Opioid Epidemic and Mortgage Default

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Abstract
This paper studies the impact of the opioid epidemic on households' mortgage defaults in the United States. Controlling borrower characteristics at mortgage origination, I find that higher opioid overdose mortality rates are associated with higher delinquency rates among prime borrowers. I establish a causal link between the opioid crisis and mortgage defaults by exploiting the variation in oxycodone supply. I document that the result is more pronounced in areas with more insurance coverage rates, suggesting the role of supply factors in driving the epidemic. Income or unemployment growth rates are not explanatory mechanisms for this effect. In contrast, I present evidence that depressed local house prices due to the epidemic have caused more defaults through home equity channel. Accordingly, I show that lenders approve fewer loans to opioid-afflicted areas, indicating pronounced search frictions for the constrained households living in these neighborhoods. Overall, my findings contribute to the current discussions on the direct and indirect costs of the opioid epidemic.

Motivation

- Prescription opioids are morphine-like pain-killer drugs, highly addictive, and overdoses and deaths are common (NIH, 2020).
- Since 1999, 450,000 people died in the U.S. from drug overdoses involving opioids (CDC, 2020).
- 3.6% of the U.S. population misused prescription opioids alone in 2018 (SAMSHA, 2019).
- Economic costs are at around 3.4% of the US GDP alone in 2018 (BEA, 2019).
- Health shocks constitute a significant source of economic risk.
- House value captures the largest share of households' wealth, and around 60% of homeowners hold mortgage loans.

Question

Q1. Does the opioid epidemic have a causal effect on mortgage defaults?
- It is challenging to rule out common demand-side drivers.
  $\Longrightarrow$ Focus on supply factors fuelling the epidemic.

Q2. What economic mechanisms can explain such relationship?
- Attemp to distinquish direct (e.g., abuse, health, loss of income) vs. indirect (e.g., externality to others) channels.

Sample construction

Mortgage characteristics and performance: HMDA, Fannie Mae and Freddie Mac

Opioid drug overdose deaths: CDC Wonder

Oxycodone supply: ACROS + Washington Post

Identification strategy

Opioid overdoses and abuses can also be driven by economic despair like financial distress.

Moreover, there are potential unobservable omitted variables, which might lead to biased estimates.

I use oxycodone supply - *Oxy Supply* - as a shifter for opioid abuse.

Relevance criteria: oxycodone has been a key drug in the evolution of opioid epidemic.

Exclusion restriction:

Aggresive marketing of OxyContin by Purdue Pharma $\Rightarrow$ oxycodone is a key ingredient.

Differential practices for pain treatment by primary care phycisians.

Lack of oversight on the distribution of oxycodone by the pharmacies.

$\Longrightarrow$ *Oxy supply* is related to mortgage defaults only through opioid overodoses and abuses.

Empirical specification

Exploiting the variation in *Oxy Supply* in the following IV setting:

$$Overdose\ Deaths_{j,t-1} = \alpha + \nu_{s,t} + \gamma \cdot Oxy\ Supply_{j,t-1} + \Gamma \cdot X_{j,t-1} + \epsilon_{j,t-1}$$
$$Delinquency\ Rate_{i,t} = \beta + \lambda_{s,t} + \theta \cdot \widehat{Overdose\ Deaths}_{j,t-1} + \Omega \cdot X_{i,t-1} + \eta_{i,t}$$

$Overdose\ Deaths_{j,t-1}$: proxies local opioid abuse, computed per 100,000 residents for a county j at year $t-1$.

$Oxy\ Supply_{j,t-1}$: per capita oxycodone supply for county j at year $t-1$

$Delinquency\ Rate_{i,t}$: proxies default, portion of 90+ days delinquent mortgages among all outstanding mortgages for a census tract i at year t.

$X_{i,t-1}$ are tract-level controls: *Interest Rate*, *Loan-to-Value Ratio*, *Debt-to-Income Ratio*, *Credit Score*, *Log(Applicant Income)*, *Log(Loan Amount)*, *White Applicant Rate*, *Male Applicant Rate*, *Log(Population)*, *Log(Housing Units)*, *Hospital Rate* and *Cancer Mortality Rate*.

- All variables are normalized.

Result I: The impact of the opioid epidemic on defaults

One std. change in opioid overdose rate causes delinquency rate rise by 0.40 std.

	1st stage	2nd stage
	Opioid OD	Delinquency rate
Oxy Supply	0.238***	
	(5.98)	
Opioid OD		0.402***
		(3.33)
Controls	Yes	Yes
State x Year FE	Yes	Yes
Obs	162,797	162,797
F-stat	35.76	
Clustering	County	County

The effect is more powerful for a sample of counties with higher insurance rate $\Longrightarrow$ accessibility $\Longrightarrow$ supply channel

	Delinquency rate	
Sample:	Low Insured	High insured
Opioid OD	0.057	0.835***
	(0.60)	(3.85)
Controls	Yes	Yes
State x Year FE	Yes	Yes
Obs	74,614	88,183
Clustering	County	County

Result II: What is the underlying economic mechanism?

The opioid epidemic may cause mortgage defaults in the following forms:

1. Directly in the form of liquidity shock:
   - Addiction to opioids can result with suboptimal decision-making.
   - Deteriorating health condition may lead to loss of income and employment.
   - In extreme cases default will be more detrimental if overdose death occurs.
2. Indirectly due to the loss of house values and hence, of home equity:
   - Strategic motives may trigger if paying a mortgage does not maximize wealth anymore.
   - Double-trigger defaults may happen if people with liquidity (not opioid-related) need cannot extract home equity.
   - Search frictions may be pronounced if banks cut lending to the opioid-afflicted areas.

1. The observed causal relationship cannot be explained by lower income growth or labor supply.

$\Longrightarrow$ direct liquidity shocks do not seem to be a systematic cause.

2A. Defaults are born by households with lower current home equity.

	Delinquency rate		
Sample:	$CLTV < 60$	$CLTV \geq 60$	$CLTV \geq 80$
Opioid OD	0.088	0.371***	0.366***
	(1.42)	(3.14)	(2.94)
Controls	Yes	Yes	Yes
State x Year FE	Yes	Yes	Yes
Obs	162,283	163,054	161,014
Clustering	County	County	County

home equity has been shrinking due to the depressed local house values driven by the epidemic $\Longrightarrow$ strategic and double-trigger defaults.

2B. Banks approve fewer mortgage loans to opioid-afflicted places.

	Mortgage approval rate		
Sample:	All Loans	Home Purchase	Refinance
Opioid OD	-0.285***	0.251***	-0.182***
	(2.72)	(2.91)	(2.21)
Controls	Yes	Yes	Yes
State x Year FE	Yes	Yes	Yes
Obs	150,792	150,678	150,650
Clustering	County	County	County

less home purchase applications approval $\Longrightarrow$ downward pressure on house values

less refinance mortgage application approval $\Longrightarrow$ pronounced search frictions $\Rightarrow$ more defaults

Bottom Line

Opioid epidemic causes mortgage defaults.

Effects are primarily driven by the indirect channel, indicating substantial adverse externalities for the borrowers living in those neighborhoods.

Overall, this paper contributes to our understanding of the economic costs of the opioid epidemic.