CEIS Centre for Economic and International Studies
TOR VERGATA

CEIS Tor Vergata

RESEARCH PAPER SERIES

Vol. 11, Issue 14, No. 296 – October 2013

The health care system reform in China: effects on out-of-pocket expenses and saving

Vincenzo Atella, Agar Brugiavini and Noemi Pace

The health care system reform in China: effects on out-of-pocket expenses and saving.*

Vincenzo Atella[†] Agar Brugiavini[‡] Noemi Pace[§]

October 21, 2013

Abstract

This paper aims at evaluating the impact of 1998 Chinese health care reform on out-of-pocket expenditure and on saving. Existing evidence on the results achieved by this reform in terms of reduction of out-of-pocket medical expenditures is still mixed and contradictory, and very little is known about the impact of these measures on the consumption and saving behavior of the Chinese population. To shed more light on this issue we use data collected by the Chinese Household Income Project (CHIP), through a series of questionnaire-based interviews conducted in urban areas in 1995 and 2002. Contrary to previous evidence, our findings suggest that, once properly accounting for unobserved heterogeneity (health status), out-of-pocket medical expenses and saving rate are affected by the reform in a differentiated way. In particular, we find that out-of-pocket expenses increase more for individuals with poor health status and the saving rate increases only for individual with good health status.

JEL: D14, I13, P36.

Keywords: China, Health Insurance, Health care system reform, Household Saving, Out-of-pocket expenditures.

*The authors gratefully thank Cinzia Di Novi, Henkelejda Havari and the participants at the 18th International Euro-Asia Research Conference held at the University Ca' Foscari of Venice for their useful comments and suggestions. The usual disclaimers apply.

[†]University of Rome Tor Vergata, Department of Economics and Finance, CEIS Tor Vergata and CHP-PCOR Stanford University.

[‡]Universy Ca' Foscari of Venice, Department of Economics, and Venice International University.

[§]Universy Ca' Foscari of Venice, Department of Economics, and CEIS Tor Vergata.

1 Introduction

The characterization of the determinants of households' saving decisions is important both for providing a framework to explain household wealth accumulation *per se*, as well as for providing valuable information on a variety of welfare policies. Given the large size of the Chinese economy and its importance at the international level, considerable effort has been devoted in the economic literature to understand Chinese households' saving decisions.

In the '70s, China has launched several reforms affecting the economy and, in particular, the social security system. The main objective of these reforms was to transform China's stagnant, impoverished and centrally planned economic system into a more flexible and decentralized system capable of generating sustained economic growth and increasing the well-being of Chinese citizens. The reforms began in 1978 and occurred in two stages. The first stage, between the late '70s and the early '80s, involved the de-collectivization of agriculture, the opening up of the country to foreign investments, and the permission for entrepreneurs to start up businesses. However, most industries remained state-owned. The second stage of the reform, between the late '80s and the '90s, involved the privatization and contracting out of much state-owned enterprises (SOEs) and the removal of price controls, protectionist policies, and redundant regulations, although state monopolies in sectors such as banking and petroleum remained state-owned. Following these changes, the private sector grew remarkably, accounting for as much as 70 percent of China's GDP by 2005, reaching a figure larger than the GDP of Western nations. Along with the economic reform, the period between the end of the '80s and the middle of the '90s was characterized by high inflation and low real interest rate that might have induced an increase in saving rate (Modigliani and Cao, 2004; Aaberge and Zhu, 2001; Nabar, 2011). Within the same period, the Chinese government also implemented a series of reforms in the social security sector, including the pension system.

The saving rate of urban Chinese households was basically flat before the '70s, but it started to increase as from 1978, until the beginning of the '90s and reached a percentage as high as 35 percent of GDP (Modigliani and Cao, 2004). The average saving rate of urban households relative to their disposable income rose from 17 percent in 1995 to 24 percent in 2005 (Chamon and Prasad, 2011; Yang et al., 2010). Several studies, based on classical models of saving have been used to explain the pattern of consumption/saving in developed market economies. In particular, well established models, such as the Modigliani-Brumberg's life-cycle theory and Friedman's permanent-income hypothesis, are taken into account as theoretical ground to try to explain the Chinese household's saving behavior. However, the results predicted by these theories are not supported by the findings of empirical studies on the Chinese household saving behavior (Chow, 1985; Qian, 1988; Wang, 1995; Modigliani and Cao, 2004). One challenging fact that hardly

reconciles with the life-cycle theory is the age-saving profile of the Chinese household: it shows a U-shaped pattern (Chamon and Prasad, 2011; Brugiavini, Weber and Wu, 2013), which is inconsistent with the hump-shaped pattern predicted by the life-cycle hypothesis. Moreover, empirical studies have provided evidence of the increased uncertainty related to income and consumption induced by the economic sector reforms and, as a consequence, an increase of precautionary savings (Ma and Yi, 2010; Kraay, 2000). Other studies using a simple growth model have shown that uninsured risk induced by the economic transition partially altered the relation between the marginal propensity to consume and the permanent income. Instead of consuming, the high income households prefer to save more (Wen, 2010; Wang and Wen, 2011).

The aim of this paper is to focus on the health care system reform undertaken in 1998 and on its potential effects on household out-of-pocket expenses and saving. We extend the descriptive analysis provided in Atella, Brugiavini, Chen and Pace (2013) to investigate, through an econometric analysis, the causal relationship between the health care reform and out-of-pocket expenses and saving. To the best of our knowledge, this is the first contribution addressing this specific research question.

Within this literature, several authors have investigated the effect of various determinants of household saving rate (Chamon and Prasad, 2011; Brugiavini, Weber and Wu, 2013; Feng et al., 2011; Wei and Zhang, 2011) but to date there are no contributions studying the relationship between the health care reforms and household out-of-pocket expenses and saving using micro data. The only two papers that focus on the relationship between the reforms in the health care sector and saving are Barnett and Brooks (2010) and Baldacci et al. (2010) but they use macro data and cannot assess the role of heterogeneity.[1]

The remainder of this paper is organized as follows: section 2 reviews the institutional background of the health care system; section 3 describes the data, the econometric model and the estimation results. Finally, section 4 concludes.

2 The health care sector reform in urban China

Before 1998, the Chinese urban health insurance system consisted mainly of two insurance schemes: *i)* the Labor Insurance Schemes (LIS) that bore all costs of medical treatment,

[1]Barnett and Brooks (2010) pool provincial data in China from 1994-2008 to exploit variations in provincial spending on health and differences in saving rates. Their results suggest a statistically significant negative relationship between government health spending and saving in urban areas. Baldacci et al. (2010) examine the impact of expanding social programs on household consumption in China. They simulate the effects of alternative government social expenditure reforms on aggregate consumption using estimates of the age-specific marginal propensities to consume for different income groups and estimates of the lifetime amount of resources available to each cohort. They find that a 1 percentage point of GDP increase in social expenditures allocated across pension, education and health would result in a permanent increase in household consumption of 1.2 percent of GDP.

medicine and hospitalization for the workers and for their dependents; and *ii)* the Government employee Insurance Scheme (GIS) under which medical costs were covered by government budgetary allocation.[2] While GIS and LIS have played an important role in providing China's urban working population with health protection, several aspects of the original schemes contributed to China's rapid health care cost inflation and inefficient resource allocation. First of all, GIS and LIS were third-party insurance, providing comprehensive benefits with minimal cost sharing. Second, insured individuals receive largely free outpatient and inpatient services. This limited consumer financial responsibility for the health services utilization, did not create incentives to seek the most cost-effective health care. Moreover, both GIS and LIS beneficiaries seek medical services from public hospitals, which are usually reimbursed on a fee-for-service basis according to a government-set fee schedule. This system gives providers incentive to over-provide services (Liu, 2002).

For this reason, during the '80s, China started to implement a whole series of reforms in the urban health insurance system. During the first stage of the reforms (early '80s to 1991) the primary objective was cost containment and major reform measures include the introduction of demand-side and supply-side cost sharing. During the second stage (1992-1998), the health sector reforms addressed the issue of inadequate risk pooling. Two cities in Jiangxi and Jiansu Province began pilot reforms that used a combination of individual savings accounts and social risk-pooling funds to finance medical expenditures. Before an individual could access the social risk-pooling fund, however, he or she must first pay deductibles from a first tier of individual medical savings account and a second tier of direct deductible equal to 5 percent of annual income.

