The Mortgage Piggy Bank: Wealth Building through Amortization

(previously "Mortgage Amortization and Wealth Accumulation")

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Summary

"One nice thing about investing in a house is that you're committed to a mortgage payment. So if you don't take out a home equity line of credit or do something like that, you will accumulate wealth."

Nobel Laureate Robert Shiller (CNN Dec 4th, 2014)

1) Standard mortgages = loan + repayment plan (amortization)

2) These amortization "illiquid savings" plans are immense
(In U.S. $100s of bil/yr → comparable w/ pension programs)

3) First causal evidence of effect on wealth → substantial
($1 amortization → ~$1 wealth)

4) Implications for homeownership and wealth building/inequality, debt-savings fungibility, and macroprudential policies

The Basics

What is a **mortgage**?

Standard **Mortgage** = Loan + Repayment Plan (Amortization)

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expenses

Interest

Lender

↑↓

Parker et al. 13', Di Maggio et al. '17,…

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expenses ↓ ↓ **savings**

Interest + Debt Repayment

Lender

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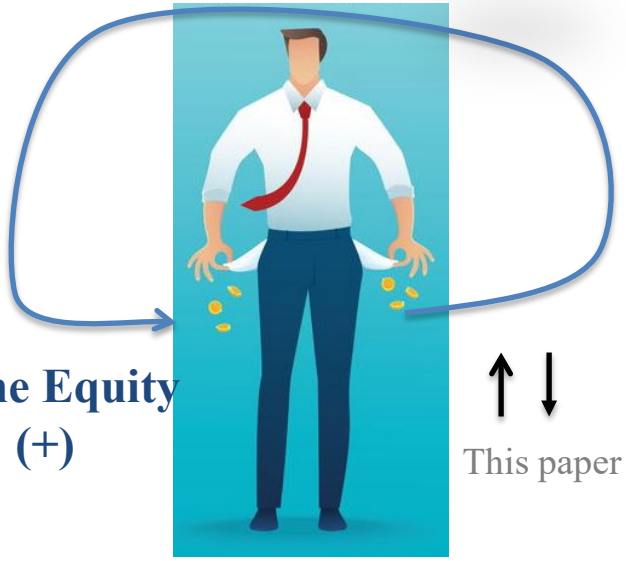

Home Equity (+)

↑↓

This paper

Research question

What is the effect of mortgage amortization on wealth accumulation?

Wealth Accumulation = Mtg **A**mortization (Repayment) + Net (non-mtg) **S**avings

$$\text{Fungibility } (F) := -\frac{\partial \boldsymbol{S}}{\partial \boldsymbol{A}}$$

$$\text{Marginal Wealth from Amortization } (MWA) := \frac{\partial \boldsymbol{W}}{\partial \boldsymbol{A}} := 1\text{- Fungibility}$$

H_0: No effect - perfect fungibility between savings and debt repayment

H_a: Some effect - imperfect fungibility

- If H_a: what is the level of fungibility F and therefore elasticity MWA?

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What is the effect of mortgage amortization +$1 on wealth accumulation?

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$0 **$0 "leakage"**

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+$1 -$1 "crowdout"

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=

Income

-

Expenses

$$\text{Fungibility } (F) := -\frac{\partial S}{\partial A} = \mathbf{0}$$

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		+$1		**+$1**		**$0**
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		‖				
$0		Income				
		-				
-$1		Expenses				

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Research question

What is the effect of mortgage amortization on wealth accumulation?

Do they **reduce other savings**

$$MWA = 0$$

or **cut expenses/leisure**

$$MWA = 1$$

or **both**?

$$MWA \in [0,1]$$

Empirical Challenges

1) Debt repayments & savings co-determined (obviously)

2) Detailed administrative household-level wealth information

Our approach

1) Natural Experiment from Dutch Macroprudential Policy

Jan-2013 remove tax benefits/conformability of incremental IO mtgs

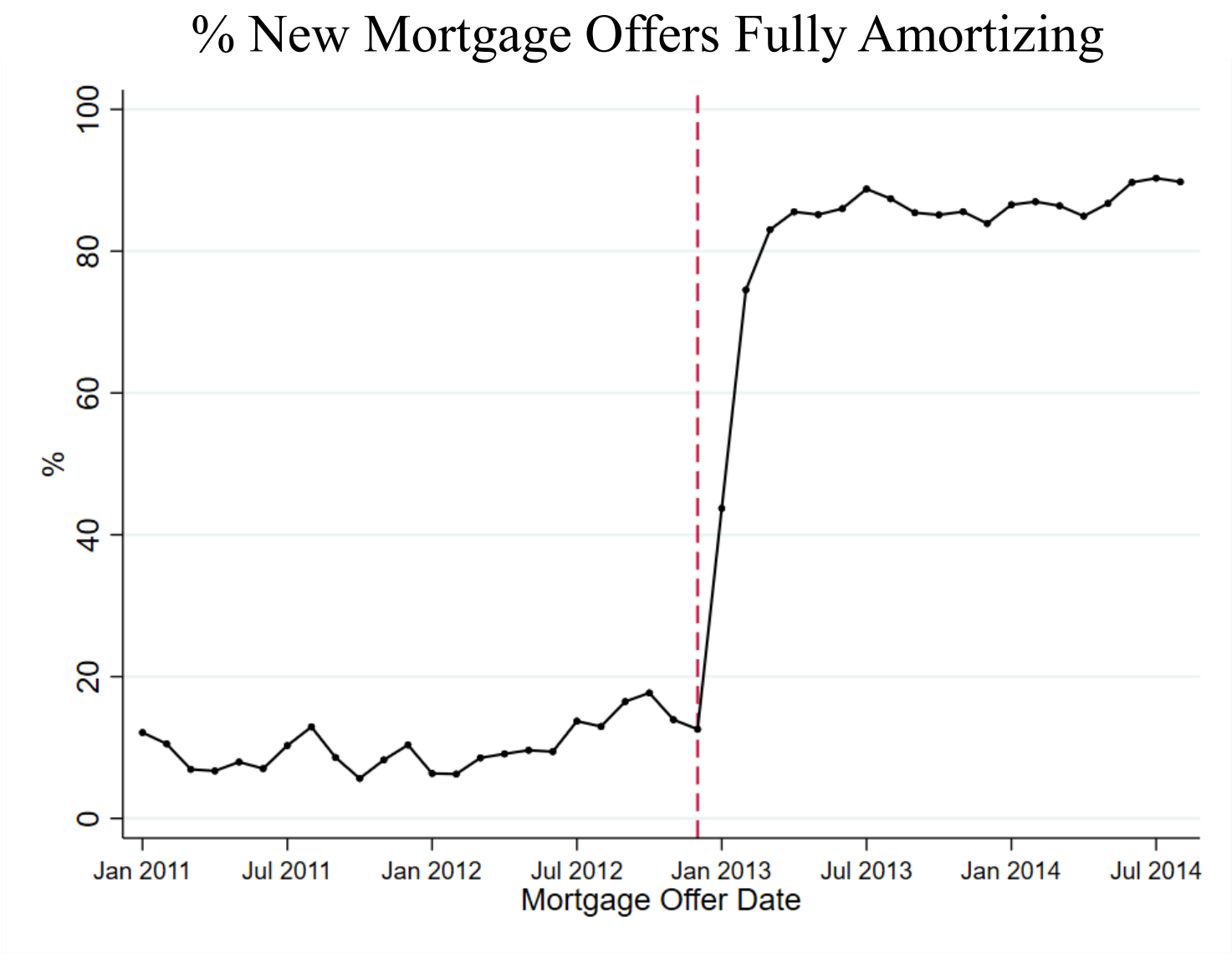
2) Administrative data

Tax records of assets, income, and liabilities for entire population for 2007-2016

