SGH

MACROPRUDENTIAL POLICY AND REAL ESTATE BUBBLES

Summary of a dissertation

submitted in fulfillment of the requirements for the degree of **Doctor of Philosophy in Finance**, supervised by Professor **Leszek Balcerowicz**

Małgorzata Karaś, Master of Arts

Reasons for undertaking the research problem. The global financial crisis of 2007-2009 was a reminder of detrimental consequences of bursts of real estate bubbles. As research shows (e.g. Claessens, Kose, 2013), house price busts lead to roughly 15 times larger drops in financial indicators than other downturns (while equity busts more than 2.5 times as large), last longer (18 quarters, compared to about 9 quarters for other downturns and 10-12 quarters for equity busts), and more often lead to serious recessions. This is why it is extremely important to understand factors that lead to real estate bubbles' emergence and remedies that can be introduced, especially those in the areas of monetary, fiscal, and regulatory policies.

Some theoretical propositions (e.g. by Claudio Borio, 2003), as well as certain, though still scarce, empirical experience (e.g. dynamic provisions in Spain, Garcia-Herrero, de Lis, 2009, de Lis, Garcia-Herrero, 2010; certain regulations in China, Colombia, Korea, New Zealand, Lim et al, 2011) started to emerge, yet multiple issues remain open. They include (Goodhart, 2010, Hanson et al., 2011, Borio, 2011) i.a. (a) measurement of financial sector stability, (b) analysis of factors that lead to emergence of systemic risk, (c) analysis of relationships between financial sector stability and non-regulatory factors, such as monetary policy, (d) feasibility study of introducing regulations increasing financial sector stability, (e) analysis of changes in existing regulatory framework that could increase financial sector stability, (f) profit and loss analysis of potential new regulatory instruments, (g) creation of new macroeconomic models including the aspect of financial sector stability. This dissertation aims at filling these gaps – it deals with questions (a) – (d).

This work is particularly important for Poland. On one hand, if Poland decides to join the Eurozone, understanding of the relationship between lack of independent monetary policy and risks to financial stability will be of huge value. This is why Chapter 2 of my dissertation in particular may be of interest for Polish monetary authorities. On the other hand, a quantitative measure of systemic importance of financial institutions, with a detailed explanation of how it may be applied using the already existing data, may be useful in the daily conduct of financial supervision in our country regardless of monetary policy regime (especially in the light of CRD IV, recently introduced by the EU).

Objective and hypotheses. The purpose of the dissertation is solving a research problem defined as decreasing the probability of emerging and severity of real estate bubbles using macroprudential policy. This purpose is achieved via verifying five hypotheses (in chapters 1-4) and developing a method of measurement of systemic importance of financial institutions which can be applied to operationalize one of the commonly proposed macroprudential tools, systemically important institutions buffer (in chapter 4).

The following hypotheses – which flow naturally from each other – are verified: (1) existence of a certain combination of non-monetary policies is necessary, but not sufficient, for a real estate bubble's emergence and growth; (2a) loose monetary policy is a necessary, but not sufficient factor driving a real estate bubble regardless of monetary policy regime; (2b) non-monetary tools need to supplement monetary policy in leaning against real estate bubbles; (3) macroprudential policy can be sufficient to prevent real estate bubbles, even in case of loose monetary policy and bubble-prone non-monetary policies; (4) systemic importance of a financial institution can be quantified using data on interbank assets, liabilities, and each institutions' inherent risk level.

The research is focused on capitalist economies, such as the United States, Western Europe, Central and Eastern Europe. My conclusions about the nature of real estate bubbles can generally be applied regardless of time period, yet most data presented and analyzed in this dissertation refers to the last 20 years.

Research methods. The dissertation is interdisciplinary and draws upon methodology of finance, economics, law, mathematics, and computer science. Specifically, I (a) thoroughly analyzed existing theories and literature, (b) conducted case studies and comparative analyses of real estate bubbles in the United States, Spain, and the United Kingdom in the course of the previous decade, and referenced them whenever applicable, (c) analyzed legal regulations, (d) analyzed (as well as modeled and triangulated) statistical data, (e) applied mathematical methods to create a metric (of systemic importance), (f) implemented it in a computer application, written in Python, (g) applied the application to analyze data.

Results. Regarding the first hypothesis, both theory and empirical experience seem to suggest a crucial role of certain combinations of policies of the government in emergence of real estate bubbles. Out of non-policy factors, (a) private information and errors of forecasts do not offer plausible explanations for sudden waves of optimism fueling asset price bubbles emergence, (b) factors related to demography, immigration, and culture do not explain rise of prices to the level significantly above the fundamentals, (c) behavioral theory of manias and panics does not explain different sizes of bubbles observed, and (d) economic boom does not explain why the increase in credit would be observed specifically in a given market, such as real estate, as opposed to being included in inflation or manifesting itself somewhere else. Therefore, certain government policies are necessary for a real estate bubble to emerge. Out of non-monetary factors, the most important one seems to be subsidization of real estate and mortgage credit

(incl. via tax regulation, promoting homeownership). A bubble seems to be likely to grow especially huge if such subsidization is supplemented by inappropriate regulation of banks and institutions that invest or facilitate investing on the real estate market. Quantification of exact impact of each of these factors on the size of real estate bubbles would be an interesting area of further research.

