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Shadow banks or just not banks?
Growth of the Swedish non-bank sector[*]

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Abstract

The global non-bank sector has experienced significant growth since the global financial crisis, raising concerns that this shift represents a financial stability risk. We consider the drivers of this growth in Sweden: a small, open economy whose non-bank sector has grown rapidly. In contrast with the existing literature for the US, we find no evidence that growth in the Swedish non-bank sector is driven by regulatory arbitrage from banks. Instead, we find that the main drivers are the growing and increasingly complex pension investments, together with returns on global equity markets. While this provides some evidence that growth may be driven for search for yield, we also find that the non-bank sector appears to make its global investment choices on relatively conservative grounds. We conclude that trend-consistent growth may be driven by different factors depending on the jurisdiction. Our findings do not rule out financial stability risks, but further work is required to assess other channels by which these risks could propagate, including further analysis of cross border non-bank activities.

Keywords: non-bank financial institutions, cross-border capital flows, shadow banking, regulatory arbitrage

JEL classification: F32, F41, F44, G15, G18, G22, G23, G28

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1 Introduction

The global non-bank financial intermediation (non-bank) sector has grown by almost 150 per cent since the global financial crisis (Financial Stability Board, 2023). Sweden has been no exception to this trend: the aggregate size more than tripled between 2008 and 2023. The growth in total assets, both in Sweden and abroad, has outpaced that of the banking sector, which is now smaller than the non-bank sector in gross terms.

As a result of this growth, policymakers - especially those with a financial stability mandate - have focused increased attention on this sector. For example, Federal Reserve Chair Jerome Powell pointed to the potential financial stability risks arising from the fast growth in US non-bank participation in lending activities in his remarks to the Foreign Bankers' Association in Amsterdam on 14 May 2024. In Europe, Vice-President of the ECB Luis de Guindos has stated "...we have seen the role that non-banks play in financing the euro area economy become increasingly important. While this is a welcome development...it also entails increased risks for the financial system" (De Guindos, 2023). At a global level, John Schindler, Secretary General of the Financial Stability Board, has noted "the non-bank sector is increasingly critical to the global financial system, and that criticality has been highlighted by the role the sector has played in recent periods of market turmoil" and also that "stricter regulations on banks have led to the migration of certain activities to the non-bank sector" (Schindler, 2024).

This latter point - that regulatory arbitrage has been a key growth in the non-bank sector - underpins much of policymakers' concerns. A growing body of literature supports the finding that the growth in the non-bank sector is driven by bank regulation, which increases either the relative costs imposed on banks or their relative risk aversion. There are several theoretical papers exploring this channel and its associated financial stability effects, including Harris, Opp, and Opp (2014) and Plantin (2015). The role of regulation in driving non-bank growth is also supported by empirical studies, which demonstrate that regulation has led non-banks to replace banks in small business lending (Duca, 2016, Cortés, Demyanyk, Li, Loutskina, and Strahan, 2020, Gopal and Schnabl, 2022, Irani, Iyer, Meisenzahl, and Peydro, 2021, Chernenko, Erel, and Prilmeier, 2022, and Kim, Plosser, and Santos, 2016), mortgage origination (Buchak, Matvos, Piskorski, and Seru, 2018) and market making (Aramonte, Schrimpf, and Shin, 2022). Until recently, the natural policy conclusion of this research has been that the non-bank sector is an under-regulated substitute for banks, and may therefore contribute to financial instability (see, for instance, Metrick and Tarullo, 2021 and Adrian and Ashcraft, 2012). More recent findings by Acharya, Cetorelli, and Tuchman (2024) suggest rather that regulation has resulted in banks and non-banks becoming complements, with incomplete transfer of risk from one to the other. This is likely to increase rather than decrease the concerns of policy makers, as it means failure in the non-bank sector could have spillover effects to the banking sector.

However, this literature suffers from three clear limitations. The first is the potential role of other drivers of non-bank growth, which are generally less comprehensively studied. For instance, older literature focused on the role of technological innovation, specialization and information in driving the growth of non-banks (see for example Duca, 1992 and Edwards and Mishkin, 1995). These drivers have been less thoroughly examined in more recent work. There are some indications that they are still relevant factors, although they play a relatively smaller role than previously anticipated (see for instance Buchak et al., 2018, Pozsar, Adrian, Ashcraft, and Boesky, 2013, and Duca, 2016). In addition, a cluster of theoretical and empirical research suggests a role for search for yield, due to low interest rates and/or high rates of savings (see for example Beck and Kotz, 2016, Martinez-Miera and Repullo, 2017, Sarto and Wang, 2023). Finally, there are a handful of papers that cite alternative hypotheses, such as the role of commitment (Donaldson, Piacentino, and Thakor, 2021) and quantitative easing (Buchak, Matvos, Piskorski, and Seru, 2024).

The second limitation is that non-banks are not a single sector. This fact is understood by policymakers but not always acknowledged in practice. For example, the Financial Stability Board has noted that the non-bank financial intermediation sector is highly diverse, but often treated as "monolithic" (Schindler, 2024). This diversity increases the potential for error when summarizing and extrapolating results across different subsectors. For instance, the literature on the role of regulatory arbitrage covers a range of different activities, from specific analyses on securities firms, mortgage securitizers, or business lenders, through to wider analyses covering the whole of 'shadow banking'. Even the definition of 'shadow banking' varies from author to author, country to country, and institution to institution (IMF, 2014). For the purpose of this paper, we will refer to shadow banking loosely as the undertaking of credit intermediation activities by any financial institution not classified in Europe as a monetary financial institution (which we will term a 'bank'). However, even if attention is restricted to a specific subset of the non-bank sector (for example pension funds), the *activities* that sector undertakes can vary both through time and by country. For instance, loans form 11 per cent of US pension funds' total assets, while they form only 1.5 per cent of Swedish pension funds' assets.

