

Does FinTech Affect Household Saving Behavior? Findings from a Natural Experiment.



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Philadelphia, September 29th 2017

The Economic Problem of Under-saving and Over-consumption

Does FinTech affect Household Saving?

Research Results

Implications for Researchers, Regulators and Practitioners

People save less than predicted by normative models while costs to enhance financial transparency and capabilities were too high in the past

People save less than they should

- Normative models predict **consumption smoothing** by saving is optimal behavior (Lifecycle consumption model by Modigliani & Brumberg 1954)
- However, in reality people **under-save** and **over-consume** in current periods (Laibson (1997), Ashraf et al. (2006), Thaler & Benartzi (2004), Ottaviani & Vandone (2011))

In the past, high information search costs made transparency expensive

- **Need for increased financial transparency** and reduced complexity to improve household saving (Bernanke 2009, Lusardi 2008)
- Yet, in non-digital past, high **search and transaction costs** made it economically unattractive to invest into better household finance management capabilities /overview (Campebl et al. 2011, Sirri & Tufano 1998, Kamenica et al. 2011)

Negative effects on overall economy, e.g., **deficient wealth at retirement** (Lusardi & Mitchell 2007, Beshears et al. (2015)) **and over-indebtedness** (Lusardi & Tufano 2009, Dynan & Kohn 2007)

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Financial Technology (FinTech) promises better personal finance management. Is this a great new future or just good advertising?

It's all coming together

When you're on top of your money, life is good. We help you effortlessly manage your finances in one place.

SIGN UP FREE

Where is your money going? Whether you want to reduce your debt or start saving, our personal budget software will help you manage your money.

BudgetSimple Promo

BANK ACCOUNT

CREDIT CARDS

The effect of FinTechs on household finance has never been tested so far

Budget \$220 Left June 2016

Category	Spent	Limit	Left
Overall	\$870 of \$1090	\$1090	\$220
AUTO & TRANSPORT			
Gas & Fuel	\$167 of \$200	\$200	\$63
FOOD & DRINK			
Coffee Shops	\$20 of \$40	\$40	\$20
Groceries	\$148 of \$200	\$200	\$40
Restaurants	\$83 of \$100	\$100	\$67
SHOPPING			
Clothing	\$120 of \$150	\$150	\$30

Control of Your Money

Stop living paycheck to paycheck, get out of debt, and save more money.

TRY YNAB FREE FOR 34 DAYS

See why it works (So Amazingly Well)

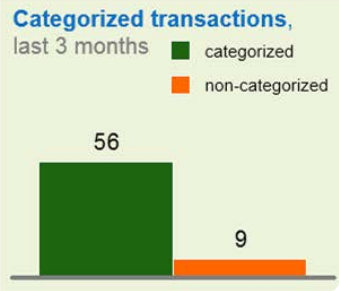
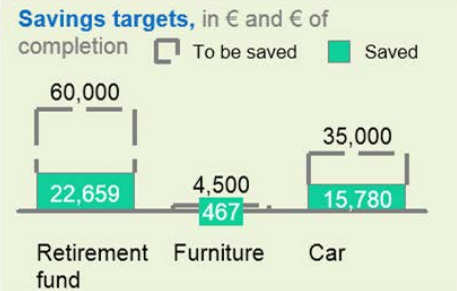
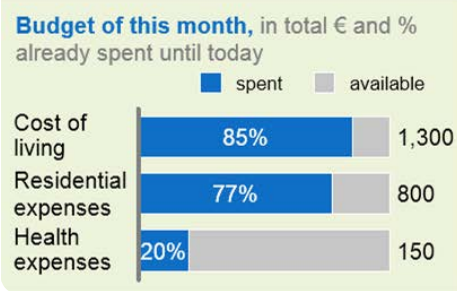
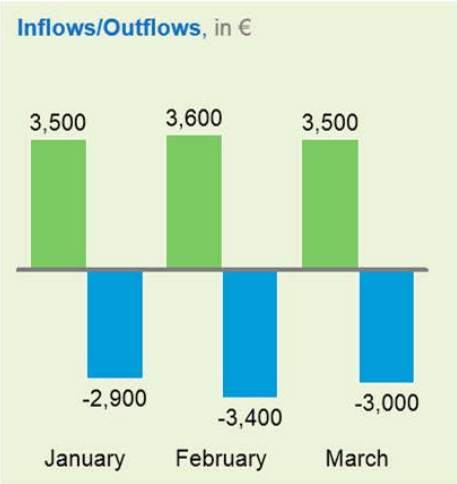
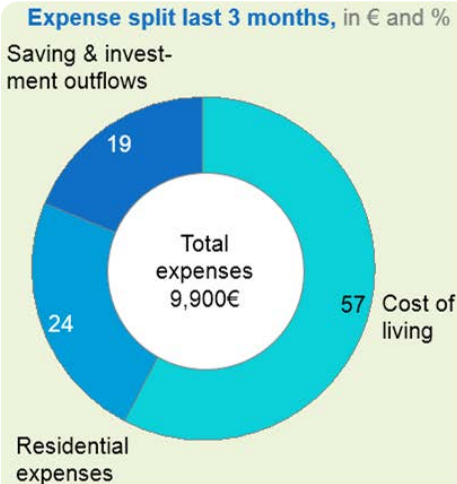
We collaborate with a European bank and leverage their FinTech in a natural experiment to assess its effect on household saving behavior

Cooperating bank & natural field experiment

- Usage of the tool is **free of charge** and part of **online banking ecosystem**
- Natural field experiment starts on **September 1st 2015** and ends on **February 29th 2016**
- All customers receive invitations to **activate the money management tool at log-in**
- During the observation period, **15,077 random customers enrolled** to the tool
- 49,996 customers did not activate** the tool and serve as control group

Cockpit PFM FinTech

SIMPLIFIED



Within our paper, we address the following questions

1

Who activates the money management FinTech?

2

What is the effect of activation on household financials?

3

Do people react differently, contingent on previous saving activity?

4

How does spending behavior post activation change?



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1 Young, male customers with low saving balances but some (financial) education are most likely to activate the FinTech

Results robust probit regression

Dependent variable	Activation of FinTech		
	(1)	(2)	(3)
Dummy male	0,1630992*** <i>0,00</i>	0,1672009*** <i>0,00</i>	0,1670825*** <i>0,00</i>
Age	-0,0562632*** <i>0,00</i>	-0,0548782*** <i>0,00</i>	-0,0552033*** <i>0,00</i>
Dummy industrial employee	-0,0815001*** <i>0,00</i>	-0,08991*** <i>0,00</i>	-0,0877733*** <i>0,00</i>
Dummy unemployed	-0,0848828*** <i>0,00</i>	-0,0068634*** <i>0,82</i>	-0,00643963*** <i>0,83</i>
Portfolio		0,0281702* <i>0,18</i>	0,0361354*** <i>0,09</i>
High Debit at t=0			-0,0251945 <i>0,37</i>
Low Debit at t=0			0,0709578*** <i>0,00</i>
Demographic controls	Yes	Yes	Yes
Banking relationship controls	No	Yes	Yes
Financial controls	No	No	Yes
Observations	59.126	58.996	58.996
Pseudo-R ²	0,0415	0,0522	0,0527

Promising to see that customers with previously **low saving levels** are more likely to activate. However, some previous **(financial) education/ experience is apparently** required

