# Sharing Benefits Not Risks? Estimating Household Sharing Behaviors Using Two Quasi-Natural Experiments in China

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# Introduction

# Overview

- ◇ In this paper, we attempt to explore the **risk-sharing** and **benefit-sharing** mechanisms between spouses.
- ◇ We develop an static model characterizing the voluntary private provision of marital public goods within couple.
  *Under the complementarity assumption, spouses contribute*
  - more to the marital goods regardless of who receives an income benefit,
  - less to the marital goods if his/her spouse experiences a negative income shock.
- ◇ Empirical exercise utilizes the **laid-off reform** (i.e., negative income shock) and **housing privatization reform** (i.e., positive income shock) in the state sectors in China in 1990s.
  *Our results indicate that*
  - individual's health outcomes worsen when he/she is in the risk of losing job, while he/she is not affected by his/her spouse's risk.
  - his/her health outcomes are improved regardless of who receives the housing reform benefits.

# Motivation

- ◇ The stability of family is of substantial importance to the soundness of society.
  - crime reduction (Sampson et al., 2006, Antecol and Bedard, 2007), human capital accumulation (Argys et al., 1998, Stafford and Yeung, 2004, Gruber, 2004, Bjorklund and Sundstrom, 2006).
- ◇ Family is not always strong enough to address idiosyncratic shocks.
  - The negative labor market shocks lead to an increase in the intimate partner violence (Schneider et al., 2016), a reduce in fertility (Cherlin et al., 2013) and marriage dissolution (Charles and Stephens, 2004).

# Motivation

- To maximize the role of the social assistance policy, it is necessary to understand the household risk managements.
  - A welfare program that involves public transfers to some (or all) of the partners of an insurance agreement with imperfect enforceability is likely to reduce or crowd out private transfers
  - Juarez (2009) finds private transfers could neutralize the changes in the public transfers for the elderly in Mexico.
  - Formal insurance crowds out informal risk sharing arrangements (Lin et al., 2014).

# Previous Studies

- ◇ Marriage is a mutual insurance.
  - – When the insurance market and financial markets are under-developed, marriage is considered as one crucial vehicle to resist risks (Rosenzweig and Stark, 1989, Ogaki and Zhang, 2001, Li et al. 2016, etc.).
- ◇ However, the evidence for the risk- and benefit- sharing between couples are mixed.
  - – Support the risk- and benefit- sharing:
    - – Bobonis (2009) finds that in Mexico when the wife receives the female-specific income transfer from PROGRESA, the family public goods consumption increase.
    - – Ortigueira and Siassi (2013), Zhang (2014) find wife tend to increase their labor supply to compensate the husband's labor shock.
  - – Opposite evidence:
    - – Robinson (2012) conducts a random cash lottery in Kenya and finds that both wife and husband spend more on their own private consumption when their own income increases.

# Contribution

- ◇ Most of the studies consider either income benefits (transfers) or income shock (job loss), very few studies examine both the benefits and risks among the same population during the same time span.
- ◇ Study on the impacts of income benefits and risks on the same demographic people who share the same culture custom has several advantages:
  - Results are comparable.
  - Tests on asymmetric responses to income changes are reasonable.
- ◇ In our paper, we consider two nature experiments in state sectors in China in 1990s:
  - Laid-off Reform: Negative income risks
  - Housing Privatization Reform: Positive income benefits

# Institutional Background

# Background: Laid-off Reform

- ◇ Before the Reform and Opening Policy in 1979, Chinese economy is a particular Soviet-type economy. All the firms were either state-owned or collective-owned (hereafter SOE).
- ◇ The SOEs have several pronounced features:
  - They controlled most of the social resources and conducted production activities strictly following the plan made by the Central Planing Commission.
  - They monopolized each industry, and sold their products at the price set by the government.
  - They had no incentive to improve efficiency and earn profit. Once they lost profit, the government bank provided them with substantial funding to recover the production.

# Background: Laid-off Reform

- One prominent responsibility of the SOEs is to contribute to the social stability (the Multi-task Theory in Bai et al.(2006)).
  - The social security net for the labor heavily depended on the SOEs in the urban, and on the People's commune in the rural.
  - In 1978, approximated 78% of the workers were in the SOEs, and the rest were in the collective firms
  - The SOE workers were guaranteed the life-time position, and most of their life service including the health care, children's education expense were covered by their state employers (Bai et al., 2006).

# Background: Laid-off Reform

- ◇ Since 1980, policies began to encourage the development of the private firms, township and village enterprises, and the foreign investments.
- ◇ Due to their gross production inefficiency, and poor management system, the SOEs kept losing profit and market share.
  - In 1996, the SOEs contributions to the total industrial output dropped from 77.6% in 1978 to 28.8% in 1996, and approximately 40% of them were losing money (Lin et al., 1998).
- ◇ **The radical urban labor market reform, or Laid-off Reform, was initiated in 1994 in state sectors to improve the efficiency of the SOEs and to resolve huge financial loss of SOEs.**
- ◇ Since the social security system that was independent of the jobs was less developed at that time, losing jobs means losing all the welfare benefits affiliated to the job.

