

# For Online Publication

Appendix to “Learning in the Limit: Income Inference from Credit Extensions” by Xiao Yin

## A. Survey

Please read the following information carefully.

The use of credit cards is one important channel for residents to make daily consumption. To better understand the impact of credit cards on people’s lives, we selected a certain number of active users to participate in a survey. The survey is expected to take between 5 to 10 minutes. If you choose to take the survey, you will be awarded 15 CNY.

This study is in collaboration with Xiao Yin, an assistant professor of economics at UCL in the UK. The data will only be analyzed by Xiao Yin for scientific research purposes and will not be evaluated by this bank. We will not disclose participants’ personal information in any respect. We will not, to any extent, change the types of financial products we provide, including credit scores, credit limits, deposit rates, etc., based on the participants’ personal answers. Therefore, please answer based on your true thoughts.

- Yes
- No

1. How many banks do you usually use for transaction purposes?

- (a) 1
- (b) 2
- (c) 3 or more

2. Your total income over the past 12 months is \_\_\_\_\_.

Note: income includes wages, salaries, bonuses, commission, etc., excluding capital gains and financial return from financial investments.

3. What was the total amount of your spending during the past 12 months (excluding investment and purchases of durable goods including housing, cars, etc.)?

4. What is the current value of your total wealth?

Note: total wealth is the value of all assets such as cash, savings, houses, stock market wealth, and all other liquid and fixed assets minus all debts you owe.

5. How many hours on average do you work every week over the past 12 months?

6. Over the next 12 months, suppose you are not unemployed, what's the level of total income you are most likely to get?

7. What's the most likely level of your total wealth in 12 months?

8. Over the next 12 months, how much would you most likely spend on average every month (excluding investment and purchases over durable goods including housing, cars, etc.)?

9. How many hours on average will you work every week over the next 12 months?

10. What's the probability that you will lose your job over the next 12 months?

11. What's the probability that you will not be able to make a payment to your borrowing over the next 12 months?

Note: Please answer zero if you do not plan to borrow over the next 12 months.

12. Compared to your current total credit limit across all financial institutions or platforms, how much would your total credit limit be (in percentage) in one year?

- (a) Decreases by more than 50%
- (b) Decreases by between 25% and 50%
- (c) Decreases by between 10% to 25%
- (d) Decreases by between 0% to 10%
- (e) Stays roughly the same.
- (f) Increases by between 0% to 10%
- (g) Increases by between 10% to 25%
- (h) Increases by between 25% and 50%
- (i) Increases by more than 50%

13. Compared to your current total credit limit across all financial institutions or platforms, how much would your total credit limit be (in percentage) in five years?
- (a) Decreases by more than 50%
  - (b) Decreases by between 25% and 50%
  - (c) Decreases by between 10% to 25%
  - (d) Decreases by between 0% to 10%
  - (e) Stays roughly the same.
  - (f) Increases by between 0% to 10%
  - (g) Increases by between 10% to 25%
  - (h) Increases by between 25% and 50%
  - (i) Increases by between 50% and 100%
  - (j) Increases by between 100% and 200%
  - (k) Increases by more than 200%
14. How much will the overall Chinese economy change (in percentage relative to the current level) over the next year?
- (a) Decreases by more than 20%
  - (b) Decreases by between 15% and 20%
  - (c) Decreases by between 10% to 15%
  - (d) Decreases by between 5% to 10%
  - (e) Decreases by between 2.5% to 5%
  - (f) Decreases by between 0% to 2.5%
  - (g) Stays roughly the same.
  - (h) Increases by between 0% to 2.5%
  - (i) Increases by between 2.5% to 5%
  - (j) Increases by between 5% to 10%
  - (k) Increases by between 10% to 25%
  - (l) Increases by between 25% and 30%
  - (m) Increases by more than 20%
15. How much will the unemployment (in percentage relative to the current level) over the next year?
- (a) Decreases by more than 20%
  - (b) Decreases by between 15% and 20%
  - (c) Decreases by between 10% to 15%
  - (d) Decreases by between 5% to 10%
  - (e) Decreases by between 2.5% to 5%
  - (f) Decreases by between 0% to 2.5%
  - (g) Stays roughly the same.