*** 1%, ** 5%, * 10% significance level cluster robust OLS; P-Values reported below

2 We find significant increases in current account, savings and total debit balances, which are economically relevant

Coefficients cluster robust DiD

Dependent variable	Monthly wealth balance at the bank	Monthly debit balance	Monthly savings product balance	Monthly current account balance
	(1)	(2)	(3)	(4)
Interaction dummy	256.7321* <i>0,08</i>	409,0246*** <i>0,00</i>	268,5227*** <i>0,01</i>	176.1064* <i>0,07</i>
Dummy treatment	163.0745** <i>0,05</i>	171.2442** <i>0,03</i>	68.761 <i>0,12</i>	89.940 <i>0,18</i>
Dummy monthly usage	71.751 <i>0,51</i>	41.792 <i>0,69</i>	82.459 <i>0,26</i>	-27.808 <i>0,73</i>
Monthly fixed effects	Yes	Yes	Yes	Yes
Demo controls	Yes	Yes	Yes	Yes
Financial controls in t=0	Yes	Yes	Yes	Yes
Number of observations (months)	211,920	211,920	211,920	211,920
R-squared	0.8307	0.7298	0.7308	0.632

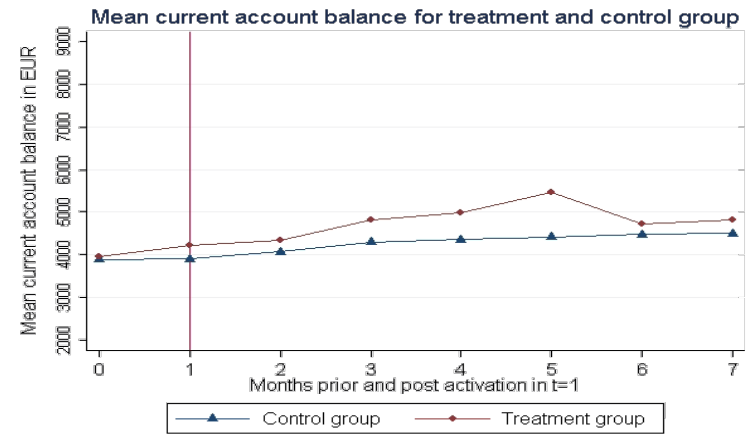
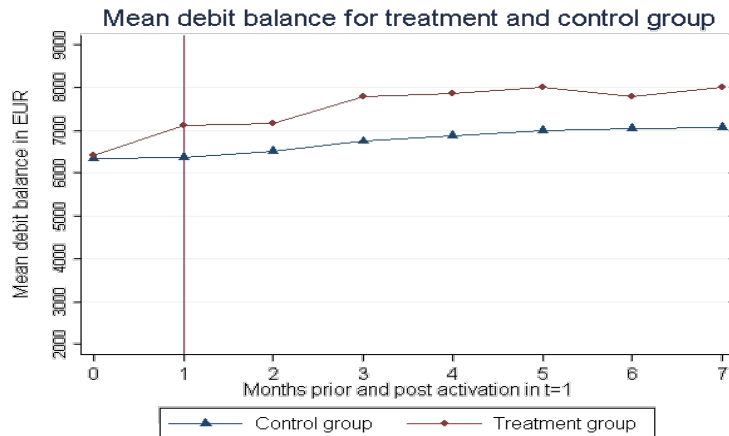
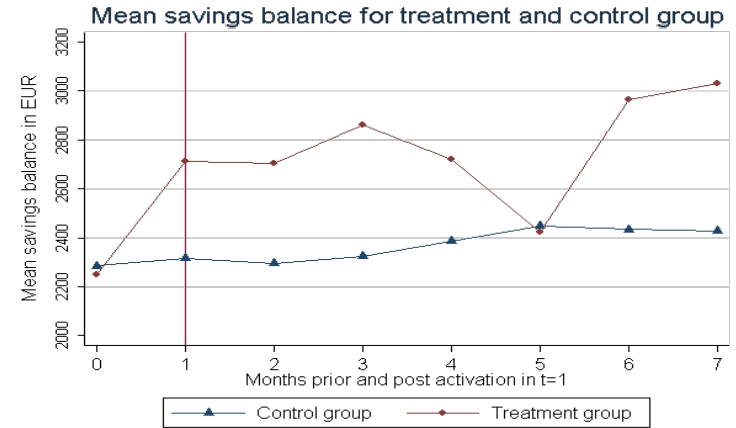
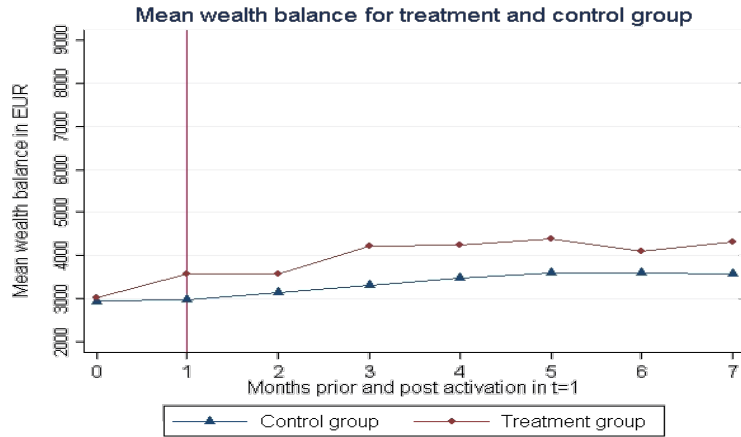
We previously matched the group of activators with a group of comparable non-activators, using coarsened exact matching and propensity score matching

We follow the approach by Bertrand et al. (2004) & Bertrand and Mullainathan (2003) and run a DiD for which we divide months into pre- and post-treatment period


*** 1%, ** 5%, * 10% significance level cluster robust OLS; P-Values reported below

2 The effect is clearly observable and persistent during the observation period

Mean balances treatment group with activation in Sep 2015 and resp. control group



4 We find increasing salary inflows, savings and non-categorized outflows comparing t-1 to t+1

 Further detailed

Spending per category, in € Data variable	Month prior money management tool activation			Month post money management tool activation			t-test P-Value	Wilcoxon- Mann- Whitney P-Value	Cluster robust OLS P-Value	Mean- difference (B)-(A)
	Mean (A)	Median	N	Mean (B)	Median	N				
Inflows										
All inflows	4.236,71	2.209,26	10.115	4.722,20	2.277,74	10.115	.02	.00	.01	485,49
Wage and salary income	3.307,71	1.796,34	10.115	3.721,00	1.846,16	10.115	.03	.00	.02	413,30
Cost of living related inflows	16,64	0,00	10.115	15,26	0,00	10.115	.81	.05	.61	-1,38
Rental income	27,11	0,00	10.115	34,57	0,00	10.115	.35	.00	.28	7,46
Leisure and travel related inflows	13,30	0,00	10.115	17,97	0,00	10.115	.24	.08	.06	4,67
Mobility related inflows	10,74	0,00	10.115	11,38	0,00	10.115	.89	.32	.84	0,64
Medical related inflows	10,63	0,00	10.115	7,72	0,00	10.115	.26	.65	.18	-2,91
Children related income	30,92	0,00	10.115	4,15	0,00	10.115	.00	.00	.00	-26,77
Education related inflows	18,25	0,00	10.115	21,36	0,00	10.115	.75	.07	.68	3,11
Saving & investment income	152,79	0,00	10.115	181,23	0,00	10.115	.33	.01	.09	28,44
Insurance inflows	197,97	0,00	10.115	249,87	0,00	10.115	.00	.00	.00	51,89
Credit related inflows	16,32	0,00	10.115	38,40	0,00	10.115	.08	.46	.08	22,08
Other inflows (incl. cash)	434,34	0,00	10.115	419,29	0,00	10.115	.69	.00	.57	-15,05
Outflows										
All outflows	-4.009,53	-2.156,49	10.115	-4.862,60	-2.322,01	10.115	.00	.00	.00	-853,07
Non categorized outflows	-1.518,87	-333,70	10.115	-1.888,48	-398,73	10.115	.00	.00	.00	-369,61
Cost of living	-272,44	-163,89	10.115	-267,68	-164,54	10.115	.69	.07	.63	4,76
Residential expenses	-401,65	-185,00	10.115	-425,62	-227,81	10.115	.14	.00	.00	-23,97
Leisure and travel expenses	-75,27	0,00	10.115	-72,92	-5,95	10.115	.71	.02	.69	2,35
Mobility expenses	-80,26	-6,90	10.115	-94,44	-13,00	10.115	.19	.01	.15	-14,18
Medical expenses	-22,41	0,00	10.115	-32,07	0,00	10.115	.02	.00	.02	-9,66
Children related outflows	-8,84	0,00	10.115	-7,99	0,00	10.115	.51	.10	.17	0,85
Education and work costs	-19,30	0,00	10.115	-26,68	0,00	10.115	.00	.00	.00	-7,38
Saving & investment outflows	-159,78	0,00	10.115	-444,35	0,00	10.115	.01	.00	.01	-284,57
Insurance expenses	-262,84	-55,36	10.115	-271,29	-69,22	10.115	.44	.00	.28	-8,44
Credit down payments	-167,05	0,00	10.115	-185,25	0,00	10.115	.22	.01	.17	-18,19
Other outflows (incl. cash)	-1.020,83	567,79	10.115	-1.145,83	-600,00	10.115	.00	.00	.00	-125,00

