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Costs of Housing Crises: International Evidence

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Abstract:
This analysis provides evidence for the costs housing crises induce in terms of GDP growth and under what circumstances these crises are particularly costly. Housing crises are often followed by recessions that are longer and deeper than other recessions. According to empirical estimates, a housing crisis reduces the GDP growth rate in the following year on average by 2.5 percentage points and has a further negative impact in the second year. One important channel transmitting the additional effect of housing crises works through the depression of the construction sector, while wealth effects play a minor role.

Keywords: Housing crisis, Panel Data

JEL classification: E21, E32, C23

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1 Introduction

This paper analyzes the effects of housing market crises occurring since the 1970ies in a panel of industrialized countries. As noted by Reinhart and Rogoff (2008), these crises tend to exhibit several common patterns, which can be assessed via the use of panel data. A single time series approach in contrast is problematic as housing crises are rather seldom events. Housing crises seem to have a strong impact on economic output, as they are often accompanied by recessions, compare Leamer (2007). Our investigation seeks to quantify the costs of housing crises in terms of GDP growth and to assess the circumstances under which conditions housing crises are particular costly. The analysis is performed by means of a panel model approach, whereby further focus is put on analyzing the influence housing crises exhibit on economic growth depending on wealth effects and the construction sector in the economy.

A wide literature is concerned with the link between asset prices or different types of assets and consumption. Provided evidence is rather mixed. While Case et al. (2005) emphasize the role of housing wealth as an important, especially more important than other types of wealth, determinant of consumption expenditure, EU (2008) argues that housing wealth is a less important determinant of consumption in several European countries. Finally, it seems reasonable that differences between countries exist depending on their financial systems, see Aron et al. (2006). We revisit this issue by linking the costs of housing crises to other covariates, namely the homeownership ratio, the share of consumption in GDP and the share of housing investment in GDP. If the housing wealth would play a major role a housing crises should be more costly with a consumption share and a high homeownership ratio as the consumption of a wider share of population would be directly effected. In our analysis we find no evidence for such a pattern. Given a high ratio of housing investment relative to GDP, where construction services can be generally seen as labor intense, a damaging effect arises from an resulting increase in unemployment with possible second rounds effects in consumption. Our results give a hint that the share of housing investment on GDP has a crucial impact on the costs of housing crises.

The paper proceeds as follows. Section 2 describes the data set applied in this analysis as well as the empirical methodology used to define a housing crisis. The connection between housing crises and recessions is assessed in Section 3. The panel model and its results are presented in Section 4, while Section 5 concludes.

2 Data Description

The data set includes data for 15 industrial countries.[1] Real house prices primarily consist of a data set from the Bank of International Settlements. House prices for France (Existing Houses & Apartments, I.N.S.E.E.) and the United States (House Price Index - All Transactions, Office of Federal Housing Enterprise) as well as land prices for Japan (Nationwide Land Price Index, Japan Real Estate Institute) deflated by consumer prices taken from the national statistical agencies were added.

The start of a housing crisis is defined as the peak of houses prices within a rolling window of eight years, followed by a price decline from the peak of at least 7.5 percent during the next four years. Based on the data set with quarterly data for real house prices between 1970 and 2004 we can identify 23 housing crises across those countries.[2] However, due to data limitations stemming from the other covariates in the regression analysis we can just use 18 of them for inference on the (unbalanced) panel model. The identification approach is robust against moderate modifications of both, the threshold value and the length of the window, and gives similar results as in the literature (see e.g. IMF 2004). Data for real and nominal GDP, nominal residential investment and nominal consumption between 1970 and 2007 were taken, if possible, from the OECD Economic Outlook Database. Nominal residential investment for Spain was taken from Quarterly National Accounts from the OECD and is available between 1980 and 2004. Residential investment for Switzerland is provided by the Konjunkturforschungsstelle Zürich and is available from 1976 onwards.

