

# **The Relationship Dilemma: Organizational Culture And The Adoption Of New Technology By Banks In India**

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# Qualifier

Views are personal.

Not necessarily those of CAFRAL, RBI, or the IMF

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# Question

- What factors influence adoption of new technology?
  - Do competitive forces push uniform adoption rates across organizations?
  - Does legacy play a role?
  - Do structure of organizations and organizational culture play a role?
  
- Solow (1956)
  - Innovation is a source of growth
  - Productivity improvements driven by “adoption” of innovation

# Our study

- Technology adoption
- Unique context
  - adoption of credit bureaus and credit scoring technology

# Why India #1

- Credit bureaus are new technologies exogenously introduced only in 2005
  - Legally enabled in 2007
- Credit Information Companies Regulation Act (CICRA, 2005)
  - Banks must submit data to Bureaus
  - 4 Bureaus
    - Subs of U.S. and European entities
  - Inquiries almost free, US\$ 0.15-0.30 per inquiry
  - Matching process
  - Bureau returns a score if there is a match
  - Banks not legally required to inquire

# Why India #2

- Two major players
  - State-owned banks (PSBs) and New private banks (NPBs)
  - Very different set of cultures

# Why India #2

- 26 State-owned banks (PSBs)
  - Median age = 87 years
  - ~70% market share
  - Majority owned by government
    - Born after 1969 and 1980 nationalization
    - Bureaucratic culture
- 7 New Private Banks (NPBs)
  - Median age= 21 years
  - ~ 20% market share
  - Private enterprises
    - Born after the 1991 liberalization
    - Modern enterprises free of legacy cultures

# Preview of Findings

- Slow adoption of technology by PSBs vis-à-vis NPBs
  - Surprisingly only for borrowers with prior lending relationships
  - Reluctance to inquire fading over time
- Inquiries with the Bureau are useful. Associated with better ex post loan performance
- Counterfactual: PSBs would have shown better ex post performance had they inquired



# Preview of Findings

- Incentives induced by public ownership?
- Old *private* banks (OPBs)
  - Too small to nationalize, similar in age/culture to PSBs
  - Behave similar to PSBs
- Age an important factor
- One conjecture: differences in culture
  - Originate from age
  - Experiences during formative years
  - Competition drives away relationship based behavior

# Outline

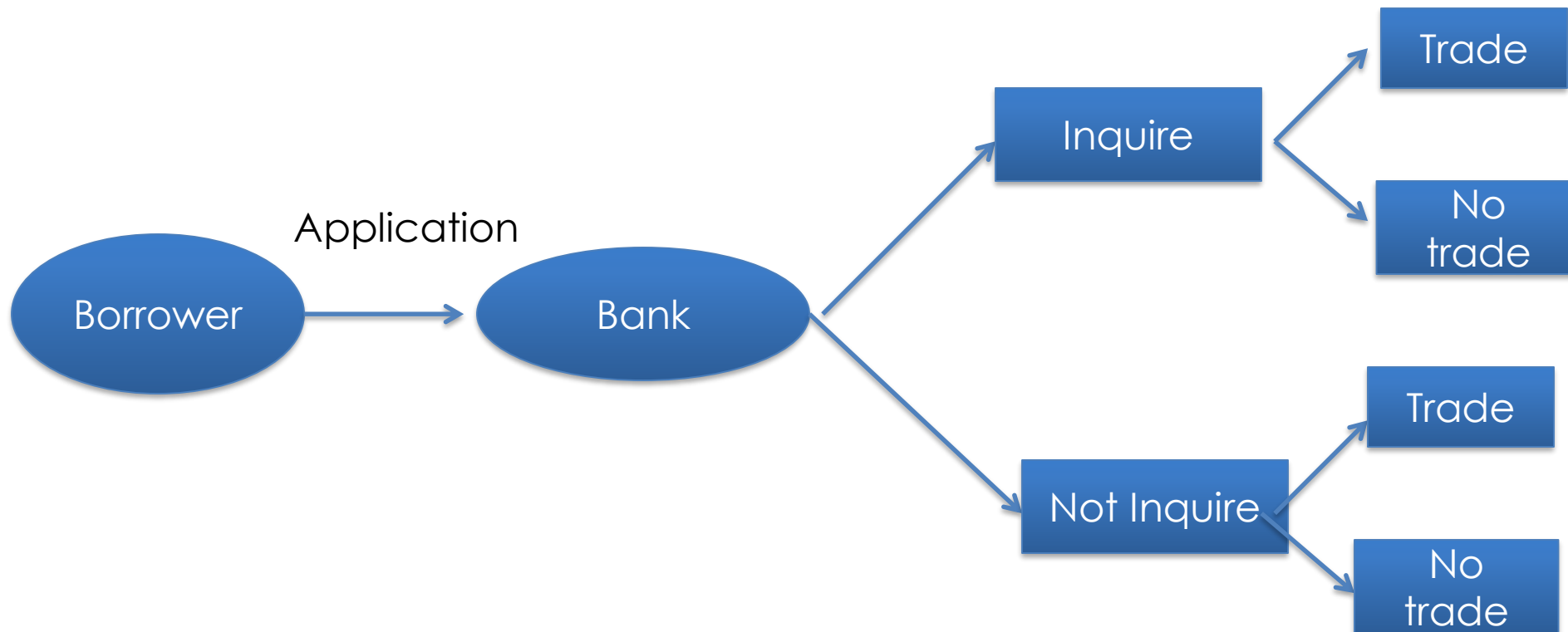
- Related work
- Data
- Empirical results
- Discussion of findings
- Conclusions

# Related work and Contribution

- Organizational culture (Harvey et. al. (2017))
- Inefficiency of state-owned banks or enterprises (La Porta et al 2002)
  - Political channel (Sapienza, 2004; Khwaja and Mian, 2005)
- Innovation (Solow, 1956, Aghion and Howitt, 1992, Romer, 1990)
  - Microdata on adoption (or not) of innovation
  - Observe ex post outcomes for adoption and non-adoption
- Credit Bureau (Jimenez et. al. 2012, 2014; Baskaya et. al. 2017)
- Management practices (Bloom et. al. 2007; Cole and Fernando, 2016)
  - Culture may explain slow adoption of better management practices