1

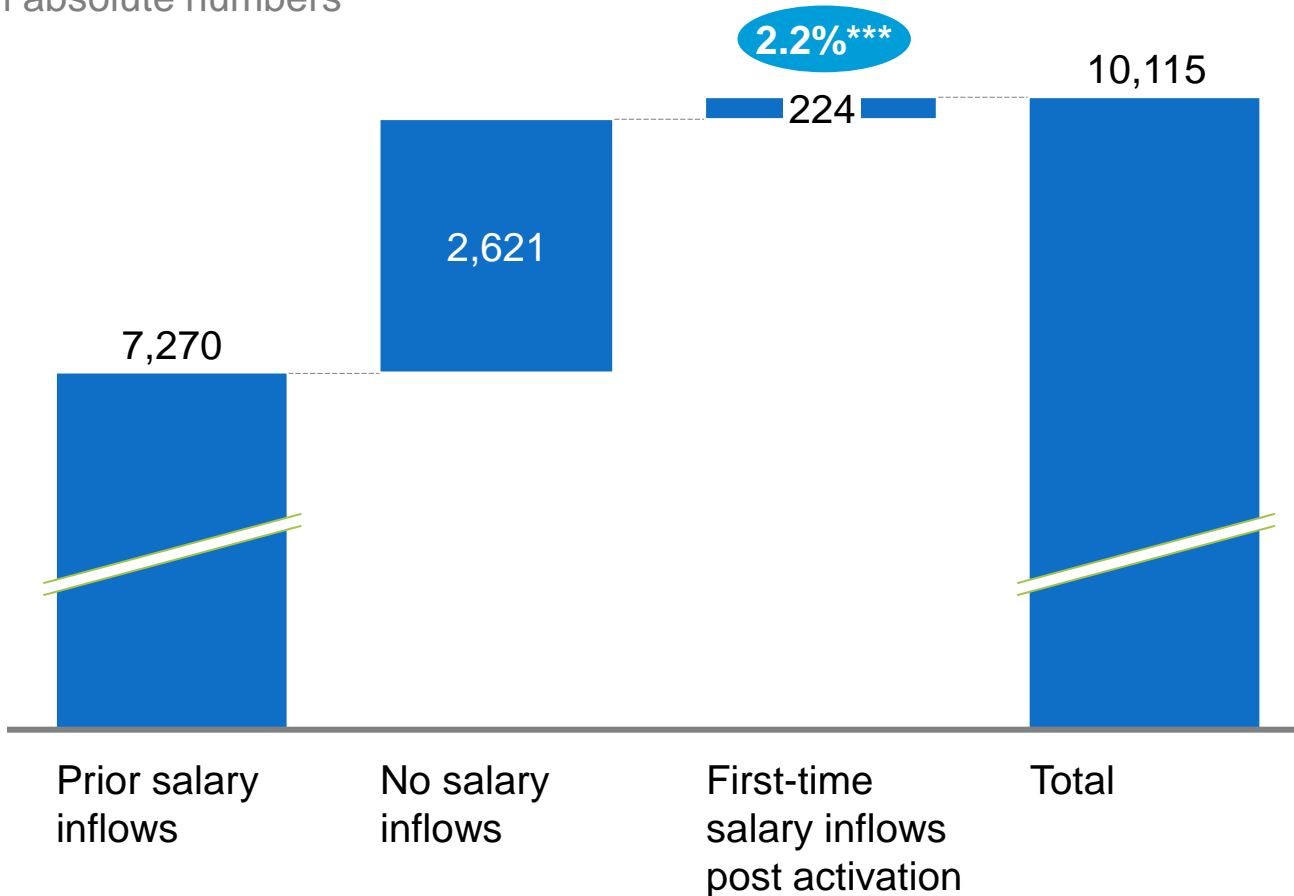
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2

4.1 2.2% of FinTech activators move their salary account to the bank, after tool activation although they are no new customers

Salary inflows of tool users who registered between Nov 1 – Feb 29

In absolute numbers



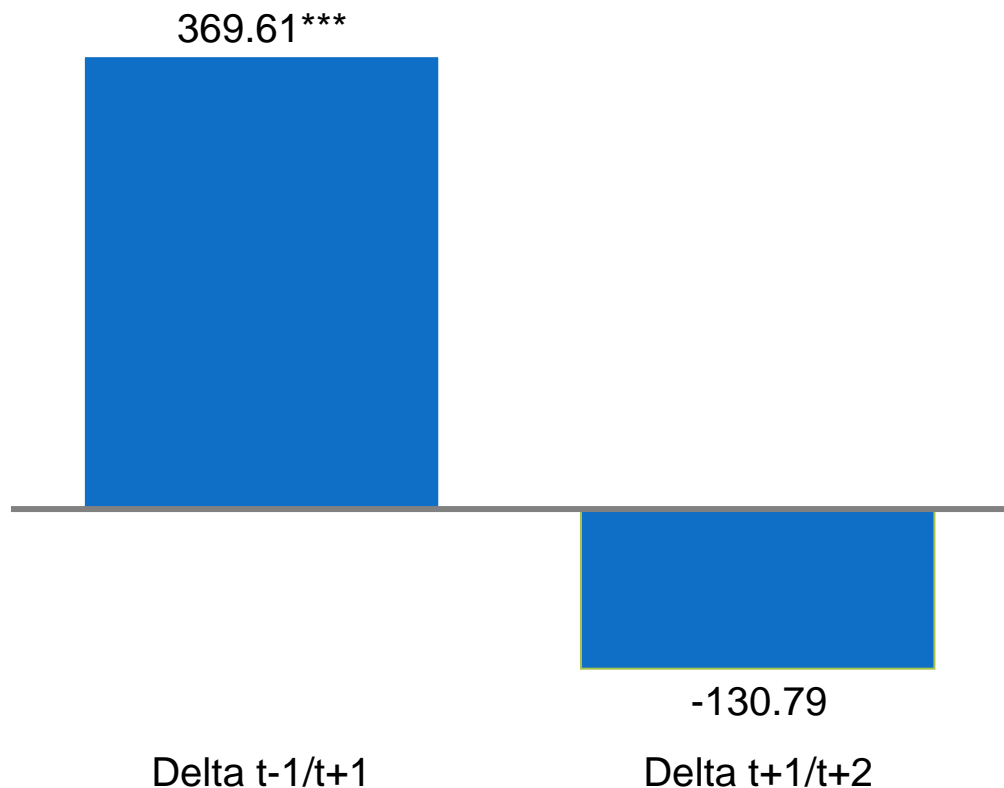
This finding is promising for **practitioners**. It is the **first scientific proof** that digital FinTech service offerings can **improve customer relationships**, significantly!