# Background: Laid-off Reform

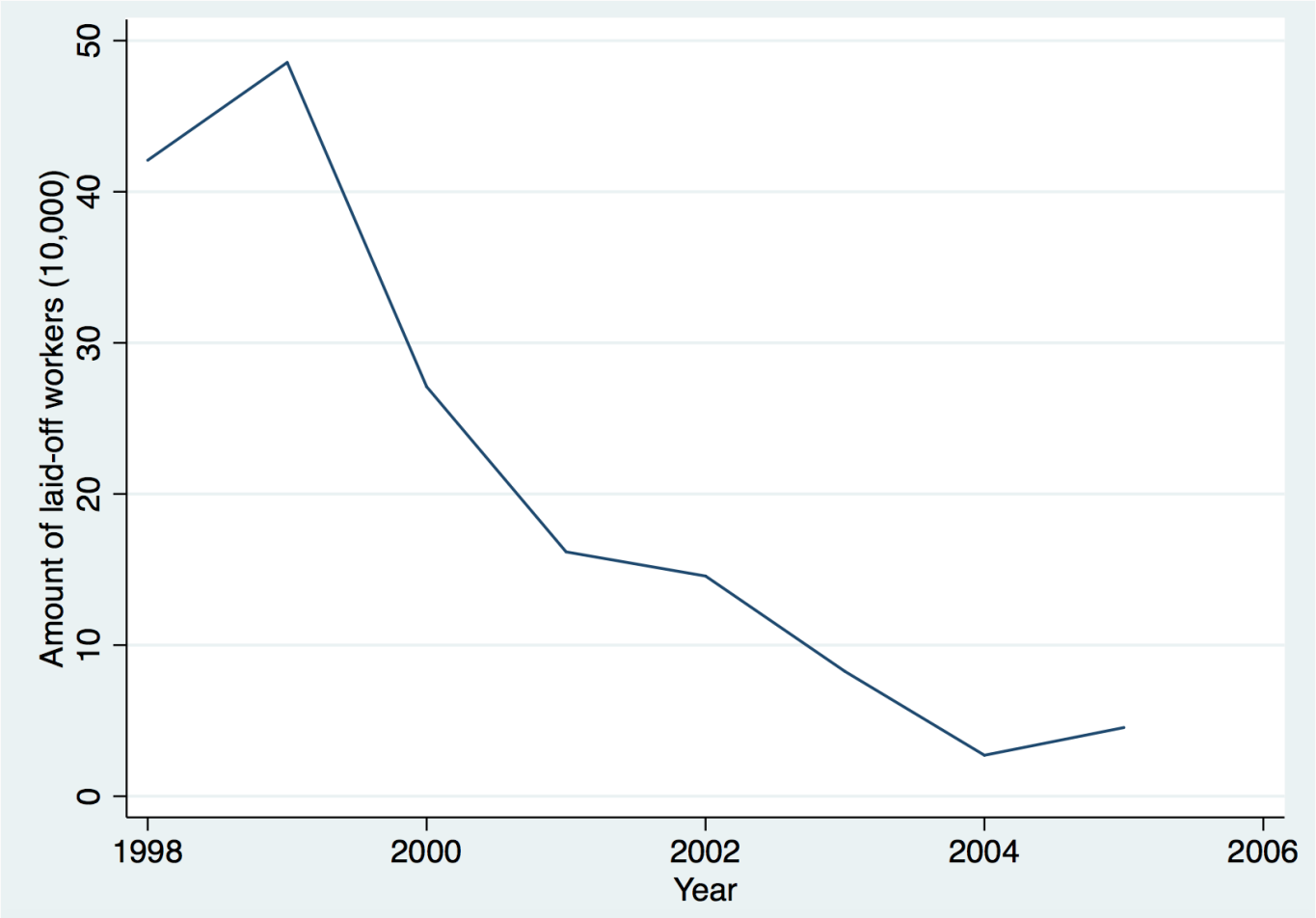


**Figure 1:** Laid-Off in State Sector

Source: Data from the National Statistical Bureau. The laid-off data in the figure is the sum of Liaoning, Heilongjiang, Jiangsu, Henan, Hubei, Hunan, Guangxi, Guizhou. These are the provinces surveyed in CHNS.

# Background: Housing Privatization Reform

- ◇ Starting from 1955, the government exclusively had the ownership of the newly built houses (hereafter public houses) in the urban. Before 1979, majority of the urban residence lived in the public house rented by their work-unit and paid the nominal rents.
- ◇ As the Reform and Opening Policy started in 1979, government began to recognize the severe urban housing shortage problem due to the rapid urban population growth.
- ◇ Several small-scale privatization of public housing experiments were piloted in the country during the 1980s and early 1990s. But they all failed.
  - – Through the early 1980s to 1985, the '3-3 scheme' subsidized housing sales experiment was piloted.
  - – During 1986 to 1993, the government swithced their emphasis to rents increase with accompanying the wage increase (Zax, 2003). Meanwhile, a rents voucher system was established.

# Background: Housing Privatization Reform

- ◇ The comprehensive privatization housing reform was initiated in 1994 throughout the urban areas in the country.
- ◇ **This reform**
  - – **entitled the employees living in the public houses the right to buy their current houses from their work-units.**
  - – **gave the work-units the flexibility to set the prices for their housing stock.**
- ◇ The work-units usually set the price under the market price to promote their employees' purchase.
  - – For example, in Guangxi province, the employees on average paid less than 15% of the market price of their homes (Wang, 2012).
- ◇ Wang (2014) estimated the gap between the sale price and market price is approximately 24,462 yuan, which is over two times of the average annual wage of a household at that time.

# Theoretical Framework

# Voluntary Provision of Marital Goods Model

**Model Environment:**

- ◇ We consider marital goods as joint produced public goods.
- ◇ we assume a representative household with only two breadwinners, the husband ($h$) and wife $w$.
- ◇ Each earns an income $y_i$ and allocate his/her income into private consumption $c_i$ and input of joint marital production $m_i$, and $i \in \{h, w\}$.
- ◇ The household joint production function is given as $V = V(m_h, m_w)$, which is shared equally by the entire household.

**Assumption-1:** Utilities from private consumption $U_i(c_i)$ and household public goods consumption $V(m_i, m_j)$ are separable and additive.

## Voluntary Provision of Marital Goods Model

The spouse $i's$ utility maximization problem is:

$$\begin{aligned} \underset{m_i}{\text{Max}} \quad & W(m_i) = U_i(c_i) + V(m_i, m_j) \\ \text{s.t.} \quad & c_i + m_i \leq y_i. \end{aligned} \tag{1}$$

**Assumption-2:** The utilities $U(c_i), V(m_i, m_j)$ are assumed to have the following properties:

$$\frac{\partial U_i}{\partial c_i} > 0, \ \frac{\partial^2 U_i}{\partial c_i^2} < 0, \ \frac{\partial V_i}{\partial m_i} > 0, \frac{\partial^2 V_i}{\partial m_i^2} < 0, \frac{\partial V_i}{\partial m_j} > 0, \frac{\partial^2 V_i}{\partial m_j^2} < 0.$$

**Assumption-3:** Complementarity Condition:

$$\frac{\partial^2 V}{\partial m_i \partial m_j} > 0.$$

Spouses' marital contributions are complements.

