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A Formula of Property Rights, Incentives and Market Mechanisms

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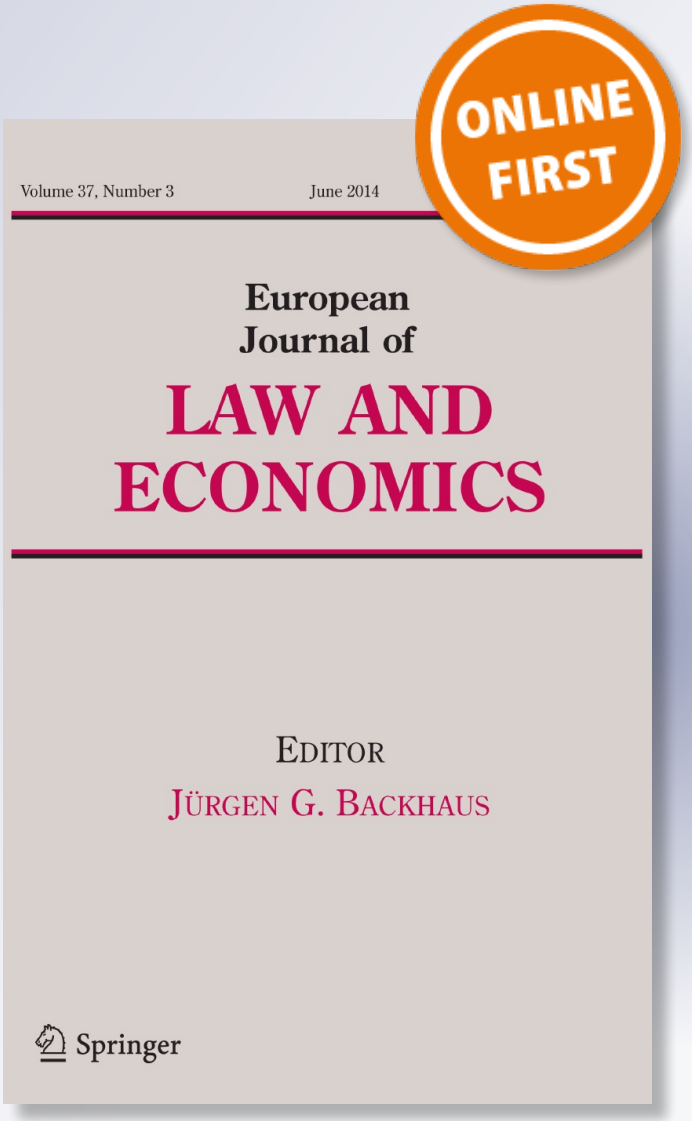

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On security of collateral in Danish mortgage finance: a formula of property rights, incentives and market mechanisms

Karin Haldrup

Abstract Specialized mortgage intermediaries in Denmark have for over 200 years provided owners and buyers of real property wide access to credit. The present paper sets out to explore the safeguards that nurtured development of a robust, market based financing system and a deep mortgage market. Observations are made on the nature of collateral performance in respect to property rights, mortgage law and market development in search of general features of required institutional arrangements. The robustness of the Danish mortgage finance system is largely accredited to the securitization model based on the balance principle that assigns risks and responsibility to market players in a self-disciplinary manner and protected the mortgage banks against cash flow mismatches even during deep crisis, as history attests. It is shown how property registers and effective enforcement have created transparent property rights and practically reduced legal risks of mortgaging to zero. Standardization and scale of economics supported collateral efficiency, as measured in terms of simplicity, transparency, rapidity and costs. The Danish mortgage finance system illustrates the critical role of government in insuring the quality and enforceability of mortgage collateral, and reducing uncertainty for market players throughout the entire process. The paper suggests that sound incentive structures of the securitization model, strong commitment mechanisms and the market mechanisms constituted a complex formula of safeguards that—rather than specific capital coverage requirements—created the preconditions required for a well-functioning mortgage market.

JEL Classification G01 · G14 · G15 · G21 · K10 · K11 · K42 · R30

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1 Introduction

The Danish mortgage finance system is characterized by its long development path that represents a rare case among financial institutions of an over 200 years' history, during which it has provided mortgage credit to a wide section of the Danish society on market conditions (Andersen 2011; Møller and Nielsen 1997). The current mortgage law traces its roots back to the first mortgage credit act of 1850, probably the oldest in the world. Early mortgage markets were developed through mortgage credit associations on the basis of property rights secured through a century old legal tradition of public announcements and land book records, now transformed into a fully digital legal property registry.

In the following collateral safeguards are analyzed in view of both stable and dynamic features in search of the roots of collateral performance. The composite nature of collateral security is mapped out, and it is discussed how a low risk environment was built. A mortgage deed is a money-creating debt contract secured by a registered interest in the concerned property, but security of collateral is not a narrow legal issue, as elaborated below.

The robustness of the Danish mortgage finance system is largely accredited to the securitization model based on the balance principle, a principle that continues to be vital to the system. Through the balance principle a number of risks are eliminated, in combination with strong property rights. The qualities of the securitization model are highlighted in a number of comparative studies (Wyman 2003; Suarez and Vassallo 2004; Nadler 2005). A study by the International Monetary Fund stated that the Danish mortgage system is widely recognized as one of the most sophisticated housing finance systems in the world (IMF 2006). The mortgage system remains highly competitive in present day capital markets, as evidenced by the size of the mortgage bond market relative to county size (Chong 2010). By April 2014 international investors held 45 % of all Danish bonds.[1]

The paper takes its point of departure in the legal and specific foundation of credit arrangements, while collateral of mortgage intermediaries is mentioned briefly, because the security backing mortgage deeds determines the quality of collateral pools, a critical issue in current negotiations on future international financial regulations, Basel III and CRD IV.[2]

Mortgaging in Denmark is governed by the 'Mortgage-Credit loans and Mortgage-Credit Bonds etc. Act' (in brief the Mortgage Credit Act,[3] MCA). Mortgage credit issued by the specialized mortgage banks (originally mortgage credit associations) are only issued against a registered interest on the real estate in the legal property register pursuant to the MCA §2. The mortgage contract constitutes the document of registration (mortgage deed), and functions as well as

[1] VP Securities, 2014, VP.indikator Beholdninger, Link file http://www.plan.aau.dk/Users/knh/Downloads/Beholdning%20(1).pdf

[2] BIS, Bank for International Settlements, www.bis.org, Basel Committee on Banking Supervision. Basel III, CRD IV, see opinions at http://www.realkreditraadet.dk/Current_issues/New_international_rules_(Basel_III_-_CRD_IV).aspx.

[3] The first mortgage credit act of 1850 to current versions, Consolidating Act no. 1261 of 15 November 2010, http://www.finanstilsynet.dk/en/Regler-og-praksis/Translated-regulations/Acts.aspx.

the debtor's promissory note (Spang-Hanssen 2009). In this manner a registered mortgage deed represents both a (personal) contract between the lender and the borrower, and an (impersonal) property interest.

Collateral performance will be explored with reference to principles and practices of mortgaging, property rights, and to the related institutional arrangements:

In Sect. 2 the basic ideas and historic roots of the mortgage finance system are outlined with a focus on the securitization principle, risk profile, organization and the mortgage market in Denmark.

In Sect. 3 observations are made on the performance of the Danish mortgage system during previous chocks and formative market events like the economic crisis in the 1930's, urbanization, integration into the European community and the recent global financial crisis.

The discussion in Sect. 4 focuses on different dimensions of collateral security and the robustness of the mortgage finance system achieved through its particular blend of regulation, organization and securitization technique within a market paradigm.

Conclusions are summarized in Sect. 5 on the incentive structures and on the safeguards that created the preconditions for high collateral performance.

2 A brief introduction to the Danish mortgage finance system

2.1 Mortgage credit associations and their successors, mortgage banks

The long history of the finance system permits analysis of questions on mortgage credit in context during different economic development phases (Andersen 2011; Møller and Nielsen 1997).

The first Danish mortgage credit association dates back to 1797, when an association of lenders was established in order to raise capital for reconstruction after a devastating fire in Copenhagen, but remained the only one until the first mortgage credit act of 1850 opened for establishing mortgage credit associations across the country. Pursuant to the first mortgage credit act of 1850 mortgage credit associations were constituted as specialized cooperative enterprises acting as mono-line market intermediaries owned by the borrowers/members. The mortgage credit associations were founded on private initiative with few incentives provided by the state but relied on effective systems of clear, secure and transparent property rights (Haldrup 2011).

Mortgage credit associations served as non-profit intermediaries predating private banking in Denmark. Since members (owners) carried joint and several responsibility for outstanding debt against the mortgage association—in addition to the collateral backing their individual mortgages—they were in nature conservative. In this manner the solidarity coverage combined with effective property rights helped build trust among investors before the existence of a mature financial infrastructure in the country.

