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A NOTE ON BANKING AND HOUSING CRISES AND THE STRENGTH OF RECOVERIES

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We investigate whether recoveries following normal recessions differ from recoveries following recessions that are associated with either banking crises or housing crises. Using a parametric panel framework that allows for a bounce-back in the level of output during the recovery, we find that normal recessions are followed by strong recoveries in advanced economies. This bounce-back is absent following recessions associated with banking crises and housing crises. Consequently, the permanent output losses of recessions associated with banking crises and housing crises are considerably larger than those of normal recessions.

Keywords: Business Cycle, Recovery, Banking Crisis, Housing Crisis

1. INTRODUCTION

We investigate the strength of recoveries following recessions. In doing so, we differentiate between recessions associated with severe crises, i.e., banking crises or housing crises, and recessions that are not associated with banking crises or housing crises (normal recessions). Our approach to differentiating between these types of recessions is motivated by the competing findings in the literature.

Several studies on recessions associated with banking or other financial crises find that such recessions are particularly long-lasting and severe and that the subsequent recoveries are weak. This finding has already been documented, for example, by Kaminsky and Reinhart (1999) and Bordo et al. (2001), and affirmed by studies such as Reinhart and Rogoff (2008, 2009a, 2009b), Cecchetti et al. (2009), and Haugh et al. (2009). Moreover, many studies find that recessions associated with

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banking crises dampen the level of output permanently [Boyd et al. (2005); Cerra and Saxena (2008); Furceri and Mourougane (2009); IMF (2009b)]. This view is challenged by Bordo and Haubrich (2012) and Howard et al. (2011). Bordo and Haubrich analyze 27 business cycles in the United States starting in 1882 and find that recoveries after banking crises do not differ from other recoveries. Howard et al. perform a similar analysis for 59 advanced and emerging market economies over the past 40 years and come to a similar conclusion. However, Bordo and Haubrich relate slow recoveries to weak dynamics of residential investment. In an event study, Howard et al. find that recessions with large declines in house prices tend to be followed by slow recoveries. This finding emphasizes that housing crises have been proven to have severe economic consequences [Claessens et al. (2009); Jannsen (2010); Aßmann et al. (2013)].

The strength of recoveries and the permanent effects of recessions on levels of output were already analyzed using time series models in the 1980s and 1990s. Nelson and Plosser (1982), Campbell and Mankiw (1987), and Hamilton (1989) find that recessions have large permanent effects on output. Beaudry and Koop (1993) find that, once they allow for nonlinear effects in their empirical model, recessions in the United States are followed by a bounce-back in the level of output—or alternatively by particularly strong recoveries—and consequently that recessions have only small or even no permanent effects on the level of output. Sichel (1994) and Kim et al. (2005), among others, confirm this finding. Although there is strong evidence for this finding in the United States, the evidence for other economies is mixed. Balke and Wynne (1996) find evidence for strong recoveries following recessions for the G-7 economies as an aggregate. However, Bradley and Jansen (1997), who apply the approach of Beaudry and Koop (1993) to the G-7 countries, find evidence for strong recoveries only for the United States, Italy, and to a lesser degree Germany. Kim et al. (2005) find the bounce-back effect to be much smaller for several other advanced economies than for the United States.

A major contribution of our study is that we combine the time series literature on strength of recoveries with the literature on the effects of banking crises and housing crises. In particular, we explicitly evaluate the strength of recoveries following recessions associated with severe crises compared to that of normal recessions that are not associated with such crises, using the time series model presented in Beaudry and Koop (1993). We explicitly differentiate between normal recessions, recessions associated with (simultaneous) banking crises and housing crises, and recessions associated with pure housing crises (but not with banking crises).[1] Our results on the strength of recoveries also provide information about the permanent effects of normal recessions on the level of output compared to recessions associated with severe economic crises.[2]

Using a panel data set for 17 advanced economies between 1970 and 2012, we find that normal recessions and recessions associated with banking and housing crises differ sharply in terms of the subsequent recovery. Whereas normal recessions are followed by a bounce-back effect in the level of output, this bounce-back effect is absent after recessions associated with banking and housing crises.