3 Housing crises and recessions

There is broad evidence in the literature that a housing crisis usually go hand in hand with a slowdown of economic activity, see e.g. IMF (2004). In particular, Leamer (2008) points at the close link between housing crises and the business cycle in the US and Jannsen (2009) shows the impact of housing crises on the business cycle on an international level with the same data set we apply here. We broaden this evidence by analyzing the link between housing crises and recessions. The whole data set includes 23 housing crises. Within one year after the start of the housing crises in 15 out of the 23 cases a recession started.[3] Overall the data set contains 45 recessions. To check whether this seemingly connection is not just a random phenomenon we perform a simulation exercise to derive

[1] These are: Australia, Belgium, Canada, Denmark, Finland, France, Great Britain, Ireland, Japan, The Netherlands, Norway, Spain, Sweden, Switzerland and The United States.

[2] The dates of housing crises and recessions respectively are given in Table (1).

[3] Recessions are defined according to the Bry-Boschan-algorithm for quarterly GDP data. Compare Bry and Boschan (1971) and for the quarterly version Watson (1994).

a distribution for the number of recessions that are connected to housing crises.[4] Within the 10,000 random draws the event that 15 housing crises or more are followed by a recession virtually never occurred and thus providing evidence for a clear relation between housing crises and recessions.

We further assess this relation by comparing the properties of a recession following a housing crises and those without a housing crisis. We do not find differences between both types of recessions according to the mean growth rate of GDP during a recession, the mean growth rate is slightly higher in recessions with housing crisis but the differences are not significant according to the common levels. However, we find clear evidence that recessions with housing crises last longer, namely on average four quarters compared to roughly 5.5 quarters in a recession with housing crisis, see Table (2).

We conclude that recessions are often preceded or accompanied by housing crises and that those lead to longer lasting output reductions than other recessions. In the following section we discuss a parametric approach to grasp the costs of housing crises and to ask which circumstances might be particularly adverse.

4 Costs of housing crises

To assess the costs of a housing crisis in terms of output we apply a panel model. For analyzing the impact of a current crisis usually a treatment framework as in Heckman (1979) is needed, as the crisis can be triggered by shocks that also affect GDP growth. However, preliminary exercises showed no evidence for an impact of a housing crisis on the output in the current year. Thus, we focus on the effects of housing crisis on the output growth of the following year. The pooled panel model we use takes the following form:

$$y_{i,t} = \alpha_0^{(i)} + \alpha_1^{(i)} y_{i,t-1} + \beta^{(i)} X_{i,t-1} + \sum_{j=1}^{2} \gamma_j I_{i,t-j} + \sum_{j=1}^{2} \delta_j I_{i,t-j} \times Z_{i,t-j} + u_{i,t}, \tag{1}$$

where $y_{i,t}$ represents the GDP growth of country i in year t. The dummy variable $I_{i,t-j}$ indicates whether a housing crisis started in the year before or two years before respectively. In a second term the dummy is multiplied by a variable $Z_{i,t-j}$ to check whether particular conditions can increase

[4] In the simulation we assume that the occurrence of the 23 housing crises is random and not correlated to the recessions. We generate 10,000 random draws. In each draw 23 housing crises are distributed on a sample of same size as the original one. The drawn set of housing crises thereby has to fulfill some conditions to be accepted as a draw for the distribution. E.g. a minimum distance between two crises is assumed. Otherwise the unrealistic case can occur that housing crises start in consecutive years, what is not observed in the data. Mind, due to this restrictions (dependency structure) a typical χ^2 test is not in reach. The random draws of the housing crises are than connected with the observed recessions and the number of joint housing crises and recessions is calculated as for the original sample.

the costs of housing crises. To assess such conditions we regard a proxy measure of the impact of housing prices on consumption, namely the homeownershiprate, and a measure for the impact on construction, namely the level housing investment as its share on real GDP. Furthermore, the lagged GDP growth is included as well as additional control variables, like short and long term interest rates, represented by $X_{i,t-1}$ to capture other influences on GDP growth. We specify the error term $u_{i,t}$ as a MA(1) process

$$u_{i,t} = \rho e_{i,t-1} + e_{i,t} \tag{2}$$

to guarantee a white noise process in the errors $e_{i,t}$. To take possible heteroscedasticity within the panel into account a random coefficient approach is specified. Preliminary analysis yielded that consideration of a random coefficient is sufficient for the persistence term α_1 and the coefficient for the long term interest rates. Thus we assume that $\alpha_1^{(i)}$ is a random variable following a normal distribution with parameters μ_{α_1} and σ_{α_1} and for one of the β we assume that it follows a normal distribution with parameters μ_{β_3} and σ_{β_3}, while all other parameters are constant in i. Estimation is done via the Maximum Likelihood method, see Beck and Katz (2007).

