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Spillovers from the oil sector to the housing market cycle[☆]

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ABSTRACT

We assess the spillovers from the oil sector to the housing market cycle using quarterly data for 20 net oil-exporting and -importing industrial countries, and employing continuous- and discrete-time duration models. We do not uncover a statistically significant difference in the average duration of booms and normal times in the housing markets of those net oil-importers and net oil-exporters. Similarly, the degree of exposure to commodity price fluctuations does not seem to significantly affect the housing market cycle. However, we find that housing booms are shorter when oil prices increase than housing busts when oil prices decrease. We also show that the net oil-importers are more vulnerable to protracted housing slump episodes than the net-oil exporters.

1. Introduction

Oil prices have a boom–bust cycle that may stretch between 10 and 15 years, but their short-run effects can also be global.[1] Housing prices in different countries share a similar cycle pattern. For example, in countries like Spain, the United Kingdom or the United States, the housing market dynamics display the typical boom–bust cycle that follows a prolonged normal time period (Young, 2013; Agnello et al., 2015). Even the Great Recession emerged near the end of a large oil shock, which led to a downturn in housing prices and triggered the global financial crisis of 2008–2009 (Hamilton, 2009).[2] Thus, there is a potential link between the oil price and housing price cycles (Hamilton, 2011).

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[1] Innovations, commercial interests, geopolitics, and military conflicts have generally been the drivers of the boom–bust cycle of the oil industry (El-Ramly, 2015; Groneworld, 2015).

[2] Fluctuations in commodity prices may be predictors of future industrial production (Sadorsky, 1999; Park and Ratti, 2008; Narayan and Sharma, 2011) and other real economic activity (Hamilton, 1996, 2003, 2011). Earlier studies show that housing price downturns and oil price spikes tend to go hand in hand with the likelihood of economic recessions (Hamilton, 2003, 2005). Leamer (2007) argues that, despite representing a relatively small component of GDP, the housing sector plays a major role during recessions, contributing to their persistence and severity. Hamilton (2011) also argues that the relationship between housing price corrections and energy price volatility strengthened during the Great Recession.

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The existing literature embraces different channels through which commodity prices and housing prices may be associated. First, energy price increases have both direct and indirect impacts on disposable income and household spending (i.e., the income and demand effects), as they raise unemployment rates, shrink the purchasing power and squeeze profits in oil importing countries at the benefit of the oil-exporters.[3] This has a detrimental effect on housing demand (Spencer et al., 2012). Kaufmann et al. (2011) also find a reasonable correlation between household energy expenditure and US mortgage delinquency rates.

Second, energy price surges have both direct and indirect effects on construction costs, whether in terms of producing and operating equipment and consuming raw materials, and hence affect the quantities and the prices of houses. Moreover, Quigley (1984) shows that increases in energy price can lead to a reasonable rise in the housing service costs. Similarly, as the housing sector represents a large fraction of overall energy consumption in OECD countries, rising energy costs can have a large impact on housing prices (Swan and Ugursal, 2009).

Third, energy price increases can affect the headline inflation rate and induce a tightening in monetary policy, which erodes liquidity and can in turn reduce housing demand (Edelstein and Kilian, 2009).

Fourth, since the financialization of commodities is important, a sharp rise in energy prices can increase the attractiveness of commodities and generate large portfolio rebalancing effects away from stocks and houses and towards commodities through capital flows (Caballero et al., 2008; El-Gamal and Jaffe, 2010; Basu and Gavin, 2010).

Fifth, common factors (such as changes in the regulation and supervision of financial markets, global economic growth and variations in global liquidity) can influence the joint dynamics of commodity and housing prices where periods of expansion in global liquidity have typically coincided with substantial increases in commodity prices (Batten et al., 2010; Belke et al., 2010, 2014; Frankel, 2014; Hammoudeh and Yuan, 2008; Ratti and Vespignani, 2013, 2015).

Sixth, depreciating domestic currencies attract foreign buyers of domestic properties and can contribute to housing booms and busts.

Seventh, in the specific case of emerging market economies, Chiquier and Lea (2009) highlight the importance of the expansion of housing finance and underline its major drivers, including (i) lower inflation and mortgage interest rates; (ii) stronger housing demand related to demographic factors and urbanization; and (iii) financial liberalization. Additionally, the global commodity price boom of 2000–2008 and the rapid growth had induced large capital inflows (Higgins et al., 2006).[4] This can lead to exceptionally large fluctuations in asset prices, including housing prices.

