



LUND UNIVERSITY
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Master's Programme in Economic Growth, Population and Development

The Debt Shift and Its Consequences

An Analysis of the Effect of Property Lending on House Prices in South Korea

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Abstract: This thesis analyzes the consequences of the debt shift in South Korea and explores whether the expansion of property-related lending causes the rise in residential property prices. By making use of quantitative methods, such as statistical analysis and econometric techniques, the thesis studies the causal relationship between the expansion of property-related loans, which includes both mortgage and real estate loans, and the increase in residential property prices in Korea. It finds that the direction of causation between property-related lending and house prices is unidirectional, with the Granger causality test revealing that the past values of the change in property-related loans are significant in forecasting the rise in house prices at the 10 percent level. Statistical analysis has also shown that the rise in household and real estate lending in Korea has led to higher levels of household debt and housing inequality, while crowding out loans to productive manufacturing industries. In line with the theories by Schumpeter, Kindleberger, and Minsky, the findings highlight the relationship between the growth of 'unproductive' lending and asset prices, which could have adverse effects on the economy. The findings justify the use of macroprudential regulations and the return of selective credit controls to monitor and restrict the quantity of property-related loans to preserve financial stability in the future.

Keywords: debt shift, property-related lending, household debt, housing inequality, house prices, South Korea

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1. Introduction

From the 1960s to the 1990s, South Korea (Korea hereafter) was one of the fastest growing economies in the world as it transformed from an agrarian society to an industrial and technological powerhouse. To explain Korea's economic ascent, scholars have emphasized its export-oriented growth model and the important role of the Korean 'developmental state' that intervened strategically in the economy to nurture the development of key industries. When Park Chung Hee assumed power in 1961, he reorganized the entire state bureaucracy and set up 'pilot agencies', such as the Economic Planning Board, that were committed to economic development, had the capacity to implement selective industrial policies, and the embedded autonomy to foster close state-business relationships (Amsden, 1989; Evans, 1995; Kim, 1997; Kim, 2020).

In line with Gerschenkron's (1962) catching-up model, Korea was a 'latecomer' to development that relied on state intervention in the financial system to direct the allocation of credit to sectors deemed important for economic development and export-led industrialization. During the 1980s and 1990s, however, the Korean government began to deregulate and liberalize the economy as industries matured and no longer relied on government aid and protection. State-owned commercial banks were privatized, sectoral industrial policies were abandoned, and the capital account was gradually liberalized by the early 1990s, weakening the capacity of the state to intervene in the economy (Pirie, 2008). It can be argued that premature deregulation and financial liberalization made the Korean economy more vulnerable to the inflow of volatile short-term foreign capital. The demise of the developmental state in turn led to a mismanagement of financial liberalization that contributed to the financial crisis of 1997-98 (Shin & Chang, 2003).

Following the Asian financial crisis, corporate loan demand started to fall as Korean companies began to deleverage to reduce their debt-to-equity ratios as prescribed by the IMF, prompting banks to significantly expand their mortgage and consumer lending. The liberalization and deregulation of the economy contributed to a rapid expansion of household credit in the early 2000s (Park, 2007). Meanwhile, in large cities, such as Seoul, house prices have skyrocketed, making it more difficult for first-time buyers to afford a home. Even high-income earners need to borrow large amounts of money from lenders to purchase a home, speculating that they can repay their loans and obtain the capital gains as house prices continue to rise in the future (Bae, 2024). In recent years, socioeconomic disparities have increased in Korea, not only because of

differences in income, but also because of housing inequality, as ownership of real estate is one of the most important sources of wealth (Shin, 2020). The high level of household debt, reaching 106 percent of GDP in 2022, means that many Korean households are vulnerable to property downturns and interest rate hikes (Kim & Hwang, 2024). A fall in house prices could adversely affect the economy as households that are ‘underwater’ with debts exceeding property values would be forced to rein in their consumer spending to pay down their mortgage debts, leading to a so-called ‘balance-sheet recession’ (Koo, 2015). Finally, due to the rise in house prices and the high debt burden, many young Koreans have chosen to delay or forgo having children, contributing to the country’s low birth rate. This, combined with a rapidly aging and shrinking population, could reduce Korea’s future economic growth potential (Chong-hoon, 2024).

1.1 Research Problem

The gradual shift in banks’ credit allocation away from productive business investments toward households and the real estate sector coincides with the rapid increase in property prices in Korea in the last two decades. Therefore, in line with the theories provided by Schumpeter, Kindleberger and Minsky, this thesis seeks to answer the following research question:

- *Is there a causal relationship between the increase in property-related lending and house prices in South Korea?*

Beyond rising house prices, this study seeks to identify and analyze additional economic consequences that are related to this ‘debt shift’ in Korea. The three sub-questions that analyze the effect of the debt shift on the level of household debt, the share of loans to productive sectors, and housing inequality, are as follows:

- *Has the shift in banks’ credit allocation contributed to higher levels of household debt?*
- *Does the expansion of property-related lending ‘crowd out’ bank lending to more productive sectors of the economy?*
- *Has the increase in the total value of housing contributed to higher levels of housing inequality?*

From the 1960s to the late 1980s, the Korean government relied on ‘financial repression’ to direct the allocation of credit to export-oriented industries, while discouraging investment in housing (Renaud, 1988: 3). However, as the Korean economy developed, restrictive credit

policies were gradually removed and lending to real estate activities started to expand rapidly. Large Korean firms are also less dependent on bank loans as a source of finance and increasingly obtain funds by issuing bonds and stocks on the capital market. Hence, structural change and the liberalization of the Korean economy have contributed to the shift in banks' credit allocation from non-financial corporations toward households and the real estate sector.

Another explanation for the shift in banks' credit allocation is that household loans offer higher profitability for banks than corporate loans, given that their delinquency is lower, which reduces bad debt expenses. Household loans are also secured by residential property as preferred collateral (BoK, 2024: 203). The Bank of Korea (2024) has argued that the growing prominence of real estate sector credit could hinder economic growth as financial resources are misallocated toward less productive areas, with the share of loans to the manufacturing industry gradually decreasing, whereas the share of loans to the real estate sector has increased substantially. An empirical study by Lombardi et al. (2017) has, for example, shown that a high level of household debt, exceeding 80 percent of GDP, tends to result in lower economic growth in the long run. Since the financial crisis of 2008, the high level of household debt in Korea has been a concern among policymakers and financial regulators.

The main research question will examine the causal relationship between the increase in property-related lending and residential property prices in Korea, while the three sub-questions focus on the consequences of the debt shift, including on the level of household debt, the share of loans to productive industries and the level of housing inequality. The relationship between bank lending and house prices is important because the real estate market affects not only GDP but also the stability of the financial system. For example, through the housing 'wealth effect', a rise in property prices increases the wealth of existing homeowners, making households more confident to expand consumption (Bartzoka, 2023). However, a growth model based on driving up house prices to spur consumption is not sustainable as it increases inequality and augments financial fragility. The final hypothesis that will be analyzed in this study is the housing wealth effect in Korea:

H1: The rise in house prices causes private consumption and economic growth to rise through the wealth effect.

A credit boom and a house price bubble could undermine financial stability when house prices suddenly fall, which could make it more difficult for borrowers to repay their loans. If borrowers default on their loans, banks end up with non-performing loans on their balance

sheets, making lenders more risk averse as their profitability declines, which could result in a so-called ‘credit crunch’ as banks rein in their lending (Fredriksson & Frykström, 2019). It is therefore important to understand the causes of rapid increases in house prices to prevent financial crises in the future and thereby reduce both the frequency and magnitude of *economic shrinking* (Andersson et al., 2021). Hence, a prerequisite for achieving greater resilience to economic shrinking is not only to improve certain social capabilities, such as accountable and autonomous states, but also to create a stable and resilient financial system.

As epitomized by the American subprime mortgage crisis of 2007-10, a housing bubble fueled by a rapid expansion in mortgage credit that suddenly bursts could destabilize the financial system and result in a deep and long economic recession. While there is a broad literature about the relationship between bank lending and house prices, most studies have focused on how house prices influence credit growth or how the expansion of credit affects real estate prices. This study will, however, focus on how property-related loans, a proxy that includes both mortgage and real estate sector loans, influence house prices, which is much more closely related to the housing market than general bank lending. This study is based on the theoretical insights of Minsky (1986), Kindleberger (1978) and Schumpeter (1934), which seek to explain how excess credit creation for ‘unproductive’ purposes could lead to asset price bubbles and undermine financial stability. This is applied on the case of South Korea by analyzing whether the expansion of property-related lending by banks causes house prices to rise.

1.2 Aim and Contribution

This study focuses on the causal relationship between banks’ property-related lending and house prices in Korea between 2007 and 2024 as defined in terms of Granger causality. Because of its history as a prominent developmental state, together with being one of the ‘Four Asian Dragons’ of fast-growing economies, Korea is an interesting case study to analyze how changes in state policy and economic structure have contributed to the shift in banks’ credit allocation. The consequences of this credit or debt shift can be analyzed in line with the theoretical framework provided by Minsky, Kindleberger and Schumpeter to explore how certain types of loans, such as property-related loans, influence the Korean economy. The rapid expansion of mortgage loans and the increase in property prices are both related to the macroeconomic issues of higher levels of household debt, lower productivity growth and greater housing inequality in Korea in recent decades.

Furthermore, this study complements the existing literature by focusing on property-related loans, a proxy that includes both mortgage loans to households and loans to real estate activities by non-financial corporations. While most previous studies use general bank lending as their main independent variable, it can be argued that this variable is much too broad to study the effect of credit on house prices.

It is important to distinguish between different types of credit, as mortgage loans and corporate loans for real estate are more closely related to the real estate market by determining both the demand and supply of housing than other type of loans that are captured by general bank lending data. Finally, this study contributes to the literature by examining whether there is a *causal* relationship between property-related loans and housing prices in Korea.

The empirical results of this study have shown that there is a positive and statistically significant association between the year-on-year change in property-related lending and residential property prices in Korea. The results of the Granger causality test show that at the 10-significance level, the change in property-related loans Granger-cause the increase in house prices, while there is no causal relationship in the opposite direction. The results have also shown that in contrast to the wealth effect theory, the increase in house prices is not significant in forecasting the change in private consumption or nominal GDP. The statistical analysis section of this study has analyzed the three sub-questions, finding that the shift in banks' credit allocation toward the real estate sector has resulted in higher levels of household debt, a crowding out of loans to manufacturing and greater housing inequality.

1.3 Outline of the Thesis

The study proceeds as follows. Section 2 provides the historical and policy context of Korea, explaining how selective credit policies were used by the Korean developmental state to direct credit toward strategic industries and describing key aspects of the Korean housing market. In section 3, the theories by Schumpeter, Kindleberger and Minsky are explained in more detail and a summary is provided of previous empirical studies. Section 4 outlines how data has been collected and describes the variables used in the empirical analysis, while section 5 explains the methodology and presents the main estimation models. Results for the empirical and statistical analysis are presented in section 6, where the findings are analyzed and discussed. Finally, the conclusion in section 7 summarizes the most important findings and presents some policy recommendations.

