The Price-Turnover Relationship in European Housing Markets

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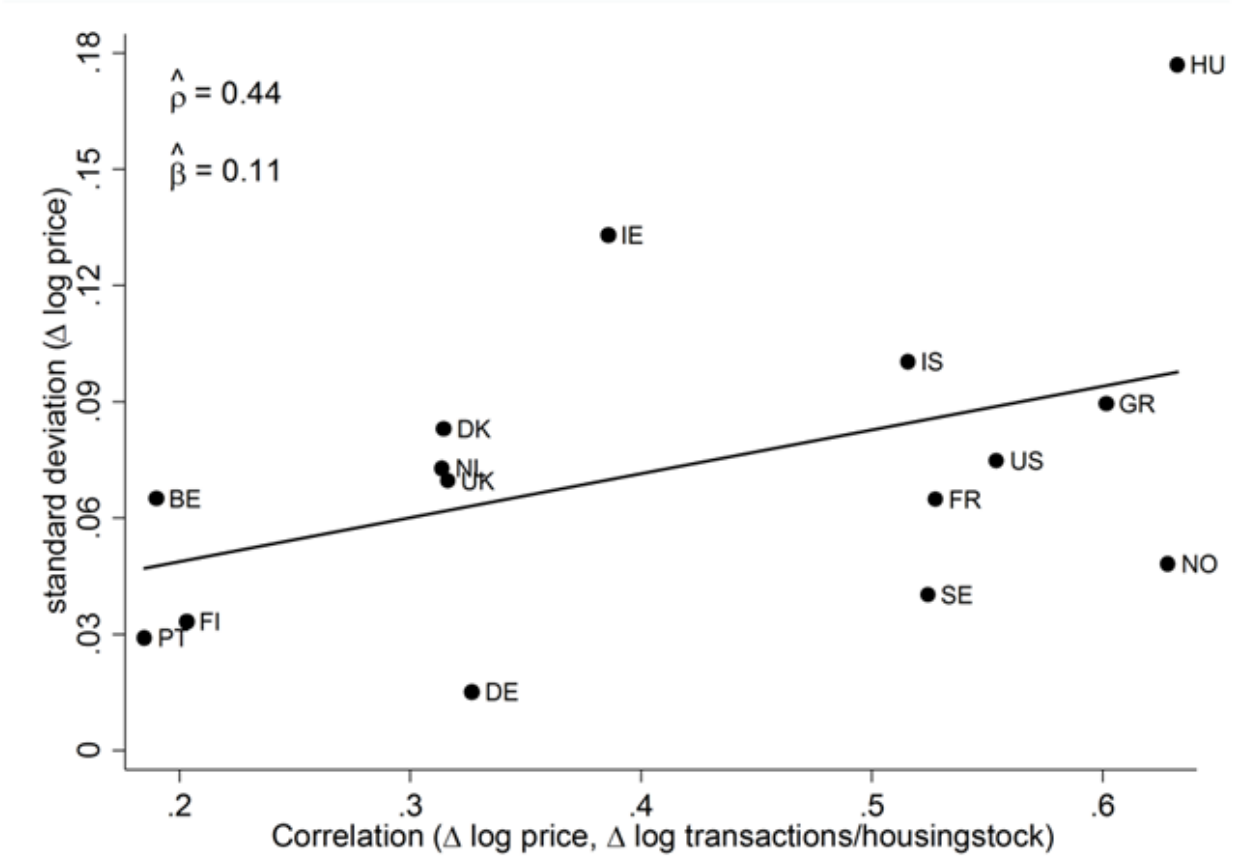
Outline

Introduction

- Price-turnover relation in European Housing Markets
- Connection with volatility



Theoretical explanations price-turnover relation

- Search markets
  - steady-state search model by Wheaton (1990): *mismatch between housing units and the number of households* due to building, migration and household formation
  - reflect *variations in liquidity and the quality of matching* between buyers and sellers (Krainer, 2001; Novay-Marx, 2009; Genesove and Han, 2011)
  - *asymmetric information between seller and buyer*: no comprehensive information about demand (Genesove and Han, 2011; Goetzman and Peng, 2006; Berkovec and Goodman,1996)
- Financing constraints (Stein, 1995; Ortalo-Magné and Rady, 1999, 2006)
- Behavioural considerations: nominal loss aversion (Genesove and Mayer, 2001; Engelhardt, 2003)