3) Design

Wealth accumulation for homebuyers before vs. after Jan-2013

Our macroprudential shock



Preview of Findings

1) Δ€1 amortization increases wealth €1 $(MWA \sim 1)$

- Little debt-savings substitutability $(F \sim 0)$
- Not selection: Holds for only life-event driven purchases (ex. timing of birth of child)
- Not "non-savers": Holds for HHs who save substantially

2) "Paid" for with income and expenditures

- Higher wealth paid for with higher income(~1/4th) and lower expenditures (~3/4th)

Dutch Mortgage Environment in 2012

- Harsh recourse laws (think harsher than U.S. student loans)
  - Little role for strategic default - orders of magnitude lower default rates than U.S. in crisis peak
  - Origination LTVs>100%

- Regulatory DTI limits
  - DTI max computed *as if* 30yr amortizing loan (*not affected by the regulation*)

- New mortgages typically 50% interest-only
  - External validity: IO mtg isn't weird subsample & most have some amortization

The Regulation

"Financial Stability" program

- Announced in '12 (passage uncertain til Oct) starting January 1st, 2013
  - Based on date purchase contract, not close date (typically >2 months later)
  - For close dates, "treatment" will start after March 1st, 2013

- Afterwards only 30-year fully amortizing mortgages eligible for MID
  - Applies to incremental loans, so fully to first-time homebuyers and partially to other buyers

Data and Definitions

$$\Delta \boldsymbol{Wealth}^{1,2} \equiv \Delta Assets - \Delta \text{Liabilities}$$

$$\begin{aligned} Assets \equiv\ & Deposits \text{ (tax records confirmed by banks)} \\ & + Stocks \text{ (tax records confirmed by banks)} \\ & + Bonds \text{ (tax records confirmed by banks)} \\ & + Voluntary\ Pension \text{ (implied from tax records)} \end{aligned}$$

$$\begin{aligned} Liabilities \equiv\ & Mortgages \text{ (tax records confirmed by banks + registry)} \\ & + Other\ liabilities \text{ (credit registry)} \end{aligned}$$

[1] Wealth does NOT include value of human capital (which we explore separately)

[2] Accurate annual house values limited, but can/do look at assessed values

Summary Stats – Our Sample

Universe of all 111,523 first-time time homebuyers in Netherlands in 2012/2013

Relatively High Income

- Pre-tax household income as of '11 (mean €58k; median €54k)

Relatively Young

- Oldest person in household as of '14 (mean 38; median 36; 90th-tile 52)

Highly Levered

- Balance '14 (mean €203k; median €187k)
- LTV '14 (median 105%; 25th percentile 101%)

Most have liquid financial savings

- Level as of '14 (mean €18k; median €8k; 25th €2.6k)
- Substantial variability within household over time (esp. in years of job loss)

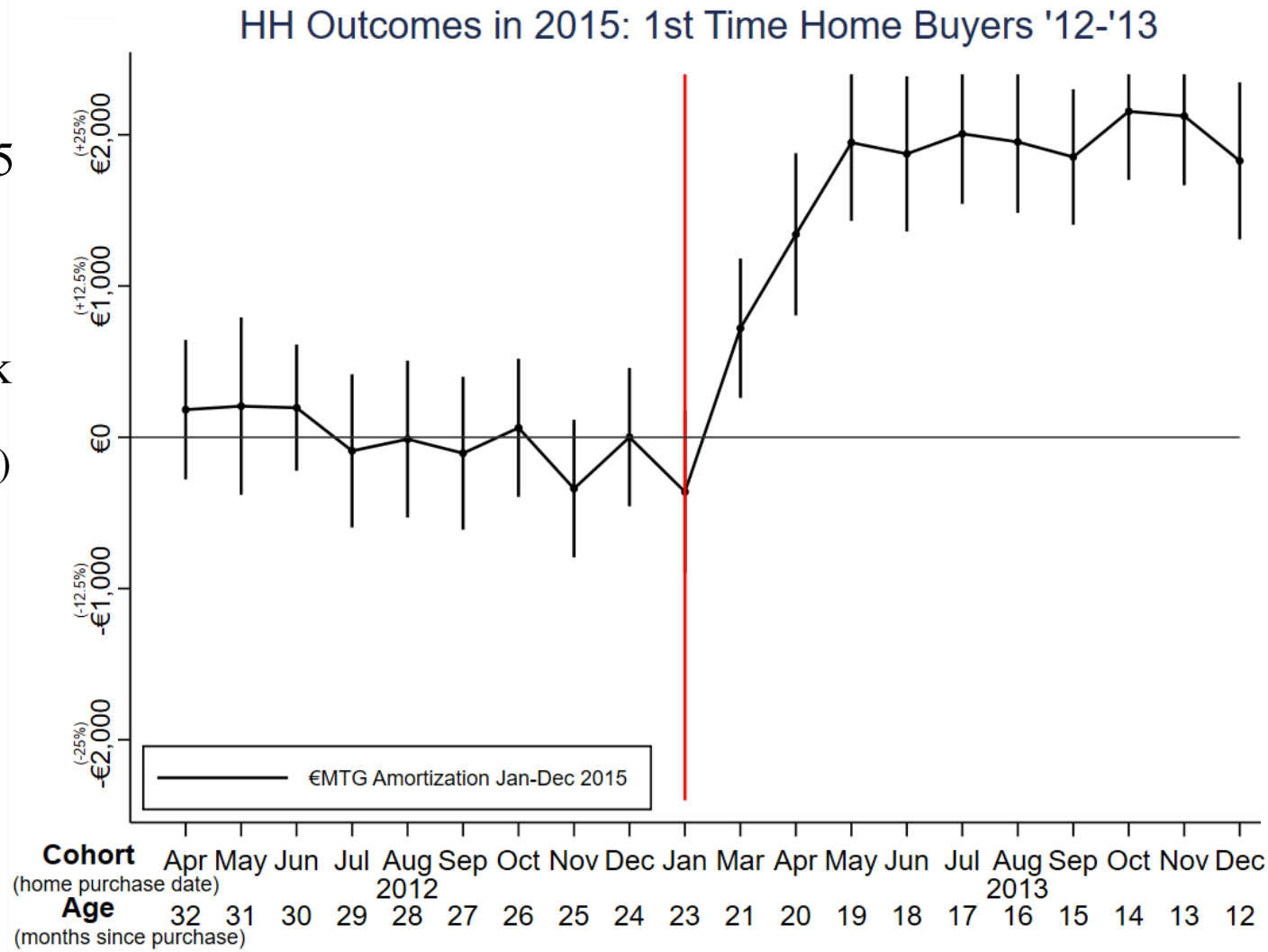
Effect on MTG Repayment (1st stage)

$$\Delta MtgBalance_{i,Jan-Dec\ '15} = \sum_j \delta_j \times 1_{Closing\ Date\ j} + \epsilon_i$$