At the end of 1998, the Chinese government established a social insurance program for urban workers that replaced the existing LIS and GIS in the cities, known as Basic Insurance Scheme (BIS). The program is financed by premium contributions from employers (6 percent of the annual employee's wage) and employees (2 percent of their annual wage).[3] Retired workers are exempt from premium contributions and the cost of their contributions is to be borne by their former employers.[4] Compared with the old GIS and LIS, the new program expands coverage to private enterprises and smaller public enterprises. Moreover, self-employed workers are allowed to enter the program. However, compared with the old system of GIS and LIS, the benefit structure under the new system has two major gaps in coverage. First, the dependents of the urban workers, who used to receive partial coverage, are no longer covered. Second, the new system has a ceiling on the insured amount of

[2]In this section we provide a short description of the health care system before and after the reform undertaken in the 1998. More details are provided in Wagstaff et al. (2009) and in Atella et al. (2013), to which we refer interested readers.

[3]The amount of the employer's contribution was different across provinces and cities. The average level was 6 percent of the employee's wage.

[4]Liu (2002) provides an extensive description of the characteristics of BIS.

the individual medical expenditures (equivalent to four times the annual average wage in the region). Imposition of this ceiling is due to budget constraints as well as the political emphasis on the wide coverage, but it leaves most catastrophic illnesses uncovered.

The Ministry of Labor and Social Security (1999) estimated that the premium contribution based on the 8 percent of the current wage can only cover about 70 percent of the total outlay under the old systems of GIS and LIS. Moreover, Gao et al. (2007) show that the proportion of elderly covered by health insurance in urban China has declined over the period 1998-2007.[5]

3 Data and empirical analysis

The empirical analysis of this paper is based on cross-sectional data obtained from the Chinese Household Income Project surveys (CHIPs) conducted by the Chinese Academy of Social Science (CASS) in 1988, 1995 and 2002. The surveys use sub-samples from the main nationally representative household survey programme conducted by the Chinese National Bureau of Statistics in the urban and rural areas, and are designed to be representative of the whole Chinese population. For the scope of our analysis, we only focus on the 1995 and 2002 waves that represent respectively the pre-reform and post-reform periods. We exclude from the analysis the 1988 wave because there are incomplete information on income and expenditure. Furthermore, we do not consider the rural sample because the Basic Insurance Scheme (BIS) was introduced only in the urban areas. The urban sample included individuals and households from 11 provinces and municipalities.[6] The purpose of CHIPs urban data collection was to measure the distribution of personal income. Moreover, the data provide a large set of information on each household member concerning his/her social and economic status, including employment characteristics, wage, tax, and sources of income, and demographic variables such as, age, gender, marital status, relationship to

[5]This may be attributed to the reform of state-owned enterprises, which has resulted in many enterprises being closed and a substantial number of workers being laid off (Gao et al., 2001). As only the minimum living allowance was guaranteed, the elderly who were laid off or whose employing enterprises were closed as a result of the ongoing economic reforms process may have lost their entitlements such as the health insurance.

[6]In the 1995 wave, the 11 provinces and municipalities are Anhui, Beijing, Gansu, Guangdong, Henan, Hubei, Jiangsu, Liaoning, Shanxi, Sichuan, and Yunnan. In the 2002 wave, Chongqing municipality is also included. Since it was one city of Sichuan province and became the municipality in 1997, we combine Chongqing and Sichuan together in the 2002 wave. These 11 provinces and municipalities cover all the 6 geographical areas and can reflect the economic situation of China. In 2002, Guangdong ranked the first in GDP and Beijing municipality ranked the first in per capita GDP, whereas Gansu ranked the 25th in GDP over all the Chinese 31 provinces and was one of the lowest per capita GDP all over the country; Liaoning was heavy industry center, where petrochemical industry, machinery manufacturing industry and metallurgy industry occupied 70 percent of total Liaoning gross industrial output value; Henan was the most important agriculture province, where cultivated area ranked the first all over the country (National Bureau of Statistics of China, 2003).

the household head. Information is also gathered on household's expenditures and on their living conditions.[7]

3.1 Data description

The empirical analysis will be performed at household level, with some information collected at the head of the household level (socio-demographic and employment characteristics) and some other at the household level (income, expenditures and saving). Given the current structure of the Chinese health care assistance and our focus on saving behavior, we restrict the sample to include only household heads aged 25-65. Moreover, to avoid potential measurement errors, we dropped the extreme values of the saving rate (values of the saving rate below the first percentile and above the $99th$ percentile). After performing these selections we obtain a sample of $6,496$ households in 1995 and $6,252$ households in 2002. However, for our empirical analysis the sample size reduces to $5,337$ households in 1995 and to $4,551$ in 2002, as the survey contains a non negligible number of missing values for the income and some employment characteristics variables used as regressors.

Table 1 reports summary statistics (based on the final sample) for household disposable income, consumption, the resulting saving rates and out-of-pocket expenses.

Place Table 1 here

The measure of disposable income that we focus on includes labor income, property income, transfers, and income from household sideline production minus income tax. The consumption expenditure variable covers a broad range of categories.[8] Out-of-pocket medical expense is defined as the difference between total household's health care expenditure and the amount of the reimbursement by any kind of health insurance. All flow variables are expressed in 2011 U.S. dollars, PPP adjusted, and nominal variables in 2002 are deflated using the national CPI (base year 1995=100). Furthermore, we measure savings as the difference between disposable income and consumption expenditure and we define the saving rate as the ratio between saving and disposable income. On average, we observe that the household's total and disposable income increased significantly in real terms from 1995 to 2002. Accordingly, also the household total expenditure increased significantly, even

[7] In the 2002 wave, CHIPs provides two special data sets which investigate rural-to-urban migrant individual and household information. However, such data do not exist in the 1995 wave. Therefore we do not take these rural-to-urban migrant households into account in our analysis.

[8] Consumption expenditure includes food, clothing and footwear, household appliances, goods and services, medical care and health, transport and communications, recreational, educational and cultural services and housing.

though the rate of growth of expenditure is lower than what we observe for the income variables. Moreover, the average out-of-pocket medical expenses increased significantly from 1995 to 2002 which is consistent with the findings of Gao et al. (2001) and Wagstaff and Linderlow (2008). Finally, the average ratio between out-of-pocket medical expenses and disposable income is 0.025 in 1995 (ranging from 0 to 0.97) and 0.047 in 2002 (ranging from 0 to 3.36). The household saving rate and the ratio between out-of-pocket medical expenses and disposable income are the dependent variables in the econometric analysis presented in the next section.

There are several possible explanations for the increase in total household expenditure, but in our paper we stress two main reasons. First, in 1995 the health care costs of the LIS and GIS beneficiaries' dependents could be partially reimbursed, whereas in 2002 BIS did not reimburse the dependents' health care costs any more. Second, during this period there was a remarkable health care cost increase, which lead to higher household health care expenses. Moreover, the proportion of the public insurance coverage decreased from 1995 to 2002 significantly. This result is not surprising, since the Ministry of Labor and Social Security (1999) reported that BIS could only cover 70 percent of the total outlay under GIS and LIS. This may be attributed to the reform of SOEs which has resulted in many enterprises being closed and a substantial number of workers being laid-off (Gao et al., 2001).

Table 2 and Figure 1 provide information on the average saving rate by age group. For all age groups the saving rate is higher in 2002. Moreover, in both waves, the saving rate has a U-shape pattern. Coherently with previous empirical analyses run by Yang et al. (2010), Chamon and Prasad (2011), Brugiavini, Weber and Wu (2013), and Atella, Brugiavini, Chen and Pace (2013), we also find that the lowest saving rate level are registered among the 30-44 age group in 1995 and among the 35-49 age group in 2002.

Place Table 2 here

Another interesting aspect is to explore the evolution of saving rate by type of insurance coverage. In China, the household head can be covered either by public insurance, private insurance, or can remain uninsured. According to the data collected, in the 1995 wave, public insurance was provided by either LIS or GIS, whereas in the 2002 wave it was provided only by BIS. In 1995, 70.58 percent of household heads were covered by LIS or GIS, 17.23 percent were covered by private health insurance, while the remaining 12.19 percent of households heads were not covered by any kind of health insurance. In 2002, 68.79 percent of household heads were covered by BIS, 5.31 percent was covered by private health insurance while the remaining 25.9 percent of households heads were not covered by any kind of health insurance.

Table 3 shows the average saving rate by survey, public health insurance coverage and age groups. It is clear that in 2002 the saving rate is significantly higher for households whose household heads were covered by public health insurance and in the 40-54 age group. Not statistically significant differences can be found in 1995 with the only exception of the 30-34 age group. Figure 2 and 3 show the saving rate profile by age group and working unit type. In Figure 2, we consider two categories of households, those with the household head working in the private sector (employed in a private enterprise) and those with the household head not working in the private sector (therefore working either in public enterprises - State Owned Enterprises (SOE) at central or provincial level or local SOE - or in government agencies or in public institutions). This figure shows that the saving rate pattern is smoother for employees not working in the private sector. Moreover, while in 1995 the saving rate difference for those working in the private sector *vs* those not working in the private sector was not statistically significant, in 2002 it became significantly higher.