Studies on price dynamics within Europe

- OECD/IMF studies on price dynamics (Hilbers et al., 2001; André; Andrews, 2010; Andrews et al., 2011)
- Panel data (16 countries; 15 years) on prices and turnover
- Added value of research
  - Model price and turnover as 2 endogenous processes, allowed to be interdependent
  - Our dataset contains data on both the pre-crisis and crisis period
- Main results
  - Considerable degree of lagged feedback between prices and turnover
  - Strong momentum effects in prices and turnover
  - Considerable bias in autoregressive parameters if interdependency is not explicitly taken into account

Panel data

- House price indices and Number of transaction
- For 16 European countries from 1999–2013
- Sources: Eurostat and European Mortgage Federation
- Additional variables:
  - Amount of outstanding mortgage balance to GDP
  - Interest rates
  - Housing stock

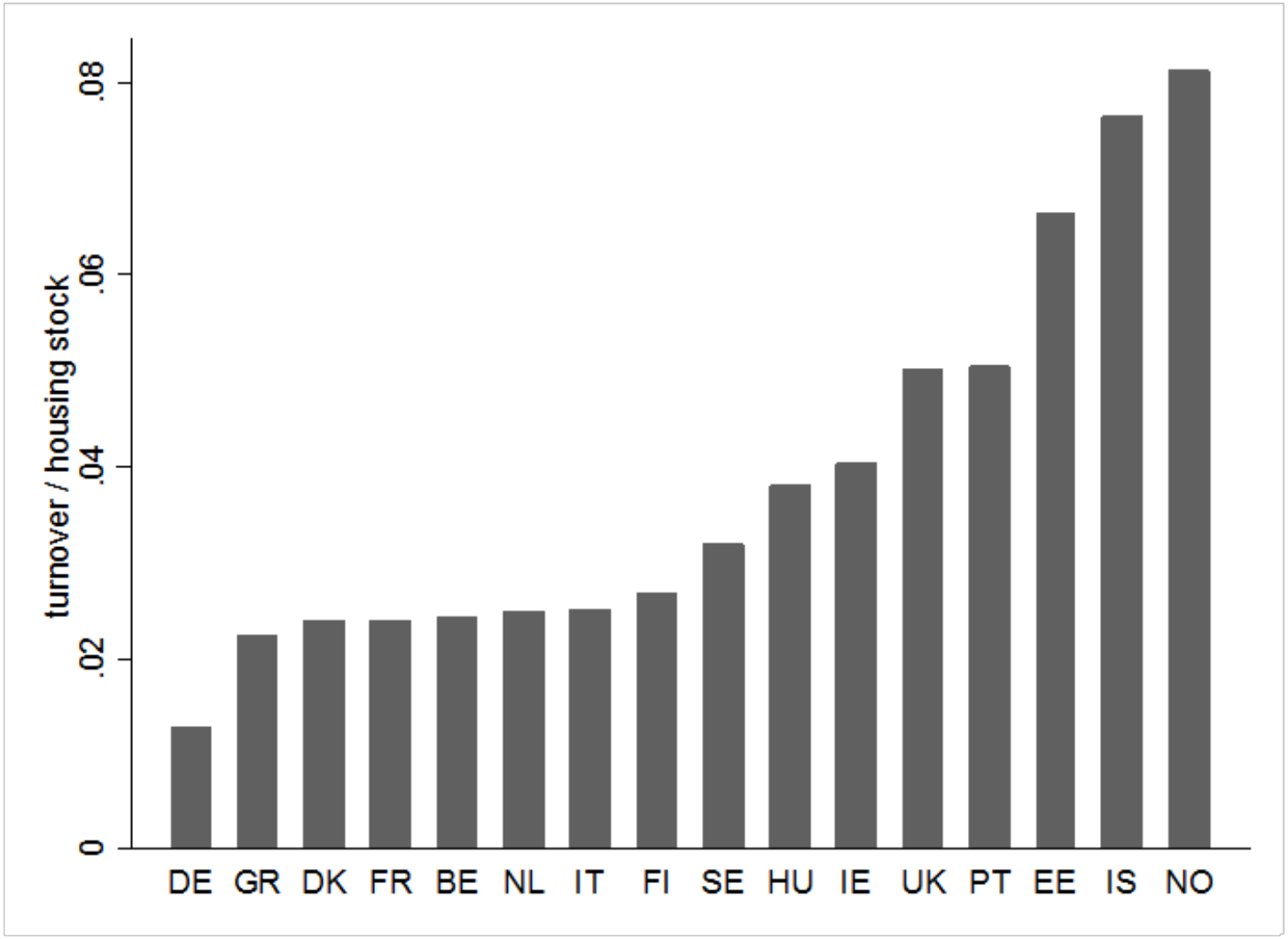
House prices, turnover, other variables (differences)