2. Background

2.1 Historical and Policy Context

2.1.1 The Korean Developmental State and Selective Credit Control

Since the 1960s, South Korea has transformed from a poverty-stricken country into a modern industrial powerhouse. When Park Chung Hee assumed power in May 1961 through a military coup he reorganized the entire state bureaucracy and launched a new development strategy focused on export-oriented industrialization. Park created a plan-rational ‘developmental state’ as economic development became the most important goal of government action (Johnson, 1982). A new ‘pilot agency’ or ‘super-ministry’ was established in 1961 called the Economic Planning Board (EPB) that was responsible for coordinating the policies of key economic ministries and drafting short to long-term economic development plans. For the implementation of these plans, the EPB had the power to control budget expenditures and to determine the allocation of credit, fiscal funds, and foreign capital (Jung, 2011: 557-559). The EPB in cooperation with other economic ministries ensured that selected firms targeted by industrial policy would enter new industries, achieve specified export targets or expand production capacity in exchange for preferential treatment, such as subsidies, tax breaks, and low-cost loans. All commercial banks were nationalized, and credit was directed only toward firms that were successful in meeting their assigned export targets. The extension of preferential loans to finance large-scale investments in new plant and equipment helped achieve economies of scale and to reduce unit costs, enabling manufacturers to sell goods at competitive prices on overseas markets (Amsden, 2001: 163).

Hence, according to Alice Amsden, Korea deliberately got relative prices ‘wrong’ through various export-promotion measures and other forms of state intervention to create price distortions that induced firms toward greater investment and promoted exports, such as by allocating loans to targeted industries at rates below market equilibrium levels and by keeping the exchange rate of the Korean currency artificially low. However, the Korean government still sought to ‘discipline’ the private sector by making access to credit and subsidies conditional on achieving certain performance standards. A good performing firm in the areas of exports, R&D and product introduction would be ‘rewarded’ with preferential loans to expand production capacity, while poor performers were penalized through a reduction in credit (Amsden, 1989: 14-15). To nurture the development of the export industry, a selective export credit program was introduced that automatically approved loans provided by banks to

those who had received export letters of credit (L/C). The Bank of Korea would also rediscount (or refinance) eligible short-term export credits at preferential rates, while selected export companies were granted access to low-cost, long-term loans from specialized banks, such as the Export-Import Bank of Korea and the Korea Development Bank. The Ministry of Commerce and Industry, for example, scrutinized the ‘appropriateness of loan applications’ and issued recommendations to the banks to ensure that credit was extended to priority sectors, such as export-oriented industries (Choi, 1993: 33-34). Selective credit control was hence one of the most important instruments of industrial policy used by the Korean developmental state to direct the allocation of bank credit to strategic industries, such as steel, automobiles, shipbuilding and electronics. Approximately 55 percent of total domestic bank credit was allocated to targeted industries in the form of preferential ‘policy loans’ to finance the government’s industrialization drive between 1963 and 1987, such as the construction of factories, steel mills and shipyards (Chung, 2007: 144- 145). Meanwhile, banks were required by the monetary authorities to limit their lending to ‘nonproductive’ industries. The Bank of Korea and the Ministry of Finance would issue ‘loan guidelines’ that established a ranking of loan priorities in order to ‘guide’ banks to give preference to Heavy and Chemical Industries (HCI) targeted by industrial policy, while restricting banks from extending loans to sectors deemed ‘nonessential’. These loan guidelines prohibited commercial banks from extending loans for the purpose of purchasing real estate, consumer goods and other luxury items (Wontack, 1979: 112-116).

2.1.2 Housing Policies and the Korean Real Estate Market

Because of Park’s industrial policy, the allocation of credit to households was tightly restricted and the housing finance system remained underdeveloped. As a result, the Korean government underinvested in housing, leading to a relatively low share of residential investment as a percentage of GDP during the 1960s and 1970s (Kim & Suh, 1991: 93-94). Until the late 1980s, the Korean government viewed housing as a sector that generated a low return compared with manufacturing and export industries, and therefore discouraged the allocation of scarce resources from flowing into the real estate sector. Large-scale land development and the volume of new housing units were controlled by the state, while ‘speculative’ demand for housing was curtailed through punitive taxation. Investment in housing started to increase from 1988 when the government began to change its housing policy by supporting the construction of two million new dwellings by 1992 to alleviate the housing shortage (Kim, 2004: 323-324).

The government also gradually removed price controls on new apartments and eased regulations on the conversion of agricultural land in the mid-1990s in order to promote urbanization. The majority of the housing stock consists of apartments in Korea, which reflects the high urbanization rate as around 70 percent of all households live in urban areas. However, the homeownership rate, which stood at around 56 percent in 2005, remains relatively low in Korea in comparison with other advanced economies (Igan & Kang, 2011: 6). Moreover, because commercial banks were not allowed to extend mortgage loans, the mortgage market was dominated by the state-owned Korea Housing Bank (KHB) and the National Housing Fund that provided low-interest, long-term mortgages to households for home purchases. The government, however, rationed the supply of credit by imposing a ceiling on the loan amount per household to ensure that the loan-to-value ratio remained below 30 percent, and only new houses were eligible for loans (Kim, 2004: 329). The housing finance market started to change during the 1990s when the government deregulated and liberalized the financial system and privatized state-owned financial institutions, such as the KHB. Because of financial liberalization, competition in the mortgage market intensified as commercial banks and other financial institutions entered the mortgage business and drastically expanded the extension of mortgage loans to households in order to seize market share and maximize profits.

In addition, structural reforms were implemented that weakened the role of the state in the economy as key policy instruments and institutions of the Korean developmental state, such as the Economic Planning Board, were abolished by the early 1990s. According to Jang-Sup Shin and Ha-Joon Chang (2003), the demise of the Korean developmental state led to the breakdown in industrial policy and the mismanagement of financial liberalization, resulting in an uncoordinated investment boom by large Korean business conglomerates (Shin & Chang, 2003: 76). This culminated in the Asian financial crisis of 1997-98 that prompted the Korean government to ask the IMF for a \$58.4 billion bail-out package.

There were, however, several conditions attached to these loans, such as to cut government spending, raise interest rates, and to liberalize financial markets. The IMF also required the government to impose strict debt-to-equity limits of 200 percent on large firms to reduce corporate leverage, forcing them to sell assets, issue new equity and reduce their borrowings from banks (Chang & Yoo, 2000: 118-120). As corporate loan demand declined after the Asian financial crisis, banks aggressively expanded their lending toward households by providing mortgages and credit card loans, leading to a credit card lending boom that burst in 2003. Banks adjusted their lending policies in favor of households since mortgages and consumer loans

generated higher returns for lenders and banks became more cautious about the risks associated with corporate loans. Moreover, as housing and consumer credit soared in the early 2000s, with the share of household loans in total bank loans doubling from less than 25 percent to over 50 percent between 1999 and 2005, apartment prices in major cities like Seoul started to rise substantially (Kang & Ma, 2009; Kim, 2004). In Korea, most consumer loans are collateralized by real estate and the majority of household loans are used to finance the purchase of a home. The increase in mortgage and consumer lending also led to a rapid increase in household debt in the early 2000s, causing the household savings rate to fall and heightening the volatility of private consumption, thus making the Korean economy less stable (Chung, 2009).

2.1.3 Macro-prudential Regulations

As house prices have skyrocketed in the Korean real estate market since the 2000s, the government has used macro-prudential regulations to control household lending and deflate real estate prices, including by setting maximum limits on the loan-to-value (LTV) ratio and the debt-to-income (DTI) ratio (Igan & Kang, 2011). The ceiling on the LTV ratio introduced in 2002 limits the total loan amount a borrower can obtain from a lender to purchase a home, which is set as a percentage of the total value of the property. A lower LTV ratio means that the borrower must pay a larger down payment in cash to buy a home, while a higher LTV ratio increases the amount of credit that a borrower can obtain to engage in real estate transactions.

The ceiling on the DTI ratio imposed since 2005 restricts the monthly payment that a consumer needs to make to pay down its debt, which is set as a percentage of a consumer's monthly gross income. However, during the global financial crisis of 2008, as house prices started to fall in Korea, the government relaxed these macro-prudential regulations to stimulate housing transactions and boost property prices (Hwang et al., 2010: 158-159). For example, in certain areas, the government raised the LTV from 40 percent to 60 percent to allow borrowers to take out larger loans and expand mortgage lending. This highlights the counter-cyclical nature of housing policies in Korea and suggests that the government tends to use macroprudential regulations to control cycles in the real estate market by either expanding or restricting mortgage and household lending. Financial regulators rely on housing policies and regulations to restrict the availability of mortgage loans, manage the level of household debt and prevent excessive speculation in the real estate market in order to maintain 'stable' house prices (Igan & Kang, 2011: 7).

As a legacy of the developmental state era, the government continues to intervene in the housing market through ‘moral suasion’ on commercial banks, the provision of ‘policy mortgages’ by the state-owned Korean Housing Finance Corporation, and the development of land for residential use by the Korea Land & Housing Corporation.

2.1.4 The Chonseil Housing Rental System

A unique aspect of the Korean housing market has been the *Chonseil* housing rental system that emerged as a result of the underdevelopment of the Korean housing finance system. Under this arrangement, the tenant gives the landlord a lump sum deposit, instead of making monthly rental payments, that could equal up to 70 percent of the value of a home. The landlord will refund the *Chonseil* deposit at the end of the lease. However, because tenants cannot afford to pay the entire deposit upfront, it is common for tenants to borrow ‘rental deposit loans’ from banks to fund the *Chonseil* deposit. Banks generally lend no more than 80 percent of the entire deposit to tenants. The result of the *Chonseil* system is thus that middle-income households essentially provide borrowed money to affluent landlords that tend to use the funds to engage in speculative homebuying, driving up house prices (Kim, 2004; Jing et al, 2022: 8-11).

3. Theory and Previous Research

3.1 Theoretical Background

To understand the relationship between bank credit and asset price bubbles and the wider consequences of the debt shift on the economy and financial stability, this section provides a summary of the main theories by Schumpeter, Kindleberger, and Minsky on these topics.

3.1.1 Credit Creation and Schumpeter's Theory of Economic Development

Joseph A. Schumpeter described in his book *The Theory of Economic Development* (1934) the 'special' role of banks as they can create credit or new purchasing power 'out of nothing' in the act of lending. Banks can be an important source of financing for pioneering entrepreneurs to fund new investments and develop innovative products or technologies. In contrast to economic textbooks, Schumpeter argued that banks are not simply intermediaries that collect savings and lend these out to new borrowers but can simply create new money whenever they grant a loan through a new bookkeeping entry on the customer's account (Schumpeter, 1934: 69-74). Hence, in the words of Schumpeter: 'It is much more realistic to say that the banks 'create credit,' that is, that they create deposits in their act of lending, than to say that they lend the deposits that have been entrusted to them' (Schumpeter, 1954: 1080).

Schumpeter regarded the relationship between credit creation by banks and technological innovation as the fundamental engine of capitalist society. However, Schumpeter distinguished between 'productive' loans for innovative entrepreneurs that use the newly created money to fund investments in new production, and 'consumptive' loans that are extended to households to fund the purchase of consumer durables but do not lead to an increase in productivity growth. As Schumpeter (1939) explained, 'unproductive' loans are loans extended by banks to households for consumptive purposes, which he called the 'secondary wave' of credit, as these loans do not increase output and augment the risk for financial crises (Schumpeter, 1939: 122-125). Only loans for productive business investment generate the income streams needed to repay these loans. Meanwhile, an expansion of credit for consumptive purposes could be inflationary as more money would chase a limited number of goods and services (Schumpeter, 1934: 102-112). This distinction between different types or uses of credit was also made by John Maynard Keynes in his *A Treatise on Money* (1930) in which he distinguished between loans used for the purposes of industry (or 'industrial circulation') and loans used for the

purposes of finance (or ‘financial circulation’). Banks could, for example, allocate credit to industrial firms that use the funds to finance the production of new products or they could extend loans to finance speculation in securities, such as stocks (Keynes, 1930: 243).