# Voluntary Provision of Marital Goods Model

We solve the maximization problem (1), and obtain each spouse's best response function:

$$\underbrace{\frac{\partial U_i(y_i - m_i^*)}{\partial c_i}}_{\text{Marginal Cost of Contribution } m_i} = \underbrace{\frac{\partial V(m_i^*, m_j^*)}{\partial m_i}}_{\text{Marginal Benefit of Contribution } m_i} \quad ; \quad i \in \{h, w\}, \text{and}, j \neq i. \tag{2}$$

In the equilibrium, the $m_i, m_j$ are the functions of the $y_i, y_j$, the only parameters in the model, $m_i^* = m(y_i, y_j)$ $(i \in \{h, w\}, j \neq i)$.

This intra-household sharing process is modeled as an static simultaneously voluntary public goods provision game.

## Voluntary Provision of Marital Goods Model

**Definition:** A perfect marriage is a relationship in which spouse bears each other's risks and shares each other's benefits. Risk-sharing is defined as $\frac{\partial m_i^*}{\partial y_j} < 0$ when $\Delta y_j < 0$, and benefit-sharing as $\frac{\partial m_i^*}{\partial y_i} > 0$ when $\Delta y_i > 0$.

**Proposition 1:**If $\frac{\partial^2 V}{\partial m_i \partial m_j} > 0$, then $m_h^*$ and $m_w^*$ are positively correlated. For instance, as husband makes more contributions to the household public goods, his wife will contribute more as well, vice versa.

Proposition 1 tells no "free-rider" problem exists in the household. This is because of the complementarity assumption.

## Voluntary Provision of Marital Goods Model

**Proposition 2:** If $\frac{\partial^2 V}{\partial m_i \partial m_j} > 0$, and utility maximization can be achieved, then couples shares benefits but not risks. That is to say:

- ◇ When husband faces a negative income shock, he will decrease his contribution $m_h^*$ to the household public goods as well as his private consumption $c_h^*$. Meanwhile, his wife will also decrease her contribution $m_w^*$ but increase her private consumption $c_w^*$.
- ◇ When husband faces a positive income shock, he will increase both his contribution $m_h^*$ to the household public goods and his private consumption $c_h^*$. Meanwhile, his wife will increase her contribution $m_w^*$ but decrease her private consumption $c_w^*$.

## Voluntary Provision of Marital Goods Model

In the equilibrium each spouse obtains an utility

$$W_i^*(y_i, y_j) = U_i(y_i - m_i^*(y_i, y_j)) + V^*(m_i^*(y_i, y_j), m_j^*(y_i, y_j)).$$

Total differentiating this equilibrium utitliy and applying the Envolop Theorem give us:

$$\begin{aligned} dW_i^*(y_i, y_j) = & [\frac{U(y_i - m_i^*(y_i, y_j))}{\partial c_i} + \frac{\partial V(m_i^*(y_i, y_j), m_j^*(y_i, y_j))}{\partial m_j^*(y_i, y_j)} \times \frac{\partial m_j^*(y_i, y_j)}{\partial y_i}] dy_i + \\ & \frac{\partial V(m_i^*(y_i, y_j), m_j^*(y_i, y_j))}{\partial m_i^*(y_i, y_j)} \times \frac{\partial m_i^*(y_i, y_j)}{\partial y_j} dy_j \end{aligned} \tag{3}$$

The general reduced estimation form can be constructed as:

$$W_i = \alpha_1 \Delta y_i + \alpha_2 \Delta y_j + \alpha_3 X_i + \varepsilon_i \tag{4}$$

# Voluntary Provision of Marital Goods Model

- ◇ We can not conclude which one of $\alpha_1$ and $\alpha_2$ has a large magnitude from equation (3).
- ◇ However, we can at least consider some special scenarios in which it is easy to verity whether the risk-bearing or benefit-sharing exists.
  - If the estimated $\widehat{\alpha_1}$ is significant when $\Delta y_i < 0$, while $\widehat{\alpha_2}$ not when $\Delta y_j < 0$, we believe the risk-bearing mechanism is not strong.
  - If the estimated $\widehat{\alpha_1}$ is significant when $\Delta y_i > 0$, and $\widehat{\alpha_2}$ is significant when $\Delta y_j > 0$ as well, the benefit-sharing mechanism is more likely to exist.

# Identification Strategy and Data

# Identification Problems

- To test the intra-household risk-bearing or benefit-sharing, the empirical work suffers from at least two main difficulties.
  - It is not easy to find a context in which researchers can test the impacts of postive and negative income shocks on the same cohort, during the same time period, in the same culture environment.
  - The data on each spouse's contribution to the marriage, such as the food consumption, family medical expense, is not available in most survey data.
- We can not directly get the spouse's marital contributions, but we can observe the outcomes of these contributions.

# Identification Problems

- ◇ The health outcomes such as the **body weight** are good alternatives.
  - – Body weight is jointly produced by the private consumption and the household public consumption (shared food, and harmonious household environment).
  - – Body weight is able to reflect the impact of marital quality change to some extend.
  - – The disadvantage is we should separate the impact of $V$ in equation (4) from the impact of consumption $C$.
- ◇ We draw on **blood pressure** and **nutrition intake** to distinguish the impact of $V$ from the impact of consumption $C$.

# Identification: Data

- ◇ We use the China Health and Nutrition Survey (CHNS) data.
- ◇ CHNS is a longitudinal dataset internationally collaborated by University of North Carolina at Chapel Hill and the Chinese Center for Disease Control and Prevention (CCDC).
- ◇ It covers in total over 30,000 individuals from 7200 households in 12 provinces and municipal cities in 9 waves.
  (1989, 1991, 1993, 1997, 2000, 2004, 2006, 2009, and 2011)
- ◇ It has been widely used to examine the impacts of health, nutrition and family planning policies in China (i.e Wang, 2011, 2012, 2014, Liu and Zhao, 2014).