Place Table 3 here

Figure 3 highlights a similar evidence: here we consider two categories of households, those with the household head working in government agencies and government insitutions and those with the household head working in enterprise (public or private) or in other institutions. The result shows not statistically significant difference in 1995. On the contrary, in 2002 household heads employed in government agencies or public institutions save significantly more than the others.

Figure 4 shows the saving age profile by age group and characteristics of the job contract. In particular, we consider two categories of households, those with the household head permanently employed in a working unit and those without a permanent contract. The figure shows that, in both waves, the saving rate of permanently employed household heads is always higher than the saving rate of the households head with different employment contract.

Finally, descriptive statistics of other relevant variables are reported in Table 4. We consider the age of the household head, the household composition (number of household members aged less than 25, 25-49, 50+), the head's years of education and home ownership, and the employment characteristics, including working years in the current work place, permanent employed or not, working in any enterprises or not, type of occupation and economic sectors. The data show that years of education and home ownership increased significantly between 1995 and 2002, suggesting a general improvement of the living conditions of the Chinese population. Moreover, significant changes are observed on

several indicators of the job position and occupational status. The fraction of employees with permanent employment, the fraction of employees working in enterprises and the job tenure decreased significantly. In addition, in only seven years between 1995 and 2002 the data show significant changes also in the job sector. The fraction of individuals working in the mineral, real estate and geological prospecting and irrigation administration decreased significantly, while increased significantly the fraction of individuals working in the construction, finance and insurance and social services.

Place Table 4 here

3.2 Empirical Results

As our aim is to estimate the effect of the 1998 health care reform on the saving rate and OOP expenditure, we adopt a simple econometric strategy based on the estimation of the following linear reduced form model:

$$(1) \quad y_{i,t} = \alpha_0 + \alpha_1 PI_{i,t} + \alpha_2 PR_{i,t} + \alpha_3 D_t + \gamma X_{i,t} + \beta_1 PI_{i,t} * D_t + \beta_2 PR_{i,t} * D_t + \mu_{i,t}$$

where $y_{i,t}$ is the household i's saving rate or the ratio between out-of-pocket expenses and disposable income, $PI_{i,t}$ is a dummy variable representing public insurance coverage (it takes value 1 if the household head is covered by LIS or GIS in 1995, or by BIS in 2002, and takes value 0 otherwise), $PR_{i,t}$ is a dummy variable indicating private insurance coverage, D_t is the time dummy indicating the pre-post reform wave, $X_{i,t}$ is the vector of control variables, which includes household head's demographic characteristics (age and age square), household's composition variables (number of household members divided by age groups), years of education, home ownership and employment characteristics (working unit, permanent vs temporary contract, job tenure, occupation and economic sectors) and the province dummies to take into account geographical heterogeneity. Furthermore, the interaction terms $PI_{i,t} * D_t$ and $PR_{i,t} * D_t$ should capture the causal effect of the health care reform on outcome variables. Finally, $\mu_{i,t}$ is the error term and t refers to time (with $t = 1995, 2002$).[9]

The coefficient estimates, obtained through simple OLS regressions, are reported in Table 5. Columns from a to c show the estimated coefficients for OOP expenses. Columns from d to f show the estimated coefficients for saving rate. We estimate different model specifications: the first includes only demographic characteristics and province dummies

[9]We also considered as dependent variable the log-normalized difference between disposable income and expenditure, controlling for the level of disposable income as additional regressor. However, the high correlation between years of education and income affects the estimated standard errors. For this reason we did not show the results that are available upon request.

(column *a* and *d*). The second adds years of education and home ownership (column *b* and *e*). Finally, the third specification, the most complete, adds the job characteristics of the household head (column *c* and *f*).[10]

Place Table 5 here

According to these results, the effect of the health care reform on the OOP expenses/income ratio (columns a-c) is negative and statistically significant. Furthermore, we find that the interaction effect with survey year is negative and larger for those who are covered by private insurance, although the difference is not statistically significant. These results suggest that after the reform, OOP expenses have increased, but both public and private insurance prove to serve as a cushion against health risks, given that they do seem to reduce the OOP expenses/income ratio. Furthermore, we find that a larger number of household members aged 25+ significantly increases the OOP expenses/income ratio. Years of education do not have a significant effect, but this may be due to its positive and significant correlation with disposable income (correlation coefficient: 0.2295, P-value: 0.000). Moreover, the employment characteristics do not play any role.

Looking at the saving rate model (columns *d-f*), the results are in line with those obtained for the OOP/income ratio. In this case we find that the interaction term between public insurance coverage and post-reform dummy is positive and statistically significant at 1 percent and this result is robust across model specifications. This suggests that the health care reform had an effect on saving rate for those individuals covered by public health insurance or, put differently, that the public coverage induces households to save between 3.7 to 4.8 percentage points more than households not covered by any kind of health insurance.

In order to better describe the role of health shocks, we investigate how the saving rate could be affected by health risks.

On the one hand saving may increase in response to unexpected future health shocks which would cause higher health expenses (including OOP). Hence saving has an insurance property *vis-a-vis* these risks. On the other hand if households are subject to liquidity constraints, a health shock causing an increase in OOP would cause a reduction is current saving. To account for these issues, we investigated the joint relationship between the saving rate and OOP expenses by estimating a seemingly unrelated regressions (SUR) system taking into account the contemporaneous cross-equation error correlation.[11] In

[10]We estimate different model specifications to check whether there are variables driving the effect on OOP/income and saving rate. However, since the coefficients of the key variables do not change between model specifications, we can conclude that this concern is unfounded.

[11]SUR produces more efficient estimates than ordinary least square regression. It does this by weighting the estimates by the covariance of the residuals from the individual regressions.

particular, we assume that current OOP enter the saving rate regression in order to capture the idea that under liquidity constraints households have to reduce current saving to cope with unexpected health expenditures.

In Table 6, we present the coefficient estimates obtained from the two equation model, one for the OOP expenses/income ratio (column a) and one for the saving rate (column b). The two equations share the same set of regressors, but we add the OOP expenses/income ratio as additional explanatory variable in the saving rate equation. As we can clearly see in column b, the coefficient of the OOP expenses/income ratio is negative and statistically significant, suggesting that high OOP expenses relative to income prevents households to save. The interaction terms remain substantially unaltered with respect to the estimates in Table 5, thus proving to be robust. Similarly, all other variables confirm their role as in Table 5.

Place Table 6 here

3.3 Data limitations: dealing with the unobserved heterogeneity

Although the analysis carried out so far present some interesting policy results, we are aware of the existence of limitations in our data that may strongly influence the estimates. In particular, our dataset lacks information on individual health status and both OOP expenses and saving rate are likely to be affected by the individual health status. Therefore, if the health status is an important determinant of outcomes, this will lead to the existence of some form of unobserved heterogeneity and our current estimate of the health insurance coverage effect could, at best, be interpreted as an average effect across individuals with poor and good health.[12]

Indeed, evidence of the existence of some unobserved heterogeneity may be seen in Figure 5 and 6. These figures are kernel density estimates of the distribution of OLS residuals from our models in equation 1. To take into account such unobserved heterogeneity, we estimate a finite mixture model. Finite Mixture Models (FMMs) are semiparametric estimators that have received increasing attention both in the economics and statistics literature because there are different areas in which such distributions are encountered. The

[12]What is available in the dataset is the number of sick leave days taken in the current year in 1995 and a measure of self-perceived health status in 2002. These two pieces of information are not directly comparable to obtain a synthetic and coherent measure of health status variation across the two waves. Theoretically, we could have constructed a coherent health status index based on the distribution of the answers to both questions. However, the large number of missing values for the number of sick leave days makes this strategy useless as it would drastically reduce the sample size for the analysis.

