Research Statement - Seungyub Han[1] (UCLA) November 2023

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I am a macroeconomist with a specialization in international economics and housing economics. At first glance, my research portfolio might appear overly broad. However, despite its wide range, every research project I undertake is characterized by solid theoretical frameworks and compelling empirical evidence, contributing uniquely to the existing literature. In addition, I am driven by several fundamental questions that bring coherence to my diverse research interests.

In this statement, I will outline how my research projects are categorized and what fundamental questions drive my research in these fields. Specifically, I will categorize my research into four main categories: international macroeconomics, international finance, household finance, and urban/spatial economics. For each category, I will discuss contributions of my research, the fundamental question that guides those works, and my future research plan.

1. International Macroeconomics

My primary research theme for this field involves understanding the mechanics underlying international business cycles. The literature presents numerous international macroeconomics puzzles, indicating that the task of fully grasping the complex dimensions of international business cycles remains incomplete. My job market paper, titled **"Housing Rent, Inelastic Housing Supply, and International Business Cycles,"**—which serves as a confluence of my research interests in international economics and housing economics—contributes to the literature by examining the integral role of housing in shaping international business cycles, especially the dynamics of real exchange rates.

The substantial rent expenditure share naturally implies that housing rent has a considerable influence on the overall price level of a country. This naturally connects housing rent with the real exchange rate, which is defined as the relative price levels across countries. In addition, housing services demonstrate exceptionally inelastic supply when compared to other nontradables. Despite these important characteristics, previous studies have often overlooked the unique role of housing and treated it as just another nontradable service.

My job market paper fills this gap by placing a distinct focus on housing services, both in data and theory. To empirically analyze the role of housing in the real exchange rate, I study eurozone countries, aiming to eliminate the influence of nominal exchange rates. This provides a cleaner identification environment to study the role of housing. Using the Eurostat PPP database, which provides item-level price data for 224 goods and services covering an entire consumption basket, I construct real exchange rates (RER) and break them down into components: the relative price levels of tradable goods, nontradable goods, and housing services across countries. This decomposition allows for an assessment of each component's contribution to variations in RER. I find that relative rent is the most volatile component and plays a significant role in both cross-sectional and time-series variations of RER. Moreover, relative rents account for more than half of the Balassa-Samuelson effect and the negative Backus-Smith correlation, which are two of the most well-known empirical regularities of

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real exchange rates.

The Balassa-Samuelson effect is the empirical pattern found in the data whereby countries with higher GDP per capita have higher price levels compared to countries with lower GDP per capita. My findings show that almost half of the higher price levels in countries with higher GDP per capita come from higher housing rents. Additionally, the Backus-Smith correlation refers to the correlation between the growth rate of relative consumption and the growth rate of real exchange rates. In standard terms, a negative Backus-Smith correlation suggests that a country's consumption exceeds that of foreign countries when its price level is higher than theirs. This situation indicates a departure from ideal risk sharing (i.e., relative demand differences). This became a major puzzle when the standard model predicted this correlation to be strongly positive. Given this background, what I find in the data is that there are negative Backus-Smith correlations in Eurozone countries and the reason for such negative correlation is mostly due to housing rents, rather than other prices.

To understand why relative rent is so important for various dimensions of RER, I construct a two-country model with a realistically calibrated housing sector, combining the work of Berka et al. (2018) and Davis and Heathcote (2005). Using this model, I simulate Eurozone economies with sectoral productivity shocks, calibrated directly from the EUKLEMS database. This simulation analysis offers explanations for why housing rents account for a large portion of the empirical patterns of RER.