Data

# Framework

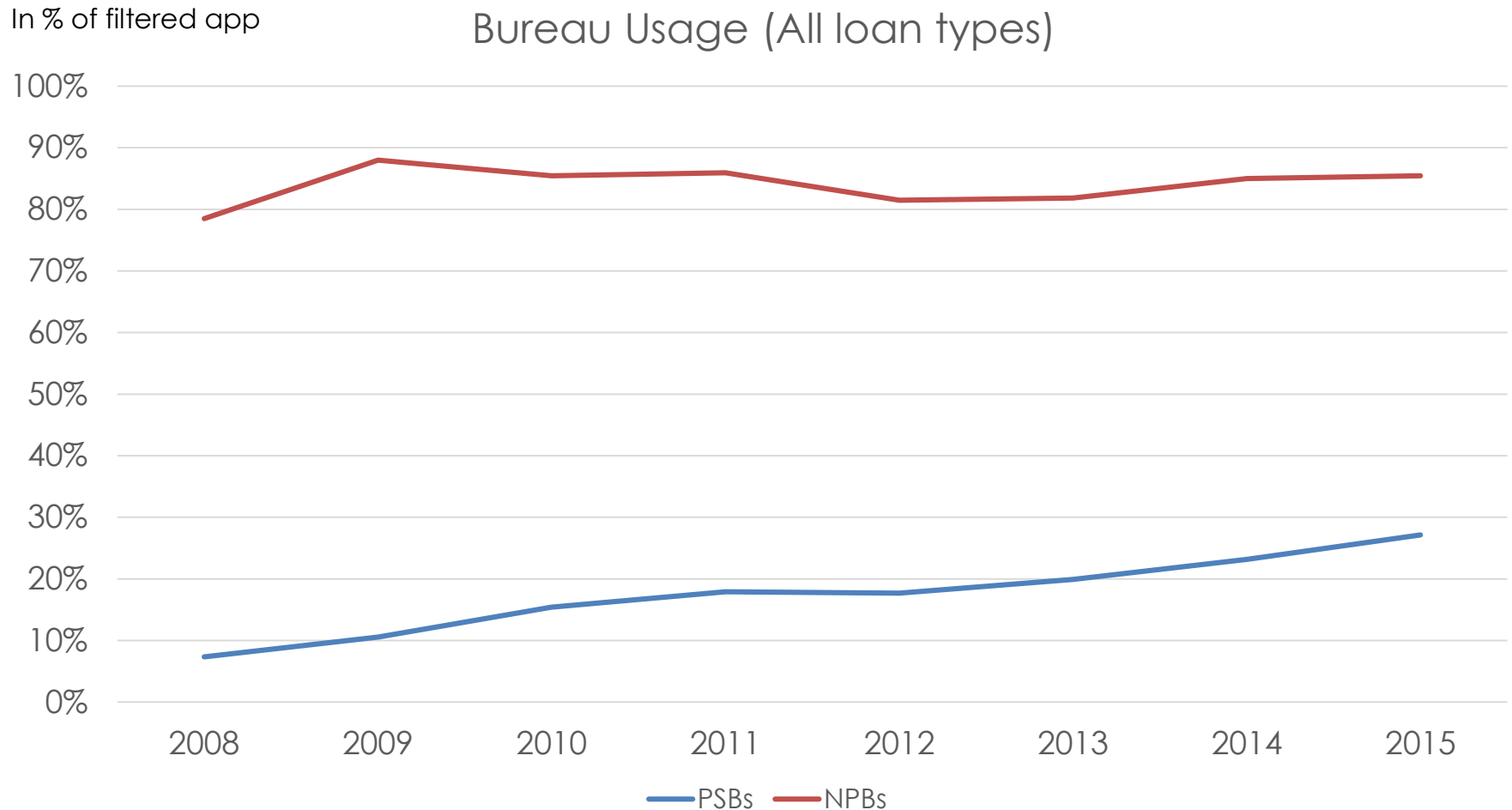


- Filtered applications  $\equiv$  # inquiries + # loans wo inquiry
- Bureau Usage  $\equiv$  # inquiries / filtered applications

# Inquiries and loans: All loan types

Year	# Filtered Application	# Inquiries	# Loans No Inq	# Loans Inq	Amount Total (INR bn)	Amount No Inq (INR bn)	Amount Inq (INR bn)	Bureau Usage	% Loans Inq	% Amt Inq
2006	190,264	17,382	172,882	5,150	38.9	35.9	3.0	9.1%	2.9%	7.6%
2007	262,929	89,557	173,372	21,403	43.1	33.2	9.8	34.1%	11.0%	22.8%
2008	351,470	210,844	140,626	44,127	49.2	30.8	18.4	60.0%	23.9%	37.3%
2009	292,356	168,980	123,376	32,673	43.8	29.0	14.8	57.8%	20.9%	33.7%
2010	273,642	122,321	151,321	33,250	61.5	36.4	25.2	44.7%	18.0%	40.9%
2011	345,195	157,033	188,162	51,403	94.7	55.4	39.3	45.5%	21.5%	41.5%
2012	457,643	203,545	254,098	80,227	105.1	51.0	54.1	44.5%	24.0%	51.5%
2013	593,863	271,330	322,533	101,746	133.3	59.4	73.8	45.7%	24.0%	55.4%
2014	712,092	351,892	360,200	131,576	148.7	60.8	87.9	49.4%	26.8%	59.1%
2015	850,010	448,434	401,576	177,439	177.7	63.1	114.6	52.8%	30.6%	64.5%
<b>Total</b>	4,329,464	2,041,318	2,288,146	678,994	896.0	455.2	440.8	47.2%	22.9%	49.2%