The mortgage credit associations soon became the dominant mortgage finance intermediaries in Denmark and have stayed so, today in the form of their modern successors, the Danish mortgage banks. In 1989 the ownership structure of mortgage credit associations were transformed into limited companies in order to comply with EU internal market standards (Andersen 2011). Hereby the solidarity guarantees were phased out and replaced by other forms of capital coverage. Danish mortgage banks are still operating as independent, strictly regulated mono-line businesses, but their organizational structures are getting closer intertwined with commercial banks.

Other aspects of the original set up have been retained, in particular the balance principle of securitization, non-callability by the lender, the principle of securing the collateral through limited loan to value ratios (LTVs),[4] and legal provisions on cautious valuation principles. Registered mortgage interests were (are) supported by swift and effective debt enforcement with full legal recourse. Danish mortgage legislation has from the start been designed to protect investors' interest, and hereby as well the borrowers', but recently macro-economic goals were added (Østrup 2011).

Mortgage banks in Denmark finance long term credit of existing property, not intermediate credit and construction projects. In the fully developed mortgage markets of the twentieth and twenty-first centuries, junior and short term credit is obtained through composite loan arrangements including bank guarantees.

2.2 The balance principle of securitization of Danish mortgage finance

The balance principle of securitization forms the core of the Danish mortgage finance system. Loan capital is raised in the capital market through issue of equivalent amounts of standardized covered bonds ("realkreditobligationer") in large series with a nominal value, currency, duration and interest rate identical to the loan, see Fig. 1. The bonds are traded on the stock exchange, so that the yield to maturity is market determined and transparent. The one-to-one relationship between loan and bonds, 'match funding', and the funding mechanism keeps cash flows simple and protects the financial system against mismatches (IMF 2006). Standardization at all levels is key to the definition of Danish mortgage bonds as mass securities.

Each series of mortgage credit loans and covered bonds were/are secured by associated "collateral pools" of the underlying properties and by fenced-off reserve funds of a minimum size determined by law. A central trust enhancing feature in the early mortgage credit associations were members' solidarity coverage, now replaced by other types of capital coverage in compliance with EU internal market standards. Mortgage credit associations[5] kept the credit on their balance until maturity, which induced a healthy market discipline.

[4] Translations of financial regulations, http://www.finanstilsynet.dk/en/Regler-og-praksis/Translated-regulations/Acts.aspx.

[5] Since 1989 replaced by specialized mortgage banks, in this paper 'Mortgage Credit Institutes' as a term used for both.

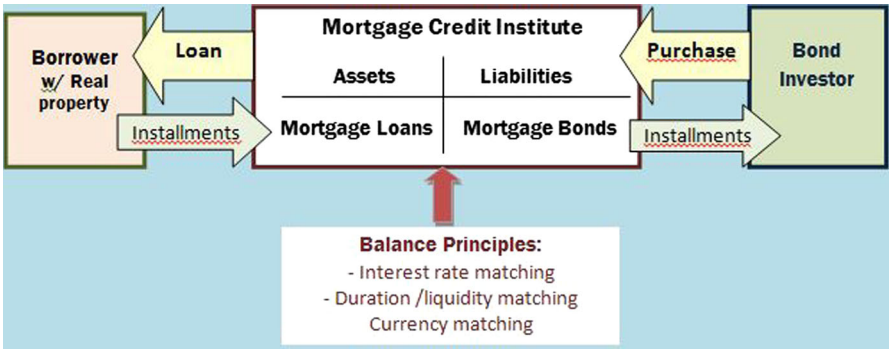

Fig. 1 The balance principle of securitization (*Source* IMF 2006, p. 5 adapted by Haldrup 2011)

The securitization process has several advantages for borrowers such as simplicity, transparency and predictability. Mortgage credit issued by Danish mortgage banks is non-callable by the lender, but callable by the borrower. Thanks to the balance principle borrowers have access to early redemption without penalty, either by early repayment of outstanding debt (at par), or by buying back the underlying mortgage bonds at market value (Svenstrup and Willemann 2006). Access to early redemption has given borrowers more competitive credit and higher mobility. Borrowers are not locked in, when interest rates change and property prices fall, a counter-cyclical feature. Investors on their side may retreat from their engagements by selling their bonds. A functioning market is thus vital to all parties in the credit chain.

Benefits for borrowers and investors arise from standardization of loans/bonds and mass-securitization, that reduce transaction costs. Borrows and investors are protected against predatory lending through standard conditions. Economy of scale is achieved in accordance with the concept of Danish covered bonds being "Standardized mass debt instruments" (MCA §19). Volume is determining for reducing operational costs and profitability and thereby for credit affordability. Volume is also a quality seen from an investor perspective, because larger series of bonds are generally more liquid and attractive for investors (Boyce 2009). More attractive bonds achieve higher selling rates to the benefit of borrowers, as well. It follows that the mortgage finance system depends on existence of high volume demand for matching long term financial assets, typically by institutional investors such as pension and insurance funds.

Danish mortgage finance institutes cover their operational costs and build own capital by levying an administrative fee paid by the borrower with each installment, traditionally in the order of 0.5 % of the outstanding principal of the loan, but on the increase due to latest international standards incurring higher capital coverage costs. The charge covers administration costs and building of reserves. Notably, mortgage credit associations were in principle non-profit organizations operating on market conditions, and still the funding mechanism limits the profit margin of mortgage intermediaries.

Operational losses have generally been relatively low, albeit rising during times of crisis. In a mature market the low administrative fees can be accredited to standardization and a considerable economy of scale associated with a competitive but consolidated business structure. As a result Danish borrowers have access to real credit at close to capital market costs. Moreover, transaction costs are relatively low in Denmark by European comparison (Wyman 2003).

A severe threat to the classical balance principle—considered the robust fundament of the Danish mortgage finance system—is constituted by new international standards on capital coverage that introduce uncertainty in funding costs.[6] The first steps of adopting international regulations were taken through the Mortgage Credit Act of 2007[7] introducing the principles of Special Coverage Credit and Bonds (SDO, SDRO[8]). Hereby two levels of LTV are to be respected:

1. Maximum LTV of each credit contract at time of issue (specific), and
2. A continuous and aggregate maximum LTV for all outstanding credit by collateral pool observed periodically based on market statistics.

If the aggregate level LTV within the collateral pool is exceeded, additional security has to be provided by the mortgage bank. The new types of mortgage credit funded by SDOs and SDROs are less transparent and introduce new uncertainty in funding costs within the mortgage banks, previously unknown to the classical securitization model. New financial regulations (Basel III) favour government bonds, a matter of serious concern for the Danish government[9] (IMF 2013, Point 32, p. 12), since they fail to recognize the low-risk nature of Danish mortgage bonds and their dominant role in the Danish capital market (market value Dec. 2013: 2.440 billion dkk (covered bonds), 483 billion dkk (government bonds), Source: Statistics Denmark). There are simply not enough government bonds to meet the demand by institutional investors, who depend on mortgage bonds as liquid and safe securities.

2.3 Risk profile of the Danish mortgage finance system

The risk profile of securitization built on the balance principle is characterized by its in-built elimination of many risk factors. The currency exchange rate risk is eliminated, and market participants (borrowers and investors in bonds) take over the interest rate risks. The cash flow is kept simple, and liquidity risks are minimized by the match between payment of installments and the payments to the holders of the bonds (pass-through securities). Stringent legal provisions on maximum LTVs and appraisal rules serve as preventive measures against losses on outstanding debt in

[6] The Association of Danish Mortgage Banks web resources at http://www.realkreditraadet.dk/Current_issues/New_international_rules_(Basel_III_-_CRD_IV).aspx.

[7] Spang-Hanssen 2009, p. 4: Law no. 577 of 6 June 2007 allows foreign credit institutions/banks to issue "covered bonds" similar to "realkredit-obligationer" as implementation of European Union Directive 2006/48/EC, June 14, 2006.

[8] 'Særligt Dækkende Obligation', SDO (Special coverage bond), and 'Særligt Dækkende Realkredit Obligation', SDRO, (Special coverage mortgage bond).

[9] IMF Country Report No. 13/22, January 2013, http://www.imf.org/external/pubs/ft/scr/2013/cr1322.pdf.

case of default. Additional layers of security for investors are provided by the MCI originally through solidarity coverage, reserve funds, own capital and currently through capital coverage requirements under strict financial supervision as other financial institutions.[10]

Holding mortgages to maturity combined with dependency on investors' trust creates a sound incentive structure on the side of lenders.

Investors in bonds have a claim against the mortgage credit institute that carries the credit risk, since it holds the mortgage credit and bonds on its balance sheets until maturity. On their part borrowers are kept responsible for outstanding debt vis-à-vis the lenders through a swift foreclosure process, and access to full legal recourse. In this manner the securitization model assigns risks and responsibility to market players inducing a healthy incentive structure.

