BANCO DE ESPAÑA
Eurosistema

WHO TRULY BEARS (BANK) TAXES? EVIDENCE FROM ONLY SHIFTING STATUTORY INCIDENCE

Gabriel Jiménez Banco de España CEPR

David Martinez-Miera UC3M & CEPR

José-Luis Peydró Imperial-CREI-UPF-CEPR

3rd Conference on Financial Stability, October 2021

The views presented here do not represent those of the Banco de España or the Eurosystem

FINANCIAL STABILITY AND MACROPRUDENTIAL POLICY

A BRIEF REMINDER ON TAX INCIDENCE

ECONOMIC VS. STATUTORY INCIDENCE OF A TAX

- (Economic) Incidence of a tax is an <u>economic concept</u>
  - Which agents are affected by a tax and by how much?
- Statutory (or Physical) Incidence of a tax is a <u>legal concept</u>
  - Which agent is the tax levied on?
    - *Which agent has the **legal obligation to pay** the tax?*
  - E.g. a transaction tax can be levied on consumers or on producers
- Can economic and statutory incidence be different? Yes
  - Impose a tax on producer (statutory incidence on producer)
  - Prices increase (pass-through)
  - Consumer is affected (economic incidence also on borrower)

DALTON'S LAW

The economic burden of a transaction tax *-incidence of the tax- on a good*
will be ***shared according to the price elasticities*** *of demand and supply. The buyer's share will be larger the less elastic is demand and more elastic is supply.*

Hugh Dalton (1936)

Implication - Irrelevance of Statutory (or Physical) Incidence

The agent on which a tax is levied ***does not*** *affect the incidence of the tax, as price adjustments compensate such shift*

Kotlikoff and Summers (1987)

OUR PAPER

MOTIVATION FOR OUR STUDY

- Irrelevance of **statutory/physical incidence** -Starting point -

  "Shifting the agent on which the tax is levied does not change the economic incidence of the tax, as price adjustments compensate such shift" (Kotlikoff and Summers (1987).
  E.g. tax on producer vs. consumer generates same outcomes

- Theoretical reasons by which the irrelevance may fail
  - e.g. Weyl and Fabinger, 2013

- **But difficult to test the irrelevance:**
  - tax rates also change (e.g. in the introduction of a tax).
  - Chetty et al. (2009) use an experiment.
  - In Saez et al. (2012) many things change (e.g. tax rates)

- **Spain (mortgage market)** offers a **quasi-experimental setting** for identification

WHAT WE DO

- **Spain (mortgage market)** offers a **quasi-experimental setting** for identification

  1. A **shift ONLY in statutory incidence** in the tax for legally documenting new mortgages (AJD): tax bearing from borrowers to banks without affecting tax rates (new law on 8th Nov 2018)
     - *Pedro Sanchez (PM): "Never again will Spaniards pay such tax, it will be paid by banks."*

  2. "Federal" tax system allows diff-in-diff:
     - Different regions set different tax rates (same difference before and after)
     - Primary Residences in Basque Country are exempt from the tax (no change at all)

  3. Exhaustive credit register for all mortgages and also for (non-affected) all consumer loans

➔ Analyze the economic incidence & distortionary effects of **only shifting statutory incidence**

PREVIEW OF MAIN RESULTS

1. After the policy change, the average mortgage rate increases consistently with a **strong (but not complete) tax pass-through**
   - 10 basis point on average (but below 100% of the tax, circa 80%)

2. **Strong heterogeneity** in the pass-through: larger for borrowers with
   - Lower income (8 bp 75 vs 25%)
   - Less lending relationships (7 bp 2 vs 1 lenders)
   - Facing less banks in their zip-code (2 bp 75 vs. 25%)
   - Not working for the lender (10 bp)

3. More affected banks reduce overall profits (consistent with the not full pass-through). Despite no tax rate change, the **policy increases banks' risk-taking**. More affected banks:
   - Reduce costly mortgage insurance in case of loan default (especially so if banks have weaker ex-ante balance sheets)
     - Government income (through this AJD tax) goes down
   - More prone to grant non-affected but much riskier consumer loans

A BRIEF OVERVIEW OF THE MORTGAGE TAX (*ACTOS JURIDICOS DOCUMENTADOS*)

THE MORTGAGE TAX (AJD)

- Prior November 2018 mortgage borrowers in Spain had to pay a mortgage transaction tax for legally documenting the mortgage (AJD) (akin stamp duty tax)
  - Similar taxes in other EU countries (France, Italy, Portugal, Austria)

- **This tax was paid by the borrower upon receiving a mortgage (pre Nov 2018)**

- Tax is based on the mortgage liability:
  - Mortgage liability serves as collateral of the mortgage in case of default
    - Maximum amount collateralized by the house
    - In Spain mortgages are full recourse (but limits to income seized)
  - Mortgage liability (set by the bank) accounts on average for 1.5 of the mortgage value
  - It is a costly ex-ante insurance

- Each region in Spain sets the tax rate and high level of heterogeneity across regions:
  - 0.5% to 1.5% of the mortgage liability
  - **Basque Country has a special tax regime: Primary residences are exempt**

FEDERAL TAX SYSTEM

Region (Comunidades Autonómas and Ciudades Autonómas)	(Base) Tax rate
Andalucía	1.5%
Aragón	1.5%
Asturias	1.2%
Baleares	1.2%
Comunidad Valenciana	1.5%
Canarias	1%
Cantabria	1%
Castilla La Mancha	1.25%
Castilla y León	1.5%
Cataluña	1.5%
Ceuta	0.5%
Extremadura	1.2%
Galicia	1.5%
La Rioja	1%
Comunidad de Madrid	0.75%
Melilla	0.5%
Murcia	1.5%
Navarra	0.5%
Basque Country	0%

TIMELINE OF THE TAX BEARING CHANGE

- Before 18th Oct 2018 borrowers that get a mortgage pay the tax
- On 18th Oct, Supreme court stated a new mandate: tax should be paid by the banks
  - 19th Oct mandate was put on hold due to "important economic and social impact"
  - 6th Nov Supreme court ratified that borrowers paid tax: mandate was never in place
- On 8th November a new law (R.D. ley 17/2018) shifted statutory incidence to banks
  - Pedro Sanchez (PM): "*Never again will Spaniards pay such tax, it will be paid by banks*"
  - **No change in the tax rate set by any region**
  - Effective 10th November
- New legal change in March 2019 (effective end-May) due to European Directive 2014/17/UE
  - So period January 2018 to May 2019

DATA DESCRIPTION

DATA SOURCES

- Information from Spain from January 2018 to May 2019
- Spanish Credit Register (Central Informacion Riesgos, CIR)
  - Loan level information
    - *Mortgage related: mortgage rate and type, LTV, amount, mortgage liability,…*
    - *Borrower related: zip code income, age, nationality, employment status,…*
    - *Bank related: which bank grants the mortgage*
  - Exclude renovations and refinancing and mortgages to self employed
  - Focus on primary residence (secondary residences in a robustness)
- Supervisory data on banks' balance sheet and income statements (as of Dec 2017)
- Consumer loan application data:
  - Applications made by borrowers without pre-existing relationship with a given bank