## Difference-in-Difference Model for SOE Laid-off Reform

- $Post = 1$ if after 1995, and $Post = 0$ if before 1995.
- **Treated Group I:** *Self_SOE_Private* includes the individuals who were SOE workers themselves, whose spouses were **not**, and who lived in the **private apartment** prior to the reform.
- **Treated Group II:** *Spouse_SOE_Private* consists of the individuals who were **not** SOE workers themselves, whose spouses were, and who lived in the **private apartment** prior to the reform.
- **Control Group:** *Non_SOE_Private* is comprised of the individuals who were **not** SOE workers ,whose spouses were **not** neither, and who lived in the **private apartment** prior to the reform.

# Difference-in-Difference Model for SOE Laid-off Reform

$$Y_{itp} = \beta_1 Post_t \times Self\_SOE\_Private_{ip} + \beta_2 Post_t \times Spouse\_SOE\_Private_{ip} + \theta_t + \gamma_i + (t \times \eta_p) + \varepsilon_{itp} \quad (5)$$

- $Y_{itp}$ is the outcomes of interests.
- $\beta_1$ and $\beta_2$, respectively, estimate the impact of income shock from self and spouse.
- The control group *Non_SOE_Private* is omitted as the reference group.
- $\theta_t$ is a vector of year and month dummies, helping to control the year and month fixed effects.
- $\gamma_i$ controls the individual fixed effects.
- In our most parsimonious model, we also control the province specific year and month linear trend, $t \times \eta_p$ to capture the time-varying macro-economy environment (hereafter year, month time trend in the tables).
- Standard error are robust.

## Difference-in-Difference Model for SOE Housing Reform

- $Post = 1$ if after 1995, and $Post = 0$ if before 1995.
- **Treated Group I:** *Self_SOE_Public* consists of those who were in the SOE, whose spouses were **not**, and whose families lived in the **state-owned public** apartment prior to the reform.
- **Corresponding Control Group I:** *Self_SOE_Private*.
- **Treated Group II:** *Spouse_SOE_Public* contains the individuals who were **not** in the SOE, whose spouse were and whose families lived in the **public apartment** prior to the reform.
- **Corresponding Control Group II:** *Spouse_SOE_Private*.
- They also help to absorb the laid-off effects and the changes in wage structure and firms' welfare provision in the SOE sector (Wang, 2014).
- We do not consider those couples both working in the SOE prior to the reform.

# Difference-in-Difference Model for SOE Housing Reform

$$Y_{itp} = \beta_1 Post_t \times Self\_SOE\_Public_{ip} + \beta_2 Post_t \times Spouse\_SOE\_Public_{ip} + \beta_3 Post_t \times Self\_SOE\_Private_{ip} + \theta_t + \gamma_i + (t \times \eta_p) + \varepsilon_{itp}. \quad (6)$$

- The model specification is as the same as the equation (5), except that we change the control and treated groups.
- The reference group is the group *Spouse_SOE_Private*.
- $\beta_1 - \beta_3$ measures the impact of housing sales subsidy received by individual self.
- $\beta_2$ measures the impact from the spouse.

# Sample

- We only use the CHNS data in the years of 1991,1993, and 1997. $(N = 29,411)$
  - Starting in 1998, the laid-off reform was also conducted in the government sector which occupied 74% of our control group in the laid-off reform analysis.
- We focus on the urban area. $(N = 14,276)$
  - Most of the SOEs were located in the urban area and the housing reform were implemented in the urban area.
- Only include individuals older than 22 years old and less than 45 years old. $(N = 7,569)$
  - Senior workers over 45 were usually got the internal retirement option.

▸ Internal Retirement

- Only include those who were married prior to the reforms. $(N = 5,756)$
- Exclude observations with missing value. $(N = 3,406)$
- Drop both in SOE living in the private house, and both or none in SOE living in the public house. (Laid-off Reform: $N = 1,054$, Housing Reform: $N = 647$)

# Sample

**Table 1:** Pre-Reform (before 1995) Summary Statistics: Health Outcomes

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| | Living in Private House | | | Living in Public House | |
| | Only Self in SOE | Only Spouse in SOE | Both not in SOE | Only Self in SOE | Only Spouse in SOE |
| BMI | 22.11 | 21.85 | 22.43 | 21.60 | 22.26 |
| | (2.460) | (2.853) | (2.819) | (2.791) | (2.516) |
| Weight(kg) | 57.14 | 56.16 | 59.07 | 54.95 | 56.09 |
| | (8.692) | (8.977) | (9.368) | (10.54) | (8.400) |
| Systol | 109.9 | 109.7 | 110.2 | 106.5 | 107.4 |
| | (14.35) | (13.70) | (13.14) | (12.83) | (14.08) |
| Diastol | 72.49 | 71.17 | 73.25 | 71.65 | 72.44 |
| | (10.52) | (10.09) | (10.58) | (9.206) | (9.936) |
| Observations | 198 | 179 | 417 | 55 | 55 |

Standard deviation in the parentheses.

# Sample

**Table 2:** Pre-Reform (before 1995) Summary Statistics: Demographics

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| | Living in Private House | | | Living in Public House | |
| | Only Self in SOE | Only Spouse in SOE | Both not in SOE | Only Self in SOE | Only Spouse in SOE |
| Household income | 3731.0 | 3939.1 | 3596.9 | 4325.0 | 3887.5 |
| per capita | (3040.2) | (3245.2) | (2559.8) | (2862.7) | (3887.5) |
| age | 35.46 | 35.49 | 35.32 | 36.44 | 35.18 |
| | (5.183) | (5.401) | (4.988) | (5.906) | (5.175) |
| male | 0.409 | 0.453 | 0.441 | 0.382 | 0.382 |
| | (0.493) | (0.499) | (0.497) | (0.490) | (0.490) |
| less than | 0.465 | 0.363 | 0.290 | 0.273 | 0.236 |
| primary school | (0.500) | (0.482) | (0.454) | (0.449) | (0.429) |
| junior middle | 0.313 | 0.358 | 0.412 | 0.527 | 0.345 |
| school | (0.465) | (0.481) | (0.493) | (0.504) | (0.480) |
| senior middle school | 0.222 | 0.279 | 0.297 | 0.200 | 0.418 |
| and above | (0.417) | (0.450) | (0.458) | (0.404) | (0.498) |
| Observations | 198 | 179 | 417 | 55 | 55 |

Standard deviation in the parentheses.