# Wide variation in Bureau usage



# Why a large difference in Bureau usage?

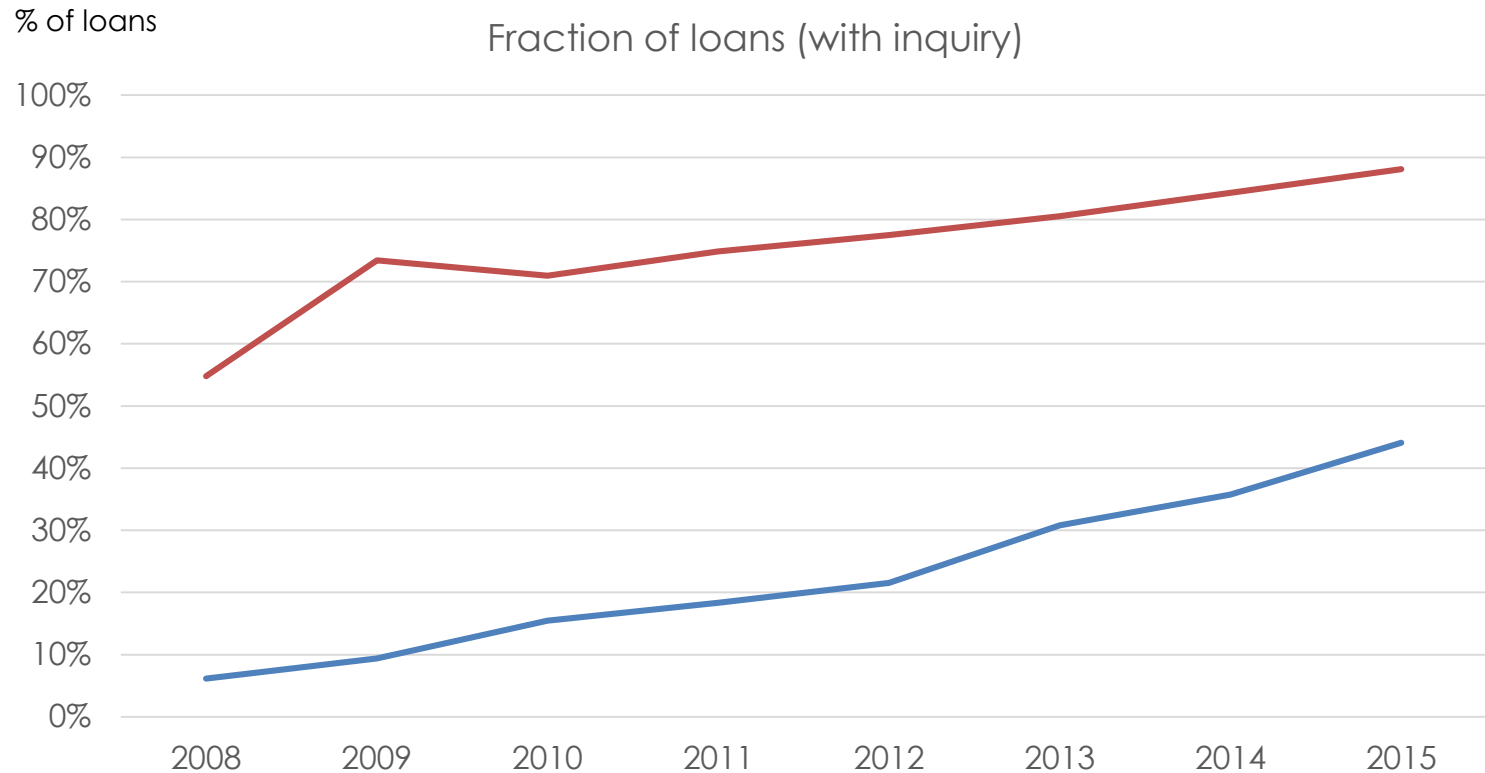
- I. Different kind of loans by PSBs
- II. Prior relationships
- III. Non-availability of credit scores
- IV. Bureau information irrelevant for PSBs



# I. Different kind of loans by PSBs

- Two special categories: “priority sector” (PSLs) and Gold
- PSBs dominant in PSLs+ old
  - 85% of gold and 99% of PSLs by PSBs
- PSL+gold less likely to be inquired with the Bureau
  - Only 2-3% inquired
- Exclude gold + PSL
  - Auto, housing, and unsecured retail
    - 43% (88%) and 71% (95%) in volume and value of total portfolio for PSBs(NPBs)

# Wide gap even after excluding PSL+gold



## II. Prior relationships

- Prior relationship vs new borrower
  - Prior relation=1 If the borrower associated with the loan/inquiry had at least one prior loan with the same bank since 2006

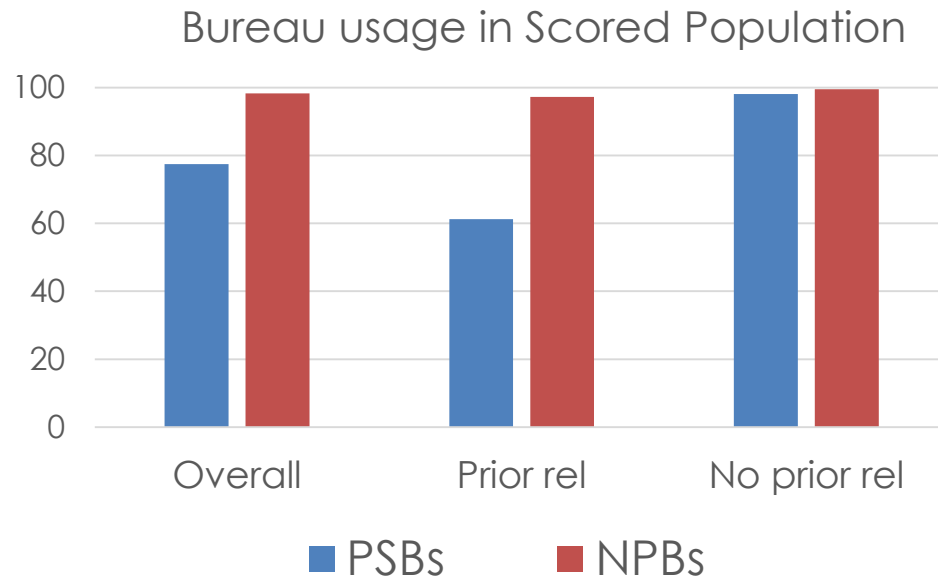
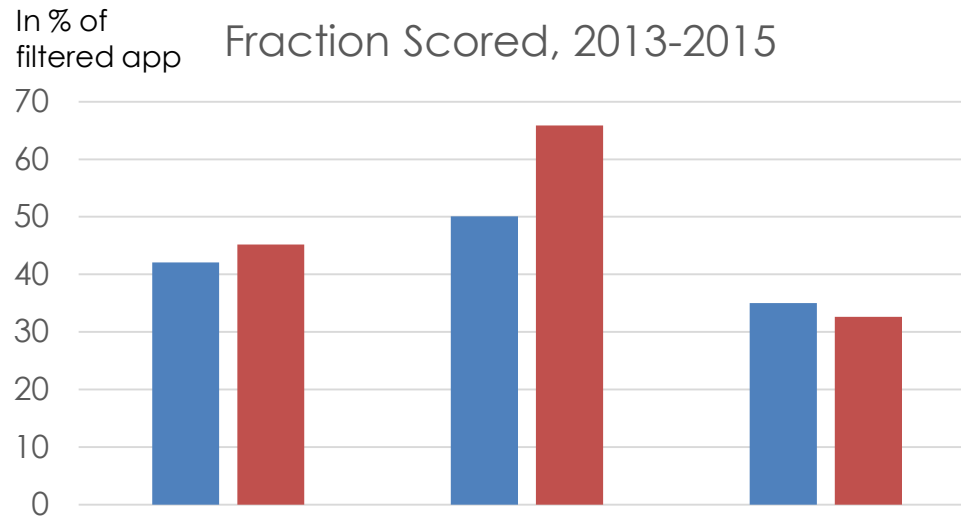
# Relationships drive Bureau usage

