International Articles

Editor

Arthur L. Schwartz, Jr.
148 N. Casey Key Road
Osprey, FL 34229

941-966-2995 (Phone)
baycityart@yahoo.com

This section publishes research articles on subjects outside of the United States. All real estate topics are sought. The editor and associate editors are particularly interested in papers on emerging markets and they recognize that database and other research limitations may exist in such markets. Manuscripts on developed markets are encouraged as well. All submissions should be limited to fifteen double-spaced pages. Contact the new editor Graeme Newell (g.newell@uws.edu.au) for submission information.

Associate Editors

Residential Mortgage-Backed Securitization in Asia: The Singapore Experience

Tien F. Sing* and Seow E. Ong**

Abstract

Securitizing residential mortgages has been used effectively to manage mortgage related risks like interest rate risks, credit risks, funding risks and sector concentration risks by financial institutions in many Asian countries. However, in Singapore, development of the residential mortgage-backed securitization (RMBS) market has been slow, despite strong support from the government of Singapore via revising securitization guidelines and making changes to policies that are favorable for RMBS development. Currently, an excess supply of liquidity and a perceived loss in the long-term relationship with the existing mortgagors/clients are the two main barriers to banks in securitizing their residential mortgages.

Introduction

Real estate bubbles and excessive lending have been suggested as the contributing causes for the 1997 Asian Financial Crisis by both the International Monetary Fund (IMF) (Collyns and Senhadji, 2000) and academic authors (Quigley, 2001; and Krugman, 1988). The high exposure of commercial banks and finance companies to real estate related loans appears to be connected to the financial and currency market crises in these Asian countries in 1997. The rapid escalation of asset prices in the mid 1990s fuelled by a large influx of foreign capital was not sustainable. The price bubble burst in mid-1997. Non-performing loans of financial institutions reached a critical level following a sharp decline in asset prices. Financial institutions and banks started to call their loans following a rapid depreciation of the countries' currencies. The inability of the borrowing institutions to liquidate their long-term loan assets to meet bank calls of loan repayment seriously disrupted the financial stability of many East Asian countries in 1997.

Thailand was the first country to crumble under the financial pressure and the attack on its weakening currency. The ''*financial contagion*'' spreads quickly to other countries including Korea, Indonesia and Malaysia. The IMF swiftly stepped in to rescue three of the most seriously affected economies in Asia, Thailand, Korea and Indonesia, via a slew of financial re-capitalization and institutional restructuring measures. The Malaysian government has, on the other hand, severed its link to free exchange rate markets by introducing selective exchange and capital controls on September 1, 1998, which pegged the currency at Ringgit $3.80 to $1.00 U.S.

---

*National University of Singapore, Singapore 117566 or rststf@nus.edu.sg.
**National University of Singapore, Singapore 117566 or rstongse@nus.edu.sg.

The overreliance of households and corporations on bank loans for real estate purchases was one of the key factors underpinning the real estate bubble in the Asian markets. Various measures have been advocated to strengthen bank lending and to restrict the banks' lending to the real estate markets. The creation of the Real Estate Investment Trust (REIT) vehicle, which is so prevalent in the United States and the Australian markets, has been one of the policy recommendations, which is intended to provide an alternative source of financing for the real estate sector (Collyns and Senhadji, 2000). Securitizing mortgage loans has also been identified as a possible way to improve bank liquidity, and more importantly, to enforce greater discipline on bank underwriting and lending evaluation standards (Quigley, 2001).

The Mortgage-Backed Securities (MBS) market was established in the U.S. with the objective of increasing liquidity and lowering the financing cost in the housing markets. It also serves to reduce financing institutions' exposure to various risks related to residential lending such as interest rate risk, credit risk, funding risk, liquidity risk and sectoral concentration risk. The Residential MBS (RMBS) history in the U.S. can be traced as far back to 1930s with the establishment of the Federal National Mortgage Association (FNMA) (Fannie Mae). Following the privatization of the FNMA in 1968, the Government National Mortgage Association (GNMA) (Ginnie Mae) was then set up under the Housing and Urban Development Act to serve mainly low and moderate income homebuyers. The first RMBS was issued by GNMA in 1970. This paved the way for the rapid growth of subsequent MBS issuance by other government-sponsored entities: FNMA and Federal Home Loan Mortgage Corporation (FHLMC) (Freddie Mac).[1] The 32-year experience in establishing and operating the MBS market in the U.S. has made it a proven model to be replicated in other countries.

Since the success of MBS market in the U.S., coupled with the liquidity problem faced by many Asian property companies and financial institutions in the post-1997 crisis periods, interest in real estate securitization has been mounting steadily in Asia as the market participants recognize the potential benefits of securitization. Essentially, real estate securitization allows property companies to take their assets off the balance sheet, thus improving their liquidity as well as enhancing return on capital. Debt-ridden companies have been increasingly opting to recapitalize their balance sheets by securitizing their illiquid assets. Financial institutions, on the other hands, have also attempted to substantially shed off their non-performing loans via the secondary market. In Korea, the development of a secondary mortgage market has received the strong endorsement of the Korean government in the post-crisis period. The Mortgage-Backed Securitization Company Act and the creation of the Korea Mortgage Corporation (KoMoCo) in 1999 have paved way for an active mortgage securitization market in Korea.

In Japan, the introduction of the MBS has also been a recent phenomenon. The Japanese secondary mortgage market commenced in the same year as in Korea, facilitated largely by the introduction of the Law on the Securitization of Specified Assets by a Special Purpose Company (SPC) laws, enacted in 1998 and amended in 2000. The first RMBS of US$450 million was originated by Sanwa Bank in May

1999. A more positive signal of the MBS growth potential was through the issue of the first AAA-rated MBS of US$470 million (JPY50 billion) by the Government Housing Loan Corporation (GHLC) in March 2001.[2] The GHLC is the largest residential mortgage lender in Japan with a market share of 37%. It has planned to issue up to US$7.5 billion (JPY1 trillion) of RMBS by year 2005 (Mizuho Securities, 2002). Strong growth potential in the securitization of the residential mortgages would come from the mortgage pools of commercial banks.[3]

Active MBS market activities have also been observed in Hong Kong and Malaysia. Government sponsored agencies like Hong Kong Mortgage Corporation (HKMC) and National Mortgage Corporation (CAGAMAS) have been established to spearhead the development of MBS markets in Hong Kong and Malaysia respectively. In other Asian countries like Thailand, Indonesia and Singapore, the development MBS markets has, however, been slow and lagging with no publicly traded MBS markets at this time.