FMMs provide a natural representation of heterogeneity in a finite number of latent classes. It concerns modeling any statistical distribution by a mixture of other distributions.[13]

Following Deb and Trivedi (1997), the density function for a C-component finite mixture is

$$(2) \quad f(y \mid \mathbf{x}; \theta_1, \theta_2, ..., \theta_C; \pi_1, \pi_2, ..., \pi_C) = \sum_{j=1}^{C} \pi_j f_j(h \mid \mathbf{x}; \theta_j)$$

where $0 < \pi_j < 1$, and $\sum_{j=1}^{C} \pi_j = 1$ and f_j denotes an appropriate density given the characteristics of the error terms. In this contest normally distributed components appear to be appropriate in the context of the outcome of interest. We estimate the model's parameters using maximum likelihood. In addition, in post estimation, we calculate the posterior probability that observation y_i belongs to component c (the prior probability is assumed to be a constant):

$$(3) \quad \Pr[y_i \in \text{ population } c \mid \mathbf{x}_i, y_i; \theta] = \frac{\pi_C f_C(y_i|\mathbf{x}_i, \theta_C)}{\sum_{j=1}^{C} \pi_j f_j(y_i|\mathbf{x}_i, \theta_j)}, \qquad c = 1, 2, ..C$$

which we use to explore the determinants of class membership, and especially to see if these determinants are consistent with the idea that health status is the likely source of unobserved heterogeneity.

By mean of the Akaike Information Criterion and Bayesian Information Criterion we select a two component FMM. Parameter estimates of the finite mixture model for OOP expenses/income ratio (column a and b) and saving rate (column c and d) are reported in Table 7. Differently from OLS estimates, our findings suggest that, once properly accounting for unobserved heterogeneity (health status), out-of-pocket expenses and saving rate are affected by the reform in a differentiated way. In particular, we find that the ratio between out-of-pocket expenses and income increases more for component 1 individuals compared to component 2 (0.072 vs 0.007) and saving rate increases only for component 2 individuals. Furthermore, we find that both public and private health insurances are ineffective to cushion individuals against the increase in out-of-pocket expenses, irrespective of their group. In the case of the saving rate some positive statistically significant (at 10 percent) effects could be found only for component 2 individuals.

These results support the *prima facie* evidence that the outcomes are generated by two different distributions where, potentially, individuals in component 1 have lower health status than individuals in component 2.

[13] Atella and Deb (2013) provide a review of the contributions adopting the Finite Mixture approach.

In the model for OOP expenses/income ratio, the predicted mean in component 1 is 0.148 (std. dev. 0.048) ranging between 0.016 and 0.355, while the predicted mean in component 2 is 0.02 (std. dev. 0.006) and ranges between 0.003 and 0.040. In the model for saving rate, the predicted mean in component 1 is close to zero (mean -0.051, std. dev. 0.093) and ranges between a negative value of -0.415 and a positive value of 0.335, while the predicted mean in component 2 is 0.222 (std. dev. 0.076) and ranges between 0.004 and 0.486. The estimated class probabilities are informative vis-a-vis our speculative hypothesis that the distributions are drawn from individuals with poor health and good health, with the evidence suggesting that component 1 represents individuals with poor health.

The posterior probabilities seem to support our hypothesis: in the model for OOP expenses/income ratio the probability of being in component 1 is 14.4 percent while in the model for saving rate the same probability is 19 percent. Although we have not been able to obtain information on the health distribution for a population that is perfectly overlapping with our population, we feel comfortable to claim that the posterior probabilities are consistent with some recent findings on health status distribution available in the literature (Zhao, 2008; Chatterji et al., 2008; Strauss et al., 2011; Mu, 2013). In particular, according to Zhao (2008) 26 percent of the whole sample reported a poor and fair health status ranging from 34.8 percent in the Hubei province and 13.4 percent in Heilongjiang. Chatterji et al. (2008) show that 16 percent of the respondents in China reported having at least one chronic diseases. Strauss et al. (2011) find that 22 percent of women and 30 percent of men reported poor general health. Finally, Mu (2013) finds that 24 percent of the sample self-report a poor health status. Given that our sample is younger than the samples used by the authors listed above, we can conclude that our estimates suggest that component 1 represents the group of individuals with poor health. If health status is truly the unobserved variable affecting the results for both OOP expenditure/income and saving rate, the results suggest a quite clear story: *i)* individuals with poor health tend to pay out-of-pocket a larger share of their income and this direct disbursement reduces their saving; *ii)* individuals with fair or good health tend to pay out-of-pocket a small share of their income and can afford to save more.

Place Table 7 here

To better characterize class membership we estimate OLS regressions of the posterior probabilities (multiplied by 100) of belonging to class 1 on a set of variable including age, household income and a set of job characteristics (working unit, type of contract, tenure, occupation). The results presented in Table 8 support the poor health/good health categorization. In both models for OOP expenses/income and saving rate, the coefficients of

age is positive and statistically significant, suggesting, as expected, that aging is associated with the worsening of health status. Moreover, the coefficients of household income (expressed either as a continuous or a categorized variable) and permanent employment contract are negative and highly statistically significant, suggesting that poorer families with household head employed with temporary contract are more likely to have a poor general health with respect to wealthier families with household head employed with a permanent contract. Other job characteristics seem to be correlated with the posterior probability of belonging to class 1: working in an enterprise and the number of years spent in the current job place reduce the probability of a poor health status.[14]

Place Table 8 here

4 Conclusion

In this paper we have analyzed the economic effects of the third stage of the health care system reform occurred in 1998, when the Chinese government established a new public insurance scheme, called the Basic Insurance Scheme (BIS) nationwide. In particular, we have focused on the effects produced on OOP expenses and household's saving rate.

According to the literature, reforms which curtail health coverage and health provisions should induce households to increase both oop expenses and the saving rate (in this last case in view of future health expenditures). Using data from the 1995 and 2002 waves of the Chinese Household Income Project Survey for the Chinese urban households, we have estimated a DiD model to explore the effect of the 1998 reform. According to a first set of results based on OLS estimation, the reform has positively affected both OOP expenses and saving rate, confirming the literature results. Furthermore, we found that both public and private insurance prove to serve as a cushion against health risks, given that they do seem to reduce the ratio of OOP expenses compared to disposable income.

We have further explored the robustness of these results by allowing for the existence of unobserved heterogeneity in our data and made use of a Finite Mixture Model approach. In this way we are able to isolate two distinct groups that, according to posterior probability regression estimates, could be associated with "bad" and "good" health status. Once properly accounted for this form of heterogeneity, the effects of this reform are quite different. In particular, we find that after the reform OOP expenses increase more for the less healthy individuals, while the saving rate increases more for the healthy individuals.

[14] Also years of education is negatively associated to the posterior probability of beloning to class 1. However, we did not include this variable in the regression because is significantly correlated with household income.

Furthermore, our results suggest that, after the reform, public and private insurances do not serve as a cushion against health risks.

Overall, our results are somewhat surprising, if compared with the standard literature developed for Western economies. Once attention is paid to the different populations reflected in the sample *vis- à -vis* the different health characteristics, the role of public health provisions in protecting against current and future health shocks disappears. We cannot say much about the specific reason for this failure, but a possible explanation is the reduced coverage for dependent household members (spouse and children of the employee).

In future work we will focus on the specific role of each single health provision in order to disentangle the different explanations as to this lack of insurance properties.

References

Aaberge R. and Zhu Y. 2001. The Pattern of Household Savings during a Hyperinflation: The Case of Urban China in the late 1980s. Review of Income and Wealth, Vol. 47, pp 181-202.

Atella V., Brugiavini A., Chen H. and Pace N. The Chinese health care system reforms and household saving patterns: some stylized facts. In The Globalisation of Chinese business; implications for multinational investors, edited by Taylor et al., Chandos publishing, Oxford (forthcoming).

Atella V., Deb P. 2013. Heterogeneity in Long Term Health Outcomes of Migrants within Italy. NBER Working Paper No. 19422.

Baldacci E., Callegari G., Coady D., Ding D., Kumar M., Tommasino P., Woo J. 2010. Public Expenditures on Social Programs and Household Consumption in China. IMF Working Paper 10/69.

Barnett S. and Brooks R. 2010. China: Does Government Health and Education Spending Boost Consumption?. IMF Working Paper 10/16.

Brugiavini A., Weber G., and Wu B. 2013. Saving Rates of Urban Households in China. In The Chinese Economy, edited by G. Gomel et al., Springer-Verlag Berlin Heidelberg.

Chamon. M. D. and Prasad E. S. 2011. Why Are Saving Rates of Urban Households in China Rising? American Economic Journal: Macroeconomics, Vol. 2(1), pp 93-130.

Chatterji S., Kowal P., Mathers C., Naidoo N., Verdes E., Smith JP. and Suzman R. 2008. The health of aging populations in China and India. Health Affairs, Vol. 27(4), pp 1052-1063.

Chow G. 1985. A Model of Chinese National Income Determination. Journal of Political Economy, Vol. 93 (4), pp 782-792.