3.1.2 Credit Expansions and Asset Price Bubbles

While both Schumpeter and Keynes acknowledged the role of banks as the creators and allocators of credit and money in the economy and made distinctions between ‘productive’ and ‘unproductive’ types of credit, it was Charles P. Kindleberger who emphasized how a rapid expansion in credit for speculative purposes could lead to asset price bubbles. In his book *Manias, Panics, and Crashes* (1978), Kindleberger described numerous historical examples of speculative bubbles, from the tulip-mania of 1636-37 in the Dutch Republic and the Mississippi bubble of 1719, to the U.S. stock market bubble of 1928-29. However, what each of these manias had in common were rapid increases in credit created by banks. During economic booms or periods of *euphoria*, banks tend to expand their lending to finance both increases in economic activity and the purchase of real estate, securities and commodities to obtain capital gains. This increase in bank lending would drive up asset prices until banks and investors suddenly become more risk averse, causing prices to fall and leading to a panic and crash (Kindleberger, 1978: 55-58). For example, during the 1920s there was a rapid expansion in margin lending for the purchase of stocks in the United States, resulting in a massive stock market bubble that burst in October 1929. As the stock market crashed, New York banks became more risk averse and the credit system froze, resulting in a contraction of credit and a downturn in economic activity. While monetarists focused on the role of monetary policy and Keynesians on the role of government spending, Kindleberger emphasized the instability of the credit mechanism and the fragility of the banking system in causing the Great Depression of the 1930s (Kindleberger, 1978: 73).

3.1.3 Minsky’s Financial Instability Hypothesis

Through his ‘financial instability hypothesis’, Hyman Minsky (1982) distinguished between three different types of finance: (1) *hedge finance*, where borrowers have sufficient incomes to repay their loans, including the interest rate; (2) *speculative finance*, where borrowers only have sufficient incomes to pay the interest rate but not the principal, forcing them to borrow new loans to repay their old debts; and (3) *Ponzi finance*, where borrowers are not able to even

pay interest on their loans, forcing them to either borrow money or sell their assets. In periods of euphoria, as Minsky explained, confidence in financial markets tends to rise, resulting in more risk-taking behavior among lenders and investors and higher growth in credit, which are subsequently followed by periods of economic instability (Minsky, 1982: 122-124). The larger the share of speculative and Ponzi finance circulating in the economy, the greater the likelihood of financial instability as it would make the banking system more fragile and vulnerable to economic crises. Left to their own devices, banks would expand the supply of credit in good times and then when economic conditions slowed, they would rein in their lending, resulting in boom-and-bust cycles. Hence, the tendency of financial markets to crash is not only due to 'external shocks' but is an inherent phenomenon of the capitalist economic system (Minsky, 1986: 234).

Based on the work of Schumpeter and Keynes, Minsky explained that in our economy, banks create new money through lending, making bank deposits the dominant form of money, and is destroyed as loans get repaid. Hence, rather than focusing on traditional measurements for money like high-powered money as advocated by monetarists, bank credit would be the most useful measurement for money. Once the quantity of money (credit) increases in the economy, asset prices will rise (Minsky, 1986: 201-203). Banks tend to extend loans not only based on the creditworthiness of individual borrowers (the ability to service and repay the loans), but also on the assets that are pledged as collateral. Loans based on the value of pledged collateral, such as land or real estate, are different from loans based on future cash flows from income-generating activities. According to Minsky, the overall fragility or robustness of the financial system depends upon the type of loans that banks lend out. A cash-flow orientation by bankers would be conducive to sustaining a robust financial system, whereas the emphasis by bankers on the collateral value of assets is conducive to the emergence of a fragile financial structure (Minsky, 1986: 260-261).

Unlike a business loan used for productive investments that create sufficient cash flows to service and repay the loan, the asset of a collateralized loan often does not generate enough earnings to even pay the interest on the loan, making it a Ponzi type of loan. Still bankers tend to collateralize their loans because they expect that the underlying asset can be sold at a price that covers the amount lent and the accrued interest. Once asset prices rise, the subsequent increase in capital gains make banks more confident and less cautious, prompting them to lower their lending standards to expand credit and maximize profits. In the absence of serious financial difficulties over a period of time, lenders and investors tend to disregard the

possibility of failure altogether, leading to a more fragile financial structure (Minsky, 1986: 237-238). A break in the boom occurs whenever the expectation of future increases in asset prices and capital gains decline, for example, due to higher interest rates, in which case banks start to rein in their lending. As the value of assets (and hence collateral) falls, the likelihood of a financial crisis increases, depending on the ability of banks to absorb losses and write off non-performing loans. For example, mortgage loans extended by banks to finance the purchase of a home are usually secured by the property that is pledged as collateral. Banks are willing to extend these loans in the expectation that house prices will continue to rise in the future. This could drive up house prices when demand for housing, fueled by banks' mortgage lending, exceeds existing supply.

As epitomized by the Global Financial Crisis of 2008, banks engaged in Ponzi financing by extending mortgages to unviable borrowers with low creditworthiness, the so-called 'subprime mortgages'. They also extended other risky types of loans, such as interest-only loans, where the borrower only pays the interest during the loan term. The monthly payment on interest and principal was thus much lower than for traditional mortgage loans, allowing speculative borrowers to take out larger loans, driving up housing prices. However, the risk of borrowing money secured solely by the value of real estate is that if house prices decrease in value, it becomes more difficult for borrowers to repay their debts (McCulley, 2009, pp. 7-9). As house prices fall, borrowers increasingly come 'underwater' as the value of their homes are valued less than their mortgage debts. The expansion of speculative and Ponzi type of loans, which primarily depend on *rising* asset prices to avoid borrowers to default on their loans, thus make the financial system more unstable.

3.1.4 The Debt Shift, Wealth Effect and Balance-sheet Recessions

In most advanced economies, commercial banks have increasingly extended mortgage loans to households, while reducing their lending to non-financial corporations in recent decades, which has been referred to as the 'debt shift' by Bezemer et al. (2020). This shift in credit allocation is important because different categories of credit affect the economy differently. Depending on the type of credit, credit or debt could either promote economic growth or may cause crisis, making it important to distinguish between 'productive' and 'unproductive' credit. For example, credit creation for the real economy to finance transactions in goods and services that make up the gross domestic product (GDP) would support economic growth, whereas loans

used to finance the purchase of existing assets do not contribute to the production of new goods and services (Bezemer, 2014: 4-7). An expansion in credit for the purchase of existing assets would not only drive up asset prices, but also debt levels in the economy. If an increase in credit to the real economy increases growth, then the level of debt in proportion to the size of the economy would remain constant. Hence, debt levels in the private sector will only increase if there is a growth in credit toward asset markets (Bezemer et al, 2016).

According to Josh Ryan-Collins et al. (2017), there is a positive feedback cycle between house and land prices and mortgage credit. If mortgage lending outpaces the supply of new domestic homes, this would cause land prices to rise. As land prices rise, households are forced to borrow larger loans to purchase a home, enabling banks to expand their lending, which further pushes up house prices. In other words, ‘the supply of bank credit can be seen to create its own increased demand for even more credit, assuming a fixed supply of land’ (Ryan-Collins et al., 2017: 111). To explain the relationship between mortgage lending and house prices, Ryan-Collins et al. argue that one should not focus on the supply of homes but on the demand for homes. Most households cannot afford a home *without* borrowing money from banks. In other words, the demand for housing is determined not by people’s incomes but by the availability of credit. With house prices rising much faster than average wages, the most important driving factor in house price inflation that can be observed in most advanced economies is the expansion of mortgage credit created by banks (Ryan-Collins et al., 2017: 114-117).

The vast majority of mortgage loans in advanced economies are used to finance the purchase of existing real estate. Hence, as ‘new credit and money is created and flows into existing homes and land, the inevitable result is house price inflation and rising household debt-to-income ratios: the classic house price or real estate bubble’ (Ryan-Collins et al., 2017: 151). Mortgage lending could also indirectly influence economic growth through the so-called ‘wealth effect’. The rise in house prices increases the net wealth of existing homeowners, making them more confident to expand consumer spending, which is an important source of economic growth. Existing homeowners could, for instance, sell their properties to obtain the capital gains or refinance their mortgage loans to take equity out of their homes to fund consumption (Ryan-Collins, 2017: 123-124). However, when house prices fall, this would reduce people’s wealth and erode consumer confidence, resulting in lower spending and economic growth. If house prices fall sharply so that many homeowners become ‘underwater’ as the value of their homes is less than the mortgage debts, they may struggle to repay their loans, leading to defaults and foreclosures.

This causes the amount of bad debt to rise, prompting banks to reduce their lending to new borrowers, in which case the economy would fall into a recession (with the feedback cycle going into reverse). Households would reduce their spending and use a larger share of their incomes to pay down their mortgage debts, resulting in a so-called ‘balance-sheet recession’ (Koo, 2015). A fall in consumer spending would reduce firms’ profits, prompting them to pull back from making investments and to deleverage. Household (in particular mortgage) credit booms are also more likely to result in balance-sheet recessions that tend to be deeper and more prolonged than economic crises that do not involve credit bubbles (Ryan-Collins, 2017: 151).

3.2 Previous Research

The literature examining the relationship between bank lending and house prices is broad as interest in the topic grew significantly following the subprime mortgage crisis of 2007-09. Hofmann (2003), Davis and Zhu (2004), and Gerlach and Peng (2005) studied the relationship between bank lending and property prices, finding that the direction of causality in the long run goes from property prices to bank credit, rather than excessive bank lending being the cause of property price bubbles. On the other hand, many studies have also shown that the causality between bank lending and property prices may go in both directions, as the availability of bank credit could be determined by the value of pledged collateral for loans (such as the property value in the case of mortgage loans), which in turn could further boost house prices as an expansion in credit increases demand for a limited supply of housing. Fitzpatrick and McQuinn (2007), Cardo-Valverde and Fernández (2010), and Anundsen and Jansen (2013) find that both bank lending and house prices influence each other either in the short or in the long run, focusing on case studies of Ireland, Spain and Norway, respectively. Brissimis and Vlassopolos (2009) did not find a long run causation from mortgage lending to house prices in the case of Greece, while finding a bi-directional relationship in the short run.

Most empirical studies of advanced economies thus find a bidirectional or mutually reinforcing relationship and interdependence between property prices and bank lending or unidirectional causality running from property prices to bank lending. However, few studies find a unidirectional relationship running from bank lending to property prices. Fabian Lindner (2014), for example, empirically analyzed the relationship between mortgage credit and house prices in the United States between 1984 and 2012, finding that mortgage credit drives house prices in the long run. It argues that the liberalization of the US mortgage market in early 1980s

led to an increase in the supply of credit, thereby increasing the demand for housing and incentivizing consumers to pay higher prices for houses, which in turn is likely to have led to the housing price bubble (Lindner, 2014: 30-31). In contrast to conventional wisdom, the paper also finds that monetary policy through interest rates did not play an important role in the built-up of the housing bubble that burst in 2007. Meanwhile, Liang and Cao (2007) studied the relationship between bank lending and property prices for the case of China between 1999 and 2006, using advanced econometric techniques, such as an autoregressive distributed lag (ARDL) bounds test, and find a unidirectional causality running from bank lending to property prices. The authors noted that once Chinese commercial banks were allowed to engage in mortgage lending, the outstanding amount of household mortgage loans rose from 51.4 billion yuan in 1998 to 1836.6 billion yuan by 2005, which coincided with a rapid increase in residential property prices. The paper finds that in the long run, bank lending Granger-cause property prices, highlighting the importance of credit policies to control the growth rate of credit to prevent real estate bubbles in the future (Liang & Cao, 2007: 68-74). A limitation with this study is that uses a too broad measurement of total bank lending instead of property-related lending, such as mortgages and loans for property development.

