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Education

Ph.D., Management (Finance), expected graduation May 2017
National University of Singapore, Singapore
Supervisor: Professor Sumit Agarwal
Dissertation: Essays on Household Finance
GPA: 4.55 / 5.00

B.S., Mathematics and Economics with First Class Honours, 2012
Nanyang Technological University, Singapore
GPA: 4.72 / 5.00

Work in Progress

Saving and Consumption Response to Income Tax Exemption Policy: Evidence from India

This paper uses a unique panel data on consumer debit card and credit card transaction to study the consumption and saving response to the change of income tax policy in India. In July 2014, the Union Budget announced an increase in total income tax exemption limit of 50,000 India Rupee (754 US $). The sectional limit for long term investment including public providence fund (PPF), principle part of EMI on housing loan etc. has also been increased by 754 US $ per annum. The consumers with home loans and those without home loans naturally become the treatment and control groups respectively. By matching on gender, residential address, annual income and age, we find that the consumers with home loans reduce cash withdrawal by 300 US $ and P.O.S transactions by 40 US $ starting from the policy announcement month July till the end of the fiscal year (March 2015). The reduction in consumption effect is more pronounced for the low income, single, male and young people. With a subsample of consumers with credit card transaction data, we also find significant drop in consumption on credit card and such effect eliminates from the beginning of the next fiscal year. With no major change of the relevant policy, consumers neither reverse back nor further reduce consumption. We also find that deduction in consumption is mainly from the sectors of dining out, luxury, supermarket and travelling. In addition, we conduct similar tests for the PPF account holders and non-PPF account holders. The average increase in annual PPF top-up is 15,000 India Rupee but we do not find those who invest more in PPF cut on consumption subsequently compared with their counterparties. PPF account holders are on average much older and wealthier than the home loan owners.

Income Tax Incentive, Adverse Selection and Personal Loan Performance: Evidence from India

This paper investigates on whether income tax exemption incentive will induce the marginal buyers to take on home loan and whether the hidden characteristics of those loan borrowers affect subsequent loan performance. In July 2014, the Union Budget announced an increase in total income tax exemption limit of 50,000 India Rupee (754 US $). The sectional limit for both the principle and interest part of home loans repayment has also been increased by 754

US$ per annum. For those consumers who have exhausted the previous income tax exemption limit and have intension to borrow a home loan, the policy increases their disposable income. We find that there are 4,000 (66.7%) more new loans initiated in August and September for the loans with credit limit less than 600K India Rupee compared with June and July. We do not find such effects in the previous fiscal year and among the loans with larger credit limit value. The loans in August and September are shorter in loan term, smaller in EMI and borrowed by younger people. However, the interest rate is similar compared with its neighbouring month before the policy announcement. Controlling the interest rate, the 2-month delinquency rate in September in the next fiscal year is 1.14%, 1.22% and 1.27% higher for the loans initiated in July, August and September respectively than those initiated in May and June. Controlling for all the other loan level and consumer level observable characteristics, the significant higher delinquent rate remains.

Salience and Peer Effects: Durable Good Choice after a Neighbour's Warranty Claim

Using a unique data set of sales and warranty claim record from a home appliance chain store in Canada, we study the peer effects on durable good choice. Upon a warranty claim event on a certain brand, we observe consumers in the neighbourhood (postal code level) switch to the other brands for the same type of the products. Other types of the products in the same category and the products under all the other categories are not affected. To control all the other confounding unobservables, we use the outer ring region to conduct the diff-in-diff-in-diff tests and confirm that such switch on brand is more pronounced for the closer inner ring region. With the large sample of sales and claim record, we also impute the objective failure rate measure for the same product type under different brands and find that it cannot explain the brand switching behaviour. Moreover, the brand switching behaviour is more pronounced for the brands with relatively better objective quality standard. Also, we find that the peer effect is stronger for the regions with less diversified population measured in terms of age, household size, education level, mother tongue and immigrants.