Year	Bureau Usage	
	Past rel=1	Past rel=0
2006	1.2%	99.6%
2007	13.0%	99.1%
2008	40.8%	99.2%
2009	42.6%	99.5%
2010	31.6%	99.3%
2011	37.2%	99.2%
2012	42.6%	99.2%
2013	54.1%	99.2%
2014	60.6%	99.2%
2015	69.5%	99.2%
Total	41.4%	99.2%

# PSBs inquire intensely for new clients

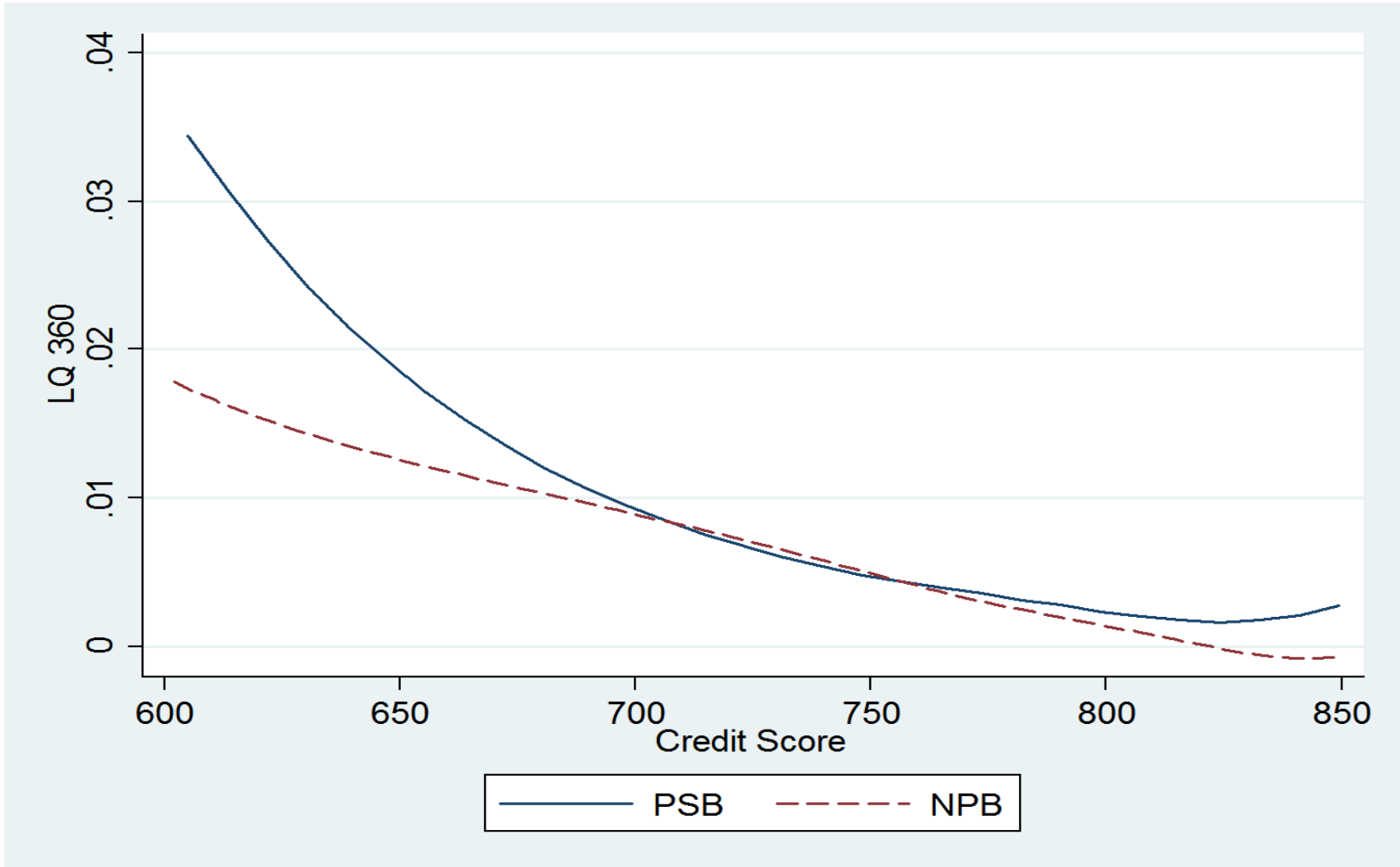
Year	Bureau Usage			
	New		Old	
	PSB	NPB	PSB	NPB
2006	99.9%	99.6%	0.1%	2.1%
2007	99.6%	99.0%	1.1%	18.8%
2008	98.5%	99.2%	2.3%	58.6%
2009	98.4%	99.8%	3.9%	79.9%
2010	98.7%	99.6%	7.2%	73.5%
2011	98.5%	99.7%	12.5%	73.9%
2012	98.4%	99.6%	17.9%	74.9%
2013	98.6%	99.6%	28.9%	80.4%
2014	98.6%	99.6%	36.5%	86.3%
2015	98.5%	99.7%	48.3%	90.3%
Total	98.6%	99.6%	20.0%	61.3%

### III. Non-availability of credit scores?



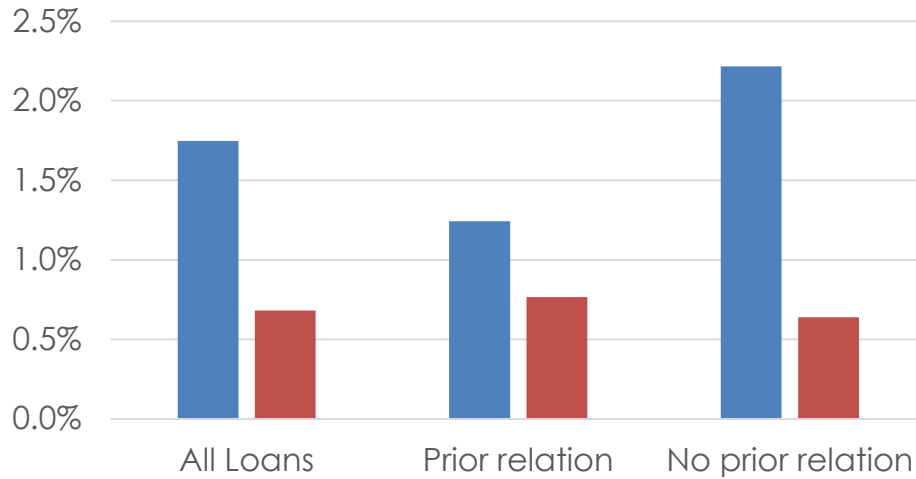
## IV. Credit scores irrelevant for PSBs?