Regarding the hypothesis 2a, loose monetary policy seems to be a necessary factor driving real estate bubbles. For countries within a monetary union, or another fixed exchange rate regime, single monetary policy may be too loose for an economy which is imperfectly synchronized with the business cycle or fundamentals of the union's core economy/economies. For countries with independent monetary policy, central banks that focus purely on inflation and ignore e.g. positive supply side shocks may set interest rates at too low levels. In either case, loose monetary policy is transmitted to a credit boom and asset price bubbles, most importantly because in an environment with low short-term interest rates, credit tends to be cheap, which drives demand. However, monetary policy is not sufficient for a real estate bubble: only if cheap credit is supplemented by non-monetary policies, which make the cheap money concentrate in the real estate sector, perfect conditions for real estate bubbles emerge. If mortgage credit were not cheap, mere subsidization of real estate would not suffice for a significantly-sized bubble to emerge because people would not be able to afford purchasing homes at scale. Empirically, these mechanisms were clearly visible in the Unites States and Spain in early 2000s. In both countries,

monetary policy was too loose in that critical period, which led to an emergence of bubbles on their real estate markets.

Regarding the hypothesis 2b, even though monetary policy very strongly influences real estate bubbles, depending only on it as a tool to lean against bubbles would not be the best solution. Reasons for that include: (a) difficulty with assessing a right interest rates level that would allow the bubble not to emerge, (b) the fact that long-term interest rates do not correlate perfectly with a policy rate, (c) risk of overshooting if the interest rates were to be increased too significantly, (d) difficulty with identifying bubbles early enough to respond effectively, finally, (e) impact that using monetary policy to lean against bubbles could potentially have on central banks' credibility. Still, monetary authorities should reserve the right to use monetary policy whenever multiple indicators suggest a strong boom and an emergence of an asset price bubble of significant size.

Regarding the hypothesis 3, the general empirical evidence suggests that macroprudential tools can be helpful in leaning against real estate bubbles, although it is still too early to (a) conclude if macroprudential policy in general can – even in case of loose monetary policy and bubble-prone non-monetary policies – be sufficient to prevent real estate bubbles, (b) claim with certainty which of instruments are likely to be most effective given most of them have not really been tested in case of a serious bust. One definite advantage of macroprudential solutions, especially these in a form of "enhanced" capital regulations, is the relative ease of implementation.

Regarding the hypothesis 4, a few methods had been developed aiming to tackle measurement of systemic importance, none of which was based specifically on interbank assets and liabilities. I proved that it can be done by introducing and implementing a method of quantifying systemic importance based on such data, and demonstrated its usage on partially simulated data for the Polish economy. I showed how resulting levels of interconnectedness, systemic importance, and systemic risk differ based on different assumptions. I presented how systemic risk differs (or, rather, does not differ) in concentrated and non-concentrated financial systems, empirically demonstrated differences between interconnectedness ranking and systemic importance ranking, showed how interconnectedness and inherent risk level interplay in systemic importance (for example, in case of PKOBP and BPS), and demonstrated the influence of transactions with foreign banks on systemic importance of particular institutions in the home country. I also provided details on how this analysis can be performed using the tool I developed and actual, confidential data that the Polish Financial Supervision Authority and the National Bank of Poland possess.

Structure. Chapters in the dissertation are dedicated to the respective hypotheses.

The purpose of Chapter 1 is to verify the first hypothesis; therefore, it analyzes the root causes of real estate bubbles. At first, I define financial crises, financial stability, systemic risk, asset price bubbles, credit booms, and real estate bubbles. I then introduce case studies of real estate bubbles in the United States, Spain, and the United Kingdom in the course of the previous decade. In the

following sections, I analyze factors that lead to asset price bubbles and credit booms' emergence and growth – considering both theoretical models and empirical examples from the US, Spain, and the UK. I differentiate clearly between markets-driven and policy-driven causes for bubbles and booms, showing how most factors can be, in fact, traced down to policies, even when they seem to be markets- (or human nature-) generated on the surface. I conclude by suggesting the key policy factors that are necessary for real estate bubbles.

The purpose of Chapter 2 is to verify the hypotheses 2a and 2b; therefore, it analyzes the influence of (expansionary) monetary policy on real estate bubbles. At first, I define loose monetary policy, using Taylor rule, a widely accepted benchmark. I then investigate the importance of monetary policy for emergence of real estate bubbles in both countries with independent monetary policy regimes and monetary unions' member states. This analysis is conducted from the theoretical standpoint and then supplemented with extensive case studies and comparative analysis of the Unites States (illustration for a country with an independent monetary policy regime) and Spain (illustration for a monetary union member). I then consider whether, in the light of this empirical material and views in the literature, tightening monetary policy can be a tool of leaning against real estate bubbles.

The purpose of Chapter 3, which is mostly literature-based, is to verify hypothesis 3 and provide indication of whether macroprudential policy can be sufficient to prevent real estate bubbles. At first, I introduce the definitions of macroprudential policy and systemic risk, as well as discuss in detail objectives

of the former. I then provide a broad overview of macroprudential instruments –
their different classifications, details on most frequently discussed tools, as well
as (scarce) results of their usage in certain countries.

The purpose of Chapter 4 is to verify hypothesis 4, propose such
quantification of systemic importance measure that would make it possible to
operationalize one of the commonly proposed macroprudential tools (systemically
important institutions buffer), and to apply it for Poland. At first, I present how
the European Union's CRD IV directive defines systemically-important
institutions for the purpose of creating systemically important institutions buffers.
I then provide an overview of research on measurement of systemic importance
and systemic risk, as well as propose a method to calculate it based on interbank
assets, liabilities, and each institutions' inherent risk level. Afterwards, I
introduce Risk Counter, a computer program I built, that calculates systemic risk,
interconnectedness, and systemic importance of institutions based on the method
suggested. This section is followed by an application of the method for the Polish
financial system, based on partially simulated data. Finally, I suggest how
regulatory institutions in Poland can make best use of the method and program
to designate institutions which would need to implement systemically important
institutions buffers.

The dissertation is then concluded.

The final parts of the work include appendices I and II (description and user manual of Risk Counter application, as well as its source code), list of literature, sources of data, table of figures and table of tables.