Moral Hazard and Claim Timing of Extended Warranty on Dural Goods

With a unique data set from a home appliance chain store in Canada, we study the consumer's extended warranty (EW) claiming behaviour. In the last week before the expiration of the EW, there are 265% more claims events associated with 20.6% higher labour cost and 27.8% longer repairing time. In all the other period, the distribution of claim events and claim event features is even. Fixing the product, we estimate the hazard rate by comparing the claiming rate under the short EW and the long EW during the valid period of short EW. Only in the last week before the expiration of the short EW, the claim rates of the products under short EW are 32% higher than those products under the long EW. Moreover, the claims under short EW are associated with higher labour cost and longer repair time. We also find that the procrastination behaviour is more pronounced for then consumers living far away from the store, with average higher income and during the economic boom period. The results are consistent with the behaviour argument on salience cost and procrastination.

Teaching Experience

Tutor, NUS Business School, Department of Finance

FIN2004X, Finance (2014/2015 Semester 2), undergraduate course

Student evaluation: 4.80 / 5.00 (Faculty Average 4.02)

Teaching Assistant, NUS Business School, Department of Finance

BMA5324, Value Investing in Asia (2013/2014 Semester 1), MBA course

FIN3132, Value Investing in Asia (2013/2014 Semester 1), undergraduate course

Academic Awards and Honours

Graduate Research Scholarship, National University of Singapore, 2012 - 2015

Full Undergraduate Scholarship Award, Singapore Ministry of Education, 2008 - 2012

Dean's List, Nanyang Technological University, 2009 – 2010

Skills and Personal

Programming: MATLAB, STATA, RapidMiner, VBA, C++

Database: Compustat, Execucomp, CapitalIQ, IRRC, Risk Metrics

Language: Chinese Mandarin (native), English (proficient)

Nationality: Chinese. Singapore permanent resident.

Household Finance Research Proposal

Man Zhang, National University of Singapore

Given the unique data set provided by one of the largest commercial banks in India, we have the panorama of the financial activities of Indian households. In the coming year, my research work will concentrate on polish the papers (1 and 2) briefed below and carry on investigating on the other two research projects (3and4).

1. **Saving and Consumption Response to Income Tax Exemption Policy: Evidence from India**

This paper uses a unique panel data on consumer debit card and credit card transaction to study the consumption and saving response to the change of income tax policy in India. In July 2014, the Union Budget announced an increase in total income tax exemption limit of 50,000 India Rupee (754 US $). The sectional limit for long term investment including public providence fund (PPF), principle part of EMI on housing loan etc. has also been increased by 754 US $ per annum. The consumers with home loans and those without home loans naturally become the treatment and control groups respectively. By matching on gender, residential address, annual income and age, we find that the consumers with home loans reduce cash withdrawal by 300 US $ (**Graph1.1**) and P.O.S transactions by 40 US $ (**Graph1.2**) starting from the policy announcement month July till the end of the fiscal year (March 2015). The reduction in consumption effect is more pronounced for the low income, single, male and young people. With a subsample of consumers with credit card transaction data, we also find significant drop in consumption on credit card and such effect remains from the beginning of next fiscal year (**Graph1.3**). With no major change of the relevant policy, consumers neither reverse back nor further reduce consumption. We also find that the deduction in consumption is mainly from the sectors of dining, luxury, supermarket and travelling. In addition, we conduct similar tests for the PPF account holders and non-PPF account holders. The average increase in annual PPF top-up is 15,000 India Rupee (**Graph1.4**) but we do not find those who invest more in PPF cut consumption subsequently compared with their counterparties. PPF account holders are on average much older and wealthier than the home loan owners.

The study belongs to the large literature on saving behavior, self-control and consumption and whether policy can gauge the behavior mistake on consumption and saving decisions. Thaler (1994) review the literature and points out there are evidence showing that consumers have self-control problems which is inconsistent with life-cycle theory. Although there are many papers using IRA programs trying to test one the effectiveness of tax policy on saving, they are lack of data and hence cannot identify whether consumers truly increase saving from consumption.