PSB and NPB Loans, 360-day delinquency rates

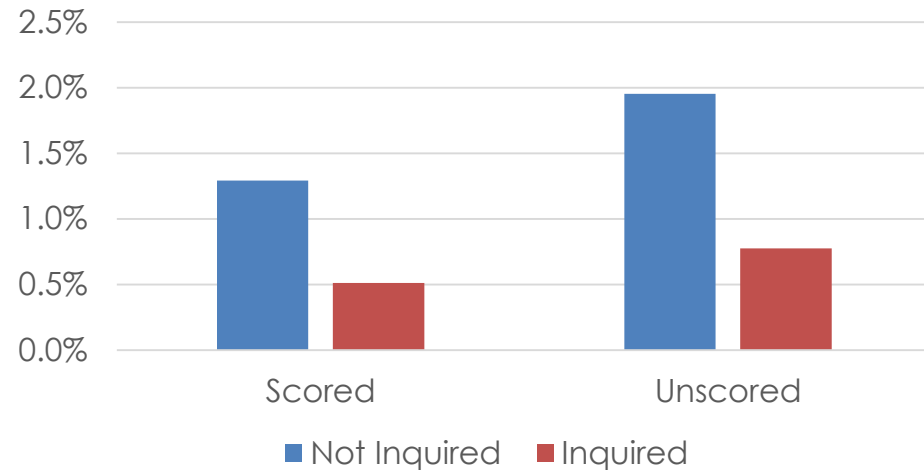


# Inquiries associated with lower delinquency

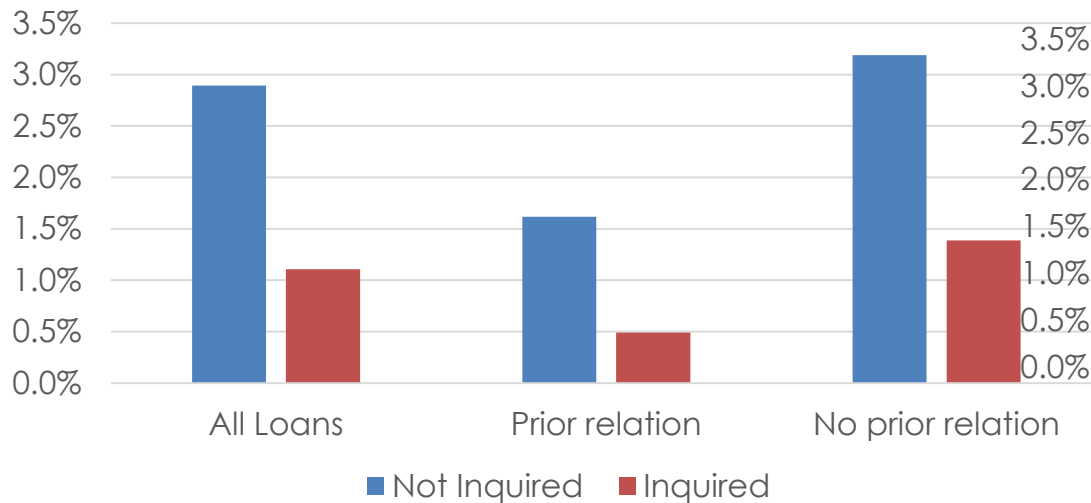
PSBs: Delinquency and Inquiry



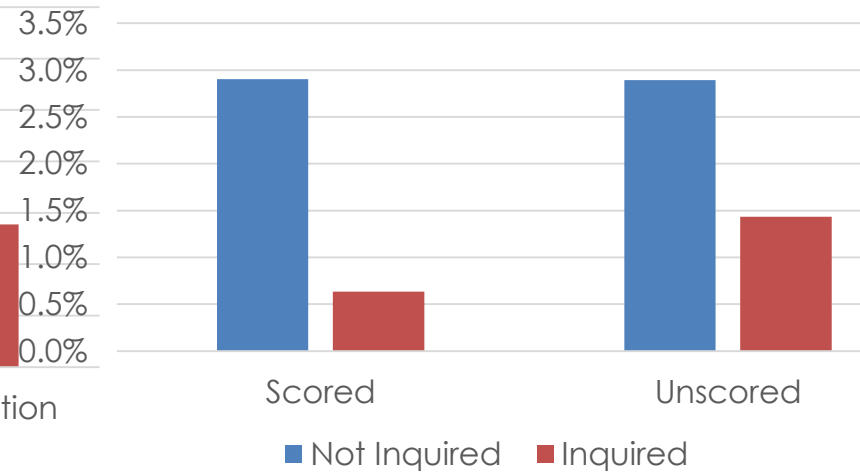
PSBs: Delinquency and Inquiry



NPBs: Delinquency and Inquiry

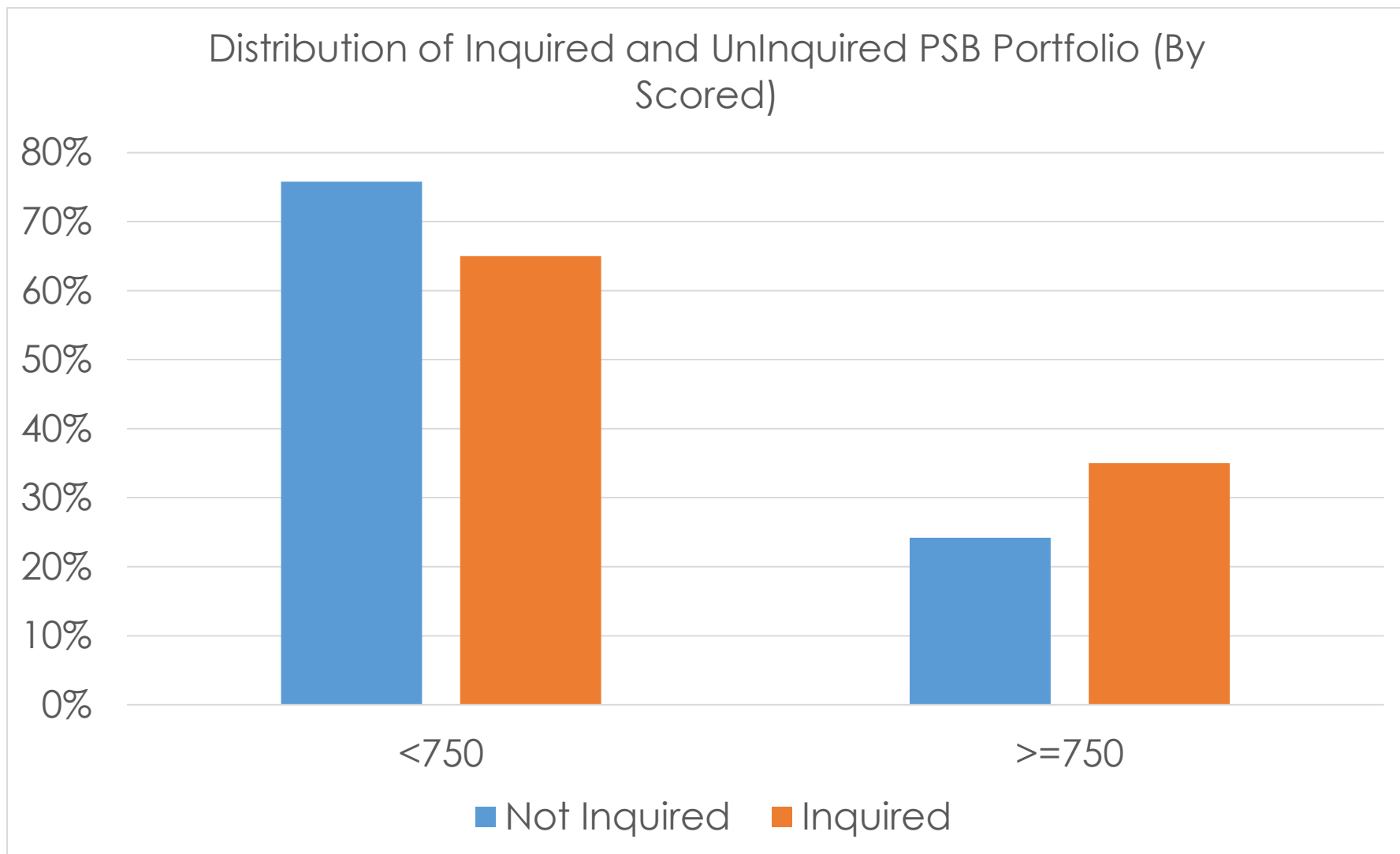


NPBs: Delinquency and Inquiry





# Does non-inquiry reflect active intent or incompetence?



# Empirical Results

# PSBs inquire less

	(1)	(2)
<b>PSB (=1)</b>	-0.1966*** (0.002)	-0.2038*** (0.002)
<b>Past Relationship (=1)</b>		-0.1392*** (0.002)
<b>Male (=1)</b>	0.0516*** (0.003)	0.0524*** (0.003)
<b>LN(Age)</b>	-0.0610*** (0.005)	-0.0486*** (0.005)
<b>Constant</b>	1.1544*** (0.018)	1.1842*** (0.017)
<b>Time FE</b>	Y	Y
<b>#</b>	162,988	162,988
<b>R<sup>2</sup></b>	0.121	0.169

# P (Inquiry)

	(1)	(2)
	NPB	PSB
<b>Score/1000</b>	-0.0231*** (0.006)	0.0092 (0.025)
<b>Past Relationship (=1)</b>	-0.0014 (0.001)	-0.3061*** (0.004)
<b>Male (=1)</b>	-0.0031** (0.001)	0.0872*** (0.005)
<b>LN(Age)</b>	-0.0087*** (0.002)	-0.0601*** (0.009)
<b>Constant</b>	1.0316*** (0.009)	1.0718*** (0.040)
<b>Time FE</b>	Y	Y
<b>#</b>	91,194	71,794