- X: Close date
- Y: -ΔMTG '15
- Base: Feb '13
- No controls
- 1st stage ~ €2k

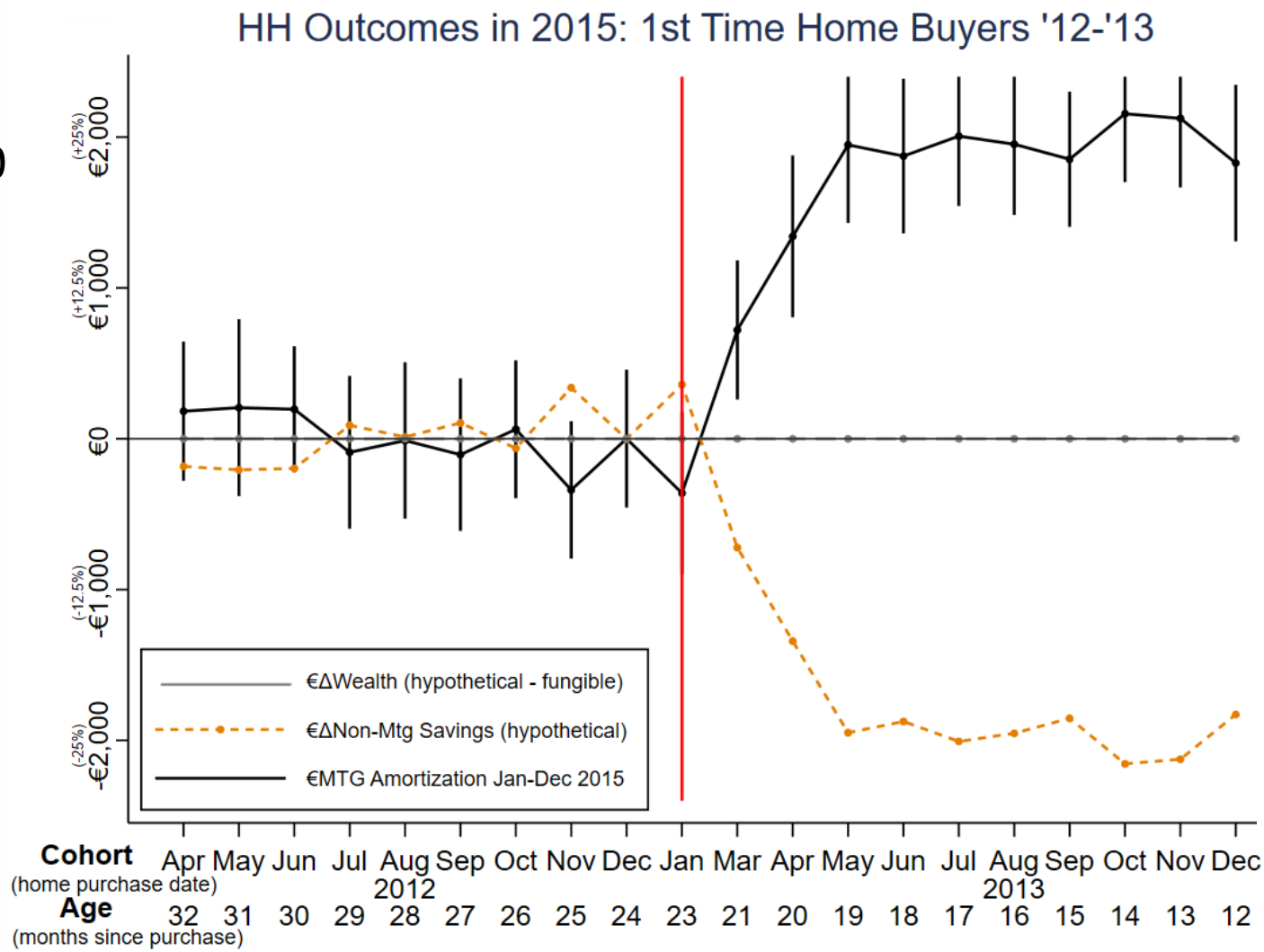
Not shown (in paper)