Despite the government's support for a strong MBS market,[4] it has still failed to take off in Singapore. What are the impediments to the development of MBS markets in Singapore? This paper examines these questions by comparing and contrasting the MBS experience between Singapore and other Asian and U.S. markets. The published literature on MBS markets in Asia is rather limited. This paper begins with an overview of the development and institutional framework in the four Asian MBS markets, namely Malaysia, Hong Kong, Korea and Japan. The issues of why a MBS market does not yet exist in Singapore are discussed, along with an examination of its impediments. The potentials of creating a secondary mortgage market in Singapore will also be explored by making a comparative analysis of the depth of the primary mortgage and the bond markets in Singapore and other countries. The possible driving factors will also be explored, which include changes to institutional rules like the Central Provident Fund (CPF) and the Housing Development Board (HDB) mortgage rules and also the use of synthetic securitization as an alternative approach for lenders to securitize mortgage credit risks. The paper closes with some concluding comments. The focus of this paper is on RMBS, and the statistics on primary mortgage, bond and MBS markets are obtained from reliable secondary sources, mainly the central banks and research houses of the respective countries.

Institutional Framework of RMBS in Asia

The setting up of the government sponsored secondary market institutions like Hong Kong Mortgage Corporation (HKMC), Korea Mortgage Corporation (KoMoCo) and National Mortgage Corporation of Malaysia (Cagamas) was a deliberate step taken by the governments of the Asian countries in emulating the U.S. MBS story in their respective markets. Exhibit 1 contains a summary of the institutional frameworks and structure of the residential MBS markets and primary mortgage markets for the five selected countries.

The earliest MBS market in the East Asian countries started in Malaysia in 1986 with the setting up of the Perbadanan Cagaran Malaysia (Cagamas), the National Mortgage Corporation under the Companies Act (1965). The securitization process of Cagamas

Exhibit 1
Summary of MBS Markets in Asia

Countries	Singapore	Hong Kong	Japan	Korea	Malaysia
MBS related legislations	Banking Act	Companies Ordinance	Law on Securitization of Specified Assets by a Special Purpose Vehicle (the SPC Law)	Mortgage-Backed Securitization Company Act	Companies Act
Publish mortgage vehicles/secondary mortgage institutions	n.a.	Hong Kong Mortgage Corporation (HKMC)	Government Housing Loan Corporation*	Korea Mortgage Corporation (KoMoCo)	National Mortgage Corporation (Perbadanan Cagaran Malaysia—CAGAMAS)
Year of incorporation	n.a.	1994	1950	1999	1986
First MBS issued	n.a.	1999	2001[a]	2001	1987
Value	n.a.	HK$1.63 billion	JPY 50 billion	KRW 397.6 billion	M$100 million
Type of MBS instrument	n.a.	Pass-through MBS	Fixed-rate residential mortgage-secured pass-through notes	Pass-through MBS with senior/ subordinated structure	Mortgage-Backed Bonds
Prevailing mortgage type	Adjustable Rate Mortgage	Adjustable Rate Mortgage	Adjustable Rate Mortgage	Adjustable Rate Mortgage	Adjustable Rate Mortgage
Major public mortgage lenders	Housing Development Board (HDB)	n.a.	Government Housing Loan Corporation (GHLC)[b]	Kookmin Bank & Housing & Commercial Bank of Korea (H&CB)	Malaysia Building Society Berhad (MBSB) & Borneo Housing Mortgage Finance Berhad (BHMF)
Prime Lending Rate (2001)	5.30%	5.17%	1.85%	7.70%	6.66%

Notes:
[a] The earliest issuance of RMBS in Japan is by private institution, Sanwa Bank, placed in Japan in May 1999 valued at US$450 million However, the first MBS issue by GHLC—Housing Loan Corporation Bond No 1, was always regarded at the cornerstone development of RMBS in Japan.
[b] GHLC was established in 1950 as a public housing loan provider, and its role expanded subsequently to securitizing its loan portfolio.

is rather straightforward. Cagamas is involved primarily in buying housing loans from banks and finance companies. The first pool of mortgages was completed in October 1987 amounting to US$38.5 million (RM$100 million). Four types of mortgages are included in the Cagamas mortgage purchase program: conventional mortgages, Islamic housing debts, industrial property loans, and hire purchase and leasing debts.[5] The purchase of the loan pool is funded by the issuance of Cagamas debt securities. Cagamas helps to inject liquidity into the financial institutions through this securitization process, and at the same time, it reduces home financing costs and makes home purchases more accessible to borrowers. As of late December 2001, Cagamas securitized 18.9% of the outstanding housing loans of the financial institutions, which consists of 171,593 loans with a value of US$1,927 million (RM$7,321 million). With the floatation of Cagamas debt securities via the principal dealers (PDs) system, Cagamas bonds indirectly contribute to the deepening of the private debt securities market in Malaysia. As of late November 2002, the outstanding Cagamas debt securities stood at US$6.6 billion (RM25.1 billion).

Hong Kong has one of the most developed secondary mortgage markets in Asia. Securitization began in 1994 with the first pool of residential mortgages securitized by the Bank of America. The proposal of creating a mortgage corporation was first discussed in 1994. At that time, Hong Kong enjoyed sound economic fundamentals and had a primary mortgage market that was running smoothly. The impetus for creating an active RMBS market came primarily from a belief that the future supply of housing finance would not be able to meet the expected demand. The Hong Kong Monetary Authority (HKMA) estimated the potential shortfall in housing finance in year 2005 to be about US$92 billion (HK$711 billion)[6] (Lamoreaux, 1998).

The incorporation of the Hong Kong Mortgage Corporation with a paid-up capital of US$129 million (HK$1 billion) in March 1997 was a strong commitment of the Hong Kong Monetary Authority (HKMA) to promote the secondary mortgage market. The HKMC began operation in October 1997 and purchased the first batch of 526 loans worth US$84.1 million (HK$650 million) from four approved banks in November 1997.[7] As of end 2001, the total net mortgage portfolio of HKMC stood at US$2.54 billion (HK$19.78 billion), which represents 3.74% of the total outstanding loans (US$67.76 billion or HK$528.5 billion) for the year. The funding of the purchase was mainly obtained through unsecured HK dollar notes or debt issuance programs. The outstanding amount of the HKMC debt securities was US$2.57 billion (HK$20.05 billion) at the end of 2001.

Compared to the Cagamas mortgage-backed bond program, which stops short of transferring the ownership rights of the mortgage pool to the investors, the HKMC MBS program moves one step ahead into the pass-through arrangement. It packages mortgages with payment guarantee and transfers them to a bankruptcy remote special purpose company (SPC).[8] This SPC then sells the MBS back to the selling bank in the so-called ‘‘back-to-back pass-through’’ arrangement. Two major tranches of back-to-back MBS of US$0.21 billion (HK$1.63 billion) were issued to the Dao Heng Bank (US$0.13 billion or HK$1 billion) and to the American Express Bank (US$81.38 million or HK$630 million) in October and December 1998, respectively. Another breakthrough in the HKMC securitization effort is the introduction of the bond-type MBS pay-through program, which saw the inaugural multi-currency issue of US$0.26 billion (HK$2 billion) through the Bauhinia SPC in March 2002. The issue collateralized against a pool of high quality residential mortgages was divided into a HIBOR[9]-based coupon tranche of US$0.15 billion (HK$1.2 billion) and a prime rate-based coupon tranche of US$0.1 billion (HK$0.8 billion).[10] With an expanded range of MBS programs and a sophisticated regulatory framework in place, HK is well positioned towards becoming the most securitization-friendly jurisdiction in Asia.