Moreover, the bounce-back effect is considerably weaker in recoveries following recessions associated with pure housing crises than in recoveries following normal recessions. Our results indicate that the permanent effects of recessions on the level of output do not depend only on the depth and the length of a recession. Even if recessions were identical in terms of their depth and their length, our results suggest that the permanent effects of recessions associated with banking and housing crises or with pure housing crises would be much larger than those of normal recessions because the recovery is significantly stronger after normal recessions.

Although our results are in line with the earlier literature about the overall effects of banking crises, they are not in line with the results of Howard et al. (2011) or Bordo and Haubrich (2012), who both analyze the strength of recoveries explicitly. In addition to the different methodology we use, one reason for the different results might be that we investigate the effects of banking crises and housing crises on the strength of recoveries in a joint framework. Overall, by differentiating between recoveries following normal recessions and recoveries following recessions associated with severe economic crises, we are able to explain some of the heterogeneity in the results of the literature on the strength of recoveries. We use a series of tests to show that our main results are robust with respect to several modifications of our baseline specifications. In particular, our results are robust when we do not include the recessions and the banking and housing crises of the years 2008 and 2009 and the subsequent recoveries in our sample.

The structure of the remaining paper is as follows. Section 2 presents our estimation methodology. Section 3 describes the data set. Section 4 presents our estimation results and illustrates them graphically. Section 5 summarizes the results and concludes.

2. METHODOLOGY

We use a panel framework to estimate the effects of banking and housing crises on the strength of recoveries because such crises are rare events. To account for nonlinear dynamics following recessions—independent of whether they are normal or associated with severe crises—we augment an autoregressive panel model of GDP growth by the current depth of recessions (cdr) term introduced by Beaudry and Koop (1993).[3] The cdr term is defined as the deviation of current GDP from its previous peak:

$$\mathrm{cdr}_t = \max(y_{t-j})_{j\geq 0} - y_t, \tag{1}$$

where $\max(y_{t-j})_{j\geq 0}$ refers to the peak of log real GDP until year t. When real GDP falls below its previous peak (or alternatively when real GDP growth is negative), the cdr term becomes positive; otherwise, the term is equal to zero. Therefore,

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during recessions, cdr_t becomes positive until GDP reaches its previous peak again. During expansions, cdr_t is equal to zero.

By using the cdr term, we deviate from the literature on the effects of severe crises [Cerra and Saxena (2008)] and on the strength of recoveries [Cerra and Saxena (2005)], which uses dummy variables to account for phases of severe crises or recoveries. In contrast to most of the literature on severe crises, we focus exclusively on the recovery phase and do not estimate the average depth of severe crises in terms of GDP using dummy variables, but interpret severe crises as shocks that can have very different sizes. In this regard, the approach of Beaudry and Koop (1993) is more flexible than using dummy variables because it relates the strength of a recovery to the depth of the preceding recession. The autoregressive panel model that is augmented by the cdr term is given by

$$\Phi(L)\Delta y_{t,i} = \alpha_i + [\Omega(L) - 1]\text{cdr}_{t,i} + \varepsilon_{t,i}, \tag{2}$$

where Δy_t is real GDP growth in country i in year t, the lag polynomial of Φ denotes the autoregressive structure of GDP growth, and α_i denotes country fixed effects. The lag polynomial of Ω measures the impact of the cdr term on GDP growth. If the sum of all coefficients is positive, economic growth will on the average be stronger during recoveries when the cdr term is positive than during expansions when the cdr term is zero. Moreover, positive coefficients for the cdr term indicate a significant bounce-back effect in the level of GDP, as deeper recessions are associated with stronger subsequent economic growth.