NOTE: Effect remains significant & robust even when removing all customers age below 30 (potential job starters)

4.3 However, the average customer quickly loses discipline to use the tool frequently and stops allocating non-categorized transactions

Increase in unknown outflows

Mean differences, significant levels of cluster robust OLS regression



- No further increase of non-categorized outflows
- Delta driven by the fact that customers have opportunity to allocate past transactions, which they do only once during tool initiation phase
- Finding ways to **increase discipline of long-term FinTech usage** as promising avenue for future research

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Conclusion



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FinTechs are more likely activated by young, male customers who previously have low savings but some financial experience

2

After activation, savings and current account balances significantly increase compared to control group

3

The FinTech increases both – the likelihood to start first-time saving and to increase existing savings

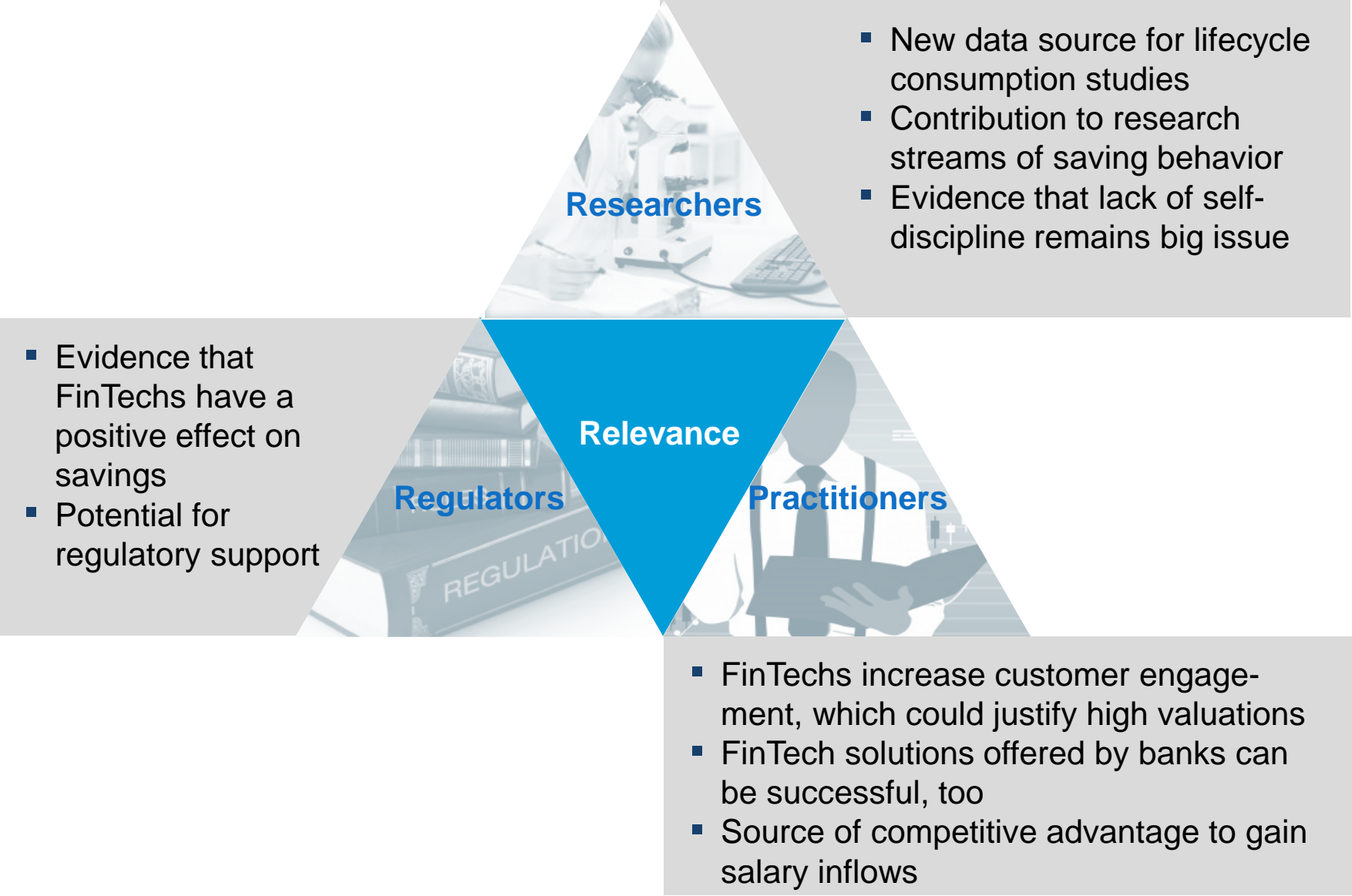
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We find evidence that savings increase is driven by increased usage of savings plans – a feature implemented within the FinTech

5

While some FinTech users transfer their salary to the bank after activation, the majority of customers lacks discipline to use the FinTech over a longer period

We hope our findings contribute to researchers, practitioners & regulators



QUESTIONS



BACKUP

Sample descriptives (1/2)