Deb P. and Trivedi P.K. 1997. Demand for Medical Care by the Elderly: A Finite Mixture Approach. Journal of Applied Econometrics, Vol. 12, pp. 313-336.

Feng J., He L., and Sato H. 2011. Public pension and Household Saving: Evidence from urban China. Journal of Comparative Economics, Vol. 39(4), pp 470-485.

Gao J., Raven J., and Tang S. 2007. Hospitalization among elderly in urban China. Health Policy, Vol. 84, pp 210-219.

Gao J., Tang S., Tolhurst R. and Rao K. 2001. Changing access to health services in urban China: implications for equity. Health Policy and Planning, Vol. 16(3), pp 302-312.

Kraay A. 2000. Household saving in China. World Bank Economic Review, Vol. 14(3), pp 545-570.

Liu Y. 2002. Reforming China's urban health insurance system. Health Policy, Vol. 60, pp 133-150.

Ma G. and Yi W. 2010. China's high saving rate: myth and reality, BIS Working

Papers 312, Bank for International Settlements.

Ministry of Labor and Social Security 1999. The policy options for supplementary medical insurance in China. Mimeo.

Modigliani F. and Cao S.L. 2004. The Chinese Saving Puzzle and the Life-Cycle Hypothesis. Journal of Economic Literature, Vol. 42(1), pp 145-170.

Mu R. 2013. Regional disparities in self reported health: evidence from Chinese Older Adults. Health Economics. doi: 10.1002/hec.2929.

Nabar M. 2011. Targets, Interest Rates, and Household Saving in Urban China. IMF Working Paper 11/223.

National Bureau of Statistics of China 2003. The Chinese Statistical Yearbook 2003. China Statistics Press.

Qian Y. 1988. Urban and Rural Household Saving in China. IMF Staff Papers, Vol. 35(4), pp 592-627.

Strauss J., Lei X., Park A., Shen Y., Smith J., Yang Z., Zhao Y. 2011. Health Outcomes and Socio-Economic Status Among the Elderly in China: evidence from the CHARLS pilot. Journal of Population Ageing, Vol. 3, pp 111-143.

Wagstaff A. and Lindelow M. 2008. Can insurance increase financial risk? The curious case of health insurance in China. Journal of Health Economics, Vol. 27(4), pp 990-1005.

Wagstaff A., Yip W., Lindelow M., Hsiao W. 2009. China's health system and its reform: a review of recent studies. Health Economics. Vol. 18, S7-S23.

Wang Y. 1995. Permanent Income and Wealth Accumulation: A Cross-Sectional Study of Chinese Urban and Rural Households. Economic Development and Cultural Change, Vol. 43 (3), pp 522-550.

Wang X. and Wen Y. 2011. Can rising housing prices explain China's high household saving rate?. Review 93(2), Federal Reserve Bank of San Louis.

Wei S.J. and Zhang X. 2011. The Competitive Saving Motive: Evidence from Rising Sex Ratios and Savings Rates in China. Journal of Political Economy, Vol. 119, pp 511-564.

Wen Y. 2010. Saving and growth under borrowing constraints explaining the "high saving rate" puzzle. Working Paper 2009-045C., Federal Reserve Bank of San Louis.

Yang D.T., Zhang J. and Zhou S. 2010. Why Are Saving Rates so High in China?, Working Paper 16771, National Bureau of Economic Research.

Zhao Z. 2008. Health Demand and Health Determinants in China. Journal of Chinese Economic and Business Studies, Vol. 6 (1), pp. 77-98.

Tables

Table 1: Household income, expenditure, saving rate and OOP expenses.

Variable	1995	2002	|t-stat|
Total Household Disposable Income	5,099.23	7,306.24	35.40
Total Household Expenditures	4,260.42	5,439.25	26.35
Saving rate	13.20%	21.8%	16.79
OOP medical expenses	127.22	345.11	17.48

Notes: The total household disposable income, household expenditure and the out-of-pocket expenses are reported in 2011 US dollar. The fourth column shows the absolute t-value of a standard test of mean difference.

Table 2: Descriptive statistics saving rate by survey year and age groups

Saving rate by age group	**All sample**	**1995**	**2002**	**|t-stat|**
25-29	17.10	15.24	21.25	2.20
30-34	16.80	11.87	23.79	8.66
35-39	15.75	12.43	19.27	5.96
40-44	15.09	11.09	20.08	8.05
45-49	17.23	12.82	20.53	6.40
50-54	21.19	15.91	25.88	6.65
55-59	20.65	16.35	27.46	5.62
60-65	16.07	15.17	21.93	1.81

Note: The fifth column shows the absolute t-statistic of a standard test of mean difference.

Table 3: Descriptive statistics of saving rate by health insurance coverage, survey year and age groups

Saving rate	1995			2002		
	coverage	no coverage	|t-stat|	coverage	no coverage	|t-stat|
all age groups	13.0	13.6	0.75	**23.2**	**18.7**	**5.25**
25-29	14.3	16.9	0.89	22.6	19.7	0.58
30-34	**10.4**	**14.9**	**2.47**	23.9	23.5	0.22
35-39	12.2	12.5	0.18	20.3	17.4	1.53
40-44	11.8	10.9	0.34	**21.1**	**17.6**	**1.85**
45-49	12.6	13.1	0.26	**22.6**	**16.2**	**3.64**
50-54	15.9	16.4	0.20	**27.5**	**20.6**	**2.77**
55-59	16.6	16.1	0.18	28.7	23.9	1.30
60-65	15.7	12.7	1.04	24.1	17.4	0.76

Note: The fourth and the seventh columns show the absolute t-value of a standard test of mean difference.

Table 4: Descriptive statistics

Variable	**1995**	**2002**	**|t-test|**
Age	43.62	43.36	1.44
hh members 0-24	1.03	0.89	12.10
hh members 25-49	1.57	1.65	5.15
hh members 50+	0.58	0.50	4.64
Years of education	10.69	11.27	9.59
Home ownership	0.43	0.79	38.73
Permanent employment	0.84	0.57	31.16
Years in current job	18.12	16.74	7.12
Working unit: Enterprise	0.66	0.59	6.74
Occupation: Manager, self-employed	0.26	0.26	0.24
Occupation: Director of government departments	0.16	0.14	2.90
Occupation: Skilled worker	0.42	0.41	0.88
Occupation: Unskilled worker	0.16	0.19	3.58
Sector: Farm, forest and fishery	0.02	0.01	1.24
Sector: Mineral	0.41	0.27	14.61
Sector: Manufacturing	0.01	0.03	4.89
Sector: electricity, gas, water supply facilities	0.03	0.04	1.07
Sector: Construction	0.05	0.12	11.32
Sector: Geological prospec., irrigation admin.	0.13	0.10	5.32
Sector: Transportation, storage, post office	0.04	0.10	12.68
Sector: Wholesale, retail, food services	0.05	0.05	0.49
Sector: Finance and insurance	0.08	0.09	2.63
Sector: Real estate	0.03	0.02	2.69
Sector: Social services	0.01	0.03	3.84
Sector: Health, sports, social welfare	0.13	0.13	0.48
Sector: Education, culture, arts, mass media	0.01	0.02	5.53

Table 5: OLS regressions for out-of-pocket expenses/disposable income ratio and saving rate

	OOP expenses/income			Saving rate		
Variables	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**
Public Insurance	−0.006	−0.006	−0.005	0.003	0.004	−0.002
	(0.004)	(0.004)	(0.004)	(0.011)	(0.011)	(0.011)
Private Insurance	−0.002	−0.002	−0.002	0.001	0.001	−0.001
	(0.005)	(0.005)	(0.005)	(0.104)	(0.013)	(0.013)
Survey year	0.033***	0.034***	0.032***	0.051***	0.043***	0.054***
	(0.005)	(0.005)	(0.005)	(0.013)	(0.013)	(0.013)
Public Insurance*Survey year	−0.010**	−0.010*	−0.009*	0.048***	0.041***	0.037***
	(0.005)	(0.005)	(0.005)	(0.014)	(0.014)	(0.014)
Private Insurance*Survey year	−0.016*	−0.016*	−0.016*	0.030	0.025	0.020
	(0.008)	(0.008)	(0.008)	(0.022)	(0.022)	(0.022)
Age	−0.001	−0.001	−0.001	−0.000	−0.000	−0.001
	(0.001)	(0.001)	(0.001)	(0.003)	(0.003)	(0.003)
Age Square/1000	0.012	0.012	0.010	0.007	0.008	0.007
	(0.013)	(0.013)	(0.012)	(0.033)	(0.034)	(0.034)
Num. hh members 0-24	0.003	0.003	0.003	−0.029***	−0.029***	-0.030***
	(0.002)	(0.002)	(0.002)	(0.005)	(0.005)	(0.005)
Num. hh members 25-49	0.005**	0.005**	0.005**	0.018***	0.018***	0.018***
	(0.002)	(0.002)	(0.002)	(0.006)	(0.006)	(0.006)
Num. hh members 50+	0.007	0.007***	0.007**	0.029***	0.028***	0.027***
	(0.005)	(0.002)	(0.002)	(0.006)	(0.006)	(0.006)
Education years	-	−0.000	0.000	-	0.002***	0.000
		(0.000)	(0.000)		(0.001)	(0.001)
Home ownership	-	−0.002	−0.003	-	0.032***	0.030***
		(0.002)	(0.002)		(0.006)	(0.006)
Permanent employment	-	-	−0.002	-	-	0.013*
			(0.003)			(0.007)
Working unit	-	-	−0.003	-	-	−0.008
			(0.003)			(0.008)
Job tenure	-	-	−0.000	-	-	0.000
			(0.000)			(0.000)
Occupation	no	no	yes	no	no	yes
Economic Sector	no	no	yes	no	no	yes
Province dummies	yes	yes	yes	yes	yes	yes
Constant	0.036	0.042*	0.040*	0.092	0.057	0.083
	(0.023)	(0.024)	(0.025)	(0.062)	(0.064)	(0.067)
Observations	9,888	9,888	9,888	9,888	9,888	9,888