DESCRIPTIVE STATISTICS

		Mean	S.D.	P25	Median	P75
LOAN LEVEL						
MORTGAGES						
Interest rate of the mortgage	%	2.068	0.987	1.510	2.118	2.569
Log(Size of the mortgage)	Log(Euros)	11.465	0.656	11.060	11.486	11.878
Log(Maturity of the mortgage)	Log(Months)	5.656	0.330	5.497	5.720	5.900
Loan Amount/Mortgage Liability	%	73.123	13.476	66.667	77.700	83.262
Log(Loan to value (LTV) of the mortgage)	Log(%)	4.120	0.440	4.006	4.257	4.377
Treated	0/1	0.942	0.233	1.000	1.000	1.000
Treated Border	0/1	0.574	0.495	0.000	1.000	1.000
Post	0/1	0.439	0.496	0.000	0.000	1.000
Household Characteristics						
Log(Gross income)	Log(Euros)	10.291	0.189	10.138	10.281	10.435
Public servant	0/1	0.081	0.273	0.000	0.000	0.000
Banking group employee	0/1	0.014	0.118	0.000	0.000	0.000
Student	0/1	0.028	0.165	0.000	0.000	0.000
Unemployed or homemaker	0/1	0.020	0.139	0.000	0.000	0.000
Log(Age)	Log(Months)	6.153	0.238	5.974	6.155	6.321
Indebted	0/1	0.463	0.499	0.000	0.000	1.000
Log(1+No.of banking relationships)	Log	0.331	0.396	0.000	0.000	0.693
Log(1+No. of banks in the zip code)	Log	1.902	0.596	1.609	2.079	2.303
Bank Characteristics						
Log(Total assets of the bank)	Log(1000Euros)	18.626	1.502	17.613	19.546	19.546
Own funds/total assets of the bank	%	8.491	2.883	6.156	7.125	9.560
Liquidity ratio of the bank	%	15.190	11.277	11.415	11.415	17.310
ROA of the bank	%	0.382	0.432	0.371	0.508	0.587
Non-performing loan (NPL) ratio of the bank	%	6.592	1.740	5.988	6.150	7.528
Loans to households/total assets of the bank	%	26.049	8.366	23.019	27.290	31.139
Main bank	0/1	0.159	0.365	0.000	0.000	0.000
Leader bank in the zip code	0/1	0.241	0.428	0.000	0.000	0.000
High Exposure to Mortgages outside Basque Country	0/1	0.535	0.499	0.000	1.000	1.000
CONSUMER LOANS						
Loan application	0/1	0.507	0.500	0.000	1.000	1.000
Interest rate of the loan	0/1	9.493	4.828	6.688	8.785	10.416
Log(Size of the loan)	Log(Euros)	8.748	0.935	8.112	8.765	9.393
Log(Maturity of the loan)	Log(Months)	3.936	0.531	3.611	3.912	4.290
Future default	0/1	0.122	0.328	0.000	0.000	0.000
BANK LEVEL						
Interest Income of Loans/Total Assets	%	0.938	0.367	0.729	0.942	1.172
Loan Fees/Total Assets	%	0.079	0.101	0.022	0.044	0.081
ROA	%	0.509	0.428	0.355	0.532	0.729

<u>Median Mortgage</u>

Rate 2.12%

Loan size 100,000 Euros

Maturity 24 years

LTV 70%

Loan/mortgage liability 77%

Income 29 000

Age 39

Bank relationships 1

Banks in the zip code 7

<u>Consumer loan</u>

Rate 8.78%

Loan size 6400 Euros

Maturity 4 years

EMPIRICAL STRATEGY AND RESULTS

MAIN ELEMENTS FOR THE EMPIRICAL STRATEGY

- Shift of a mortgage transaction tax from borrowers to banks, **only statutory incidence shift**
    - *Actos Juridicos Documentados tax (Spain)*
    - Shift in November 2018
    - **No change in the tax rate**
- "Federal" tax system: each region sets the level of the tax
    - **Primary Residences in Basque Country are exempt from the tax (control)**
    - Different regions (CC.AA) set different tax rates (heterogenous treatment)
    - Allows for a diff-in-diff analysis (also continuous treatment)
- Agents that are potentially directly affected by the tax
    - Borrowers on mortgage credit and lenders
    - Spillovers to consumer lending, and government taxes?

DIFF IN DIFF AT THE LOAN LEVEL

- Equation to estimate

$$Interest\ rate_{ijt} = \boldsymbol{\beta} Treated_i * Post_t + X_i + X_j + \eta_{ijt} + \varepsilon_{ijt}$$

- where i=household, j=bank and t= time
  - $Treated_i$: dummy =1 if house located outside the Basque Country (benchmark regs)
  - $Post_t$: dummy =1 if month is after October 2018
  - X_i: set of household and mortgage characteristics and (some) fixed effects
    - *Head of household characteristics (income (zip code), age, employment, etc)*
    - *Mortgage charact. (fix or variable, maturity, amount granted, mortgage liability)*
  - X_j: set of bank characteristics
    - *ROA, NPL, Equity ratio etc, or fixed effects*
  - η_{ijt}: vector of (household) mortgage type-bank-time fixed effects (year:month:day)

DIFF IN DIFF AT THE LOAN LEVEL: HETEROGENEITY

- Equation to estimate (heterogeneity)

$$Interest\ rate_{ijt} = \beta Treated_i * Post_t + \boldsymbol{\gamma} Treated_i * Post_t * \boldsymbol{X_{ij}} + \boldsymbol{X}_i + \eta_{ijt} + \varepsilon_{ijt}$$

- where
  - X_{ij} = set of mortgage and bank related characteristics (demeaned)
    - *Borrower charact: Income, number of bank relationships, employment …*
    - *Bank charact: NPL …*

TREATMENT AND CONTROL GROUPS: POSSIBLE ISSUES

- Concern 1: Treatment and control groups should be sufficiently similar
    - Ameliorate the concern using a large set of observable and unobserved controls
    - Concentrate in zip-codes surrounding the boarder of Basque Country (robustness)
    - Test for selection on further unobservables a la Oster (2019) and Altonji et al. (2005)
- Concern 2: Parallel trend assumption
- We will show some of these tests after the results

TREATMENT AND CONTROL GROUPS

	All sample			Adjoining Zip Codes		
	Treated=0	Treated=1	Normalized Differences	Treated=0	Treated=1	Normalized Differences
	Mean	Mean	test	Mean	Mean	test
Household Characteristics						
Log(Gross income)	10.42	10.28	-0.63	10.37	10.34	-0.20
Public servant	0.05	0.08	0.10	0.03	0.06	0.11
Banking group employee	0.04	0.01	-0.12	0.02	0.00	-0.11
Student	0.02	0.03	0.05	0.01	0.02	0.02
Unemployed or homemaker	0.01	0.02	0.04	0.01	0.02	0.08
Log(Age)	6.15	6.15	0.00	6.15	6.12	-0.09
Log(LTV)	4.05	4.12	0.12	4.10	4.16	0.12
Log(1+No. of banks in the zip code)	1.92	1.90	-0.02	1.65	2.00	0.32
Indebted	0.45	0.46	0.01	0.52	0.43	-0.12
Log(No.of banking relationships)	0.32	0.33	0.02	0.36	0.31	-0.10
Bank Characteristics						
Log(Total assets of the bank)	17.87	18.67	7.17	17.93	18.47	0.25
Own funds/total assets of the bank	7.98	8.52	-1.67	8.07	8.04	-0.01
Liquidity ratio of the bank	13.39	15.30	0.14	12.87	11.41	-0.19
ROA of the bank	0.54	0.37	-0.33	0.55	0.52	-0.10
NPL ratio of the bank	5.67	6.65	0.34	5.59	5.93	0.11
Loans to households/total assets of the bank	31.93	25.69	-0.50	32.67	29.25	-0.27
Main bank	0.18	0.16	-0.04	0.22	0.16	-0.11
Leader bank in the zip code	0.15	0.25	0.17	0.22	0.29	0.11
Loan Characteristics						
Log(Loan amount)	11.68	11.45	-0.27	11.59	11.32	-0.36
Log(Loan maturity)	5.72	5.65	-0.15	5.71	5.64	-0.19
Interest rate	1.57	2.10	0.41	1.73	1.93	0.20
No. of Observations	9,703	158,547		477	644	