<b>R<sup>2</sup></b>	0.002	0.159

# Delinquency LQ360

	(1)	(2)	(3)
<b>PSB (=1)</b>	0.0034*** (0.001)	0.0035*** (0.001)	-0.0015 (0.001)
<b>Past Relationship (=1)</b>		-0.0024** (0.001)	-0.0036*** (0.001)
<b>Inquired (=1)</b>			-0.0115*** (0.002)
<b>Male (=1)</b>	0.0029** (0.001)	0.0029** (0.001)	0.0035*** (0.001)
<b>LN(Age)</b>	-0.0034* (0.002)	-0.0030 (0.002)	-0.0051*** (0.002)
<b>LN(1+Amf)</b>	-0.0014*** (0.000)	-0.0015*** (0.000)	-0.0004 (0.000)
<b>Constant</b>	0.0354*** (0.009)	0.0361*** (0.009)	0.0422*** (0.009)
<b>Product FE</b>	Y	Y	Y
<b>Time FE</b>	Y	Y	Y
<b># Obs</b>	38,801	38,801	38,801
<b>R<sup>2</sup></b>	0.002	0.002	0.004

# Counterfactual Approach

- Counterfactual loan supply

$$Q_{NI \rightarrow I}(\text{PSB}) = \sum p_c(\text{NPB}, X_c, S_c) \times L_C \times \delta_{c,NI}$$

- Counterfactual delinquency rate (1)

$$\text{LQ360}_{NI \rightarrow I}(\text{PSB}) = \sum p_c(\text{NPB}, X_c, S_c) \times L_C \times \delta_{c,NI} \times \text{LQ360}_c(\text{PSB},.)$$

- Counterfactual delinquency rate (2)

$$\text{LQ360}_{NI \rightarrow I}(\text{PSB}) = \sum p_c(\text{NPB}, X_c, S_c) \times L_C \times \delta_{c,NI} \times \text{LQ360}_c(\text{NPB},.)$$