# Empirical Results

# Impacts on Weights

**Table 3:** Impacts of Laid-off Reform and Housing Reform on log Weight

| VARIABLES | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Laid-off Reform | | Housing Reform | |
| $\alpha_1$ : Post*Only Self in SOE (Private Housing) | -0.025** | -0.023** | -0.016 | -0.016 |
| ↑ negative shock from self | (0.010) | (0.011) | (0.012) | (0.012) |
| $\alpha_2$ : Post*Only Spouse in SOE (Private Housing) | -0.011 | -0.008 | | |
| ↑ negative shock from spouse | (0.011) | (0.011) | | |
| $\alpha_3$ : Post*Only Self in SOE (Public Housing) | | | 0.021 | 0.036* |
| | | | (0.019) | (0.020) |
| $\alpha_4$ : Post*Only Spouse in SOE (Public Housing) | | | 0.026 | 0.034* |
| ↑ positive shock from spouse | | | (0.021) | (0.019) |
| Test $\alpha_3 - \alpha_1 = 0$ ← positive shock from self | | | 0.0368 | 0.0519 |
| F-value | | | 3.770 | 7.531 |
| Individual FE | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |
| Month FE | Yes | Yes | Yes | Yes |
| Year Linear Trend | No | Yes | No | Yes |
| Month Linear Trend | No | Yes | No | Yes |
| Number of IDind | 461 | 461 | 278 | 278 |
| Observations | 1,054 | 1,054 | 647 | 647 |

Robust Standard errors in parenthese.
***, p<0.01, **, p < 0.05, *, p < 0.10

# Interpret the Impacts on Body Weight

- ◇ The loss of body weight indicates the worse off in health status considering the Chinese demographic conditions during 1990s.
  - – The proportion of the population with malnutrition to the entire population was as high as 23.9% and the share of underweight children over all the children under age 5 was 19.1%.
  - – Wang et al. (2002) also finds that approximately 15.4% of the adolescents (age from 10–18) were underweight.
- ◇ That negative risk leads to the weight loss is also consistent with the medical studies.
  - – The psychological pressure causes the lean people to lose weight and the overweight people to gain weight. (Kivimaki et al., 2006)
  - – Individuals facing stress are possible to lose appetite and eat less (Epel et al., 2004).
  - – It is also likely that the stress reduces the body weight by triggering physiological process (Dallman et al., 2003).

## Discussion: Malnutrition v.s Stress?

$$dW_i^*(y_i,y_j) = [\frac{U(y_i - m_i^*(y_i,y_j)^*)}{\partial c_i} + \frac{\partial V(m_i^*(y_i,y_j), m_j^*(y_i,y_j))}{\partial m_j^*(y_i,y_j)} \times \frac{\partial m_j^*(y_i,y_j)}{\partial y_i}]dy_i +$$
$$\frac{\partial V(m_i^*(y_i,y_j), m_j^*(y_i,y_j))}{\partial m_i^*(y_i,y_j)} \times \frac{\partial m_i^*(y_i,y_j)}{\partial y_j} dy_j$$

From the above equilibrium status, we know two channels might exist:

- ◇ The body weight loss can be attributed to the reduction in food consumption.
- ◇ If individual suffering a severe risk of job loss does not get enough caring from his/her spouse, he/she could also lose weight due to the harsh stress.

# Impacts on Blood Pressure

**Table 4:** Impacts of Laid-off Reform and Housing Reform on Blood Pressure: Systoblic

| VARIABLES | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Laid-off Reform | | Housing Reform | |
| Panel A: Systolic Blood Pressure | | | | |
| $\alpha_1$ : Post*Only Self in SOE (Private Housing) | -5.130** | -6.615*** | -3.947 | -4.467* |
| | (2.184) | (2.163) | (2.542) | (2.471) |
| $\alpha_2$ : Post*Only Spouse in SOE (Private Housing) | -0.952 | -1.661 | | |
| | (2.129) | (2.128) | | |
| $\alpha_3$ : Post*Only Self in SOE (Public Housing) | | | 4.774 | 5.245 |
| | | | (4.096) | (4.184) |
| $\alpha_4$ : Post*Only Spouse in SOE (Public Housing) | | | 5.748** | 6.384** |
| | | | (2.701) | (2.746) |
| Test $\alpha_3 - \alpha_1 = 0$ | | | 8.722 | 9.712 |
| F-value | | | 4.502 | 5.758 |
| Individual FE | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |
| Month FE | Yes | Yes | Yes | Yes |
| Year Linear Trend | No | Yes | No | Yes |
| Month Linear Trend | No | Yes | No | Yes |
| Number of IDind | 461 | 461 | 278 | 278 |
| Observations | 1,054 | 1,054 | 647 | 647 |

Robust Standard errors in parenthese.
***, p<0.01, **, p < 0.05, *, p < 0.10

# Impacts on Blood Pressure

**Table 5:** Impacts of Laid-off Reform and Housing Reform on Blood Pressure: Diastolic

| VARIABLES | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Laid-off Reform | | Housing Reform | |
| Panel B: Diastolic Blood Pressure | | | | |
| $\beta_1$ : Post*Only Self in SOE (Private Housing) | -3.605** | -5.100*** | -2.165 | -3.247 |
| | (1.732) | (1.750) | (2.030) | (1.967) |
| $\beta_2$ : Post*Only Spouse in SOE (Private Housing) | -1.254 | -1.895 | | |
| | (1.613) | (1.660) | | |
| $\beta_3$ : Post*Only Self in SOE (Public Housing) | | | 0.477 | -1.033 |
| | | | (2.898) | (3.354) |
| $\beta_4$ : Post*Only Spouse in SOE (Public Housing) | | | 6.188*** | 5.269* |
| | | | (2.384) | (2.888) |
| Test $\beta_3 - \beta_1 = 0$ | | | 2.642 | 2.213 |
| F-value | | | 0.795 | 0.480 |
| Individual FE | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |
| Month FE | Yes | Yes | Yes | Yes |
| Year Linear Trend | No | Yes | No | Yes |
| Month Linear Trend | No | Yes | No | Yes |
| Number of IDind | 461 | 461 | 278 | 278 |
| Observations | 1,054 | 1,054 | 647 | 647 |