To assess the impact of banking crises and housing crises on recoveries, we define interaction terms between dummy variables that indicate whether a recession was associated with a banking and a housing crisis and the cdr term. We differentiate between recessions that are associated with banking crises and housing crises and recessions that are associated with pure housing crises. Because of data limitations, we do not include an interaction term for recessions that are associated with pure banking crises in our model.[4] The interaction terms are given by $\text{cdr}_{t,i}^{\text{bc,hc}}$ (when a recession was associated with a banking crisis and a housing crisis) and $\text{cdr}_{t,i}^{\text{hc}}$ (pure housing crisis). They are equal to the value of the cdr term if a recession was associated with these crises and are zero otherwise. We estimate the effects of severe crises by including the interaction terms, $\text{cdr}_{t,i}^{\text{bc,hc}}$ and $\text{cdr}_{t,i}^{\text{hc}}$, in the equation

$$\begin{aligned}\Phi(L)\Delta y_{t,i} = \alpha_i &+ [\Omega(L) - 1]\text{cdr}_{t,i} + [\Gamma(L) - 1]\text{cdr}_{t,i}^{\text{bc,hc}} \\ &+ [\Pi(L) - 1]\text{cdr}_{t,i}^{\text{hc}} + \varepsilon_{t,i},\end{aligned} \tag{3}$$

where the lag polynomials of Γ and Π measure the impact of severe crises on the strength of the recovery. Negative coefficients for the interaction terms indicate that recoveries following recessions that are associated with severe crises are weaker.

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3. DATA

We use a panel data set of 17 advanced economies.[5] We focus, following Claessens et al. (2009) and IMF (2009a), exclusively on advanced economies, because data on house prices are available in a consistent database only for such economies. Moreover, focusing exclusively on advanced economies ensures that we use a relatively homogeneous data set for our empirical analysis and are not mixing data from economies with sharply differing market structures, institutions, or risk perceptions. The analysis is based on annual data from 1970 to 2012, and we use real GDP as taken from national sources as a measure for economic activity.

In the literature, housing crises are usually identified by real house price developments and are characterized by periods of falling prices [IMF (2003); Ahearne et al., 2005; Claessens et al. (2009); Jannsen (2010); Cunningham and Kolet (2011)]. Building on Ahearne et al. (2005), Claessens et al. (2009), and Jannsen (2010), we define a housing crisis as a period following a house price peak. We identify a house price peak as a centered nine-year high in real house prices. Thus, according to our identification criterion, there has to be a minimum period of five years between two consecutive housing crises.[6] The starting year of the crisis is defined as the year when real house prices peak.[7] Data on real house prices are from the International House Price Database of the Federal Reserve Bank of Dallas, which starts in 1975. We use real house price data from the Bank of International Settlements to extend the data set for real house prices to 1970. With respect to banking crises, we rely on the chronology of banking crises provided in Laeven and Valencia (2010). Throughout this paper, we define a recession as a period of negative GDP growth, which is common in the literature when a data set of advanced economies and annual data is used. According to this criterion, we have 60 recessions in our sample. In addition, we have 43 housing crises and 18 banking crises in our sample.

As we are interested in the existence and the strength of bounce-back effects following both normal recessions and recessions associated with severe crises, we differentiate between these two types of recessions. We consider a recession to be associated with a banking crisis or a housing crisis if it begins within a period of two years after the crisis began. It turns out that 15 out of the 18 banking crises and 32 out of the 43 housing crises are associated with a recession. Furthermore, 10 recessions are associated with banking crises and housing crises. Consequently, we have 5 recessions that are associated with pure banking crises, 22 recessions that are associated with pure housing crises, and 23 normal recessions. Given the small number of pure banking crises, we do not include them in our baseline model.[8]

4. RESULTS

We use an AR(2) process as our baseline model. Preliminary tests show that the first two lags in GDP growth are significant in most specifications, whereas higher lags usually are not. We start by estimating the models (2) and (3) using panel fixed effects.

