 we observe the similar slope but majority of the observations are clustered together. However, for one of the observations pertaining to university education we see higher growth in consumption than income. There is a negative growth in income for people with junior middle education but 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 in income and consumption.



**Figure 1.5 Change in income and consumption by education groups and cohorts**

*“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.*

In Figure 1.5 we document the last plot of six years difference for change in income and consumption with respect to education group age-cohorts. It suggests 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. Slope of the line is much lower in contrast to Figure 1.3 and Figure 1.4, as we have seen in the Figure 1.1 and Figure 1.2, 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.

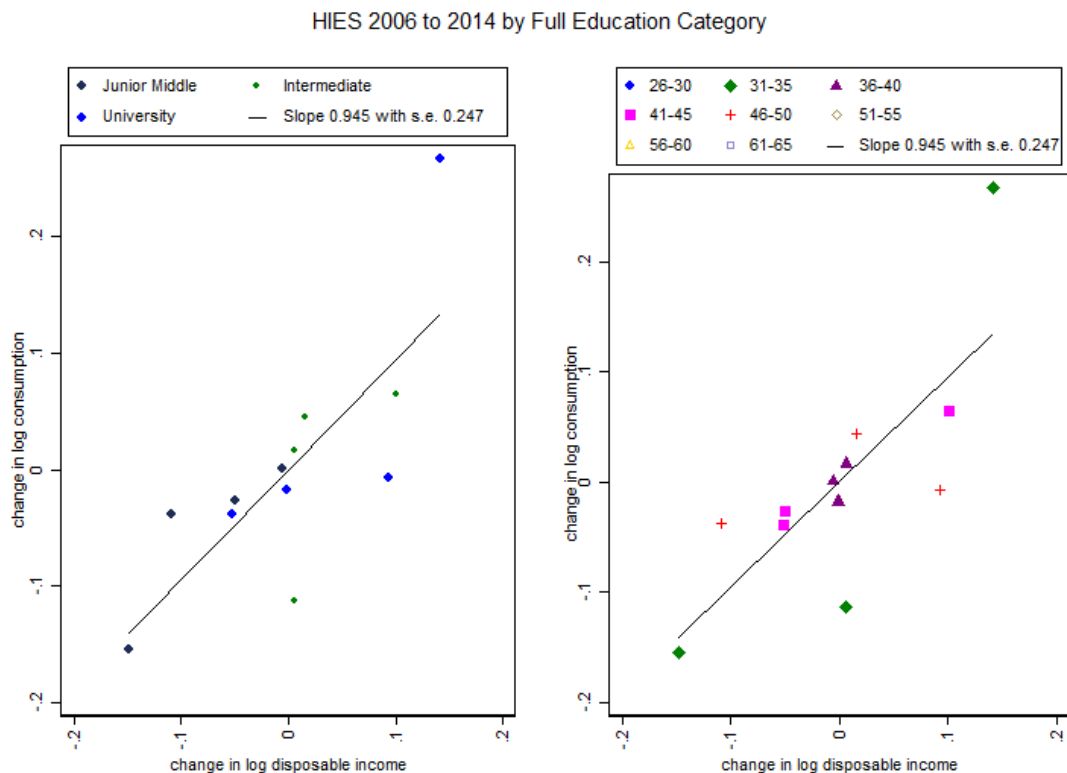


**Figure 1.6 Change in income and consumption by education groups and cohorts**

*“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.*

In Figure 1.6 we see 8 years growth horizon 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.