Robust Standard errors in parenthese.
***, p<0.01, **, p < 0.05, *, p < 0.10

## Interpret the Impacts on Blood Pressure

- ◇ Recent medical researches begin to recognize that the low blood pressure could also be associated with somatic and psychological symptoms as well (Pemberton, 1989, Wessely et al., 1990, Pilgrim et al., 1992, Rosengren et al., 1993, Jorm, 2001).
- ◇ Stress exhibits significant association with the systolic blood pressure, while slightly weaker association with the diastolic blood pressure (Landsbergis, 1994, Hildrum, 2007).
- ◇ Neurons that control the blood pressure are reported to express neuropeptide $Y$. This peptide seems to reduce both blood pressure and the anxiety, and lower the sympathetic outflow. (Carrasco, 2003). Neuropeptide $Y$ is one of a large number of neurotransmitters that are involved in different stress responses.

# Impacts on Calorie Intake

**Table 6:** Impacts of Laid-off Reform and Housing Reform on Calorie Intake

| VARIABLES | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Laid-off Reform | | Housing Reform | |
| $\alpha_1$ : Post*Only Self in SOE (Private Housing) | 203.026* | 102.904 | -15.256 | -34.958 |
| | (108.261) | (107.360) | (130.743) | (115.455) |
| $\alpha_2$ : Post*Only Spouse in SOE (Private Housing) | 188.182 | 125.731 | | |
| | (119.455) | (114.364) | | |
| $\alpha_3$ : Post*Only Self in SOE (Public Housing)c | | | 67.358 | 93.516 |
| | | | (160.729) | (166.114) |
| $\alpha_4$ : Post*Only Spouse in SOE (Public Housing) | | | -186.170 | -186.322 |
| | | | (280.620) | (253.703) |
| Test $\alpha_3 - \alpha_1 = 0$ | | | 82.61 | 128.5 |
| F-value | | | 0.282 | 0.622 |
| Individual FE | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |
| Month FE | Yes | Yes | Yes | Yes |
| Year Linear Trend | No | Yes | No | Yes |
| Month Linear Trend | No | Yes | No | Yes |
| Number of IDind | 461 | 461 | 278 | 278 |
| Observations | 1,054 | 1,054 | 647 | 647 |

Standard errors in parenthese.
***, p<0.01, **, p < 0.05, *, p < 0.10

# Interpret the Impacts on Blood Pressure and Calorie Intake

- We do not find any significant impacts on nutrition intake.
  - Food, different from other private consumption, are consumed together. It is not exclusive.
- Stress could reduce weight by affecting metabolism.
- The results of blood pressure and nutrition intake give two possible explanation:
  - Though spouses' food consumption does not change significantly, but they reduce their caring to each other when one of them is in risk.
  - It is also possible that they have an increase in activity intensity and consume more energy. But due to the lack of time use in the data, we cannot directly test this.
- At least, our results imply the spouse' caring could be an important channel.

# Pre-existing Trend Test

The key assumption for DID approach is that in absence of the treatment the treated group should display a parallel trend as the control group.

**Laid-off Reform:**

$$\begin{aligned} Y_{itp} =& \beta_1 Post_t \times Self\_SOE\_Private_{ip} + \beta_2 Post_t \times Spouse\_SOE\_Private_{ip} \\ &+ d_1 Yr_{1993} \times Self\_SOE\_Private_{ip} + d_2 Yr_{1993} \times Spouse\_SOE\_Private_{ip} \\ &+ \theta_t + \gamma_i + (t \times \eta_p) + \varepsilon_{itp} \end{aligned} \tag{7}$$

**Housing Reform:**

$$\begin{aligned} Y_{itp} =& \beta_1 Post_t \times Self\_SOE\_Public_{ip} + \beta_2 Post_t \times Spouse\_SOE\_Public_{ip} + \\ &\beta_3 Post_t \times Self\_SOE\_Private_{ip} + d_1 Yr_{1993} \times Self\_SOE\_Public_{ip} \\ &+ d_2 Yr_{1993} \times Spouse\_SOE\_Public_{ip} + d_3 Yr_{1993} \times Self\_SOE\_Private_{ip} \\ &+ \theta_t + \gamma_i + (t \times \eta_p) + \varepsilon_{itp}. \end{aligned} \tag{8}$$

$Yr_{1993}$ is a dummy taking 1 if it is the year of 1993, otherwise 0.

▸ Pre-existing Trend Tests

# Pre-existing Trend Test: Weight

**Table 7:** Pre-Trend Specification: log Weight

| VARIABLES | (1) Laid-off Reform | (2) Laid-off Reform | (3) Housing Reform | (4) Housing Reform |
|---|---|---|---|---|
| $\alpha_1$ : Post*Only Self in SOE (Private Housing) | -0.022* | -0.020 | -0.006 | -0.007 |
| | (0.012) | (0.013) | (0.013) | (0.013) |
| $\alpha_2$ : Post*Only Spouse in SOE (Private Housing) | -0.019 | -0.014 | | |
| | (0.012) | (0.013) | | |
| $\alpha_3$ : Post*Only Self in SOE (Public Housing) | | | 0.029 | 0.047** |
| | | | (0.021) | (0.022) |
| $\alpha_4$ : Post*Only Spouse in SOE (Public Housing) | | | 0.018 | 0.029 |
| | | | (0.022) | (0.021) |
| $\alpha_5$ : 1{Yr of 1993}× | 0.005 | 0.006 | 0.020** | 0.018** |
| Only Self in SOE (Private Housing) | (0.008) | (0.008) | (0.009) | (0.009) |
| $\alpha_6$ : 1{Yr of 1993}× | -0.015* | -0.012 | | |
| Only Spouse in SOE (Private Housing) | (0.008) | (0.008) | | |
| $\alpha_7$ : 1{Yr of 1993}× | | | 0.017 | 0.023 |
| Only Self in SOE (Public Housing) | | | (0.014) | (0.014) |
| $\alpha_8$ : 1{Yr of 1993}× | | | -0.014 | -0.008 |
| Only Spouse in SOE (Public Housing) | | | (0.014) | (0.013) |
| Test $\alpha_3 - \alpha_1 = 0$ | | | 0.0351 | 0.0535 |
| F-value | | | 2.921 | 6.704 |
| Test $\alpha_7 - \alpha_5 = 0$ | | | -0.00292 | 0.00438 |
| F-value | | | 0.0458 | 0.101 |
| Year Linear Trend | No | Yes | No | Yes |
| Month Linear Trend | No | Yes | No | Yes |
| Observations | 1,054 | 1,054 | 647 | 647 |

