Research Proposal: The Housing Wealth Effect on Consumption in The Backdrop of Housing Price decline in Mainland China.

1. Statement of Purpose

After decades of extraordinary growth, the housing price in China is about to decline. During the years of growth, the households have accumulated large amount of housing wealth, and the recent decline in price means the households will experience a negative wealth shock. Will this negative wealth shock have a significant impact on households' consumption?

The wealth effect on consumption has been a classic topic in the Macroeconomics and Finance. And the 2008-9 Financial Crisis in The U.S. has inspired many empirical researchers to inquire the impact of a housing market collapse on household consumption. There is a particular paper that inspired me to study this topic. Mian, Rao and Sufi (2013) have conducted empirical research in the backdrop of the Great Recession in the U.S. which featured by a collapse in housing price and a slump in household consumption. The major contribution of this paper is their evidence on the heterogeneity in households' responses to the housing wealth shock. They have found that the poorer and more levered households are cutting more on consumption (higher MPC) given equal level of housing wealth loss. This finding is important because the housing wealth shock has substantial variation across states and if the shock is concentrated on the households that have a higher Marginal Propensity to Consume (MPC), the aggregate impact of the recession will be aggravated. Therefore, when evaluating the damage of a recession we not only need to consider the overall magnitude but also consider the distribution of wealth shock.

In this writing, I propose a plan to conduct empirical study in Mainland China to examine the change in household consumption in response to the recent housing price decline, and whether there exists heterogeneity in the way households spends, like Mian, Rao and Sufi (2013) have suggested.

2. Research Questions

I intend to answer three major questions based on empirical evidence from recent year Mainland China. **First,** whether the housing price decline has a significant impact on households' consumption. **Second,**

whether households' MPC is heterogenous in wealth and leverage. And **third,** I am also interested in the distribution of the housing wealth shock, whether the shock has concentrated on those have a higher MPC, which if true, may put the country in a bigger recession.

3. Literature Review

In this section, I review four representative literatures that conducted empirical research on the wealth effect on consumption. Three of them are based in the U.S. and one in Mainland China.

Mian, A., Rao, K., & Sufi, A. (2013). Household Balance Sheets, Consumption, and the Economic Slump*. *The Quarterly Journal of Economics*, *128*(4), 1687–1726.

This proposal of mine is inspired by this paper. Mian, Rao and Sufi (2013) provided empirical evidence on the consumption consequences of the housing price collapse in the U.S. during 2006 to 2009. They emphasized the distribution of the wealth shock and the heterogeneity in Marginal Propensity of Consume (MPC) across households' wealth and leverage. One of the advantages they have is the availability of the ZIP code level data in both consumption and net worth. The key findings are that the poorer households have a higher MPC under the same wealth shock, and the more levered households also have a higher MPC out of wealth, the effect of wealth and leverage is independent to each other. This paper has important implications because if the net worth shocks during a recession hit harder on those who respond more aggressively to wealth loss, the total impact of recession could become worse.

One thing worth noting is the use of housing supply elasticity as an instrumental variable to deal with the endogeneity problem caused by variables that potentially correlated with both consumption and housing wealth shock, an example of such variable is the construction sector employment. The housing supply elasticity is an index indicating the difficulty of building new homes in the metropolitan area. This index was first introduced by Saiz (2010) and its quality to be used as a valid instrument was also discussed in other empirical studies such as Mian and Sufi (2009).

Case, K. E., Quigley, J. M., & Shiller, R. J. (2005). Comparing Wealth Effects: The Stock Market versus the Housing Market. *Advances in Macroeconomics*, 5(1).

Will the impact of wealth shock on consumption be differential on the form of wealth held by households? Case, Quigley, and Shiller (2005) tried to answer this question by doing comparison between the financial and housing wealth effect on spending. Their empirical evidence was drawn from the quarterly panel data in U.S. states between 1982 to 1999. The financial wealth was estimated using the ratio of mutual funds holdings in each state, assuming the ratio of mutual funds to the total financial holdings is linear over time. The housing wealth is estimated from the repeated sales price index for each state, where the consumption data is constructed by using retail sales data as a proxy.

Their empirical methods put an emphasis on the time series side of panel data. Multivariate analysis methods such as including the lagged differenced terms, and ECM regression, year and state fixed effects were used to build different specification. Most of their empirical evidence suggests that housing wealth has a large effect on consumption where the impact of financial wealth is relatively small. Later in 2013, the authors extended their study using the same methods and have reached similar results with the previous one.