2. **Income Tax Incentive, Adverse Selection and Personal Loan Performance: Evidence from India**

This paper investigates on whether income tax exemption incentive will induce the marginal buyers to take home loans and whether the hidden characteristics of those loan borrowers affect subsequent loan performance. In July 2014, the Union Budget announced an increase in total income tax exemption limit

of 50,000 India Rupee (754 US $). The sectional limit for both the principle and interest part of home loans has also been increased by 754 US$ per annum. For those consumers who have exhausted the previous income tax exemption limit and have intention to borrow a home loan, the policy increases their disposable income. We find that there are 4,000 (66.7%) (**Graph 2.1**) more new loans initiated in August and September for the loans with credit limit less than 600K India Rupee compared with June and July. We do not find such effects in the previous fiscal year and loans with larger credit limit value. The loans in August and September are shorter in loan term, smaller in EMI and borrowed by younger people. However, the interest rate is similar compared with its neighboring month before the policy announcement. Controlling the interest rate, the 2-month delinquency rate in September in the next fiscal year is 1.14%, 1.22% and 1.27% higher for the loans initiated in July, August and September respectively than those initiated in May and June. (The unconditional sample average plot can be found in **Graph 2.2**.) Controlling for all the other loan level and consumer level observable characteristics, the significant higher delinquent rate remains.

The 2008 global financial crisis has drawn much attention of the literature on how the monetary policy and increase in credit supply affect people's incentive in taking mortgage loans and subsequent default consequences. However, the effect of fiscal policy on mortgage market is absent from the literature. My study fills up the blank and show that fiscal policy incentive may also alter mortgage demand composition.

3. Inflation Expectation and Consumption

Inflation is a prolonged issue in India. High inflation introduces much uncertainty to the society and thus hinders economic development in the long run. There are literatures in studying the effect of inflation expectation on real economy. Schwab (1982) investigates the relationship between inflation expectation and demand for housing. The welfare loss associated with an increase in inflation is a function of the distortion of consumer's preferred time path of consumption in this theoretical work. Elder (2004) examines the effect of inflation uncertainty on real economic activity by utilizing a dynamic structural model. They find that an average shock to inflation uncertainty has tended to reduce output growth over three months by about 22 basis points. Schmeling and Schrempf (2011) show that the survey-based measures of expected inflation are significant and strong predictors of future aggregate stock returns in several industrialized countries both in sample and out of sample.

Reserve bank of India conducts consumer survey[1] on expected inflation in India for each quarter. For example, in June 2016, the survey was conducted across 18 cities among 5360 urban households from various categories. The survey data is accessible from the beginning of 2014 up to date. We observe heterogeneity in inflation expectation across geographical regions, demographical groups and over different consumption product categories. Moreover, we have the large credit card and debit card spending panel data at transaction level over the two years and the consumer demographical information.

[1] https://www.rbi.org.in/Scripts/QuarterlyPublications.aspx?head=Inflation%20Expectations%20Survey%20of%20Households

With all the data, we can address the question on what is the relationship between inflation expectation and consumption decision.

4. Agriculture Loan, Credit Supply and Loan Performance

More than 50% of the populations in India live on agriculture income. Access to financial service is believed to be effective in reducing poverty and spur economic development. India governments have introduced various subsidized program to help farmers to get access to loans. However, the agriculture loan default rate is very high and some farmers even commit the suicide because they feel devastated when their land may be liquidated as the collateral. Therefore, it is an important question to ask what kind of policy is effective and how that will alter the farmers' incentive and behavior. I have two research plans as discussed below. Due to limited space, I provide partial summary statistics of the agriculture loan data set in **Table 1**.

4.1 Infrastructure, Credit Supply and Default

Agriculture loan can assist farmers to buy seeds, fertilizer and rent machines to increase productivity. The farmers can repay the loans at the harvest season when they receive the income from selling the agriculture products. To ensure the healthy development of the loan markets, the farmers need to have certain levels of cognitive ability and there must be adequate public infrastructure to facilitate product sales. I would like to ask what is the relationship between education, infrastructure construction (e.g. transportation), credit supply and loan performance. Increasing credit supply alone may not be able to increase farmer's income and even make them default on the loans subsequently. Credit supply needs to come along with education and infrastructure development to fundamentally improve farmers' productivity. Empirically, within the same agriculture loan subsidy programs, I can estimate the effect of geographical distance between the farmer and schools, highway or railways on the loan performance.