The Asian Financial Crisis gave the impetus for rapid transformation and reform of the financial sector in Korea, and the development of the mortgage securitization market in Korea has also progressed since then. The first Asset-Backed Securitization (ABS) law was enacted in 1998, which allows financial institutions in Korea to securitize various kinds of assets including mortgages. The Korean Exim Bank and the Industrial Bank of Korea were the two private financial institutions that took the lead in securitizing their international loan receivables worth US$265 million and US$106 million in December 1998 and February 1999 respectively (Lam, 2002). The cornerstone of the MBS development was cast in 1999 following the enactment of the ''Mortgage Backed Securitization Company Act'' on January 20, 1999, and also the incorporation of the Korea Mortgage Corporation (KoMoCo) on September 21, 1999.

The KoMoCo securitization process takes the form of a mortgage-backed bonds and/or a mortgage pass-through (MPT) structure. In the MPT structure,[11] KoMoCo will purchase mortgages from financial institutions and transfer them with additional payment guarantee to a trustee, such as KoMoCo trust. The trustee then transforms the mortgage pool into tradable MBS and sells these to potential investors. Mortgage holding is not permitted for KoMoCo under the current MBS Company Act. In other words, the transfer of the mortgages of lending institutions will only occur when the mortgage volume accumulates to a critical size.[12] The funds collected from MBS issuance are channeled back to KoMoCo as acquisition capital. The mortgage selling institutions will continue to assume the roles of a servicer in the MBS process.

After three years of operation, KoMoCo has issued and placed out seven MBS with a total issuance value of US$1.97 billion (KRW 2,549.77 billion) collateralized against pools of 350,139 mortgage loans. The increase in the spread between the mortgage interest rate and the government bond rate in the post-1997 periods has created a favorable market environment for the further development of MBS in Korea (Lee, 2002). However, the high concentration of outstanding mortgages in two government-linked agencies: National Housing Fund (NHF) and the private Kookmin Bank, which control 90.7% of the mortgage market share in Korea, restricts the involvement of other financial institutions in the MBS market (Lam, 2002; and Lee, 2002). The increase in the origination of short-term 3-year bullet loans by lenders after 1999 also set back the development of the MBS market. These short-term mortgages are less attractive for MBS investors (Cho, 2002; Kim, 2002; and Lee, 2002).

Japan is another East Asian country that has had a relatively slow start in the securitization of residential mortgages. Securitization of contingent claims like equipment leases, consumer loans, auto loans and credit card receivables has been regulated by the 1993 MITI law (Law for Regulating Business for Specific Claims), which simplifies the assignment process by exempting the need to serve notarially certified notices on individual obligors. Residential mortgages, which do not fall within the definition of ‘‘specific claims’’ under the MITI law, however, are not exempted from the notarially certified notice requirement. This indirectly increases the securitization cost for this class of non-MITI claims. The need to obtain borrowers’ consents prior to the mortgage assignment is disruptive to the banks’ long-term business relationships with borrowers. Banks perceive this as an obstacle to their plans to securitize their residential mortgages. In a series of major financial reforms initiated by the former Prime Minister Hashimoto in late 1996, several changes to the regulations that facilitate more efficient securitization have been announced. Two important changes to the regulations are the Law Relating to Exception to the Requirement for the Perfection of Assignment of Receivable (the Perfection Law)[13] and the Law on Securitization of Specified Assets by a Special Purpose Vehicle (the SPC Law). Both laws that came into effect in 1998 have significantly boosted asset securitization in Japan.

The RMBS market took off in Japan in May 1999 with the first public RMBS issuance of US$450 million secured against 5000 single-family mortgages. Total RMBS market value has since increased more than three times from US$1.17 billion (JPY 120.2 billion) in two issues during the financial year 1999 to a total of US$4.6 billion (JPY 470 billion) in 10 RMBS issues during the financial year 2000. The most significant milestone in the Japanese RMBS market was marked by the inaugural issue of the US$0.38 million (JPY 50 million) GHLC’s MBS in March 2001. The largest public mortgage lender also pledged to launch more RMBS issues and on a more regular basis. However, the government’s impending review and reform of the GHLC, which may lead to the abolition of the institution in the end of 2005, could be seen as a setback to the Japanese RMBS market.

Real Estate Securitization in Singapore: The RMBS Missing Link?

The development of the real estate related securitization market in Singapore is not motivated by the liquidity crunch during the regional economic turmoil. In fact, the first mortgage-backed bond (MBB) of US$8.5 million (S$18.5 million) was issued in 1986 by a private developer, Hong Leong Holdings Limited, who pledged the mortgage on its office building (Hong Leong Building) in the downtown central business district. Property companies, especially unlisted ones,[14] had been actively taping the capital markets[15] in the mid 1990s by issuing MBB to raise medium- to long-term funds directly from the public investors. Over a five-year period from 1994 to 1998, there were seventeen issues of MBB. The total amount of MBB issued since 1986 is US$1.16 billion (S$2.53 billion) representing less than 0.8% of the total outstanding bond issues (Exhibit 2). Most of the bonds issued have a term to maturity of 5 years. The average coupon of these bonds is 247 basis points higher than that of equivalent government bonds, reflecting the premium that the borrowers have to offer to entice investors to take-up these bonds. The average issue size is US$83

Exhibit 2
Mortgage-Backed Bonds Issued in Singapore

S/NO.	Issuer	Issue Date	Term	Principal (S$)	Coupon (%)
1	Hong Leong Holdings Ltd	1986	5	18,500,000	7.250
2	Orchard Parade Holdings Ltd	1992	5	51,000,000	5.625
3	Avenbury Property Ltd	1994	5	50,000,000	4.700
4	Goldenview Properties Ltd	1994	5	88,000,000	5.125
5	Orchard Parade Holdings Ltd	1994	5	93,000,000	6.090
6	Orchard Parade Holdings Ltd	1995	5	150,000,000	5.700
7	Branbury Investment Ltd	1996	5	210,000,000	4.930
8	CDL Properties Ltd	1996	5	280,000,000	5.500
9	Eunos Link Technology Park Ltd	1996	5	100,000,000	5.625
10	PLPM Properties Ltd	1996	7	350,000,000	5.060
11	Seasons Green Ltd	1996	5	60,000,000	6.500
12	Century Square Development Ltd	1997	5	146,000,000	5.060
13	Dover Rise	1997	3, 4	130,000,000	6.07–6.20
14	Guthrie GTS	1997	5	75,000,000	3.020
15	MCL Land (RQ) Ltd	1997	5	90,000,000	5.090
16	Orchard 290 Ltd	1997	5	270,000,000	4.600
17	Orchard 300 Ltd	1997	5	180,000,000	4.875
18	Superbowl Holdings Ltd	1997	5	30,000,000	3.530
19	Leonie Condotel Ltd	1998	5	162,000,000	7.120

Note: The source is Ong, Ooi and Sing (2000).

million (S$133 million). The largest 7-year MBB of US$249.8 million (S$350 million) was issued in 1996 by PLPM Properties, a fully-owned subsidiary of Pontiac Marina, to finance the construction of its mega office project, Millennia Towers.

