Trade-Off Between Consumption Growth and Inequality:

Theory and Evidence for Germany

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Abstract

This paper examines the structure and evolution of consumption and consumption growth inequality. Once heterogeneous agents relate their neighbors' consumption to their own, consumption volatility and inequality are affected. The relationship predicted between the group average consumption growth and within-group growth inequality was shown as only slightly positive yet significant using survey data from the German Socio-Economic Panel (GSOEP, 1984-2005). Age and household size are crucial for within-group inequality, as young and/or small households are more sensitive to income and consumption shocks. Large and well-educated households with unskilled jobs have shown surprisingly inferior performance in consumption growth and variance. The data also shows increases of within-group inequality directly after the reunification and the introduction of the euro.

Preliminary!

Keywords: consumption inequality, consumption growth, German Socio-Economic Panel, altruism

JEL codes: E21, D91, D31, D64

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1 Introduction

The structure and evolution of income inequality has always been well documented for many countries, while studies on consumption inequality are relatively limited due to the availability of survey data. This is also the case for Germany where most inequality studies focus on wage income, disposable income or household wealth. For the purpose of examining the well-being of population, however, consumption is a more direct measure. The contribution of this paper is two-folded: providing a theoretical framework of heterogeneous agents in order to examine the link between within-group inequality and group average consumption growth, and finding empirical evidence on the aforementioned relationship using household data from the German Socio-Economic Panel study.

Of the 24 sample households groups divided according to characteristics including household size, age, education and occupation of household head, Figure 1, 2 and 3 plot the group average income and consumption growth. Two points are worth noticing concerning the figures: firstly, the growth patterns are remarkable different across groups both in latitude and frequency, where young, small households with high education and skilled job (group 4) have the highest income and consumption growth, which stay almost always positive; secondly, more than often, consumption growth sinks deeper than income growth at bad time and climbs higher than income growth at good time. It seems as if there are moments when households over-adjust their consumption as reaction to income shocks. Although this does not overthrow (DIAN FU) the business cycle stylized fact on consumption's being less volatile than income, it renders question on the rationality assumption of the households. Reasoning can take various perspectives, one of which is the consumption externality discussed in this paper.

The analysis of consumption inequality for Germany (West) in this paper complements a number of studies that use micro data to document the evolution of income or wage inequality in Germany in the last 25 years. As Biewen (2000) finds that the West German income distribution between 1984 and 1996 was stable, Ludsteck and Schönberg (2007), exploring the IABS 2% random sample of social security records for the years 1975 to 2004, conclude that German wage inequality has increased at the top of the distribution in the 1980s, while inequality at the bottom of the distribution started to rise in the 1990s. Apart from labor
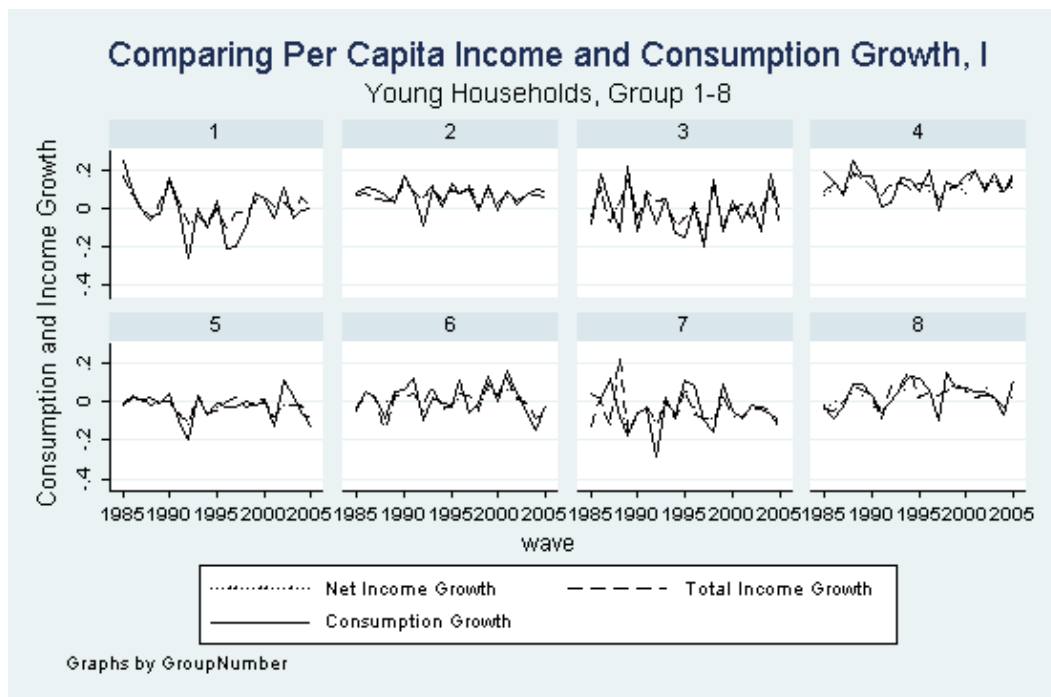
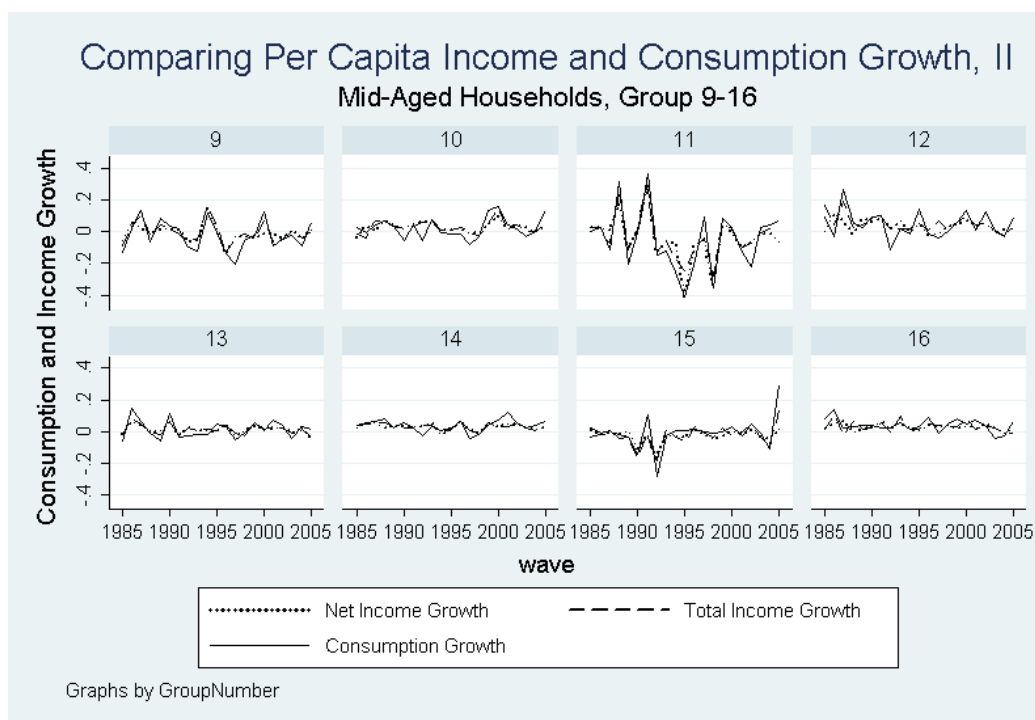Figure 1: Consumption and Income Growth, Young

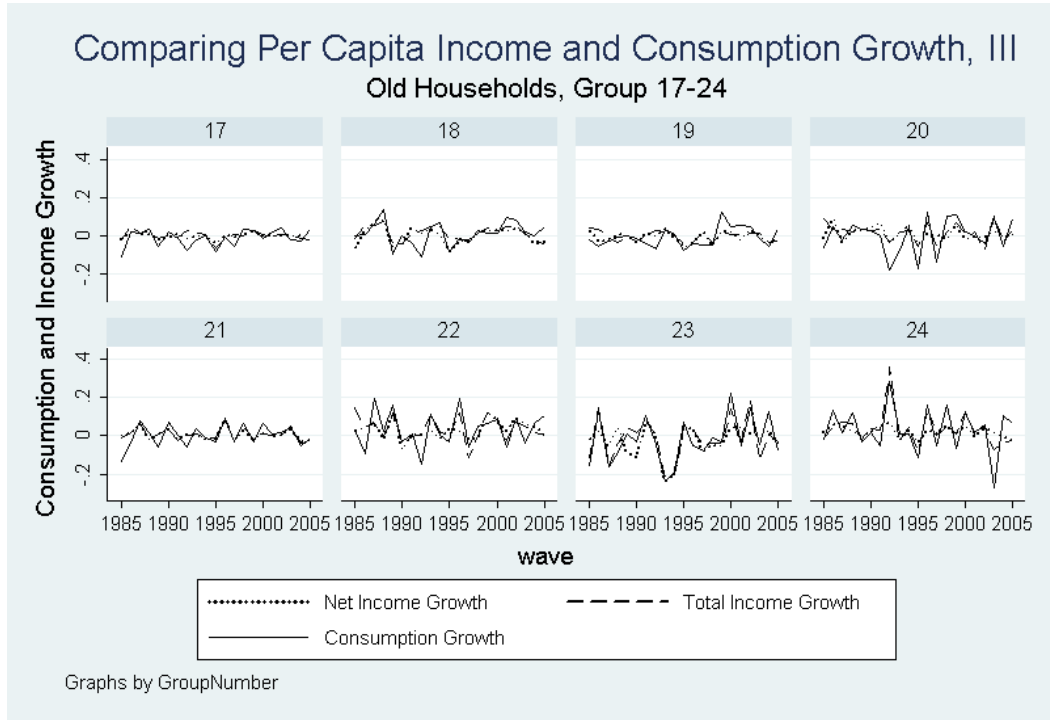Figure 2: Consumption and Income Growth, Middle

Figure 3: Consumption and Income Growth, Old

income, recent studies lay more attention in capital income and regard it as another source of inequality. Fräßdorf, Grabka and Schwarze (2008) compare Germany, the U.S. and the U.K., analyze the weight of capital income in disposable income, and find that a large part of the growing disparity of disposable income could be explained by the increasing capital income inequality.

As one of the first studies on the trend of consumption inequality in Germany, Fuchs-Schündeln, Krüger and Sommer (2008) look into both income and consumption inequality. Combining the GSOEP and EVS data, they document the inequality trends of wage income, consumption and wealth in West Germany and find upward trends in wage and market income after the reunification. In contrast, disposable income and consumption inequality only display a modest rise over the same period. The pattern of consumption inequality in their findings can be confirmed in this paper, and what's more, by constructing yearly consumption data from the GSOEP, my study fills in the blanks between their observations based on EVS, which is only available every five years.

The theoretical part of this paper is rooted in a rich body of literature on the connection

between income shocks and consumption growth inequality. Incomplete risk-sharing/imperfect insurance are often considered as the explanations to the diverse evolution of income and consumption inequality. Examining U.S. panel data on income from the PSID (1978-1992) and cross-section Consumer Expenditure Survey (CEX) data on consumption (1980-1992), Blundell, Pistaferri and Preston (2008) confirm that consumption inequality follows closely the trends in permanent earnings inequality, as is shown earlier in Cutler and Katz (1991). They also find extremely strong evidence against full insurance for permanent income shocks but not for transitory income shocks, which is an extended result of a previous study by Blundell and Preston (1998).

Krüger and Perri (2005) notice in the CEX data that while between-group consumption inequality has tracked between-group income inequality quite closely, within-group consumption inequality has increased much less than within-group income inequality. Motivated by this observation, they propose a theoretical framework depicting the risk-sharing behavior within groups when idiosyncratic labor income shocks occur, where the market is imperfect due to the lack of contract enforceability. Their model shows that when income becomes more volatile, risk-sharing turns out to be more valuable for agents. As their incentive to default diminishes, within-group consumption inequality also decreases consequently. Parallel to limited enforcement of contracts, private information problem is another hypothesis on consumption smoothing and risk-sharing. Attanasio and Pavoni (2007) present such a setting, introducing moral hazard and hidden savings. Since agents in their model can insure more of their idiosyncratic risks under asymmetric information on efforts and secretive savings, consumption volatility resulted is lower than in a single asset model (E.g. permanent income hypothesis type of model, PIH).