Data variable	Measurement units	Activate the tool			Do not activate the tool			t-test	Mann-Whitney test
		Mean (A)	Median	N	Mean (B)	Median	N	P-Value	P-Value
Client demographics									
Gender	Dummy=1 if male	59,0%	1	13.670	54,4%	1	45.456	.00	.00
Age	Years	38,8	36,0	13.670	45,0	43,0	45.456	.00	.00
Age 0-15	Dummy=1 if Age 0-15	0,0%	0	15.077	0,0%	0	49.996	.72	.72
Age 16-25	Dummy=1 if Age 16-25	14,1%	0	15.077	6,7%	0	49.996	.00	.00
Age 26-40	Dummy=1 if Age 26-40	42,4%	0	15.077	33,1%	0	49.996	.00	.00
Age 41-50	Dummy=1 if Age 41-50	17,6%	0	15.077	20,9%	0	49.996	.00	.00
Age 51-65	Dummy=1 if Age 51-65	11,7%	0	15.077	19,5%	0	49.996	.00	.00
Age 65plus	Dummy=1 if Age 65plus	4,9%	0	15.077	10,7%	0	49.996	.00	.00
Joint account	Dummy=1 if Joint account	9,3%	0	15.077	9,1%	0	49.996	.34	.34
Single	Dummy=1 if single	50,1%	1	15.077	41,1%	0	49.996	.00	.00
Civil union	Dummy=1 if civil union	0,2%	0	15.077	0,1%	0	49.996	.06	.06
Married	Dummy=1 if married	30,7%	0	15.077	36,9%	0	49.996	.00	.00
Separated	Dummy=1 if separated	1,7%	0	15.077	1,7%	0	49.996	.96	.96
Divorced	Dummy=1 if divorced	5,8%	0	15.077	7,0%	0	49.996	.00	.00
Widowed	Dummy=1 if widowed	1,8%	0	15.077	3,5%	0	49.996	.00	.00
No marriage reported	Dummy=1 if nothing reported	9,7%	0	15.077	9,7%	0	49.996	.02	.02
Self-employed	Dummy=1 if self-employed	0,8%	0	15.077	0,9%	0	49.996	.47	.47
Employees	Dummy=1 if employee	38,9%	0	15.077	36,6%	0	49.996	.00	.00
Public employees	Dummy=1 if public employee	2,1%	0	15.077	2,1%	0	49.996	.59	.59
Industrial worker	Dummy=1 if industrial worker	9,2%	0	15.077	9,3%	0	49.996	.68	.68
Students	Dummy=1 if student	19,8%	0	15.077	14,2%	0	49.996	.00	.00
Housewife	Dummy=1 if housewife	2,2%	0	15.077	2,7%	0	49.996	.00	.00
Retiree	Dummy=1 if retiree	3,4%	0	15.077	7,1%	0	49.996	.00	.00
Unemployed	Dummy=1 if unemployed	3,9%	0	15.077	3,9%	0	49.996	.90	.90
No job reported	Dummy=1 if nothing reported	19,8%	0	15.077	23,2%	0	49.996	.00	.00
Zip Code region 0	Dummy=1 if zip code region 0	7,7%	0	15.077	8,1%	0	49.996	.11	.11
Zip Code region 1	Dummy=1 if zip code region 1	13,9%	0	15.077	16,4%	0	49.996	.00	.00
Zip Code region 2	Dummy=1 if zip code region 2	12,0%	0	15.077	12,3%	0	49.996	.28	.28
Zip Code region 3	Dummy=1 if zip code region 3	7,9%	0	15.077	7,5%	0	49.996	.12	.12
Zip Code region 4	Dummy=1 if zip code region 4	17,3%	0	15.077	17,3%	0	49.996	.96	.96
Zip Code region 5	Dummy=1 if zip code region 5	10,9%	0	15.077	10,8%	0	49.996	.24	.24
Zip Code region 6	Dummy=1 if zip code region 6	10,8%	0	15.077	9,4%	0	49.996	.00	.00
Zip Code region 7	Dummy=1 if zip code region 7	8,6%	0	15.077	6,9%	0	49.996	.00	.00
Zip Code region 8	Dummy=1 if zip code region 8	7,2%	0	15.077	7,5%	0	49.996	.21	.21
Zip Code region 9	Dummy=1 if zip code region 9	3,8%	0	15.077	4,0%	0	49.996	.28	.28

Sample descriptives (2/2)

Data variable	Measurement units	Activate the tool			Do not activate the tool			t-test	Mann-Whitney test
		Mean (A)	Median	N	Mean (B)	Median	N	P-Value	P-Value
Bank relationship									
Length of banking relationship	Years	12,3	9,5	15.064	15,5	12,9	49.874	.00	.00
Intensity of banking relationship	# of branch visits p.a.	1,0	0,0	15.077	0,7	0,0	49.996	.00	.00
Savings plan	Dummy=1 if 'Savings plan' owned	41,1%	0	15.077	36,6%	0	49.996	.00	.00
Savings product	Dummy=1 if 'Savings product' owned	9,0%	0	15.077	11,0%	0	49.996	.00	.00
Retirement product	Dummy=1 if 'Retirement product' owned	15,6%	0	15.077	13,7%	0	49.996	.00	.00
Credit Card	Dummy=1 if 'Credit Card' owned	24,7%	0	15.077	23,1%	0	49.996	.00	.00
Consumer Credit	Dummy=1 if 'Consumer Credit' owned	14,2%	0	15.077	10,5%	0	49.996	.00	.00
Mortgage	Dummy=1 if 'Mortgage' owned	4,2%	0	15.077	4,3%	0	49.996	.86	.86
Credit default risk	Bank credit score (0=low - 1=high)	0,009	0,003	15.077	0,007	0,002	49.996	.00	.00
Financials									
Cash at t=0	€	5.591	1.116	15.077	6.847	1.452	49.996	.00	.00
Low Cash	Dummy=1 if cash in t=0 is lowest decile	11,0%	0	15.077	9,7%	0	49.996	.00	.00
High Cash	Dummy=1 if cash in t=0 is highest decile	8,4%	0	15.077	10,5%	0	49.996	.00	.00
Share of portfolio owners	Dummy=1 if portfolio is owned	10,3%	0	15.077	11,3%	0	49.996	.00	.00
Portfolio value at t=0	€, if portfolio is owned	66.189	7.939	1.554	92.756	15.318	5.664	.00	.00
Debit value at t=0	€	9.648	1.477	15.077	12.103	1.950	49.996	.00	.00
Low Debit	Dummy=1 if debit in t=0 is lowest decile	11,7%	0	15.077	9,5%	0	49.996	.00	.00
High Debit	Dummy=1 if debit in t=0 is highest decile	8,2%	0	15.077	10,5%	0	49.996	.00	.00
Credit value at t=0	€	7.106	0	15.077	5.967	0	49.996	.00	.00
Low Credit	Dummy=1 if credit in t=0 is lowest decile	74,7%	1	15.077	78,1%	1	49.996	.00	.00
High Credit	Dummy=1 if credit in t=0 is highest decile	11,9%	0	15.077	9,4%	0	49.996	.00	.00

Probit: Who activates the FinTech

Dependent variable	Registration for money management tool			
	(1)	(2)	(3)	(4)
Dummy male	0,163 0,00	0,167 0,00	0,167 0,00	0,167 0,00
Age	-0,056 0,00	-0,055 0,00	-0,055 0,00	-0,055 0,00
Age ²	0,000 0,00	0,000 0,00	0,000 0,00	0,000 0,00
Dummy civil union	0,354 0,01	0,326 0,020.021	0,325 0,02	0,323 0,02
Dummy married	0,076 0,00	0,069 0,00	0,068 0,00	0,067 0,00
Dummy divorced	0,177 0,00	0,136 0,00	0,134 0,00	0,134 0,00
Dummy separated	0,181 0,00	0,156 0,00	0,155 0,00	0,154 0,00
Dummy widowed	0,152 0,00	0,062 0,16	0,063 0,15	0,061 0,17
Dummy no marriage reported	-0,054 0,53	0,014 0,87	0,012 0,89	0,020 0,82
Dummy self-employed	0,013 0,83	0,017 0,78	0,030 0,63	0,021 0,74
Dummy public employee	0,014 0,73	-0,006 0,88	-0,007 0,87	-0,003 0,94
Dummy industrial employee	-0,082 0,00	-0,090 0,00	-0,085 0,00	-0,088 0,00
Dummy student	-0,223 0,00	-0,137 0,00	-0,135 0,00	-0,134 0,00
Dummy housewife	-0,027 0,47	0,039 0,31	0,041 0,29	0,041 0,28
Dummy retiree	-0,050 0,15	-0,075 0,03	-0,077 0,03	-0,753 0,03
Dummy unemployed	-0,085 0,00	-0,007 0,82	-0,005 0,88	-0,006 0,83
Dummy no job reported	-0,161 0,00	-0,111 0,00	-0,108 0,00	-0,112 0,00
Zip Code region 0	-0,033 0,18	-0,015 0,54	-0,015 0,53	-0,014 0,56
Zip Code region 1	-0,099 0,00	-0,081 0,00	-0,080 0,00	-0,080 0,00
Zip Code region 2	-0,031 0,14	-0,027 0,19	-0,027 0,20	-0,027 0,20
Zip Code region 4	-0,004 0,81	-0,005 0,78	-0,005 0,79	-0,005 0,79
Zip Code region 6	0,067 0,00	0,069 0,00	0,700 0,00	0,071 0,00
Zip Code region 7	0,077 0,00	0,073 0,00	0,073 0,00	0,073 0,00
Zip Code region 8	-0,059 0,02	-0,060 0,02	-0,060 0,00	-0,059 0,02