Notes: *** significance at 1% level, ** significance at 5% level, * significance at 10% level.

Table 6: Seemingly unrelated regression

Variables	**OOP Expenses/income** (*a*)	**Saving rate** (*b*)
OOP Expenses/income	–	-0.312^{***} (0.027)
Public Insurance	-0.005 (0.004)	-0.004 (0.011)
Private Insurance	-0.002 (0.005)	-0.002 (0.013)
Survey year	0.032^{***} (0.005)	0.063^{***} (0.013)
Public Insurance*Survey year	-0.009^{*} (0.005)	0.034^{**} (0.014)
Private Insurance*Survey year	-0.016^{*} (0.008)	0.015 (0.022)
Age	-0.001 (0.001)	-0.001 (0.003)
Age Square	0.010 (0.013)	0.010 (0.034)
Num. hh members 0-24	0.003 (0.002)	-0.028^{***} (0.005)
Num. hh members 25-49	0.004^{***} (.002)	0.019^{***} (0.006)
Num. hh members 50+	0.006^{***} (0.002)	0.030^{***} (0.006)
Education years	0.000 (0.000)	0.000 (0.001)
Home ownership	-0.003 (0.002)	0.029^{***} (0.006)
Permanent employment	-0.002 (0.003)	0.013^{*} (0.007)
Working unit	-0.003 (0.003)	-0.009 (0.008)
Job tenure	-0.000 (0.000)	0.000 (0.000)
Occupation	yes	yes
Economic Sector	yes	yes
Province dummies	yes	yes
Observations	9,888	9,888

Note: *** significance at 1% level, ** significance at 5% level, * significance at 10% level.

Table 7: ML regressions for out-of-pocket expenses/disposable income ratio and saving rate

	OOP expenses/income		Saving rate	
Variables	*Comp.* 1 (*a*)	*Comp.* 2 (*b*)	*Comp.* 1 (*c*)	*Comp.* 2 (*d*)
Public Insurance	−0.013 (0.027)	−0.003*** (0.001)	−0.028 (0.049)	0.005 (0.011)
Private Insurance	−0.017 (0.032)	−0.001 (0.001)	0.041 (0.058)	−0.011 (0.012)
Survey year	0.072** (0.029)	0.007*** (0.001)	−0.050 (0.057)	0.076*** (0.012)
Public Insurance*Survey year	−0.012 (0.032)	−0.001 (0.001)	0.090 (0.062)	0.023* (0.013)
Private Insurance*Survey year	−0.020 (0.050)	−0.000 (0.002)	−0.033 (0.099)	0.030 (0.020)
Age	−0.001 (0.006)	−0.000** (0.000)	−0.018 (0.013)	0.002 (0.003)
Age Square/1000	0.028 (0.073)	0.000* (0.000)	1.699 (1.445)	0.024 (0.032)
Num. hh members 0-24	0.005 (0.011)	0.001*** (0.000)	−0.013 (0.023)	−0.031*** (0.005)
Num. hh members 25-49	−0.000 (0.012)	0.002*** (0.001)	0.054** (0.026)	0.009 (0.006)
Num. hh members 50+	−0.008 (0.011)	0.002*** (0.000)	0.054** (0.020)	0.020*** (0.006)
Education years	0.002 (0.002)	0.000 (0.000)	−0.002 (.004)	0.001 (0.001)
Home ownership	0.002 (0.013)	0.001*** (0.000)	−0.011 (.025)	0.040*** (0.005)
Permanent employment	−0.001 (0.015)	−0.001** (0.001)	0.064** (0.029)	−0.002 (0.006)
Working unit	−0.022 (0.018)	0.000 (0.001)	−0.074** (.037)	0.000 (0.008)
Job tenure	−0.000 (0.001)	−0.000 (0.000)	0.002 (.002)	0.000 (0.000)
Occupation	yes	yes	yes	yes
Economic Sector	yes	yes	yes	yes
Province dummies	yes	yes	yes	yes
Constant	0.218 (0.148)	0.031*** (0.005)	0.137 (0.287)	0.092 (0.062)
σ	0.206 (0.004)	0.017 (0.000)	0.357 (0.008)	0.177 (0.002)
π	0.144 (0.005)	0.856 (0.005)	0.186 (0.013)	0.816 (0.013)

Note: *** significance at 1% level, ** significance at 5% level, * significance at 10% level.

Table 8: OLS estimates of the correlates of the posterior probabilities

	OOP expenses/income		Saving rate	
Variables				
Age	0.276*** (0.042)	0.280*** (0.042)	0.053* (0.030)	0.060** (0.031)
Household Income/1,000	−0.177*** (0.026)	-	−0.079*** (0.019)	-
2nd HH income quartile	-	−3.441*** (0.883)	-	−2.959*** (0.647)
3rd HH income quartile	-	−5.086*** (0.891)	-	−3.710*** (0.653)
4th HH income quartile	-	−6.016*** (0.905)	-	−4.030*** (0.663)
Permanent employment	−3.831*** (0.740)	−3.769*** (0.740)	−1.031* (0.543)	−1.070** (0.542)
Working unit: enterprise	−1.086 (0.690)	−1.194* (0.691)	−1.246** (0.506)	−1.404** (0.506)
Job tenure	−0.099** (0.040)	−0.091** (0.038)	−0.003 (0.029)	0.004 (0.029)
Occ.: Manager, self-employed	−1.246 (0.995)	−1.087 (0.998)	0.417 (0.730)	0.732 (0.731)
Occ.: Director of government departments	−1.984* (1.152)	−1.874* (1.154)	0.553 (0.845)	0.869 (0.845)
Occ.: Skilled worker	0.024 (0.899)	0.122 (0.900)	0.319 (0.660)	0.490 (0.659)

Note: *** significance at 1% level, ** significance at 5% level, * significance at 10% level.

"Unskilled worker" is the reference category for occupation.