In this paper I choose a comparatively easy way of modeling to capture the "excessive smoothing" of consumption. In the spirit of Duesenberry's Relative Income Hypothesis (1949) and similar to the setup in Galí (1994), I apply a special type of consumption externalities, group average consumption, to a self insurance model. The attitude of households toward this externality is the key issue if the model produces "excessive smoothing" or opposite. Acknowledging consumption growth inequality as a result of income uncertainties (permanent and transitory), I use this model to study the link between the group average consumption growth and within-group inequality. The main theoretical finding is that this consumption

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externality drives agents from the original consumption smoothing path. When restrictions on the time series properties of consumption growth are relaxed, the deviation can be even larger. Nevertheless, regardless of the extent of the deviation, the model most possibly predicts a positive correlation between the group average consumption growth and within-group inequality.

I further test this theoretical hypothesis using data from the German Socio-Economic Panel and find significant though only slightly positive correlation. Overall, the constructed consumption data does not show large changes in inequality during the sample period (1984-2005), except distinguishable increases directly after the reunification of Germany and the introduction of the euro. Compared to income inequality, the data shows a similar picture as what Krüger and Perri (2005) find in U.S. data, that between-group consumption inequality has tracked between-group income inequality much more closely than the within-group consumption inequality has followed the within-group income inequality.

The rest of the paper is organized as following: Section Two presents the theoretical model and an extension based on the random walk hypothesis of consumption growth; Section Three introduces the GSOEP data and discusses inequality trends in Germany in the 22 sampling years; in Section Four the grouping strategy of the sample is discussed, and tests are carried out on the relationship between consumption growth and inequality; Section Five concludes.

2 Consumption Growth and Inequality

In modern economics there are two major hypothesis connecting income shocks and consumption insurance. The complete market hypothesis assumes that consumption is fully insured against idiosyncratic income shocks (both permanent and transitory), which is soundly rejected in micro data (e.g. Attanasio and Davis, 1996). The other one, the permanent income hypothesis, assumes that personal savings serve as the only mechanism to smooth income shocks, and exclusively against transitory shocks (Deaton, 1992). This hypothesis is also rejected by, for example, Attanasio and Pavoni (2007). Their paper, as well as an earlier paper by Campbell and Deaton (1989), finds that consumption exhibits "excessive smoothness" by reacting too little to permanent income shocks; while some other studies find that consumption shows "excessive sensitivity" by reacting too much to transitory shocks (e.g.

Hall and Mishkin, 1982). The truth seems to lie somewhere in between, and therefore partial insurance of consumption to income shocks becomes slowly the consensus.

Based these works and acknowledging the effects of income shocks on consumption insurance, various extensions were added to the simple self insurance (PIH) model in asset pricing literature and one special "flavor" is to include relative consumption into household utility as a consumption externality . There is a refined difference if agents take the previous or current average consumption as benchmark. The former, which is a variation of the habit formation setup, is the case of "catching up with the Joneses" (Mehra and Prescott, 1985, Abel, 1990, Campbell and Cochrane, 1999) and the latter "keeping up with the Joneses"(Galí, 1994). While the former involves the interdependence between the agents' past, present and future well-being, the latter setup emphasizes contemporaneous trade-offs and generates simpler result. In fact, Ljungqvist and Uhlig (2000) discusses optimal tax policy using these two differentiated cases and finds as optimal procyclical taxes for the former and a flat tax rate for the latter[1].

The true task of this paper is to study the contemporaneous consumption distribution (cross-sectional) using a panel setting, and therefore the "keeping up with the Joneses" model is chosen so as to avoid more complex intertemporal considerations. To be specific, the model should help to discover the connection between consumption growth and inequality.

The paper starts with discussing two possible extensions of a standard PIH model where agents use one asset to transfer resources intertemporally. The first extension involves some external criteria for the households: the households cast their preference not only on their own consumption, but also on that of their neighbors (other households who are in the same social class). Relative standard of living becomes another important issue besides the absolute level. The consumption smoothing path of the household in the standard PIH model would be distorted, and variance of consumption would change. The direction of this change depends on household attitude to their neighbors' well-being (if they are altruistic or meant to "keep up with the Joneses"). The result, however, is reached regardless of the assumption about the time series properties of the group average growth (the cross sectional moments such as means and variances), and the relaxation of this assumption will be examined as the

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[1]Guo (2003) elaborates the latter case by adding capital accumulation and imperfect competition in the goods market and finds similar result

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second extension.

2.1 A Heterogeneous Agent Model

The economy is composed of a large number of heterogeneous households, which can be divided into m groups according to characteristics such as household size, members' age, education, occupation and so on. One can intuitively interpret a group as a highly similar neighborhood. Households within one group share the aforementioned features but are still subject to idiosyncratic income and consumption shocks. Although households in a given group do not observe the exact income of other group members, they can observe their consumption patterns. If they would like to compare with others in a similar socio-economic class, it is the case of "keeping up with the Joneses". Otherwise, if they also benefit when others are doing well, we have "altruistic" households. I label the result of this additional externality a group effect on household consumption decision.

The setup is similar to Galí(1994) and Abel (1990), only that in Abel's case households regard agents' own consumption habits and the group average consumption in the previous period as a benchmark for their current period consumption ("catching up with the Joneses")[2]. Besides, Galí(1994) and Abel (1990) both use the model to describe the (homogeneous) households in the whole economy, while this paper rather takes the perspective of each group, and the "keeping up" mechanism bounds the agents within one group only. The comparison of agents in different groups is not captured in this model, which does not deny the existence of such comparison, but is rather the result of model simplification and focus on the more likely comparison among people of similar socio-economic backgrounds.

There are two reasons why a heterogeneous agent model is considered here. Firstly, just as is shown in Figure 1, 2 and 3, aging effect on consumption growth can vary for people with different education/occupation attainments. Secondly, using heterogeneous agents model enables the contemporaneous examination of consumption growth inequality within group, while still allowing for comparison on time dimension and/or group-to-group dimen-

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[2]Abel (1990) introduces jointly the agent's own consumption habit and past aggregate consumption into current utility: $u(C_t, v_t) = [C_t/v_t]^{1-\alpha} / (1-\alpha)$, where the preference parameter $v_t \equiv \left(C_{t-1}^D v_{t-1}^{1-D}\right)^\gamma$. Let $D = 0$, then the current consumption only takes external habit (aggregate consumption) as benchmark, which is also the case here.

sion (more discussion of this issue can be found at the end of next subsection). In a word, such setup allows mobility of the households on the total consumption distribution and enables their comparison with their contemporaneous benchmarks once they move from one group to another.

Households transfer their resources between periods by buying and selling a risk-free one-period bond which pays off one unit of consumption good. Let $\{q_t\}_{t=0}^{\infty}$ be the sequence of bond prices and $\{A_{ij,t+1}\}_{t=0}^{\infty}$ the plan of asset holdings. A typical PIH model also allows for endogenous labor supply and non-stationary income (Bewley, 1977). However, since the purpose of this paper is on the consumption dynamics, I reduce the household problem to consumption and asset holding decisions. To rule out other possible deterrents to consumption smoothing, I also assume there are no liquidity constraint for any household even though previous empirical tests have shown such constraint may be an important explanation for excessive sensitivity of consumption to current income (Flavin, 1984)[3]. Another simplification is not to emphasize the mobility of the households across the groups. The reason is two-fold. On the on hand, the purpose of using panel data is to examine the consumption growth, which requires the involvement of sequential years but underlines the cross-sectional comparison. One the other hand, the data shows that mobility is an important but not the dominant issue, since more than half of the households in the samples (56.8%) between 1984-2005 have never changed their groups, while among the group swtichers over half of them (51.8%) have changed only once, among which over 52.7% cases happened due to aging. In a word, these heterogeneous households appeared to stay relatively persistently in their group.

Define $C_{ij,t}$ as the time t household consumption of the jth household in the ith group, $X_{i,t}$ the group-average consumption and $Y_{ij,t}$ the endowment realization at the same period. γ is the risk aversion parameter and is usually larger than 1. Household j in group i has the

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[3]In fact Flavin (1984) examines a simple "Keynesian" consumption function as an alternative to the PIH. Using unemployment rate as proxy for the portion of population subject to liquidity constraint, she confirms the excess sensitivity of consumption to current income (i.e. behavior marginal propensity to consume out of transitory income is nonzero) and underpins liquidity constraint as a candidate explanation.

following maximization problem[4]:

$$\max_{\{C_{ij,t}\}} E_0 \sum_{t=0}^{\infty} \beta^t \left[U\left(C_{ij,t}, X_{i,t}\right) \right]$$

subject to

$$C_{ij,t} + q_t A_{ij,t+1}\left(A_0, Y^t, X_i^t\right) \leq Y_{ij,t} + A_{ij,t}\left(A_0, Y^{t-1}, X_i^{t-1}\right),$$

where A_0 is given and $\lim_{T \to \infty} q_T A_{ij,T} = 0$ so that Ponzi schemes are ruled out.

The utility function has the following isoelastic form:

$$U\left(C_{ij,t}, X_{i,t}\right) = \frac{C_{ij,t}^{1-\gamma} X_{i,t}^{-(1-\gamma)\alpha} - 1}{1 - \gamma}.$$

As is mentioned above, the model is simplified to exclude mobility of households and comparison with non-group members. The consumption part of the utility can be approximately decomposed into two parts taking logarithms:

$$(1-\gamma)\ln C_{ij,t} - (1-\gamma)\alpha \ln X_{i,t} = (1-\gamma)\left[(1-\alpha)\ln C_{ij,t} + \alpha \ln \frac{C_{ij,t}}{X_{i,t}}\right].$$

Scaled by parameter α, household's consumption preference is a weighted average of the absolute and relative consumption (compared to group average). There is no restriction on α to be positive or negative, which allows us to examine three cases considering the group effect in consumption:

1. When $\alpha > 0$, the household would like to "keep up with the Joneses". Average consumption decreases the household's utility level but increases household's marginal utility of an additional unit of consumption. This reflects exactly the economic implication of "keeping up with the Joneses", since "any given addition to his current level of consumption becomes more valuable"[5]. In the later part of the paper, it will become clear that such partial

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[4]To elaborate in income, e.g. Krüger and Perri (2005), the utility function takes the form

$$U\left(C_{ij,t}\right) = \frac{C_{ij,t}^{1-\gamma} X_{i,t}^{-(1-\gamma)\alpha} - 1}{1 - \gamma} - \frac{N_{ij,t}^{1-\psi}}{1 - \psi}.$$

Labor income is considered as the product of an economy-wide wage and idiosyncratic labor endowment, and the latter consists of a group-specific part (explainable by group characteristics) and an unexplained part (which includes a permanent and a transitory part).

[5]Galí(1994).

preferences, keeping up with the Joneses, could reduce contemporaneous consumption growth inequality but drive up the consumption volatility over business cycle further from a model without consumption externality.

2. When $\alpha < 0$, households do not take the group mean as benchmark, but rather gain utility once the others in the group are doing well. For philanthropists this could be interpreted as altruism. However, a more economic intuition is that the group mean consumption acts as "substitute" for the household's own consumption. This would be the feature of a public good. Here, a single household benefits from an increase in the group average.

3. When $\alpha = 0$, the utility function is reduced to a typical self insurance version, where agents are only concerned with their own consumption.

The resulting Euler equation is:[6]

$$
q_t = \beta E_t \left[\left(\frac{C_{ij,t+1}}{C_{ij,t}} \right)^{-\gamma} \left(\frac{X_{i,t+1}}{X_{i,t}} \right)^{-(1-\gamma)\alpha} \right].
$$

2.2 Implication on Consumption Dynamics

Even though household income does not enter the model directly, it is closely related to household consumption. The permanent income hypothesis states that periodical consumption is subject to lifetime resources, instead of each period's income. Household wealth is thus a better candidate as a consumption constraint. However, while the change of household consumption is additionally triggered by consumption innovations, the main shocks occurring to household consumption are often identified as contemporaneous income shocks in the related literature.

Following Meghir and Pistaferri (2004), I assume that per period labor income $Y_{ij,t}$ follows the following process:

$$
y_{ij,t+1} = \ln Y_{ij,t} = \varphi Z_{ij,t} + P_{ij,t} + \varpi_{ij,t}
$$

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[6]In Abel's (1990) model households compare themselves with the previous consumption of the group members, so as to "catch up with the Joneses". Households still buy one unit of risk-free bond at price q_t

$$
q_t \left(\frac{X_{i,t}}{X_{i,t-1}} \right)^{-(1-\gamma)\alpha} = \beta E_t \left[\left(\frac{C_{ij,t+1}}{C_{ij,t}} \right)^{-\gamma} \right]
$$

Taking logs gives the same result as above, since the growth rate of $X_{i,t}$ is time invariant. This picture, however, can be totally different if consumption growth is time-variant.

where $Z_{ij,t}$ is a set of observable characteristics, $P_{ij,t}$ is the permanent income component, and $\varpi_{ij,t}$ is the transitory component.[7]

The permanent component of income follows a martingale process (random walk):

$$P_{ij,t+1} = P_{ij,t} + \zeta_{ij,t+1}$$

where $\zeta_{ij,t}$ is the permanent shock and serially uncorrelated.