Zhou, X., & Carroll, C. D. (2012). Dynamics of Wealth and Consumption: New and Improved Measures for U.S. States. *The B.E. Journal of Macroeconomics*, 12(2).

Zhou and Carroll (2012) estimated the impact of both financial and housing wealth shock on spending growth. Using the newly constructed panel data from 2001 to 2005, they found a significant and lasting effect of housing wealth, but the impact of financial wealth shock is small.

The major contribution of this paper is the construction of the two panel datasets which provide advantages in estimating the impact of wealth effect that was not possible before. The first data set is the state level consumption data which was estimated based on the sales tax revenue and the second data set is the financial wealth data which is estimated based on an account-level financial holding data from a private company. The newly contracted dataset was claimed to be superior to the data used by Case, Quigley and Shiller (2005), which-according to Zhou and Carroll (2012) suffers from measurement error and endogeneity problem which underestimated the effect of financial wealth. Nonetheless, even using the more accurate ZIP code level data constructed by Zhou and Carroll (2012) on financial holdings, the impact of financial wealth on spending is still insignificant

The availability of panel data made it possible to examine the time series changes in the data. The authors applied an ARDL model with the spending growth on the righthand side and the growth in

financial, housing wealth and income in the twice lagged forms are on the lefthand side, and the result shows that although the financial wealth effect is small, the housing wealth effect is still significant after lagged twice.

Li, C., & Zhang, Y. (2021). How does housing wealth affect household consumption? Evidence from macro-data with special implications for China. *China Economic Review*, 69, 101655.

Li and Zhang (2021) studied the housing wealth effect on consumption in the context of Mainland China. The international studies have conventionally found a positive relationship between housing wealth and consumption, however, the authors argued that due house purchasing are often for speculation and precautionary purpose in China, this relationship may be revered. Their empirical study drew on international macro-level data on wealth rather than housing price index, provides new evidence in considering various factors and mechanisms affecting the wealth-consumption relationship. Their econometrics methods adopted the Generalized Least Squares procedure, and all the variables enter the model as first differences. The coefficients indicate one percentage increase in housing wealth is associated with 0.086 percent raise in consumption, and the housing wealth has similar effects on consumption but in a much smaller extent. In addition to the benchmark model, several instrumental variables are included to deal with the endogeneity problem, they are the “top 1% pre-tax income share”, “domestic credit to private sector” (as % of GDP), “total trade value” and “urbanization rate”. After introducing the instruments, the results are still similar with that of the benchmark model which posited a significant impact of housing wealth.

4. Methodology

4.1 Data Choice

The major challenge of studying the wealth effect on consumption empirically is finding the good data, this has also been the challenge faced by all the previous works discussed in the literature review section. To conduct research in this topic, we need to pin down some key variables: the consumption, the housing wealth, the financial wealth, and the income. Other important variables that are endogenous to the model should also be considered, such as the fraction of employment in construction sector, the leverage ratio in a region, the list goes on. The previous works mentioned before have all

constructed their own dataset, as the data we need for this topic is often not available in public sources, here I propose some methods that data on the key variables can be constructed.

The consumption data is usually not available at a disaggregated level. Mian, Rao and Sufi (2013) estimated their consumption data based on the MasterCard's Purchase data, the advantage of using such data is obvious, the consumption can be sorted by geographical units and even the categories of the goods purchased with very little measurement error. However, without special sponsorship such data is impossible to come by. A more feasible source of consumption data is the retail sales tax data, this was the method used by both Case, Quigley and Shiller (2005) and Zhou and Carroll (2013). Retail sales is not equivalent to consumption but in through certain process it can serve as a good proxy of consumption. In the context of Mainland China, we could also explore the possibility to use the sales data from online shopping sites. These online shopping site have detailed data on the geographical distribution (shipping address) of the consumption as well as the value of purchases.

The housing wealth could be constructed using data from regular census datasets. By multiplying the regional housing price index with the number of homeowners in a region. Although most of the empirical studies conducted in the U.S. suggested the effect of financial wealth is insignificant, ideally, we still need to take it into account in our own study.

And there is also the question of aggregation or disaggregation. As we are studying the consumption consequence of wealth shock, we need to make sure there is enough variation of wealth shock in our observations. if we are using cross sectional data, there should be enough variation across geographical units, if we are using panel data, there should be enough variation over time. For example, if the provincial level data has the most variation, we should use the provincial data, since it can provide us the largest statistical power. The variation of wealth shock in a particular dataset can be simply measured by the standard deviation. The choice between cross-sectional and panel data is largely dependent on the availability of data, as I am indefinite on the data available to me, I will discuss the Econometric methods under both situations.