First, the Balassa-Samuelson effect predominantly operates through housing rent due to the distribution of sectoral productivities among Eurozone countries. Data from the EUKLEMS database show that countries with higher tradable sector productivity also tend to have higher nontradable sector productivity (excluding the construction sector). However, their construction sector productivity is lower compared to that in other countries, a finding in line with recent literature on stagnant construction sector productivity in developed countries (e.g., Goolsbee and Syverson 2023). This pattern leads the textbook Balassa-Samuelson hypothesis mechanism to function exclusively through housing rent. On the other hand, the inelastic nature of the housing supply proves to be a factor that mitigates any text-book Balassa-Samuelson hypothesis mechanism via housing rents. This is because housing costs are influenced not only by wages—the price of the production factor used in the tradable sector—but also by land price. Furthermore, the simulation demonstrates that the wealth effect—where countries with higher GDP per capita consume more as they grow wealthier, prompted by an increase in tradable sector productivity—tends to enhance the model-generated Balassa-Samuelson effect.

Second, incorporating housing into the model proves beneficial in addressing the Backus-Smith puzzle. Whereas the standard model fails to replicate the Backus-Smith correlation regressions I did, my model, which includes the housing sector, successfully replicates it, with a significant portion of this negative correlation attributable to housing rents, as the data indicates.

The simulation demonstrates that this is due to the nature that housing is hard to supply. Sectoral productivity shocks can produce a variety of effects, but they can all be classified as either demand effect shocks or supply effect shocks. A productivity shock in the tradable sec-

tor acts as a demand effect shock. Consider if a home country experiences a positive tradable sector productivity shock; it becomes wealthier compared to a foreign country, under incomplete market, which shifts the home country's aggregate demand cure upwardly more than that of the foreign country. This increase in demand raises the prices of all goods and services with consumption, resulting in the negative Backus-Smith correlation. Conversely, productivity shocks in the nontradable and construction sectors function as supply effect shocks. If the home country experiences a positive shock in the nontradable or construction sector, it can produce these goods more efficiently, leading to lower prices in those sectors. (A wealth effect does not occur because the prices of outputs in the nontradable and construction sectors decrease without the foreign demand.) This effect produces the positive Backus-Smith correlation.

In my model without housing sector, the impact of supply shock effects outweighs that of demand shocks. This imbalance prevents the standard model from producing the negative Backus-Smith correlation. However, when I assign significant importance to the housing sector—stipulating that 16% of total expenditure is allocated to housing rents—the influence of demand shocks surpasses that of supply shocks. The reasoning is straightforward: given the difficulty in increasing housing supply, the aggregate supply curve becomes more inelastic. Consequently, any wealth effect—which generates a shift in the aggregate demand curve—is magnified. Furthermore, due to housing stock being more significant than housing flows, a productivity shock in the construction sector does not significantly affect the supply of housing services. This causes only minor shifts in the aggregate supply curve in response to productivity shocks, thereby attenuating the effects of supply shocks. These adjustments, through the housing sector, enable my model to generate the negative Backus-Smith correlation, providing a new way to tackle the major puzzle in international macroeconomics.

In conclusion, my job market paper offers a comprehensive analysis of the role housing plays in shaping the empirical regularities of the real exchange rate. By explaining both the Balassa-Samuelson effect and the Backus-Smith puzzle through the lens of housing—a perspective that has not been previously explored—I make a novel contribution to the existing literature. Building upon these results, I aim to further enrich this line of research by exploring several underexamined aspects of housing in the literature. My future endeavors include examining the effects of nonhomothetic preferences for housing consumption, evaluating the impacts of rent-control policies, and investigating the influence of housing finance systems on international business cycles.

2. International Finance

I have two ongoing projects in international finance, with a particular focus on the unique aspects of the international financial system. In my working paper titled **"Dollar Liquidity Flows in Small Open Economies,"** I am collaborating with Saki Bigio and Paul Castillo to examine the intricate relationship between nominal exchange rates and the dollar liquidity demands of non-US banks. Given that the US dollar is the dominant instrument for international transactions, most non-US banks accept dollar-denominated deposits from their customers, while maintaining their own dollar-denominated deposits in major US banks. Through the

LIBOR market and these dollar deposits, they can facilitate the international transactions requested by their customers. This activity can be a source of revenue for these banks, but at the same time, it exposes them to dollar liquidity risk, which may arise from the sudden withdrawal of dollar deposits by their customers. If such a withdrawal occurs, these banks will seek dollars, and this demand may affect the nominal exchange rate. Furthermore, the supplied amount of dollar liquid assets can also be important. We aim to understand such channels both empirically and theoretically.