The log of income growth is therefore

$$\triangle y_{ij,t+1} = y_{ij,t+1} - y_{ij,t} = \varphi \triangle Z_{ij,t+1} + \left(\zeta_{ij,t+1} + \triangle \varpi_{ij,t+1} \right).$$

Once data are available on income and consumption, one can even identify the degrees to which permanent and transitory income shocks affect the change of consumption (see Blundell et al., 2008). Even though this is not the focus of my paper, it serves as the premise of my approach. Based on the strong correlation between consumption and income, a natural guess is that the change in log consumption is subject to part of the permanent income shock, transitory income shocks and consumption innovation shocks. The consumption growth rate of household j in group i is approximately the difference of log consumption and can be decomposed into $g_{i,t+1}$, the average growth rate of group i, and some household specific shock $v_{ij,t+1}$:

$$
\begin{aligned}
g_{ij,t+1} &= c_{ij,t+1} - c_{ij,t} = g_{i,t+1} + v_{ij,t+1} \qquad (1) \\
\text{where } g_{i,t} &= \frac{1}{J_i} \sum_{j=1}^{J_i} g_{ij,t}, \quad j = 1, 2, ..., J_i \\
\text{and } v_{ij,t+1} &\sim i.i.d.N \left(0, \sigma_{v_i}^2 \right)
\end{aligned}
$$

As is mentioned, this unexplained consumption growth shock $v_{ij,t+1}$ contains information about income shocks (permanent and transitory), as well as some household specific consumption innovation (Blundell et al. 2008). The interaction of between-households comparison is captured in the group aggregate growth. In the most simple case, where the growth of consumption is assumed to be log-normally distributed, I can assume $g_{i,t+1}$ to be time-invariant (g_i).

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[7]Meghir and Pistaferri (2004) use U.S. data to test the autocovariance of the unexplained earnings growth rate. Their result suggests that the transitory shock follows a moving average of degree 1.

Accordingly, the distribution of consumption growth is $\triangle c_{ij,t+1} \sim i.i.d.N\left(g_i, \sigma_{v_i}^2\right)$. When I aggregate the households within each group i, the idiosyncratic shocks average out and

$$\triangle x_{i,t+1} = x_{i,t+1} - x_{i,t} = g_{i,t+1}$$

Apparently, $X_{i,t}$ is also log-normally distributed, and has a rather simple distribution $N\left(g_i, 0\right)$[8]. Therefore the one-period bond price is

$$q_t = \beta \exp\left[\left[\left(\gamma - 1\right)\alpha - \gamma\right]g_i + \frac{\gamma^2 \sigma_{v_i}^2}{2}\right] \tag{2}$$

A none-zero α leads to the deviation from the standard PIH case where the household optimization problem is independent of others' consumption behavior. This deviation could be one way to mitigate the equity premium puzzle problem in asset pricing. To focus on growth and inequality, I take logs and rearrange equation (2) as:

$$\sigma_{v_i}^2 = 2\frac{\left[\gamma + \alpha\left(1 - \gamma\right)\right]g_i + \ln q_t - \ln\beta}{\gamma^2} \tag{3}$$

It yields a relationship between the within-group variance in consumption growth and group average consumption growth. Note that once no group mean is taken into account by the household ($\alpha = 0$), the equation is reduced to the standard PIH model:

$$\sigma_{v_i}^2 = 2\frac{\gamma g_i + \ln q_t - \ln\beta}{\gamma^2}. \tag{4}$$

Comparing these two equations can tell us the effect of minding neighbors' "business". For a reasonable value of risk aversion, $1 - \gamma < 0$,

Proposition 1 *household altruism / enviousness leads to a higher / lower within-group inequality in consumption growth comparing to a no-externality model.*

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[8]Then it holds that

$$\ln\left(\frac{C_{ij,t+1}}{C_{ij,t}}\right)^{-\gamma} + \ln\left(\frac{X_{i,t+1}}{X_{i,t}}\right)^{-(1-\gamma)\alpha} \sim N\left(\left[\left(\gamma - 1\right)\alpha - \gamma\right]g_i, \gamma^2\sigma_{v_i}^2\right)$$

assuming no correlation between the economy-wide shock and the other two shocks. As a result, I write

$$E_t\left[\left(\frac{C_{ij,t+1}}{C_{ij,t}}\right)^{-\gamma}\left(\frac{X_{i,t+1}}{X_{i,t}}\right)^{-(1-\gamma)\alpha}\right] = \exp\left[\left[\left(\gamma - 1\right)\alpha - \gamma\right]g_i + \frac{\gamma^2\sigma_{v_i}^2}{2}\right]$$

and plug it into the FOC.

When households are enthusiastic about group average well-being (regarding it as a public good) and lack the incentive to keep up, the variance of the unexplained part of the consumption growth $\sigma^2_{v_i}$, as well as consumption itself, is higher than in a typical PIH model. Following the contrary argument, group **inequality** is lower in the case of keeping up with the Joneses. Intuitively, members' endeavor to keep up with each other naturally leads to the declining group variance in each single period. Now recall the modeling strategy to exclude mobility of the households across groups, one can see that this result rather offers a snapshot of within-group variance and makes cross-sectional comparison possible, thus regardless of the mobility question.

Apart from this contemporaneous effect, two further interpretations can be made from the result. Firstly there is a story on the evolution of inequality **over time**.

Proposition 2 *In the "keeping-up" / altruism scenario, business cycle effects are reinforced and aggregate consumption turns to be more / less volatile over the time than in a classical PIH model.*

Let's focus on the "keeping-up" case. In a business cycle context, in boom times agents would sell more bonds than they would in an externality-free economy so as to keep up with the average high consumption level, while in recessions everyone's comparison with the prudent neighbors leads to higher consumption contraction. In a word, business cycle effects are reinforced and aggregate consumption thus turns to be **more volatile** over the time than in no-externality case.

Moreover, the faster the others in your group are upgrading, the larger is the punishment of not keeping up with them.

Proposition 3 *The variance moderating effect under "keeping-up" is stronger in booms (when growth rate g_i is high) than in recessions (with a lower growth rate).*

Alternatively the result can be used to interpret the difference in group-specific inequality **between groups**. The major concern is on the sign of the relationship between g_i and $\sigma^2_{v_i}$, which depends on the degree of risk-aversion and the sign and size of the externality parame-

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ter α. For example, a positive correlation would suggest that groups with higher consumption growth also have to pay the price of larger within-group inequality. Nonetheless, equation (3) shows that there is a possibility that the relation becomes negative: group with higher consumption growth is subject to lower within-group disparity.

Proposition 4 *Given a reasonable value of risk aversion parameter ($\gamma > 1$), negative relationship between group average consumption growth and within-group inequality occurs when agents have high desire in "keeping up with the Joneses" ($\alpha > \frac{\gamma}{\gamma-1} > 1$).*

Other than assuming the values of the key parameters, it is also possible to estimate them using the method of maximum likelihood (MLE), which will be in the next step of the research. The focus of the current paper is to examine the empirical relationship between group average consumption growth and within-group inequality.

2.3 The Time Series Properties to Group Consumption Growth Rate

A further extension of the model includes relaxing the time-invariance assumption about the group average consumption growth. Note that the theoretical result (3) does not depend on if group-specific consumption growth is time-invariant or not. However, asset pricing theory tells that the assumption about the evolution of consumption growth rate is very important for the theoretical model to reproduce the price volatilities of the risk-free bonds.

Starting from the consumption level itself, there has been an intense debate on if it is a random walk process. Hall's famous random walk hypothesis was challenged by Campbell and Mankiw (1989), who use aggregate data and test the predictability of consumption change from income change. Their result shows that about fifty percent of the change in consumption is predictable, implying a significant rejection to the random walk hypothesis. Will this also hold for the GSOEP data? A small exercise is carried out on the 24 groups defined by characteristics including household size, household head's age, education and occupation. After the optimal lags of the group average per capita consumptions are found through Augmented Dickey-Fuller / Generalized Least Squares unit root test, a confirmatory analysis jointly using Dickey-Fuller test, Phillips-Perron test and a stationarity KPSS test is applied

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to detect the stationarity of the group average consumption level[9]. The result, however, is not at all obvious: 2 out of 24 groups appear to follow a stationary process, also 2 out of 24 groups significantly show nonstationary pattern, while the rest unclear in their stationarity. When trend is assumed, 3 groups' consumption appear to be stationary and 3 other groups non-stationary, and the rest 18 groups bear unclear results.

Following the same procedure, I run the tests for the group-specific consumption growth. The results here are much more clear compared to those for consumption level. Indeed at the 5% significance level, when time trend is assumed, 19 out of 24 groups appear to be stationary processes; when no trend is included, all 24 groups' consumption growth can't reject the hypothesis of stationarity.

Based on this observation, I assume that the group-wide growth rate $g_{i,t+1}$ of consumption follows a driftless $AR(1)$ process with a group-specific shock $u_{i,t+1}$:

$$g_{i,t+1} = \phi g_{i,t} + u_{i,t+1}; \; u_{i,t+1} \sim i.i.d.N\left(0, \sigma_u^2\right) \tag{5}$$

which implies that consumption growth is conditionally log-normally distributed:

$$E_t\left[g_{i,t+1}\right] = \phi g_{i,t} \text{ and } var_t\left[g_{i,t+1}\right] = \sigma_u^2$$

The variance of this group-specific shock can be interpreted as one of the sources of between-group variance. Recall from (1) that the difference between individual consumption growth and the group mean is merely the idiosyncratic shock $v_{ij,t}$. Combining (5) with (1) yields $g_{ij,t+1} = \phi g_{i,t} + u_{i,t+1} + v_{ij,t+1}$, where the conditional mean and variance are

$$E_t\left[g_{ij,t+1}\right] = \phi g_{i,t} \text{ and } var_t\left[g_{ij,t+1}\right] = \sigma_u^2 + \sigma_{v_i}^2.$$

and the group average growth rate $g_{i,t+1} \sim i.i.d.N\left(\phi g_{i,t}, \sigma_u^2\right)$. Equation (2) would look different:

$$q_t = \beta \exp\left[\left[(\gamma - 1)\alpha - \gamma\right]\phi g_{i,t} + \frac{\gamma^2 \sigma_{v_i}^2 + \left[\gamma^2 + (1 - \gamma)^2 \alpha^2\right]\sigma_u^2}{2}\right]$$

Obviously, the additional uncertainty from group consumption growth drives up household demand for a secure transfer of their consumption between periods, thus increasing the bond

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[9]This confirmatory analysis is used because both Dickey-Fuller test and Phillips-Perron test have low power in rejecting the null hypothesis of unit root, and therefore an opposite test for stationarity, which also has the low rejecting power problem, is used for comparison.

price. Besides, when current growth $g_{i,t}$ is high, households expect high consumption growth tomorrow. Due to their smoothing motive, they would like to borrow against future growth, thus also driving up bond prices.

The stationary consumption growth also adds a new element to consumption inequality:

$$\sigma_{v_i}^2 = \frac{2\left[(\gamma + \alpha - \gamma\alpha)\,\phi g_{i,t} + \ln q_t - \ln\beta\right]}{\gamma^2} - \frac{\left[\gamma^2 + (1-\gamma)^2\,\alpha^2\right]\sigma_u^2}{\gamma^2}$$

Keeping all other parts unchanged, within-group inequality decreases as a large part of the variance is now attributed to the between-group differences.

However, the correlation between the group growth rate and within-group variance is the same as in (3).

As mentioned above, except that households are highly altruistic and risk averse, both the standard PIH case and the extensions would predict a positive correlation between the group growth and within-group variance. It suggests that groups with faster consumption growth have also higher variance in growth. Should they be groups with a lower consumption level and therefore especially sensitive to income shocks? Since a larger part of their income may be used to purchase basic goods with a very low demand elasticity, and a relatively small portion of the consumption is sensitive to the business cycle (luxury goods) compared to the higher income group, it may be the higher endowment group who bears more consumption growth inequality and has faster consumption growth. This hypothesis may be tested using the GSOEP data set where annual household consumption can be constructed in subsequent years between 1995 and 2005. The next section will describe the data and report the results.