ΔAmort ~ ΔRepaid



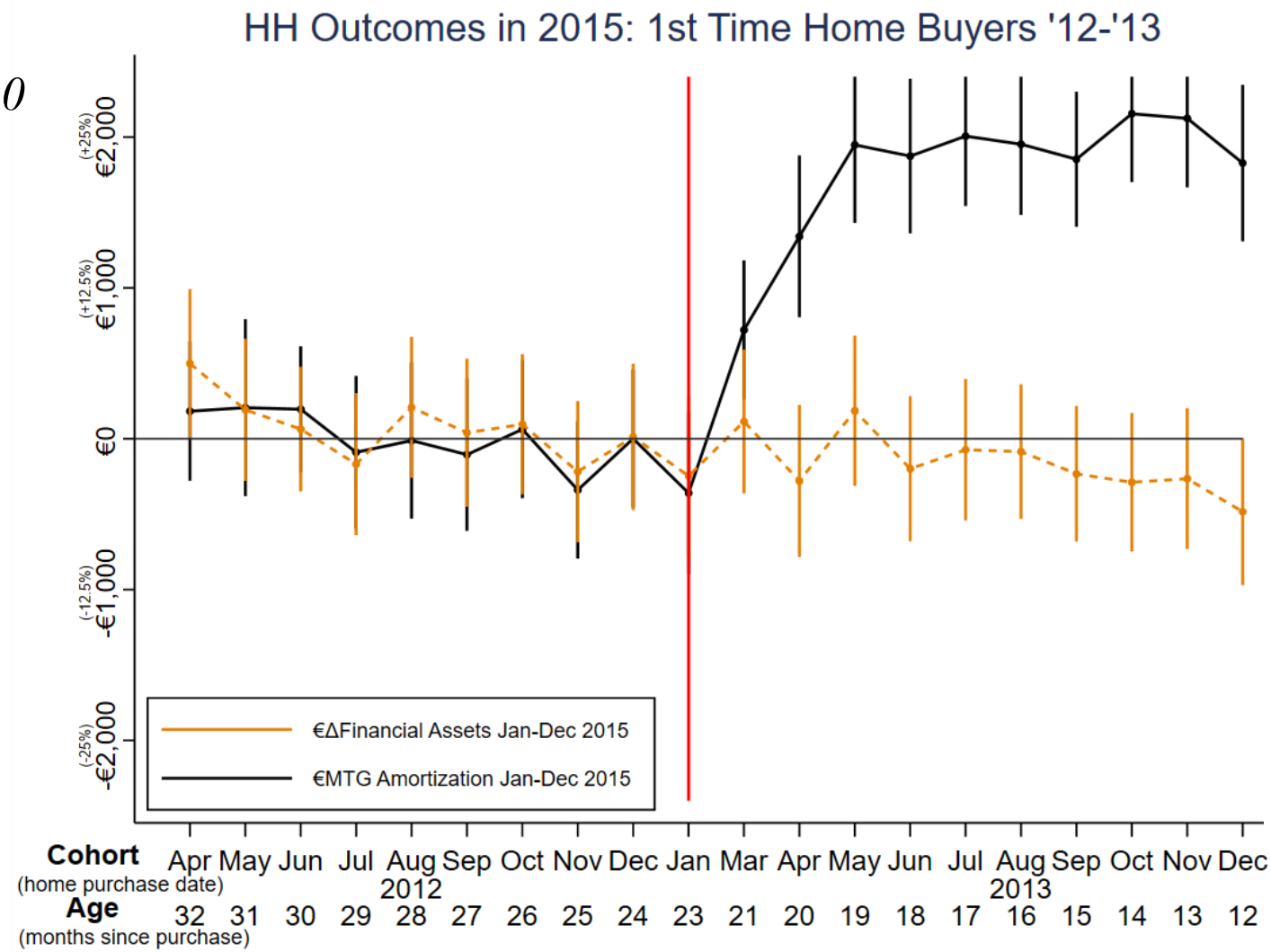
Hypothetical under perfect fungibility

- Assume $F=1$
  $\rightarrow MWA = 0$



Effect on Financial Assets

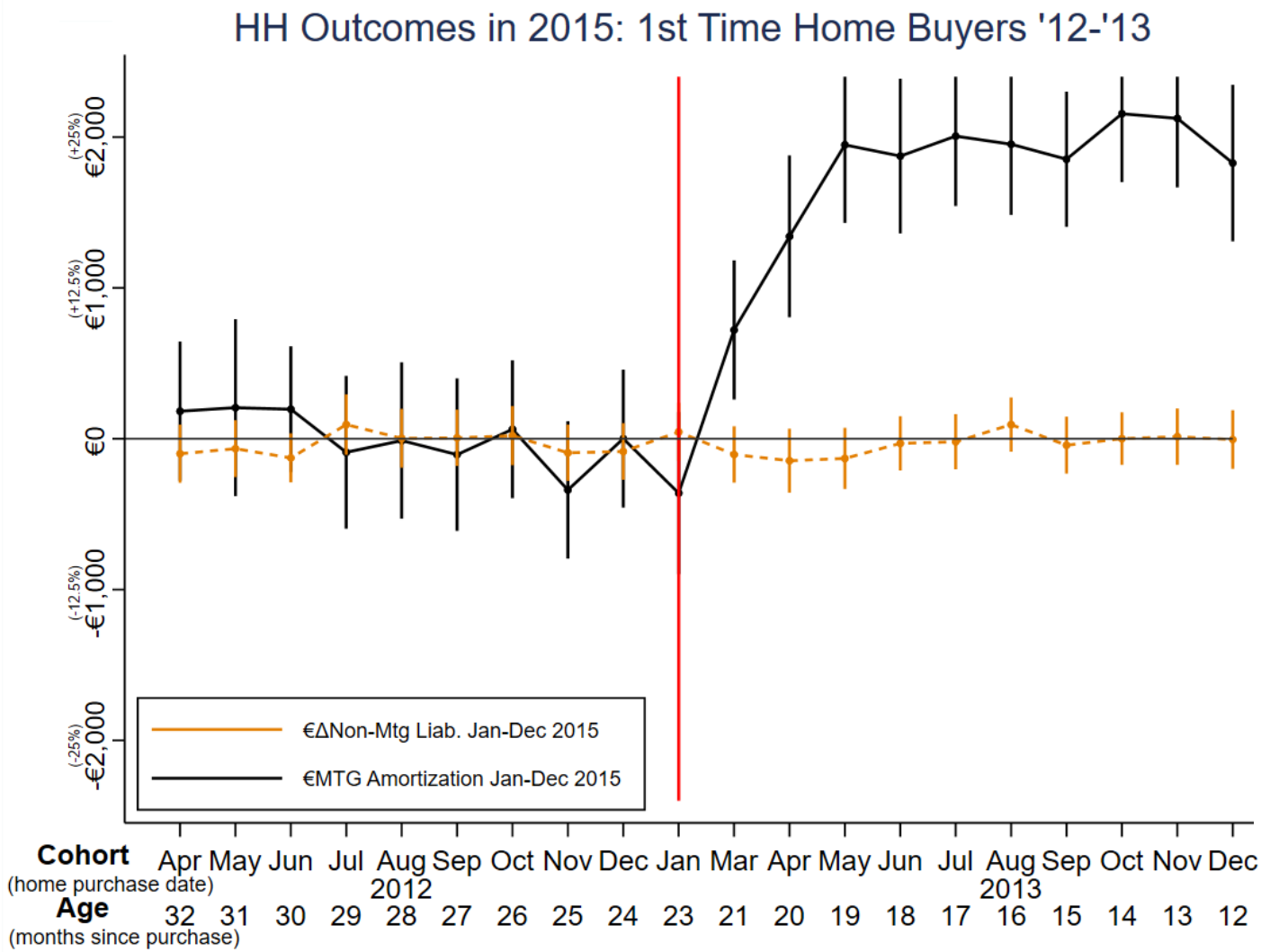
➢Fail reject: *F=0*



Effect on Non-MTG Liabilities

Non-mtg liabilities

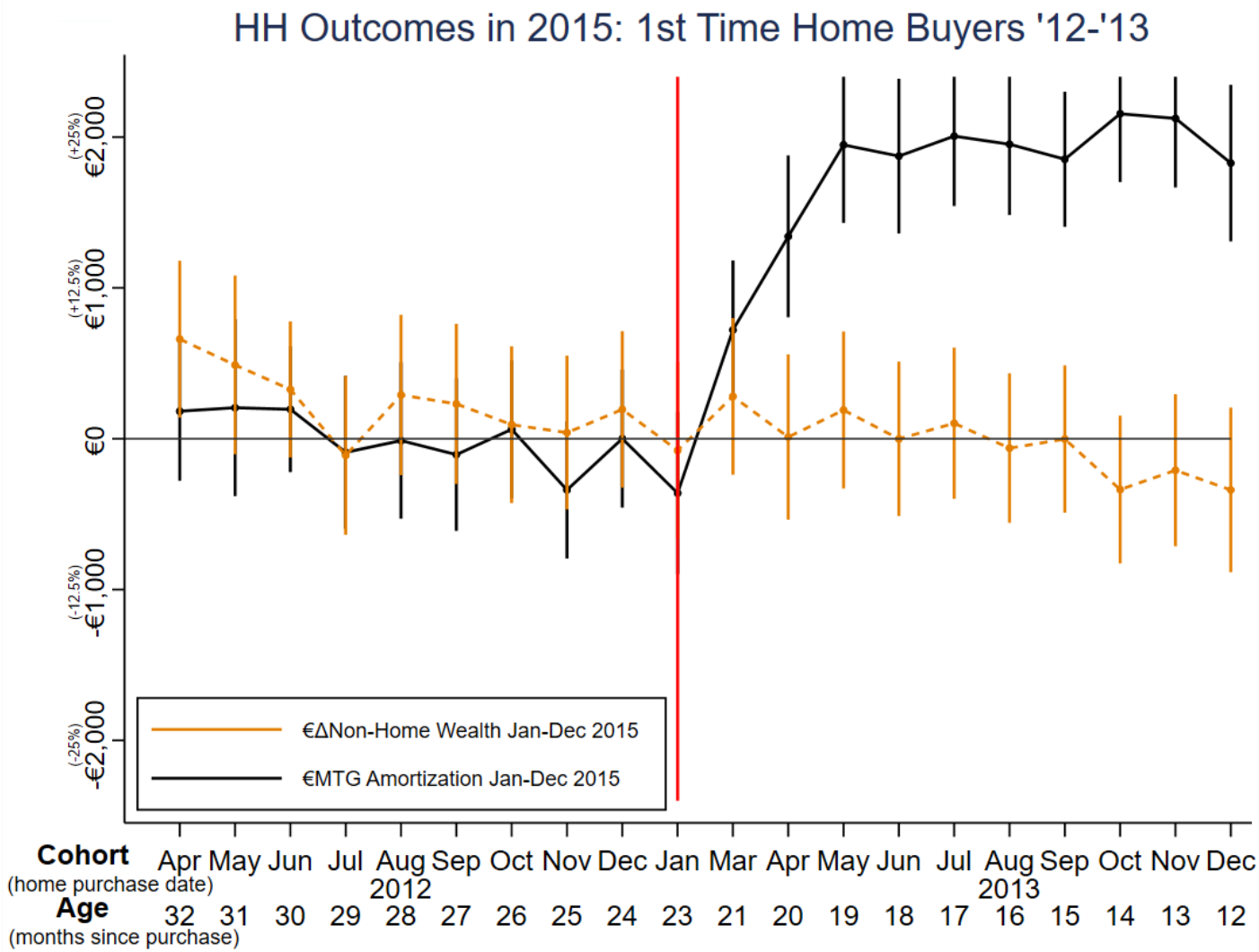