The overall risk of investors of default by the mortgage credit institution itself is remote. Investors in mortgage bonds (now) have a preferential status in case of bankruptcy of the mortgage credit institute, but with a possible exception of one minor case in 1857 no investors have suffered losses due to bankruptcy of Danish mortgage credit institutes during the system's over 200 years' history. However, the financial system underwent difficult periods especially in the 1930's (Haldrup 2011).

Hereby the securitization model peels off layers of risks from the mortgage credit institute, while also protecting the interests of the market participants. Lower risks translate into lower interest rates and means lower costs of credit, thus higher affordability, *ceteris paribus*. As a result the main risk held by the Danish mortgage credit institute is the credit risk: if the borrower will (be able to) honour the debt, and in case of default, if the collateral value is adequate to cover outstanding mortgage debt, a matter depending on both Loan-To-Value ratios (LTV) and the property market. As a result the naked relation between mortgage credit and collateral security backing the credit stands out as a key issue in Danish mortgage finance.

Historically underwriting was based on collateral value ('bricks only') rather than the profile of the loan applicant (except for exclusion of bad payers). In case of a property sale the mortgage is callable by the lender pursuant to standard clauses of mortgage credit contracts. In practice mortgages can be transferred to the buyer subject to approval by the mortgage institute,[11] a feature that reduces transaction costs. This continued and widespread practice suggests an impersonal nature of mortgages within certain limits, e.g., that the buyer is not registered as a bad-payer.

As from 1992 formal credit conditions have been tightened to include the creditworthiness of applicants (Andersen 2011, p. 179). This shift towards underwriting the personal debt service capacity now explicitly defines the security backing a loan as both the income stream of the applicant and the value of the property. In this manner the case of mortgage deeds underlines their combined nature as credit contracts and a (dormant) property interest (Mortensen 2010, p. 19), hereby

[10] Finanstilsynet, http://www.finanstilsynet.dk/en/Regler-og-praksis.aspx.

[11] Often provided subject to a reduction in the outstanding principal, 'ejerskifteafdrag', (von Eyben 2002).

elegantly bridging the distinction between personal and impersonal rights discussed by Arruñada (2012).

2.4 Recent mortgage market development

Loans and bonds were fairly standardized during the first century of Danish mortgage credit system, but over time the products offered have diversified. Since 1996 new types of interest re-set mortgage credit (Adjustable Rate Mortgages (ARMs)) have been introduced and gained a significant market share.

An amendment of the Mortgage Credit Act of 2003 opened for access to Interest Only Mortgages (IOMs) for a maximum of 10 years, a new credit product swiftly embraced by the market (Fig. 2). This has—combined with unprecedented low interest rates—given Danish borrowers access to very cheap credit within the lending limits of the mortgage credit institutions (Beltoft 2011). General optimism in the property market fueled borrowing and lending at that time, so in hindsight the IOMs are seen to have contributed to increased equity withdrawal and enhanced a property market bobble that bust in 2008 (Scanlon et al. 2008), see Fig. 3.

Although exposed to extreme stress Danish mortgage banks continued to issue loans and bonds during the financial crisis in 2008–2009, even in September 2008, when the rest of European mortgage markets were at a standstill. The balance principle protected the mortgage institutes against cash flow mismatches, and investors continued acquiring Danish mortgage bonds, that were regarded as secure and very liquid assets in a turbulent time (Jensen 2010).

The government did intervene in the market with guarantee options offered to financial institutions (at their cost), but did not subsidize the mortgage market (Rohde 2011). By lifting restrictions on the portfolios of institutional investors the pressure on the bond market was eased, so that fire sales of mortgage bonds were avoided (Jensen 2010), when bonds outperformed shares.

The property markets reacted swiftly, see Fig. 3, and property prices have by 2012 in average fallen back to the pre-bobble level in 2005. Price development varied depending on sector, location and other factors, thus reinforcing market segmentation. All owners of property have shouldered some depreciation of property assets. Many new owners, who entered the real estate market during the boom, became technically insolvent.

Foreclosure rates rose in 2008, peaked in 2009 and continued at a higher than usual level. Mortgage banks have suffered higher than usual losses in 2009–2011.[12] Losses peaked in 2009, but were still in average a few promille of outstanding credit following a long period with very low losses.

The SDO–coverage rules in force since 2007 have aggravated the difficulties faced by mortgage banks by increasing funding costs in the mortgage sector at the worst possible time (Knøsgaard 2011). In response loan policies were tightened, hereby illustrating how questions of collateral security affect the market. In any case, it is evident that the value dimension of collateral security is taking the center

[12] Annual reports: Nykredit A/S, Totalkredit A/S, BRF Kredit A/S, Realkredit Danmark A/S, etc. at company websites.

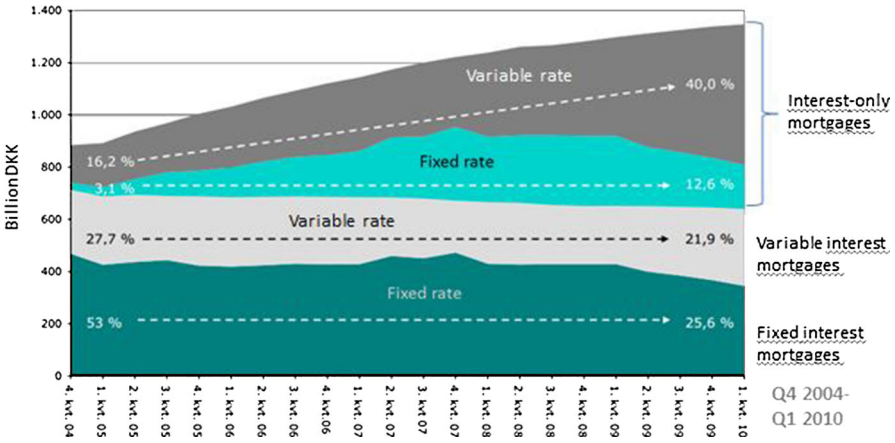

Fig. 2 Mortgage Credit Institutes' domestic lending: outstanding mortgage debt for housing in Denmark 2004–2010, all maturities by type of amortization, DKK Billions, *Source*: Realkreditforeningen, Newsletter 20 May 2010. http://www.realkreditforeningen.dk/nyheder/Pages/Nyt/2010/40-pct-harafdragsfrit-laan-med-variabel-rente.aspx

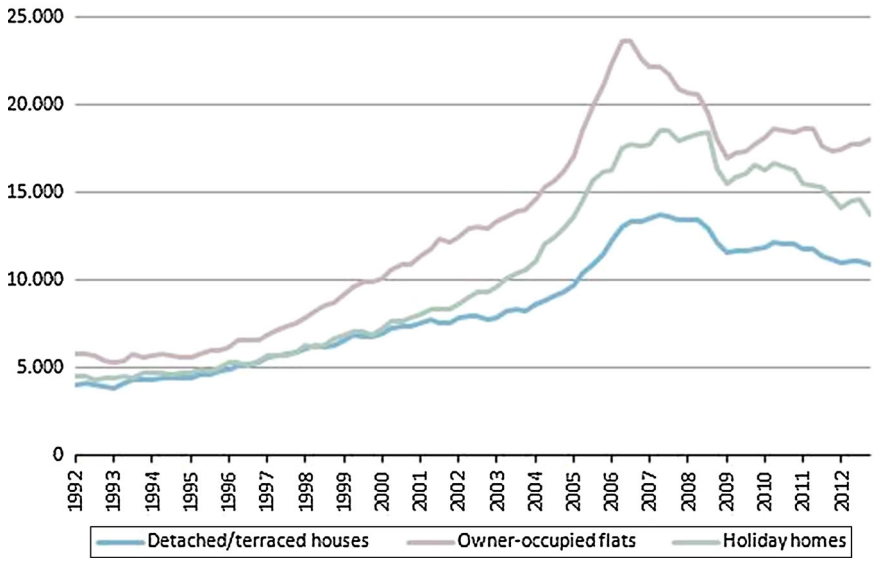

Fig. 3 Average square meter prices (DKK) of owner occupied homes, Denmark 1992–2012, *Source:* The association of Danish mortgage banks; updated March 18, 2013

stage in mortgage finance, now in a two-tier version: at specific property level at loan issue, and (continuously) at aggregate level within the collateral pools of each mortgage credit institute.

As outlined above, the Danish mortgage finance system is strongly regulated, while the securitization system based on the balance principle is entirely market based and depends on the functioning of real and capital markets for achieving scale of economics and liquidity to the benefits of both borrowers and investors in mortgage bonds. Two hundred years of experience with the Danish mortgage finance system illustrate the critical role of government in insuring the quality and enforceability of mortgage collateral, and reducing uncertainty for market players throughout the entire process, as stated by Renaud (2008, p. 276).

In the following section the nature of safeguards is explored within three fundamental areas of collateral security: (1) property rights protection, (2) property appraisal and (3) foreclosure.