The earlier MBB tranches were placed privately with institutional investors and some wealthy retail investors (Quek, 1996). There was no active secondary market. The bonds were usually held to maturity. To further promote liquidity and to broaden the debt instrument types in the secondary debt market, the Monetary Authority of Singapore (MAS), the *de-facto* central bank of Singapore, has recommended asset-backed securitization (ABS) in its strategic debt capital market plan in 1998 (Lee and Ang, 1998; and Wong, 1998). The first ABS deal occurred in late 1998 when the locally listed Neptune Orient Lines (NOL) sold its flagship office tower, the NOL Building at Alexandra Road for US$110.8 million (S$185 million) (Ong, Ooi and Sing, 2000). This first ABS deal together with the ABS guidelines introduced by MAS sparked off a series of physical asset securitizations since 1999. Investment property securitized as of the end of 2002 totaled US$821 million (S$3.58 billion) (Exhibit 3).

Exhibit 3
Asset-Backed Securitization (ABS) in Singapore

Date	Seller/Originator	Real Estate Assets	Price (S$ mil)
May 1999	CapitaLand/ DBS Land	Robinson Point	$193.0
July 1999	CapitaLand/ Pidemco	The Clearwater[a]	$100.0
August 1999	CapitaLand/ DBS Land	268 Orchard Rd	$184.0
September 1999	First Capital Corp	Century Square Shopping Centre	$130.0
November 1999	CapitaLand/ DBS Land	Six Battery Rd	$878.0
November 1999	CapitaLand/ DBS Land	DBS Tampines Centre	$180.0
September 2000	Tan Chong International	Willy Residence[a]	$146.0
June 2001	CapitaLand/ DBS Land	Raffles City	$984.5
May 2002	Al Khaleej Investments/Wisma Development Pte Ltd	Wisma Atria Shopping Mall	$451.0
November 2002	Fraser and Neave Limited	Compass Point Shopping Centre	$335.0

Note:
[a] Residential condominium

Despite the success of the ABS, securitizing residential mortgages has not yet developed in Singapore. Financial institutions in Singapore have been hesitant to exploit the RMBS opportunity even though the government has given its support. Are the financial institutions overconservative in securitizing their residential mortgages? Are the institutional frameworks too restrictive in facilitating the RMBS? The barriers that restrict the development of RMBS in Singapore are evaluated in the following section.

Interest rate risk is low in Singapore because residential mortgages are originated predominantly on an adjustable rate basis. The credit risk is also low (Ong and Thang, 2001)[16] in Singapore due partly to the stringent underwriting criteria[17] imposed by financial institutions in Singapore. Residential mortgages are therefore regarded as the ‘‘golden geese’’—one of the most lucrative and low risk assets, in the balance sheet of commercial banks and finance companies in Singapore. They are reluctant to part with their residential mortgages via securitization. Moreover, based on the newly proposed Basel Capital Accord of the Bank of International Settlements (BIS) revised in 2001, fully secured residential mortgages offer a risk-based capital weight of only 50%, which translates to a minimum capital ratio of 4% (based on a minimum capital adequacy ratio of 8%). The lower capital reserve requirement in holding residential mortgages increases the liquidity of the financial institutions. The financial institutions are, therefore, not pressed to securitize their residential mortgages at this time.

Another barrier holding back financial institutions is the fear of possible disruption of the business relationships they have established with their mortgagors over the years. Although the former may continue to serve customer as mortgage servicers, the flexibilities in allowing mortgagors to refinance and restructure the loans during difficult times would be withdrawn.

Commercial banks in Singapore have enjoyed a strong liquidity position of 25.5% as at first quarter 2002, compared with the minimum liquid asset of 18% required by the MAS. Based on first quarter 2002 MAS statistics, the excess liquid asset stood at US$4.69 billion (S$8.28 billion), which equal approximately 19% of the US$24.62 billion (S$43.42 billion) housing loans outstanding during the same period. Two other changes to MAS banking policies, namely the lowering of the minimum cash balance from 6% to 3% in July 1998 and the reduction of the Tier 1 Capital Adequacy Ratio from 12% to 8%[18] in September 2000, have further strengthened the liquidity position of the local licensed banks. Moreover, the loans and advances of commercial banks have been consistently lower than total deposits since 1998. As of March 2002, the total loan-to-deposit ratio was 0.86, which means that on every S$1 of deposit received by banks, only S$0.86 was translated into a loan. Based on the above statistics, the commercial banks and finance companies in Singapore appear to be flooded with liquidity. This implies that securitizing mortgages would not be the main priority for the financial institutions in the near future.

Banks and finance companies have recently been engaging in an aggressive ''price war'' to increase their market share of residential mortgages. Banks have been offering competitive interest rates, and also teaser rate incentives, which can go as low as 1.33% in the first year (by ABN AMRO bank), to attract new homebuyers (Quak, 2002). The tightening of the spread between the mortgage interest rate and the prime lending rate has been another possible barrier that reduces the attractiveness of residential mortgage securitization.

Potential of the RMBS in Singapore

In the current low interest rate environment coupled with the excess liquidity faced by banks and finance companies in Singapore, selling residential mortgages through securitization will not be appealing to the financial institutions. Instead, they are competing aggressively to entice new homebuyers by offering them preferential interest rate loans. The benefits of securitizing residential mortgages will be more apparent when liquidity is drying up and the need to inject new capital becomes more urgent for the financial institutions. This section attempts to evaluate the depth of the primary residential mortgage market in Singapore, and also to assess the appetite of potential investors towards these mortgaged-backed debt securities. Comparative statistics of other Asian RMBS markets will be drawn on in the following analysis.

Primary Mortgage Market

Based on the 2000 census statistics of Singapore, about 92.3% of households own their own home, out of which 88% of the households stay in public flats.[19] As almost all homeowners take mortgage loans in their home purchase, the high home ownership rate underpins a mature and developed primary mortgage market. The primary mortgage market in Singapore is divided into public and private sector markets. The Housing and Development Board (HDB) is the major public housing loan originator, which provides both concessionary[20] and market-rate housing loans for public housing owners. Private sector mortgagees consist of banks and finance companies, which offered housing loans predominantly to private house purchasers prior to January 1, 2003.[21] The distribution between the private and public sector loans as in 2001 was approximately 59% and 41% respectively.