3 Bringing the Model to the Data

3.1 GSOEP

For the purpose of testing this theoretical framework, panel data is needed to get the growth rate of household consumption, whereas the best choice is the German Socio-Economic Panel[10]. Starting from 1984, this panel data set is based on household interviews, and

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[10]Alternatively, the micro data from German Income and Expenditure Survey (Einkommens- und Verbrauchsstichprobe, EVS) can offer a deep and detailed view of the household consumption. However it is carried out only every 5 years, which, unfortunately, can not help constructing the growth rates

contains crucial questions on living and income. The sample used in this paper includes all West German and foreigner households from 1984, whereas immigrants households are added starting in 1995. However, since GSOEP does not offer much information on consumption, especially not on nondurable goods consumption, what one can do is to construct consumption from the available information on financial inflows and outflows. Besides the household monthly net income and savings, there are data on extra income: yearly rental income, capital/investment income, additional income from winnings and inheritance; and detailed expenditures: rent without heating costs, water and other expenses (noted as CR from here on), the cost of heating and water, the credit and interest repayment. Unfortunately, there are neither data on expenditure on durable goods (which would otherwise decrease the amount of nondurable consumption), nor data on total amount of consumption credit (which would otherwise increase the total amount of the expenditure). I can only make the assumption that the two missing parts of the puzzle, the underestimation and overestimation, approximately cancel each other out, i.e. consumption credit is only used for durable goods. This, however, is a reasonable assumption due to the often high prices of the durables.

I follow Cutler and Katz (1991) to construct consumption from the expenditure of house owners, where I need to impute the market-valued cold rent for all house owners. In case some house owners also report their own estimation of the rental value of the housing, I also impute the estimated CR for other house owners who did not report their estimation. The imputations are based on relevant house characteristics such as size of the apartment, family size, family monthly net income, area of the apartment (only available in 1985, 1994, 1999, 2004). Year and federal state dummies are included[11]. Then I add the imputed CR/estimated CR to expenditure and deduct the mortgage payments and interest, the expenses to maintain the house, as well as the costs for water, garbage removal and street cleaning, in order to get an approximation of consumption for these house owners. Further I calculate consumption growth of each household. Regressions of within-group variances on the group average growth rate, using these two imputed values separately, yield slightly different results (see Figure 4 and 6).

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[11]The two imputed results are highly correlated with a correlation coefficient of 0.915, which indicates that the estimated CR by the house owner does not differ too much from the market value. In 62.4% of the cases, the estimated rent is higher than the market value of the apartment/house.

3.2 Grouping Strategy

Before entering the discussion about within-group and between-group effects, the crucial question would be, what criteria can be used to group the samples. For this purpose I carry out a two-step strategy to identify the criteria. Firstly, a factor analysis with principle component is used to distill the various household characteristics into most informative ones. With variables such as nationality, sex and federal land discarded, three blocks of variables are retained: age of household head and partner, their education level and their job types. Some variables overlap with each other, such as International Standard Classification of Education (ISCED-1997) and years of education, or Erikson Goldthorpe Classification (EGP) for job types and Occupational Position (Stellung im Beruf, coded by Statistisches Bundesamt). Therefore I run a simple OLS regression of log consumption on combinations of the crucial household characteristics mentioned above together with household size and year dummies, and look for the combination with the highest explanatory power. Since a Breusch-Pagan test shows that the residuals are heteroskedastic, I allow for heteroskedasticity in the regression.

My result shows that in this dataset the best explanatory variables for consumption are age and age-squared, ISCED for education [12], EGP for occupation [13] of the household head, household size and its square, as well as the interaction term of education and occupation. Year dummies are included. As the fitted part counts for the between-group variance, the residuals (unexplained variables) are equivalent to the within-group inequality, and thus the data carries the information of the evolution of these inequalities over the sampling years. A further discussion of this important byproduct can be found in next subsection.

Having extracted the most relevant attributes, I can start grouping the samples. Consequently, I use household size and household head's age, ISCED education level and EGP occupation to divide the sample into 24 groups. Particularly, a household is regarded as small once there are fewer than 3 members, otherwise it is large. Regarding age, suppose on average

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[12]Dividing levels of education into: Pre-Primary Education, Primary Education or First Stage of Basic Education, Lower Secondary or Secondary Stage of Basic Education, (Upper) Secondary Education, Post-Secondary Non-Tertiary Education, First Stage of Tertiary Education, and Second Stage of Tertiary Education.

[13]Dividing occupations into: High Service, Low Service, Routine Non Manual, Self-Employed With Employees, Self-Employed No Employees, Manual Supervise, Skilled Manual, Semi - Unskilled Manual, Farm Labor, Self-Employed Farm, Unemployed, and Pensioner.

one person can work 40 years (between 25 and 65 years old), then the first 10 years (25-35) would be the phase of trying out and getting stabilized, and the last 10 years is the adjusting period before retirement, and the middle 20 years is the most stable period in the sense of income and social status. Therefore I consider the household head to be young if she or he is under 35, middle aged if between 35 and 55, and old if older than 55. For education levels, a household is counted as higher educated if one has at least post-secondary non-tertiary education, or lower educated otherwise. At last, I use the EGP to label the job as of higher level if the index is less or equal to 8 (including high/low level service, routine non-manual, self-employed, manual supervision, and skilled manual jobs), otherwise it is considered as lower level.

3.3 An Important By-Product: the Evolution of Inequalities
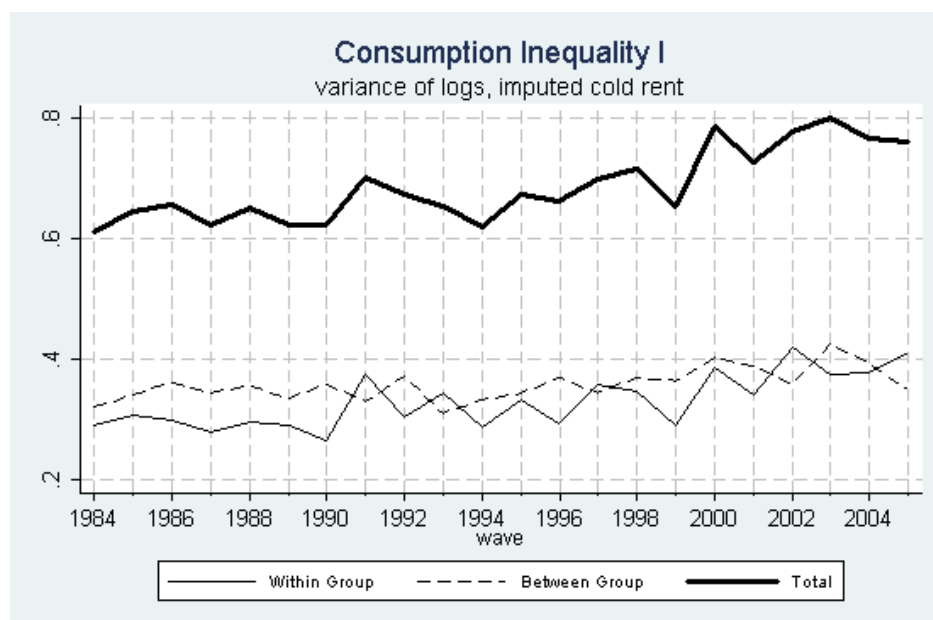
Figure 4: Consumption Inequality I

Figure 4 shows the evolution of total, between-group and within-group inequality. We can observe a notable increase in total inequality directly after the reunification in the year 1990. A closer look at the decomposed inequality (Figure 5) reveals that this rise was fueled by a 42.3% surge of within-group variance (emphasized by a shaded column). This may be a result of the influx of East German workers to West Germany. This is not a period when a

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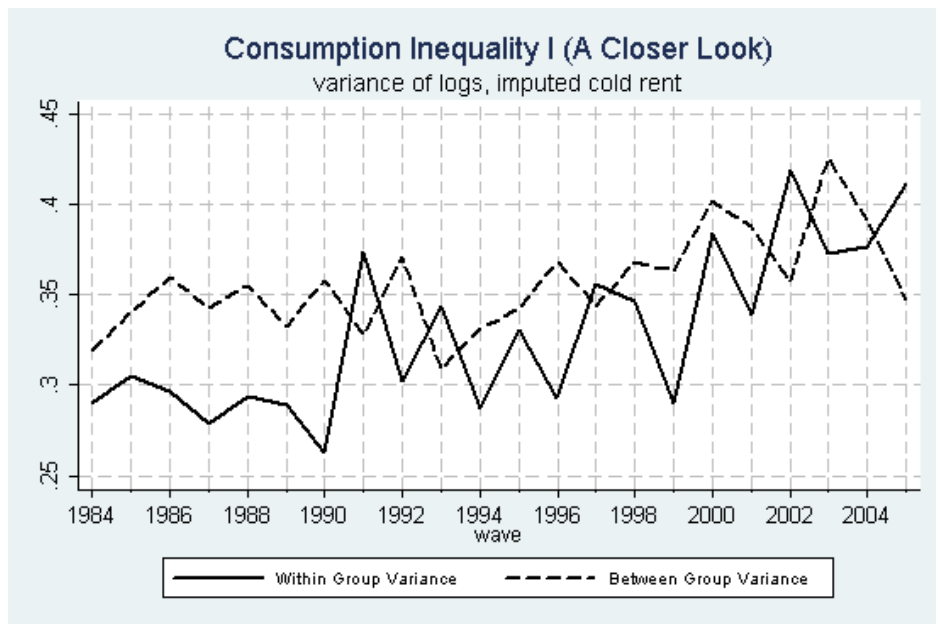
Figure 5: Consumption Inequality I (A Closer Look)
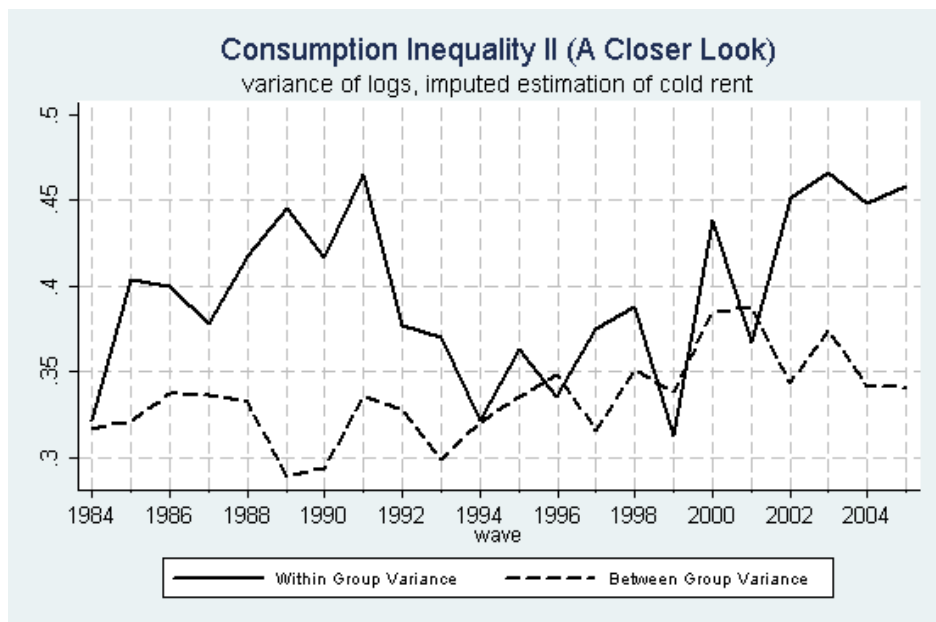
Figure 6: Consumption Inequality II (A Closer Look)

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trained doctor from the East could immediately get a job with the same payment as his West German colleague. Another time point of sharp increase in inequality comes in 2000 when the euro was introduced, and ascended further when Germany experienced a boom (2002/2003). High inflation followed the arrival of the new currency and joined the upturn of the economy, which may have distorted people's usual consumption behavior. To be observed at first is an increase of within-group variance, which is more "nominal" and may result from differences in heterogeneous preferences and idiosyncratic shocks. Afterwards, the real economy may also be affected and the structure of economic sectors and industries could potentially change, which may consequently raise the inequality between different groups.

Figure 6 shows a slightly different version of the evolution of inequality. Instead of imputed CR, the imputed estimation of cold rent is added to expenditure (and effectively to consumption). While the total and between-group variances do not change much, the within-group variance is higher in absolute value. Accordingly, in most of the years, within-group variance, which peaked in 1991 and 2003, overtakes between-group variance. This is a result from the overestimation of CR compared to the market value of the rent. The imputed expenses in consumption of house owners are thus higher, and so is the difference between them and the renters. Subsequently, consumption inequality within the same group increases, and the increase after the reunification is even more impressive.