3 Observations on security of collateral in Danish mortgage finance

3.1 Property rights protection and mortgages

Throughout its history the Danish mortgage finance system has benefitted from functioning legislation with supportive administrative systems that have reduced uncertainty of mortgaging. The Danish legal framework has for centuries provided protection of both primary and secondary interests in land, and mortgage law has long been well developed (Tamm 1978, p. 261). Ancient principles of public announcements of property transactions and on good faith contributed to building trust in property rights.

A national cadastre was completed by 1844, and as from 1845 the interconnection between the cadaster and the legal property registry was strengthened by reorganizing the legal deeds' protocols using cadastral identifiers as common entries (Kruse and Philip 1953). General protection of property rights and freedom rights were guaranteed through the constitution of 1849, hereby opening for development of mortgage credit associations. Pursuant to the first mortgage credit act (1850) and later versions, mortgage credit (through mortgage credit associations) was provided only against a security interest in the legal property register. The constitutive act of a mortgage is registration, and the credit contract also serves as the mortgage deed (Mortensen 2010). Mortgaging is supported by a long and deep tradition of practice, e.g., on definition of priorities of mortgages with fixed positions according to time of registration, unless otherwise agreed, a feature that eases remortgaging.

Over time the legal registry underwent modernization, both in respect to clarification of principles and organisation of the legal property registry and registration procedures, but the main reform took place in 1926 with the explicit purpose of strengthening the mortgage credit market. The reform (prepared by the scholar, F. Vinding Kruse) reconciled the law of obligations and the law on property to the effect that mortgaging in Denmark is simpler than in German law (Kruse and Philip 1953).

The registration of property act 1926[13] included provisions on e.g.:

[13] Current real property registration act, ('Tinglysningsloven' hereafter TL), LBK nr 158, 09/03/2006, https://www.retsinformation.dk/Forms/r0710.aspx?id=2031.

- Compliance with the principles of publicity, and clarification of the legal effects of registration, including state guarantee of registered property rights and principles of good faith in the registry;
- Securing the processes of registration of interests in real property under conveyancing;
- Ordering the contents of the registry on each property in sections, including a section on mortgage interests;
- Clarifying the extent of security interests backing mortgages as including insurance sums, fixtures, etc. (TL §38), and associated production factors of commercial property (TL §§ 37);
- Protection against eroding the value of the collateral through property mutations, etc.;
- Strict coordination and consistency between the cadastre and the legal registry.

Consequently rights in real property must be registered to achieve protection against third party, and the time of registry generally defines priorities of registered rights (first in time, best in right) unless otherwise agreed among the concerned holders of rights (von Eyben 2002).

The principles of the legal reform of 1926 were so meticulously prepared that few adjustments of principles have been required since then—despite an ever increasing volume and complexity of mortgage credit (Olsen 2008). The indemnity coverage for errors of registration paid out by the state over the years has been negligible compared to market size.[14]

Standardization of mortgage deed formats was introduced with the legal reform in 1926. The standard mortgage credit contract (Mortgage Deed Format B[15]) is brief and includes clauses on legal recourse, non-callability by the lender (subject to due debt service, etc.), payment conditions, insurance coverage, etc. In this manner standardization of mortgages and registration of mortgage deeds in Denmark supports collateral efficiency, as measured in terms of simplicity, transparency, rapidity and costs (EMF 2007).

Mortgagees' interests are protected against erosion during transactions over the lifetime of a mortgage. The standard mortgage credit agreement was—and still is—conditional on the borrower's continued maintenance of the collateral. Coordinated legal provisions of the registration of property act and the cadastral law protect the parties during the critical steps of conveyancing and, in case of property mutations, against depreciation of the underlying collateral value. Only insignificant mutations or adjustments of boundaries can be conducted without consultations with mortgagees (TL§23).

The cadastre and legal registry underwent a comprehensive technical reform during 1980–2010 aimed at providing advanced and fully electronic services. By September 8, 2009, the whole system (including 75 million A4-pages of documents)

[14] http://www.domstol.dk/om/talogfakta/statistik/Tinglysning/Pages/default.aspx.

[15] Tinglysningsbekendtgørelsen; http://www.themis.dk/synopsis/docs/Lovsamling/Tinglysningsbekendtgoerelsen.html#Kapitel 3 Dokumenter m.v., Pantebrevsformular B (English translation available in Spang-Hanssen, 2009, Appendix E).

had been fully converted to digital form and e-services, very much in response to needs of the financial sector.

Owners and professional users now have access to self-service functions with instant registration of standard transactions such as mortgage deeds. Hereby transaction time was reduced to 1 day for standard transactions,[16] and costs of more expensive intermediate financing was saved. The electronic system is open for inquiries by the general public, thus creating a fully transparent regime of property rights.

Moreover, access to property market information has been eased: Sales prices have since 1992 been available in public access portals. New e-services extract and integrate public property data for use in transactions[17] in support of transparency in the property market. Asymmetry in the property and mortgage market has been minimized, hereby reducing the problems discussed by (Arruñada 2012). Protection of the quality of collateral is further protected through functioning building regulations, etc.

Activities in the Danish mortgage market have been particular high compared to other mature mortgage markets due to borrowers' access to early redemption without penalty,[18] so that the high mortgage market activity has generated considerable state revenues (fees and transfer taxes). Investments in the legal infrastructure underpinning mortgage law have paid generously back in more than one way. Financial experts emphasize that clarity and transparency of the legal registry of property rights and efficient compulsory sale procedures have added to the protection of investors in Danish mortgage bonds (Golin 2006, p. 112).

On its side the mortgage system provided compelling incentives for registration and since the mid twentieth century also for compliance with planning and building regulations. These incentives combined with non-prohibitive transactions costs mean that informality or under-declaration was—and is—not an option in Denmark. Therefore, it is suggested that mortgage finance is contributing to strengthening of the legal registration system's sustainability over time, as much as mortgage finance was dependent on the legal registry in the first place (Haldrup 2011).

In conclusion, security of collateral backing mortgage credit issued by the Danish mortgage banks was built through a consistent and functioning legal framework:

- Mortgage credit rests on century old practices, and on stable and clear registration principles, now modernized;
- Mortgage contracts/deeds are standardized, hereby protecting the parties of mortgage contracts and facilitating the function of mortgage bonds as liquid mass securities;
- Safeguards of mortgages against erosion of the underlying collateral value during the lifetime of the credit contract;

[16] http://www.tinglysningsretten.dk/tinglysning/talogfakta/sagsbehandlingstid/Pages/default.aspx.

[17] DIADEM, http://www.mbbl.dk/ejendomsdata/ejendomsdata-i-anvendelse/ejendomsdatarapporten/ejendomsoplysninger-i-diadem.

[18] Early redemption of outstanding debt occur by either buying back the corresponding bonds at market rates, or by repaying outstanding capital at par.

- Legal risks are practically zero for duly registered mortgages that are covered by state guarantees;
- The property market is fully formal and transparent with public access to rich information on properties, rights and restrictions, and sales prices;
- Transaction costs have been non-prohibitive to market development.

The evolution of property rights protection in Denmark delivers specific evidence of their role in economic development (North 1990), and connects property rights with trust and market development over the long term (Calderon et al. 2002), but also demystify the process by showing how results were achieved through simple principles and total coverage of the cadastre and land registries at an early time, which permitted mortgage markets to benefit from economy of scale already in the nineteenth century. Later sophistication of the property registration system was to a large degree driven by the mortgage industry. The cost of digital reforms of the legal registry has been more than outweighed by revenues and by positive externalities generated to the economy at large.

3.2 Security of collateral, valuation and leverage

The value dimension of collateral security depends on the combined effect of value assessments at loan issue, maximum LTVs, amortization and later market development. A key concern for collateral security is defining maximum LTVs as a buffer against fluctuating real estate prices without jeopardizing the functioning of the market. Whether regulations on maximum LTVs have the intended effect on lending depends on the practices of valuations. Early observers saw that "Valuation is the Achilles' heel of mortgage credit system", and noted that restraint is particularly difficult in economic growth periods (Haldrup 2011).

The first mortgage credit act (1850) permitted issue of annuity loans on very long term—up to 60 years—within a maximum of 60 % of the property value, against first priority security interests (Andersen 2011). The mortgage credit act of 1936 codified the provision of secondary mortgages within a LTV ratio of 75 %. These conditions for senior mortgage credit prevailed until the 1960's, after which lending limits were raised and duration of credit abbreviated. The 1970 mortgage credit act defined a max duration of 30 years and varying maximum LTVs dependent on type of property (Haldrup 2011).

The mortgage credit act was subject to numerous changes between 1975 and 1993, when credit rationing served as a financial policy instrument. Changes concerned maximum LTVs, credit duration, and amortization schemes differentiated in respect to intended use of credit and property type.[19] Since 1993 regulations on LTVs and loan duration have been stable, but amortization options were expanded through invention of new mortgage products (ARMs, IOMs).