However, only a few papers have empirically studied the relationship between mortgage lending and house prices in South Korea. Kim (2004) has analyzed the relationship between the expansion in housing loans and house prices in Korea by conducting several Granger causality tests. The results show that there is a two-way causality between changes in housing loans and house prices, using data on urban house prices from 1996 to 2002. The results did also show that consumer loans did not Granger-cause house prices and *vice versa*. The study period is relatively short, however, failing to capture the long-term influences of bank lending on residential property prices. Kim and Park (2014) examined the relationship between GDP, interest rates, bank lending and house prices in three Korean housing submarkets, the premium (or expensive) market in Kangnam area of Seoul, the moderate market in Kangbuk of Seoul and the provincial markets in cities like Pusan, Incheon and Ulsan, using data between 1999 and 2011. The study has collected monthly data on apartment house prices, outstanding bank loans, GDP, interest rates, construction permit units, and the construction cost index, which have all been adjusted to real terms by using the consumer price index and converted into logarithms (except for real interest rates). To analyze the long-run relationship between apartment house prices and bank lending at the regional level, Kim and Park use a co-integrating VAR model. The results show that in the premium house market of Kangnam area

in Seoul and most other provincial housing submarkets, such as Pusan, Daejeon and Ulsan, there is a significant positive relationship between bank lending and house prices in the long run. In particular, it shows that a 1% increase in bank lending is associated with a 1.26% increase in the apartment price in the Kangnam area (Kim & Park, 2014: 64-65). However, in the short run, the results suggest that house prices in the premium market are negatively affected by bank lending, meaning that house prices continued to rise, for example, despite a contraction in bank lending. The authors suggest that house prices in the Kangnam area are less sensitive to bank lending in the short-run, and that income growth instead has a positive short-run impact (Kim & Park, 2014: 73-74).

The authors conclude that the premium housing submarket has peculiar price dynamics of its own and is therefore less affected by factors highlighted by the general economic theory, such as bank lending. Some limitations with the study are that it relies on a relatively short sample period from 1999 until 2011 and uses data on general bank lending to study the effect on apartment prices (with a particular focus on the premium house submarket), rather than mortgage loans or property-related loans that are more closely related to the real estate market. Bank lending also captures loans to specific industries for various purposes, such as working capital, investments in R&D, and M&As, that are not related to housing transactions, making this variable much too broad to analyze the effect of credit on house prices.

3.3 Gaps in the Literature

Most previous studies hence focus on the relationship between house prices and credit growth or tend to use general bank lending as their main independent variable to explain the rise of property prices. However, bank lending captures all type of loans in the economy and is too broad to study how credit effects the real estate market. Meanwhile, mortgage loans only capture the effect of bank lending on the *demand* for housing by allowing borrowers to obtain credit to purchase a home. It fails to capture the effect of bank loans allocated toward the construction of housing, for example, which effects the *supply* of housing and thereby house prices. Few studies thus find a *causal* relationship between the change in property-related lending, which captures both the demand and supply of housing by including both mortgage loans to households and corporate loans to real estate activities, and the change in house prices. Finally, since a time-series analysis of the effect of bank lending on property prices can be sensitive to the length of time, a relatively long sample period would be appropriate to obtain more accurate evidence.

4. Data

4.1 Source Material

The data used for the statistical and empirical analysis have been obtained from several public data sources and databases, such as Federal Reserve Economic Data (FRED) from the Federal Reserve Bank of St. Louis, Korea Statistics, the Bank for International Settlements and the Bank of Korea. These are reliable data sources that are responsible for collecting and publishing economic data in a transparent manner that is publicly accessible for users. FRED is an online database that collects and provides economic time series data from numerous sources, such as the IMF and the World Bank. FRED allows users not only to download data freely but also to adjust data and alter the unit of measurement or the time frequency. Korea Statistics is the national statistical agency of Korea that makes statistical data accessible for users through the online database system KOSIS. The Economic Statistics System (ECOS) is the economic database of the Bank of Korea that provides various data about the Korean economy, including monetary and financial statistics. For the statistical analysis, for example, data was collected on the percentage change in household credit and house prices, the share of manufacturing loans to total loans, the level of household debt to GDP, the total value of housing, and the rate of homeownership by income class in Korea.

One of the reasons for choosing Korea as a case study for this study is because of the quantity and quality of economic data that is available to examine the main research question. The original dataset covers the period from the first quarter of 2004 to the fourth quarter of 2024 for most variables used in the analysis. To fill the gap in the literature, this thesis primarily focuses on the change in property-related loans to explain the rise in property prices. However, because the data on mortgage loans and real estate sector loans are only available from the fourth quarter of 2006 at ECOS, which are used to construct the main independent variable for property-related loans, the sample period runs from the first quarter of 2007 to the fourth quarter of 2024. The dataset has a total of 84 observations and the summary statistics for all key variables are given by Table A1 in the Appendix. The descriptive statistics show that residential property prices in Korea grew on average by 2.9 percent, while property-related loans and credit to households grew on average by 7.9 percent and 6.9 percent, respectively. Both house prices and property-related loans are quite volatile with growth rates varying from a low of -7.31 and 2.87 percent, respectively, to a high of 15.69 and 18.44 percent. A description of the variables used for the empirical analysis is provided in greater detail below.

4.2 Selection of Variables

Outcome variables

The empirical analysis of this study focuses on whether there is a causal relationship between the growth rate in property-related loans and the increase in residential property prices in Korea. To test the Minsky-Kindleberger theory that an expansion in credit will increase asset prices, this study has selected residential property prices to capture the value for the most important type of asset and source of wealth held by Korean households. Data on the outcome variable, the change in residential property prices, has been obtained from the FRED database, based on data from the Bank for International Settlements, covering the entire residential property market, that is, all types of new and existing dwellings in Korea. The data for residential property prices is an index that can be modified into year-on-year percentage changes in the FRED database and the index has been set to 100 in the year 2010. There is only data on house prices publicly available on a quarterly basis in an index form in Korea, rather than average house prices in millions of won or per square meter.

Finally, to empirically analyze the hypothesis that the rise in house prices causes household consumption to increase through the housing wealth effect, data on private consumption expenditure has been obtained from ECOS. Private consumption captures the total value of all goods and services consumed by households. It is arguably more appropriate to use private consumption as a dependent variable to analyze the housing wealth effect, since it excludes government consumption, which is less sensitive to changes in residential property prices.

Main independent variables

The main independent variable is the growth rate of property-related loans, which has been constructed by adding all outstanding mortgage loans to households and corporate loans to real estate activities extended by commercial banks, provided by ECOS, which has then been transformed into a growth variable by calculating the percentage change of property-related loans from a year ago. This proxy has been constructed because in contrast to most other studies that tend to focus only on general bank lending or mortgage lending, this study will focus on banks' credit extension to the entire residential property market, capturing both the demand for housing through mortgage loans and supply of housing through corporate loans to real estate activities. For example, mortgage loans affect the demand for housing, while loans to property developers influence investment in the construction of new housing units.

As in all other markets, the property price in the housing market is determined by the supply and demand for houses. This study primarily focuses on the role of credit rather than average household income because with house prices getting more expensive relative to incomes, the main reason why people still can afford to buy a home is by borrowing money. However, in addition to property-related loans, house prices are affected by many other factors. Demand for housing can be modeled as a function of income, the availability of (mortgage) credit, and population change. The supply of housing, on the other hand, could be expressed as a function of land prices and investment in residential buildings, which influence the supply of new housing units (Kim & Park, 2014: 55). Because no data is available for average household income prior to 2019, this study uses nominal GDP growth for Korea provided by FRED as a measurement for the year-on-year change in national income as a demand-side factor that influences the demand for housing. This study uses the percentage change in the number of economically active population to capture the effect of demographic factors on house prices, which have been obtained from ECOS. On the supply side, the study uses year-on-year land price fluctuations in percent to capture changes in land prices, which is a survey to collect data on countrywide land price fluctuations conducted by the Korea Real Estate Board. Because there is only a fixed supply of land, an increase in land prices will affect the costs for property development and in turn the price of housing. The final supply-side variable is the growth rate in gross fixed capital formation in residential buildings as a measurement for investment in housing, which captures the supply of new housing units, and is obtained from ECOS.

Control variables

Additional control variables have been included in the models, such as the rate of inflation measured by the consumer price index, which has been obtained from ECOS. Earlier studies have already noted a link between CPI inflation and the purchase price of housing (Kim, 2004: 337). The demand for housing is not only determined by the availability of credit but also by its price. The higher the interest rate on mortgage loans, for example, the lower is the demand for mortgage loans to purchase a home, thereby affecting the demand for housing. Meanwhile, the investment decisions of firms that rely on borrowed money to invest in real estate development projects are also affected by the level of interest rates in the economy. As a control variable, this study will therefore use the Base Rate of the Bank of Korea (BoK) provided by ECOS, which in turn influences the level of all other interest rates in Korea, including lending rates on business and mortgage loans.

Frequency and unit of measurement

All relevant variables are given as quarterly time series data, since this is the most frequent period available for the main variables of interest, such as house prices and property-related loans, and are in year-on-year percentage change, except for the land price fluctuation rate and the BoK Base Rate. Because not all variables were seasonally adjusted, the year-on-year (YoY) growth rates were taken to de-trend and de-seasonalize the data. Using YoY (or four-quarter) growth rates, which compares each quarter to the same quarter in the previous year, is comparable to using seasonal (4th) difference of log-transformed data (Ryan-Collins, 2016: 49). Seasonal differencing is the difference between an observation and the corresponding observation from the previous year and is often used to obtain stationary data (Hyndman & Athanasopoulos, 2014: 217). Moreover, this study focuses on YoY growth figures in order to analyze how *changes* in the quantity of property-related loans influence the rise in house prices.

4.3 Data limitations

Because of data limitations, this study uses the growth rate of investment in residential buildings, which captures investments in the construction of new housing units, as a proxy for the change in housing supply, since there was no data on the number of housing units nor for construction costs on a quarterly basis. Another limitation with the data is that the Bank of Korea only has data on household income from 2019, which makes for a relatively short study period. Therefore, this study will use nominal GDP growth that captures the change of national income rather than the change in individual income. Since there are no direct price indices that can be used to deflate credit data, such as mortgage loans, all relevant variables are expressed in nominal terms. A limitation with the proxy for property-related loans in Korea is that it fails to capture all loans used for home purchases. For example, it does not include ‘rental deposit’ loans that are provided by banks and used to pay for *Chonse* deposits to landlords. While about 25 percent of all mortgages are used to pay for the *Chonse* deposit, banks also provide other types of loans that are used to pay for homes that are not captured by the mortgage data (Kang, 2022). Meanwhile, the data for corporate loans to real estate activities also includes loans used for commercial property projects that are not necessarily related to the residential property market, such as the construction of office buildings or department stores. However, because a more detailed disaggregation of the household, mortgage or real estate loan data does not exist to analyze the *use* of credit, this study will rely on property-related loans as an approximation of bank credit allocated to the real estate market.