Dependent variable	Registration for money management tool			
	(1)	(2)	(3)	(4)
Length of banking relationship		-0,008 0,00	-0,008 0,00	-0,008 0,00
Intensity of banking relationship		0,059 0,00	0,063 0,00	0,059 0,00
Portfolio		0,028 0,18	0,048 0,03	0,036 0,09
Savings Plan		0,130 0,00	0,126 0,00	0,134 0,00
Consumer Credit		0,094 0,00	0,089 0,00	0,075 0,01
Credit Card		0,064 0,00	0,063 0,00	0,065 0,00
Retirement Product		0,027 0,12	0,025 0,16	0,027 0,13
Savings Product		-0,013 0,55	-0,009 0,69	-0,001 0,97
Mortgage		0,025 0,51	0,021 0,61	0,018 0,69
Credit default risk		1,1 0,00	1,1 0,00	0,8 0,00
Cash at t=0			-2,46E-08 0,93	
High Cash at t=0				0,0 0,95
Low Cash at t=0				0,0 0,43
Debit Balance at t=0			-7,72E-09 0,97	
High Debit at t=0				0,0 0,37
Low Debit at t=0				0,1 0,00
Credit Balance at t=0			3,04E-08 0,84	
High Credit at t=0				0,0 0,95
Low Credit at t=0				0,0 0,53
Portfolio value at t=0			-3,78E-07 0,00	
Constant	0,870 0,00	0,708 0,00	0,713 0,00	0,721 0,00
Observations	59.126	58.996	58.996	58.996
Pseudo-R ²	0,0415	0,0522	0,0526	0,0527

DiD: Effect of FinTech activation on financial balances (1/2)

Dependent variable	Monthly wealth balance at the bank		Monthly debit balance		Monthly savings product balance		Monthly current account balance	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Interaction dummy $T_i t_j$	604.285** (0.04)	256.732* (0.08)	542.466** (0.02)	409.025*** (0.00)	129.374 (0.42)	268.523** (0.01)	437.282*** (0.00)	176.106* (0.07)
Dummy treatment		163.075* (0.05)		171.244** (0.03)		68.761 (0.12)		89.940 (0.18)
Dummy monthly usage		71.751 (0.51)		41.792 (0.69)		82.459 (0.26)		-27.808 (0.73)
Dummy male		73.555 (0.53)		165.703 (0.15)		-56.858 (0.51)		295.757*** (0.00)
Age		15.705*** (0.01)		18.172*** (0.00)		9.881** (0.01)		15.820*** (0.00)
Dummy self-employed		1031.671 (0.34)		805.662 (0.44)		-299.592 (0.61)		1464.813 (0.12)
Dummy student		-21.470 (0.86)		24.061 (0.84)		109.725 (0.17)		-66.888 (0.46)
Dummy housewife		123.290 (0.75)		175.299 (0.65)		191.556 (0.58)		-77.837 (0.72)
Dummy retiree		-211.077 (0.66)		-451.190 (0.34)		-23.481 (0.95)		-504.733* (0.05)
Dummy industr. worker		-355.740*** (0.00)		-550.917*** (0.00)		-43.133 (0.48)		-689.140*** (0.00)
Dummy unemployed		-354.488*** (0.00)		-427.400*** (0.00)		-17.856 (0.72)		-543.526*** (0.00)
Years with the bank		7.856 (0.35)		3.372 (0.67)		2.404 (0.66)		3.143 (0.56)
Number of visits p.a.		-11.742 (0.86)		73.659 (0.18)		27.174 (0.49)		51.859 (0.12)
Dependent financial variable at t=0 before natural field experiment		0.962*** (0.00)		0.963*** (0.00)		0.956*** (0.00)		0.925*** (0.00)
Portfolio usage		786.832** (0.04)						
Saving plan		17.504 (0.89)		4.714 (0.97)		185.105** (0.03)		
Saving product		1696.121*** (0.00)		1972.776*** (0.00)		1444.243*** (0.00)		
Retirement product		-13.516 (0.94)		-90.302 (0.60)		-3.363 (0.98)		
Consumer credit		-1677.357*** (0.00)						
Credit card		609.649*** (0.00)						
Mortgage		-2200.136** (0.04)						

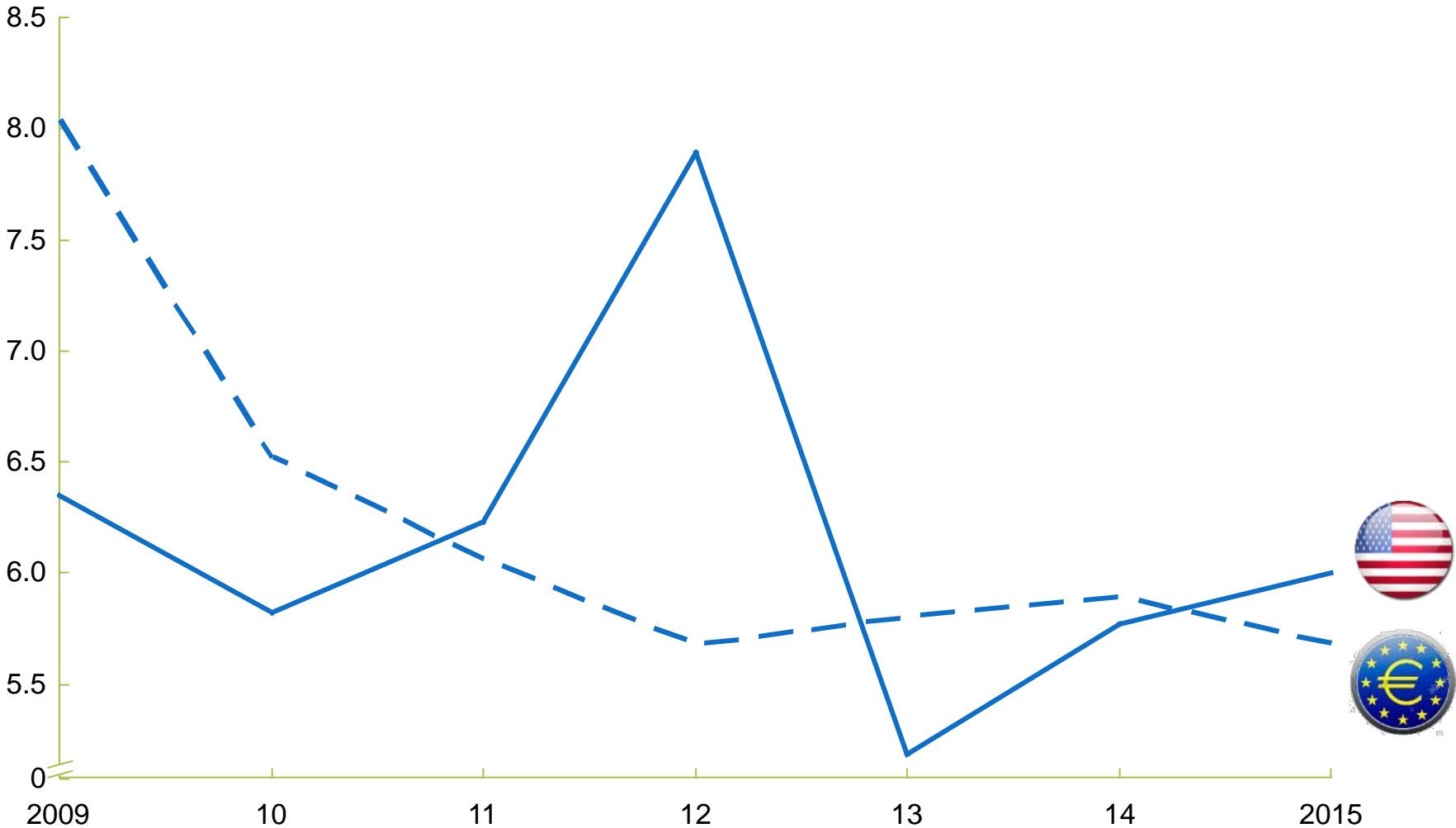
DiD: Effect of FinTech activation on financial balances (2/2)