BEFORE AND AFTER (SELECTION)

	Before the shock Post=0		After the shock Post=1		Normalized Differences
	Mean	S.D.	Mean	S.D.	test
Household Characteristics					
Log(Gross income)	10.29	(0.19)	10.29	(0.19)	-0.02
Public servant	0.08	(0.27)	0.08	(0.27)	0.01
Banking group employee	0.01	(0.12)	0.01	(0.12)	0.00
Student	0.03	(0.16)	0.03	(0.17)	0.01
Unemployed or homemaker	0.02	(0.14)	0.02	(0.14)	0.01
Log(Age)	6.15	(0.24)	6.16	(0.24)	0.02
Log(LTV)	4.13	(0.43)	4.11	(0.46)	-0.04
Log(1+No. of banks in the zip code)	1.93	(0.60)	1.87	(0.58)	-0.07
Indebted	0.45	(0.50)	0.47	(0.50)	0.03
Log(No.of banking relationships)	0.32	(0.39)	0.34	(0.40)	0.03
Bank Characteristics					
Log(Total assets of the bank)	18.74	(1.44)	18.48	(1.56)	-0.12
Own funds/total assets of the bank	8.64	(2.93)	8.30	(2.81)	-0.08
Liquidity ratio of the bank	15.18	(10.35)	15.21	(12.37)	0.00
ROA of the bank	0.40	(0.40)	0.36	(0.47)	-0.06
NPL ratio of the bank	6.66	(1.66)	6.51	(1.83)	-0.06
Loans to households/total assets of the bank	25.74	(8.40)	26.45	(8.30)	0.06
Main bank	0.16	(0.37)	0.15	(0.36)	-0.02
Leader bank in the zip code	0.26	(0.44)	0.22	(0.42)	-0.05
Loan Characteristics					
Log(Loan amount)	11.47	(0.65)	11.46	(0.67)	0.00
Log(Loan maturity)	5.66	(0.32)	5.66	(0.34)	0.00
Interest rate	1.97	(0.89)	2.20	(1.09)	0.16
No. of Observations	94,466		73,784		

RESULTS - PLAN OF ATTACK-

1. Pass-through to mortgage rates

    1. *Average results*
    2. *Heterogeneity results*
    3. *Non full pass-through*

2. Effects on other mortgage terms

    1. *Maturity, loan to value, amount, loan amount/mortgage liability*
    2. *Discussion of tax revenues*

3. Distortions - Risk related decisions

    1. *Consumer loans*
    2. *Mortgage liability*

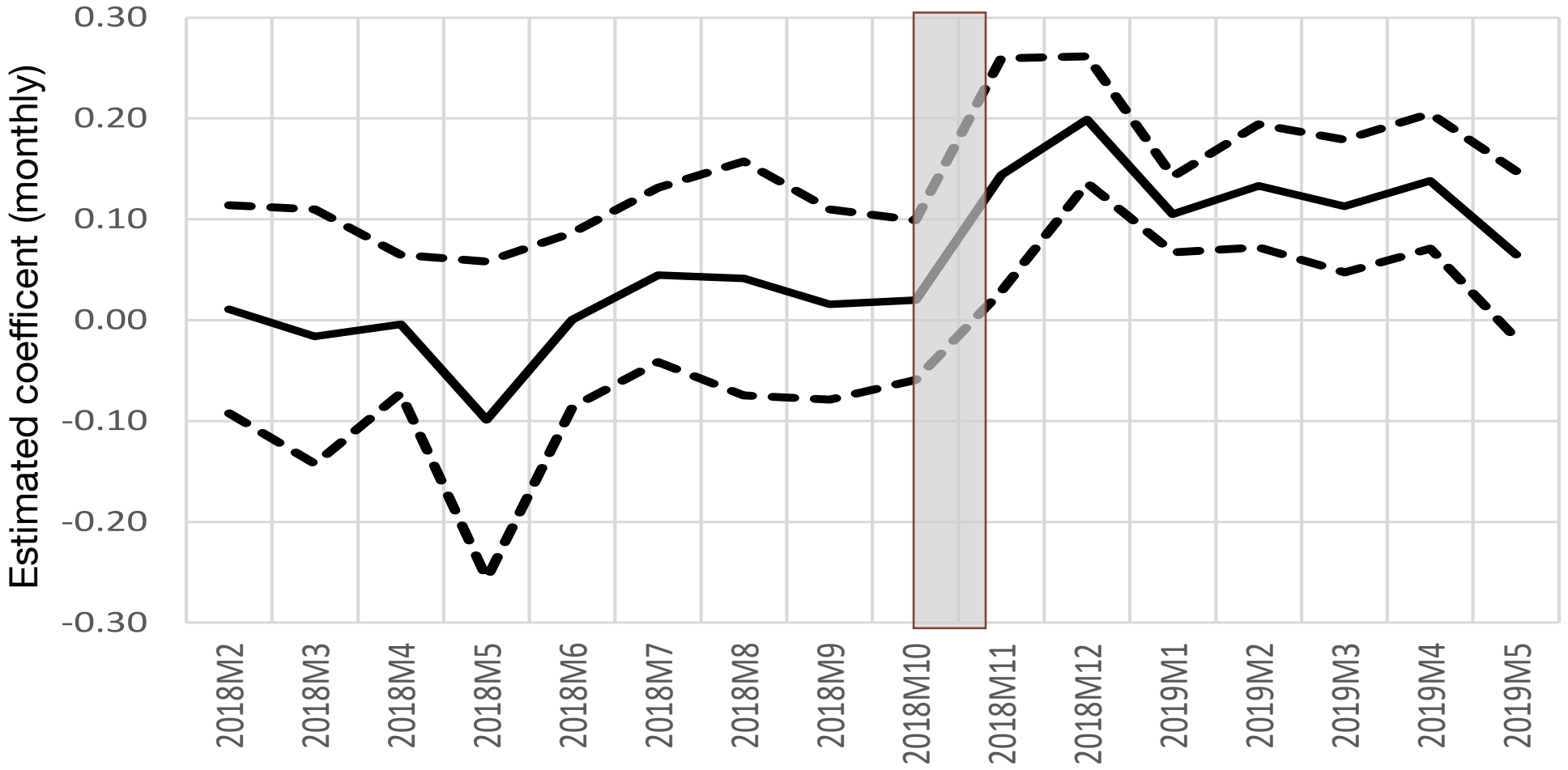
EFFECT ON MORTGAGE RATES: AVERAGE RESULTS

$$Interest\ rate_{ijt} = \boldsymbol{\beta} Treated_i * Post_t + X_i + X_j + \eta_{ijt} + \varepsilon_{ijt}$$