The historical statistics on the outstanding housing loans in Singapore in both the private and the public sector markets are summarized in Exhibit 4. The total outstanding loans advanced to purchasers of public and private houses as at yearend 2001 were US$58.12 billion (S$106.38 billion) consisting of US$23.79 billion (S$41.33 billion) loans by private commercial banks and finance companies and US$34.33 billion (S$62.92 billion) loans by the public housing agency, HDB. Out of the US$34.33 billion (S$69.92 billion) HDB loans, approximately 63% was granted on concessionary rate to the first time HDB homebuyers and the second-time HDB upgraders.

In terms of the sheer scale, the primary residential mortgage market of Singapore is comparable to the Hong Kong and Korean markets, which have total outstanding housing loans of US$67.77 billion and US$43.50 billion (private bank loans) respectively (Exhibit 5). There is sufficient depth in the primary residential mortgage market in Singapore for operating a RMBS market.

Exhibit 4
Outstanding Private and Public Sectors Housing Loans in Singapore

	Private Sector Housing Loans				
Yearend	Commercial Banks	Finance Companies	Combined Private Sector Loans	Public Sector Housing Loans by HDB (S$ million)	Total Outstanding Housing Loan (S$ million)
1993	11,718.5	1,826.9	13,545.4	13,515.0	27,060.4
1994	14,702.8	2,314.2	17,017.0	17,658.0	34,675.0
1995	17,482.8	2,637.3	20,120.1	22,987.0	43,107.1
1996	20,402.3	3,221.1	23,623.4	30,196.0	53,819.4
1997	22,934.8	3,721.7	26,656.5	38,758.0	65,414.5
1998	31,788.5	3,821.2	35,609.7	49,092.0	84,701.7
1999	35,154.1	3,500.1	38,654.2	56,095.0	94,749.2
2000	38,562.5	2,768.0	41,330.5	60,053.0	101,383.5
2001	41,731.2	1,884.7	43,615.9	62,921.0	106,536.9

Notes: The sources are the Annual Reports of Housing and Development Board and Monetary Authority of Singapore.

Exhibit 5
Depth of Asian Primary Mortgage Markets (in $US billion)

	Total Outstanding Housing Loans				
Year	Singapore[a]	Hong Kong[b]	Japan[c]	Korea[d]	Malaysia[e]
1993	16.89	28.36	370.45	n.a.	n.a.
1994	23.67	30.66	425.43	35.27	n.a.
1995	30.53	35.25	469.29	42.37	n.a.
1996	38.41	42.73	455.60	44.07	14.20
1997	40.99	55.04	438.52	37.48	12.93
1998	51.40	59.33	524.61	34.58	13.34
1999	56.65	61.55	635.82	39.63	10.57
2000	57.63	66.89	597.87	46.35	12.71
2001	58.12	67.77	n.a.	43.50	15.56

Notes: The sources are:
[a] Monetary Authority of Singapore Annual Reports
[b,c] Hong Kong Mortgage Corporation & Datastream
[d] Bank of Korea Statistics
[e] Bank Negara Malaysia (Malaysia Central Bank) Monthly Statistics Bulletin

Interest rate risk is not critical in countries like Hong Kong, Korea, Malaysia and Singapore because residential mortgages in these countries consist predominantly of the floating rate type loans. However, sector risk as a result of the high concentration of housing loans in the total loans advanced by banks and financial institutions in selected Asian countries such as Singapore (24.94%) and Hong Kong (24.19%), and to a lesser extent in Japan (15.03%), Korea (15.73%) and Malaysia (12.11%),[22] may induce banks and financial institutions to divest their residential mortgage loans and also to improve their balance sheet management via securitization.

Debt Securities Market

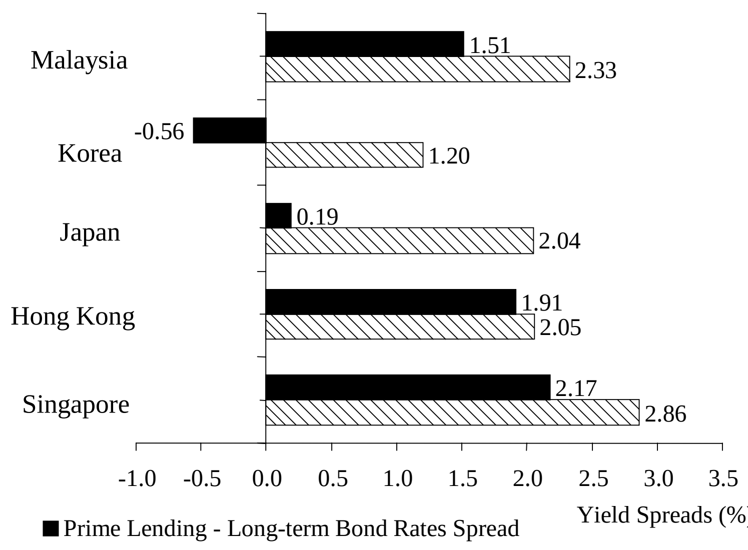
Following the Asian Financial Crisis in 1997, the Singapore government has adopted a two-prong approach to actively promote and broaden debt security market activities. The MAS and various government agencies such as the Jurong Town Corporation (JTC)[23] and the HDB have been issuing government securities and bonds to deepen the bond market. The MAS has also revised the dollar internationalization policy to allow more multi-nationals and high-quality foreign corporations to tap the S$ bond market. The corporate debt volume has since doubled from US$19.42 billion (S$32.00 billion) in 1988 to US$44.08 billion (S$80.80 billion) in 2001. The debt market offers considerable potential for corporations to diversify their funding risks by not overly relying on bank borrowing.

The launch of the first MBS fund backed by U.S. home loans by SG Asset Management in Singapore in November 2002,[24] and the issuance of US$170 million

(S$300 million) Freddie Mac bonds in June 2002[25] are two positive developments, which reflect the potential demand for debt securities issuance backed by domestic home loans in the Singapore debt market in the future.

The mortgage spread, which is defined as the difference between the fixed-rate mortgage interest rate and the Treasury bill rate, is highly sensitive to the shape of yield curve, mortgage interest rate volatility and home price volatility (Cho, 2002). The spread determines the risk premiums for RMBS and it has significant impact on the investors' preference for the instruments. Exhibit 6 shows the average spreads between, on the first hand, the prime lending rate and the long-term government bond yield rate and, on the second hand, the prime lending rate and the deposit rate of the five Asian markets for a 10-year period from 1992 to 2001. With the exception of the average −0.56% prime rate-bond yield spread in Korea, the yield spreads for all other

Exhibit 6
Yield Spreads (1992–2001) in Five Asia Countries



Notes: Datastream is the source of the figure.