Appendix

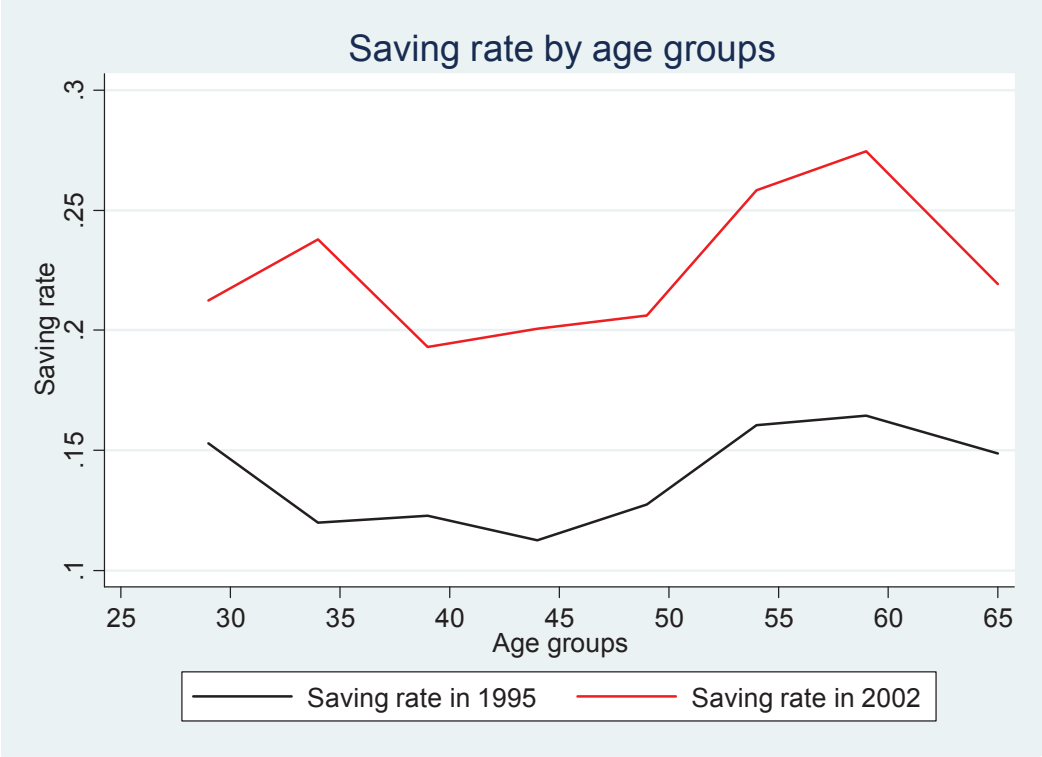

Figure 1: Saving rate by age groups and survey year

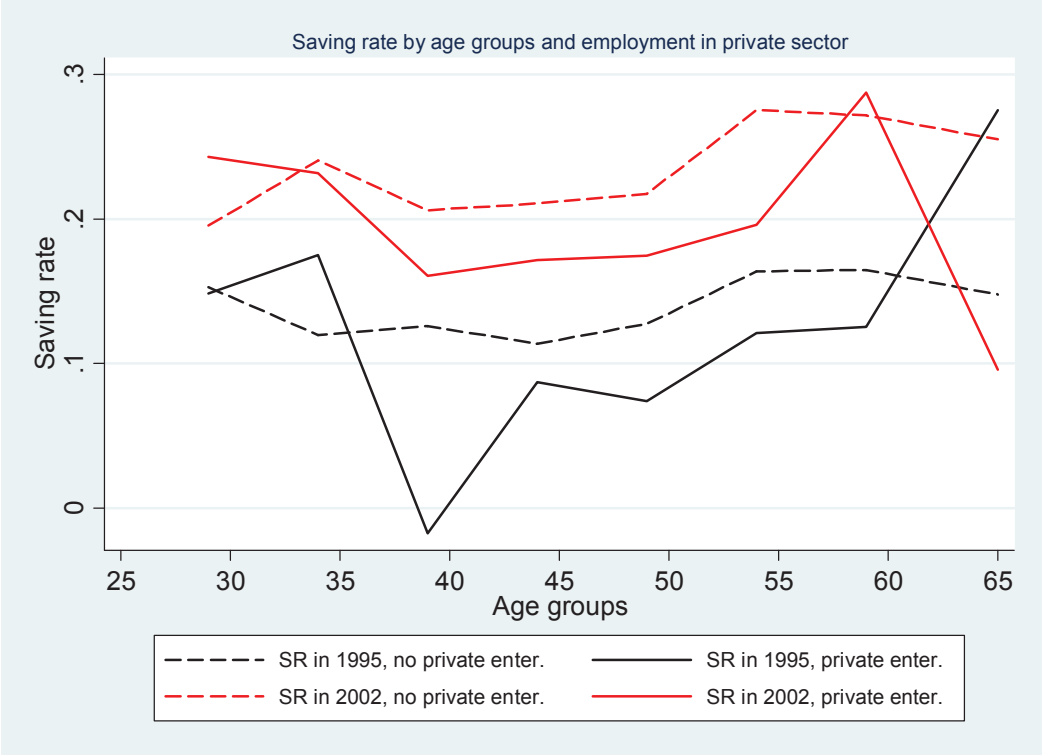

Figure 2: Saving rate by age groups, private/no private enterprise and survey year.

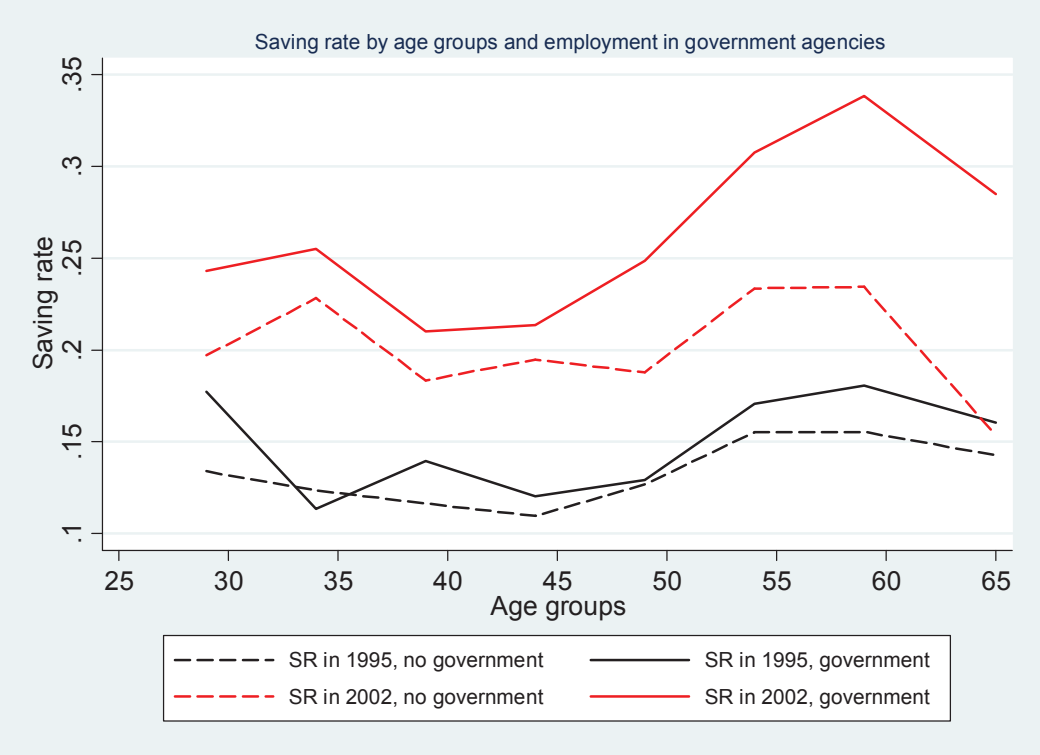

Figure 3: Saving rate by age groups government/no government employment and survey year.

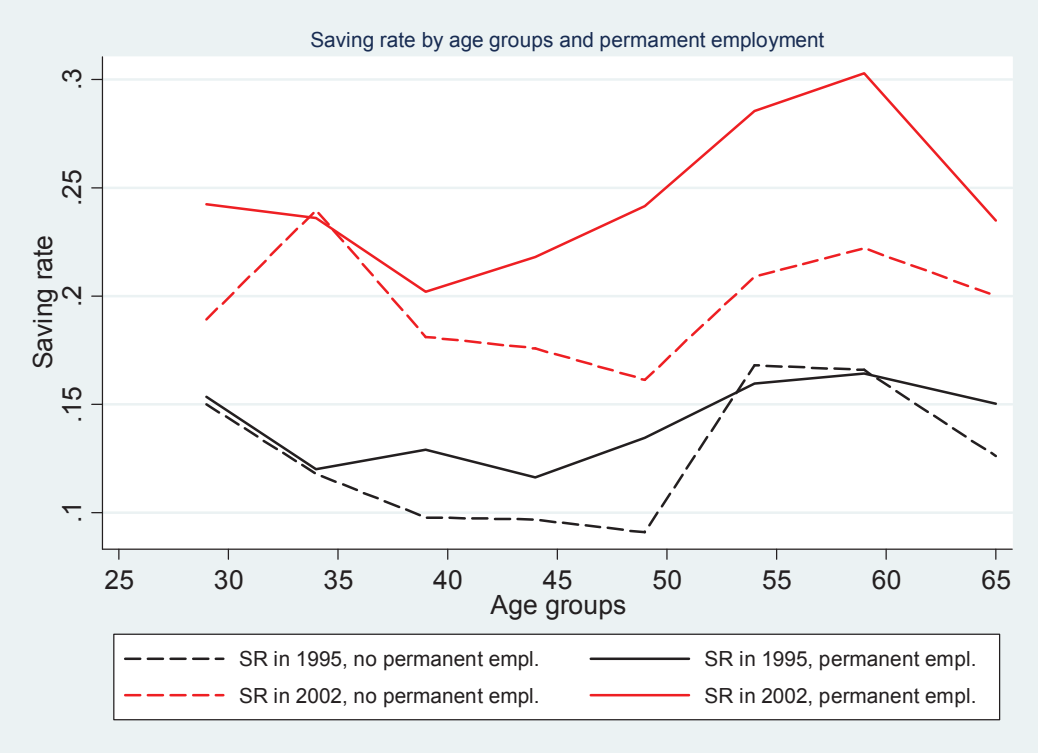

Figure 4: Saving rate by age groups, permanent employment and survey year.