Dependent Variable: Mortgage interest rate								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treated*Post	0.153**	0.095**	0.099**	0.106**	0.102***	0.110***	0.107***	0.106***
	(0.066)	(0.047)	(0.038)	(0.041)	(0.038)	(0.033)	(0.034)	(0.033)
Bank Fixed Effects	No	Yes	-	-	-	-	-	-
Year:month Fixed Effects	No	Yes	-	-	-	-	-	-
Fixed/Variable/Mixed Interest Rate Fixed Effects	No	Yes	-	-	-	-	-	-
Bank*Year:month*Fixed/Variable Interest Rate Fixed Effects	No	No	Yes	-	-	-	-	-
Bank*Year:month:day*Fixed/Variable Interest Rate Fixed Effects	No	No	No	Yes	Yes	Yes	Yes	Yes
Zip Code*Employment Status Fixed Effects	No	No	No	No	Yes	-	-	-
Zip Code*Employment Status*Foreigner Fixed Effects	No	No	No	No	No	Yes	Yes	Yes
Loan Characteristics	No	No	No	No	No	No	Yes	Yes
Household Characteristics	No	No	No	No	No	No	No	Yes
Observations	168,250	168,250	168,250	168,250	168,250	168,250	168,250	168,250
R-squared	0.024	0.341	0.429	0.596	0.665	0.676	0.697	0.701

Very stable coefficient

PARALLEL TRENDS: TIME-VARYING COEFFICIENTS



ADJOINING ZIP CODES

- Focus only on zip codes surrounding the Basque Country Border (both in treatment and control)
  - Advantage: higher similarities (on observables)
  - Disadvantage: fewer observations (<1% of the sample)

Dependent Variable: Mortgage interest rate							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Treated*Post	0.177*	0.108**	0.094*	0.107*	0.131**	0.116**	0.100*
	(0.090)	(0.040)	(0.053)	(0.054)	(0.053)	(0.055)	(0.057)
Bank Fixed Effects	No	Yes	-	-	-	-	-
Year:month Fixed Effects	No	Yes	Yes	Yes	Yes	Yes	Yes
Fixed/Variable Interest Rate Fixed Effects	No	Yes	-	-	-	-	-
Bank*Year:quarter*Fixed/Variable Interest Rate Fixed Effects	No	No	Yes	Yes	Yes	Yes	Yes
Zip Code*Employment Status Fixed Effects	No	No	No	Yes	-	-	-
Zip Code*Employment Status*Foreigner Fixed Effects	No	No	No	No	Yes	Yes	Yes
Loan Characteristics	No	No	No	No	No	Yes	Yes
Household Characteristics	No	No	No	No	No	No	Yes
Observations	1,121	1,121	1,121	1,121	1,121	1,121	1,121
R-squared	0.033	0.516	0.583	0.632	0.657	0.682	0.690

Very stable coefficient and very similar to whole sample

FURTHER ROBUSTNESS

- Heterogeneous treatment: Exploit heterogenous intensity of the treatment
  - *Expect higher pass-through in those regions with higher tax rates*

Region (Comunidades Autonómas and Ciudades Autonómas)	(Base) Tax rate
Andalucía	1.5%
Aragón	1.5%
Asturias	1.2%
Baleares	1.2%
Comunidad Valenciana	1.5%
Canarias	1%
Cantabria	1%
Castilla La Mancha	1.25%
Castilla y León	1.5%
Cataluña	1.5%
Ceuta	0.5%
Extremadura	1.2%
Galicia	1.5%
La Rioja	1%
Comunidad de Madrid	0.75%
Melilla	0.5%
Murcia	1.5%
Navarra	0.5%
Basque Country	0%

FURTHER ROBUSTNESS

BANCO DE ESPAÑA
Eurosistema

- Heterogeneous treatment: (1) to (4)
- Timing: (5) and (6)
- Secondary residence mortgages (7)
- 1 year ahead –no repricing- (8)

Dependent Variable: Mortgage interest rate

	Intensity								Matching	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Tax rate<1% & Basque Country	Tax rate≥1% & Basque Country	Treated= (Tax rate≥1%) Without Basque Country	Continous Treatment	Within two weeks arond treatment date	Without 2018M10 & 2018M11	Secondary residence mortgages	Interest rate July 2020	B. Country vs Madrid & Catalonia	B. Country vs synthetic B. Country
Treated*Post	0.073**	0.118***	0.069**	0.078**	0.088**	0.117***	0.054*	0.112***	0.078***	0.127***
	(0.027)	(0.041)	(0.031)	(0.030)	(0.041)	(0.039)	(0.033)	(0.028)	(0.023)	(0.025)
Bank*Year:month:day*Fixed/Variable/Mixed Interest Rate Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Zip Code*Employment Status*Foreigner Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	43,981	131,677	158,352	168,250	6,773	147,637	33,029	157,604	36,304	12,916
R-squared	0.674	0.718	0.703	0.701	0.743	0.706	0.701	0.740	0.774	0.685

Higher pass through in regions with higher tax rates

Pass through 15 days around introduction

AVERAGE EFFECTS ON MORTGAGE RATES: RECAP & NEXT STEPS

- Pass-through to mortgage rates
  - Average pass-through 10 basis points
  - Already incorporated 15 days after the shift
- **Is the pass-through similar for all borrowers? – heterogeneity**
- Is the overall observed pass-through consistent with 100%?

EFFECT ON MORTGAGE RATES: HETEROGENEITY

$$Interest\ rate_{ijt} = \beta Treated_i * Post_t + \boldsymbol{\gamma} Treated_i * Post_t * \boldsymbol{X_{ij}} + X_i + \eta_{ijt} + \varepsilon_{ijt}$$

HETEROGENEITY

Dependent Variable: Mortgage interest rate	(1)	(2)	(3)	(4)	(5)	(6)
Treated*Post	0.133***	0.134***	0.145***	0.116***	0.104***	0.071***
	(0.035)	(0.033)	(0.033)	(0.026)	(0.027)	(0.031)
Household Characteristics						
Treated*Post*Log(Gross income)	-0.313**	-0.313**	-0.300**	-0.314**	-0.264**	-0.274**
	(0.122)	(0.122)	(0.121)	(0.123)	(0.112)	(0.110)
Treated*Post*Public servant		0.011	0.002	0.022	0.021	0.021
		(0.063)	(0.061)	(0.064)	(0.065)	(0.069)
Treated*Post*Banking group employee		-0.151*	-0.170**	-0.201**	-0.178*	-0.170**
		(0.084)	(0.084)	(0.096)	(0.092)	(0.083)
Treated*Post*Student		0.036	0.023	0.006	0.006	0.012
		(0.079)	(0.073)	(0.082)	(0.075)	(0.074)
Treated*Post*Unemployed or homemaker		0.019	0.044	0.076	0.056	0.062
		(0.128)	(0.126)	(0.139)	(0.138)	(0.137)
Treated*Post*Log(Age)			0.044	0.053	0.094*	0.086
			(0.055)	(0.058)	(0.055)	(0.052)
Treated*Post*Log(LTV)			0.023	-0.022	-0.029	-0.043
			(0.062)	(0.060)	(0.050)	(0.049)
Treated*Post*Log(1+No. of banks in the zip code)				-0.038*	-0.033*	-0.034*
				(0.020)	(0.019)	(0.019)
Treated*Post*Log(1+No.of banking relationships)				-0.102**	-0.101**	-0.102**
				(0.049)	(0.043)	(0.042)
Bank Characteristics						
Treated*Post*Log(Total assets)				0.005	0.014	-0.087**
				(0.021)	(0.022)	(0.036)
Treated*Post*Own funds/Total assets				0.053***	0.053***	0.093***
				(0.012)	(0.011)	(0.011)
Treated*Post*Liquidity ratio				-0.002	-0.002	-0.000
				(0.005)	(0.005)	(0.005)
Treated*Post*ROA				0.042	0.015	0.188
				(0.134)	(0.129)	(0.135)
Treated*Post*NPL ratio				-0.002	-0.008	0.076**
				(0.021)	(0.021)	(0.037)
Treated*Post*Loans to households/Total assets				0.010***	0.011***	0.011***
				(0.003)	(0.003)	(0.003)
Treated*Post*Main bank				0.085	0.081	0.080
				(0.055)	(0.056)	(0.056)
Treated*Post*Leader bank in the zip code				-0.028	-0.036	-0.047
				(0.033)	(0.030)	(0.033)
Bank*Year:month:day*Fixed/Variable/Mixed Interest Rate Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Zip Code*Employment Status*Foreigner Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Loan Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Household Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Treated*Post*Loan Characteristics	No	No	No	No	Yes	Yes
Treated*Post*Loan Amount/Mortgage Liabitity	No	No	No	No	No	Yes
Observations	168,250	168,250	168,250	168,250	168,250	168,250
R-squared	0.701	0.704	0.705	0.705	0.706	0.707