5. Methods

The empirical analysis of this thesis relies on two quantitative methods: First, statistical tests and econometric techniques are applied to examine the main research question, that is, whether there is a causal relationship between the change in property-related loans and house prices in Korea, as well as to test the hypothesis that higher property prices will increase private consumption and economic growth through the housing wealth effect; Second, statistical analysis is used to examine the three sub-questions related to the research question by analyzing the economic consequences of the debt shift. The three sub-questions that examine the effects of the debt shift on the level of household debt, the share of loans to productive sectors, and housing inequality in Korea are analyzed by making use of time-series graphs and scatterplots. The statistical analysis relies on graphs to visualize the data and to uncover patterns and relationships.

5.1 Econometric Methods and Statistical Tests

Following the collection of the time-series data for the relevant variables, tests have been conducted to check whether the variables are stationary. Because economic time series often tend to possess features like trends (a sustained upward or downward movement over time) or seasonality (a kind of pattern that can be found in specific time periods), it is important to test for stationarity before conducting a regression analysis. If the time-series are non-stationary, meaning that the values change over time, it is said to have a unit root. Stationary time series are characterized by a constant mean and variance over time, meaning that the properties of the time series are not affected only by the change of time (Shrestha & Bhatta, 2018: 72-73). For this study, the stationarity of the time series is analyzed both through graphs and statistical tests.

The Augmented Dickey Fuller test is a unit root test where the null hypothesis states that the series has a unit root, which can be rejected if the test statistic is larger than the critical value at the 5 percent significance level. The test is sensitive for the number of lags to be included, which is intended to clean up any serial correlation. It is common practice that the lag length is determined by the frequency of the data. Because this study uses quarterly data, four lags would be sufficient (Wooldridge, 2016: 612-613; Beckett, 2013: 382-383). If all relevant variables are stationary, ordinary least squares (OLS) and vector autoregressive (VAR) models can provide unbiased estimates. In addition to stationarity, the present values of a time series

may also have some kind of relationship with its past values, which is referred to as serial correlation or autocorrelation. To test whether there is autocorrelation in the residuals, a Durbin Watson (DW) test is conducted. If the DW statistic is close to two, the model is considered to be ‘autocorrelation free’ (Shrestha & Bhatta, 2018: 80). The existence of autocorrelation could lead to biased results. To test for autocorrelation in the residuals for the VAR model, a Lagrange Multiplier test has been conducted, where the null hypothesis of no autocorrelation is rejected if the p-value is less than 0.05. Moreover, this study will also estimate the relationship between the relevant variables by using the Prais-Winsten (PW) and Newey-West estimation methods that address autocorrelation and heteroskedasticity in the error terms. Finally, to check whether the residuals are homoskedastic or not, a Breusch-Pagan test is conducted, where the null hypothesis of homoskedasticity is rejected if the p-value less than 0.05 (Wooldridge, 2016: 244).

However, since the primary aim of this study is not to analyze the correlational relationship between the relevant variables, but to examine whether there is a *causal* relationship between property-related lending and residential property prices in Korea, a Granger causality test is conducted. This test has also been applied to examine the hypothesis that the increase in house prices Granger-causes the rise in private consumption in accordance with the ‘wealth effect’. The Granger causality test can be used to determine if the past values of one variable can predict the current values of another variable. The null hypothesis in the Granger causality test states that variable x (change in property-related loans) does not Granger cause variable y (change in house prices). A rejection of the null, if the p-value is smaller than 0.05 at the 5 percent significance level, indicates that variable x Granger causes variable y (Shrestha & Bhatta, 2018: 79).

5.2 Limitations

One limitation with the Granger causality test is that predictability is not the same as direct causation between two variables. Whether a time series that improves the prediction of another time series should be regarded as a ‘causal effect’ remains subject of discussion among scholars (Shojaie & Fox, 2022: 292-293). This means that the term ‘causes’ in Granger-causes should be interpreted with caution. Moreover, a Prais-Winsten estimation is used to address the problem of serial correlation, even though PW standard errors only correct for first order autocorrelation or AR(1), where the present value of a variable is based solely on the immediate preceding value (Shrestha & Bhatta, 2018: 72). This study also uses Newey-West standards

errors that are robust to heteroskedasticity and serial correlation in the residuals. However, a limitation with using Newey-West or heteroskedasticity- and autocorrelation-consistent (HAC) standard errors is that they can be poorly behaved in the presence of substantial serial correlation (Wooldridge, 2016: 400).

5.3 The Models

To analyze the relationship between the change in property-related loans and the increase in residential property prices in Korea, this study will use several different estimation methods, including Ordinary Least Squares, Prais-Winsten and Newey West. OLS is a linear regression model that minimizes the sum of squared residuals between the observed values and the predicted values in the model (Wooldridge, 2016: 40). Prais-Winsten uses the Generalized Least Squares (GLS) method to estimate the parameters in a linear regression model where there is serial correlation in the error terms. Both autocorrelation and heteroskedasticity in the residuals could lead to unreliable OLS standard errors and misleading test statistics (Wooldridge, 2016: 395). The Newey-West estimation method provides the same coefficients estimated by OLS but produces Newey-West standard errors that correct for heteroskedasticity and autocorrelation, thereby providing more valid test statistics. The coefficients in the regression model represent the effects that one or more independent variables have on the dependent variable. The regression model of this study estimates the effect of the change in property-related loans on the change of house prices, which is given by the following equation:

$$\Delta RPP_t = \beta_0 + \beta_1 \Delta PL_t + \beta_2 \Delta NGDP_t + \beta_3 \Delta EAP_t + \beta_4 \Delta IRB_t + \beta_5 \Delta CPI_t + \beta_6 LP_t + \beta_7 BR_t + \varepsilon_t \quad (1)$$

where ΔRPP_t is the dependent variable that represents the change in residential property prices, β_0 is the intercept, ΔPL_t is the main independent variable that represents the change in property-related loans, $\Delta NGDP_t$ is the growth rate of nominal GDP, ΔEAP_t is the change in the number of economically-active population, ΔIRB_t is the growth rate of investment in residential buildings, and LP_t represents the fluctuation rate of land prices. In addition, the model includes two control variables, ΔCPI_t and BR_t , that represent the inflation rate measured by the consumer price index (CPI) and the Base Rate of the Bank of Korea. The subscript t stands for time, which in this study is provided on a quarterly basis from 2007 to 2024, while ε_t represents the error term, that is, unobserved factors that could influence the dependent variable. To examine the causal relationship between the change in property-related loans and the increase in residential property prices in Korea, Granger causality tests are conducted through the use of bivariate

Vector Autoregressive (VAR) models. VAR models are typically used to forecast different variables, collectively consisting of a ‘vector’ of time series variables. A bivariate VAR model with two time series variables consists of two equations: one where the dependent variable is Y_t and the other where the dependent variable is X_t . In both equations, the regressors are lagged values of these two variables. In other words, in a bivariate VAR model, the present value of the variables depends on their past values (Stock & Watson, 2020: 650). The number of lags is denoted p . The equations for the bivariate VAR model are as follows:

$$Y_t = \beta_0 + \beta_1 Y_{t-1} + \dots + \beta_p Y_{t-p} + \gamma_1 X_{t-1} + \dots + \gamma_p X_{t-p} + \varepsilon_{1t} \quad (2)$$

$$X_t = \beta_0 + \beta_1 X_{t-1} + \dots + \beta_p X_{t-p} + \gamma_1 Y_{t-1} + \dots + \gamma_p Y_{t-p} + \varepsilon_{2t} \quad (3)$$

where the β 's and γ 's are the coefficients and ε_{1t} and ε_{2t} are the error terms. The optimal number of lags to be included in the VAR models has been selected using the Hannan and Quinn Information Criterion (HQIC), which is suitable for quarterly data. For the main research question, a bivariate VAR model is used for the Granger-causality test to analyze the ‘causal’ effect of the year-on-year change in property-related loans, the main independent variable, on the change in residential property prices in Korea, the main outcome variable. Additional Granger causality tests have been conducted to examine whether there is a causal relationship between both the change in mortgage and household lending and the increase in house prices. Moreover, to study the hypothesis that the increase in house prices Granger-cause private consumption, a bivariate VAR model has been used where Y_t is the growth rate of private consumption and X_t is the change in residential property prices. Finally, bivariate VAR models have been used to conduct a Granger-causality test for the relationship between the change in house prices and nominal GDP growth to examine the assumption of the housing wealth effect.

6. Empirical Analysis

This section starts with empirically examining the main research question and hypothesis and presents the estimation results. It also presents the results of the Granger causality test on the relationship between the increase in property-related lending and the change in residential property prices in Korea. It is followed by the statistical (descriptive) analysis of the three sub-questions related to the main research question. Finally, the results will be discussed in conjunction with the findings of earlier studies and the theoretical background.

6.1 Empirical Results

The results for the unit root test, the Augmented Dickey-Fuller (ADF) test, is given in Table A2 in the Appendix and show that all variables used for the empirical analysis are stationary at the 5 percent significance level, with p-values below 0.05. The estimation results for the OLS regression model are given in the first column of Table 1, which shows a positive and statistically significant relationship between the change in property-related loans and residential property prices in Korea from the first quarter of 2007 to the fourth quarter of 2024.

Table 1: Estimation Results for the OLS, PW and NW Regression Models

Empirical model	OLS	PW	NW
Dependent variable: residential property prices			
	(1)	(2)	(3)
Property-related loans	0.878*** (0.147)	0.658*** (0.137)	0.878** (0.266)
Nominal GDP growth	0.109 (0.169)	0.073 (0.072)	0.109 (0.179)
Economically act. Pop.	1.032* (0.526)	0.591* (0.343)	1.033 (0.709)
Residential investment	-0.068* (0.039)	-0.016 (0.029)	-0.068 (0.048)
Land price fluctuation rate	2.499 (1.833)	-0.316 (0.890)	2.499* (1.459)
BoK Base Rate	-1.483*** (0.401)	-0.634 (0.547)	-1.483* (0.840)
Inflation Rate	1.572*** (0.371)	0.831** (0.340)	1.572*** (0.547)
Constant	-5.613*** (1.692)	-3.164 (2.587)	-5.613** (2.582)
DW statistic	0.287	0.929	-
R-squared	0.477	0.355	0.477
Observations	72	72	72

Note: estimation methods used are Ordinary Least Squares (OLS), Prais-Winsten (PW) and Newey-West (NW). Standard errors are in parentheses. The Durbin Watson (DW) statistics is given only for the OLS and PW estimations. Lag length for the Newey-West regression model is four and based on the frequency of the data, which is quarterly. Significance levels denoted as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Both the inflation rate and the increase in the economically active population also seem to be positively associated with the increase in residential property prices, suggesting that there is a link between higher prices for consumer goods and houses and that an increase in the population leads to more demand for housing, contributing to the rise in house prices. On the other hand, the results in Table 1 also show that investment in residential buildings and the Base Rate of the Bank of Korea are negatively related to residential property prices, which suggests that an expansion in the supply of new homes through residential investments reduce house prices and that lower interest rates tend to increase property prices by raising the demand for mortgage credit. The coefficient for nominal GDP growth is also positive but the relationship with residential property prices is not statistically significant. As a measurement for the goodness of fit, the R-squared shows that the OLS regression model explains around 48 percent of the variation in the dependent variable. Meanwhile, according to the results presented in Table A3 in the Appendix of the Breusch-Pagan test for heteroskedasticity, there is no heteroskedasticity in the residuals for the OLS regression model, with a p-value of 0.8136 that is well above the significance level of 0.05, thereby failing to reject the null hypothesis of homoskedasticity. However, the Durbin-Watson (DW) statistic for the OLS regression is low, with a value of 0.287, suggesting that there is serial correlation in the residuals. This could make the standard errors and the test statistics for the OLS model less reliable.