4.2 Loan Default Forgiveness, Adverse Selection and Credit Supply

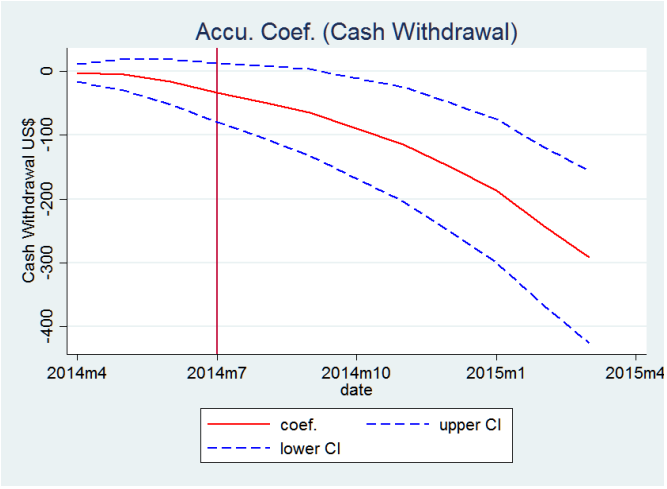
Politics intervention may induce undesirable consequences. In order to help the farmers make through the hard time of natural disasters, in the past, the India governments have several times of default agriculture loan waiving programs. The loan waiving programs may make the farmers form the belief that they could default with no cost in the future. On the other hand, the banks would anticipate, in the next year after the waiving program, there is severe adverse selection issue of all the loan applications. The banks however cannot distinguish the peach from lemon and thus strengthen the credit supply, increase the borrowing cost as a whole in equilibrium. The poor farmers who desire the funding support the most will have difficulty in getting the loans. Moreover, such loan default waving policies go with the provincial election cycles. In order to get more votes, the governor candidates often make such promises. With the rich data on agriculture loans, I am able to estimate the effects of loan waiving programs, to what extent, will affect the credit supply and borrowing cost and how persistent such effect is. The paper has much implication on the policy making in the developing countries.

Graphs and Tables

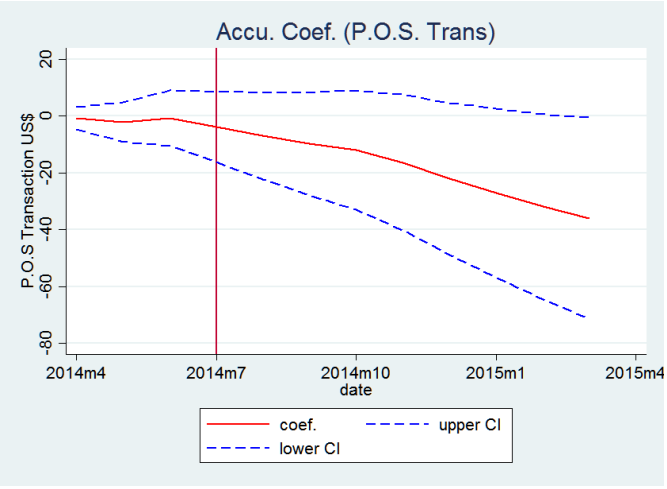
The following graphs report the accumulative coefficients and its 5% and 95% confidence interval by estimating the following regression equation. $Y_{i,t} = \sum_{t=-3}^{9} \beta_t \, HomeLoan_i * Month_t + \gamma_t + \gamma_i + \epsilon_{i,t}$. $Y_{i,t}$ is the monthly total cash withdrawal, P.O.S. transaction and credit card spending (in US dollars) respectively for **Graph1.1**, **Graph 1.2** and **Graph 1.3**. γ_t represents the year-month fixed effect. γ_i represents the individual fixed effect. The standard errors are clustered at individual level. The regression estimation is over the matched sample of home loan owners and non-home loan owners (residential address, annual income, age, gender) in the period March 2014 to March 2015. FY 2014-2015 is from April 2014 to March 2015. The red vertical line indicates the policy announcement month July 2014.

Graph 1.4 plots the monthly top-up on PPF accounts of fiscal year 2013-2014 and fiscal year 2014-2015. The red line also indicates the policy announcement month July 2014.