	Long-term Bond Yield Rate	Deposit Rate
Singapore:	Average buying rates of government securities 7-year bond yield	1-year middle deposit rate
Hong Kong:	Inter-bank 1 year Middle rate	1-year middle deposit rate
Japan:	Long-term government bond yield rate	Deposit Rate
Korea:	Long-term government bond yield rate	1-year time deposits rate (1996–2001)
Malaysia:	Long-term government bond yield (10-year) (1996–2001)	Deposit Rate

countries were positive. The prime rate-bond yield spread of 2.17% in Singapore will offer attractive incentives for RMBS investors.

Potential of RMBS in Singapore

There are positive factors and policy changes, especially the Central Provident Fund (CPF) rules, which would clear the way for the development of RMBS in Singapore. A synthetic securitization structure, which allows banks to transfer their mortgage credit risks to investors without taking the assets off their balance sheet, is another positive development for RMBS in Singapore.

Central Provident Fund Factors

The Central Provident Fund (CPF) is a comprehensive compulsory social security saving scheme that is devised to provide retirement, homeownership, healthcare and insurance protection for its members, who are comprised of employees and self-employed persons in Singapore. Under the CPF public housing and residential properties schemes, members are allowed to use their CPF ordinary account savings and their future monthly contributions to the account to purchase public or private residential properties. CPF members can withdraw up to 100% of the savings in their CPF ordinary account and 100% of their monthly CPF contribution to pay for mortgage installments in their home purchase subject to a statutory limit, which is the lower of the market valuation or the purchase price.

If the housing loan is still outstanding when the limit is reached, they may still use the balance in their CPF account up to the Available Housing Withdrawal Limit (AHWL) to amortize their outstanding loans. The AHWL is set at not more that 80% of the gross savings in their ordinary and special accounts in excess of the minimum sum (currently is S$75,000).[26] The generous AHWL limit has led many members to over-commit in the property purchase, which as a result they are left with insufficient savings in the CPF accounts to support their retirement requirement. With effect from September 1, 2002, the government has capped AHWL at 150% of the valuation, and the limit will be further reduced to 120% of the valuation over five years, to enforce a more prudent management of the members' savings and to curb over-consumption in property.

For public housing purchased with loans obtained from the Housing Development Board (HDB), the first charge of the property will be given to the HDB, which is followed by the CPF board as the second chargee. Whereas for private properties purchased using private housing loans, the CPF board will assume the priority charge over the private banks and finance companies. In cases of default by the mortgagors, the CPF Board will have the first claim on the proceeds of the foreclosure sale and deposit back into the member's CPF account an amount equivalent to the total CPF withdrawn plus interests accrued. The remainder will then be distributed to other creditors. This first loss position assumed by private banks has been long regarded as one of the key obstacles for securitizing private residential mortgages in Singapore.

In September 2002, the government reversed the charging position for mortgage loans on private properties between the CPF board and financial institutions. The private financial institutions now have the first charge on private mortgaged properties over the CPF board. This policy change reduces the loss potential of private residential mortgages and makes them more attractive for securitization purposes. The transfer of the first lien on collateralized properties to private lenders removes the obstacle for the development of MBS in Singapore. As Diane Lum, director of structured finance at Standard & Poor's commented, "This will lower the amount of required credit support, and markedly improved the affordability of structured finance as a funding tool for banks."[27]

Devolution of the Public Mortgage Financing Role to Private Banks

In addition to the role of providing basic affordable public housing, the HDB also currently serves as the public housing mortgage lender. It currently offers two types of loans: concessionary loan and market rate loans, to buyers in the primary and resale HDB housing markets. The market rate loans are given to public housing buyers who are not eligible for the concessionary rate.[28] This role of HDB as the market rate lender will be transferred to private mortgage lenders with effect from January 1, 2003. The current excess liquidity in the private financial institutions will be channeled into the HDB market rate mortgage loans. When bank liquidity depletes, mortgage securitization will become an appealing option.

The HDB outstanding mortgage balances totaled US$35.67 billion (S$62.92 billion) at the end of FY 2001/2002, of which approximately 37% (US$13.2 billion, or S$23.28 billion) was made by the HDB at market rates. The sheer scale of these loans, which constitutes about 53.4% of the US$24.73 billion (S$43.62 billion) outstanding housing loans in the portfolio of commercial banks and finance companies, represents a huge potential for RMBS in Singapore, if HDB were to take them off its balance sheet either by direct sales to commercial banks and finance companies and/or by securitization.

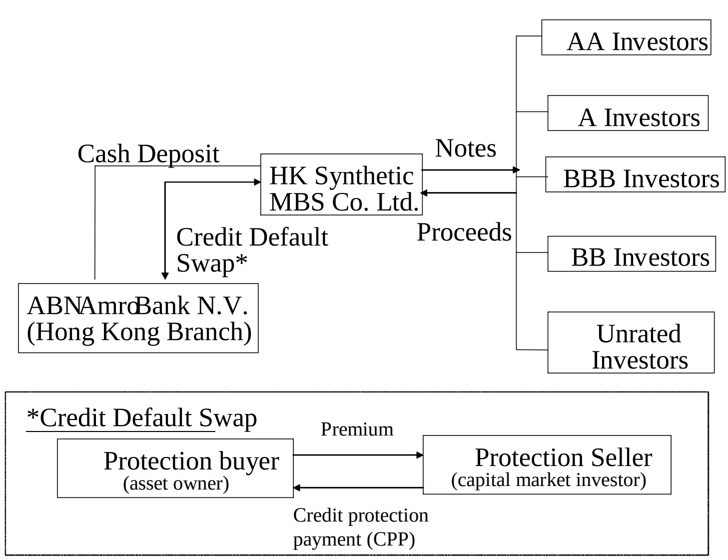
Synthetic Structure for RMBS in Singapore

The securitization of residential mortgages has generally taken the form of the pass-through technique, which involves the issue of debt/equity instruments by a Special Purpose Vehicle (SPV).[29] The payments of interest and principal on the debt securities are secured against mortgages purchased by the SPV from the originator. The "true sale" of mortgages could sever the link and disrupt the business relationships between banks and mortgagors. The stamp duties[30] incurred in the transfer of a pool of thousand of mortgages off the bank's book, on the other hand, increase the transaction costs in structuring the RMBS.

One creative way of eliminating the tedious off-balance transfer of mortgage in the securitization process is the use of a synthetic securitization structure. In the synthetic structure, banks can transfer mortgage credit risks of their collateralized debt obligations (CDOs) without disrupting the ownership right of the mortgage pools by using a credit default swap. The Development Bank of Singapore (DBS) has successfully securitized US$1.53 billion (S$2.8 billion) of its corporate loans in December 2001[31] using the synthetic collateralized loan obligations (Synthetic CLOs). The arrangement allows the bank to hedge credit risks in its corporate loans, and at the same time reduces its risk-weighted assets for its capital adequacy ratio requirement. The synthetic CLOs issued by the SPV-ALCO 1 Ltd, consist of US$122.41 million (S$224.37 million) collateralized mezzanine notes, which represent 8% of the reference portfolio, a top 87.5% ''super senior'' tranche hedged via unfunded credit default swaps and a bottom 4.5% ''first loss'' tranche retained by the issuer.