EFFECT ON MORTGAGE RATES: BORROWER HETEROGENEITY

$$Interest\ rate_{ijt} = \beta Treated_i * Post_t + \boldsymbol{\gamma} Treated_i * Post_t * \boldsymbol{X_{ij}} + X_i + \eta_{ijt} + \varepsilon_{ijt}$$

HETEROGENEITY

Dependent Variable: Mortgage interest rate						
	(1)	(2)	(3)	(4)	(5)	(6)
Treated*Post	0.133***	0.134***	0.145***	0.116***	0.104***	0.071***
	(0.035)	(0.033)	(0.033)	(0.026)	(0.027)	(0.031)
Household Characteristics						
Treated*Post*Log(Gross income)	-0.313**	-0.313**	-0.300**	-0.314**	-0.264**	-0.274**
	(0.122)	(0.122)	(0.121)	(0.123)	(0.112)	(0.110)
Treated*Post*Public servant		0.011	0.002	0.022	0.021	0.021
		(0.063)	(0.061)	(0.064)	(0.065)	(0.069)
Treated*Post*Banking group employee		-0.151*	-0.170**	-0.201**	-0.178*	-0.170**
		(0.084)	(0.084)	(0.096)	(0.092)	(0.083)
Treated*Post*Student		0.036	0.023	0.006	0.006	0.012
		(0.079)	(0.073)	(0.082)	(0.075)	(0.074)
Treated*Post*Unemployed or homemaker		0.019	0.044	0.076	0.056	0.062
		(0.128)	(0.126)	(0.139)	(0.138)	(0.137)
Treated*Post*Log(Age)			0.044	0.053	0.094*	0.086
			(0.055)	(0.058)	(0.055)	(0.052)
Treated*Post*Log(LTV)			0.023	-0.022	-0.029	-0.043
			(0.062)	(0.060)	(0.050)	(0.049)
Treated*Post*Log(1+No. of banks in the zip code)				-0.038*	-0.033*	-0.034*
				(0.020)	(0.019)	(0.019)
Treated*Post*Log(1+No.of banking relationships)				-0.102**	-0.101**	-0.102**
Bank*Year:month:day*Fixed/Variable/Mixed Interest Rate Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Zip Code*Employment Status*Foreigner Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Loan Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Household Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Treated*Post*Loan Characteristics	No	No	No	No	Yes	Yes
Treated*Post*Loan Amount/Mortgage Liabitity	No	No	No	No	No	Yes
Observations	168,250	168,250	168,250	168,250	168,250	168,250
R-squared	0.701	0.704	0.705	0.705	0.706	0.707

EFFECT ON MORTGAGE RATES: SUMMARY

- Pass-through to mortgage rates
  - Average pass-through 10 basis points (b.p.)
  - Already incorporated 15 days after the shift

- Strong heterogeneity
  - Borrowers in the 75% vs the 25% of the distribution of
    - *Income (32k vs 24k) have a 8 b.p. lower increase after the shift*
    - *Number of banks (9 vs. 4) a 2 b.p. lower increase*
  - Number of banking relationships (2 vs. 1) a 7 b.p. lower increase
  - Bank employees have no pass through

- Full pass-through on average?

(NOT) FULL PASS THROUGH ANALYSIS – BACK OF THE ENVELOPE

- How much does 10 bp (on average) account for?

- Compute the PV of 10 bp for the average mortgage
  - This gives us the increase in income of the bank coming from the 10 bp pass-through
  - Average maturity, average loan size observed

- **10 bp accounts for a PV of 1400 Euros (1100 Euros)**
  - *Discount rate is relevant and unobserved assume*
  - *Average of the 10 Y Spanish government bond yield 1.33%*
  - *YTM argument: 2.1% average loan rate*

- Average AJD is 1774 Euros
  - Banks profits (NPV) are lower on average (+1400 -1774<0)

- What would be the full pass through rate?
  - 12,8 bp (14 bp) account for an NPV of 1774 (NPV =0)

(NOT) FULL PASS THROUGH ANALYSIS – HETEROGENEITY –

- Compare observed rates with (simulated) full pass-through rates
  - Full pass-through rate: rate such that bank profits (per loan) are not affected by the tax shift

- Methodology: compare (simulated) full pass-through rates with observed rates.
  - Simulated rates for pre period in treatment areas
    - *bank profits (observed rates, no tax) = bank profits (simulated rates, tax)*
  - Observed rates for post period in treatment areas
  - The difference between simulated and observed gives us the effective pass-through
  - If simulated>observed pass-through is not complete (and vice-versa)
- **Main challenge: discount rate per loan not observed**
  - Use Gvt bond discount rate (conservative estimation – overestimates pass-through)
  - Use observed pre rate as discount (more realistic estimation)
- Results
  - Simulated pass-through 12 (or 16) bp vs 10 bp observed on average
  - Accounts for a not pass-through of 324 euros (or 730 euros) per loan on average

(NOT) FULL PASS THROUGH-HETEROGENEITY RESULTS-

BANCO DE ESPAÑA
Eurosistema

Dependent Variable: Mortgage interest rate	(1)	(2)	(3)	(4)	(5)
		Government Bond			
		Below P75 Gross Income	Above P75 Gross Income		Yield to Maturity
Treated*Post	-0.046***	-0.002	-0.132***	-0.064**	-0.073**
	(0.015)	(0.019)	(0.026)	(0.032)	(0.032)
Household Characteristics					
Treated*Post*Log(Gross income)				-0.222*	-0.216*
				(0.127)	(0.127)
Treated*Post*Public servant				0.015	0.017
				(0.059)	(0.059)
Treated*Post*Banking group employee				-0.177**	-0.164**
				(0.076)	(0.076)
Treated*Post*Student				0.013	0.012
				(0.077)	(0.077)
Treated*Post*Unemployed or homemaker				0.061	0.059
				(0.124)	(0.124)
Treated*Post*Log(Age)				0.004	-0.003
				(0.053)	(0.053)
Treated*Post*Log(LTV)				-0.009	-0.009
				(0.039)	(0.039)
Treated*Post*Log(1+No. of banks in the zip code)				-0.033	-0.033
				(0.025)	(0.025)
Treated*Post*Log(1+No.of banking relationships)				-0.105**	-0.104**
				(0.046)	(0.046)
Bank*Year:month:day*Fixed/Variable/Mixed Interest Rate Fixed Effec	Yes	Yes	Yes	Yes	Yes
Zip Code*Employment Status*Foreigner Fixed Effects	Yes	Yes	Yes	Yes	Yes
Loan Characteristics	Yes	Yes	Yes	Yes	Yes
Household Characteristics	Yes	Yes	Yes	Yes	Yes
Treated*Post*Loan Characteristics	No	No	No	Yes	Yes