- (h) Increases by between 0% to 2.5%
  - (i) Increases by between 2.5% to 5%
  - (j) Increases by between 5% to 10%
  - (k) Increases by between 10% to 25%
  - (l) Increases by between 25% and 30%
  - (m) Increases by more than 20%
16. (Random 30%) How confident are you in evaluating whether the overall economy is functioning effectively at the moment? <sup>11</sup>
- (a) not very confident
  - (b) somewhat confident
  - (c) very confident
17. (Random 30%) Suppose the overall economy in China grows by 5% relative to the current level over the next year, how would this affect your total income over the same period?
- (a) Decreases by more than 20%
  - (b) Decreases by between 15% and 20%
  - (c) Decreases by between 10% to 15%
  - (d) Decreases by between 5% to 10%
  - (e) Decreases by between 2.5% to 5%
  - (f) Decreases by between 0% to 2.5%
  - (g) Stays roughly the same.
  - (h) Increases by between 0% to 2.5%
  - (i) Increases by between 2.5% to 5%
  - (j) Increases by between 5% to 10%
  - (k) Increases by between 10% to 25%
  - (l) Increases by between 25% and 30%
  - (m) Increases by more than 20%
18. (Random 30%) Suppose the unemployment rate in China decreases by 10% relative to the current level over the next year, how would this affect your total income over the same period?
- (a) Decreases by more than 20%
  - (b) Decreases by between 15% and 20%
  - (c) Decreases by between 10% to 15%
  - (d) Decreases by between 5% to 10%
  - (e) Decreases by between 2.5% to 5%
  - (f) Decreases by between 0% to 2.5%

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<sup>11</sup>Questions 16 to 21 are sent tot the same set of individuals.

- (g) Stays roughly the same.
- (h) Increases by between 0% to 2.5%
- (i) Increases by between 2.5% to 5%
- (j) Increases by between 5% to 10%
- (k) Increases by between 10% to 25%
- (l) Increases by between 25% and 30%
- (m) Increases by more than 20%

19. (Random 30%) Suppose banks increase your credit card limit by 5000 CNY this month. This would mean that the banks expect your total income to be changed by \_\_\_\_\_ in the next 12 months.

Note: use a negative number for decreases.

20. (Random 30%) Suppose banks increase your credit card limit by 10000 CNY this month. This would mean that the banks expect your total income to be changed by \_\_\_\_\_ in the next 12 months.

Note: use a negative number for decreases.

21. (Random 30%) Rather than receiving 100 Yuan today, which options would you choose? (select all that apply)

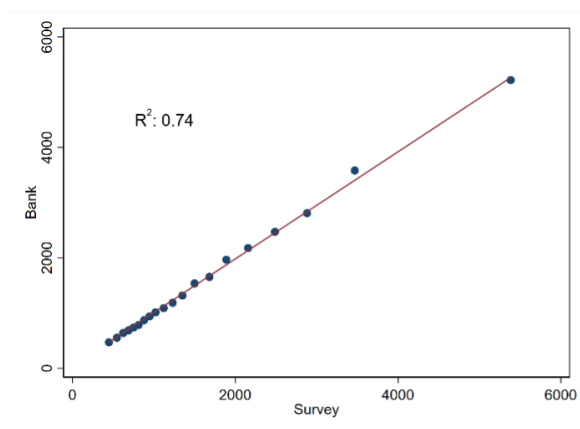
- (a) 100 Yuan in 6 months.
- (b) 102.5 Yuan in 6 months.
- (c) 105 Yuan in 6 months.
- (d) 107.5 Yuan in 6 months.
- (e) 110 Yuan in 6 months.
- (f) 112.5 Yuan in 6 months.
- (g) 115 Yuan and more in 6 months.