From the beginning mortgage credit associations recruited a local network of assessors among reputable men in touch with the local property markets, typically farmers and owners/borrowers themselves. The duty of local assessors involved

[19] Annual Report of the Association of Danish Mortgage Banks, 1986, p. 55.

'keeping an eye' on the state of the collateral. The original organisational model of mortgage credit associations presumably served a disciplining function, since members/owners had reasons to be risk averting when subject to solidarity coverage.

Appraisal has since long been conducted by real estate professionals. However, assessing market value as a basis for lending remains a critical issue dependent on competence, incentives, and ethics in the whole valuation set-up, e.g., to avoid undue interference between credit sales activities and assessment.

The appraisal principles for mortgage lending pursuant to the 2010- mortgage credit act (MCA 2010, §§ 10–14) build on (conservative) market value under consideration of potential market risks disregarding special conditions and scarcity. Market price[20] (dwellings and leisure houses) refers to a likely price paid by a prudent buyer for a similar property in the area, sold within 6 months of announcement. The state of the pledged property is to be inspected inside and outside by the assessor, and assessments must include assets in concordance with the extent of the property rights as defined in the legal property registration act (TL §§ 37 and 38). In practice valuation benefits from availability of rich property data and true market price statistics in public domain (https://www.ois.dk), as well as market information recorded by each mortgage credit institute.

Valuation for mortgage lending is further regulated in respect to new international regulations[21] and subject to quality control by the Financial Supervisory Authority. While maximum LTVs are defined by law, lenders retain some flexibility in valuation, due to the nature of assessment.

Valuation is becoming even more important in mortgage finance given the latest developments of mortgage products without amortization of the principal for shorter or longer periods, as well as the introduction of SDO and SDRO-loans (and bonds) in 2007, that require recurring valuations over the lifetime of the credit to be performed on a statistical basis by the mortgage banks for determination of their (dynamic) capital coverage requirements.

While uncertainty of assessing current property value can be reduced by use of good market information, the volatility of market value over time is a major risk factor in mortgage lending given market fluctuations caused by macro-economic cycles. The Danish mortgage market went through a boom and bust during the first decade of the twenty-first century. After the bust home owners suffered loss of equity and more borrowers were locked in. Hardest hit were borrowers who entered the property market or exploited all credit options during the boom.

Hereby it was confirmed that a general difficulty in an active mortgage market is restraining mortgage lending during growth periods with rapid appreciation of assets.

Local market values are as well impacted over time by large scale structural changes in society. In this respect the Danish mortgage credit system reduces risks

[20] Other categories of properties are subject to other valuation principles.

[21] Bekendtgørelse nr. 687 af juni 2007, Bekendtgørelse om værdiansættelse af pant og lån i fast ejendom som stilles til sikkerhed for udstedelse af særligt dækkede realkreditobligationer og særligt dækkede obligationer.

through its composition and size of collateral pools characterized by diversity (and dynamics) backing each bond series. In contrast to the collateral pools of the Mortgage Backed Securities in the US (Nadler 2005), the Danish collateral pools are large and inhomogeneous hereby reducing the exposure to particular local property markets.

Summing up mortgage law and valuation for mortgage lending in Denmark is contributing to collateral security through features such as:

- Mortgage law regulates maximum LTVs and valuation principles; and valuation for mortgage lending is subject to supervision by the Financial Supervisory Authority (FSA);
- Danish mortgage banks only provide mortgages against registered charges on existing properties hereby eliminating development risks;
- Valuation is supported by rich property data and reliable, current market statistics;
- Early redemption gives borrows a possibility to partially offset market fluctuations;
- Diversity of collateral pools backing Danish mortgage bonds provides a level of protection against location risks.

Principles of valuation for mortgage lending follow recommendations by European Mortgage Federation (EMF 2012, p. 9–11), on regulatory framework, transparency and methodology. Restraint in growth periods remains a critical issue, since appreciated property values open for equity withdrawal and higher economic expectations, a pattern also seen in other mortgage markets. As a result overoptimistic borrowing and lending occurs at intervals.

3.3 Security of collateral and foreclosure

Security of collateral is put to an ultimate test in the case of default, when a lender needs to recover the outstanding debt through the asset value or the income flow of the property.

Effective debt enforcement was put in place with the first mortgage credit act of 1850. Mortgage associations were then authorized to apply out of court enforcement proceedings (Andersen 2011, p. 84). Full legal recourse was previously combined with tight social control in small communities. Now foreclosure is executed by the local bailiff court according to principles that date back to legal revision of the Danish Civil Procedure Code in 1977 (Spang-Hanssen 2009). Provisions on the borrowers' position and on enforcement in case of default are set down in the standard mortgage contracts.

Debt enforcement is effective through functioning legal systems combined with complete and reliable legal and administrative registers, such as the Central Personal Register (CPR), register of enterprises (CVR), address system, etc. In case of arrears the main instruments of enforcement are consultations with defaulting borrowers, preventive sales, repossessions, or eventually foreclosure. If the arrears cannot be remedied, and the case is pursued through the legal system, the law recognizes that a defaulting borrower may need assistance. The judge is given

authority to guide borrowers, to call pre-auction meetings, and in special cases to appoint legal aid. More than half of the cases are withdrawn after initiating legal procedures (www.domstol.dk).

An auction is a necessary, ultimate step of enforcement. The option of foreclosure is unattractive both for lenders and borrowers due to transaction costs, risks of low auction bids, and for the borrower—in addition to the traumatizing consequences of losing a home or business-, the personal debt and the registration in the register of bad payers.[22] The overall goal of the legal process is to realizing the concerned property at the highest possible price, preferably in the open market or—if it fails—at an auction, to the benefit of all parties.

Arrears are swiftly pursued to avoid (further) erosion of the assets concerned. Standard mortgage agreements define payment schedules and give a respite of 7 days after the due date for installments and interest, after which a formal notice must be sent to the debtor prior to pursuing the claim through forced sale proceedings. The official court process is standardized and can be initiated after minimum 14 days, and elapsed time from formal notice to foreclosure is in average about 6 months.[23]

The bailiff court is responsible for announcements of auctions in the Danish gazette, on the Internet and in local news media for attracting prospective bidders.[24] Information on the property is documented in a standardized and comprehensive report designed to help bidders in taking informed decisions during the auction, e.g., by including all registered interests in the property in order of priority rank. The auction information sheet is a key document of any auction in combination with standard auction conditions (Spang-Hanssen 2009).

In principle the highest bidder at an auction takes over the property "as is" at the moment of hammer stroke without warranty. The winning bid is likely to be below market price due to the special circumstances of the sale. If the bids are not satisfactory, a claimant may request a second auction to be held, if covering the additional auction costs. The revenue of the bid accrues to the holders of rights in the order of priority of their interests, irrespective of who was the auction-claimant, and if all claims are satisfied, the remaining sum goes to the borrower.

The auction buyer can demand that the court strike out those claimant-rights that were not embraced by the bid by order to the Legal property registry (Spang-Hanssen 2009). Claimants not covered by the final bid have access to full legal recourse (subject to clauses of the credit contract).

Despite a standardized and speedy foreclosure process, the parties are likely to incur added costs compared to an open market transaction. The risk for the debtor and the creditors is a hammer stroke at a very low bid. The mortgage credit

[22] Experian, see http://www.experian.dk/rki/index.html. The number of bad payers registered in the RKI–register was about 5 % of the adult population ultimo 2012, owing in average about 65000 dkk/person (about 8700 Euro).

[23] An overview of the foreclosure process is available at the association of Danish Mortgage Banks, http://www.realkreditraadet.dk/Forbrugerforhold/Manglende_betaling/Udl%C3%A6g_og_tvangsauktion.aspx.

[24] See the Danish gazette, www.statstidende.dk; and real estate sales sites: www.tvangsauktioner.dk, www.itvang.dk.

institute(s) are likely to be among the bidders to defend their collateral, and depending on the bids, they may choose to minimize their loss by buying on the auction and selling later at a convenient time. The market mechanism may then help the patient auction buyer. The number of taken over properties by mortgage banks serves as a market indicator.[25]

Systemic elements are evident in the occurrence of foreclosures. Periods with higher than usual foreclosure levels were triggered by events in the overall economy, but the Danish mortgage finance system has proven robust through crisis as indicated by historic evidence.

During the economic crisis of the 1930s special crisis legislation in 1932–1936 eased the pressure on borrowers and on the mortgage credit associations by giving access to a 2 year derogation of mortgage payments for farmers, who saw steeply falling incomes. The mortgage credit associations endured and counted their losses in an average of 1 promille per year of outstanding nominal debt (Glud 1951, pp. 249–250; Møller and Nielsen 1997, p. 114). However, borrowers suffered.

