The Impact of Repossession Risk on Mortgage Default

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Does reducing repossession risk lead to an increase in mortgage default?

Repossession Risk and Mortgage Default

- Moral hazard
- Importance of the household default cost parameter
  - Financial stability: leverage choice (Bailey et al, 2018)
  - Ex-post debt renegotiation: HAMP in the US, similar programmes elsewhere
  - Policy: foreclosure moratoria
- Strategic default
  - Are borrowers strategic when it comes to default?
  - Implications for mortgage contract design

This paper

- Exploit *quasi-experimental variation in Irish repossession law* to test whether repossession risk matters for mortgage default.
- Analyse whether *treated loans defaulted at a higher rate* after a legal ruling striking down law.
- Analyse heterogeneous treatment effects to answer: is excess default strategic?
  - Distressed borrower welfare enhanced?
  - Or just strategic borrowers getting the benefit?

Preview of results

- Methodology
  - Cut-off date in a legal judgment: law does not apply to originated before cut-off
  - Two cohorts originated either side of the cut-off date
  - Difference-in-differences research design comparing pre and post default rates
- Removing repossession risk lead to an immediate increase in default rates.
  - 1-2 pp increase in cumulative default probability in one year after event.
  - ~40% increase over estimated counterfactual.
- Treatment effect highest for loans with
  - lowest and negative home equity
  - previous missed payments

What does economic theory tell us?

- Reducing the cost associated with mortgage default should increase the demand for it.
  - Home repossession large cost of default
  - Default may not be optimal
- Social theory:
  - Mortgage default isn't a rational cost-benefit calculation
  - Driven by emotion, not ameniable to economic analysis
  - Reduced default costs should not matter
- Not exactly clear from economic theory who excess defaulters are
  - Strategic default: inframarginal borrowers default

Economic evidence

- Public finance, health: moral hazard exists
  - Einav & Finkelstein (2018): “compelling evidence that moral hazard in health insurance exists”
- Mortgage market evidence more mixed
  - Mayer et al (2014): mortgage renegotiation programme led to increased default rates in U.S.
  - Ganong & Noel (2017): **Low** moral-hazard cost because mortgage default primarily driven by affordability
  - Agarwal et al (2017): No moral hazard effect from HAMP, a well-designed intervention
  - Collins & Urban (2016): No default response to New Jersey foreclosure moratorium

Research Design

Ireland: 2011 Court Judgment

- 2009 Land Act
  - December 2009: Land and Conveyancing Law Reform Act replaces 1964 law.
- July 2011: Justice Dunne rules that 2009 Act **failed to preserve relevant parts of the older law**
- After July 2011, mortgages originated before 1st December 2009 *cannot be repossessed* if borrower defaults.
  - 2 years passed before law fixed

A natural experiment

- For loans originated around *1st December 2009*: repossession risk quasi-randomly removed 1.5 years later in July 2011.
  - Treatment group originated before the cut-off
  - Control group after
- Plausibly exogeneous: treatment group did not rush to get mortgages before the new law
  - Minor change to conveyancing law, routine procedure
  - Legal ruling *not anticipated*
- Difference-in-difference: use outcome of control group to estimate missing counterfactual for treatment group.

Hundreds of home repossession cases may be struck out: High Court judge finds gap in 2009 land Ac
Gartland, Fiona
The Irish Times (1921-Current File); Jul 26, 2011;
ProQuest Historical Newspapers: The Irish Times and The Weekly Irish Times
pg. 6

Hundreds of home repossession cases may be struck out

High Court judge finds gap in 2009 land Act

FIONA GARTLAND

HUNDREDS OF property repossession cases could be struck out following a High Court ruling there was a "lacuna" – or gap – in legislation introduced in 2009.

On foot of the decision, counsel for one lender said his client would take a constitutional challenge of the Land and Conveyancing Law Reform Act 2009, which Ms Justice Elizabeth Dunne said yesterday may have had "unintended consequences".

The new Act was introduced on December 1st, 2009, and it only applied to mortgages created after that date, the judge found.

It repealed older conveyancing legislation and failed to save elements of the Registration of Title Act 1964 that would have allowed lenders to repossess properties with mortgages taken out before December 2009 that went into arrears after that date.

"It is not for the court to supply that which is not contained in the 2009 Act," the judge said.

Hundreds of borrowers who took out mortgages before the December date and who went into arrears after it will be affected by tion of the Registration of Title Act 1964. In two of the cases, borrowers were sent demands for vacant possession of the property prior to December 1st, 2009, while in the other two, the demands were after that date.

Ms Justice Dunne ruled that legal proceedings started prior to the December date could continue.