Full pass-through for <P75 Income

(NOT) FULL PASS THROUGH-HETEROGENEITY RESULTS-

- Could heterogeneity results in mortgage rate pass through be driven by (unobserved) risk?
  - Are our observable variables capturing heterogenous risk?
  - Yes qualitatively (quite probably)
  - But not plausible quantitatively

1. We simulate the risk change that would be consistent with observed heterogeneous coefficients

  - These are inconsistent with level of the interest rates and observed defaults
    - *We do not observe such level of heterogeneity in ex ante rates*
    - *Implied change in default rates very large (8 basis points – 3% def probability)*

2. Estimations using YTM should incorporate (at least part) of such unobserved risk
  - Coefficients of interest exhibit small changes and maintain (economic) significance

(NOT) FULL PASS THROUGH-RISK-

Dependent Variable:	Mortgage interest rate (1)	Future Default (2)
Treated*Post	0.065***	0.004
	(0.033)	(0.007)
Household Characteristics		
Log(Gross income)	-0.255***	-0.050***
	(0.038)	(0.038)
Treated*Log(Gross income)	-0.093	-0.018
	(0.090)	(0.020)
Post*Log(Gross income)	-0.006	-0.012
	(0.035)	(0.011)
Treated*Post*Log(Gross income)	-0.263**	0.015
	(0.100)	(0.030)
Log(1+No.of banking relationships)	0.094***	0.036***
	(0.019)	(0.009)
Treated*Log(1+No.of banking relationships)	-0.010	0.007
	(0.029)	(0.009)
Post*Log(1+No.of banking relationships)	-0.047**	-0.002
	(0.018)	(0.003)
Treated*Post*Log(1+No.of banking relationships)	-0.089**	0.034*
	(0.043)	(0.018)
Bank*Year:month:day*Fixed/Variable/Mixed Interest Rate Fixed Effec	Yes	Yes
Province Fixed Effects*Employment Status*Foreigner Fixed Effects	Yes	Yes
Loan Characteristics	Yes	Yes
Household Characteristics	Yes	Yes
Treated*Post*Loan Characteristics	Yes	Yes
Treated*Post*Loan Amount/Mortgage Liabitity	Yes	Yes
Observations	168,250	168,250
R-squared	0.677	0.072

EFFECT ON MORTGAGE RATES: TAKING STOCK & NEXT STEPS

- A shift in statutory incidence affects equilibrium mortgage rates
  - Increases the mortgage rate (as standard theory predicts)
- But
  - Increases it less than would be predicted by irrelevance of statutory incidence
  - Affects disproportionally more certain type of borrowers
    - Those with characteristics related to lower bargaining power
- **Do banks change other lending related decisions?**
  - They might also change other loan terms (maturity, amount, loan to value, etc)
  - If their rents are lower (not full pass-through), they can change their risk-taking attitudes
- **Are more affected banks getting lower profits?**

EFFECTS ON OTHER MORTGAGE TERMS

OTHER LOAN TERMS: LOAN LEVEL ANALYSIS

- Analyze if other mortgage terms vary in treated vs control areas
    - We know that interest vary, but what about other terms: amount, maturity etc?

- Strategy: diff in diff analysis at the loan level
    - control (basque country) treatment (other regions)
    - (back to our main identification strategy)

LOAN-LEVEL EFFECTS ON OTHER LOAN TERMS

$$\textbf{Loan term}_{ijt} = \beta Treated_i * Post_t + \eta_i + \eta_j + \eta_{ijt} + \varepsilon_{ijt}$$

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent Variable:	Loan Amount		Maturity	Loan to Value	Loan Amount/Mortgage Liability	Future Default	Additional Credit
	Zip-code Level						
Treated*Post	0.010	-0.012	-0.003	-0.014	0.092*	-0.005	0.003
	(0.013)	(0.028)	(0.004)	(0.011)	(0.048)	(0.007)	(0.004)
Bank*Yearmonthday*Fixed/Variable/Mixed Interest Rate Fixed	Yes	No	Yes	Yes	Yes	Yes	Yes
Zip Code*Employment Status*Foreigner Fixed Effects	Yes	No	Yes	Yes	Yes	Yes	Yes
Loan Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Zip Code Fixed Effects	-	Yes	-	-	-	-	-
Yearmonth Fixed Effects	-	Yes	-	-	-	-	-
Observations	168,250	39,839	168,250	168,250	168,250	168,250	168,250
R-squared	0.728	0.891	0.367	0.631	0.862	0.197	0.202