## B: Additional Results

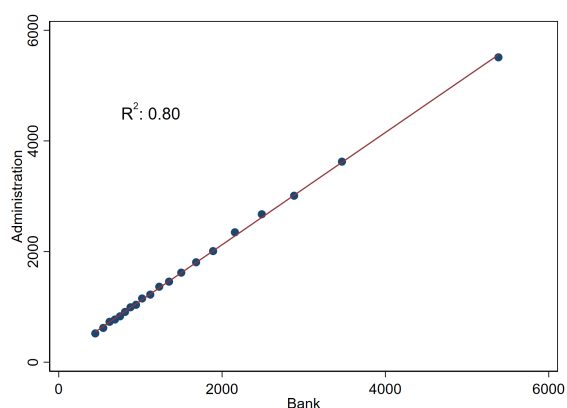
Figure A.1. Sanity Check of Survey Data

This figure performs the sanity check of the survey data. Panel A is a binned scatter plot of income calculated from transaction history vs reported income. Panel B is a binned scatter plot of income calculated from administration and that from transaction history. Panel C is a binned scatter plot of past consumption calculated from transaction history vs reported past consumption; data is restricted to those who reported only using this bank for daily transactions. Panel D is a binned scatter plot of past consumption calculated from transaction history vs that from the credit registry; data is restricted to those who reported to have liquid savings less than one week of income.

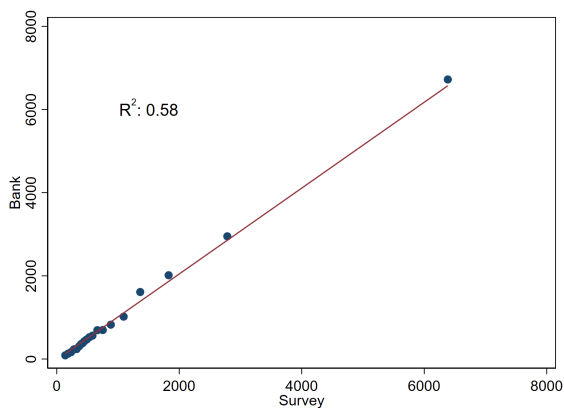
A: Income from Transaction Histories and Surveys



B: Income from Administration and Transaction Histories



C: Spending from Transaction Histories and Surveys



D: Spending from Transaction Histories and Credit Registry

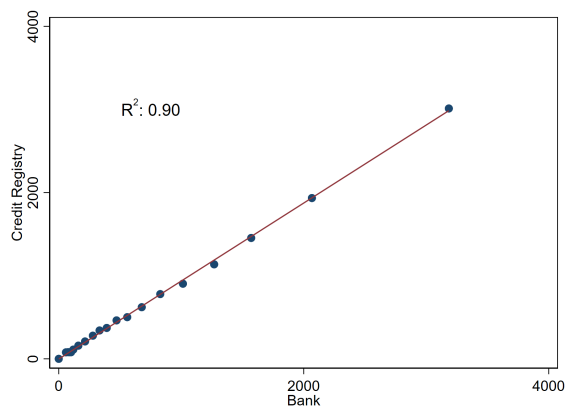


Figure B.2: Limit Growth and Income Growth

This figure plots the relationship between measures of future income growth on year-on-year quarterly credit limit growth. On both panels, the x-axis is the log changes in aggregate credit limits from quarter  $t - 3$  to quarter  $t$ . Data is from New York Fed's Survey of Consumer Expectations. On Panel A, the y-axis is the average quarter- $t$  one-year-ahead expected income growth from New York Fed's Survey of Consumer Expectation. On Panel B, the y-axis is the quarterly GDP growth from a quarter  $t$  to quarter  $t+3$ . Data is from Fred. Sample periods are from 1999Q1 to 2023Q3.