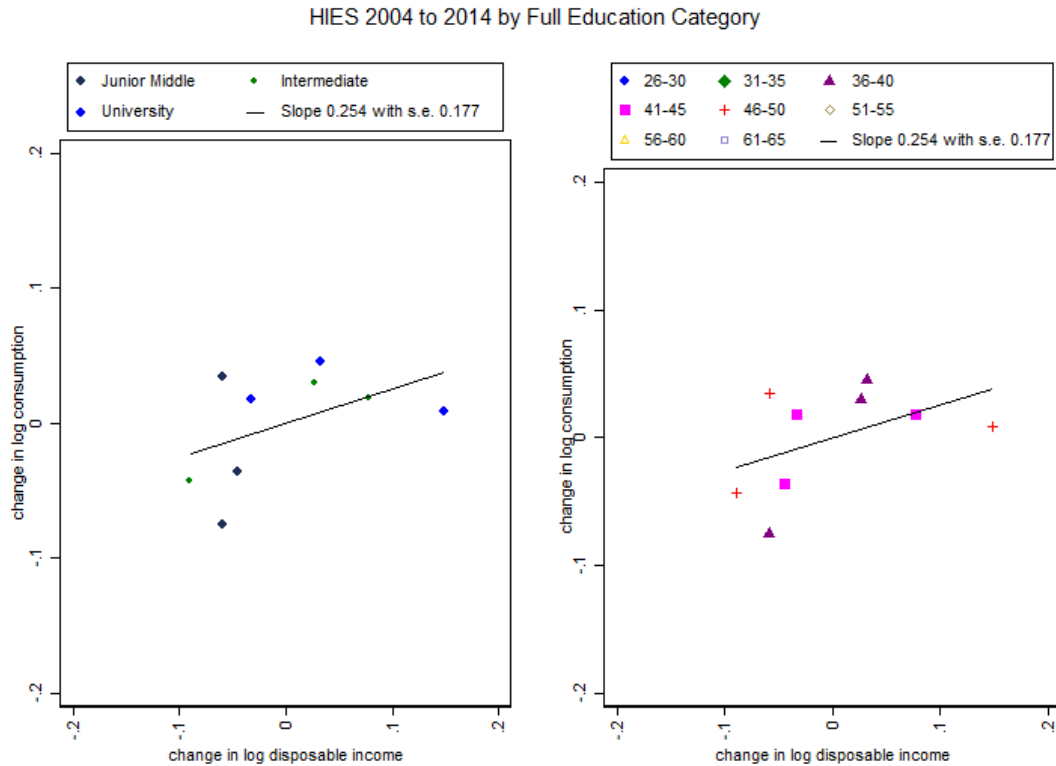




**Figure 1.7 Change in income and consumption by education groups and cohorts**

*“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 1.7 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 people with university and junior middle education. Besides this, we see greater consumption smoothing for people with 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 1.8 Change in income and consumption by education groups and cohorts**

*“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.*

Figure 1.8 shows ten years difference plot from 2004 to 2014 and it shows consumption is more insured over a 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 wage 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 the cohort from 46 to 50 years of age, consumption does not move with wages, implying there is consumption smoothing. This contrast we see, highlights the benefit of our empirical strategy. By drawing on cross-sectional datasets to build a pseudo or long synthetic panel, we can detect the persistent apparatuses of relative wage movements causing relative consumption movements.

## **6. Conclusion**

We started researching on relative risk sharing in consumption issue as we observed Pakistan's economy experienced definite and persistent movements in the structure of relative wages since 2004. We outline that relative wage movements across birth cohorts and education groups bring noteworthy changes in distribution of adult equalized household consumption. We document the greater variation in relative wage in comparison to consumption for men with lower educational attainment. In six years difference specification we observe, for all the education groups there is a clear evidence that adult equalized real consumption moves with hourly real wage which supports the rejection of consumption insurance hypothesis.

In addition to this, under eight years difference design, we observe, for some of the observations, 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 suggests 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 the 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 suggests the existence of consumption insurance, which means food security, clothing and housing are insured against income variations which differs from earlier research by Attansio and Davis (1996). But these findings are largely in line with the argument that in developing countries people tend smooth more over a longer time horizon (Zheng and Lolips, 2018). 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 move together in short periods but over a longer duration, people tend to smooth their consumption.

The authors do acknowledge the current limitations of this primary effort. We are unable to identify whether the consumption insurance in particular to longer time horizon exist due to some counter cyclical fiscal policies or due to some other social factors. In future, this research could be extended to check for the roles of fiscal policies along with other social factors in determining the consumption insurance in longer and shorter time horizons. Furthermore, the 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 spectra as in the developing economies repeated cross section data is easily available than longitudinal panel due to higher tracking cost of individuals across different waves of the surveys. Moreover, inclusion of endowment shocks could be more useful for

getting better insights. Another interesting expansion of this research could be to break down consumption into different bundles. In order to see which type of consumption is more affected from income shocks such as comparison of non-durable consumption bundles with durable ones. This will be important addition to this paper to observe if results vary among different consumption bundles.

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