No intensive effect

No extensive effect

No differential Future default

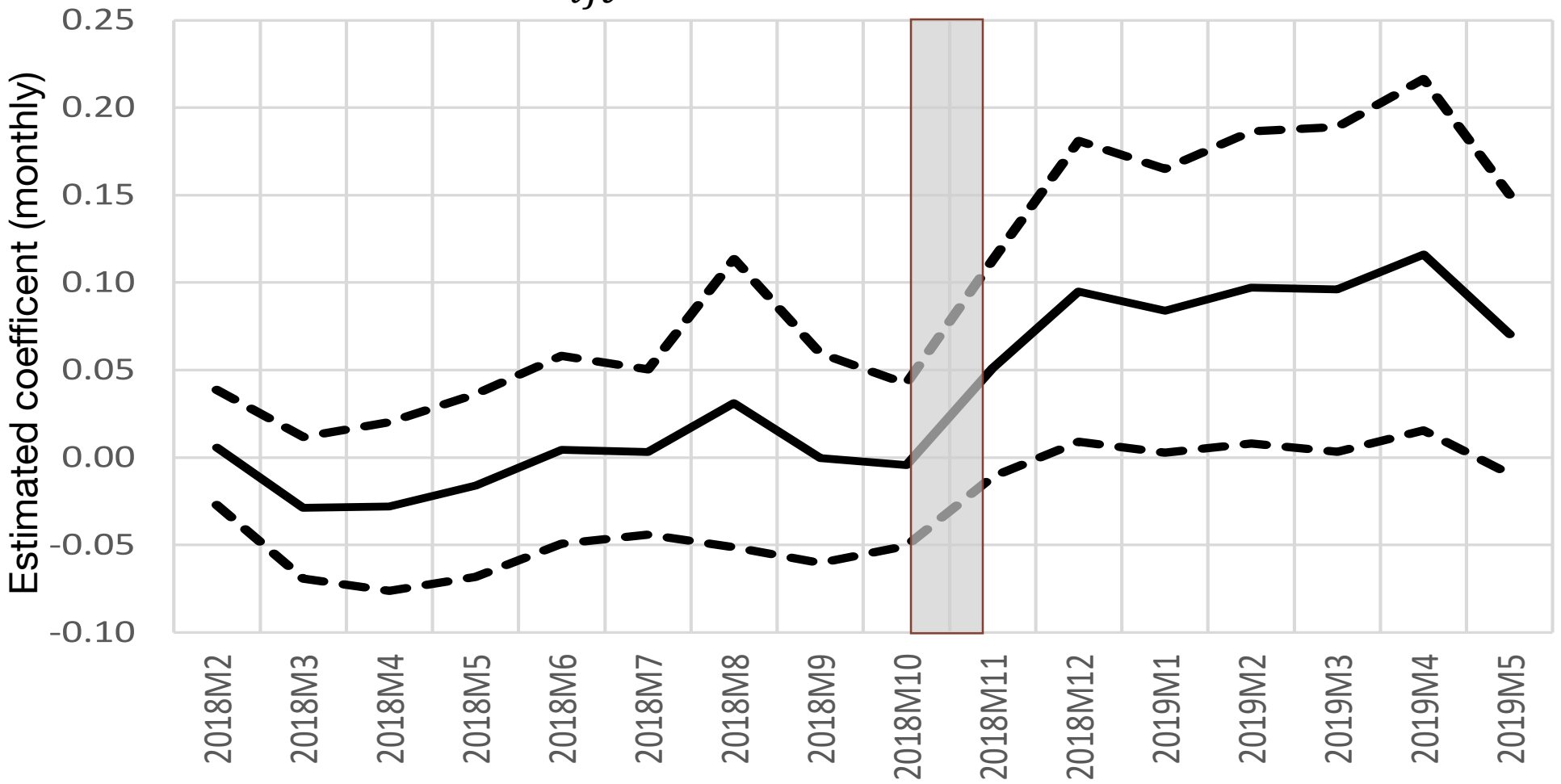
LOAN-LEVEL EFFECTS ON OTHER LOAN TERMS: MORE RISK-TAKING

$$\textbf{Loan term}_{ijt} = \beta Treated_i * Post_t + \eta_i + \eta_j + \eta_{ijt} + \varepsilon_{ijt}$$

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent Variable:	Loan Amount		Maturity	Loan to Value	Loan Amount/Mortgage Liability	Future Default	Additional Credit
	Zip-code Level						
Treated*Post	0.010	-0.012	-0.003	-0.014	0.092*	-0.005	0.003
	(0.013)	(0.028)	(0.004)	(0.011)	(0.048)	(0.007)	(0.004)
Bank*Year:month:day*Fixed/Variable/Mixed Interest Rate Fixed	Yes	No	Yes	Yes	Yes	Yes	Yes
Zip Code*Employment Status*Foreigner Fixed Effects	Yes	No	Yes	Yes	Yes	Yes	Yes
Loan Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Zip Code Fixed Effects	-	Yes	-	-	-	-	-
Year:month Fixed Effects	-	Yes	-	-	-	-	-
Observations	168,250	39,839	168,250	168,250	168,250	168,250	168,250
R-squared	0.728	0.891	0.367	0.631	0.862	0.197	0.202

LOAN-LEVEL EFFECTS ON MORTGAGE LIABILITY: TIMING

$$\frac{\textbf{Loan amount}}{\textbf{mortgage liability}_{ijt}} = \beta Treated_i * Post_t + \eta_i + \eta_j + \eta_{ijt} + \varepsilon_{ijt}$$



LOAN-LEVEL EFFECTS ON MORTGAGE LIABILITY: HETEROGENEITY

BANCO DE ESPAÑA
Eurosistema

$$\frac{\boldsymbol{Loan\ amount}}{\boldsymbol{mortgage\ liability}_{ijt}} = \beta Treated_i * Post_t + \boldsymbol{\gamma Treated_i * Post_t * X_i} + \eta_i + \eta_{ijt} + \varepsilon_{ijt}$$

Dependent Variable: Loan amount/mortgage liability	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treated*Post	0.106**	0.104**	0.095***	0.094***	0.088**	0.088**	0.099***	0.119**
	(0.051)	(0.049)	(0.034)	(0.034)	(0.035)	(0.034)	(0.035)	(0.047)
Household Characteristics								
Treated*Post*Log(Gross income)	-0.195*	-0.191*	-0.212*	-0.208			-0.164	-0.111
	(0.109)	(0.108)	(0.122)	(0.132)			(0.127)	(0.102)
Treated*Post*Public servant		-0.038	-0.033	-0.033			-0.001	0.004
		(0.059)	(0.055)	(0.054)			(0.051)	(0.049)
Treated*Post*Banking group employee		0.043	0.046	0.046			0.045	0.071*
		(0.044)	(0.037)	(0.039)			(0.043)	(0.040)
Treated*Post*Student		0.039	0.044	0.043			0.043	0.044
		(0.044)	(0.043)	(0.045)			(0.045)	(0.046)
Treated*Post*Unemployed or homemaker		-0.040	-0.062	-0.061			-0.077	-0.083
		(0.055)	(0.046)	(0.062)			(0.061)	(0.062)
Treated*Post*Log(Age)			-0.064	-0.057			-0.003	-0.009
			(0.064)	(0.067)			(0.045)	(0.040)
Treated*Post*Log(LTV)			-0.095	-0.095			-0.014	0.009
			(0.089)	(0.090)			(0.059)	(0.067)
Treated*Post*Log(1+No. of banks in the zip code)				-0.002			-0.001	0.002
				(0.024)			(0.022)	(0.021)
Treated*Post*Indebted				0.015			-0.003	0.005
				(0.052)			(0.046)	(0.045)
Treated*Post*Log(No.of banking relationships)				-0.031			-0.007	-0.006
				(0.074)			(0.065)	(0.062)
Bank Characteristics								
Treated*Post*Log(Total assets of the bank)					-0.022	-0.025	-0.026	-0.040
					(0.028)	(0.028)	(0.028)	(0.027)
Treated*Post*Own funds/total assets of the bank					0.006	0.007	0.008	0.013
					(0.016)	(0.016)	(0.015)	(0.015)
Treated*Post*Liquidity ratio of the bank					0.006	0.006	0.006	0.006
					(0.004)	(0.004)	(0.004)	(0.004)
Treated*Post*ROA of the bank					0.227**	0.231**	0.226**	0.258**
					(0.113)	(0.113)	(0.107)	(0.103)
Treated*Post*NPL ratio of the bank					0.070**	0.071**	0.070***	0.072***
					(0.027)	(0.027)	(0.024)	(0.025)
Treated*Post*Loans to households/total assets of the bank					0.003	0.003	0.003	0.002
					(0.005)	(0.005)	(0.005)	(0.005)
Treated*Post*Main bank						0.004	0.013	0.014
						(0.017)	(0.018)	(0.020)
Treated*Post*Leader bank in the zip code						0.024	0.026	0.024
						(0.031)	(0.030)	(0.028)
Bank*Year:month:day*Fixed/Variable Interest Rate Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Zip Code*Employment Status*Foreigner Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan Characteristics & Inteerst Rate	No	No	No	No	No	No	No	Yes
Observations	168,250	168,250	168,250	168,250	168,250	168,250	168,250	168,250
R-squared	0.861	0.861	0.861	0.861	0.862	0.862	0.862	0.863

No borrower heterogeneity

Only for bank employees

Observed differences in pass-through not explained b changes in mortgage liability

Bank heterogeneity: NPLs

LOAN-LEVEL EFFECTS ON OTHER LOAN TERMS

- No effect on loan amount, maturity, loan to value
- But an effect on mortgage liability
  - Banks react to statutory shift (they now have to pay) by reducing mortgage liability
  - This reduction does not depend on borrowers' characteristics
- Reduction in mortgage liability has two effects
  - Lower tax collection by the government (mortgage liability is the base)
    - We do not find aggregate quantity effects (no extensive margin effects)
    - No statistical significance in a diff-in-diff of total lending the zip code level
  - Increase in the risk that the bank bears
    - Mortgage liability serves as collateral for the bank
    - Consistent with the below full pass-through and with banks' reduction in profits

EFFECTS ON CONSUMER LOANS

FURTHER DISTORTIONARY EFFECTS: UNAFFECTED LOANS

- Do banks change their risk-taking attitudes in non-mortgages (unaffected loans)?
  - Consistent with bank having lower rents (no full pass-through)
- Already documented evidence on change in mortgage liability
  - Banks react to statutory shift (they now have to pay and are affected in economic incidence) by reducing mortgage liability
- What about other credit? Focus on consumer credit
  - Consumer credit is not affected by the tax shift directly
  - But can be indirectly if banks' change their strategy
    - Consumer credit is much riskier than mortgage credit
    - Average loan rates: 9% consumer credit vs. 2% mortgages

CONSUMER CREDIT: WHAT WE DO

- Analyze (possible) changes in consumer credit:

  1. Is there a change in the propensity of granting consumer credit?
  2. Is there a change in the characteristics of consumer credit?