Variable	Mean	Std. Dev.	Min.	Max.
Δ log house prices (index)	0.048	0.096	-0.446	0.621
Δ log real house prices (index)	0.021	0.094	-0.448	0.526
Δ log number of transactions	-0.023	0.167	-0.925	0.418
Δ log housing stock	0.012	0.011	-0.004	0.088
Δ log turnover rate	-0.035	0.168	-0.949	0.409
Δ outstanding mortgage balance to GDP (%)	2.137	3.897	-13.6	32.8
Δ interest rate new mortgage loans (%)	-0.241	1.045	-4.58	2.53
Δ real interest rate	-0.086	1.029	-5.18	5.51
Δ log GDP	0.036	0.065	-0.372	0.206
Δ log real GDP	0.009	0.068	-0.492	0.192
Δ log population	0.0045	0.0060	-0.0066	0.0309
Δ share of population between age 18 and 30	-0.0013	0.0028	-0.0132	0.0051
Δ log HICP (level index)	0.026	0.020	-0.017	0.151
Δ log inflation	-0.009	0.780	-3.954	2.805
Sample period	1999-2013 (15 years)			
Number of countries	16			
Number of observations	224			

House prices and financial crisis: annual return

	1999–2013	Before crisis	Crisis	Until 2013
Belgium	0.066	-	-	-
Denmark	0.034	0.082	2007	-0.031
Estonia	0.094	0.270	2007	-0.053
Finland	0.044	0.047	2009	0.036
France	0.057	0.101	2007	-0.002
Germany	0.012	0.008	2006	0.016
Greece	0.027	0.084	2008	-0.075
Hungary	0.075	0.145	2008	-0.050
Iceland	0.081	0.134	2007	0.009
Ireland	0.019	0.116	2007	-0.110
Italy	0.029	0.056	2008	-0.020
Netherlands	0.024	0.064	2008	-0.048
Norway	0.071	0.091	2007	0.045
Portugal	0.015	0.025	2010	-0.020
Sweden	0.062	0.070	2011	0.011
UK	0.064	0.109	2007	0.003

Turnover 1999–2013: transactions / housing stock



Specification

- Specification in first differences
  (no co integration; differenced vars stationary)

$$\begin{pmatrix} \Delta \log p_{it} \\ \Delta \log tr_{it} \end{pmatrix} = \begin{pmatrix} \gamma_1 & \delta_1 \\ \gamma_2 & \delta_2 \end{pmatrix} \begin{pmatrix} \Delta \log p_{i,t-1} \\ \Delta \log tr_{i,t-1} \end{pmatrix} + \begin{pmatrix} \beta_1' \\ \beta_2' \end{pmatrix} \Delta x_{it} + \begin{pmatrix} \Delta \tau_{1,t} \\ \Delta \tau_{2,t} \end{pmatrix} + \begin{pmatrix} \varepsilon_{1,it} \\ \varepsilon_{2,it} \end{pmatrix}$$