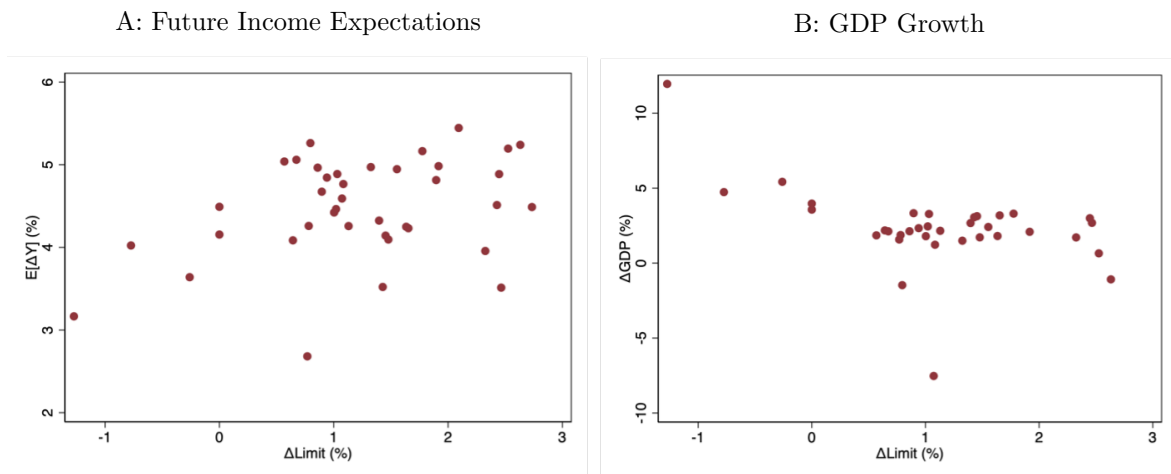


Table B.1. Sample Comparison

This table compares the main sample and a 3% of the whole sample in the bank.

	(1)	(2)	(3)	(4)	(5)	6	7	8	9	10
	Panel A: Survey Sample					Panel B: Whole Sample				
	Mean	SD	p25	Median	p75	Mean	SD	p25	Median	p75
Age	39.28	9.00	29	39	48	40.83	10.21	28	39	48
Female	0.52	0.50	0	1	1	0.50	0.50	0	0	1
Spending	7.57	10.30	1.85	4.88	9.40	9.30	13.42	2.12	5.19	11.96
Income	10.57	14.04	4.52	7.70	16.01	12.12	16.81	5.58	9.40	17.83
Saving	169.61	193.04	10.07	27.30	127.62	172.29	236.17	11.82	52.01	160.01
Limit	87.88	110.88	13.39	54.13	155.27	92.77	152.81	18.10	65.86	183.17
Debt	7.67	10.08	0.00	0.00	9.53	7.03	15.78	0.00	0.00	14.21
Debt Debt> 0	11.96	11.14	4.36	11.81	22.82	14.44	16.77	2.90	12.90	26.34



Table B.2: Effects of Limit Increases - Restricted Sample

The table compares the debt and expectation responses, restricted to those who only use credit cards at other financial institutions.

	Panel A: Main Sample		Panel B: Surveyed Sample		
	D B - 3M (1)	D B - 6M (2)	D B - 3M (3)	D B - 6M (4)	D E[Y] (6)
T1	0.082*** (0.012)	0.141*** (0.020)	0.097*** (0.021)	0.175*** (0.032)	0.394*** (0.130)
T2	0.049*** (0.014)	0.087*** (0.022)	0.062*** (0.023)	0.113*** (0.035)	0.013 (0.181)
Diff	0.032** (0.015)	0.054** (0.027)	0.035 (0.024)	0.062* (0.038)	0.381** (0.184)
Controls	Yes	Yes	Yes	Yes	Yes
N	2234	2234	1215	1215	1215

Table B.3: Spending Responses by Expectation Changes

This table compares the spending responses by changes in expectations.