# Specification Test: Control the Pre-reform Characteristics

- ◇ We are also concerned that the individual's characteristics prior to the reform could bias our estimates.
- ◇ To address this issue, we re-estimate the models (5), and (6) by additionally controlling the interaction terms of $Post_t$ and individual's gender, interaction terms of $Post_t$ and education levels dummies, and interaction terms of $Post_t$ and household income per capita prior to reforms.

# Control Pre-reform Characteristics

**Table 8:** Robustness Test: Control Pre-reform Features

| | (1) Log Weight | (2) Systol | (3) Diastol | (4) Calorie |
|---|---|---|---|---|
| Panel A: Laid-off Reform | | | | |
| $\alpha_1$ : Post*Only Self in SOE (Private Housing) | -0.021* | -6.569*** | -5.129*** | 119.271 |
| | (0.012) | (2.189) | (1.762) | (108.754) |
| $\alpha_2$ : Post*Only Spouse in SOE (Private Housing) | -0.008 | -1.791 | -2.171 | 121.984 |
| | (0.011) | (2.141) | (1.598) | (112.942) |
| Panel B: Housing Reform | | | | |
| $\beta_1$ : Post*Only Self in SOE (Private Housing) | -0.012 | -3.979 | -2.943 | 4.405 |
| | (0.012) | (2.448) | (1.891) | (110.625) |
| $\beta_2$ : Post*Only Self in SOE (Public Housing) | 0.033* | 4.873 | -1.246 | 70.143 |
| | (0.019) | (4.267) | (3.387) | (164.262) |
| $\beta_3$ : Post*Only Spouse in SOE (Public Housing) | 0.031* | 6.937** | 6.021** | -180.081 |
| | (0.018) | (2.810) | (2.900) | (238.777) |
| Test $\beta_2 - \beta_1 = 0$ | 0.0450 | 8.852 | 1.698 | 65.74 |
| F-value | 6.380 | 4.570 | 0.274 | 0.169 |
| Post × Pre-Reform personal characteristics | Yes | Yes | Yes | Yes |
| Post × Pre-Reform Household income per capita | Yes | Yes | Yes | Yes |
| Year Linear Trend | Yes | Yes | Yes | Yes |
| Month Linear Trend | Yes | Yes | Yes | Yes |

# Conclusion

# Conclusion

- ◇ In this paper, we attempt to explore the risk-bearing and benefit-sharing mechanisms between spouses.
- ◇ Our theoretical model shows under the complementarity assumption, spouses contribute more to the marital goods in good times, but less in bad times.
- ◇ Empirical exercise utilizes the laid-off reform and housing privatization reform in the state sectors in China in 1990s and find **spouses tend to share benefits but not share risk**.
- ◇ **Policy Implication:** In developing countries, when insurance market and financial market are not well developed, the household does not have strong ability to resist the large-scale income shock. The government should establish social safety net to help them in need.

# Limitations

**Limitations:**

- ◇ We don't have data on the spouses' marital contributions.
- ◇ Our theoretical model does not match the reality perfectly. To examine the large scale income shock, it would be better to characterize the equilibrium in the marriage market.
- ◇ If individual predict his/her spouse's risk is temporary, how does our result change? If individual does not consider this income benefit as a lump-sum transfer, and predict in the future it could be more valuable, will he/she still share benefits? We should introduce expectation into the model.
- ◇ Relative small sample size (panel data).

## More to do?

- ◇ Use the U.S data (i.e UI) to test whether this social assistance generates an spillover effect towards spouse (less likely to smoke, less likely to over-work, improved infant outcome).
- ◇ Use the CHNS data after 2000, and take the increasing housing price into consideration, and test in the long run, if individuals observe their income benefits are increasing in value, whether they still share benefits?
- ◇ Loose the sample selection to retain a larger sample size.
- ◇ Other outcome variables?

Thank You!

# Appendix

# Internal Retirement

- The seninor workers usually had the option to take *internal retirement* instead of totally losing their jobs.
- **Internal retirement:** no documented age threshold for internal retirement. Usually, workers older than 45 years could sign the internal retirement agreement.
  - these senior workers would stop their routine jobs but their contracts with the employer were not expired.
  - After internal retirement, they still received a considerable pension (lower than their salary) until they reached the retirement age, after which they could formally retire, and receive the retirement pension.
- The junior workers were usually had no choice but involuntarily fired. Once they got laid off, they had to totally leave the firm in three years with their contract ultimately terminated.

# Internal Retirement

**Table 9:** Average Living Compensation in 1998 (Yuan)

| | Totally laid-off | Internal retired |
|---|---|---|
| Beiijng | 3494 | 5346 |
| Tinajin | 1356 | 4232 |
| Hebei | 1435 | 3876 |
| Shanxi | 711 | 3016 |
| Inner Mongonia | 981 | 3576 |
| Liaoning | 763 | 3242 |
| Jilin | 702 | 3776 |
| Helongjiang | 495 | 3711 |
| Nation Average | 1271 | 3846 |

Data sources: China Labor Yearbook of 1998 from the National Statistical Bureau.