Proceedings started after December 1st, but where a demand for possession had been made prior to the date, it could also continue. But in cases where a demand had not been made until after the date, lenders had no right to apply for possession.

Ms Justice Elizabeth Dunne: "not for court to supply that which is not contained in 2009 Act"

A further 24 cases involving seven other lenders had been held over to yesterday in advance of the ruling. Some of these were adjourned to the new term in November.

He said there was an argument to be made about whether the Act could be valid, given it would deprive lenders of the remedy of repossession. He asked for time to consider notifying the Attorney General. The judge adjourned the case to November.

In a case taken by Bank of Ireland with a demand after the December date, the court was told the borrower was living in the US and had consented to an order for possession. Counsel for the lender asked the judge to consider making an order, given the consent.

"I can't do it and I'm not going to do it," Ms Justice Dunne said. "As far as I can see it, I have no jurisdiction to make an order. I will strike it out. I don't think there is anything else I can do in the matter."

Some 11 orders for possession were granted for older cases yesterday out of a list of 94.

These included an order granted to Start Mortgages against two brothers who mortgaged their parents' home.

The court was told they took out a €250,000 loan in April 2007 and defaulted on it in June of the

Loophole prompts surge in calls to mortgage group
Gartland, Fiona
The Irish Times (1921-Current File); Aug 5, 2011;
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Loophole prompts surge in calls to mortgage group

FIONA GARTLAND

A VOLUNTARY group that defends mortgage holders in danger of losing their homes has said it is receiving up to 50 inquiries a day following a court judgment that acknowledged a loophole in existing legislation.

New Beginning says it has already identified 13 homeowners who have orders for possession against them and who fall into the 2009. It repealed older conveyancing legislation, but failed to save elements of the Registration of Title Act 1964.

Ms Justice Dunne ruled that borrowers who went into arrears before December 1st, 2009, and received demand letters from lenders before that date, could still be repossessed under the old legislation.

Borrowers however who took out mortgages before the Decem- had been inundated with calls since the ruling.

He also acknowledged that it would be possible for the Dáil to simply amend the legislation to close the loophole.

"It would be possible for the Dáil to introduce such legislation without dealing with the core issue of people losing their homes, but that would be despicable," he said.

However, Declan Black, partner at Mason Hayes and Curran, said

Data

- Central Bank of Ireland Loan-Level Data
- Collected from regulated banks for stress-testing, 2010-present
- Quarterly panel data with information on
  - *current* loan characteristics
  - *origination* borrower characteristics

Paper data set

- Take loans originated 180 days before and after the cut-off date in legal ruling: 1st December 2009
  - Pre cut-off are the treatment group
- Q3/2010 - Q2/2012
- Loans are matched by an estimated propensity score
  - Future treatment group status as a function of first period covariates
  - Matching without replacement to eliminate observations without counterpart
- 80,732 observations. 7,913 loans. Half treatment, half control.

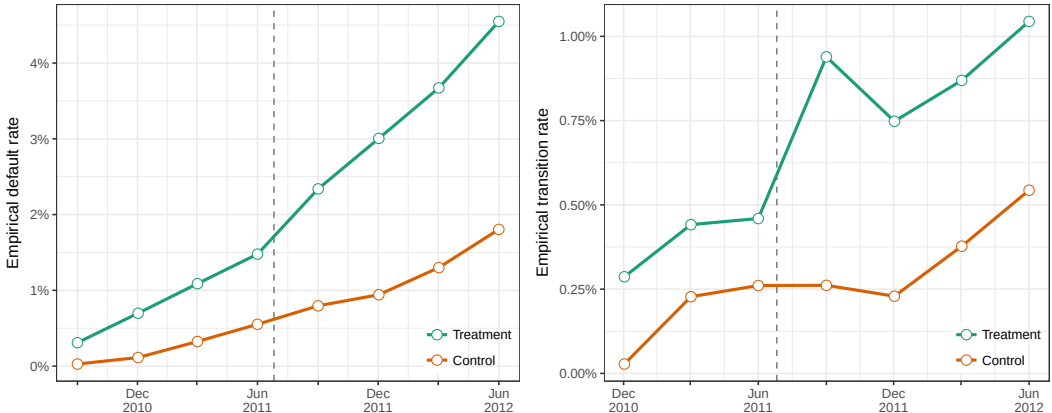
Mortgage default

$$\text{default}_{it} = P(90\text{DPD}_{it} = 1 \,|\, 90\text{DPD}_{is} = 0 \text{ for all } s < t)$$