We estimate the (unbalanced) panel model in Equation (1) in several specifications with respect to the crisis dummies and cross terms, while group of control variables stays always the same. Overall we find that housing crises have an impact in two consecutive years after their occurrence while the inclusion of cross terms only provides an remarkably improvement of model fit in the first year and not in the second. We present a selection from all considered specifications in Table (3). Specification (I) takes into account the crisis dummies only and no cross term. A housing crisis has a significant impact on growth in both years after its occurrence. In the first year the growth rate is dampened by 2.5 percentage points and in the second year by almost 1 percentage point next to the impact of the first year that is prolonged by the autoregressive dynamics. In the second specification the housing investment cross term is regarded additionally and turns out to be highly significant. It shows up with a reasonable improvement of the model fit. A share of residential investment in GDP of 10 % would lead to a loss of GDP growth of about 4 percentage points in the first year after the outbreak of a housing crisis. An LR-test would reject the first specification in favor of the second one at any conventional level. Such an improvement is not provided by the cross term homeownershiprate in Specification (III). Even if the t-value for the cross term points at an reasonable impact of the homeownwershiprate the AIC rejects the additional cross term compared to the benchmark Specification (I).[5]

For further assessment we run Specification (IV) where the crisis term is disregarded for the

[5]T-values might be misleading as the joint consideration of cross terms and dummies induces the problem of multicollinearity

first year after the crisis but both cross terms are taken into account. This specification has a slightly better fit than Specification (II), which has the same number of parameters. Thus the cross term has at least the same informational content as the crisis dummy. Again, the t-values have to interpreted with care. Finally, we present Specification (V) where the crisis dummies as well as the housing investment cross term are both considered for the first and the second year after a crisis. As mentioned before specifications with additional cross terms in the second year yield no improvement in terms of AIC. However, it should be mentioned that the crisis parameter for the second year is reasonable higher in absolute terms compared to that one Specification (II) and that the cross term parameter for the second year has a positive sign (even though not significant at conventional levels). Thus one might conclude that a housing crisis preceded by a rather high level of housing investment has a particular detrimental impact in the first year, however, the adjustment in this sector seems to go relatively quick and does not impose a particular burden on the second year after the crisis.

Overall, raising house prices often induce a boom in the construction sector and boosts housing investments. In the aftermath of the corresponding crisis the following bust exhibits high costs for the whole economy. A connection between housing wealth and output via consumption seems comparable less important as the comparison between Specification (II) and (III) yields.[6] However, this study mainly captures housing crises in the 70ies and 80ies. Financial tools which enable house owners to transmit wealth increases into additional consumption were less developed as they are today.[7]

5 Conclusion

This analysis provides evidence for a close link between housing markets and the business cycle at the level of industrialized countries. Housing crises are often followed by recessions that are longer and thereby deeper than other recessions. Within a panel study we analyzed the costs of housing crises. They reduce the GDP growth rate in the following year by about 2.5 percentage points on average and of roughly 1 percentage point in the second year after the outbreak of the housing crisis in addition to the dynamic effects of the first years impact. Particular detrimental is a high share of housing investment in GDP as the housing crisis induces a rapid and costly adjustment process affecting mainly the first year after the crisis. In the second year after housing crises have

[6] In addition we run a specification, where the cross term is based on the consumption level of the economy. This specification does not yield preferable results, too. Thus the consumption link seems less important compared to the housing investment link.