To address first-order serial correlation, a Prais-Winsten (PW) estimation has been conducted, with the results in the second column of Table 1 presenting a positive and statistically significant relationship between the change in property-related loans and the increase in residential property prices. The PW estimation results also continue to show a negative association between the increase in residential investment and the level of interest rates with the change in house prices. However, with a DW statistic of 0.929 that is below the value of 2.0, there still seems to be autocorrelation in the error terms, as the PW estimation method does not address serial correlation beyond AR(1). Hence, column 3 in Table 1 presents the results for the Newey-West regression with heteroskedasticity and autocorrelation-consistent (HAC) standard errors to address the issue of serial correlation, which continues to show a positive relationship between the change in property-related loans and house prices that is statistically significant at the 5 percent level. As a robustness check, Table A4 in the Appendix presents the results for the PW estimation model that uses a broader definition of credit to households as the main independent variable, which captures all types of loans extended by financial institutions to households that is either secured by real estate as collateral or used to purchase

a home, including through ‘rental deposit loans’ that is used by borrowers to pay for the deposit under the *Chonse* rental system. The PW estimation model also includes a lagged dependent variable to address the issue of serial correlation in the error terms. It has been shown that the inclusion of a lagged dependent variable in the regression model to get rid of autocorrelation is appropriate for relatively small sample sizes, that is, between 50 and 150 observations, and could still lead to consistent estimates (Keele, & Kelly, 2006: 203). Column 7 in Table A4 shows that there is a positive and statistically significant relationship between the percentage change in credit to households and the rise in residential property prices, while the results for the remaining control variables (except the constant and the lagged dependent variable) are insignificant. With the value of the DW test statistic close to 2.0, we fail to reject the null hypothesis of non-autocorrelated errors and conclude that there is no autocorrelation in the residuals.

The main research question of this study, however, aims to examine whether there is a *causal* relationship between the percentage change in property-related lending and residential property prices in Korea. The results of the Granger causality test that has been conducted using a bivariate Vector Autoregressive (VAR) model are shown in Table 2. The results indicate a one-way or unidirectional causation between the change in property-related loans and the rise in house prices. With a p-value of 0.054, we can reject the null hypothesis that the change in property-related loans does not Granger cause the change in house prices at the 10 percent significance level, but not at the 5 percent level. The Granger causality test in Table 2 indicates that there is a stronger unidirectional causal effect between the percentage change in mortgage loans extended by banks and house prices at the 5 percent significance level. In other words, the change in property-related lending has a weaker ‘causal effect’ on the rise in house prices than the change in mortgage loans. One explanation for this is that the proxy for property-related loans also captures loans used for investments in the construction of housing, which could increase the supply of new housing units and put downward pressure on house prices.

For the broader definition of the change in total credit to households and residential property prices, the results for the Granger causality test in Table 2 reveal a pattern of two-way or bidirectional causality between credit to households and house prices at the 1 percent level. Unlike mortgage loans, the results of the Granger-causality test for the relationship between household credit and house prices show that there could be a problem of *reverse causality*. Hence, loans to households not only affect the demand for housing, thereby influencing property prices, but an increase in house prices could also influence credit growth.

Most consumer and mortgage loans extended by banks are secured by real estate as collateral, suggesting that if house prices rise, banks become more willing to expand their lending to households, further driving up property prices.

Table 2: Results of the Granger Causality Tests

Related pair of variables	Null hypothesis	Lag length	P-value
% change of property -related loans (PRL) vs % change of residential property prices (RPP)	PRL $\nRightarrow$ RPP	2	0.054*
	RPP $\nRightarrow$ PRL	2	0.953
% change of banks' mortgage loans (BML) vs % change of residential property prices (RPP)	BML $\nRightarrow$ RPP	2	0.040**
	RPP $\nRightarrow$ BML	2	0.430
% change of total household credit (THC) vs % change of residential property prices (RPP)	THC $\nRightarrow$ RPP	6	0.000***
	RPP $\nRightarrow$ THC	6	0.000***

Note: quarterly data. The optimal lag length is determined by the Hannan and Quinn information criterion (HQIC). The significance level is denoted as * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

In addition, the Lagrange Multiplier test for autocorrelation has been conducted to examine whether there is serial correlation in the VAR model. The results are presented in Table A5 in the Appendix, which show that for the first lag the p-values are greater than 0.01, meaning that we fail to reject the null hypothesis that there is no autocorrelation and conclude that the models do not have serial correlation in the residuals. At the second lag, all the bivariate VAR models used for the Granger causality tests are also free of autocorrelation at the 1 percent level.

Finally, the results of the Granger causality test that examines the hypothesis stating that there is a 'housing wealth effect' in Korea are presented in Table A6 in Appendix, showing that the change in residential property prices is not significant in Granger-causing either the change in private consumption or nominal GDP growth, while the change in house prices do seem to follow economic growth. The lack of statistical significance suggests that the housing wealth effect based solely on changes in house prices is largely absent in Korea as it has no 'causal' effect on both private consumption and economic growth. Meanwhile, the Lagrange Multiplier tests in Table A7 show that there is no autocorrelation in the bivariate VAR models used for the Granger causality tests, with all p-values larger than 0.01.

6.2 Statistical Analysis

Through the debt shift, a rapid expansion of mortgage and real estate sector lending by banks has occurred in Korea in recent decades. The empirical results have shown that this increase in property-related lending causes residential property prices to rise, contributing to the emergence of real estate bubbles. The primary aim of the statistical analysis is to evaluate additional consequences of the shift in banks' credit allocation, such as on the level of household debt, the share of loans to productive sectors of the economy and the level of housing inequality in Korea. The association between property-related loans and house prices is also given by the Correlation Matrix in Table A8 in the Appendix, where there is a positive correlation between house prices and property-related loans of 0.46, while the correlation between the increase in house prices and the growth rate of household credit is 0.55. The Correlation Matrix shows that the association between these two credit variables and house prices is higher than all other remaining control variables, including mortgage loans. Meanwhile, as expected, there is a negative correlation between both residential investment and the Base Rate of the Bank of Korea with the increase in house prices.

Figure 1 shows a scatterplot for the relationship between property-related loans and residential property prices in Korea from the first quarter of 2007 to the fourth quarter of 2024. While the figure shows a positive correlation between the growth rate in property-related loans and the increase in house prices, the existence of outliers suggests that there could be other factors that affect house prices other than loans. The relationship between a broader definition of credit to households, which includes mortgage and consumer loans secured by real estate, and house prices in Korea from 2004 until 2024 is illustrated in Figure 2.

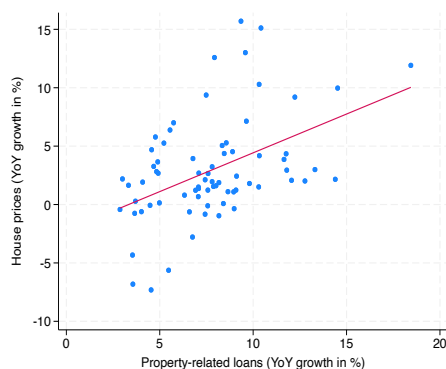


Figure 1: Growth in Property Loans and House Prices

Source: FRED, Bank of Korea

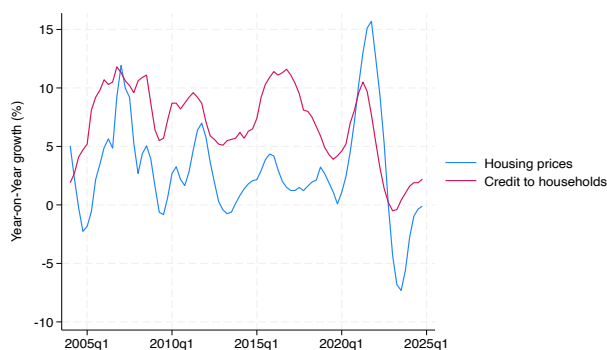


Figure 2: Household Credit and House Prices, 2004-2024

As can be seen in Figure 2, there seems to be a time lag on the effect of household lending on house prices, as credit to households expanded earlier than residential property prices between 2004 and 2007. The administration of Moon Jae-in (2017-2022) attempted to curb rapid rises in property prices during the Covid-19 pandemic, when house prices and household credit grew by 14 and 10 percent in 2021, respectively, by tightening the LTV ratio on loans for home purchases in certain overheated areas in Seoul, which subsequently led to a sharp decline in both lending and house prices (see Figure 2). House prices fell as more stringent lending conditions were imposed on mortgages, leading to a downturn in the Korean real estate market.

While there seems to be a positive association between both the increase in property-related loans and household credit and the rise in residential property prices in Korea, it is important to understand why and what the consequences are of rapid increases in credit and property prices. Bezemer et al. (2020) has, for example, observed a debt shift in most advanced economies, where banks increasingly provide mortgage loans rather than business loans for productive investments, which could have numerous macroeconomic consequences, including lower economic growth, higher levels of inequality and private sector debt, and greater risk for financial instability. Meanwhile, Ryan-Collins et al. (2017) have argued that banks prefer mortgage lending to maximize profits, and that stagnant wage growth has made individuals more reliant on bank credit to be able to purchase a home. This increase in mortgage lending increases demand for housing and, given that the supply of land is fixed, in turn contributes to higher property prices.

This is in line with the theories by Minsky and Kindleberger who argued that an excessive increase in credit creation tends to result in asset price bubbles and that certain kind of loans, such as speculative and Ponzi type of finance, could undermine the stability of the financial system. In Korea, Figure 3 shows a shift in banks' credit allocation from productive industries toward households and the real estate sector, with the share of 'productive' loans (defined as loans to industries minus corporate loans for real estate and finance) declining from around 49 percent in early 2014 to 41 percent by the end of 2021, while the share of unproductive loans (defined as mortgage credit and corporate loans to real estate activities and finance) increased from 39 percent to 45 percent during the same period. This is also illustrated by the decline of the share of corporate loans to the manufacturing sector that fell from 40 percent in 2013 to around 31 percent in 2024 (see Figure 4). While the share of loans to manufacturing has gradually declined, banks have increased their lending to households and the real estate sector.

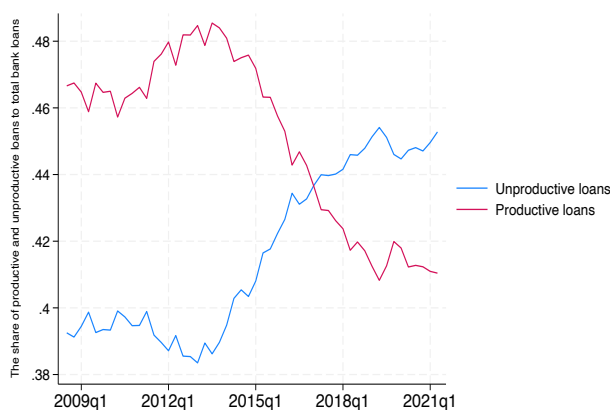


Figure 3: Share of Productive and Unproductive Credit, 2009-2020 Figure 4: Share of Manufacturing Loans, 2005-2024

Source: Bank of Korea

The first sub-question relates to the economic consequences of this debt shift in Korea as it seeks to analyze: *whether the shift in banks' credit allocation has led to higher levels of household debt*. As bank lending toward households and the real estate sector has increased, as illustrated by the rise in the share of unproductive credit in Figure 3, there has been a noticeable rise in level of household debt in Korea since the 1980s. Today, Korea has one of the highest levels of household debt among advanced economies. This rapid increase in household debt has been a concern among Korean policymakers because of the adverse effects it could have on economic growth and financial stability. Figure 5 shows the level of household debt relative to GDP in Korea, with the household debt-to-GDP ratio rising from around 9 percent in early 1970 to over 97 percent by the end of 2022. This can be explained by the rise in banks' consumer and mortgage loans, which account for over 90 percent of total household debt in Korea (Kang, 2022).