TABLE 1. Estimation results

	I	II	III	IV	V	VI
$\Delta y_{t-1,i}$	0.46***	0.62***	0.52***	0.65***	0.44***	0.47***
	(10.6)	(11.9)	(11.8)	(12.7)	(10.5)	(9.7)
$\Delta y_{t-2,i}$	−0,05	−0.18***	−0,07*	−0.20***	0.01	−0.01
	(1.3)	(3.9)	(1.8)	(4.2)	(0.3)	(0.3)
$\text{cdr}_{t-1,i}$	0.20***	0.60***	0.97***	1.24***	0.71***	0.76***
	(2.7)	(5.6)	(5.8)	(7.0)	(5.0)	(4.8)
$\text{cdr}_{t-2,i}$		−0.56***		−0.63***		−0.13
		(5.3)		(3.5)		(0.8)
$\text{cdr}^{\text{bc,hc}}_{t-1,i}$			−0,96***	−0,99***	−0.68***	−0.75***
			(5.6)	(5.1)	(5.1)	(5.0)
$\text{cdr}^{\text{bc,hc}}_{t-2,i}$				0.30		0.14
				(1.4)		(0.8)
$\text{cdr}^{\text{hc}}_{t-1,i}$			−0.57***	−0.44**	−0.41***	−0.34**
			(3.1)	(2.1)	(2.7)	(2.0)
$\text{cdr}^{\text{hc}}_{t-2,i}$				−0.04		−0.06
				(0.2)		(0.3)
Time fixed effects	No	No	No	No	Yes	Yes
AIC	1.44	1.40	1.39	1.35	0.73	0.72
F-test						
Banking and housing crises			0.92	0.31	0.72	0.80
Pure housing crises			0.00	0.11	0.00	0.02

Notes: *t*-values in parentheses. *F*-test shows the *p*-values resulting from the hypothesis that the parameter values of the cdr terms and of the banking and housing crises interaction term or the pure housing crises interaction term are identical. AIC shows the value of the Akaike information criterion. $\text{cdr}^{\text{bc,hc}}_{t}$ indicates a recovery following a recession associated with a banking and housing crisis. $\text{cdr}^{\text{hc}}_{t}$ indicates a recovery following a recession associated with a housing crisis.
*,**,*** Significance at the 10%, 5%, and 1% level, respectively.

In the first specification, we do not differentiate between normal recessions and recessions associated with banking or housing crises, and we estimate model (2) by allowing for one lag of the cdr term. We find only a slightly positive parameter value, which is, however, significantly different from zero (Table 1, specification I). The coefficient estimate of 0.20 for the term $\text{cdr}_{t-1,i}$ indicates that for every 1% that GDP falls below its previous peak during a recession, the growth rate of real GDP increases by 0.2 percentage points.

When we include the second lag of the cdr term, it leads to a considerable increase in the parameter value and the significance level of the first lag of the cdr term. However, it turns out that the parameter value of the second lag of the cdr term has a negative sign and is roughly the same size as the parameter value of the first lag (specification II). Thus, our results indicate that recessions in general are not followed by particularly strong recoveries.

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In specification III, we allow for heterogeneity among recessions and augment the first specification by the first lag of the interaction terms for recessions associated with banking crises and housing crises and for recessions associated with pure housing crises. The parameter value of the cdr term increases considerably and is highly significant. The coefficient estimate of 0.97 for the term $\text{cdr}_{t-1,i}$ indicates that for every 1% that GDP falls below its previous peak during normal recessions, the growth rate of real GDP increases by 0.97 percentage points. This result indicates a significant bounce-back effect following normal recessions, as deeper recessions are associated with more robust subsequent economic growth. When the recession is associated with a banking and housing crisis, this bounce-back effect vanishes completely; the parameter value of the interaction term $\text{cdr}_{t,i}^{\text{bc,hc}}$ takes on a value of -0.96. When the recession is associated with a pure housing crisis, the parameter value of the interaction term is -0.57, which suggests that the bounce-back effect is significantly weaker than in recoveries following normal recessions (the growth rate of GDP increases only by 0.4 percentage points for every 1% that GDP falls below its previous peak).[9] In specification IV, we augment the model by a second lag for each cdr term. It turns out that the business cycle effects in the first year following a recession are even more pronounced than in specification III. For the second year, the parameter values have the opposite sign, indicating some repercussive effect for each type of recession (with or without a severe crisis). Overall, the effects are qualitatively similar, albeit somewhat weaker than those in specification III.