	E[L.W]		E[T.W]		E[Hrs]		E[u]		E[ $\rho$ d]		E[L] - 6M		E[L] - 5Y	
	Low (1)	High (2)	Low (3)	High (4)	Low (5)	High (6)	Low (7)	High (8)	Low (9)	High (10)	Low (11)	High (12)	Low (11)	High (12)
Panel A: B - 6M														
T1	0.200*** (0.046)	0.167*** (0.036)	0.248*** (0.041)	0.117*** (0.039)	0.202*** (0.035)	0.220*** (0.066)	0.216*** (0.034)	0.229*** (0.066)	0.223*** (0.035)	0.225*** (0.055)	0.203*** (0.048)	0.174*** (0.043)	0.209*** (0.047)	0.182*** (0.041)
T2	0.120*** (0.042)	0.109*** (0.037)	0.122*** (0.040)	0.107** (0.042)	0.127*** (0.032)	0.127*** (0.051)	0.116*** (0.031)	0.138*** (0.056)	0.113*** (0.031)	0.123** (0.063)	0.124** (0.037)	0.110** (0.045)	0.116*** (0.035)	0.119** (0.047)
N	2588	2523	2698	2413	4084	1027	4142	969	4408	702	2561	2550	2564	2547
Panel A: C														
T1	0.334*** (0.055)	0.342*** (0.069)	0.311*** (0.056)	0.364*** (0.072)	0.350*** (0.049)	0.301*** (0.102)	0.333*** (0.054)	0.367*** (0.093)	0.332*** (0.050)	0.460*** (0.097)	0.360*** (0.030)	0.372*** (0.084)	0.379*** (0.033)	0.349*** (0.081)
T2	0.236*** (0.062)	0.213*** (0.070)	0.224*** (0.059)	0.219*** (0.071)	0.246*** (0.058)	0.209** (0.077)	0.224*** (0.058)	0.199** (0.082)	0.217*** (0.056)	0.198** (0.094)	0.215*** (0.036)	0.184** (0.092)	0.201*** (0.040)	0.195** (0.087)
N	2588	2522	2698	2412	4083	1027	4141	969	4408	701	2560	2550	2563	2547

Table B.4. Transfers

This table studies the effects of the experiment on between-financial institutions transfers. Inflow is the transfer from other banks to the bank in the sample plus deposits. Outflow is the transfer from the bank in the sample to other banks plus withdraws.

	Inflow (1)	Inflow (2)	Outflow (3)	Outflow (4)
T1	0.032 (0.064)	0.047 (0.071)	0.063 (0.082)	0.069 (0.089)
T2	-0.075 (0.069)	-0.069 (0.088)	-0.052 (0.077)	-0.033 (0.086)
Controls	No	Yes	No	Yes
N	5500	5500	5500	5500

Table B.5: Expectation Changes by Industries

This table studies expectation changes by *XS Var* and sector tradability. *XS Var* is defined in section IV.C in the main text. Following Müller and Verner (2023), participants are labeled as in a tradable sector if they work in agriculture, manufacturing, or mining. Non-tradable include other sectors.

	E[Y]		E[Hrs]		E[u]	
	Non-Tradable (1)	Tradable (2)	Non-Tradable (3)	Tradable (4)	Non-Tradable (5)	Tradable (6)
Panel A: Low XS Var						
T1	0.204 (0.173)	0.093 (0.176)	-0.000 (0.000)	-0.000 (0.000)	-0.077 (0.153)	0.003 (0.147)
T2	0.042 (0.181)	0.033 (0.251)	0.000 (0.000)	0.000 (0.000)	-0.031 (0.166)	-0.045 (0.173)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
N	693	462	693	462	693	462
Panel B: High XS Var						
T1	0.554*** (0.167)	0.434*** (0.182)	-0.000 (0.000)	-0.000 (0.000)	-0.309** (0.158)	-0.242 (0.171)
T2	0.082 (0.226)	0.063 (0.244)	0.000 (0.000)	0.000 (0.000)	-0.062 (0.109)	-0.032 (0.150)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
N	693	462	693	462	693	462

## C. US Survey

1. How many credit cards do you use for daily spending?

- (a) 0
- (b) 1
- (c) 2
- (d) 3
- (e) 4 or more

2. What's the total level of your credit limit over all financial institutions?

- (a) less than 2000
- (b) 2000 - 5000
- (c) 5000 - 10000
- (d) 10000 - 20000
- (e) 20000 - 40000
- (f) 40000 - 70000
- (g) 70000 - 100000
- (h) more than 10000

(10%) For the following questions, we would like you to consider the scenario that your bank has decided to increase your credit card limit by 10%.

(10%) For the following questions, we would like you to consider the scenario that your bank has decided to increase your credit card limit by 15%.

(10%) For the following questions, we would like you to consider the scenario that your bank has decided to increase your credit card limit by 20%.

(10%) For the following questions, we would like you to consider the scenario that your bank has decided to increase your credit card limit by 25%.

(10%) For the following questions, we would like you to consider the scenario that your bank has decided to increase your credit card limit by 30%.