Additionally, Figure 7 compares the inequality of income and consumption (calculated with the imputed CR) within groups and between groups. W_Income represents the within-group income inequality, W_Consumption the within-group consumption inequality, B_Income the between-group income inequality, and B_Consumption the between-group consumption inequality. Similar to what is found by Krüger and Perri (2005) for U.S., between-group consumption inequality has tracked between-group income inequality more closely, while within-group consumption inequality has increased less than within-group income inequality.
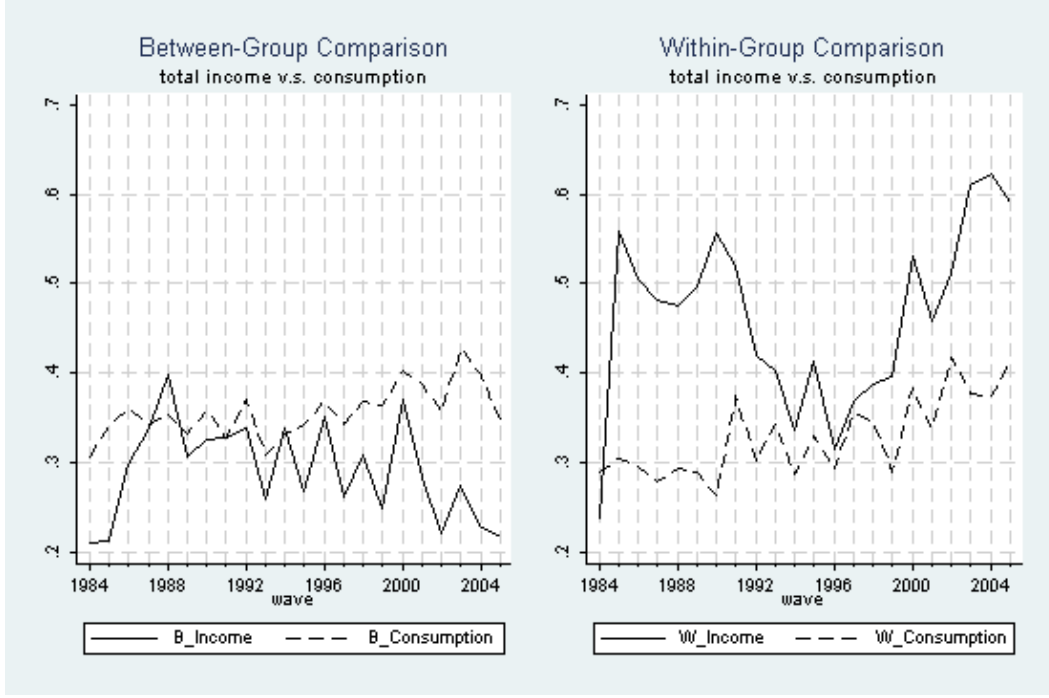
Figure 7: Consumption Inequality II

4 Empirical Test for Correlation

4.1 Is Inequality the Price for Growth?

Although I try to include all legitimate explanatory variables, it may still happen that some important candidates are not available in the data set. In fact an omitted-variable test suggests that the model does have omitted variables. Therefore the regression residual includes both the within-group variances and the error term $\varepsilon_{i,t}$ due to the lack of regressors.

$$g_{ij,t} = \alpha \triangle Z_{ij,t+1} + v_{ij,t} + \varepsilon_{i,t} \tag{6}$$

As the changes in group-specific characteristics are usually very limited across years, $\triangle Z_{ij,t+1}$ is close to zero. Averaging (6) over all j within each group i produces the group average growth rate, which is approximately equal to the measurement error $\varepsilon_{i,t}$.

As a result, a better estimation for the within-group variance is the demeaned group rate

$$E\left(g_{ij,t} - g_{i,t}\right)^2 = E\left(v_{ij,t}^2\right) = \sigma_v^2.$$

The following table shows the OLS regression result of the group variance on average group

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Regression of Within-Group Variance on Group Consumption Growth

VARIABLES	Within_Variance (market value cold rent)	Within_Variance (self estimated cold rent)
mean_growth (market value cold rent)	0.066***	
	[0.015]	
mean_growth (self estimated cold rent)		0.315***
		[0.023]
Constant	0.38***	0.33***
	[0.00]	[0.00]
Observations	135076	137005
R-squared	0,13	0,06
Adj.R-squared	0,12	0,06

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05

Note: OLS regression. Heteroskedasticity-robust standard errors in brackets. All year dummies are highly significant but not reported.

growth and year dummies. Heteroskedasticity of the error terms is controlled for. At the 0.1% significance level, the regression coefficient of the group average growth rate is slightly positive (0.066) when the imputed CR is used, whereas if I use imputed estimation of CR the coefficient increases to 0.315 with a t-value of 13.47. This result points to a positive direction of the relationship, i.e., higher consumption growth is possibly accompanied by higher within-group consumption growth inequality. Admittedly this relation is relatively weak and one can not use it as a clear-cut evidence for the hypothesis posted at the equilibrium of theoretical model. It thus makes more sense to look into details of the groups.

The data shows the groups with highest consumption growth are young, small sized households with good education and skilled jobs (see later Figure 11), while the highest growth inequality appears in the group of young, small sized households with low education and unskilled jobs (see later Figure 20). It seems that young groups have at the meantime high growth and high equality. One possible reason can be that a large portion of the young population is still studying or under training, with very limited income. Besides, even among those who are working, people are subject to more shocks and changes at the beginning of their career, particularly due to different educational backgrounds and job types, which could

also contribute to the high inequality within young population. A further deduction is, as they grow older, working experience can make up for the lack of education and the differences in income and consumption growth between the group members should decrease.
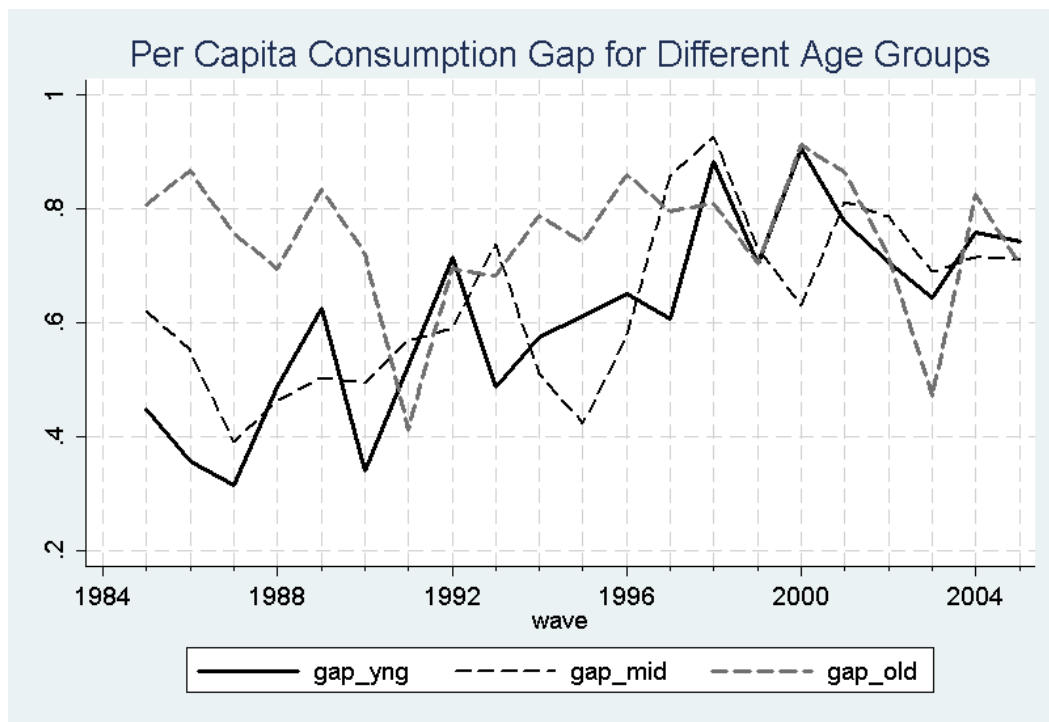
Figure 8: Per Capita Consumption Gap-Young v.s. Old

The data provides evidence in line with these arguments, which shows that the remarkable difference within each age group. Let's take a first look at the consumption gap, which is defined as the difference in per capita consumption of two totally different groups: large households with high education and skilled jobs versus small households with low education and unskilled jobs. Figure 8 plots the gaps for young-, middle- and old-aged households. One can see that the gaps are distinct for various age groups, with the largest gap almost always in the elderly households (except between 1997-1999). At the beginning of the sample period, the gap is relatively small for the young and big for the old population until the end 1980s. Within this starting period, the smallest gap occurred in 1987 for the young households, which is about 31.5%; the largest gap was among the old households and hits as high as 86.7 percentage points. In the first half of 1990s, the gap in old households keeps high, whereas between 1994-1996 the gap in the young surpasses that for the middle-aged. Since the end

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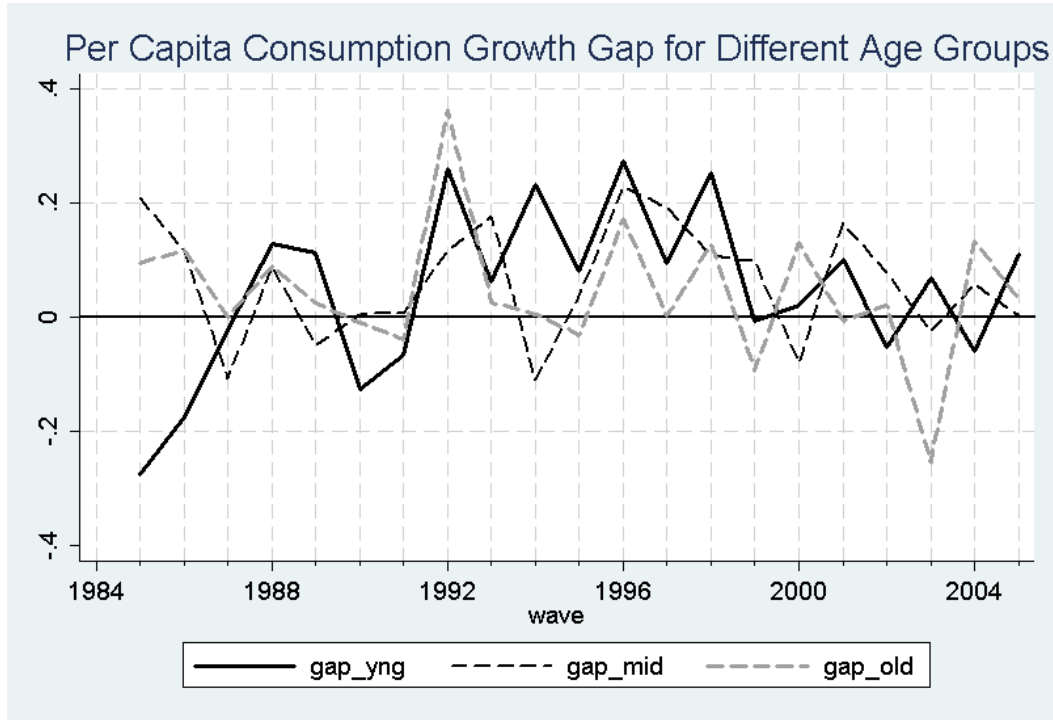
Figure 9: Per Capita Consumption Growth Gap-Young v.s. Old

of 1990s the gaps have converged with an exceptionally low point for old in 2003, reaching 47.2%.

The consumption growth also differs within different age groups, as is shown in Figure 9, with some similar trend between the young and old households from 1995 to 1999. Apart from the fact that the gaps in three age groups alternate in dominating the consumption growth during the whole sample period, it is also interesting to see that the gaps in consumption growth stay most time positive (a few exceptional negative points include: 1985-1987, 1990, 1991, 2002 and 2004 for gap in the young households; 1987, 1989, 1994, 2000 and 2003 for gap in the middle-aged households, 1991, 1995, 1999 and 2003 for gap in the old households). Recall in Figure 8 the absolute positiveness in the consumption gaps between these groups with different educational and occupational backgrounds. This result indicates that for each age group, the superior groups (groups with better education and jobs) not only have absolute advantage in consumption, but also undergo averagely higher consumption growth. As a result, we can observe in Figure 8 a slightly upward trend in the absolute consumption gaps.