Other waves of foreclosure occurred in the beginning of the 1980s following the oil crisis, but the pressure on the mortgage market was then eased by inflation. Later towards the end of the 1980's a serious wave of foreclosure hit, when the Danish government used credit rationing as an instrument in the so-called 'Potato diet' (Chong 2010). The introduction of shorter amortization periods and other restrictions in 1986 had a strong impact on the property market at a time when unemployment rates also rose. Easing of lending policies among different mortgage credit associations in their competition for market shares contributed to the crisis (Andersen 2011). Following that sobering experience (and a new business structure pursuant to the mortgage credit act of 1989), the mortgage banks introduced underwriting of the applicants' personal debt service ability in 1992.

At the outset of the global financial crisis in 2008 foreclosure levels went up immediately, but did not reach the levels experienced around 1990, see Fig. 4. Some market segments suffered more than others, and first time buyers were particularly exposed, if they entered the market during the peak in 2005–2007 (Haldrup and Staunstrup 2014).

Irrespectively, overall foreclosure rates in the housing sector were still low on an international scale and were also dwarfed by foreclosure rates during the crisis around 1990. Swift reactions to crisis signals were seen in the mortgage industry with tightening of lending practices and adoption of international consumer protection standards on responsible lending and borrowing (EMF 2009). The days of allocating mortgages based on the principle of 'bricks only' were definitely over.

This did not cure their portfolios retroactively, but losses were avoided as long as borrowers keep servicing their debt, which is generally the case, unless unemployment or other misfortune strikes. Arrears in mortgage credit for housing were typically been between 1–3 ‰ between 1995 and 2008, but rose to 5.5 ‰ in 2009. Losses realized by mortgage credit institutions accounted to in average a few ‰ pro annum. The largest Danish mortgage bank, Nykredit, carried losses of between 1–3 ‰

[25] Statistics at www.rkr.dk.

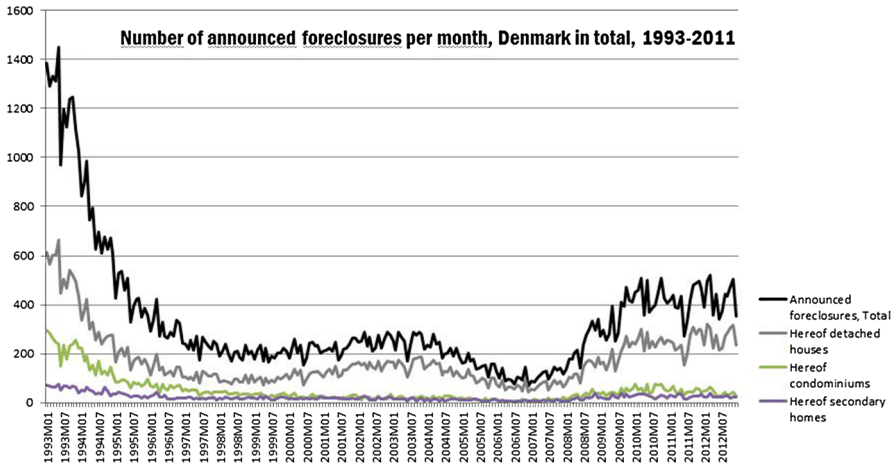

Fig. 4 Number of announced forced sales per month, by housing type (seasonally adjusted) 1993–2012, Denmark, *Source*: Statistics Denmark

during 2009–2011, (Jensen 2012). The number of repossessed residential properties were in the same period between 0 and 0.5 ‰.

In this manner, a long historical record provides evidence of effective debt enforcement, relatively low levels of foreclosure as well as limited losses in Danish mortgage institutes compared to outstanding credit. Borrowers are subject to effective foreclosure proceedings and full legal recourse that combined with legal practices provides no escape for debt in Denmark, neither on the short nor long term, but lenders may still incur losses due to incapable borrowers. This forms part of the incentive structure for both borrowers and lenders.

In summary debt enforcement in Denmark is effective through

- Complete and functioning registers on legal property interests, and other data infrastructure;
- Preventive instruments available and effectively used for aiding borrowers in case of arrears;
- Swift and effective debt enforcement conducted through the local bailiff courts within about six months;
- Standard regulations on forced sale proceedings and public announcements thereof;
- Complete information on mortgages and the property provided for prospective bidders;
- Respecting all claimants in order of priority of their claims;
- Non-full filled claimants have access to full legal recourse (subject to the clause of the mortgage);
- The auction buyer takes over the property ‘as is’, is secured access to the property, and can demand mortgages not embraced by the bid annulled in the legal registry;

- Foreclosure remains unattractive for both lenders and borrowers.

It is concluded that regulations and practices on debt enforcement are in accordance with best practices (EMF 2010).[26] Cross country studies on debt enforcement show that credit dries out, if enforcement is ineffective (Djankov et al. 2008). A functioning mortgage market in Denmark with relatively low foreclosure rates over time suggest that safeguards of mortgaging have largely been adequate, even if collateral security was impacted by macroeconomic tides. Evidence suggests that effective debt enforcement has been a necessary price paid by few for developing a deep mortgage market with affordable credit to many.

4 Discussion of the general nature of collateral security

4.1 Setting standards of collateral security

A number of specific factors mentioned in preceding chapters were shown to have influenced the security backing lending through the specialized mortgage institutes in Denmark. In the following wider issues of collateral are discussed in search of underlying mechanisms of collateral performance.

Danish owners of property have enjoyed wide access to real credit, because emphasis from the beginning was put on security of collateral and enforcement—not bankability of the applicant. Hereby the Danish mortgage credit associations originally opened for access to mortgage credit irrespective of status and age, permitting able citizens to work their way to improving their standard of living and improving their housing standards (Haldrup 2011). Lower income households were able to acquire their own home, but the system was not designed to cater for citizens without income or assets. In recent decades, owner-occupied housing is supplemented with a variety of private rental housing options and social housing for households preferring or needing to rent (Vestergaard 2002).

Over time Danish mortgage institutes have provided mortgage lending at competitive costs, which has stimulated demand for mortgages from buyers and owners of real property in Denmark. Danish borrowers have for long had a large appetite for mortgage credit, a matter lamented by Danish mortgage credit experts since 1888. When the maximum lending limits were exploited, it follows that borrowers with high leverage were more vulnerable to depreciation of assets.

Setting standards for collateral security in mortgage law is a political choice with profound effects on the housing market. Provisions on e.g., maximum LTVs serve as well as protection of investors and borrowers, but are as well seen as protecting financial stability (Østrup 2011). Between 1966 and 1992 tightening of mortgage credit was used in an attempt to curb consumption, but with negative side effects such as the blossoming of more expensive financing options.[27] Chong (2010) emphasized the positive effects of restraining equity withdrawal, but use of credit

[26] European Mortgage Federation position on Foreclosure, http://www.hypo.org/Content/default.asp?PageID=433.

[27] Annual report of the Association of Mortgage Banks, 1986, p. 20.

rationing is now regarded as a too strong policy tool due to its negative effect on property values.

Striking a balance between security and operations of the market through e.g., requirements for own equity at property acquisition is of importance especially for market entrants, typically young households. In comparison the Germany mortgage finance system sets high requirements for own equity, combined with assessment of a stable 'mortgage lending value' below market value, which is resulting in a conservative mortgage market (Tolckmitt 2012).

In contrast low lending standards in the US mortgage market resulted in inadequate collateral behind mortgage backed securities as revealed once the bobble bust in 2007, hereby causing collateral damage to the economy as widely documented. Moreover, moral hazards were exposed at all levels of the mortgage finance system (Jaffee 2008). The policy of 'affordable housing' through lowering credit standards turned out to come with a gigantic price tag.

In this light it is suggested that Danish mortgage law seems to have hit a balance between opening for access to credit and establishing adequate levels of security of collateral without being too restrictive, but it is a continuing challenge to maintain that balance.

4.2 Security of collateral and incentive structures

The overall robustness of the mortgage finance system is both a matter of design and of practices.

The original social construct of associations in finance is not unique, but the Danish system gained its strength through the securitization model based on the balance principle with its incentive structure (Lea 2011, p. 18), that allocates risks and responsibilities to market participants in a disciplining manner: The mortgage credit associations kept debt on their balance sheets to expiry, borrowers had equity at stake, the system was by design transparent etc. The balance principle is robust per se, but the performance also depends on the safeguards of the underlying collateral pools, reserves and market trust in the securities.

From time to time, too optimistic lending and borrowing was exposed later in a low market with repercussions for lenders and not the least borrowers subject to loss of equity and—in cases of forced sales—lost homes. Market forces served as a forceful educator, when the parties were exposed to un-cushioned effects of market booms and busts. Initially consequences of foreclosure were rough. Later in the second half of the twentieth century alternative housing options and development of social security programs have suspended a basic, albeit unattractive, safety net under unfortunate households. In this way the balance principle combined with effective debt enforcement built a sound, but severe, incentive structure inducing responsible borrowing and lending.