The Akaike information criterion (AIC) favors the specifications that include the interaction terms for banking crises and housing crises and exhibit the lowest value for specification IV, which includes two lags of each variable. A likelihood-ratio test indicates that specification IV fits the data better than specification I (p-value: 0.00), specification II (p-value: 0.00), and specification III (p-value: 0.05).

In specifications V and VI, we include time fixed effects to control for global developments. Controlling for global developments is an important robustness check because macroeconomic conditions have changed between 1970 and 2012 and because recessions and severe crises were internationally synchronized to some degree in the past. Overall, when time fixed effects are included, the results are qualitatively the same. However, the parameter values of the cdr terms are somewhat lower, indicating that some of the recessions, banking crises, and housing crises in our sample were indeed internationally synchronized.

Our results are also qualitatively robust with regard to several other robustness checks. Most importantly, our results are robust when we exclude the recessions, banking crises, and housing crises since 2007 from our sample and restrict our estimation period to 1970 to 2006. Moreover, our results are robust when we control for pure banking crises in our sample, when we allow for more cross-country heterogeneity in our model, when we use alternative identification criteria for housing crises, and when we include a global variable in our model to explicitly control for the impact of global factors.[10]

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5. CONCLUSION

We provide empirical evidence that normal recessions are typically followed by strong recoveries and a bounce-back in the level of output. We find that the recovery becomes relatively stronger the deeper the preceding recession was. We also find that when a recession is associated with a banking crisis and a housing crisis this bounce-back effect is completely absent. Moreover, when a recession is associated with a pure housing crisis, the recovery is significantly weaker than a recovery following a normal recession. Our results suggest that recessions associated with banking and housing crises or with pure housing crises lead to considerably larger permanent output losses than normal recessions. Our findings are robust when we apply several robustness checks. In particular, our results are robust when we exclude the recessions and banking and housing crises of the years 2008 and 2009 and the subsequent recoveries from our sample.

NOTES

1. We do not differentiate the recessions associated with pure banking crises (but not with housing crises) because of a lack of observations. See Section 3 for a detailed data description.

2. In this regard our results are also relevant to the extensive literature that tests for unit roots in GDP. The results of unit root tests, however, might be difficult to interpret in the presence of large output fluctuations, which can usually be observed during severe crises; see, e.g., Kilian and Ohanian (2002).

3. For an overview and a detailed description of nonlinear methods used in empirical macroeconomics, see Granger (2001).

4. See Section 3 for a detailed data description.

5. These economies are Australia, Belgium, Canada, Denmark, Finland, France, Germany, Great Britain, Italy, Ireland, Japan, the Netherlands, Norway, Spain, Sweden, Switzerland, and the United States.

6. Our results are robust with respect to the length of the moving window, for which we require a centered high of real house prices, and with respect to requiring a minimum decline of real house prices in the period following a house price peak. In Boysen-Hogrefe et al. (2015), we provide robustness checks of our results when we use various dating schemes for housing crises.

7. As an example, we identify the year 2006 as the starting year of a housing crisis in the United States because the level of house prices peaked in 2006 (house prices started to decline in the year 2007) and reached a local maximum for the period from 2002 to 2010.

8. However, the baseline results presented in Section 4 are robust when we control for these five pure banking crises.

9. F-tests indicate that the parameter values of $\mathrm{cdr}_{t,i}$ and $\mathrm{cdr}_{t,i}^{\mathrm{bc,hc}}$ are not significantly different from each other (in absolute terms), whereas the parameter values of $\mathrm{cdr}_{t,i}$ and $\mathrm{cdr}_{t,i}^{\mathrm{hc}}$ are significantly different from each other (in absolute terms), with a p-value of 0.00.

10. The robustness checks are available in the Appendix of Boysen-Hogrefe et al. (2015).

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