- Fail reject: *F=0*



Net Effect on Non-Housing Wealth

Non-housing wealth

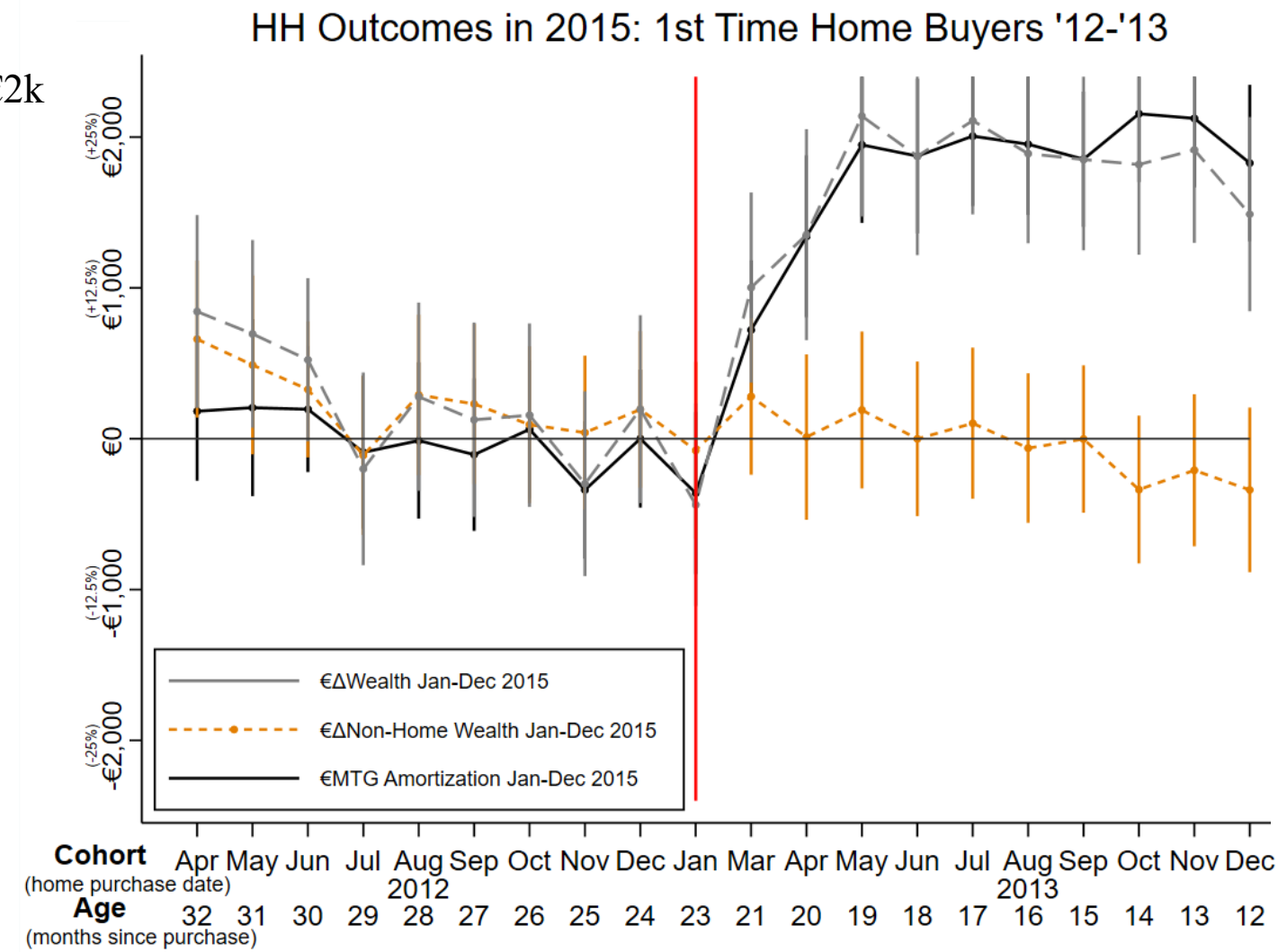
➢Fail reject: *F=0*



Net Effect on Wealth

- MTG Repaid ~€2k
- ΔWealth ~€2k
- Fail reject:

$$F = 0$$
$$MWA = 1$$



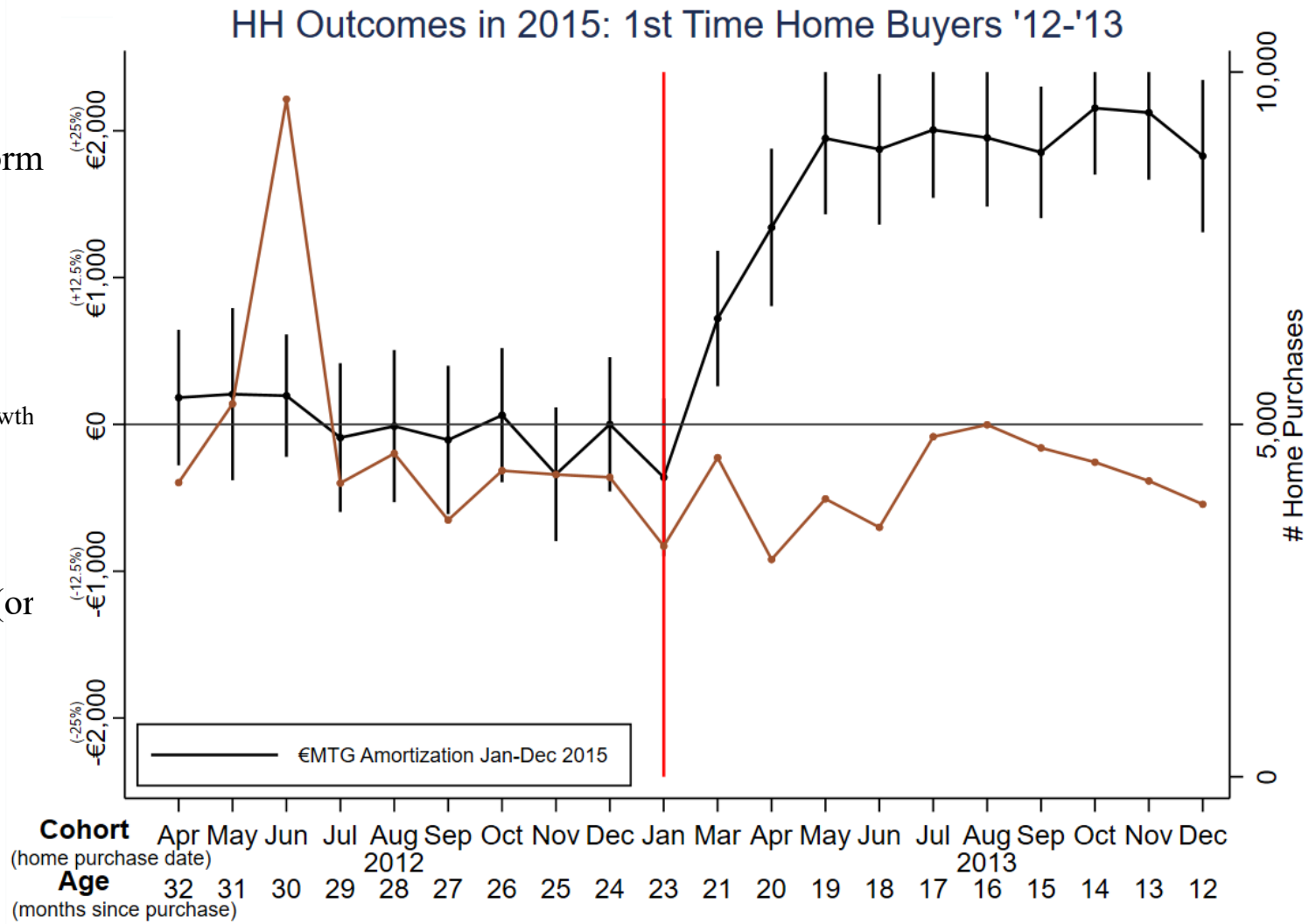
No bunching or evidence of selection

Not shown (in paper):