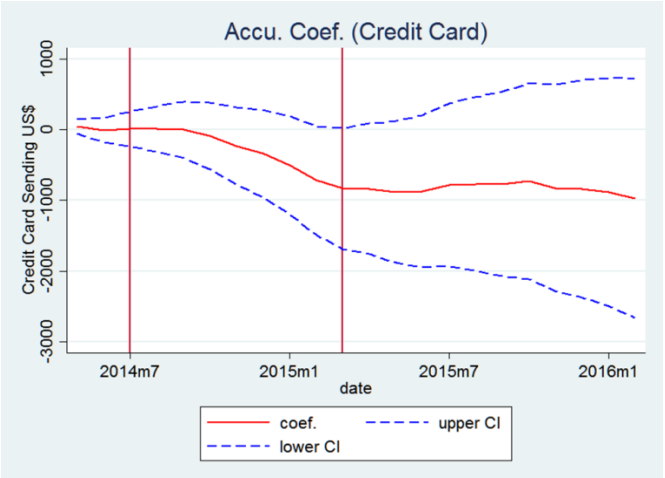
Graph 1.1



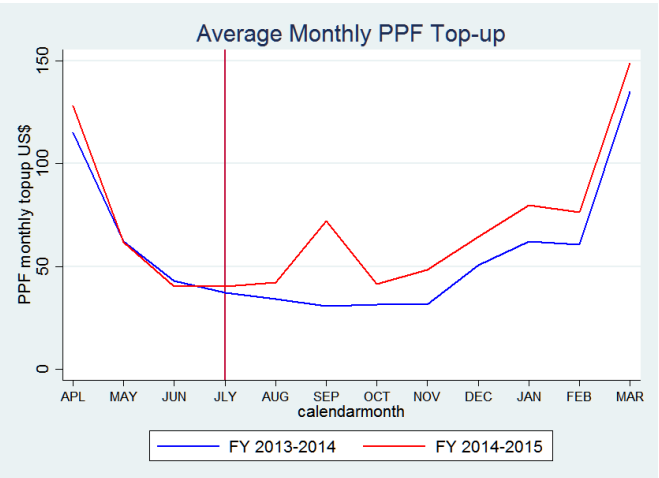
Graph 1.2



Graph 1.3



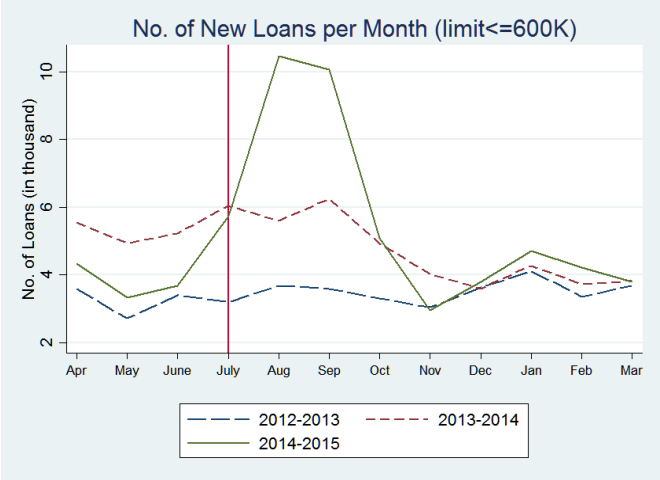
Graph 1.4



Graph 2.1 plots the number of loans (in thousand) with the approved credit limit below 600K India Rupee initiated in each of month for the fiscal year 2012-2013, 2013-2014 and 2014-2015. The loan initiation is identified by repayment starting month. The red line indicates the policy announcement month of July 2014.

Graph 2.2 shows the percentage of loan is in the delinquency/default status in the September of next fiscal year since the loan is initiated in the corresponding month. For example, the first bar is for the loans initiated in April 2012 and the loan status is on September 2013.