- Loan i is in default at time t if it has accumlated greater than 90 days worth of missed payments.
- Standard Basel definition of loan default
- Less noisy than using surrogate measures such as 30 days past due etc.
- Loan drops out of data once in default
  - Theoretical interest is in the *transition* to default and not the state of being in default

Difference in means

Stock (left) v transition (right)



Estimation and Inference

Estimating Equation

$$\text{default}_{ibfgrt} = \alpha + \beta^{DD}(\text{Treatment}_g \times \text{Post}_t) + X_{it} + \phi_{r,t} + \tau_{b,f,t} + \epsilon_{ibfgrt} \quad (1)$$

where:

- $treatment_i$ is an indicator for whether the loan was originated before the cut-off.
- $Post_t$ is an indicator for whether the observation is after the ruling (July 2011).
- β_{DD} is treatment effect of interest
- X_{it} is a matrix of control variables including treatment status, interest rate, loan-to-value ratio, borrower income, borrower age
- $\phi_{r,t} + \tau_{b,f,t}$ are region-time and interest rate type - time fixed effects
- Identification: within-group changes between treatment and control groups over time
  - Conditional on controls and fixed effects, treament β^{DD} is an unbiased estimator of treatment effect
- Inference: errors clustered at loan level.

Results

	Default		
	(1)	(2)	(3)
Treatment	0.002***	0.0001	
	(0.001)	(0.001)	
Treatment∗Post	0.003***	0.004***	0.005***
	(0.001)	(0.001)	(0.001)
Observations	80,667	80,663	80,663
Time-varying controls	N	Y	Y
Time FE	N	Y	-
Loan FE	N	N	Y
Region∗RateType∗Time FE	N	N	Y

*p<0.1; **p<0.05; ***p<0.01

Eventy study

- Interact treatment dummy with time fixed effects

	Pre-judgment
Treatment∗Mar-2011	−0.00003
	(0.001)
Treatment∗Jun-2011	0.0003
	(0.001)
	Post-judgment
Treatment∗Sep-2011	0.005***
	(0.002)
Treatment∗Dec-2011	0.006***
	(0.002)
Treatment∗Mar-2012	0.005***
	(0.002)
Treatment∗Jun-2012	0.006***
	(0.002)

Tricky inference

- Issue: quasi-randomisation at group level
- Two groups: originated pre and post 1st December 2009
- Errors correlated within group? Effective sample size of 2

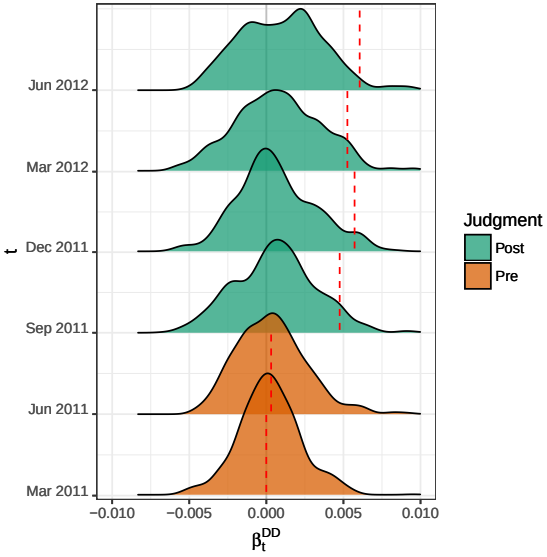
$\Longrightarrow$ Permutation inference

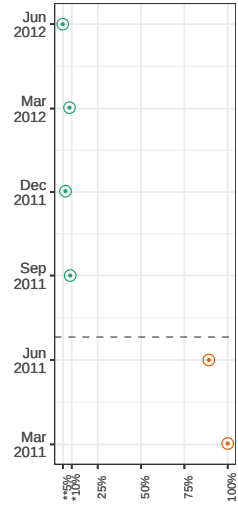
Permutation Inference

- Permutation inference aka randomisation inference
- Fisher (1936); Computing power has seen resurgence (Efron & Hastie, 2017)
- “Permute” the treatment vector many times and calculate your test statistic
  - Effect of “true” treatment vector should lie in the tails
  - Easy to calculate an exact p-value to test null
- Intuition: if there is nothing going on, your test statistic should be similar to a vector of random treatments

How to permute a natural experiment?