# Pre-existing Trend Test: Systolic Blood Pressure

**Table 10:** Pre-Trend Specification: Systolic Blood Pressure

| VARIABLES | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Laid-off Reform | | Housing Reform | |
| $\alpha_1$ : Post*Only Self in SOE (Private Housing) | -5.226** | -7.354*** | -4.610* | -5.505** |
| | (2.337) | (2.301) | (2.682) | (2.578) |
| $\alpha_2$ : Post*Only Spouse in SOE (Private Housing) | -0.302 | -1.450 | | |
| | (2.261) | (2.257) | | |
| $\alpha_3$ : Post*Only Self in SOE (Public Housing) | | | 4.393 | 4.913 |
| | | | (4.454) | (4.690) |
| $\alpha_4$ : Post*Only Spouse in SOE (Public Housing) | | | 6.766** | 7.077** |
| | | | (3.420) | (3.440) |
| $\alpha_5$ : 1{Yr of 1993}× | -0.236 | -1.441 | -1.325 | -2.070 |
| Only Self in SOE (Private Housing) | (1.779) | (1.766) | (2.359) | (2.354) |
| $\alpha_6$ : 1{Yr of 1993}× | 1.258 | 0.462 | | |
| Only Spouse in SOE (Private Housing) | (1.966) | (1.909) | | |
| $\alpha_7$ : 1{Yr of 1993}× | | | -0.787 | -0.803 |
| Only Self in SOE (Public Housing) | | | (3.189) | (3.582) |
| $\alpha_8$ : 1{Yr of 1993}× | | | 1.803 | 1.060 |
| Only Spouse in SOE (Public Housing) | | | (3.349) | (3.306) |
| Test $\alpha_3 - \alpha_1 = 0$ | | | 9.003 | 10.42 |
| F-value | | | 4.054 | 5.286 |
| Test $\alpha_7 - \alpha_5 = 0$ | | | 0.538 | 1.267 |
| F-value | | | 0.0314 | 0.139 |
| Year Linear Trend | No | Yes | No | Yes |
| Month Linear Trend | No | Yes | No | Yes |
| Observations | 1,054 | 1,054 | 647 | 647 |

# Pre-existing Trend Test: Diastol Blood Pressure

**Table 11:** Pre-Trend Specification: Diastolic Blood Pressure

| VARIABLES | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Laid-off Reform | | Housing Reform | |
| $\beta_1$ : Post*Only Self in SOE (Private Housing) | -2.631 | -4.430** | -1.576 | -2.918 |
| | (1.776) | (1.827) | (2.151) | (2.075) |
| $\beta_2$ : Post*Only Spouse in SOE (Private Housing) | -0.797 | -1.589 | | |
| | (1.801) | (1.832) | | |
| $\beta_3$ : Post*Only Self in SOE (Public Housing) | | | 1.112 | -0.791 |
| | | | (3.303) | (3.958) |
| $\beta_4$ : Post*Only Spouse in SOE (Public Housing) | | | 6.792** | 5.250* |
| | | | (2.646) | (3.083) |
| $\beta_5$ : 1{Yr of 1993}× | 1.905 | 1.265 | 1.171 | 0.650 |
| Only Self in SOE (Private Housing) | (1.540) | (1.592) | (1.865) | (1.862) |
| $\beta_6$ : 1{Yr of 1993}× | 0.857 | 0.530 | | |
| Only Spouse in SOE (Private Housing) | (1.558) | (1.510) | | |
| $\beta_7$ : 1{Yr of 1993}× | | | 1.309 | 0.505 |
| Only Self in SOE (Public Housing) | | | (2.738) | (2.979) |
| $\beta_8$ : 1{Yr of 1993}× | | | 1.142 | -0.003 |
| Only Spouse in SOE (Public Housing) | | | (2.502) | (2.522) |
| Test $\beta_3 - \beta_1 = 0$ | | | 2.688 | 2.127 |
| F-value | | | 0.662 | 0.327 |
| Test $\beta_7 - \beta_5 = 0$ | | | 0.138 | -0.144 |
| F-value | | | 0.00260 | 0.00241 |
| Year Linear Trend | No | Yes | No | Yes |
| Month Linear Trend | No | Yes | No | Yes |
| Observations | 1,054 | 1,054 | 647 | 647 |

# Pre-existing Trend Test: Calorie Intake

**Table 12:** Pre-Trend Specification: Calorie Intake

| VARIABLES | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Laid-off Reform | | Housing Reform | |
| $\alpha_1$ : Post*Only Self in SOE (Private Housing) | 231.128** | 135.272 | 9.379 | -12.004 |
| | (114.799) | (114.029) | (139.198) | (126.153) |
| $\alpha_2$ : Post*Only Spouse in SOE (Private Housing) | 186.053 | 139.371 | | |
| | (132.451) | (130.447) | | |
| $\alpha_3$ : Post*Only Self in SOE (Public Housing) | | | 156.562 | 152.219 |
| | | | (169.241) | (166.096) |
| $\alpha_4$ : Post*Only Spouse in SOE (Public Housing) | | | -138.523 | -167.468 |
| | | | (290.247) | (249.419) |
| $\alpha_5$ : 1{Yr of 1993}× | 56.007 | 61.153 | 48.288 | 43.976 |
| Only Self in SOE (Private Housing) | (92.246) | (96.813) | (104.190) | (107.091) |
| $\alpha_6$ : 1{Yr of 1993}× | -4.887 | 23.414 | | |
| Only Spouse in SOE (Private Housing) | (101.714) | (102.932) | | |
| $\alpha_7$ : 1{Yr of 1993}× | | | 190.176 | 115.764 |
| Only Self in SOE (Public Housing) | | | (132.195) | (136.193) |
| $\alpha_8$ : 1{Yr of 1993}× | | | 88.640 | 29.271 |
| Only Spouse in SOE (Public Housing) | | | (214.411) | (212.001) |
| Test $\alpha_3 - \alpha_1 = 0$ | | | 147.2 | 164.2 |
| F-value | | | 0.861 | 1.008 |
| Test $\alpha_7 - \alpha_5 = 0$ | | | 141.9 | 71.79 |
| F-value | 0 | 0 | 1.340 | 0.292 |
| Year Linear Trend | No | Yes | No | Yes |
| Month Linear Trend | No | Yes | No | Yes |
| Observations | 1,054 | 1,054 | 647 | 647 |