Graph 2.1



Graph 2.2

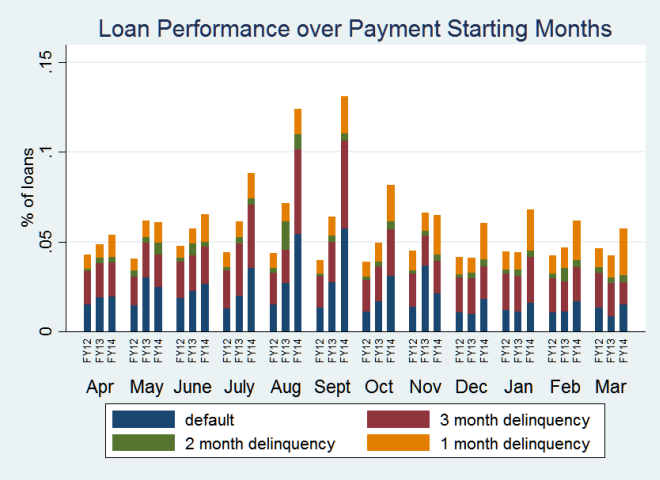


Table 1 Summary Statistics of India Agriculture Loans

Variable	N	mean	p10	p50	p90	sd
approved credit limit	6,243,347	112959.9	25000	75000	266000	221218
total disbursed amount	6,243,347	111788.2	25000	75000	264367	213835
intereat rate	6,243,347	9.67	7	9.95	11.85	2.73
age	6,243,347	44.18	29	43	61	12.07
male (==1)	6,051,642	0.69	0	1	1	0.46
primary collateral value	4,186,807	270126.6	24635	98358	351036	197,000,000
loan sanction year	6,243,347	2013.54	2011	2014	2015	2.76

Region	percent	Activity Description	percent	loan status	percent
CHENNAI	31.53%	Gold Loan	57%	normal	85.65%
HYDERABAD	29.60%	Growing Of Cereals	7%	delinquent for 1 month	0.52%
MUMBAI	7.77%	Any Other Direct Finance To Agriculture	7%	delinquent for 2 months	0.88%
KERALA	6.95%	Growing Of Sugarcane Or Sugar Beet	5%	delinquent for 3 months	4.13%
BHOPAL	3.57%	Dairy including construction of Shed	3%	non performing asset	8.82%
BHUBANESWAR	3.22%	Growing Of Other Crops, N.e.c.	2%		
BANGALORE	3.10%	Growing Of Cotton	2%		
PATNA	2.73%	PURCHASE OF TRACTORS	2%		
NEW DELHI	2.63%	Growing Of Any Other Plantation Crops,	2%		
BENGAL	2.59%	Growing Of Vegetables (olericulture)	1%		
AHMEDABAD	2.11%	Growing Of Fruits	1%		
LUCKNOW	1.83%				
CHANDIGARH	1.38%				

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Schwab R M. Inflation expectations and the demand for housing[J]. The American Economic Review, 1982, 72(1): 143-153.

Schmeling M, Schrimpf A. Expected inflation, expected stock returns, and money illusion: What can we learn from survey expectations?[J]. European Economic Review, 2011, 55(5): 702-719.

Stiglitz J E, Weiss A. Credit rationing in markets with imperfect information[J]. The American economic review, 1981, 71(3): 393-410.

Thaler R H. Psychology and savings policies[J]. The American Economic Review, 1994, 84(2): 186-192.

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SUMIT AGARWAL
Professor of Finance

November 28th 2016

To Whom It May Concern,

It gives me great pleasure to write this letter of recommendation for my PhD student Zhang Man in applying for the post-doctoral position in household finance with NBER. Man is currently on her fifth year of the finance PhD program in National University of Singapore and expected to graduate in May 2017. I started to be her thesis supervisor three years ago. She is among the very few PhD students I have ever seen who can produce research work independently with high quality. I recommend her highly for your consideration and I do hope you could offer her this precious opportunity as a milestone of her professional career.

I am firstly very much impressed by her fast learning ability, strong execution skills and great sense of responsibility. As for the training purpose, I left her with three old massive consumer credit card data-sets from three South America countries and required her to clean up the data and produce a descriptive report on the consumer credit markets for the three countries. Starting with little knowledge in the area, she soon picked up the data cleaning skills, obtained a deep understanding of the literature and produced a nicely presented and structured report in two months. In the meanwhile, she was also involved in a project using textual analysis methodology to understand the mortgage strategically default behavior. Again, with zero foundation, she figured out the how to extract textual information, process the big data and perform various analysis. These are only two very much impressive examples of the many, through which, she exhibits autonomous learning ability. She equipped herself with essential tools, rigorous thinking habit and working ethic to become a successful researcher in short time.