- This natural experiment: treatment based on cut-off date
- Idea: permute the cut-off date and perform the analysis exactly as before
  - Extract data, match with PSM, event study regression
- 1000 random dates; *save* treatment effects
- Compare “true” treatment effect to the distribution of permuted ones
  - Similar to Ganong and Jaeger (2017) on Regression Kink Design
- Estimated difference could just be a fluke due to the particular cut-off date
  - So try *many* cut-off dates


Jun 2012
Mar 2012
Dec 2011
Sep 2011
Jun 2011
Mar 2011
t
−0.010
−0.005
0.000
0.005
0.010
β_t^{DD}
Judgment
Post
Pre


Jun 2012
Mar 2012
Dec 2011
Sep 2011
Jun 2011
Mar 2011
**5%
*10%
25%
50%
75%
100%
two−sided p−value

Heterogeneous treatment effects

Beyond the avearage treatment effect

- Average treatment effect is interesting
- Is the effect driven by strategic borrowers? Or distressed borrowers?
- Welfare implications of ex-post mortgage contract policies

Triple difference regression

- Effect mostly driven by households carrying a missed payment
- Much smaller effect for fully-peforming households

	Default
	Pre-judgment
Treatment∗Jun-2011	0.0001
	(0.001)
Treatment∗Jun-2011∗Arrears	−0.0001
	(0.015)
	Post-judgment
Treatment∗Sep-2011	0.001
	(0.001)
Treatment∗Dec-2011	0.002**
	(0.001)
Treatment∗Mar-2012	0.002*
	(0.001)
Treatment∗Jun-2012	0.003**
	(0.001)
Treatment∗Sep-2011∗Arrears	0.081***
	(0.015)
Treatment∗Dec-2011∗Arrears	0.028*
	(0.015)
Treatment∗Mar-2012∗Arrears	0.058***
	(0.016)
Treatment∗Jun-2012∗Arrears	−0.016
	(0.016)

Causal forest

Uses a random forest to reduce the curse of dimensionality in a k-nearest neighbour estimation problem

- Intuition: I want to group treatment and control observations on different dimensions and compare the difference in treatment effects across these groups - Not obvious what variables to group on and what intervals to use
- You could use a kernel regression to do it but quickly run into curse of dimensionality
- Causal forest model uses random forest to decide how to weight nearby observations in a kernel regression

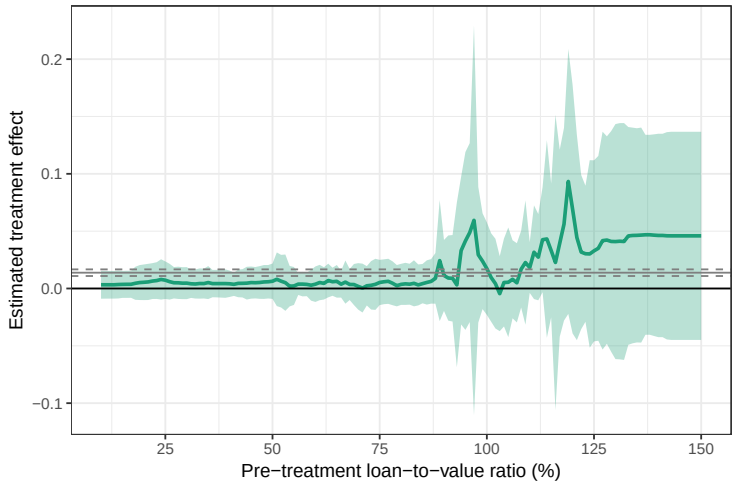
Treatment effect function

$$Y_i = (Y_{i1} - Y_{i0}) = \tau(X_{i0},\ Z_{i1}) + \epsilon_i \tag{2}$$

- Loan-level treatment effect is the difference in potential outcomes
- Model how each individuals treatment effect varies according to covarites
- 2 matrices: X and Z
- Panel data collapsed: endline Y as a function of pre-treatment covariates

Predicted treatment effect of loan-to-value ratio

Highly leveraged borrowers have lowest opportunity cost of defaulting



How are covariates associated with individual treatment effect?

	Treatment effect
LTV	0.0002^{***}
	(0.00001)
log(Income)	-0.002^{*}
	(0.001)
Interest rate	0.002^{**}
	(0.001)
Year of birth	-0.00001
	(0.00004)
Constant	0.027
	(0.088)
Observations	12,298

Conclusion

- Quasi-experimental evidence of moral hazard in the mortgage market
- Between 1 and 2 pp one-year difference in default probability
- Doesn't look like *strategic default*
  - Excess defaults made up mostly of loans in arrears
  - Causal forest reveals lower income, higher leverage, higher interest rate associated with high treatement effect
  - Marginal not inframarginal borrowers default after the ruling
- Policy implications: reducing repossession risk as a social insurance programme?
  - Of course other costs: transfers default cost from borrower to bank
  - Other GE effects: risk pricing, banking losses