# Counterfactuals

	(1)	(2)	(3)	(4)	(5)= (2)/(1)	(6)= (3)/1)
Prior Relation	P(I) * P(T I) * Amt	(1) * PSB LQ360	(1) * NPB P(LQ360)	LQ %	CF LQ% PSB LQ360	CF LQ% NPB LQ360
<b>Panel A. NPB Model</b>						
No	281,603	1,970	1,603	1.33%	0.70%	0.57%
Yes	719,841	6,997	4,135	1.29%	0.97%	0.57%
All	1,001,444	8,967	5,739	1.29%	0.90%	0.57%
<b>Panel B. PSB Model</b>						
No	153,104	1,160	1,505	1.33%	0.76%	0.98%
Yes	382,826	4,104	3,298	1.29%	1.07%	0.86%
All	535,931	5,264	4,803	1.29%	0.98%	0.90%

# Discussion of Findings



# Potential explanations

- Observable attributes
  - Size, profits, capitalization?
  - No
    - Controls in inquiry and delinquency regressions
    - PSB dummy continues to be significant
  
- Unobservable characteristics
  - Cultural differences?
    - Cultures differ between PSBs and NPBs
  
- What determines culture?
  - Age and vintage

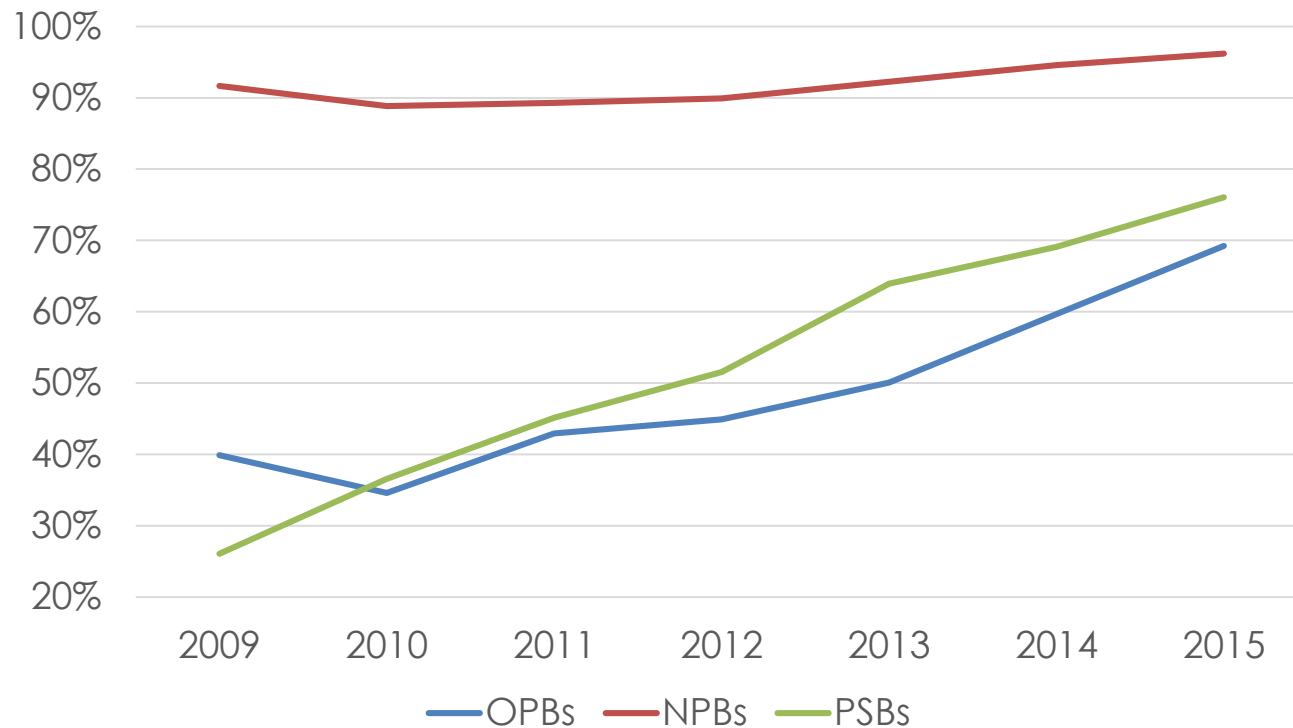
# Old Private Banks (OPBs)

- 14 small banks not nationalized in 1969 and 1980
- Culture similar to PSB, but they are much smaller
- Median age = 89 years
- Test whether OPBs are like PSBs
  - If so, then re-affirm that size not main driver