Dependent variable	Monthly wealth balance at the bank		Monthly debit balance		Monthly savings product balance		Monthly current account balance	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Time dummy September		-30.488 <i>(0.46)</i>		4.917 <i>(0.90)</i>		2.879 <i>(0.90)</i>		-12.385 <i>(0.71)</i>
Time dummy October		182.902*** <i>(0.00)</i>		193.546*** <i>(0.00)</i>		10.965 <i>(0.73)</i>		187.790*** <i>(0.00)</i>
Time dummy November		506.939*** <i>(0.00)</i>		502.875*** <i>(0.00)</i>		50.839 <i>(0.18)</i>		464.937*** <i>(0.00)</i>
Time dummy December		566.667*** <i>(0.00)</i>		531.676*** <i>(0.00)</i>		55.955 <i>(0.32)</i>		471.533*** <i>(0.00)</i>
Time dummy January		643.724*** <i>(0.00)</i>		601.572*** <i>(0.00)</i>		33.250 <i>(0.66)</i>		565.662*** <i>(0.00)</i>
Time dummy February		558.313*** <i>(0.00)</i>		563.198*** <i>(0.00)</i>		22.527 <i>(0.81)</i>		528.640*** <i>(0.00)</i>
Time dummy March		622.145*** <i>(0.00)</i>		632.548*** <i>(0.00)</i>		15.627 <i>(0.87)</i>		598.130*** <i>(0.00)</i>
Constant	3502.6*** 0.00	-748.2*** <i>(0.00)</i>	7462.0*** 0.00	-801.0*** <i>(0.00)</i>	2771.5*** 0.00	-533.1*** <i>(0.00)</i>	4482.0*** 0.00	-485.8*** <i>(0.01)</i>
Number of observations (months)	211,920	211,920	211,920	211,920	211,920	211,920	211,920	211,920
R-squared	0.0001	0.8307	0.0001	0.7298	0	0.7308	0.0002	0.632
P-value Kolmogorov –Smirnov test		<i>(0.41)</i>		<i>(0.00)***</i>		<i>(0.00)***</i>		<i>(0.00)***</i>

Indeed, household saving rates in major economies are decreasing

Household savings rates

% of disposable household income



Previous research has used granular FinTech data but DiD analyses on the effectiveness of FinTech usage itself were not feasible

Gelman et al. (2014)

- Data from **check.com** (US)
- Test **MPC** theory whether customers increase consumption in reaction to regular income arrival
- Find confirming evidence for classical theory that liquidity-constrained customers react to arrival of regular income

Carlin et al. (2017)

- Data from **Meniga.com** (Iceland)
- Compare behavior of FinTech users after new **service offering** (desktop only solution vs. desktop + mobile offering)
- Find that desktop + mobile yields reduction of banking penalty fees

Kuchler (2017)

- Data from **readyforzero.com**
- Tests whether customers stick to their self-set debt **paydown plan**
- Finds that naive customers suffer from present bias and do not stick to their plan

Our data complements and expands previous research

- Retail bank data – no 3rd party provider
- Representative footprint in Germany
- Observe customers before and after FinTech activation
- Observe a representative control group of non-users
- High reliability on demographic data

The FinTech industry is growing at fast rates and promises eased financial management for everyone

Today's focus

Targeted global users

Global total transaction value

FinTech types

Financial Management



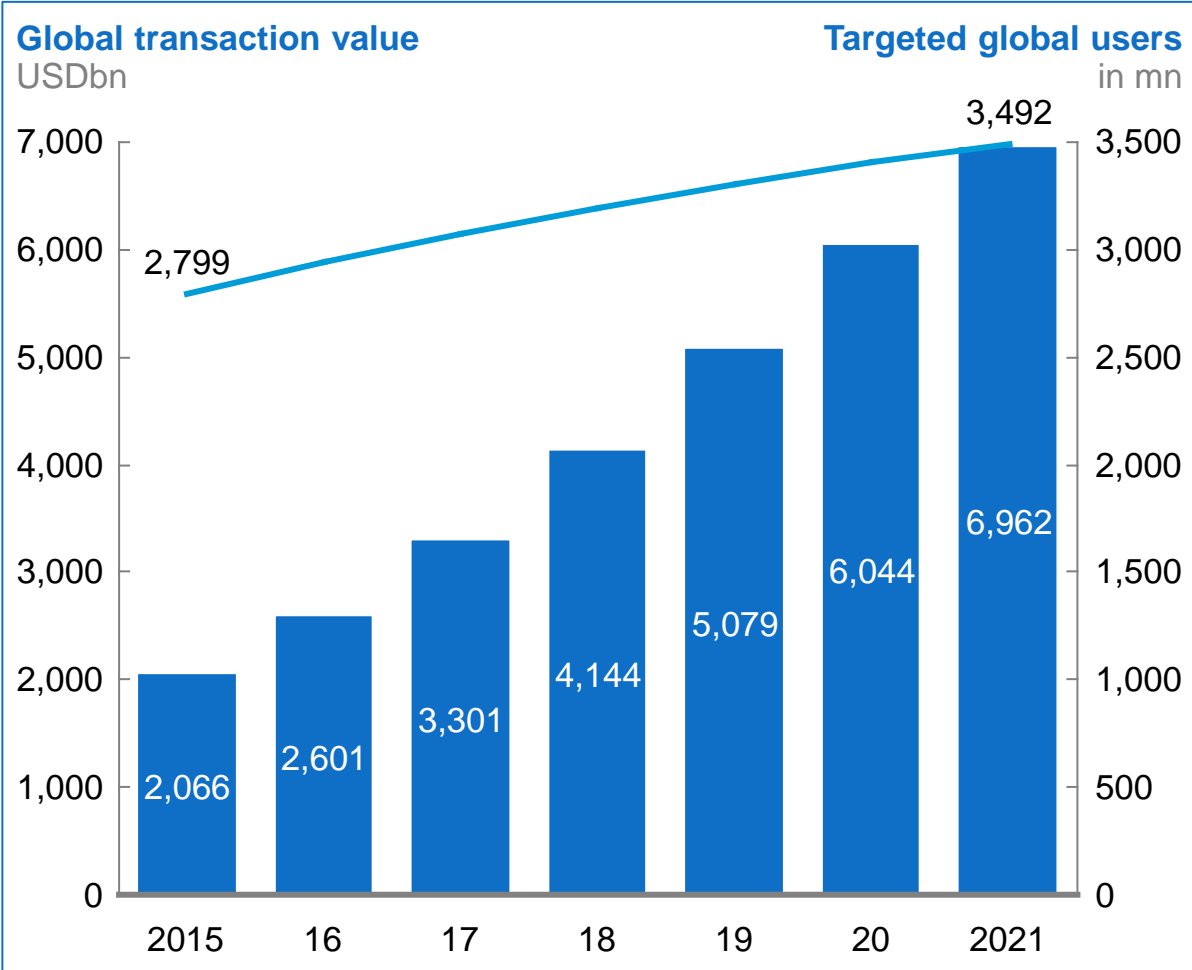
Investment & Wealth



Payments



FinTech value and dispersion continuously growing



2 Methodology to assess effect of FinTech activation on financial balances

Coarsened Exact Matching

Blackwell, Iacus, King & Porro (2010)