The ABN Amro (Hong Kong branch) issued the first synthetic RMBS rated by Standard & Poor's in December 2000. This US$0.16 billion (HK$1.26 billion) synthetic RMBS backed helps to bring the bank's regulatory risk weight assets down to 20%. In the synthetic structure as shown in Exhibit 7, a bank or a protection buyer transfers the credit risks to a protection seller via a ''credit default swap (CDS).'' The protection buyer pays a premium to the protection seller, who would in return cover the losses of the protection buyer upon the triggering of credit events that include bankruptcy and failure to pay. The SPV then complete the transfer of credit risk by issuing credit linked notes (CLNs) to investors. In the ABN Amro synthetic RMBS, the CLNs are fully funded, which means the proceeds of the notes are fully discharged and held in trust by the SPV, the HK Synthetic MBS Co. Ltd. The SPV deposits the

Exhibit 7
Synthetic Structure for Securitizing Mortgages in Singapore



Adapted from Standard & Poor's

cash proceeds with ABN Amro on behalf of the secured creditors, and the cash deposits also serve as 100% collateralization of the issuer's obligation towards the originating banks under the CDS.

In the case of default, the unrated subordinated notes, which are retained by the issuing bank, will bear the "first loss," and then the outstanding principal of the CLNs will be written down as losses in a pecking order following from the mezzanine notes to the "super senior" notes. Any principal outstanding after writing down credit losses will be distributed back to investors in the order of seniority at the end of the synthetic RMBS term. During the term of the CLNs, the note holders will receive regular cash flows generated from the interest earned on the cash deposit and also the swap premium from the issuing bank.

With the introduction of a 2-tier capital management framework under the Basel Capital Accord by the MAS, more banks would find the synthetic CDOs structure to be an attractive alternative to improve their capital management and also to increase their Capital Adequacy Ratio (CAR) in the near future.

Conclusion

In recent years, residential mortgages has been securitized effectively to manage mortgage related risks such as interest rate risk, credit risk, funding risks and sector concentration risks by financial institutions in many Asian countries. The rapid growth of RMBS in Asia is attributed to the liberalization of financial and banking sectors in these countries. In Korea and Japan, the liquidity crunch after the 1997 currency crisis has to some extent accelerated the securitization trends in the countries.

In Singapore, the development of RMBS market has been slow, despite strong support by the government via revising securitization guidelines and making changes to policies that are favorable for the RMBS development. The transfer of the first lien on the property financed via private loan to private banks, and the shift of the HDB's role in providing market rate mortgages to private banks are the two most significant housing finance policy changes in 2002 that have significant impact on the development of RMBS market. The current excess supply of liquidity and the perceived loss in the long-term relationship with the existing mortgagors/clients were the two main barriers that stand in the way of banks in securitizing their residential mortgages. These obstacles, however, can be overcome with the advancement in securitization technology, which uses a synthetic CDO structure to facilitate the transfer of banks' credit risks without having to remove the mortgages off the books.

Secondary mortgage institutions such as KoMoCo, Cagamas, HKMC and the GHLC in Japan, have played a catalyst role in creating the RMBS markets in these countries. The experience in these Asian countries may suggest that government initiatives may be required to help kick-start the development of RMBS market in Singapore. The HDB, which have a total market rate home loan portfolio of US$13.2 billion (S$23.28 billion), is in a good position to spearhead the development of RMBS in Singapore.

The securitization of the HDB market rate loan proposal, if adopted, may give a strong signal of the government's determination in promoting a well-structured RMBS market.

Endnotes

1. Freddie Mac was created through the enactment of the Emergency Home Finance Act (1970) to enhance the lending and liquidity of the conventional loans market, which has been long neglected by the two earlier government sponsored SMIs: GNMA and FNMA.
2. There is no designated mortgage corporation like the KoMoCo being set up to spearhead the MBS development in Japan. The GHLC is the primary public RMBS issuers of residential mortgages, which are generally unsecured.
3. Comments by Masaru Hayami, the Governor of Bank of Japan, in his speech ''Toward Further Development of Capital Markets—To Support Smooth Corporate Finance'' delivered at the Capital Markets Research Institute on December 9, 2002.
4. This was expressed in the keynote address ''Opportunities in Asian Debt Markets—Strategies to Deepen the Singapore Debt Market,'' by the Second Minister for Finance, Singapore, Lim Hng Kiang, at the Finance Intelligence Asia—Asian Financial Markets Conference, May 2, 2000.
5. The mortgage criteria and Cagamas mortgage purchase facilities are listed on Cagamas's website at http://www.cagamas.com.my.
6. Based on the exchange rate of US$1 to HK$7.7987 in 2002.
7. The HKMC accepts both fixed and floating rate mortgages from banks, and the criteria of its mortgage purchase programs can be found at its website: http://www.hkmc.com.hk.
8. The bankruptcy remote SPC is created to isolate credit risks of the MBS from the originator. It enhances the credit rating of the MBS because the bankruptcy remote structure shields MBS investors against bankruptcy risks of the originator.
9. Hong Kong Interbank Offered Rate.
10. The Bauhinia MBS issue was rated Aa3 by Moody's and AA by Standard & Poor's. It was divided into two tranches: the class A-1 notes carry a coupon yield of Hong Kong Prime Rate—2.75% per annum, and the class A-2 notes distribute a coupon of 1-month HIBOR +0.25% per annum.
11. The MPT structure and mortgage securitization process in Korea are available at KoMoCo's website at http://www.komoco.co.kr.
12. The MBS Company Act restricts mortgage holding and accumulation by KoMoCo, which impedes an efficient operation of KoMoCo securitization. Following other secondary mortgage corporations like FNMA, FHMLC, HKMC, this restriction is being revised to confer greater flexibility for the KoMoCo in planning their mortgage acquisition program (Lee, 2002).
13. The Perfection Law simplifies the assignment of mortgages from banks to the SPC by exempting the assignees (banks) from having to obtain consents from individual assignors (borrowers). Under this law, the assignment against third parties can be perfected or completed by filing a registration statement with a Legal Affairs Bureau.
14. For private companies under family control, listing on the stock exchange may not be an attractive option because of the public disclosure requirements and the possible dilution of control (Quek, 1996).