(10%) For the following questions, please imagine a scenario where your bank has chosen you at random to raise your credit card limit by 10%. This decision by the bank is entirely random and not influenced by any assessment of pertinent factors.

(10%) For the following questions, please imagine a scenario where your bank has chosen you at random to raise your credit card limit by 15%. This decision by the bank is entirely random and not influenced by any assessment of pertinent factors.

(10%) For the following questions, please imagine a scenario where your bank has chosen you at random to raise your credit card limit by 20%. This decision by the bank is entirely random and not influenced by any assessment of pertinent factors.

(10%) For the following questions, please imagine a scenario where your bank has chosen you at random to raise your credit card limit by 25%. This decision by the bank is entirely random and not influenced by any assessment of pertinent factors.

(10%) For the following questions, please imagine a scenario where your bank has chosen you at random to raise your credit card limit by 30%. This decision by the bank is entirely random and not influenced by any assessment of pertinent factors.

3. How much do you think your spending would change over the next year?

- (a) decreases by more than 20%
- (b) decreases by 15% to 20%
- (c) decreases by 10% to 15%
- (d) decreases by 5% to 10%
- (e) decreases by 0% to 5%
- (f) stays the same
- (g) increases by 0% to 5%
- (h) increases by 5% to 10%
- (i) increases by 10% to 15%
- (j) increases by 15% to 20%
- (k) increases by more than 20%

4. How much do you think your income would change over the next year?

- (a) decreases by more than 20%
- (b) decreases by 15% to 20%
- (c) decreases by 10% to 15%
- (d) decreases by 5% to 10%
- (e) decreases by 0% to 5%
- (f) stays the same
- (g) increases by 0% to 5%
- (h) increases by 5% to 10%

- (i) increases by 10% to 15%
  - (j) increases by 15% to 20%
  - (k) increases by more than 20%
5. How much do you think your savings would change over the next year?
- (a) decreases by more than 20%
  - (b) decreases by 15% to 20%
  - (c) decreases by 10% to 15%
  - (d) decreases by 5% to 10%
  - (e) decreases by 0% to 5%
  - (f) stays the same
  - (g) increases by 0% to 5%
  - (h) increases by 5% to 10%
  - (i) increases by 10% to 15%
  - (j) increases by 15% to 20%
  - (k) increases by more than 20%
6. What's the probability that you would default on your debt over the next year?
7. How many hours would you work on average every week over the next year?
8. How much do you think your credit limit over all financial institutions would change over the next year?
- (a) decreases by more than 20%
  - (b) decreases by 15% to 20%
  - (c) decreases by 10% to 15%
  - (d) decreases by 5% to 10%
  - (e) decreases by 0% to 5%
  - (f) stays the same
  - (g) increases by 0% to 5%
  - (h) increases by 5% to 10%
  - (i) increases by 10% to 15%
  - (j) increases by 15% to 20%
  - (k) increases by more than 20%

Table C.1: US Results

This table presents results about hypothetical limit extensions on expectation.  $E[\Delta \log C]$ ,  $E[\Delta \log Y]$ ,  $E[\Delta \log W]$ ,  $E[\Delta \log L]$  are respectively the expected next-year growth of total consumption, income, wealth, and credit limits.  $E[p(d)]$  and  $E[\text{Hrs}]$  are respectively the expected default probability and hours planned to work over the next year. Data is based on part-time and full-time employees with credit cards from SurveyMonkey. Results are winsorized at 1% level.

	$E[\Delta \log C]$ (1)	$E[\Delta \log Y]$ (2)	$E[\Delta \log W]$ (3)	$E[p(d)]$ (4)	$E[\text{Hrs}]$ (5)	$E[\Delta \log L]$ (6)
Panel A: No Information						
$\Delta \log \text{Limit}$	0.190** (0.088)	0.234*** (0.078)	0.068 (0.079)	0.101 (0.095)	-0.035 (0.374)	0.163* (0.081)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
N	344	344	344	344	344	344
Panel B: Random Extensions						
$\Delta \log \text{Limit}$	0.021 (0.075)	0.074 (0.063)	-0.016 (0.065)	0.065 (0.062)	0.002 (0.329)	0.153* (0.082)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
N	348	348	348	348	348	348