"Smooth" across reform

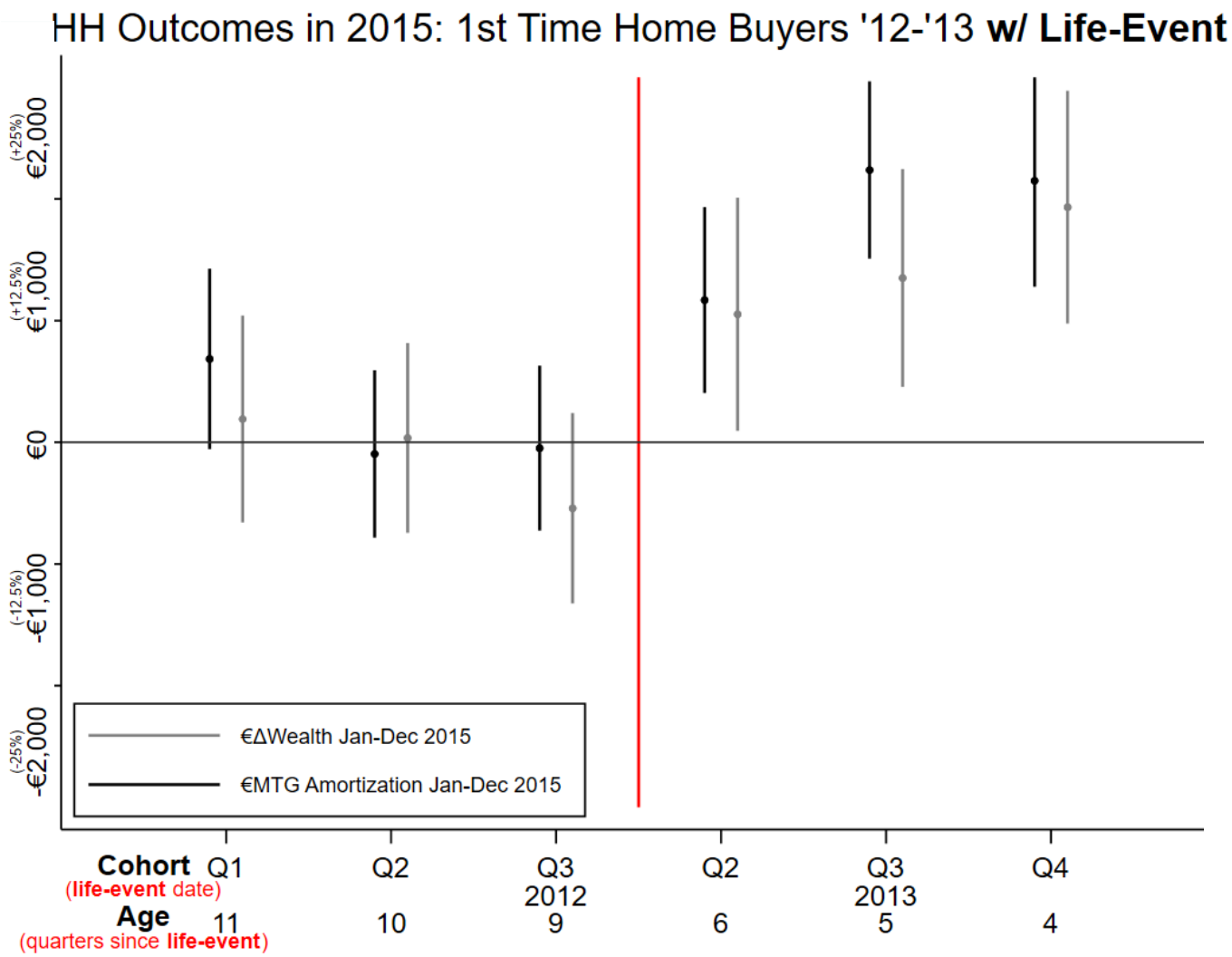
- Pre-reg Income
  - Level & growth
- Pre-reg wealth
  - Level & growth
- House value
  - At purchase & growth
- Orig LTV
- MTG Rates

Also, same *MWA* w/ non-FTHBs directly (or as a control)…



Robust to Life-Event Date

- Sub-sample of buyers with "life-event"
- Life-event = Δ#HH members
- Cohort = Month of life event (not closing date)
- Later life-event → later buyers
- Addressing selection concerns
- Alters timing, but not Pr[Own House by Dec-2016]



MTG Amort & ΔWealth

	1st Stage (1) MTG Repaid '15	RF (2) ΔWealth '15	IV (3) ΔWealth '15	IV (4) ΔNon-Home Wealth '15	IV (5) ΔWealth '15	IV (6) ΔWealth '15
Post	2045.0***	2030.8***				
	(19.22)	(14.34)				
MTG Repaid '15			0.993***	-0.007	0.864***	0.997***
			[0.88,1.10]	[-0.12,0.11]	[0.54,1.19]	[0.84,1.15]
			(17.62)	(-0.09)	(5.26)	(12.80)
Life-Event Buyers	-	-	-	-	Y	-
Fin Asset '15|Δ	-	-	-	-	-	>10k|>3k
IV	-	-	Post	Post	Post(life)	Post
F-Stat	-	-	369.3	369.3	42.3	223.0
Obs	42,468	42,468	42,468	42,468	16,581	22,005
Adj. R-sq	0.020	0.011	0.331	0.002	0.355	0.252

1-4: MTG repaid & wealth rise ~€2k → $MWA \sim 1$; $F \sim 0$

5: Holds using timing of "life-event" (ex. birth of child)

6: Holds for those with who save substantial amounts of financial assets

Not depicted (but in paper): Holds over first 5 years, where extra amortization-induced housing wealth exceeds all other accessible savings!

Also: Robust to concerns about other potential concurrent events, sample used, wealth measures (ex. levels, including real estate or not), and computation of standard errors…

How do they "pay" for Δwealth?

	(1) ΔIncome '15-'12	(2) Δ#Earners '15-'12	(3) ΔIncome '15-'12	(4) ΔIncome '15-'12	(5) ΔIncome '15-'12	(6) Income '15	(7) Income '12
Post	1270.1***	0.0239***	364.2				
	(7.71)	(3.36)	(1.59)				
ΔHrs Worked '15-'12			10.52***				
			(40.62)				
MTG Repaid '15				0.621***	0.576***	0.457**	-0.119
				[0.38,0.87]	[0.29,0.90]	[0.05, 0.79]	[-0.39,0.04]
				(4.97)	(3.83)	(2.20)	(-1.60)
Muni FE	N	N	N	N	Y	Y	Y
Add. Cntrls	N	N	N	N	Y	Y	Y
IV	-	-	-	Post	Post	Post	Post
F-Stat	-	-	-	369.3	141.6	141.6	141.6
Obs	42,468	42,468	42,468	42,468	40,352	40,352	40,352
Adj. R-sq	0.001	0.001	0.175	0.001	-0.046	-0.005	-0.015

1-3: HHs increase income via more earners & hrs worked (labor supply, rest expenditures)

4: 36% "paid for" w/ higher income (gross HH incomes, so Net ~ Gross × [1-42%])

5: Holds with controls for pre-reg income/assets

6-7: Driven by income in '15 not '12 → 26% paid for w/ income

Possible mechanisms

(1) Liquidity wedge DeFusco & Mondragon '19, …

- Illiquid savings ≠ liquid savings for short-term consumption smoothing
  - Constrained by positive equity (risky) and own income (state of the world where you need it!)
- Inconsistent: $F \sim 0$ and no variation by amount of liquidity, "weird" EIS - alter consumption/labor today and ongoing to avoid any risk (at all) in the future…

(2) Behavioral

(a) Default setting Madrian and Shea '01, Chetty et al. '14, Beshears et al. '19,…

(b) Commitment device Kovacs and Moran '19, Vihriala '19,...

(c) Mental accounting Thaler '80, Kahneman & Tverskey '84, Camanho & Fernandes '18,…

(3) Combination?