The outstanding amount of household debt was relatively low during the presidency of Park Chung Hee (1961-1979) with the Korean developmental state favoring the allocation of bank credit only to 'productive' industries, such as exports and manufacturing, while restricting mortgages and real estate loans. As the Korean economy developed and financial controls were relaxed, the level of household debt started to rise from less than 20 percent of GDP in the early 1980s to over 40 percent by the 1990s. After the Asian financial crisis of 1998 there was a rapid increase in household debt, partly fueled by the credit card bubble that then burst in 2003. As banks began to increase their mortgage and consumer lending, the level of household debt rose from around 60 percent of GDP in 2004 to 97 percent by 2022 as is shown in Figure 5.

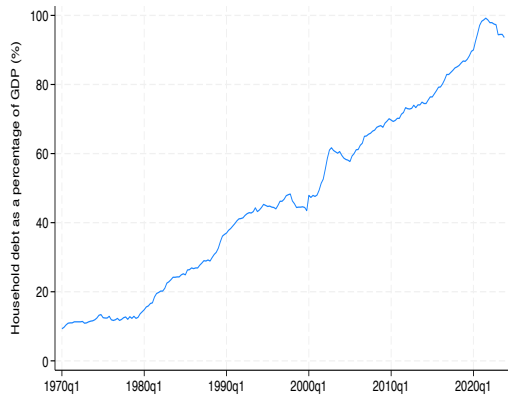


Figure 5: Level of Household Debt to GDP, 1970-2022

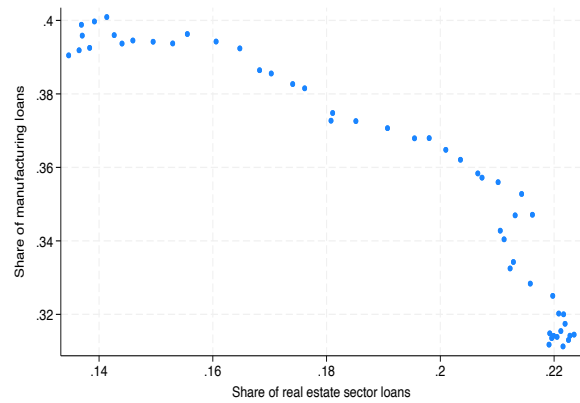


Figure 6: Share of Manufacturing vs Real Estate Loans

Source: Bank of International Settlements, Bank of Korea

The second sub-question focuses on: *how the debt shift, that is, the expansion of property-related lending, has affected the share of loans to more productive sectors of the economy.* Figure 4 showed a gradual decline in the share of corporate loans to manufacturing, while the share of loans to households and the real estate sector has increased. As illustrated in Figure 6, it can be argued that the expansion of credit to the real estate sector tends to ‘crowd out’ loans to more productive sectors of the economy, such as manufacturing. The scatterplot shows a negative correlation between the share of loans to the manufacturing sector and the share of loans to the real estate sector for the period 2012 until the end of 2024. This suggests that an increase in the share of corporate loans to the real estate sector could reduce bank lending to manufacturing industries. As Schumpeter (1934) argued, however, only bank loans used to produce new goods and services are deemed productive and contribute to productivity growth, meaning that a lower share of loans to the manufacturing industry could result in lower economic growth in the long run.

The debt shift has not only led to higher levels of household debt and a lower share of loans to manufacturing, but also contributed to higher house prices in Korea. Another economic consequence of the debt shift is analyzed by the third sub-question, which focuses on: *whether the increase in the total value of housing in Korea has led to higher levels of housing inequality.* As has been shown by the empirical results, the expansion of property-related loans, particularly mortgage loans, Granger-causes the increase in residential property prices. This means that an excessive increase in property-related lending by banks could result in a house price bubble, which could undermine the stability of the financial system.

One indicator that demonstrates the existence of a real estate bubble in Korea is the housing price-to-income ratio, which rose from 17.6 in 2019 to 29.4 in 2022, meaning that an average worker will need to save the entire salary for more than 29 years to afford a home (Yeon-woo, 2023). Figure 7 shows the total housing value in Korea in billions of won, which has increased by almost ninefold from 822 trillion won in 1995 to 7244 trillion won by 2021 according to the BoK. As can be seen in Figure 8, the share of low-income earners that can afford a home has been declining in Korea in recent years, with the homeownership rate for families in this income class decreasing from 51.9 percent in 2008 to 46.4 percent in 2019, according to data from Statistics Korea. Meanwhile the share of families who own a home among high-income earners has increased, with their homeownership rate rising from 69.4 percent in 2008 to 76.1 percent in 2019. Hence, because of the rapid increase in house prices, the level of housing inequality in Korea has widened significantly in the last two decades.

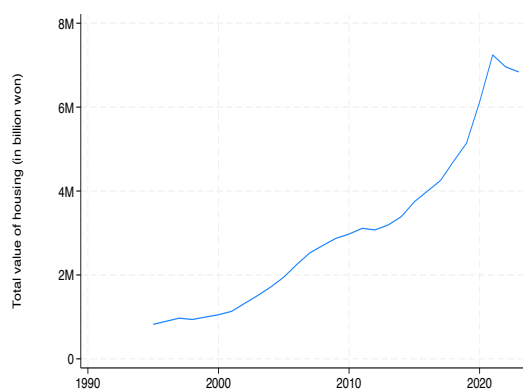


Figure 7: Total Housing Value, 1995-2023

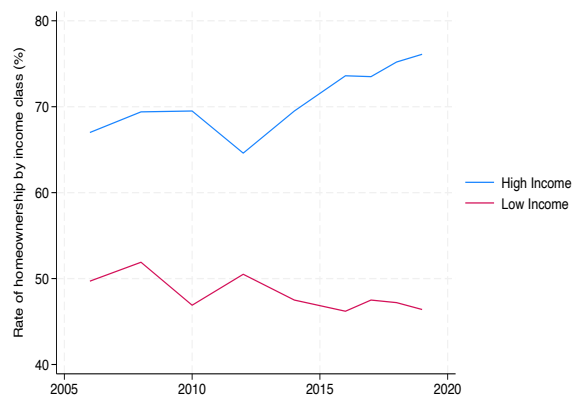


Figure 8: Rate of Homeownership by Income Class, 2006-2019

Source: Bank of Korea, Statistics Korea

6.3 Discussion

A major economic change that has occurred in Korean society since the late 1990s is not only the demise of the Korean ‘developmental state’, but also the rise in the level of household debt and socioeconomic inequality. The findings in the statistical analysis section have shown that these changes are related to the shift in banks’ credit allocation in Korea as business lending has gradually declined, while lending to the real estate sector has increased in recent decades. This is in line with the findings of earlier studies, such as Kim and Park (2014) and the Bank of Korea (2024), that have observed a rapid increase in household and real estate lending by Korean financial institutions, especially since the 1990s. The findings also suggest that an increase in ‘unproductive’ lending, defined by Joseph Schumpeter (1934) as loans that are not used to increase the production of new goods and services and productivity growth, in turn tends to ‘crowd out’ lending to more productive industries. This shift in the allocation of credit in Korea confirms the ‘debt shift’ phenomenon that can be observed in most advanced economies, since banks prefer the extension of mortgage loans to maximize profits as loans to manufacturing firms are deemed costly and too risky (Bezemer et al., 2020; BoK, 2024).

The statistical analysis section has shown that with the demise of the Korean developmental state and the liberalization and deregulation of the economy, commercial banks significantly expanded their lending toward households by providing mortgages and consumer loans, which has contributed to a rapid increase in the level of household debt that rose from less than 9 percent of GDP in 1970 to almost 97 percent by 2022. Another economic consequence of the ‘debt shift’ is an increase in bank lending to the real estate sector, which has led the value of housing in Korea to rise considerably in recent decades, contributing to higher levels of housing inequality as the rate of homeownership has increased for high-income earners, while that of low-income families has gradually declined.

The empirical analysis has examined the relationship between property-related lending and house prices in Korea, finding that there is a positive and statistically significant relationship between the change in property-related loans and house prices. For example, the Newey West estimations in Table 1 have shown that a one percentage point increase in property-related lending increases residential property prices by 0.878 percentage points, *ceteris paribus*. In line with earlier studies, such as Lindner (2014) and Liang and Cao (2007), the direction of Granger ‘causation’ between the change in mortgage lending by banks and the rise in house prices in Korea is found to be unidirectional. The Granger causality tests in Table 2 have shown that the percentage change in mortgage loans Granger-causes the increase in residential property prices

at the 5 percent significance level, while the change in property-related loans Granger-causes house prices only at the 10 percent level. The hypothesis stating that an increase in house prices in Korea would indirectly promote economic growth and consumption as households become more willing to spend due to the ‘housing wealth effect’ has been rejected. The results of the Granger causality tests presented in Table A6 show that changes in residential property prices fail to predict changes in both private consumption and economic growth. It has also been asserted that large increases in household wealth are needed to generate only a small increase in consumption via the wealth effect, while leading to higher levels of wealth inequality (Ryan-Collins, 2017: 123). It should be remembered, however, that the Granger causality test is primarily a test for predictive causality rather than direct causation.

The relationship between the expansion of credit and the rise in asset prices has also been identified by Charles P. Kindleberger (1978), with credit booms often leading to asset price bubbles that could suddenly burst and result in financial crises, such as the stock market bubble of the 1920s in the United States that burst in October 1929 and led to the Great Depression of the 1930s. According to Hyman Minsky’s financial instability hypothesis, the greater the share of Ponzi and speculative type of finance in the economy, which are loans that do not generate sufficient income streams to repay the loans, the greater the risk for financial instability. Hence, the fragility or robustness of the financial system depends upon the type of loans that banks extend. If banks provide productive business loans to finance investment projects that generate cash flows and allow borrowers to amortize and service their debts, this would be conducive to financial stability. However, if banks extend loans solely based on the value of assets pledged as collateral, this tends to create a more fragile financial system (Minsky, 1986: 260-261).

In Korea’s case, the declining share of manufacturing loans and the rapid expansion of mortgage lending and credit collateralized by real estate could lead to house price bubbles and undermine the stability of the financial system. Understanding why and how housing bubbles emerge is important to prevent financial crises in the future and create a more resilient financial system. The capability of the state to preserve financial stability and achieve financial resilience is a key condition for minimizing both the frequency and magnitude of *economic shrinking* (Andersson et al. 2021). This aspect has been overlooked by current discussions of how to achieve resilience to economic shrinking, which tend to focus on the role of social capabilities, such as structural change, state autonomy and social stability. However, the most common types of economic crises, such as banking crises and currency crises, tend to arise because of the excessive expansion of ‘unproductive’ and foreign currency-denominated loans.

