



Local labor market shocks and residential mortgage payments: Evidence from shale oil and gas booms

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ABSTRACT

Frequently, housing is the largest item on a household's balance sheet, and therefore making monthly mortgage payments is often both the largest regular expenditure as well as a primary savings vehicle for households. However, changes to economic conditions impact household spending and savings decisions. To investigate the dynamics of this relationship, we examine mortgage payment choices of homeowners who purchased property in areas that later experienced a positive shock to local economic conditions via the shale oil and gas boom. We find that borrowers with properties located in areas with shale oil and gas booms experienced a 6% reduction in the probability of missing a mortgage payment over the period 2007–2014. Indexing these results to the size of the boom, we find that one hundred additional rigs (billion dollars of oil and gas produced) are associated with a 3.2% (1.6%) decrease in default. Additionally, we find differential effects on housing markets across geography, time, loan leverage, and credit risk categories.

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1. Introduction

After many years of declining crude oil production in the United States, recent technological developments have made the extraction of previously inaccessible energy resources feasible. Specifically, the advent of horizontal drilling and hydraulic fracturing techniques have enabled the exploration and production of oil and gas from shale geological formations, and lead to significant new drilling activity over the past decade. Contemporaneously, widespread declines in residential housing values and sharp increases in mortgage default rates in 2007–2009 were a central component of the Great Recession. Notably, in the midst of the Great Recession, the technological innovations that enabled shale oil and gas extraction provided a catalyst for an economic “boom” to clearly specified local areas where these previously inaccessible resources could now be profitably extracted. This research focuses on how this natural resource boom impacted local residents of areas where these shale oil and gas resources were extracted. Specifically, we examine the impact of shale oil and gas discovery on the mortgage payment decisions of long-term residents of six geographic areas that have the geological formations that allow for shale oil and/or gas extraction, namely: *Bakken*, *Eagle Ford*, *Haynesville*, *Marcellus*, *Niobrara*, and *Utica*.¹

We estimate the impact of the shale boom on mortgage payment activity of individuals who purchased property in one of these areas prior to the natural resource discovery. Specifically, we examine the impact of the shale boom on the probability of mortgage default during a time period where aggregate default rates nationwide were sharply increasing. For the average

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¹ These areas are definitions are based on EIA (2017). The *Permian* basin located in western Texas was not included in this analysis because sufficient data on mortgages were not available.

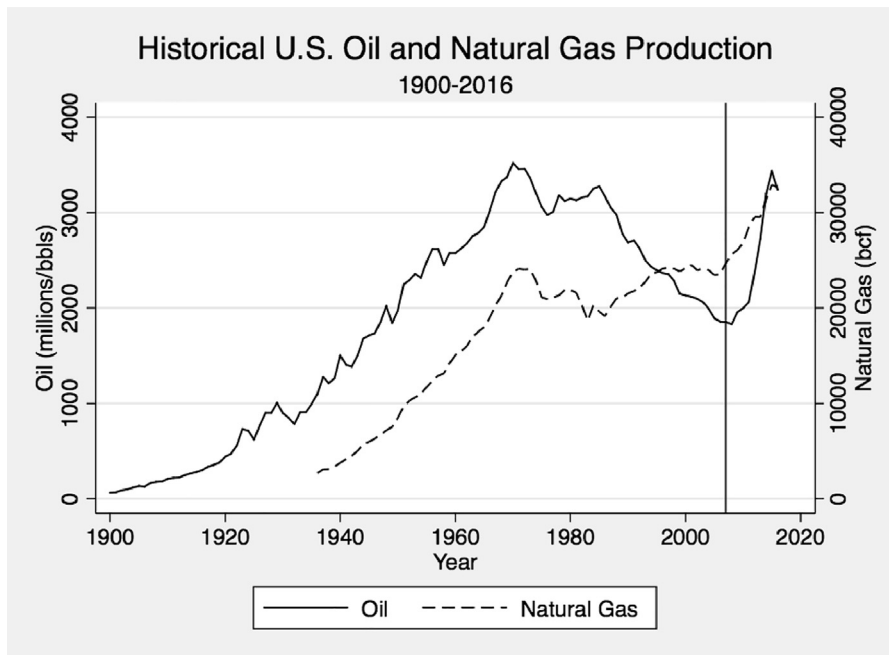


Fig. 1. Historical U.S. crude oil and natural gas production.

homeowner, their house is typically the largest asset on their household balance sheet, typically making up over two-thirds of a household's wealth (Iacoviello, 2011). Additionally, for homeowners with outstanding mortgages, this loan is typically their largest financial obligation.

Using a difference-in-differences framework, we find that borrowers with properties in counties with shale oil and gas resources experience, on average, a 6% reduction in the probability of mortgage default as compared to similar mortgages in non-shale areas after the boom began. This reduction in the probability of default reaches a maximum of approximately 7–9% in 2009, during the peak of the shale boom, and attenuates to approximately a 1–2% difference in default probabilities by the end of 2014. These results are robust to choice of control group, risk categories, alternate definitions of default, inclusion of prepayment as a loan outcome, local population levels, and placebo tests.

1.1. Economic impact of oil and gas booms

Modern crude oil production began in 1859 with Drake Well, five miles south of Titusville, Pennsylvania and began a period of rapid growth and expansion in the oil industry (Yergin, 1999). As people from all income ranges around the country began “pushing back the night” for the first time with inexpensive fuel that could be used for lighting homes, oil became an almost instant necessity. So began the age of oil that quickly spread throughout the world.

For almost a century the U.S. experienced consistent increases in oil production. But in 1970, this age of increasing domestic production reached its end and for the first time in U.S. history production began a period of decline that continued for the next four decades. However, over the last ten years, the oil landscape has changed both suddenly and dramatically as illustrated in Fig. 1. By 2007, after a long period of declining production in the U.S., a technological breakthrough allowed shale oil and gas extraction to become economically viable for the first time in history; the shale boom was underway.² Through a combination of horizontal drilling and hydraulic fracturing (informally referred to “fracking”) the trend in oil production reversed itself and the U.S. has since experienced increases in production. By the end of 2014, the U.S. was observing crude production similar to the historic levels achieved during “peak oil” of the 1970s (EIA, 2014).³ There is a growing literature on the economic impact of fossil fuel based shocks to economic activity; and this literature has seen resurgence due to the recent shale boom. Black et al. (2005) examines the impact of the coal boom and subsequent bust in the 1970s and 1980s on local labor markets and finds that in addition to increases in employment in the coal sector, employment increased in non-coal sectors as well. More recently, Allcott and Keniston (2018) utilize historical oil and gas production data in the U.S. since the 1960s and find that booms increase both employment and wages of local workers, and these increases are not just

² For the main empirical specifications in this research, the shale boom will begin in 2007 consistent with the time that EIA began tracking shale production (EIA, 2017). We will consider the specific timing of the treatment in an alternative specification.

³ By about mid-2015, the shale boom was slowing substantially due to the sharp drop in the oil price seen worldwide. This research will consider data until the end of 2014.

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