It is a question what other factors made the Danish mortgage associations succeed, while scandals hit the Savings and Loans associations in the US in the 1980's and 90's (Ferguson 2009). Spang-Hanssen (2009) attributes the long and unblemished history of specialized lending in Denmark since 1851 to the legal and institutional framework. Here it is suggested that the securitization model based on the balance principle was as important as a functioning legal system in creating a

healthy incentive structure that strengthened security of collateral beyond the word of law.

It seems reasonable to assume that that behavior of each party in the credit chain impact on the performance of the mortgage credit system. For these reasons, deep-rooted social norms and ethics might have played a role in avoiding devastating scandals or fraud, which could have put the system at risk. More factors could possibly have been decisive, e.g., the organizational setup of the mortgage intermediaries, and a non-corrupt culture, but the question of causality is open for discussion. The ability of private individuals of building mortgage credit associations based on common and reciprocal interests in the nineteenth century did provide economic benefits to members as well as the overall economy (Glud 1951), but if or to what extent the economic outcome can be accredited to social capital merits further study (Knack and Keefer 1997).

Remarkably, the finance system is fully market based and functioned for most of its long history without much government supervision. As early as 1910 outstanding mortgage debt had reached a level above 75 % of GNP (Abildgren 2006), but there was practically no state supervision, which was only fully introduced after 1980, and by inclusion of bankruptcy provisions of mortgage banks in a consolidated financial business act of 2003.[28] Their prior self-regulating nature is interpreted here as evidence of the Danish mortgage model being built on aligned incentive structures, asset quality, and principles of transparency, in accordance with (later) international recommendations (BIS, Bank for International Settlements 2011).

4.3 Features of the mortgage market and commitment mechanisms

Since modern economies are credit based (Sheng 1998; Ferguson 2009), and collateral security is a core issue of all mortgage finance, it follows that 'collateral' serves as a critical link between real and capital markets. Mortgages bring property rights into intimate contact with the macro-economy, as already observed by Kruse in 1923 (Kruse and Philip 1953), and mortgage credit is not neutral to market value, as can be observed in the Danish case as sensitivity of the property market to mortgage finance. Collateral value is hinged on market value, and the financing system itself is affecting the property market. Therefore, a definition of collateral security includes recursive features despite its firm legal base.

The Danish mortgage market is active and deep, so any changes in the mortgage credit act or in the property market is instantly testing the strength of the mortgage finance system. Events along the 200 years history of the Danish mortgage credit system showed how leaps in development occurred with introduction of new legislation, and also how the regulatory framework profoundly affected the business structures and the market, but not always in predicted ways.

On one side every economic crisis has tested the mortgage finance system and triggered thorough reviews and revisions of the legal framework. On the other side

[28] Finanstilsynet (Financial Supervisory Authority), http://www.finanstilsynet.dk/en/Regler-og-praksis/Translated-regulations/Acts.aspx.

mortgage law is a colossal force in the capital market, confirming that mortgage markets are the basis for other markets (Ferguson 2009).

Legal changes in the Mortgage Credit Act, that might seem minor, have shown to have had high impact on the mortgage and property markets, although many other factors were at play, e.g., tax incentives, inflation and employment rates. In the 1980ies credit rationing contributed to a market slump [Hoffmeyer and Jelved in (Jørgensen et al. 1997)], while opening for Interest Only Mortgages (IOM) in 2003 in hindsight is seen as having contributed to a price hike (Beltoft 2011).

Real assets were rapidly depreciated when negative economic signals hit the property market, see Fig. 3. After the bobble bust in 2008, the Danish mortgage system withstood an average depreciation of property values of in average 20 % (2009–2011) in a deep mortgage market with outstanding mortgage debt for housing at about 100 % of GDP. The foreclosure rates grew, but despite many borrowers becoming technically insolvent, the default level was still relatively low and counted in single digit promilles. The occurrence of foreclosures in Denmark is dwarfed by similar data experienced in the US both during the crisis in the 1930's and the crisis after 2007. Statistics show that Danish borrowers generally continue servicing their debt even in case of negative equity, presumably because foreclosure is an unattractive alternative.

In general the development of the Danish mortgage finance system is confirming the overall understanding of the institutional commitment mechanism as fundamental to building mortgage markets as described by Fratianni and Spinelli (2006, p. 259), who defined financial (r)evolution as resting on three pillars: (1) The institutional mechanism through which the debtor commits not to renege on debt; (2) The public bank; and (3) Innovations in financial instruments and markets. North and Weingast (1989) established the causal link between the credible commitment of government in upholding property rights and capital market development in seventeenth century England, which could also be a fitting interpretation of the development path of Danish mortgage banks.

In a current context a strong commitment structure embedded in the legal infrastructure has enhanced, it is argued, the performance and robustness of the Danish mortgage finance system based on the balance system of securitization, by averting a contamination of the combined mortgage and property markets potentially resulting in downward destructive market spirals, even during deep crisis. In this manner a strong commitment mechanism serves as an intangible and indispensable dimension of collateral security, whereas the (market) value relative to outstanding debt represents numerical aspects of collateral security, seemingly quantitative and tangible, but in part elusive.

In conclusion collateral security depends on functioning real estate markets, mortgage markets impact on property markets and thus collateral value, and market risks (and opportunities) over the lifetime of mortgage credit are in the first instance carried by the parties of the mortgage contracts, but may eventually have negative or positive spill-over effects on the overall economy. With such awesome, interconnected forces at play, a strong commitment mechanism embedded in the legal infrastructure serves as an indispensable safeguard for each and every mortgage deed, as well as a general protection stimulating mortgage market development. It is

argued that such protection was in place in Denmark in the nineteenth century, which permitted development of a deep mortgage market already in the beginning of the twentieth century (Abildgren 2006), when outstanding mortgage debt reached over 75 % of GDP (1910) before mortgage intermediaries were subject to state supervision.

Based on the above it is concluded by induction that the Danish mortgage finance system and the legal framework include strong commitment mechanisms that keep borrowers servicing their debt as evidenced by statistics on defaults during crisis.

4.4 Collateral security and the role of government in mortgage market development

Clear evidence of the role of property rights for mortgage finance development is provided by economists, who see the development of secure property rights at large and of primary markets as a precondition for development of mortgage finance systems (Lea et al. 2004; Sheng et al. 2006). In Denmark the complete and transparent legal property register (supported by effective debt enforcement) has for long provided a strong basis for mortgaging, since 2009 with instant digital registration.

Markets depend on governments to build an adequate legal infrastructure that eliminate legal risks and establish transparency, but as can be demonstrated in the Danish case, this was an investment that paid back in more than one way, partly directly through the transaction fees collected, partly through positive externalities of a low risk system. Present day investors (Boyce 2009) emphasize how covered bonds based on special legislation and on the balance principle, create an attractive finance system both for investors and borrowers with stabilizing effects on the economy.

Private initiatives and private organizations played a decisive role in building the Danish mortgage system, as the history of the mortgage associations attests. The Danish mortgage associations made it easier for the smallest land owners in rural areas to access the international capital market, than for a large entrepreneur to achieve access to the stock exchange, because the latter required substantial capital (Glud 1951, pp. 146–7). Glud also observed that the growth of the mortgage credit associations combined with the cooperative movement had contributed to a leveling of incomes and assets, and thus been of importance for the social structure in Denmark characterized by low in-equality.

Mortgage credit associations arose as spontaneous private organizations to meeting needs for institutionalized credit in an already active primary mortgage market (Haldrup 2011). Mortgage credit associations can be seen as a form of grown organization originally based on non-profit principles, but acting on market conditions, that eventually capitalized a large share of the national economy. Over more than a century they achieved an importance probably far beyond what their founding fathers could have imagined (Hayek 1982).

Market risks cannot be eliminated, but as was argued above, risks were assigned to market players in a disciplinary manner, although e.g., location risks and time of market entry over the long run produce winners and losers in the market, that may

seem unjust in the individual case. On the other hand economic risks provide inducements for market participants to anticipate impeding changes as accurately as possible (Hayek 1982, p. 284). Over time and in average, owners of property profit as well from having a share in the property market, since property values evolve over the long term grossly proportional to GDP (Møller and Nielsen 1997).

The Danish mortgage banks have proven competitive in an open international market as evidenced by their high market share of about 90 % of long term real credit in Denmark in contrast to many other European mortgage markets dominated by general banks (Suarez and Vassallo 2004). In 2011 total lending by mortgage credit institute amounted to 134 % of GDP (Jensen 2012), of which residential mortgage debt represented 100.9 % of GDP, one of the highest ratios in EU only exceeded by the Netherlands (EMF Hypostat 2011).[29] Mortgage bonds dominate the Danish capital market (about 60 %), but they also play a prominent role in the European market with the second largest share (19 % in 2011) of all mortgage bonds in the EU, only exceeded by Spain with 20.3 % of total outstanding covered bonds (HYPOSTAT 2011).