During the ‘high growth period’ from the 1960s to the late 1980s, the Korean government selectively directed the allocation of credit in line with industrial policy objectives by limiting loans to the real estate sector and encouraging state-owned banks to extend loans to strategic industries. Foreign capital flows were also tightly controlled through capital controls to ensure that foreign-currency loans were only used for productive purposes. Once the government started to privatize state-owned banks, deregulate the financial system, and liberalize the Korean economy, a shift in banks’ credit allocation began to emerge that has made the Korean economy more vulnerable to financial crises. Hence, the smaller the share of speculative loans, such as mortgage and real estate sector loans that could lead to a rise in bad debts, the more resilient the banking system is to financial crises (Werner, 2005: 230-237).

Another implication of the findings is that the rapid expansion of lending to the real estate sector tends to ‘crowd out’ bank lending to more productive sectors of the economy, such as manufacturing. Since only loans to ‘productive’ industries increase the production of new goods and services and contribute to productivity growth, a decline in the share of loans to manufacturing could result in lower economic growth in the long run. However, this study also has several limitations. For example, because of data limitations, the proxy for property-related loans does not capture all loans used for property purchases, such as rental deposit loans used to pay for *Chonse* deposits, while loans to real estate activities also include loans that are used for property development projects that are not directly related to the residential property market.

If a broader measurement is used of the change in credit provided to households by financial institutions, the Granger causality test in Table 2 shows that there is bidirectional causation between the change in total household credit and the increase in residential property prices in Korea. This shows that there could be a problem with *reverse causality*, where not only bank credit to households Granger-causes house prices, but that the expansion of household credit could be determined by the rise in house prices. For example, given that most mortgage and consumer loans in Korea tend to be secured by real estate as collateral, a rise in the value of property could make banks more willing to expand their lending, further driving up house prices. For future studies, it would be interesting to analyze how different types of loans affect house prices and to make comparisons between countries to address the issue of external validity, as this thesis is a case study of a single country, namely South Korea, which could make the findings less representative and thus cannot be generalized.

7. Conclusion

The main aim of this study is to analyze whether an expansion in property-related loans, defined as mortgage loans and corporate loans to real estate activities extended by commercial banks, causes residential property prices to rise in Korea. The literature on the relationship between bank lending and house prices is broad, with interest in the topic growing since the global financial crisis of 2008. However, most studies focus on the relationship between house prices and credit growth and tend to focus on general bank lending, rather than loans specifically allocated toward the real estate market. To fill this gap in the literature, this study has constructed a proxy for property-related loans and uses a regression model that captures the most important demand and supply-side factors that influence house prices. It has selected South Korea as a case study not only because of the quantity and quality of data that is available, but also because it epitomizes the economic change that has occurred in Korean society since the Asian financial crisis of 1997-98, namely the ‘debt shift’ away from business lending toward household and real estate-related lending.

Moreover, in line with the theories by Hyman Minsky, Charles Kindleberger and Joseph Schumpeter, certain types of loans, such as Ponzi and speculative loans that are collateralized by assets but do not generate sufficient cash flows to service or repay the loans, tend to increase the risk for financial instability. In particular, a rapid increase in credit allocated toward the real estate market could drive up house prices and augment the risk for a deep and prolonged recession, that is, the frequency and magnitude of economic shrinking. This study has shown that both the change in mortgage and property-related lending Granger-cause the rise in residential property prices in Korea, suggesting that an excessive increase in lending to the real estate market could result in housing bubbles. Meanwhile, the empirical results also reject the hypothesis that there is a housing wealth effect in Korea, as the results of the Granger causality tests have shown that the increase in residential property prices is not significant in predicting the rise in both private consumption and nominal GDP growth.

The aim of the statistical analysis is to answer the three sub-questions related to the main research question, focusing on the consequences of the debt shift and the expansion of property-related lending. For example, it has shown that bank lending to the real estate sector tends to ‘crowd out’ lending to more productive sectors of the economy, such as the manufacturing industry, which could reduce productivity growth and thereby stifle long-term economic growth. Other economic consequences of the debt shift in Korea include higher levels of both household debt and housing inequality.

In line with earlier studies, such as Bezemer and Samarina (2019), this study has shown that a rise in house prices caused by the expansion of mortgage lending tends to exacerbate disparities in homeownership between high and low-income earners, contributing to higher levels of housing inequality as it becomes more difficult for non-homeowners to be able to afford a home, whereas existing homeowners benefit of higher property prices that increase their net wealth. The expansion of property-related lending could make the Korean economy more vulnerable to 'balance-sheet recessions' by raising the level of household debt and driving up house prices, thereby increasing financial fragility. Hence, one policy implication of these findings is that financial regulators and monetary authorities should monitor and contain the rise of property-related lending to ensure orderly growth of house prices and maintain financial stability. The Korean government could intervene in credit markets by reintroducing the selective credit controls that were in place in the 1960s and 1970s to direct the allocation of bank credit to more productive sectors of the economy. For example, in addition to tightening macroprudential regulations on household and property-related lending, the government could provide incentives to encourage private banks to expand their lending to small businesses and the manufacturing industry in order to promote economic growth.

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Appendix

Table A1: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Residential property prices	84	2.912	4.283	-7.313	15.699
Property-related loans	72	7.911	3.298	2.871	18.443
Nominal GDP growth	84	3.335	2.396	-2.4	10
Economically act. Pop.	84	1.171	.811	-1.3	3.6
Residential investment	84	5.775	10.858	-19.3	29.5
Land price fluctuation rate	84	.25	.286	-1.375	1.36
BoK Base Rate	84	2.548	1.24	.5	5.25
Inflation rate	84	2.37	1.362	0	5.8
Mortgage loans	72	6.596	3.018	.5	14.8
Household credit	84	6.985	3.266	-.5	11.8
Private consumption	84	2.435	2.490	-6.1	6.7

Note: the number of observations for property-related loans and mortgage loans declines to 72 because data for the year-on-year change in mortgage loans was only available from the fourth quarter of 2006, whereas all other variables are from the first quarter of 2004 until the fourth quarter of 2024.

Table A2: Augmented Dickey-Fuller Test

Variable	Test statistic	5% Critical value	P-value	Lag length
Residential property prices	-3.018	-1.666	0.0017***	4
Property-related loans	-2.030	-1.670	0.0233**	4
Nominal GDP growth	-4.449	-1.666	0.0000***	4
Economically active population	-3.106	-1.666	0.0013***	4
Residential investment	-2.028	-1.666	0.0231**	4
Land price fluctuation rate	-3.189	-1.666	0.0011***	4
BoK base rate	-2.287	-1.666	0.0126**	4
Inflation rate	-2.101	-1.666	0.0196**	4
Mortgage loans	-2.645	-1.670	0.0052***	4
Household credit	-2.146	-1.666	0.0176**	4
Private consumption	-3.362	-1.666	0.0006***	4

Note: significance level is denoted as * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

The number of lags is based on the frequency of the data, with four lags usually being sufficient for quarterly data. The ADF test has been specified with drift as the variables fluctuate around a non-zero mean and do not exhibit a linear deterministic trend over time.

Table A3: Breusch-Pagan Test for Heteroskedasticity

	Koef.
Chi2(1)	0.06
Prob>Chi2	0.8136

Note: the null hypothesis states that there is homoskedasticity. The test is conducted for the first OLS regression model.

Table A4: Prais-Winsten Model with Lagged Dependent Variable

Dependent variable: residential property prices

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Residential property prices							
L1.	0.627*** (0.072)	0.627*** (0.072)	0.632*** (0.073)	0.633*** (0.076)	0.635*** (0.077)	0.634*** (0.077)	0.633*** (0.079)
Household credit	0.731*** (0.123)	0.732*** (0.124)	0.735*** (0.125)	0.733*** (0.129)	0.729*** (0.131)	0.723*** (0.133)	0.721*** (0.134)
Nominal GDP growth		-0.005 (0.050)	-0.004 (0.050)	-0.005 (0.052)	-0.006 (0.052)	-0.006 (0.053)	-0.006 (0.053)
Economically act. Pop.			-0.076 (0.132)	-0.077 (0.134)	-0.094 (0.136)	-0.079 (0.139)	-0.087 (0.154)
Residential investment				0.001 (0.013)	-0.003 (0.014)	-0.004 (0.014)	-0.004 (0.015)
Land price fluctuation rate					0.312 (0.286)	0.400 (0.364)	0.416 (0.378)
BoK base rate						-0.145 (0.318)	-0.166 (0.332)
Inflation rate							0.040 (0.264)
Constant	-3.855*** (0.843)	-3.844*** (0.845)	-3.785*** (0.859)	-3.780*** (0.859)	-3.811*** (0.858)	-3.434*** (1.033)	-3.452*** (1.016)
DW-statistic	1.98	1.98	1.97	1.98	1.99	2.00	1.99
Observations	83	83	83	83	83	83	83
R-squared	0.68	0.68	0.68	0.68	0.68	0.69	0.69

Note: semirobust standard errors in parentheses. Significance levels denoted as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A5: Lagrange Multiplier Test for Autocorrelation

Related pair of variables	chi2	df	Lag	Prob > chi2
% change of property -related loans (PRL) vs % change of residential property prices (RPP)	6.3964	4	1	0.171
	1.0272	4	2	0.906
% change of banks' mortgage loans (BML) vs % change of residential property prices (RPP)	11.4233	4	1	0.022
	3.4379	4	2	0.487
% change of total household credit (THC) vs % change of residential property prices (RPP)	2.4804	4	1	0.648
	8.3567	4	2	0.079

Note: the null hypothesis states that there is no serial correlation in the residuals

Table A6: Results of the Granger Causality Tests for the Wealth Effect

Related pair of variables	Null hypothesis	Lag length	P-value
% change of residential property prices (RPP) vs % change of private consumption expenditure (PCE)	RPP $\nRightarrow$ PCE	6	0.154
	PCE $\nRightarrow$ RPP	6	0.103
% change of residential property prices (RPP) vs % change of nominal GDP (NGDP)	RPP $\nRightarrow$ NGDP	10	0.350
	NGDP $\nRightarrow$ RPP	10	0.017**

Note: quarterly data. The optimal lag length is determined by the Hannan and Quinn information criterion (HQIC). The significance level is denoted as * p<0.1; ** p<0.05; *** p<0.01

Table A7: Lagrange Multiplier Test for Autocorrelation

Related pair of variables	chi2	df	Lag	Prob > chi2
% change of residential property prices (RPP) vs % change of private consumption expenditure (PCE)	3.4127	4	1	0.491
	1.1456	4	2	0.887
% change of residential property prices (RPP) vs % change of nominal GDP (NGDP)	3.5874	4	1	0.465
	1.9995	4	2	0.487

Note: the null hypothesis states that there is no serial correlation in the residuals

Table A8: Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) House prices	1.000									
(2) Property-related loans	0.461	1.000								
(3) Household credit	0.553	0.475	1.000							
(4) Mortgage loans	0.349	0.816	0.392	1.000						
(5) Nominal GDP growth	0.136	0.080	0.264	0.072	1.000					
(6) Economically act. Pop.	0.132	-0.130	0.006	-0.158	0.139	1.000				
(7) Residential investment	-0.034	0.214	0.298	0.175	0.121	0.157	1.000			
(8) Land price fluctuation	0.213	0.294	0.142	0.212	0.104	-0.003	0.183	1.000		
(9) BoK Base Rate	-0.153	-0.164	-0.101	-0.457	0.101	0.239	-0.252	-0.139	1.000	
(10) Inflation rate	0.130	-0.384	-0.137	-0.516	0.095	0.265	-0.297	-0.252	0.543	1.000

Statement on the use of AI: No AI-based tools were used in the completion of this master's thesis.