The consumption gaps above capture the difference between the most and least advan-

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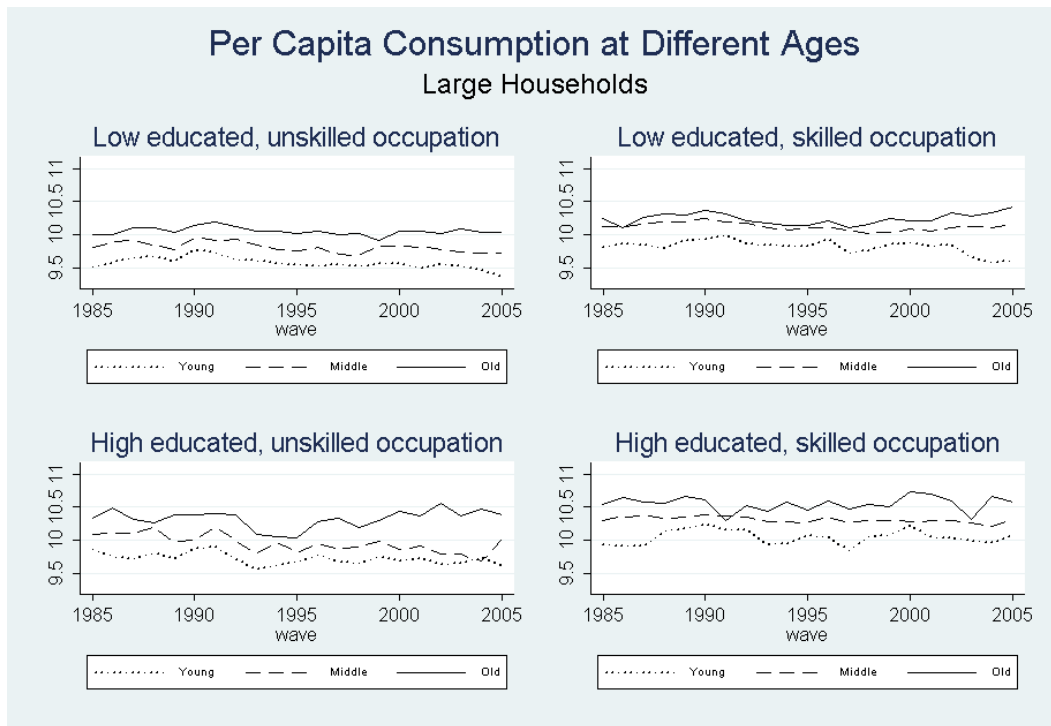
Figure 10: Per Capita Consumption-Large Households
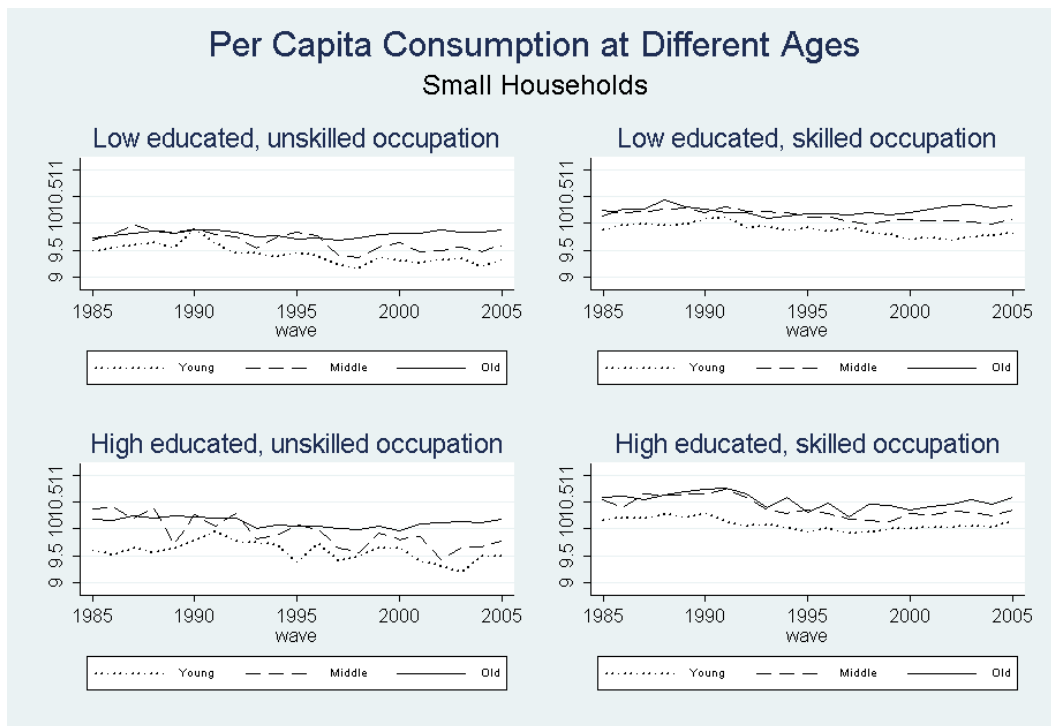
Figure 11: Per Capita Consumption-Small Households
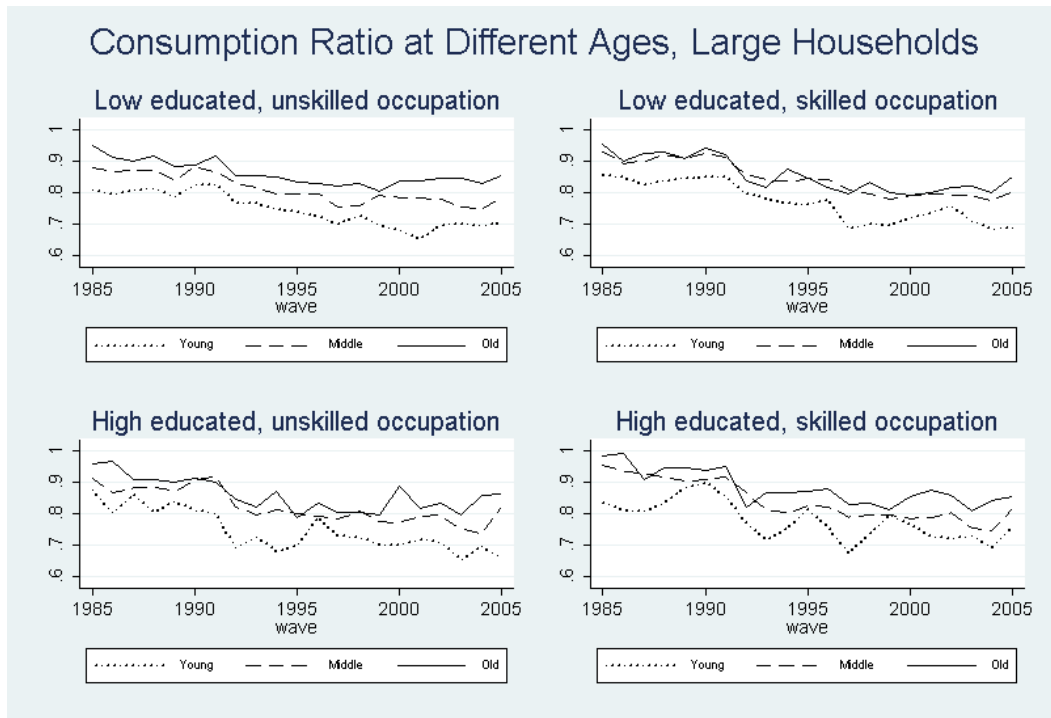
Figure 12: Consumption Ratio-Large Households
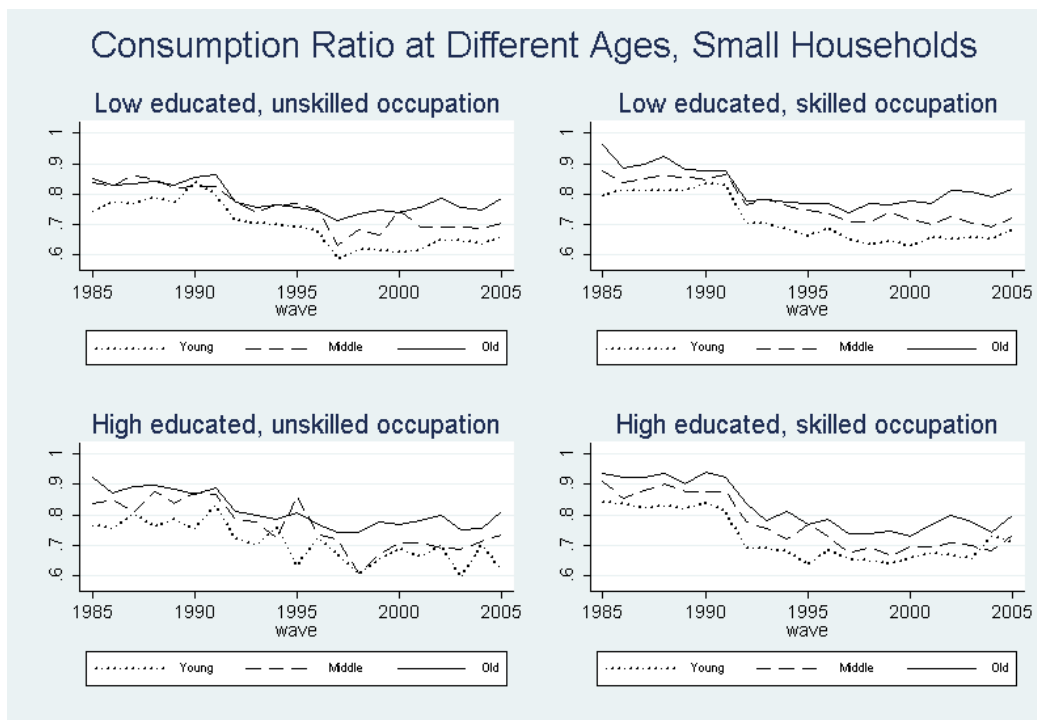
Figure 13: Consumption Ratio-Small Households

taged groups, and the per capita consumption for each group are shown in Figure 10 and 11, where household head's age is controlled. It appears that average consumption in the households increases with household head's age, and per capita consumption of the old households almost always appears to be the highest, which is followed by middle-aged households. This ranking of consumption almost always holds, should households be large or small. Besides, old household consumption is also most stable over time, especially in the small household case.

Not only do households with elderly head have the highest absolute consumption, they also have the highest consumption ratio out of the total income (Figure 12 and 13). The ordering of the consumption ratio in different age groups is similar to that of absolute consumption, implying that the older the household head is, the higher consumption ratio the household has. Since we do not observe an obvious decline of household total income through aging, this high consumption ratio is more possibly attributed to the life-cycle effect, i.e. the elderly agents do not save so much as the younger ones for their future. Meanwhile, if the high consumption ratio corresponds to a high marginal propensity to consume, it may further imply that old households do not hold the highest level of wealth among all population.

Moreover, the consumption ratios experience a rather obvious downward sloping trend for each group. While such trend is not observed in the absolute per capita consumption in the previous Figure 10 and 11, it suggests a faster growth of total income compared to consumption and even an increasing living standard according to a broader interpretation of Engel's Law.

Groups with high consumption and high consumption ratio should also have high total income. This is shown in Figure 14, 15 and 16, which plot the net income, total income and consumption. Group 4 and 8, 12 and 16, 20 and 24 High educated and skilled households have the highest income and consumption levels in their respective age periods, and households in these groups share a common feature: they have high education and skilled jobs. We can also observe that the dotted lines are sometimes overtaken by the solid lines, showing that net income is sometimes not enough to cover the household consumption.