In our paper, we investigate the potential spillovers from a series of oil-related variables to the duration of the various phases of the housing market cycle for net oil-exporting and -importing countries. More specifically, we use quarterly data for a group of 20 industrialized countries and conduct a preliminary detection of upturns and downturns in real housing prices to identify periods of booms, busts and normal times in the housing market while taking into account their magnitude, persistence and severity. Then, we rely on both continuous-time and discrete-time Weibull models to assess the impact of the oil sector dynamics on the housing cycle.

Our results show that the duration of the housing booms of both the net oil-importers and exporters falls when oil prices increase. Moreover, the net oil-importers seem to be less vulnerable to protracted housing busts than the net oil-exporters.[5] Additionally, increases in the price of oil during normal times in the housing market cycle can well be described as an improvement in economic conditions.

The remainder of this paper is organized as follows. Section 2 presents the modeling approaches and Section 3 describes the data. Section 4 analyzes the empirical results. Finally, Section 5 concludes.

2. Modeling approaches

2.1. The continuous-time duration model

The duration variable is defined as the number of periods – quarters in this study – over which a housing market boom, bust or normal cycle takes place. If T is defined as the discrete random variable that measures the time span between the beginning of one of those events and the moment it ends, the series of data at our disposal $(t_1, t_2, \ldots, t_n)$ will represent the duration of those events. The probability distribution of the duration variable T can be specified by the cumulative distribution function (CDF) $F(t) = Pr(T < t)$. This function measures the probability of the random variable T being smaller than a certain value t. A particularly useful function for the duration analysis is the hazard function

$$h(t) = f(t)/S(t), \qquad (1)$$

where $f(t)$ is the respective density function, while $S(t) = Pr(T \geq t) = 1 - F(t)$ is the survival function which measures the probability of an event surviving for t or more time. The hazard function reflects the rate at which housing booms, busts or normal times will end at t, given that they lasted until that moment. In other words, this function captures the probability of exiting from a state in moment t conditional on the length of time in that state. From the hazard function, we can derive the integrated hazard function, $H(t) = \int_0^t h(u)du$, and the corresponding survival function, $S(t) = exp[-H(t)]$.

The hazard function allows for a characterization of the dependence duration path. If $dh(t)/dt > 0$, there is a positive duration dependence, that is, the probability of a housing boom, bust or normal time ending at t, given that it has reached t, increases with its age. Thus, the longer the respective event is, the higher the conditional probability of its ending will be.

We use a proportional hazards model to parameterize the hazard function[6]:

$$h(t, \mathbf{x}) = h_0(t) \exp(\beta' \mathbf{x}), \qquad (2)$$

where $h_0(t)$ is the baseline hazard function that captures the duration dependence of the data, β is a $(K \times 1)$ vector of parameters to

[3] Leung et al. (2013) highlight that in an open economy commodity prices can affect the price of non-tradable goods (such as housing). Following Chen and Rogoff (2003), the authors highlight that commodity price fluctuations can be seen as "exogenous shocks", especially in countries where primary commodities represent a large fraction of total exports and thus have a major impact on the terms of trade. This is considered in the literature as a form of resource curse. Therefore, housing prices in some cities of those countries can be interpreted as "commodity house prices".

[4] Cesa-Bianchi et al. (2015) show that, compared to advanced countries, housing prices have larger growth rates, higher volatility, and lower degree of synchronization and persistence in emerging market economies. Their correlation with capital flows is also stronger and they are more sensitive to global liquidity shocks. In addition, housing prices are strongly procyclical in emerging markets (Igan and Loungani, 2012). Ciarlone (2012) finds that housing prices in emerging economies are not largely disconnected from the fundamentals, but the adjustment to the latter is slow and overly optimistic expectations were more prominent before the onset of the global financial crisis.

[5] In this context, our work is highly indebted to Breitenfellner et al. (2015), who find that a rise in energy inflation strongly increases the probability of a correction in housing prices. Therefore, the pass-through of oil prices to financial markets is important, and energy price inflation can be thought of as a macro-financial risk indicator.

[6] This means that the ratio of the hazard rates for any pair of observations is constant over time.