- expect: $\gamma_1 > 0$, $\delta_1 > 0$, $\gamma_2 < 0$, and $\delta_2 > 0$
- τ time fixed effects
- Δx_{it} differenced macro economic variables
- Estimation Arellano-Bond (1991): instrument the lagged dependent variables with 2nd and 3rd lag in levels

Estimation results

	Full model (1)		Asymmetric model (3)		Joint Estimation (5)	
	$\Delta \log p_t$	$\Delta \log tr_t$	$\Delta \log p_t$	$\Delta \log tr_t$	$\Delta \log p_t$	$\Delta \log tr_t$
$\Delta \log p_{t-1}$	0.520***	-0.307	0.503***			
	(0.112)	(0.248)	(0.089)			
$\Delta \log p^{+}_{t-1}$				-0.345**		
				(0.150)		
$\Delta \log p^{-}_{t-1}$				-0.780**		
				(0.350)		
$\Delta \log p^{r}_{t-1}$					0.341***	-0.737***
					(0.088)	(0.129)
$\Delta \log tr_{t-1}$	0.340**	0.414*	0.307*	0.588**	0.240*	0.595*
	(0.150)	(0.223)	(0.165)	(0.284)	(0.136)	(0.151)
ΔMIR_t	-0.008**	-0.065***	-0.006	0.070***		
	(0.004)	(0.010)	(0.004)	(0.014)		
ΔMIR^{r}_t					-0.006	-0.044***
					(0.004)	(0.009)
$\Delta \log \text{GDP}_t$	0.215*	1.177***	0.219**	1.204***		
	(0.130)	(0.373)	(0.104)	(0.436)		
$\Delta \log \text{GDP}^{r}_t$					0.379***	1.135***
					(0.092)	(0.255)
$\Delta \text{MB/GDP}_t$	-0.001	-0.002				
	(0.009)	(0.003)				
Δ%POP 18–30$_t$	-1.817	1.946				
	-(1.378)	(-3.745)				
$\Delta \log \text{POP}_t$	1.113*	-1.910				
	(0.634)	(-1.215)				
$\Delta \log \text{HICP}_t$	0.188	-0.938				
	(0.449)	(-1.103)				
Δ Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	177	172	177	172	160	160
Centered R^2	0.546	0.524	0.581	0.455	-	-