To investigate the presence of this mechanism in real-world data, we employ the proxy structural VAR method used in Gertler and Karadi (2015), along with the banking sector balance sheet data of Peru, which is heavily dollarized. Considering Peru's heavy reliance on copper for its export revenue, we utilize copper prices as a proxy to capture the exogenous shocks to the supply of liquid dollar assets into the Peruvian banking sector. Our estimation results indicate that exogenous increases in copper prices lead to greater inflows of dollar deposits into the banking sector, which results in the appreciation of the Peruvian sol and a decrease in the dollar liquidity ratio within the banking sector.

We interpret these empirical results as indicative of the banking sector's endogenous reaction to an unexpected abundance of dollars, which leads to the appreciation of the sol. In an effort to provide a theoretical underpinning for these observations, we have constructed a small open-economy model that features a banking sector susceptible to withdrawal shocks as an extension of the model by Bianchi and Bigio (2022). Preliminary results show that our model successfully replicates many of the impulse response functions found in the estimated VAR. Nonetheless, as we move forward, we plan to enhance the model by integrating bonds, with the aim of refining its predictive accuracy. Ultimately, our research seeks to shed light on the role and efficacy of foreign exchange (FX) intervention policies in dollarized economies.

In the other research project, entitled **"International Balance Sheet: A Deep Dive,"** I collaborate with Allen Cian and Luciana Juvenal to explore the implications of valuation effects on international balance sheets. The international financial market is characterized by significant fluctuations in asset prices. Consequently, a country's heavy reliance on a particular asset class can lead to substantial volatility in its net foreign asset position. Furthermore, the denomination of such assets—whether in US dollars or in the local currency—becomes a critical factor. Fluctuations in the nominal exchange rate can profoundly impact a country's external financial stability.

Driven by this rationale, our quantitative analysis delves into the impact of asset price and nominal exchange rate movements on a country's external sustainability. Using data from the IMF's Stock-Flow Reconciliation Survey, we assess the degree to which variations in net foreign asset positions stem from shifts in asset prices or exchange rate changes. The strength of this dataset lies in its ability to dissect these effects across different asset and liability categories on the balance sheet. Moreover, it provides detailed insights into the currency composition for each category.

Utilizing this comprehensive dataset, our exploration is centered on identifying the factors that determine the sustainability of net foreign asset positions and their capacity to forecast returns. A significant discovery within our study is that we provide the empirical evidence of

the "exorbitant duty," theorized in Gourinchas et al. (2017). We observe a tangible pattern: in instances where the VIX—an index measuring market volatility—intensifies, a wealth transfer is discernible from the U.S. to emerging market economies. This shift is facilitated by a dual mechanism involving a contraction in the global equity markets while U.S. debt liabilities remain relatively stable in valuation. We plan to construct a two-country model with with different types of assets and different currency denominations. Our ultimate goal is to provide the theoretical explanation on the return predictabilities of net foreign asset positions in data and why countries end up having asset and currency composition in their portfolio as they have in the data.

3. Household Finance

The main research theme that drives my research in the field of household finance is to understand the role of housing in households' choices in a life-cycle context. Housing is the largest purchase that most households ever make in their lives. At the same time, it has a life-cycle aspect. Young households buy houses using mortgages, and older households use those as collateral or for their retirement. These unique traits of housing naturally imply that housing should affect the many choices of households throughout their life. I explore such nature of housing by using both life-cycle models and household panel survey data. My recent two working papers especially focus on households' portfolio choices and entrepreneurship decisions.