- Temporarily coarsen each variable, into groups
- Exact match based on these groups & continue using the uncoarsened data
- Goal of the CEM algorithm is to **minimize the multivariate imbalance measure L_1**
- f_l & g_l relative frequency of observations within „group“ l_l for treatment & control group
- Comparable histograms within each “group” for treatment & control minimize L^1

$$\mathcal{L}_1(f, g) = \frac{1}{2} \sum_{\ell_1 \dots \ell_k \in H(X)} |f_{\ell_1 \dots \ell_k} - g_{\ell_1 \dots \ell_k}|.$$

Nearest neighbor propensity score matching

Leuven & Sianesi (2003)

- Probit model for tool activation
- Using pre-treatment variables as of August 2015
- Consideration of
 - Demographics**, age, gender, marriage status, profession, region...
 - Bank relationship**: years with the bank, # of visits p.a., products owned...
 - Financials**: Current account, Deposit, Credit balance...
- Using nearest neighbor propensity scores within each CEM strata
- Matched persons with same scores are also comparable based on observables

Cluster robust DiD regression

$$Y_{i,j} = \alpha + \beta * T_i + \gamma * t_j + \Omega * T_i t_j + \Phi * X_i + e_{i,j}$$

Bertrand et al. (2004) & Bertrand and Mullainathan (2003):

- Dependent variable: $Y_{i,j}$ – wealth/savings/current account balance of individual i in month j
- Treatment dummy T_i
- Collapsing period into pre- and post-treatment months t_j
- Variable of interest is interaction dummy $T_i t_j$ which equals one for customers in the treatment group in after FinTech activation
- Controlling for individual & time-fixed in X_i

3 FinTech increases savings for both type of customers – with and without previous saving activity

Regression coefficients

Probit: Have first time savings

0.453***



Independent variable:
Activate FinTech

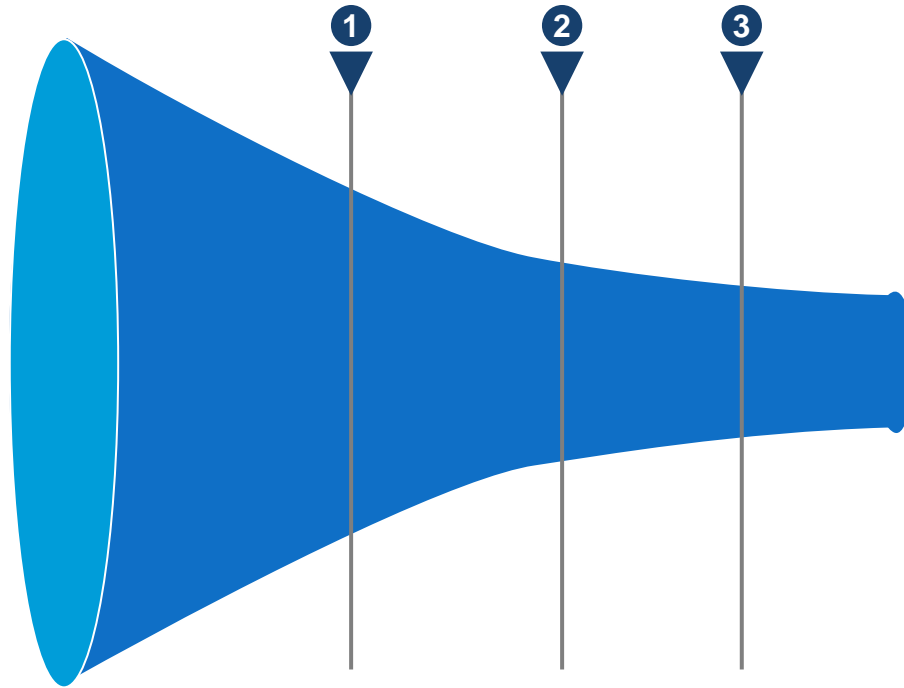
OLS: Increase in savings, if previous saving activity existent

363.750**



Independent variable:
Month with activated FinTech

4 We run within subject-event studies for a subsample of customers for whom we observe transactions before and after tool activation



Observation Sample	Natural field experiment	Matching	Transaction data +/- 1 months	Transaction data +2 /-1 months
Users	15,077	13,245	10,115	7,081
Non-Users	49,996	13,245	0	0

Comments

2

- We use individual transaction-based data available from October 1st 2015 – March 31st 2016
- We only consider customers who enrolled between **November & February** to have at least one month prior/post activation for each of them

3

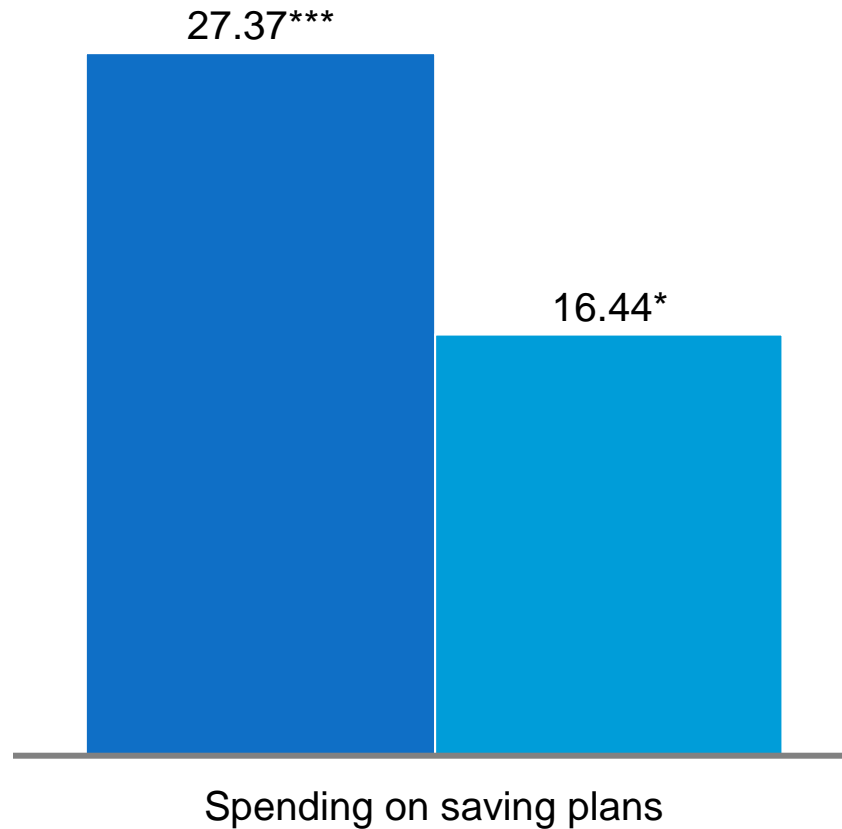
- Later, we use individual transaction-based data available from October 1st 2015 – March 31st 2016
- We only consider customers who enrolled **between November & January** to have at least one month prior and two months post activation for each of them

4.2 Customers significantly and sustainably increase their spending on saving plans – a feature offered in the FinTech

■ Delta -1 to +1
■ Delta -1 to +2

Increase in outflows for saving plans

Mean differences, significant levels of cluster robust OLS regression



All change in spending on other saving activities is not persistent over time but rather reflects a one-off effect (e.g., investment into securities)

NOTE: Different sample size for comparison of t+1 and t+2 (only customers who activated between Nov 1st 2015 and January 31st 2016)