Ignoring feedback between prices and turnover

- Granger causality
- Bias on coefficients of lagged dependent variables

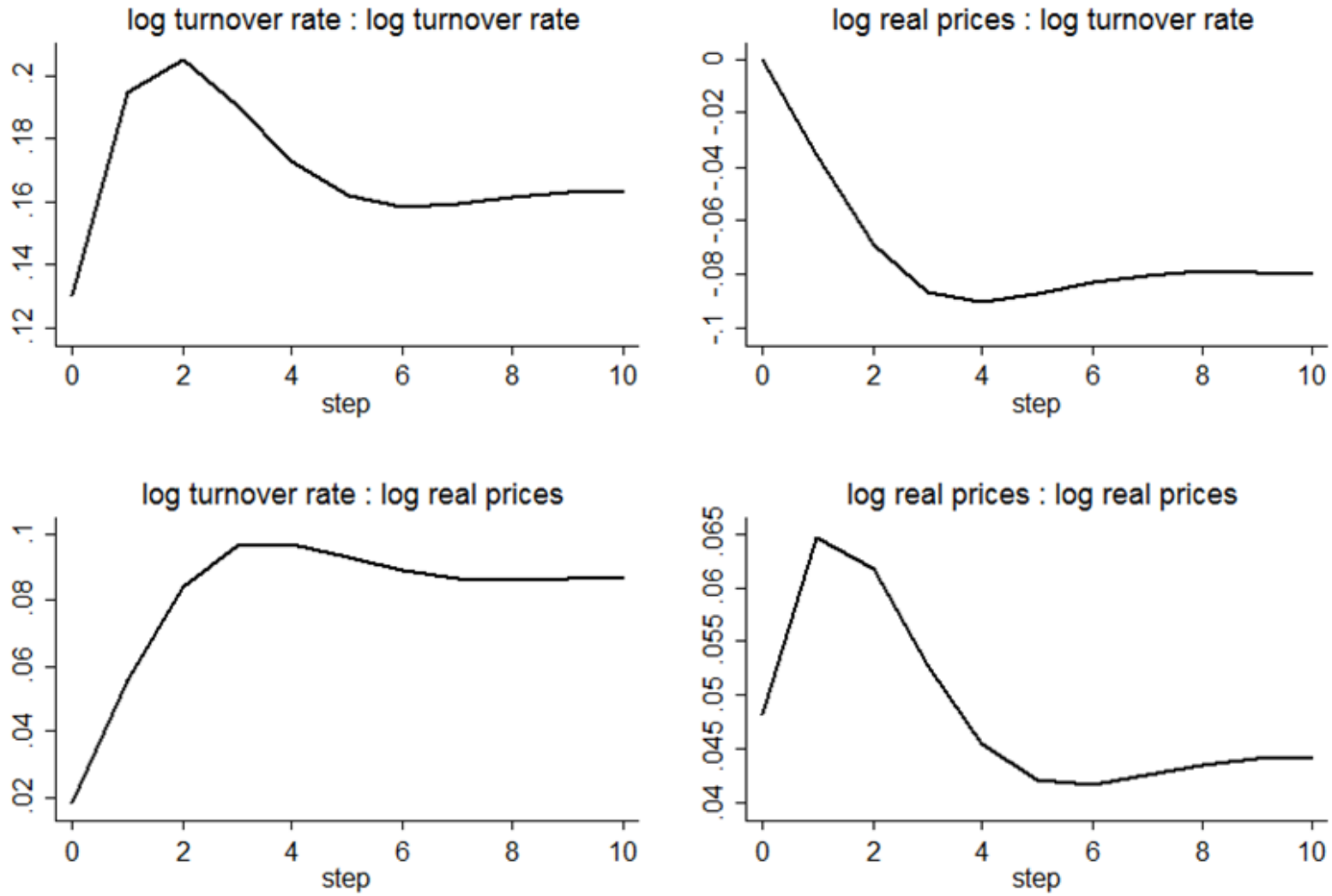
Panel A: Granger causality prices and turnover

X granger causes Y	Chi-sq.	p-value
$\log \Delta tr \rightarrow \log \Delta p^r$	3.22	0.073
$\log \Delta p^r \rightarrow \log \Delta tr$	6.309	0.012

Panel B: Bias (%) as a result of dynamic misspecification

	$\Delta \log p^r$	$\Delta \log tr$
$\Delta \log p^r_{t-1}$	14.4 %	-
$\Delta \log tr_{t-1}$	-	-42.7 %
ΔMIR_t	155.4 %	-21.1 %
$\Delta \log \text{GDP}^r_t$	21.4 %	3.2 %

Cumulative Impulse response functions



impulse variable: response variable

Decomposition of house price dynamics

- calculate the changes (shocks) in house prices, turnover, GDP, and real interest rates between 1999-2013
- use IRFs to calculate (accumulated) predicted responses to house prices
- unexplained variation includes general economic trends, EU-wide shock, but also (time-varying) country-specific shocks

	UK	France	Germany	EU
$\Delta \log p^r$	6.5 %	6.8 %	4.0 %	6.7 %
$\Delta \log tr$	13.4 %	7.5 %	25.3 %	12.4 %
ΔMIR^r	0.4 %	0.5 %	1.5 %	0.4 %
ΔGDP^r	3.6 %	0.6 %	2.4 %	1.2 %
Unexplained shocks	76.1 %	84.7 %	66.8 %	79.2 %

Concluding Remarks

- Prices and turnover in housing markets are intrinsically correlated
- Markets with the strongest feedback are the most volatile
- Strong feedback between price and turnover.
  - A 1% increase in (lagged) real prices decreases turnover by 0.74%.
  - A 1% increase in (lagged) turnover increases real prices by 0.24%.
- There is also quite some momentum in prices and turnover which can in part explain why they are so highly correlated.
  - The autoregressive coefficient on house prices is 0.34 and in the turnover equation it is 0.60.
- Ignoring feedback results in biased estimates of the autoregressive variables and fundamentals (GDP, interest rate)