In my working paper titled **"The Effect of Housing on Portfolio Choice: House Price Risk and Liquidity Constraints,"** I investigate how housing choices influence the stock investment decisions of households. Known to crowd out stock holdings, housing purchases primarily do so due to liquidity constraints—households lack funds for stock investment after buying a house—and house price risk—households intentionally reduce stock holdings to lower their overall risk exposure, given that housing is a risky asset. However, distinguishing between these channels has been difficult due to the simultaneity issue. To address this gap in the literature, I developed a life-cycle portfolio choice model with endogenous housing tenure choice and stock market participation by augmenting the model in Cocco (2005). The model suggests that the liquidity constraint channel primarily affects younger households and those with a low net wealth-to-income ratio, while the house price risk channel impacts all types of households, including those with a high net wealth-to-income ratio.

To validate these model predictions, I utilize a distinctive Korean housing tenure system called "jeonse." This is a 2-year, long-term housing lease wherein tenants make a lump-sum deposit typically amounting to 60%-70% of the home's value. They live rent-free during the contract period and are ensured a full refund of their deposit at the end of the term, with its value unchanged, thereby eliminating house price risk for tenants. Furthermore, the considerable deposit amount effectively activates the liquidity constraint channel. Therefore, households opting for jeonse are likely influenced solely by liquidity constraints, not by house price risk. Using household survey panel data from the Korean Labor and Income Panel Study, which provides comprehensive housing tenure and stock investment data, I found that the crowding-out effect of jeonse, indicative of the liquidity constraint channel, affects

primarily young or low-net-wealth-to-income ratio households. On the contrary, housing purchases—which embody both the liquidity constraint and house price risk channels—deter stock investments across all household types, affirming the model's predictions. This study shows the varying impacts of housing purchases on households' stock investment decisions based on age and wealth as a new contribution to the literature.

In the other work in progress, titled **"Skyrocketing House Prices and Squeezed Young Entrepreneurs,"** Jinseok Park and I examine the impact of housing on another form of investment: entrepreneurship. Our hypothesis contends that an exogenous increase in house prices should impede young renters from transitioning into entrepreneurship. As young renters typically do not own homes, they often face the strictest borrowing constraints. In such cases, an exogenous surge in house prices would be expected to elevate their expenses (whether for purchasing a home or for paying higher rent) and thus deter them from investing in new business ventures. While the literature frequently highlights the advantages of rising house prices for entrepreneurs who are homeowners, we offer an alternate viewpoint on this economic phenomenon.

To test our hypothesis, we use two main datasets. The first is the CPS ASEC household survey, which contains detailed information on demographics, homeownership status, and entrepreneurship decisions. The second is the Zillow home value index, which provides the median house price level for each core-based statistical area (CBSA). By combining these datasets, we construct individual-level house price-to-income ratios as proxies for the housing purchase burden faced by each person. Additionally, to address potential endogeneity concerns, we use exogenous variations in the house price-to-income ratio, applying housing supply elasticity from Albert (2010) and regional house price cycles from Guren et al. (2021) as instrumental variables (IVs). Our household-level regression with these IVs reveals that an exogenous increase in the house price-to-income ratio causes a notably sharper decrease in the likelihood of young renters becoming entrepreneurs. Moreover, preliminary evidence indicates that CBSAs with a higher house price-to-income ratio have older average entrepreneurship ages. These results imply that housing choices and entrepreneurship decisions should be jointly considered within a life-cycle framework.

To delve deeper into this relationship, we are developing a life-cycle model with endogenous housing and occupational choices. Utilizing this model, we aim to unpack the joint dynamics of housing and entrepreneurship decisions. Additionally, we intend to analyze various structural shifts in the US economy. Since the early 2000s, the house price-to-income ratio in the US has escalated to historically high levels, potentially due to factors such as low interest rates, rapid urbanization, or stringent land-use regulations. In line with our hypothesis, this trend could deter young renters from embarking on entrepreneurial ventures, thereby contributing to the observed decline in business dynamism. Our goal is to quantify the magnitude of this mechanism.