A new risk at institutional level to the Danish mortgage finance system was introduced with international regulations of financial institutions[30] disregarding the robust nature of Danish mortgage finance. Although introduced with the purpose of reducing risks, it is seen as resulting in instable and higher funding costs, that undermine the transparency and robustness of the Danish mortgage finance system. Andersen (Andersen 2011) even described the Basel II requirements as 'intellectual hybris', since there is little evidence of what precisely should be the magic adequate capital coverage (Andersen 2011, p. 275). Thus, the medicine designed to cure problems in other financial systems, is putting the Danish mortgage finance system out of balance (Jensen 2011). Nevertheless, Danish mortgage banks have adopted various strategies of complying with new capital coverage requirements in order to mitigate their negative impact.

How collateral security depends on market development was demonstrated in full with a significant depreciation of property values following the financial crisis in 2008. Danish borrowers suffered from loss of equity, but at the same time benefitted from unprecedented low interest rates due to the low risk nature of Danish mortgage bonds considered a safe-haven in the European capital market during a turbulent time, Fig. 5. This allowed borrowers to offload debt, so with patience a positive development in the property market could do the rest of the work of reducing negative equity (Rohde 2013). The Danish mortgage banks withstood the 2008-market chock helped by the government easing of framework conditions (Rohde 2011), but not through subsidies.

Overall these events confirm the interconnected nature of factors of collateral security in tandem with the strength of the Danish mortgage finance system. It is also demonstrating how the price signal serves as a strong and simple indicator of a

[29] European Mortgage Federation, HYPOSTAT, http://www.hypo.org/Content/Default.asp?PageID=524.

[30] Documentation and position papers at the Association of Danish Mortgage Banks, http://www.realkreditraadet.dk/Current_issues/New_international_rules_(Basel_III_-_CRD_IV).aspx; And Bank for International Settlements (BIS), http://www.bis.org/.

complex phenomenon. The market verdict of the security behind the Danish mortgage system compared to other systems is positive as reflected in the interest rate development.

In contrast, the US Government Sponsored Enterprises (GSEs) issuing Mortgage Backed Securities, Fannie May and Freddie Mac that accounted for 44 % of all outstanding mortgages in the US in 2008[31] have failed at a gigantic scale, as documented by their record of relaxed lending standards that ended in bankruptcy and a government bailout in 2008, costing taxpayers gigantic sums (Jaffee 2011), while the negative externalities to the national and global economy are incommensurable. It has been suggested that their failure originated in an unhealthy incentive structure of the financing model and low lending standards (Jaffee 2008). Geanakoplos (2010) argued that economists and the Federal Reserve had for too long focused on interest rates and ignored collateral, but explaining the root causes of the scandal remains controversial, as mapped out by the US government Financial Crisis Inquiery Commission.[32] A few facts speak by themselves: Foreclosure levels in 2009 reached 4.6 % for all mortgages, herof 3.3 and 15.6 % of prime respectively subprime mortgages (Jaffee 2011). Differences among US states and market segments showed that legal recourse (Ghent and Kudlyak 2011) and having own equity at stake lowered incidents of strategic defaults (Guiso et al. 2009).

Albeit massive state subsidies to the GSEs prior to 2008 and beyond, they were unable to suspend market mechanisms that eventually passed their verdict over the inflated Mortgage Backed Securities issued without adequate collateral and safeguards. In this manner events can be understood rather as policy failure than market failure. Jaffee (2011) has suggested a strategy of abolishing the GSEs and implement a private market model based on incentives with little government intervention inspired by European mortgage markets.

Both examples illustrate the centrality of collateral security and the power of the mortgage market. The Danish case serves as a counterfactual argument against a widespread perception of market mechanisms and capitalism as undermining affordable credit. On the contrary the Danish mortgage market has proven capable (without subsidies) in an open international market of securing wide access to long term credit that allowed new entrants to the property market without large prior savings. The findings illustrate the importance of getting the formula right of government regulations and of building strong property rights with legal infrastructure that allow the market to function to the benefit of society. While the formula needs to be constantly adjusted to new challenges, it is suggested that the collateral safeguards established in the Danish system represent a clever balance.

[31] Fannie Mae outstanding Mortgage Debt 3.1 Trillion USD in December 2008, Total outstanding mortgage debt in the US 12.1 Trillion USD; http://www.fanniemae.com/resources/file/ir/pdf/proxy-statements/form10k_022609.pdf, p. 7; Freddie Mac outstanding mortgage debt 2,2 Trillion USD in December 2008, see http://www.freddiemac.com/investors/er/pdf/10k_031109.pdf, page 61. Low quality loans made up about 34 % of the total single-family mortgage portfolios of Fannie Mae and Freddie Mac.

[32] The US government Financial Crisis Inquiery Commission testimonials, 2009, http://cybercemetery.unt.edu/archive/fcic/20110310173617/http://www.fcic.gov/about.

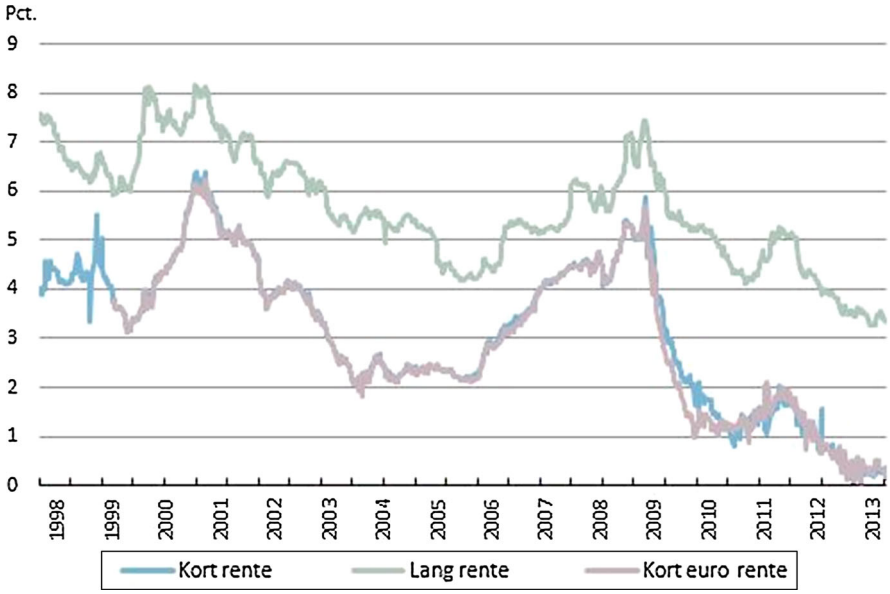

Fig. 5 Average mortgage rates in percent, Denmark. Short term and long term DKK; short term Euro. *Source*: The association of Danish mortgage banks, updated March 2013

5 Concluding observations on collateral security in the Danish mortgage system

Collateral security in the Danish mortgage finance system arose not from a single factor such as LTVs or capital coverage, but from a delicate interplay between factors pertaining to the legal framework, the securitization model and functioning markets that create a sound incentive structure that reduced the need for state supervision.

The robustness of the Danish mortgage finance system as testified by its 200 years history is generally accredited to the balance principle of securitization that preserved the system against mismatches between assets and liabilities, and assigned risks to each participant in the financial system in a disciplining manner. Standardization and mass securities have brought benefits to Danish borrowers in the form of lower transaction costs and wide access to and affordability of credit, while being fully market based. Mortgage law and the supportive legal infrastructure have in tandem built sufficient collateral security to safeguard lenders and build trust among investors without being too burdensome.

The Danish mortgage market is deep and characterized by extensive use of mortgage credit for financing of property transactions and improvements as well as equity withdrawal. While the legal dimension of collateral security has been managed through meticulous legal provisions and a functioning legal system, the volatility of market value has implications on security of collateral. Safety margins of LTVs and conservative appraisal standards—together with the size and diversity

of collateral pools –were important design elements of the finance system, but when crisis hit the commitment mechanisms stemmed the tide.

Property and credit markets are not neutral to each other, and it was shown that mortgage law may have strong effects on the property market to the effect that collateral serves as a transmission channel between the real economy and capital markets. Tightening of credit conditions have at times affected property markets negatively and consequently lowered collateral security contrary to the intent, or legal amendments of the mortgage act have fueled property market bobbles. Access to early redemption without penalty served as a countercyclical instrument, while a strong commitment structure embedded in the legal system and finance model kept borrowers servicing their debt, even in case of negative equity.

It was argued that a stable, firm and mature foundation of property and mortgage law served as a lever of the mortgage system, and the investments in property rights infrastructure have paid generously off. Effective and swift forecloses combined with full legal recourse have served to minimize losses in the ultimate case of default, but also had a disciplinary function.

In conclusion collateral security was shown to have been built on a complex formula of sound incentive structures based on the securitization model, strong commitment mechanisms and functioning market mechanisms that affected the behavior of the market participants and contributed to building mortgage markets without cost to the tax payers.

However, new international regulations designed to cure problems in other financial systems could if adopted put the Danish mortgage system out of balance, e.g., by negatively impacting on the demand for mortgage bonds.

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