15. The traditional source of funding for property acquisition and investment in Singapore is commercial banks. The main disadvantage of such indirect loans is the reluctance of lenders to provide medium or long-term fixed-interest rate loans (Ong, Ooi and Sing, 2000).
16. In an empirical study by Ong and Thang (2001) using a sample of 668 residential mortgage loans from a local financial institution, there were only 35 loans prepaid during the sample period. The probability of prepayment was estimated to be 5.24%.
17. The maximum loan-to-value ratio for residential mortgage loan is not more than 80%, and the mortgagor has to come up with 20% equity for the balance of the property price. Prepayment penalty is also levied by some banks. These are factors that discourage borrowers to prepay their loan prior to maturity.
18. Since 1992, Singapore banks have been required to maintain a Capital Adequacy Ratio (CAR) of 12%. The 2000 policy change maintains the total CAR at 12%, but it allows 4% out of the 12% CAR to be composed of Tier 2 capital asset. This brings the Singapore's CAR standard closer to the BIS standard, which is set at 8% consisting of 4% Tier 1 capital and 4% cheaper Tier 2 capital.
19. There is a two-tier housing market in Singapore. Public housing units are mainly developed and allocated by the Housing Development Board (HDB), a government housing agency, at a subsidized rate to qualified households. The private housing market consists of private housing units consisting of apartments, condominiums and landed houses, developed by private developers and sold at market price to local residents and foreigners (Ong and Sing, 2002).
20. HDB makes two types of loans to the two groups of buyers. Concessionary rate loans are subsidized loans given by HDB with the objective of promoting home ownership. The interest rate for such loans is pegged at the Central Provident Fund (CPF) interest rate plus 0.1%. The current interest rate (April 2003) for the CPF ordinary account is 2.5%. For the market rate loans offered by HDB, interest rate is pegged to the rate of Credit POSB (a privatized bank) home loan, which has dropped from 3.5% to the current low rate of 2.55% (floating) (April 2003).
21. Beginning January 1, 2003, private banks and finance companies were allowed to offer market rate loans to public housing owners, who are not eligible for the HDB subsidized mortgage loans. The convergence of the concessionary loan rate and the competitive market interest rate offered by private banks has motivated many HDB homebuyers to switch to private home loans.
22. The statistics on the private sector residential mortgages loans and total loans were obtained from various sources, which include Monetary Authority of Singapore Annual Reports, Hong Kong Mortgage Corporation, Datastream, Bank of Korea Statistics and Bank Negara Malaysia (Malaysia Central Bank) Monthly Statistics Bulletin. The loan concentration figures were estimated based on year 2001 figures for all the sample countries with the exception of Japan. The residential to total loan ratio for Japan was computed based on year 2000 figures.
23. The Jurong Town Corporation is a government's statutory board that is responsible for the development of industrial facilities and infrastructure in Singapore. It is the largest provider of public industrial facilities, which include industrial lands and custom-built factories.
24. Edna Koh states: ''SG Asset launches unit trust backed by US home loans.'' *Straits Times*, November 25, 2002.
25. Edna Koh states: ''Foreign companies prop up S$ bond market.'' *Straits Times*, June 3, 2002.

26. The detailed illustrations of how the CPF ordinary account savings and the future monthly contribution to the account can be used to pay for the monthly mortgage installment in the purchase of public and private residential properties can be found in the CPF Board website at http://www.cpf.gov.sg.
27. Rob Davies states: ''Changes to mortgage rules positive for Singapore MBS market.'' FinanceAsia.com, July 26, 2002.
28. This group of HDB flat buyers who are not eligible for concessionary rate loans includes Singapore permanent residents, private property owner, households with income exceeding S$8,000 per month, buyers who have already enjoyed two concessionary loans and also buyers who have already taken one concessionary loan and are not upgrading to a larger flat type.
29. A SPV is usually a trust company, which is set up to hold the mortgages in trust for the MBS investors. The SPV is remote from the originator, and it is thus insulated against any default risks of the originator.
30. Stamp duty is a tax on commercial and legal documents that give effect to the transactions. It is not a tax on the transaction. In Singapore, stamp duty is levied ad volorem based on the market value of a real estate transaction. If the open market value recorded in the conveyance document is found to be inadequate, the tax authority of Singapore—the Inland Revenue Authority of Singapore (IRAS)—has the right to adjudicate the true market value.
31. ''DBS securitizes $2.8b corp loans.'' *Business Times Singapore,* December 22, 2001.

References

Cho, M. Managing Mortgage Risks: A Tale of Three Countries. Paper presented at the AsRES-AREUEA Joint International Conference. Seoul, Korea, 2002.

Collyns, C. and A. Senhadji. Lending Booms, Real Estate Bubbles and the Asian Crisis. IMF Working Paper, WP/02/20. 2000.

Davies, R. Changes to Mortgage Rules Positive for Singapore MBS market. FinanceAsia.com. July 26, 2002.

Kim, T. A Survey of Mortgage-related Securities and their Relevance for Korea. Paper presented at the AsRES-AREUEA Joint International Conference. Seoul, Korea, 2002.

Koh, E. SG Asset Launches Unit Trust Backed by U.S. Home Loans. *Straits Times,* November 25, 2002.

——. Foreign Companies Prop Up S$ Bond Market. *Straits Times*, June 3, 2002.

Krugman, P. What Happened to Asia? Working paper available at http://www.mit.edu/krugman, January 1988.

Lam, E. A Primer for Investors in the Korean MBS Market. *Journal of Real Estate Portfolio Management*. 2002, 8:2, 127–40.

Lamoreaux, P. A Busy Year for the Hong Kong Mortgage Corporation. *Housing Finance International*. 1998, 13:1, 33–42.

Lee, J. Mortgage Securitization in Korea. Paper presented at the AsRES-AREUEA Joint International Conference. Seoul, Korea, 2002.

Lee, H. S. and W. M. Ang. MAS Looking into Setting Up a Mortgage Corp. BTOnline. July 21, 1998.

Mizuho Securities Co. Ltd, ABS Market in Japan—Review of 1st half of 2002. *Special Report* by Mizuho Securities. November 2002.

Ong, S. E., J. Ooi and T. F. Sing. Asset Securitization in Singapore: A Tale of Three Vehicles. *Real Estate Finance*. 2000, 17:2, 47–56.

Ong, S. E. and T. F. Sing. Price Discovery between Private and Public Housing Markets. *Urban Studies*. 2002, 39:1, 57–67.

Ong, S. E. and D. Thang, Prepayment Rate in Individual Residential Mortgages: An Evaluation of Macroeconomic and Mortgage-Specific Factors. National University of Singapore-Department of Real Estate Working Paper. 2001.

Quak, H. W. End in Sight for Home Loan War? *Business Times Singapore*. August 30, 2002.

Quek, K. M., Commercial Real Estate Securitization in Singapore: A Case Study, Unpublished M.Sc. (Real Estate) dissertation. School of Building and Estate Management, National University of Singapore, 1996.

Quigley, J. M. Real Estate and the Asian Crisis. *Journal of Housing Economics*. 2001, 10, 129–61.

Wong, W. K. MAS Task Force Clearing the Way for Asset Securitization. BTOnline. July 27, 1998.

The authors wish to thank Gangzhi Fan, Poh Har Neo and Lim Chai Hoon for their assistance in collecting and compiling the statistics. The comments made by Arthur Schwartz and two anonymous referees are also appreciated.