- Heuristic ("rule of thumb") liquidity targets ("rain day fund")
- "Perceived precautionary savings motive" Olafsson & Pagel '17, Aydin '19, D'Acunto et al' 2020,…

Consistent w/ Existing Work

(1) Debt forgiveness & consumption (U.S.) Ganong & Noel '19

- Increased liquidity (maturity extensions) for distressed → large change in consumption

(2) Mortgage run-offs (U.S. & others) Coulibaly & Li '06; d'Astous '17; Andersen et al. '19

- After loans fully paid go from regular (mostly) principal payments to nothing
- Muted changes in savings, bigger changes in consumption & income

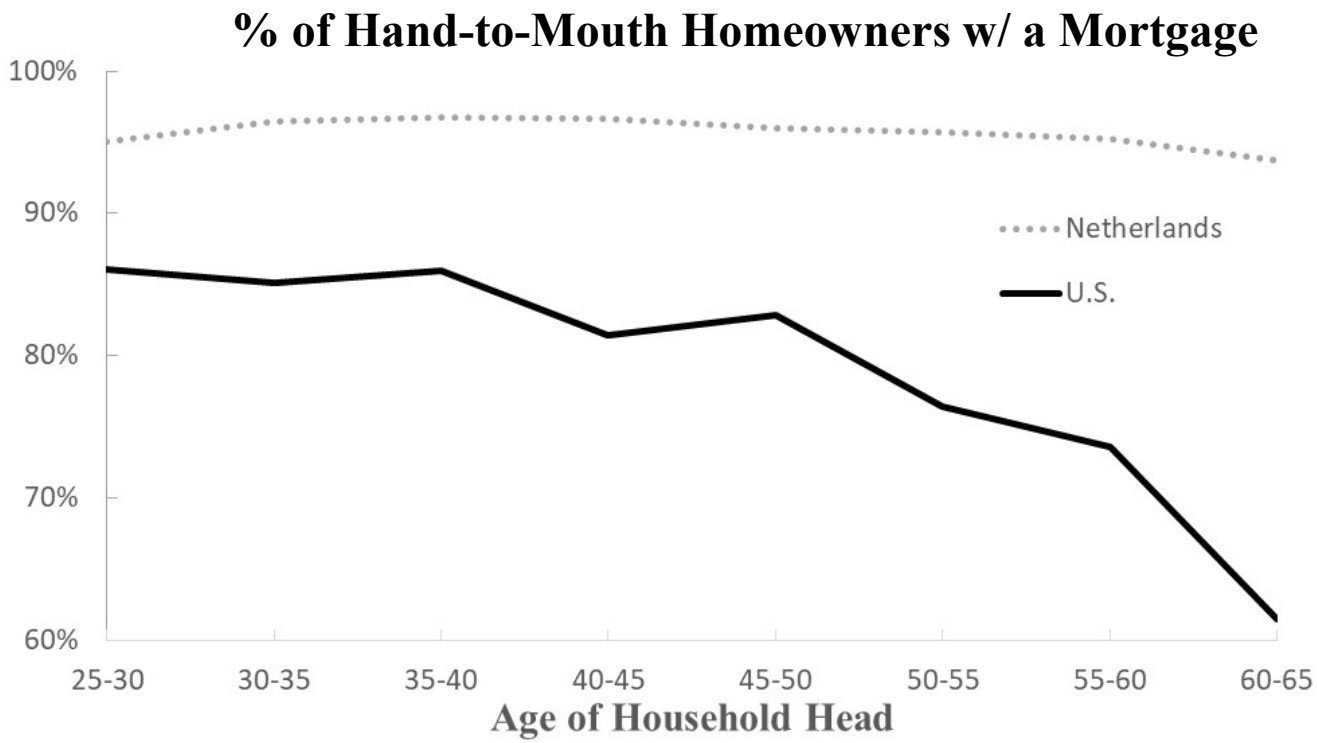
(3) Borrowers selecting IO (U.S. & others) Larsen et al. '18, Amoromin et al. '18,…

- Higher consumption and default more

(4) Elderly household balance sheets (U.S. & others) Kaplan et al. '14

- Substantial home equity (little/no mortgage debt), but few liquid assets
  - "Wealthy hand-to-mouth"
- Even more than pensions, intertemporal substitution in amortization may be costly…

Wealthy Hand-to-Mouth Homeowners



1) Fully amortizing borrowers (U.S.) don't completely "undo" amortization

- Despite cash-out refis/HELOCs, mtgs decline by ~amort amt each yr (authors calcs from PSID)
- Sellers don't fully relever and most equity is carried over (authors calcs from PSID; Patrabansh '15; Bai et al. '15)

2) Partially amortizing borrowers (Dutch) don't amortize on their own

- Median non-housing financial assets for all 60-65 year-olds w/ a mortgage is only €26k
- MWA not reduced by age, home equity, or moving in our analysis…

Conclusion/why do we care?

↑ mortgage amortization → wealth accumulation ↑

1) Micro Beshears et al. '19,…

>1/3rd of U.S. households have an amortizing mortgage

- Fungibility of debt repayment vs savings (some macro models might need adjustments)

2) Public Economics/Aging Li and Yang '10, Sodini et al. '17,…

In U.S. $100s of billions/year → comparable w/ pension programs

- MTG Design and retirement policies (*If you care about pensions you should care about amortization!*)
- Homeownership & wealth building/inequality (ex. racial differences)

3) Macroprudential Policy Campbell et al. '19; Guren et al. '19,…

In U.S. 2 years of amortization ~ first 4 yrs of TARP payments post Great Recession

- Ex-post: Reduced repayment plans (interest-only/maturity extensions)
- Ex-ante: Do HHs undo regulation intent (by altering savings)?
  - The "30 yr" mortgage is arbitrary. What about 20? 40?

THANK YOU

Additional Slides

Exploration of "eventually"

What changes when time since purchase >5yrs?

(1) Older – experience/closer to retirement

- $MWA \sim 1$ even when household head > 50 yrs old and for repeat buyers
- Limited power, but can't even reject similar effects for > 60yrs old

(2) More home equity – w/ fixed costs maybe more likely to extract

- $MWA \sim 1$ even for those w/ origination LTVs and DTIs well below constraints
- Similar across range of house sizes/mortgage amounts

(3) Move again – might be "easy" time to extract home equity

- Repeat buyers don't re-lever to LTV limits (don't extract all equity they can)
- Small sample (~1.7k) buy '12-'13, then sell and buy again by Dec '16:
  - '13 buyers: lower mtg balance; no differential HEW/non-housing savings

Interaction might matter, especially with time till mortgage maturity…will be interesting to track and see how much is eventually spent vs. bequest in future work…

Future work

1) This is only one MWA!

"The MPC for this group/setting is universal" - Nobody ever

True here too… this is one MWA for Dutch homeowners in first 5 years after purchase where:

$$MWA = MDA \times MWD$$

MWD- wealth change for change in debt repayment ("crowd-out")

MDA - debt repayment change for change in amortization ("leakage")

More work on debt-savings fungibility, HEW, housing leverage, and refinancing behaviors are critical:

(Ex. Keys et al. 2016; Bhutta and Keys 2016; DeFusco 2018; Keys and Wang 2019; Beshears et al. 2019; Amromin et al. 2020; Andersen et al. 2020; DeFusco et al. 2020)

2) TBD: lots

- Google scholar papers w/ "pension" and "wealth": ~671,000
- Examples specifically on causal estimates of effects of pensions on wealth accumulation:

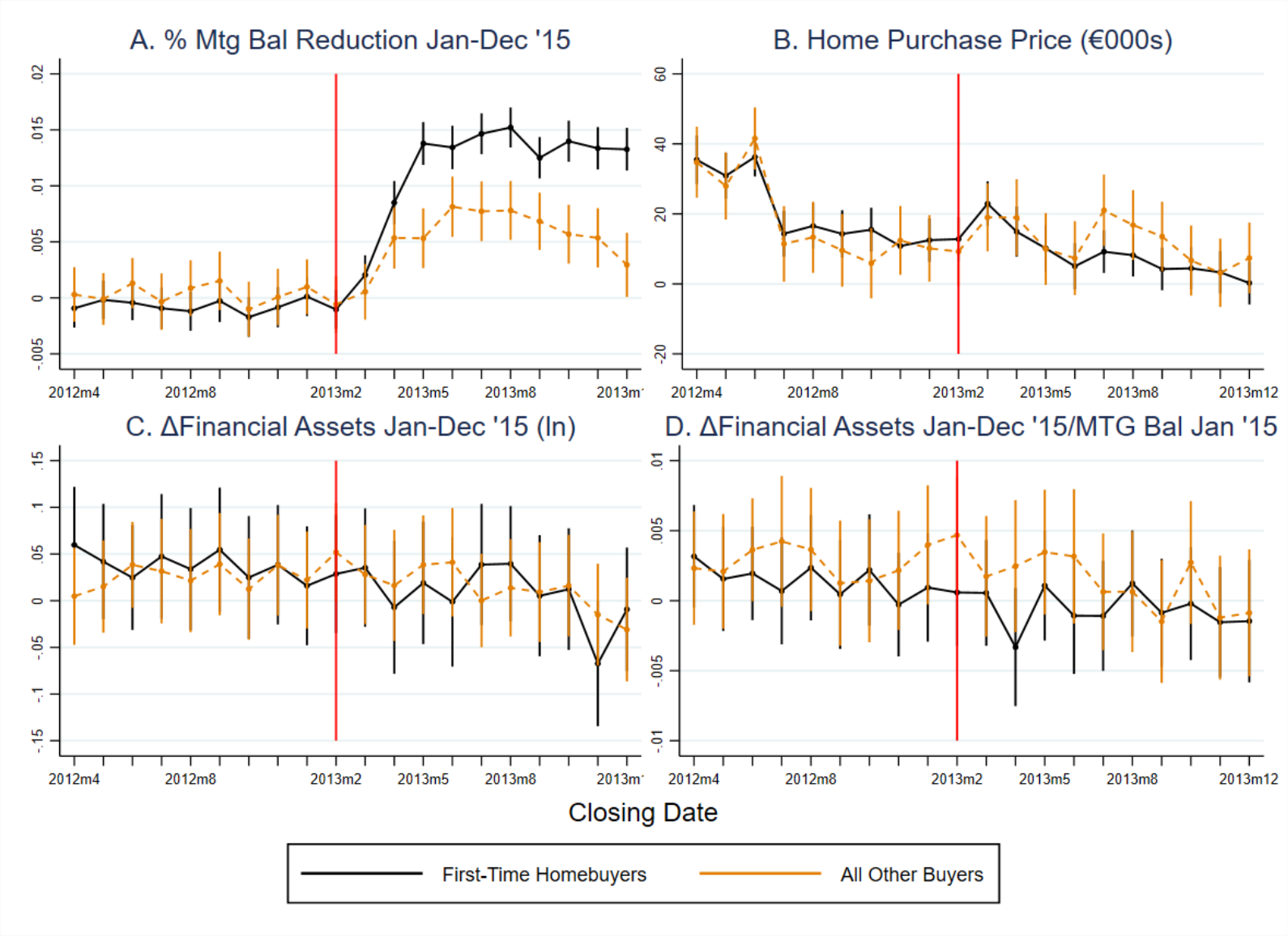
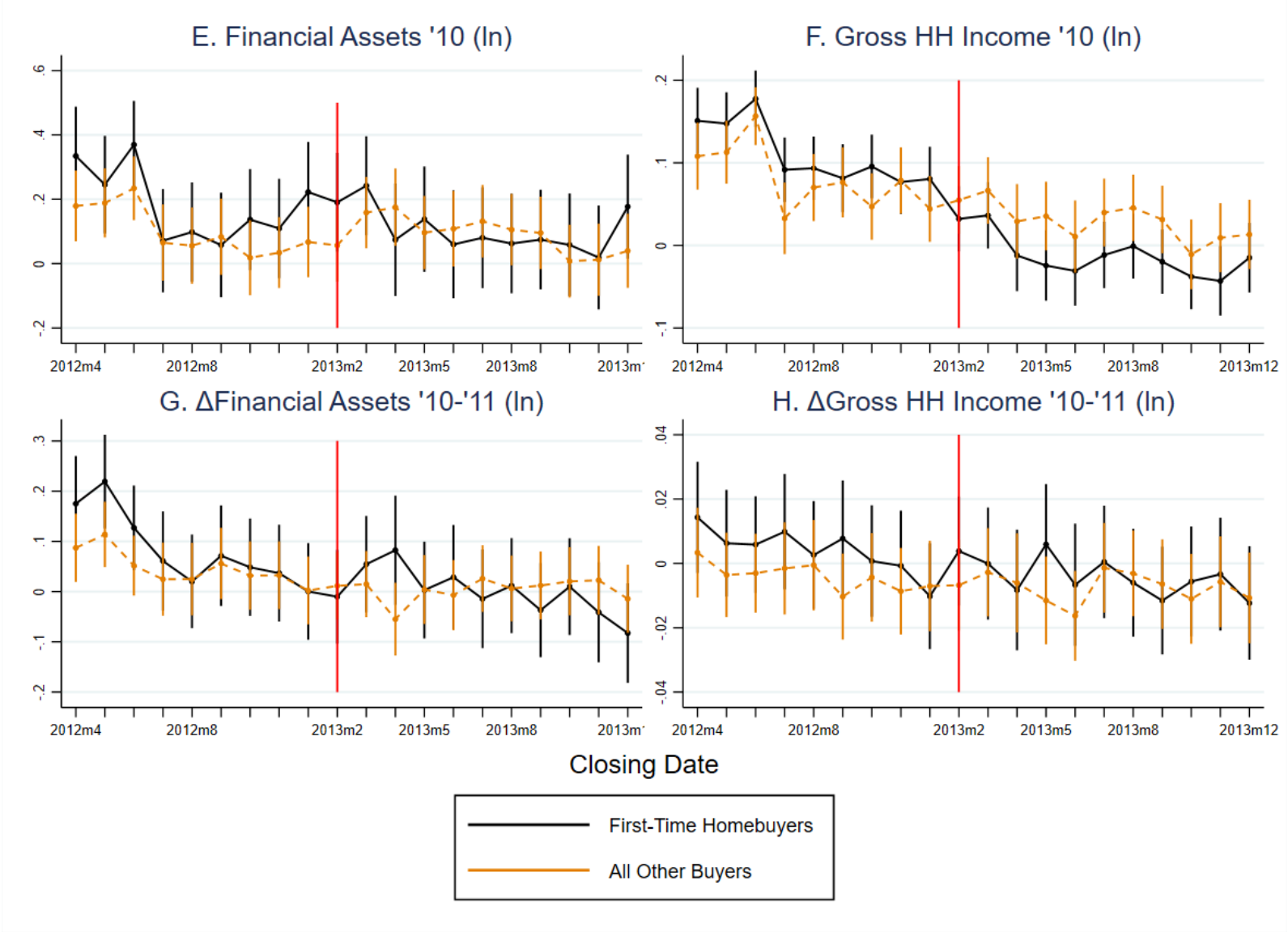
Engen et al.'96; Poterba et al. '95 & '96; Madrian and Shea '01; Choi et al. '04 & '06; Thaler and Benartzi '04; Engelhardt and Kumar '07; Beshears et al. '09; Choi et al. '09; Gelber '11; Chetty et al. '14; Beshears et al. '18….

- Papers with causal estimates of effects of mortgage amortization on wealth accumulation:

Bernstein and Koudijs '20 (aka this paper)

- Clearly lots of work to be done: hope you get involved!

FTHBs vs. Repeat Buyers



FTHBs vs. Repeat Buyers