North American Journal of Economics and Finance 38 (2016) 70–85

Contents lists available at ScienceDirect

North American Journal of Economics and Finance

journal homepage: www.elsevier.com/locate/ecofin

Forecasting house-price growth in the Euro area with dynamic model averaging

Marian Risse [a,*], Martin Kern [b]

[a] Department of Economics, Helmut Schmidt University, Holstenhofweg 85, P.O.B. 700822, 22008 Hamburg, Germany
[b] Department of Economics, University of Hagen, Universitätsstraße 11, 58084 Hagen, Germany

ARTICLE INFO

Article history:
Received 17 February 2016
Received in revised form 27 July 2016
Accepted 1 August 2016

JEL classification:
C32
C53
R30

Keywords:
House prices
Dynamic model averaging
Forecasting
Europe

ABSTRACT

We use a dynamic modeling and selection approach for studying the informational content of various macroeconomic, monetary, and demographic fundamentals for forecasting house-price growth in the six largest countries of the European Monetary Union. The approach accounts for model uncertainty and model instability. We find superior performance compared to various alternative forecasting models. Plots of cumulative forecast errors visualize the superior performance of our approach, particularly after the recent financial crisis.

1. Introduction

House-price busts can substantially harm an economy's financial and economic stability, as has become evident during the Subprime Mortgage Crisis of 2007/2008. The IMF (2003) analyzed 20 house price busts in 14 countries from 1970–2002, and found that any of the analyzed countries experiences a collapse in house prices every 20 years with a mean price correction of 30% over a period of 4 years. Leamer (2007) reports for the US market that, excluding periods of the Korean War and the burst of the New Economy Bubble in 2001, the housing market has been a primary leading indicator for recessions since 1949. Plakandaras, Gupta, Gogas, and Papadimitriou (2015) validate these findings for the breakdown of the US real estate market during the Global Financial Crisis from 2006 to 2009. Hence, forecasting house prices may contain valuable information for analyzing business-cycle movements (see Gupta & Das, 2010; Gupta & Hartley, 2013; Stock & Watson, 2003). In times of economic growth, rising demand for housing pushes upward residential investment and construction employment and thereby strengthens aggregate demand. In contraction phases, in turn, falling income and job uncertainty decrease housing demand, reduce prices and weaken the attractiveness of residential investment. As a result, the construction sector cuts production and lays off employees, further dampening business prospects and accelerating economic downturns.

* Corresponding author.
E-mail address: marian.risse@hsu-hh.de (M. Risse).

http://dx.doi.org/10.1016/j.najef.2016.08.001
1062-9408/

Throughout the last years, improvements in econometric forecasting techniques spurred researchers to study forecasting models with a wide range of possible predictors for house prices.[1] However, most of the studies focus on the US market. Rapach and Strauss (2007, 2009) use an autoregressive distributed lag model to investigate real house prices for various US states and districts. They show that their approach outperforms a simple autoregressive model using a medium-sized set of macroeconomic and financial regressors. Jarociński and Smets (2009) examine the boom-and-bust cycles in the US housing market before and after the financial crisis. Their results, derived from a Bayesian vector autoregressive model, suggest that the federal funds rate is a good indicator for house prices in 2000 and their drop in 2006. Miles (2008) argues that non-linear models increase the forecasting performance of housing markets, especially if they are subject to great volatility. Gupta, Miller, and Stephen (2012) find recursive models to provide a superior fit in forecasting the house price index in eight metropolitan areas in Southern California. Kouwenberg and Zwinkels (2014) utilize a smooth-transition model to analyze the deviation of US house prices from their fundamental values. They show that, between 1992 and 2005, house prices were mainly driven by positive autocorrelation. Plakandaras et al. (2015) develop a forecasting methodology which is based on a machine-learning approach and predict the downfall in the US real estate market (2006–2009) up to two years ahead.