In future research within this field, I intend to explore households' fertility choices. Notably, South Korea exhibits one of the world's lowest birth rates, approaching 0.7. A leading hypothesis attributes this historic low fertility rate to the high house price-to-income ratio in Seoul, the one mega city in Korea. Moreover, a similar pattern of low fertility rates is observed

in cities around the globe with elevated housing costs. My objective is to examine this critical link between housing affordability and fertility choices using household-level panel survey data and life-cycle modeling.

4. Urban and Spatial Economics

The second research theme in my work on housing economics examines the role of housing market in resource allocation across regions. Housing is an essential service for everyone, yet it remains immobile and land-dependent. Furthermore, supplying new housing is particularly challenging in urban areas due to numerous land-use regulations. These factors contribute to significant disparities in house prices across different regions, which in turn affect households' migration patterns. Such migration, consequently, determines the allocation of production resources—particularly labor—across various regions.

In our recent working paper, titled **"Building Housing: The Allocative Efficiency of Creating New Cities Versus Expanding Existing Ones,"** Sunham Kim and I assess the impact of two distinct land policies—namely, land use restrictions and proactive housing supply policies—in South Korea, using multi-region growth models adapted from Herkenhoff et al. (2018).

Our study begins by estimating regional-level land-use restrictions and total factor productivities (TFPs) via interpreting actual regional data through the lens of our model. These restrictions pertain to the regulatory limits on land usage for housing development. Our findings indicate that the Seoul metropolitan area (SMA) has been subject to comparatively relaxed land-use restrictions. Although this has increased South Korea's aggregate TFP, it has concurrently led to regional decline by disproportionately channeling economic resources into the SMA, potentially contributing to decline in other regions.

Furthermore, leveraging these estimates and a detailed dataset encompassing the expenses related to all New Town Projects initiated by the South Korean government—initiatives aimed at creating infrastructure and new housing in underdeveloped areas—we conduct a series of policy counterfactual analyses. Our focus centers on the repercussions of the second New Town Project, which delivered 666,000 new houses near to the SMA during the early 2000s. According to our model's analysis, the project was cost-effective under reasonable discount rate, generating a 0.4% increase in real aggregate GDP flow, compared to a one-time expenditure amounting to 4.05% of GDP. This increase is from the increased ability of more households to work within the higher productivity environs of the SMA. Furthermore, the project precipitated a significant shift in regional resource allocation, relocating populations from rural to suburban areas adjacent to the SMA. Our findings suggest that the initiative led to a 4% reduction in the overall rural population.

This project contributes to the literature by firstly offering an analysis of the role of land-use policies in South Korea. Additionally, it is the first study to examine the impact of proactive housing supply policies on resource reallocation across regions and aggregate productivity. It highlights the significant role that housing plays in the distribution of resources across different areas.

My coauthor and I are currently planning our next project, which aims to investigate further

the role of the housing market in resource misallocation, this time incorporating job heterogeneities. Recent research, including works by Herkenhoff et al. (2018) and Hsieh and Moretti (2019), has estimated the impact of housing market-induced misallocation on aggregate total factor productivity (TFP). The central thesis is that high housing costs can deter workers from moving to high-TFP areas, thereby inhibiting the full realization of the productivity potential in those regions.

While many urban economists have focused on this misallocation effect, the role of job heterogeneity is crucial yet often neglected. The logic is simple: in places like San Francisco, despite the high cost of living, industries with high TFP, such as the tech sector, can still attract top talent. For example, computer programmers may earn high enough wages to offset the steep housing prices. This interaction among the high TFP of specific industries, elevated housing costs, and substantial labor income could significantly alter recent estimates of housing market-related resource misallocation. To test our hypothesis, we are merging data from the County Business Pattern (CBP) database, which details industry and skill-specific wage heterogeneity, with data from the CPS ASEC household survey that sheds light on migration patterns. This amalgamated data will allow us to dissect the nuances between job heterogeneity, housing market fluctuations, and resource misallocation more thoroughly.

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