- Strategy:

  - Diff in Diff estimation at the loan level: very similar as before

- Dependent variables:

  1. Probability of granting a consumer credit application
     - Condition on applications (dummy =1 if a bank grants the application)
  2. Loan rates, maturity, amount, **ex-post default**

CONSUMER CREDIT ANALYSIS: SPILLOVERS TO UNAFFECTED LOANS

$$\textbf{Application Granted}_{ijt} = \beta Treated_i * Post_t + \eta_i + \eta_j + \eta_{ijt} + \varepsilon_{ijt}$$

	(1)	(2)
	Loan Applications	
		Adjoining zip codes
Dependent Variable:	Loan Application Granted	
Treated*Post	0.023**	0.095**
	(0.011)	(0.044)
Borrower Fixed Effects	Yes	Yes
Bank Fixed Effects	-	Yes
Year:month:day Fixed Effects	-	Yes
Bank*Year:month:day Fixed Effects	Yes	No
Bank*Year:month:day*Fixed/Variable Interest Rate Fixed Effects	No	No
Zip Code*Employment Status*Foreigner Fixed Effects	-	-
Zip Code*Bank Fixed Effects	No	No
Loan Characteristics	No	No
Household Characteristics	-	-
Observations	889,366	4,587
R-squared	0.731	0.748

CONSUMER CREDIT ANALYSIS: DEFAULTS EX-POST

$$\textbf{Loan term}_{ijt} = \beta Treated_i * Post_t + \eta_i + \eta_j + \eta_{ijt} + \varepsilon_{ijt}$$

	(3)	(4)	(5)	(6)
	Newly Granted Loans			
Dependent Variable:	Interest Rate	Loan Amount	Maturity	Future Default
Treated*Post	0.042	0.011	-0.002	0.007**
	(0.050)	(0.022)	(0.003)	(0.003)
Borrower Fixed Effects	No	No	No	No
Bank Fixed Effects	-	-		-
Year:month:day Fixed Effects	-	-		-
Bank*Year:month:day Fixed Effects	-	-	-	-
Bank*Year:month:day*Fixed/Variable Interest Rate Fixed Effects	Yes	Yes	Yes	Yes
Zip Code*Employment Status*Foreigner Fixed Effects	Yes	Yes	Yes	Yes
Zip Code*Bank Fixed Effects	Yes	Yes	Yes	Yes
Loan Characteristics	Yes	Yes	Yes	Yes
Household Characteristics	Yes	Yes	Yes	Yes
Observations	1,760,791	1,760,791	1,760,791	1,760,791
R-squared	0.495	0.598	0.348	0.187

CONSUMER CREDIT ANALYSIS: RECAP

- Higher probability of granting a consumer loan application after the shift
  - Spillovers to non directly affected market
- No change in consumer loan characteristics
  - But an increase in the probability of failure
- Suggest higher risk taking in by banks (riskier credit being granted)
  - Recall reduction in mortgage liability (collateral)

EFFECTS AT THE BANK LEVEL

BANK LEVEL EXPOSURE

- Analyze if the effects are more prevalent in more affected banks
  - Banks with a higher ratio of mortgages outside the Basque Country / total assets
  - Also analyze the effects in weaker (high NPL) banks as lower rents from not full pass-through, also in line with risk decisions being "distorted"

- Strategy: diff in diff analysis over more vs. less affected banks

  - Interaction term High exposure*post and High exposure*post*NPL
  - Analyze also loan fees, ROA (only available at the bank level)
  - Analyze different loan variables: loan rates, mortgage liability, consumer loans

$$LHS_{ijt} = \beta High\ Exposure_{\ j} * Post_t + \gamma High\ Exposure_{\ j} * Post_t * X_j + \eta_{it} + \eta_j + \varepsilon_{ijt}$$

  - $High\ Exposure_j$= dummy =1 if ratio of mortgages outside the Basque Country over total assets of the bank that grants the loan is above the median of distribution

BANK LEVEL EXPOSURE: BANK LEVEL RESULTS

$$y_{jt} = \beta High\ Exposure_{\ j} * Post_t + \eta_t + \eta_j + \varepsilon_{ijt}$$

	(1)	(2)	(3)
Dependent Variable:	Interest Income Loans/Total Assets	Loan Fees/Total Assets	ROA
Estimation:	OLS	OLS	OLS
High Exposure to Mortgages outside Basque Country*Post	0.054*	0.001	-0.093**
	(0.028)	(0.006)	(0.046)
Year:quarter Fixed Effects	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes
Observations	390	390	390
R-squared	0.973	0.35	0.693

BANK LEVEL EXPOSURE: LOAN LEVEL RESULTS

$$y_{ijt} = \beta High\ Exposure_{\ j} * Post_t + \gamma High\ Exposure_{\ j} * Post_t * X_j + \eta_{it} + \eta_j + \varepsilon_{ijt}$$

	(1)	(2)	(3)	(4)	(5)	(6)
	Mortgages				Consumer Loans	
Dependent Variable:	Interest Rate		Loan Amount/Mortgage Liability		Loan Application Granted	
Estimation:	OLS	OLS	OLS	OLS	OLS	OLS
High Exposure to Mortgages outside Basque Country*Post	0.113*	0.174***	0.125**	0.174***	0.019*	0.016**
	(0.064)	(0.052)	(0.063)	(0.060)	(0.011)	(0.008)
High Exposure to Mortgages outside Basque Country*Post*Bank NPL ratio		0.042*		0.105**		0.005
		(0.025)		(0.040)		(0.004)
Borrower Fixed Effects	No	No	No	No	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year:month:day*Fixed/Variable Interest Rate Fixed Effects	Yes	Yes	Yes	Yes	No	No
Zip Code*Employment Status*Foreigner Fixed Effects	Yes	Yes	Yes	Yes	-	-
Province Fixed Effects*Application Year:month:day	No	No	No	No	Yes	Yes
Household Characteristics	Yes	Yes	Yes	Yes	-	-
Observations	168,250	168,250	168,250	168,250	889,366	889,366
R-squared	0.496	0.497	0.824	0.831	0.731	0.732

CONCLUDING REMARKS

CONCLUDING REMARKS

- Our results suggest **economic incidence and distortionary effects of only shifting statutory incidence** (i.e., the agent on which taxes are levied), **without a tax rate change**
  - Very difficult to test the irrelevance of shifting statutory incidence

- For **identification**, we exploit a tax change and administrative data from the credit market
  - a policy change in 2018 in Spain shifting a mortgage tax to being levied on banks instead of on borrowers
  - some regions, for historical reasons, were exempted from paying this tax (or have different tax rates)

- After the policy change, the average mortgage rate increases consistently with a **strong (but not complete) tax pass-through**
  - There is **large heterogeneity in the pass-through**: larger for borrowers with lower income, less lending relationships, not working for the lender, or facing less banks.

- The policy change increases banks' **risk-taking**: more affected banks reduce costly

BANCO DE ESPAÑA
Eurosistema

THANKS FOR YOUR ATTENTION