Moving the focus away from the US market towards an international view, researchers applied vector autoregressive (VAR) models for examining influential determinants of house-price movements in a cross-country framework. Sutton (2002) observes that fluctuations of the stock market play a similar role in explaining changes in house prices as do gross national products and real short-term interest rates for Australia, Canada, Ireland, the Netherlands, the UK, and the US. Tsatsaronis and Zhu (2004) examine house-price dynamics in 17 industrialized countries and find that 50% of the price variation can be explained by inflationary shocks. One of their interpretations of this finding is that inflation directly affects mortgage financing costs and hence, housing demand, through the nominal interest rate. Algieri (2013) estimates a structural VAR for France, Germany, Italy, the Netherlands, Spain, the UK, and the US. Her results indicate that income, labor force, and the stock market positively influence house prices, while long-term interest rates and private residential investment have a negative effect.[2]

We contribute to this growing and significant literature by applying a dynamic model averaging and selection approach on a data set consisting of macroeconomic, monetary, and demographic fundamentals to predict house-price growth in the six largest countries of the Euro area (Belgium, France, Germany, Italy, the Netherlands, and Spain).[3] In particular, we are interested in identifying the main drivers of national house-price movements in a pseudo out-of-sample forecasting exercise. We expect a diverging link between housing markets and the rest of the economy across the countries in our data set because their mortgage markets are heterogeneously deregulated, with the highest degree of liberalization being observed for the Netherlands and Spain (see Calza, Monacelli, & Stracca, 2013; Cesa-Bianchi, Cespedes, & Rebucci, 2015; Iacoviello, 2005).[4]

The dynamic model averaging and selection approach was recently introduced into the housing literature by Bork and Møller (2015) to predict house-price growth for individual US federal states.[5] The approach has the advantage that it accounts for model and parameter uncertainty which are likely to be characteristic features of the data given recent crises. Therefore, the econometric model controls for fundamental shifts in the European economy, such as the end of the Cold War, the start of the EMU, and the recent financial crisis. Our results show that the approach leads to a substantial improvement in forecasting performance as compared to a simple autoregressive process. Moreover, we show that our model performs particularly well in uncertain times of the recent financial crisis, when accounting for various alternative forecasting models.

We organize the remainder of this paper as follows. In Section 2, we describe the econometric methodology. In Section 3, we characterize our data. In Section 4, we summarize the results. In Section 5, we conclude.

2. Econometric methodology

2.1. Dynamic model averaging

We begin explaining the econometric framework with a short presentation of the dynamic model averaging and selection approach.[6] For a more in-depth discussion, we refer the interested reader to the paper by Raftery et al. (2010).

We consider a time-varying coefficients model in state-space representation

[1] Early studies on predicting house prices try to improve forecast precision by testing for serial correlation in past returns (see Case & Shiller, 1989; Gau, 1985, among others) or including macroeconomic and monetary variables (see Case & Shiller, 1990; Linneman, 1986; Muellbauer & Murphy, 1997). Ghysels, Plazzi, Torous, and Valkanov (2012, chap 9) provide a detailed survey of the house-price forecasting literature over the past 30 years.

[2] Other researchers who analyze house prices in an international context are, among others, Terrones and Otrok (2004), Belke, Orth, and Setzer (2008), Beltratti and Morana (2010) and Bagliano and Morana (2012).

[3] The choice of these countries is primarily driven by the availability of data. For a similar choice of countries representing the Euro area, see Forni, Hallinc, Lippi, and Reichlin (2003).

[4] Mortgage markets in the Netherlands and Spain stand out due to their ability for mortgage equity withdrawal and the size of their secondary markets (see IMF, 2008). Both indicators have been found in the literature to influence house prices (see Ebner, 2013; Mian & Sufi, 2009).

[5] The methodology was introduced by Raftery, Kaſný, and Ettler (2010). For recent applications to other economic research, see Gupta, Hammoudeh, Kim, and Simo-Kengne (2014), Buncic and Moretto (2015) and Beckmann and Schüssler (2016), among others.

[6] The econometric model in this research has been estimated using the free R programming environment Team (2015), based on Matlab code for the core routines written by Koop and Korobilis (2012).