4.2 Empirical Methods

Following the procedure of Mian, Rao and Sufi (2013) which also conducted cross-sectional analysis, **we first want to know whether the consumption is affected by wealth shock at all** in the context of our own study. This question is essentially represented by the full risk sharing assumption. The conventional

representative agent model assumes the households can be fully insured against each other, and the consumption is insensitive to any wealth shock. Empirical, this assumption can be test by:

$$\Delta \ln(C_{i,t}) = \beta_0 + \beta_1 * \Delta \ln(Wealth_{i,t}) + \varepsilon_{i,t} \qquad (1)$$

Where $\Delta \ln(C_{i,t})$ is the growth rate of consumption in geographical unit i at time t, and the $\Delta \ln(W_{i,t})$ is the growth rate of wealth. The Full risk sharing assumption can be rejected if $\beta_1 \neq 0$ and $\beta_1$is also the Marginal Propensity of Consume (MPC) out of wealth.

Most of the previous empirical studies have soundly rejected the Full risk sharing assumption, with this premise, **the second question is whether the consumption curve is concave.** The concavity of consumption curve suggests heterogeneity in households' response to wealth shock. This heterogeneity could be in household wealth and leverage as suggested by Mian, Rao, and Sufi (2013). The following specification can used to test whether the consumption consequence is differential among households with different level of initial wealth:

$$\Delta C_{i,t} = \beta_0 + \beta_1 \Delta Wealth_{i,t} + \beta_2 Wealth_{i,t-1} + \beta_3 (\Delta Wealth_{i,t} \times Wealth_{i,t-1}) + \varepsilon_{i,t} \qquad (2)$$

Where $W_{i,t-1}$ is the initial wealth position at the beginning of a period, and $(\Delta W_{i,t} \times W_{i,t-1})$ is the interaction of the initial wealth position and the wealth shock. If the households with different initial wealth position do respond differently to the same level of wealth shock, we should observe $\beta_3 < 0$, which implies the poorer households react more aggressive to wealth loss. Similar method can also be used to find heterogeneity in leverage ratio.

A simple macro-level OLS regression is likely to suffer from endogeneity problem. The housing wealth shock is possible to be correlated with some hidden factors that are also correlated with consumption. If this is case, the housing wealth shock will be endogenous and bias our estimation. A particular factor of concern is the construction sector income, the housing price boom and bust can lead to the expansion and subtraction of the instruction sector, for regions where the employment from the construction sector accounts for a large portion of the local work force, the ups and downs in the construction sector will have an impact on income and therefore affects the consumption. In this view, housing wealth is positively correlated with construction sector income, which is positively correlated with consumption, and if the correlations between them are strong, we could end up overestimating the effect of housing wealth shock.

There are two ways we can mitigate the endogeneity problem. Firstly, we can introduce some control variables to control the effect of construction sector employment, such as the fraction of reginal employment involved in the sector. Another way is to introduce an instrumental variable that can isolate the endogenous portion of housing wealth shock. Mian, Rao, and Sufi (2013) introduced the housing supply elasticity as an instrument to isolate the effect of construction sector employment. The housing supply elasticity is an index constructed by Saiz (2010), it measures the relative easiness to build new homes in the metropolitan area in the U.S. and this index was empirically proved to be correlated with housing price and uncorrelated with construction sector employment. These properties enable the housing supply elasticity to be a valid instrument for housing wealth effect. Although, such an index is not available in the context of Mainland China, but if we can find a close substitute, similar IV strategy can also be applied in our own study.

Therefore, the benchmark model is:

$$\Delta C_{i,t} = \beta_0 + \beta_1 \Delta housing\ Wealth_{i,t} + \beta_2 \Delta financial\ wealth + \beta_3 household\ income + \beta_3 construction\ sector\ employment + \varepsilon_{i,t} \quad (3)$$

After introducing the instrument, the equation becomes:

$$\Delta C_{i,t} = \beta_0^* + \beta_1^* housing\ supply\ elasticity_{i,t} + \beta_2^* \Delta financial\ wealth + \beta_3 household\ income + \varepsilon_{i,t}^* \quad (4)$$

In the situation where panel data is available, the time series variation in the data can also be utilized to deal with the endogeneity problem. If the endogenous component of housing wealth shock does not vary with time, we can simply difference them out by using lagged differenced term of each variable. There are other time series methods that can be used in this study, which is subject to further consideration.

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