# OPBs similar to PSBs

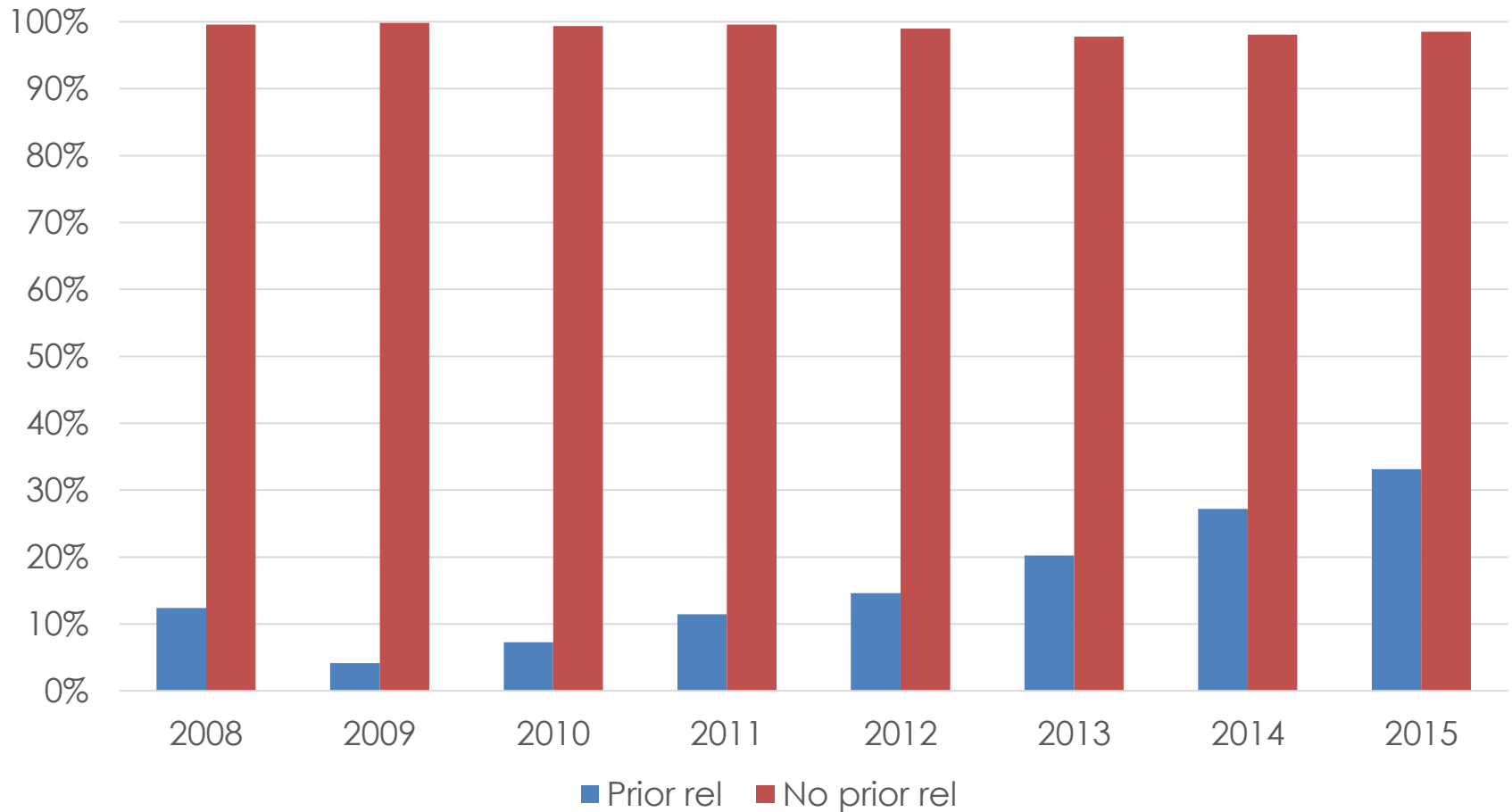
In % of filtered apps

Bureau Usage

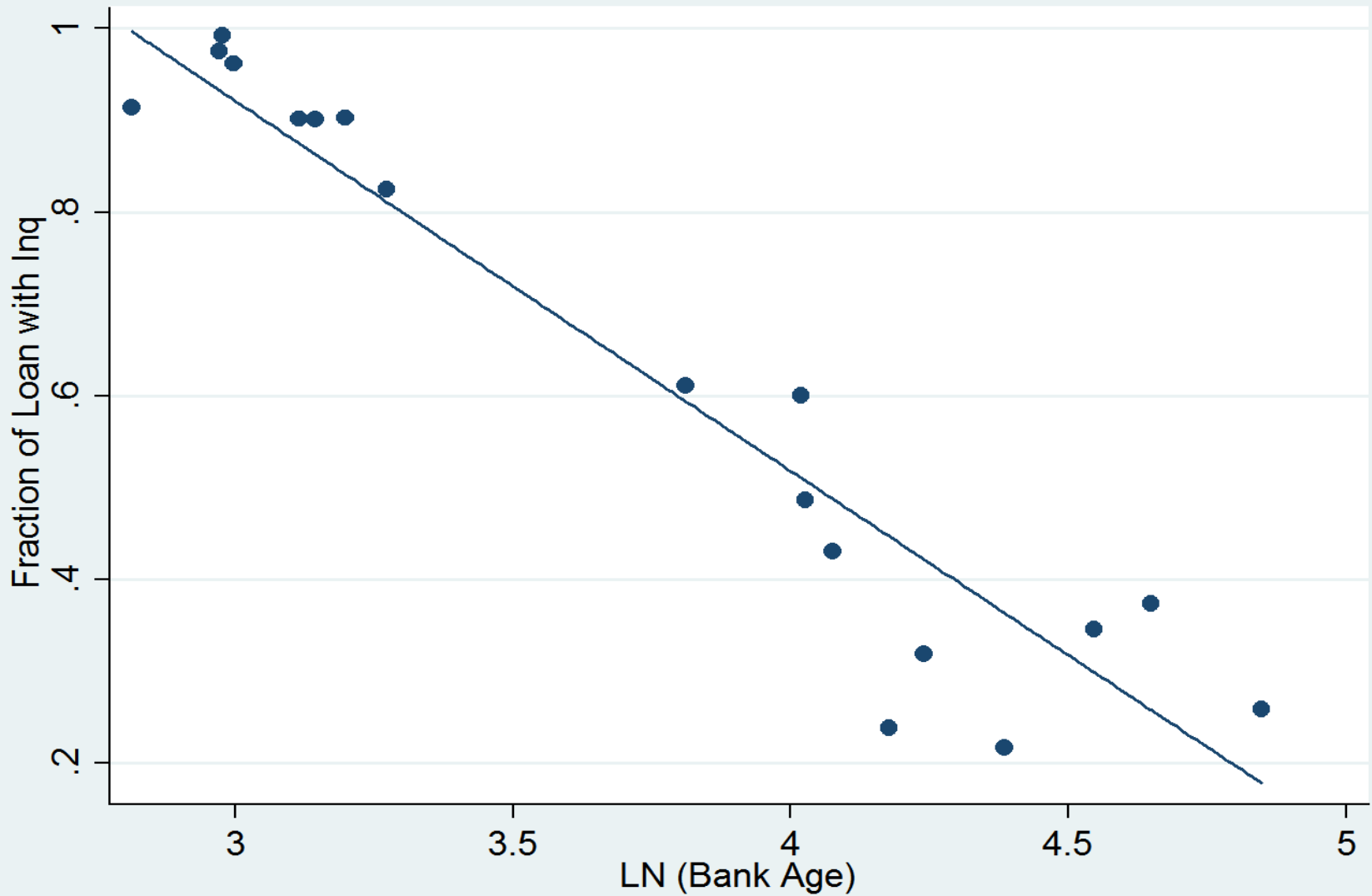


# OPBs similar to PSBs (contd.)

Bureau Usage: Old vs New



# Strong negative correlation between age and Bureau usage



# Conclusion

- Credit bureaus exogenously introduced in India in 2005
- Study focuses on level and adoption of credit scoring technology, variation across PSBs and NPBs, and its consequences
- Exploit a unique dataset drawn from 472 mn loan records
- Slower uptake of new technology by PSBs
  - *Only* when borrower has prior relationship

# Conclusion (contd.)

- Differences cannot be explained by different loan types, non-availability of scores, inquiries not being useful
- Conjecture: cultural differences may drive results
- What drives culture?
  - Not observable attributes like size, capital, profits.
  - Age and vintage. Evidence from OPBs.

Thank you!

Questions?