Do groups with high consumption level also have fast consumption growth? Or is it rather opposite that poor households experience high growth? Recall Figure 1, 2 and 3 in the introduction, which represent the young, middle-aged and old categories respectively and
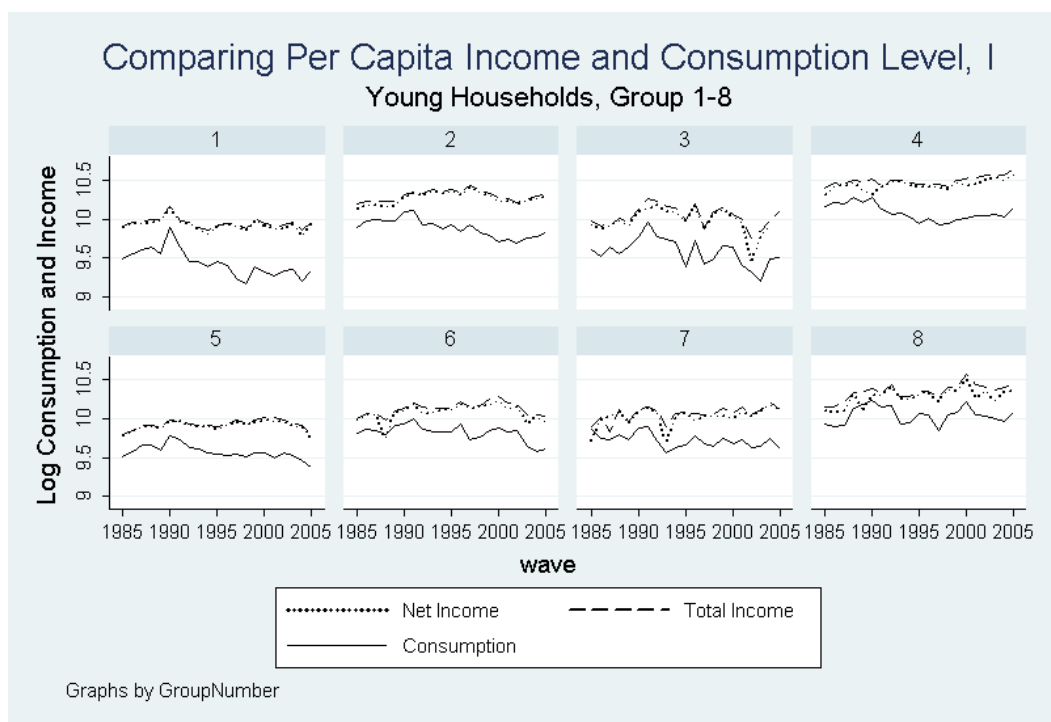
Figure 14: Per Capita Consumption and Income Level, Young
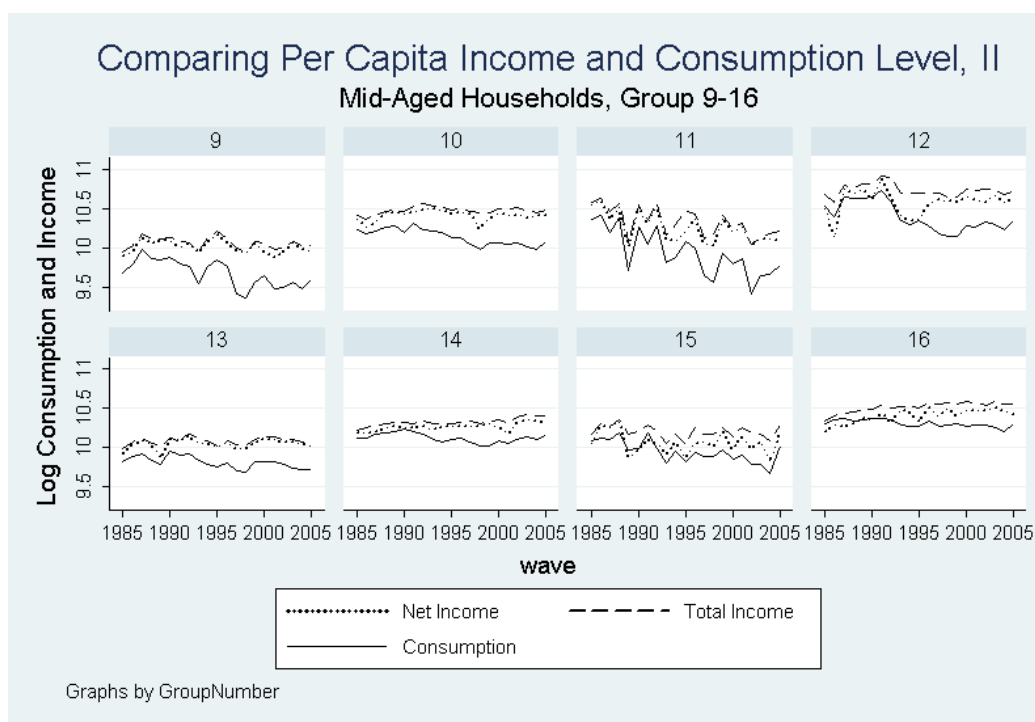
Figure 15: Per Capita Consumption and Income Level, Middle
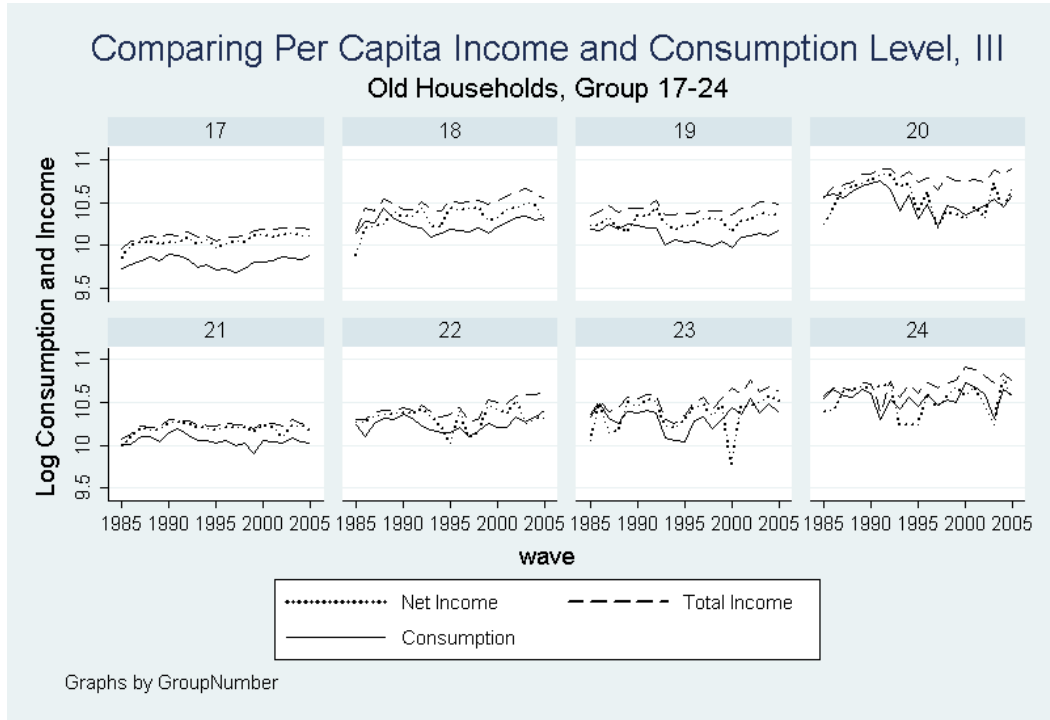
Figure 16: Per Capita Consumption and Income Level, Old

contain the group average consumption and income growth. There, only group 4, consisting of young, small households with high education and skilled job, has an obviously higher growth than others. Groups with particularly poor performance are 7, 15 and 23, which, different in age, are large and well-educated households but with unskilled jobs. In fact most of the years these groups only have negative income and consumption growth, which could be a result of the unfortunate labour market mismatch of skills and jobs. Moreover, young households in Figure 1 appear to have higher fluctuation than older ones in income and consumption growth, regardless of other household features; middle-aged households in Figure 2 have the least volatile consumption growth, only with group 11 (small and well-educated but with unskilled jobs) as an exception.

Obviously the age of household head has very strong explanatory power for household consumption behavior. controlling for the household size, Figure 17 and 18 address the issue of age directly in plotting the per capita consumption growth for households in different ages. The figures show, unless they are small and have skilled jobs, young households do not necessarily have higher consumption growth than their older counterparts. As is men-

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Per Capita Consumption Growth at Different Ages
Large Households

Low educated, unskilled occupation

Low educated, skilled occupation

High educated, unskilled occupation

High educated, skilled occupation
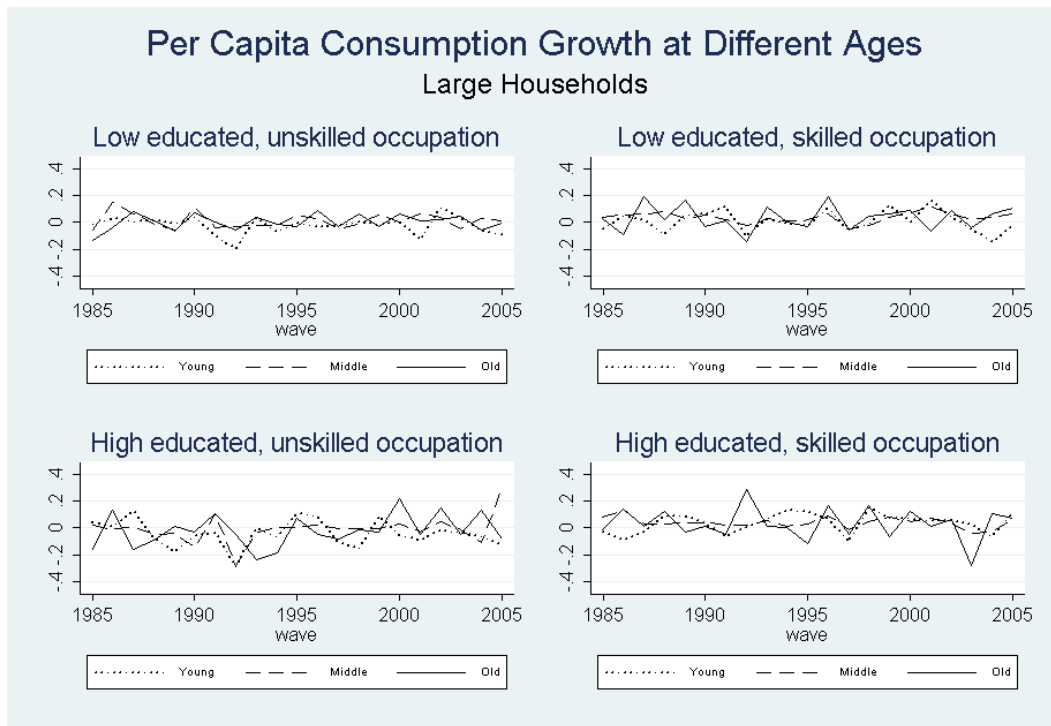
Figure 17: Per Capita Consumption Growth-Large Households

Per Capita Consumption Growth at Different Ages
Small Households

Low educated, unskilled occupation

Low educated, skilled occupation

High educated, unskilled occupation

High educated, skilled occupation
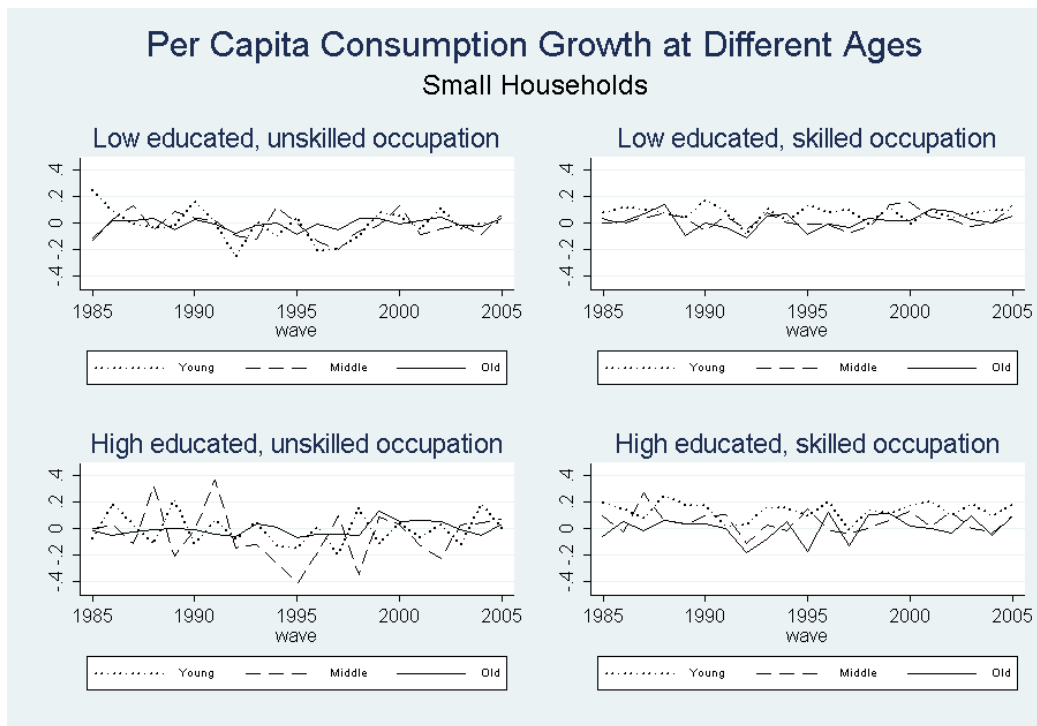
Figure 18: Per Capita Consumption Growth-Small Households

tioned before, for a well educated person, finishing study and finding a skilled job in the labour market change his/her income level and consequently consumption pattern dramatically, especially before the establishment of large family. Therefore we do not observe this consumption growth difference due to age in the groups of large households.