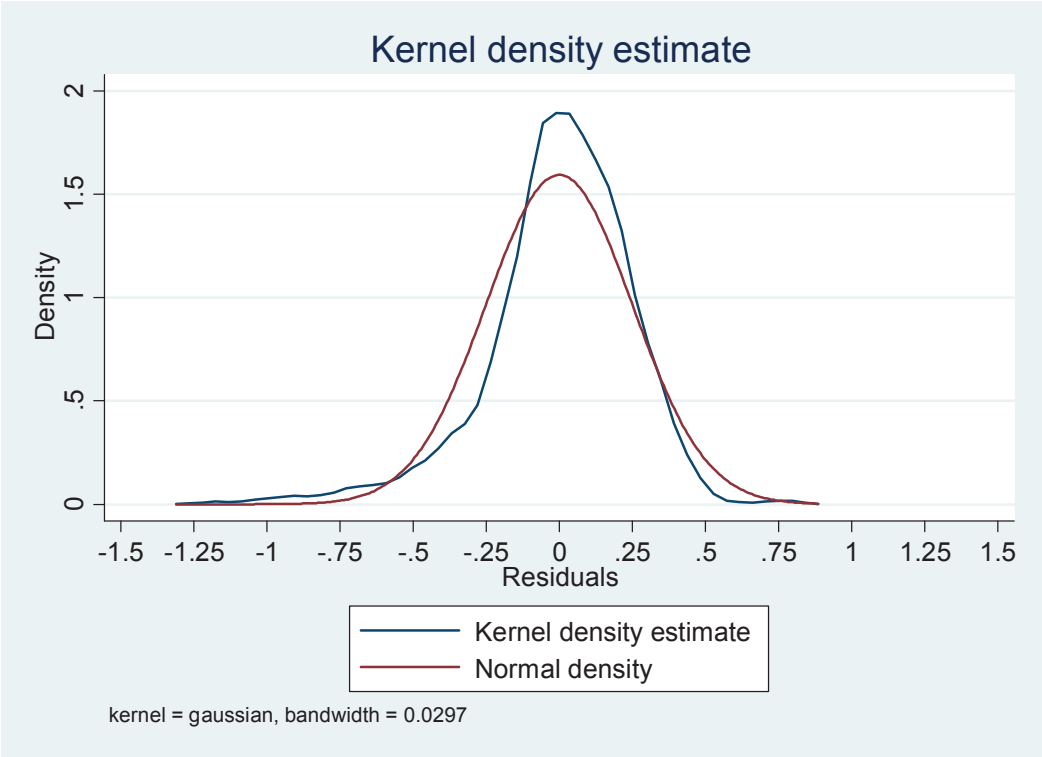

Figure 5: Kernel density of OLS residuals of household saving rate.

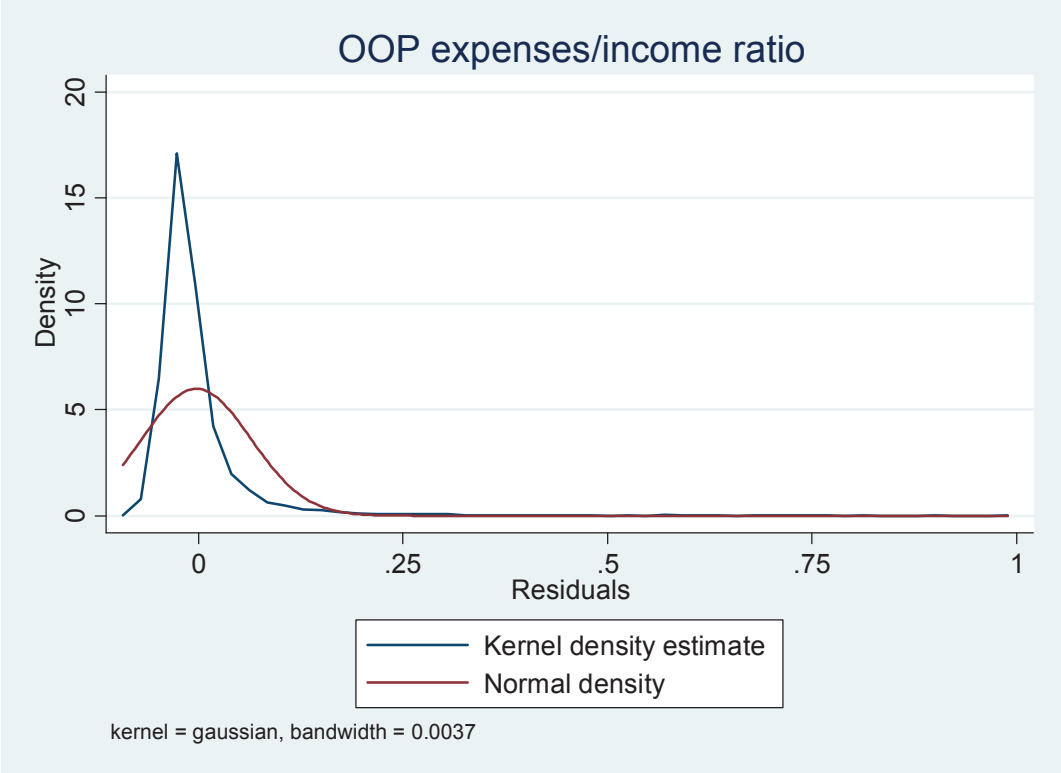

Figure 6: Kernel density of OLS residuals of OOP expenses/income.

RECENT PUBLICATIONS BY *CEIS Tor Vergata*

Seasonality in smoking behaviour: Re-evaluating the effects of the 2005 public smoking ban in Italy
Emilia Del Bono, Klaus Grünberger and Daniela Vuri
*CEIS Research Paper, 295,*October 2013

Generalizing smooth transition autoregressions
Emilio Zanetti Chini
*CEIS Research Paper, 294,*October 2013

Italy's Growth and Decline, 1861-2011
Emanuele Felice and Giovanni Vecchi
*CEIS Research Paper, 293,*October 2013

Economic effects of treatment of chronic kidney disease with low-protein diet
F.S. Mennini, S. Russo, A. Marcellusi, G. Quintaliani, D. Fouque
*CEIS Research Paper, 292,*October 2013

The Legal Origins of Corporate Social Responsibility
Leonardo Becchetti, Rocco Ciciretti and Pierluigi Conzo
*CEIS Research Paper, 291,*October 2013

Generalised Linear Spectral Models
Tommaso Proietti and Alessandra Luati
*CEIS Research Paper, 290,*October 2013

Macroeconomic forecasting and structural analysis through regularized reduced-rank regression
Emmanuela Bernardini and Gianluca Cubadda
*CEIS Research Paper, 289,*October 2013

Three Elementary Forms of Economic Organization
Leo Ferraris
*CEIS Research Paper, 288,*October 2013

EuroMInd-C: a Disaggregate Monthly Indicator of Economic Activity for the Euro Area and member countries
Cecilia Frale, Stefano Grassi, Massimiliano Marcellino, Gianluigi Mazzi, Tommaso Proietti
CEIS Research Paper, 287, October 2013

Environmental Policy and Macroeconomic Dynamics in a New Keynesian Model
Barbara Annicchiarico and Fabio Di Dio
CEIS Research Paper, 286, September 2013

DISTRIBUTION

Our publications are available online at www.ceistorvergata.it

DISCLAIMER

The opinions expressed in these publications are the authors' alone and therefore do not necessarily reflect the opinions of the supporters, staff, or boards of CEIS Tor Vergata.

COPYRIGHT

MEDIA INQUIRIES AND INFORMATION

For media inquiries, please contact Barbara Piazzi at +39 06 72595652/01 or by e-mail at ufficiostampa@ceis.uniroma2.it. Our web site, www.ceistorvergata.it, contains more information about Center's events, publications, and staff.

DEVELOPMENT AND SUPPORT

For information about contributing to CEIS Tor Vergata, please contact Carmen Tata at +39 06 72595615/01 or by e-mail at segr.ceis@economia.uniroma2.it