She demonstrated her superior ability in independent thinking in the beginning of her fourth year PhD when she started to think about the research ideas for her dissertation. I was amazed when she came up with four

well written proposals on the studies in the field of household finance. More worth well to mention, all these initiations were interesting, important to both the academia and real practice and she can only thought of these ideas because she had thorough understanding of the literature, innovative spirit and the sense of intellectual's social responsibility. The idea includes studying the stock wealth effect on consumption empirically with individual portfolio and debit card consumption transaction data. Another idea is to study how inflation expectation will affect consumption decision by utilizing the fact that monsoon forecast has great impact on inflation expectation in India and the monsoon condition is exogenous. Due to data limitation and sample range, these two ideas are at the preliminary stage.

Among the four research ideas, two of which have turned out to be her well established dissertation. The paper "*Saving and Consumption Response to Income Tax Exemption Policy: Evidence from India*" finds that the income tax incentive provided for housing loans effectively induce people to save more and consume less especially for the discretionary consumption. The estimated average lower bound of the increased home loan payment is 340 US $ per annum. Moreover, with the subsample of consumers with credit card and longer sample period, she finds that the reduction in consumption neither reverse back nor further reduced in the next fiscal year. The reduction in consumption is mainly from the sectors of dining out, luxury, supermarket and travelling. However, we do not find reduction on consumption for the consumers who top up more on the pension fund account. Those consumers have much higher saving account balance and they may transfer fund from one account to another. The finding of this paper has much contribution to the consumption and saving decision literature and provides valuable implications for the policy making.

Moreover, she also discovered the side effect of the same policy. The other paper "*Income Tax Incentive, Adverse Selection and Personal Loan Performance: Evidence from India*" shows that policy incentive may induce adverse selection issues in personal loan contract which is not identified and priced by the loan providers. The increased income tax exemption limit for home loan repayment induced the marginal buyers to take the home loan. We find that there are 4,000 (66.7%) more new loans initiated in the following two months after the policy announcement. In the September of next fiscal year, the loans initiated in these two months exhibit significantly higher (1.22% and 1.27%) two-month delinquency rate controlling for the interest rate and all the other available observables of the loan characteristics and the consumer characteristics. This paper tackles on an important question of whether the fiscal policies have the side effect that will change the demand of credit.

Moreover, she also has two other excellent working papers on durable good consumption and warranty claiming behaviors. The study on "*Salience and Peer Effects: Durable good choice*" was also solely initiated

by Man. The paper finds that, upon a warranty claim event on a certain brand, consumers in the neighborhood (postal code level) switch to the other brands for the same type of the products and this behavior is more pronounced for the brands with better objective quality standard. The other paper "*Moral Hazard and Claim Timing of Extended Warranty on Dural Goods*" finds huge spike of claim rate just before the warranty expiration date and the delayed claims are associated with higher repairing cost. This paper identifies the moral hazard behavior in the warranty contract and partially explains why the durable goods warranty service is highly priced. The paper also addresses a classical economic question on how people value time and make decisions with present salience cost.

On a personal level too, Man does not disappoint. She is friendly and easygoing with a ready smile. She is always positive and her nice personality makes various types of collaboration work smooth. She has a very good reputation among her colleagues and the faculty. I expect her will make an excellent colleague in your institution.

She constantly surprises me with her outstanding performance. Man has shown her strong passion and determination in household finance. Man always says that she would like to do research for the common people, poor people and emerging economy. She has independent thought, strong intellectual curiosity, diligent working attitude and belief in exploring the law of human behaviors. Based on my more than twenty years' experience in the academia profession, she is among the top talented and will be very valuable to your institution. If you have any questions, please do not hesitate to contact me with my coordinates appear on this letterhead.

Sincerely,

Sumit Agarwal