It is also confirmed that well-educated households with unskilled jobs have an inferior position, in the sense that their consumption growth are both irregular and often negative. In comparison, less educated households with unskilled jobs are even lower in consumption level (Figure 10 and 11); however, they have a rather smooth consumption growth, especially if they are large households.

Until now, the discussion has focused on the consumption level and growth. The intratemporal equilibrium of the model suggests a link between the consumption growth and consumption variance, with the latter shown in Figure 19 and 20. For the purpose of comparison, these two figures also look into large and small households respectively, where different age groups are shown for each combination of education and skills.

In the case of small households (Figure 20), consumption growth inequality is extremely and constantly high young households with low education and unskilled jobs (dotted line). It seems that experience for the unskilled (which grows with age) is important in stabilizing their consumption growth and bringing down the growth inequality. For the less educated households with skilled jobs, age does not show a noticeable influence on the inequality and we can observe a relative convergent pattern of the young, middle and old groups. In the large households (Figure 19) what is prominent is the almost constant inequality of low educated and unskilled workers, regardless of their age groups. Well-educated households with unskilled jobs are again at inferior position with relatively high variance. In all, among large households (except low-educated with unskilled jobs), the old ones seem to have experienced high fluctuations in inequality in the past 20 years.

Another observation in Figure 21 is the effect of household size. For young and middle-aged groups, small households have a higher within-group inequality in consumption growth, but have a lower inequality in the old groups. It also becomes clear to draw a picture of the old households (four graphics in the last row): unless they have low education with unskilled jobs, old households have relatively high consumption growth inequality. The reasoning may relate to the capital income effect on consumption.
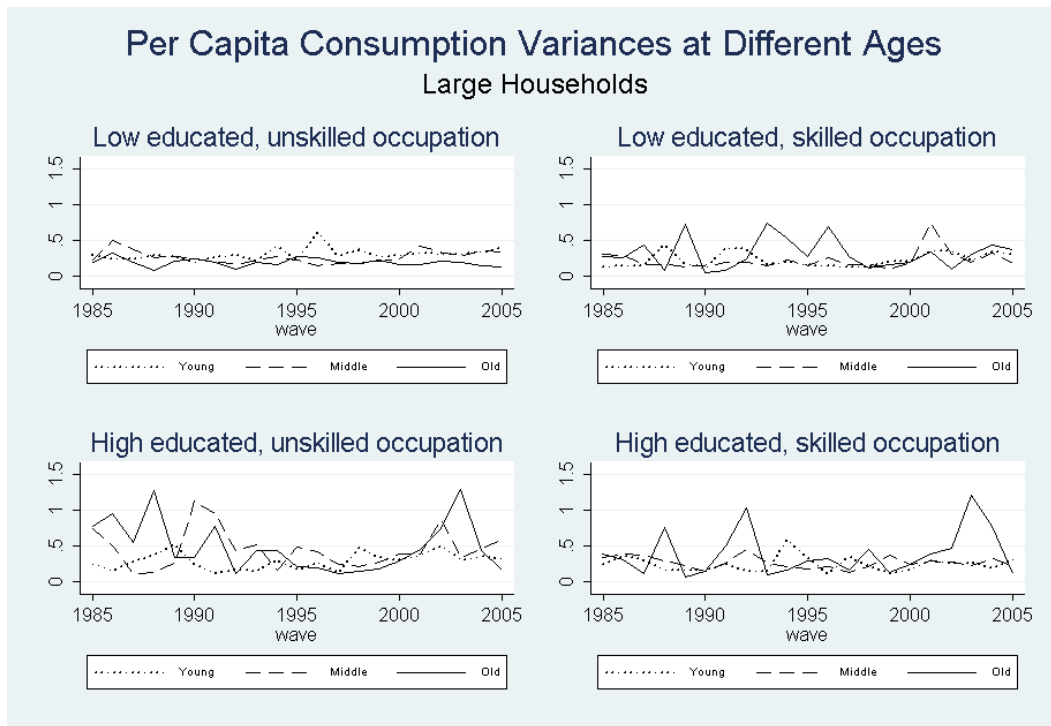
Figure 19: Variance of Per Capita Consumption-Large Households
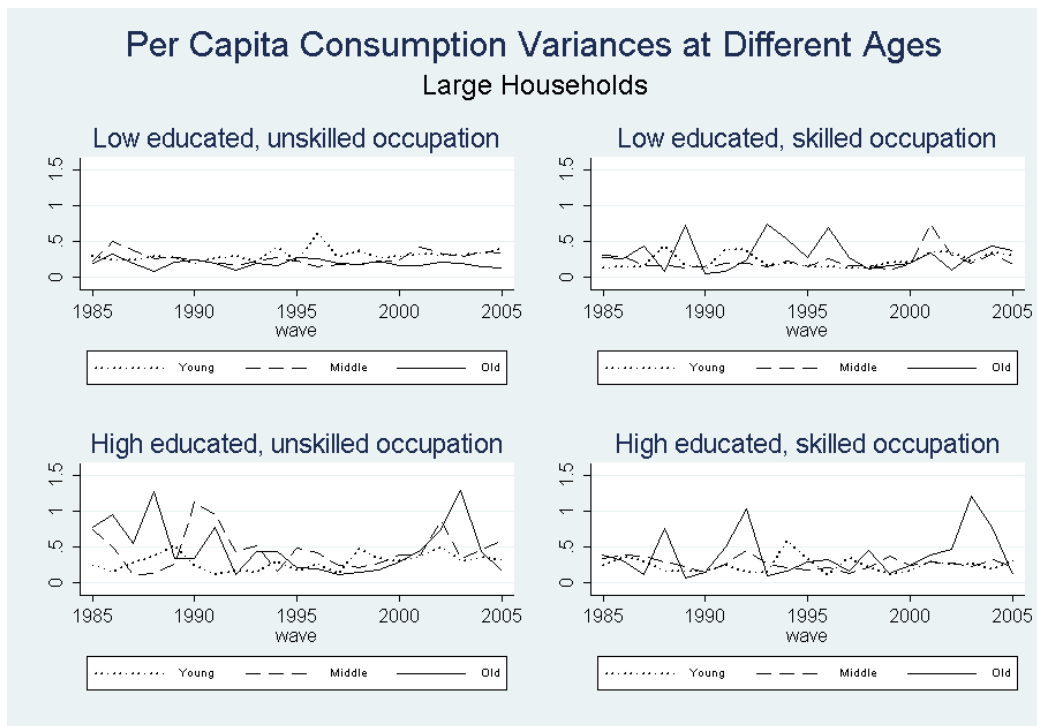
Figure 20: Variance of Per Capita Consumption-Small Households
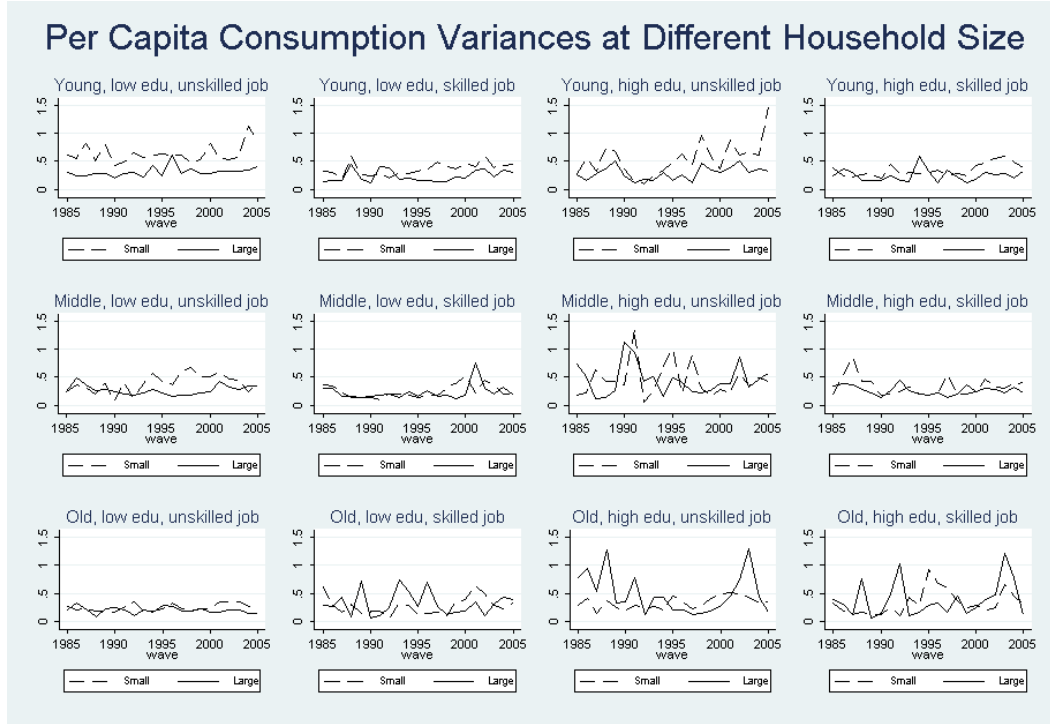
Figure 21: Variance of Per Capita Consumption-Small v.s. Large

5 Summary

This paper offers an overview of consumption and consumption growth inequality in Germany between 1984-2005. A theoretical model borrowed from the asset pricing literature is used to examine the relationship between consumption growth and inequality.

Both complete market hypothesis and self insurance hypothesis are rejected in micro data. To get around this problem, the literature suggests settings of unenforceable contracts and private information. Alternatively, I adopt a simple extension from a typical PIH model, which, among other traits, can generate "excessive smoothness". I use it to examine the dynamics of consumption inequality. The basic idea is that even though households can not observe the income of other families with similar socio-economic status, they can observe the living standards and consumptions of others. How they evaluate others' consumptions affects the group consumption growth inequality. In particular, if they want to keep themselves in pace with their neighbors in consumption, consumption distribution within the group becomes less dispersed than in a typical PIH model; while when they enjoy the well-being of others,

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this "altruism" renders higher variances in consumption.

Concerning the time series properties of the group consumption growth rates, a test using the German Socio-Economic Panel suggests stationarity for the consumption growth whereas the deviation from the original consumption smoothing is even stronger. But however far the deviation is, the model would always predict a positive relationship between the group average growth rate and within-group variance given reasonable parameter values; i.e., the group with higher consumption growth should also observe higher inequality within the group. This theoretical result is tested using GSOEP survey data, where I divide the sample households into 24 groups according to household characteristics such as size, age, education, occupation of household head and so on.

The regression results shows a significant though only slightly positive relationship between group average consumption growth is and within-group consumption inequality. Furthermore, under my grouping strategy, age and household size are undoubtedly crucial for growth and variance. Since a large part of the young population is still out of the labor force and has limited income, consumption differences between them and young professionals are big. However, once they start working, the sudden relaxation of their financial constraint boosts up their consumption to such a degree that the consumption growth of the young groups is higher than the growth of the older groups.

In the sense of risk sharing, smaller households are more vulnerable to economic shocks. After economies of scale is ruled out and per capita consumption is examined, small households dominate the large ones, especially for young and middle-aged households. The data also shows that the otherwise relatively stable consumption growth inequality and within-group inequality in particular undergo increases immediately after the reunification of Germany and the introduction of the euro.

The study confirms the better income and consumption position of households with higher education and skilled jobs. Moreover, a rather surprising result is who is at the inferior position in the across group comparison. Taking consumption growth and variances as criteria, the group with the worst performance are not those with low education and unskilled jobs, but rather the large and well-educated households who unfortunately possess unskilled jobs. It seems as if the mismatch in the labour market contributes to forming a twisted consumption pattern of the households.

These results offer an overall picture of consumption inequality in Germany in the last 20 years. Furthermore, business cycle effects are most likely also important for examining consumption inequality. Is within-group inequality generally procyclical, countercyclical or acyclical? Which groups are especially sensitive to booms and/or recessions? Concerning the theoretical model part, will the result be changed if mobility of households and between group comparison are allowed? These questions are left for future research.

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