[7] Aron et al. (2006) point at the importance of the development status of the credit channel for the link between housing prices and consumption.

still a negative impact on GDP growth while the an additional negative impact of a high housing investment share is not found. The consumption share in GDP and the homeownership ratio have less impact on the severity of a housing crisis within the data set under consideration pointing towards a minor role of wealth effects during housing crises.

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Tables

Table 1: Timing of Housing crises and Recessions

	Housing crises	Recessions
JP	1973, 1991	1973, 1993, 1997, 2001
FR		1974, 1992
US	1979	1973, 1980, 1981, 1990
UK	1973, 1980, 1989	1973, 1974, 1979, 1990
CN	1976, 1981, 1989	1981, 1990
ES	1991	1978, 1980, 1992
AU	1974, 1981, 1989	1974, 1981, 1990
NL	1978	1974, 1979, 2003
BG		1974, 1980, 1992
SD	1979, 1990	1970, 1976, 1980, 1990
SW	1973, 1989	1974, 1981, 1990, 1991, 2002
DK	1979, 1986	1973, 1979, 1986, 1992, 2003
NW	1987	1988
FN	1989	1975, 1990
IR	1979	1982, 1985

Note: The figures denoted the year a housing crisis or a recession started in according to the timing methods described in the text.

Table 2: Mean growth rates and duration in recessions

	with housing crisis	without housing crisis	t-value of difference	p-value
mean quarterly growth rate	-0.689	-0.631	-1.569	0.124
duration in quarters	5.467	4.000	5.159	0.000

Table 3: Costs of housing crises: Results for panel models

		Specification I	Specification II	Specification III	Specification IV	Specification V
α_0	constant	1.3182 3.5288	1.3986 3.2187	1.3081 3.57	1.3664 3.3276	1.3526 3.2766
μ_{α_1}	Δ GDP(t-1)	0.5455 6.459	0.52616 5.4025	0.5429 6.7167	0.53179 6.0365	0.53884 5.6796
σ_{α_1}		0.06062 2.113	0.065015 2.1352	0.0624 2.219	0.064293 1.9756	0.062953 2.0355
β_1	short interests	−0.043742 −1.4941	−0.049305 −1.4533	−0.041184 −1.367	−0.046285 −1.2921	−0.04621 −1.45
β_2	inflation	0.070465 2.6128	0.07403 2.3799	0.070063 2.4046	0.073207 2.6393	0.070968 2.1383
μ_{β_3}	long interests	−0.050441 −5.7559	−0.049815 −6.34	−0.050826 −5.3324	−0.050035 −6.0964	−0.050057 −5.7867
σ_{β_3}		0.016728 2.482	0.016202 2.2264	0.016134 2.6757	0.016129 2.0911	0.016177 2.2466
γ_1	crisis (t-1)	−2.4206 −5.8214	−0.16137 −0.15959	0.051337 0.027657		−0.1734 −0.16997
$\delta_1^{(1)}$	crisis × s.h.i.		−0.38196 −2.3909		−0.30141 −2.637	−0.3815 −2.3004
$\delta_1^{(2)}$	crisis × h.o.r.			−4.0932 −1.3655	−1.1536 −1.0624	
γ_2	crisis (t-2)	−0.99985 −2.233	−1.0221 −2.5645	−1.0148 −2.37	−1.0258 −2.5699	−2.3468 −2.3605
$\delta_2^{(1)}$	crisis (t-2) × s.h.i.					0.22815 1.3993
ρ		−0.0638 −0.54421	−0.025556 −0.21458	−0.059013 −0.54648	−0.035343 −0.30437	−0.043364 −0.36376
σ		1.5265 27.048	1.5184 28.261	1.5233 28.784	1.5177 28.352	1.5155 26.641
R^2		0.66118	0.66303	0.66183	0.66322	0.66369
LogLi		828.58	826.22	827.69	825.99	825.34
AIC		1.9071	1.9063	1.9096	1.9058	1.9088

Note: s.h.i.: share of housing investment in GDP in % (mean: 6.5); h.o.r.: homeownership ratio (mean: 0.6); LogLi: logarithm of likelihood value at point estimate; AIC: Akaike Criterion; t-values are underset.