This observed variation links to the final limitation, which is geographic. While there are a few exceptions (for example Beck and Kotz, 2016), this research is overwhelmingly focused on the US. This likely reflects a combination of its financial market size and complexity, and data availability. However, the US financial market is unique globally and has important features that do not apply to other jurisdictions. It is therefore important to complement these findings with an understanding of how the non-bank sector operates in other economies, especially where there are potential policy implications. To date, less evidence is available from other jurisdictions and results are more mixed. For example there is some evidence that in India non-bank growth is due to bank substitution for access reasons (Acharya, Khandwala, and Sabri Öncü, 2013, Arora and Zhang, 2019). The IMF (2014) uses a panel of 26 countries to examine drivers and finds some high level differences between advanced and developing economies. On the other hand, specific analysis of small, open, advanced economies is relatively lacking. Hodula, Melecky, and Machacek (2020) provide the most comprehensive analysis to date on European drivers of a narrower subset of non-banks between 2004 and 2017, but their methodology is limited by the heterogeneity of the financial systems they are comparing, and also the interconnections between those systems.[1] These issues are reflected in their country-specific results for four of the largest individual EU countries, which are more mixed.

While we cannot resolve all of these issues in a single paper, we tailor our approach in light of these challenges. We start by selecting a small open economy for analysis, allowing us to investigate whether the drivers of growth in such an economy might differ significantly from findings for the US. We consider Sweden to be a good candidate for this analysis, as in addition to being a small open economy it has also experienced rapid non-bank sector growth, more rapid even than global trends. Further, it shares important features with many other small open developed economies, including international influences on its currency, extensive cross border financial integration, a mature banking system and a developed domestic capital market. While we do not argue that our results are likely to be identical across all small and open economies, we believe these features should increase the relevance of our results to other researchers and policymakers.

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[1] For example, an unusually large share of investment funds in the EU are domiciled in Luxembourg and Ireland, but marketed and sold cross border (IMF, 2024).

We investigate the drivers of non-bank growth in Sweden over the period 1996-2023. Reflecting the complexity of identifying what 'is' and 'is not' a 'shadow bank', we analyze the growth at both a whole non-bank sector level, and also drill down into each of the three primary non-bank subsectors. We consider several possible drivers of growth, including not only substitution or complementarity with banks, but also the impacts of monetary policy, search for yield, and increasing financial complexity. In addition, we analyze whether market debt issuance - a subset of shadow banking - has similar or different drivers. Finally, we dig deeper into the foreign asset holdings of Swedish non-banks, to consider the drivers behind the geographic distribution of their assets beyond Sweden.

In contrast with the existing literature, we find no evidence that growth in the Swedish non-bank sector is driven by tighter bank regulation, or arbitrage from the banking sector. We therefore reject both the regulatory arbitrage and technology hypotheses as being of primary importance for the country and period of our study. Instead, we find that the main drivers of non-bank growth in Sweden are the growing volume of pension savings and the increasingly complex structure of their investments, together with global yield proxied by the returns on global equity markets. While this provides some evidence that growth may be driven for search for yield, we also find that the non-bank sector appears to make its global investment choices on relatively conservative grounds, and does not appear to be selecting high-volatility investment locations.

The difference between our findings and the existing literature can be explained at least to some degree by differences in the structure of the financial sectors in Sweden compared with the US. Sweden, as a small open economy has primarily seen growth in non-banks that specialise in equity investment. This is due to 1990s reforms to the pension system, which has increased the total volume of investment and channeled funds into foreign and domestic equity investment through mutual funds. At the same time, unlike in the US where securitization is dominant, mortgages in Sweden are primarily issued and held by banks, which in turn are funded by covered bonds with both domestic and foreign buyers. In addition to these structural features, there appears to be differences in the types of activities each subsector undertakes, which may also reflect regulatory variation.

The remainder of the paper is structured as follows. First we present some details of the financial sector institutional arrangements in Sweden as well as an indication of how these differ from the US. We then provide an overview of our data, including some stylised facts. In section 4 we provide results on the drivers of non-bank growth. In section 5, we look more specifically at the drivers in the growth of Swedish non-bank's offshore activities. Finally, we offer some conclusions and suggestions for further work.

2 The Swedish non-bank sector: historical background

The Swedish non-bank sector can be divided into three categories: (1) insurance corporations and pension funds (ICPFs), (2) investment funds (including mutual funds, hedge funds and other funds), and (3) other financial institutions (OFIs) (which cover all other providers of financial services with the exception of banks). The growth in the total assets of each of these subsectors, relative to the banking sector, is outlined in figure 1a.

ICPFs have represented the largest share of the non-bank sector since data collection began in 1996. For the purposes of this paper, we treat insurance companies and pension funds together for two reasons. The first is normative: occupational pension schemes in Sweden have historically been treated as a form of insurance, with minimum payments often guaranteed. Reflecting this structure many of the same entities have traditionally offered both insurance and pension products. The second is practical: accounting and regulatory changes, together with the similarity in the underlying business models, have resulted in multiple instances of reclassification between the insurance corporation and pension fund categories in our data source over the available time series. The result is large swings in the data, which are removed by combining the two categories.

The second largest and also fastest-growing sector is the investment fund sector. Investment funds have a long history in Sweden, back to the 1980s. By 1996, direct holdings of investment funds represented 7 per cent of household sector assets, peaking at 15 per cent in 2000. The proportion has since fallen, and since 2010 has remained around 8-9 per cent of the total. This relative decline has been more than offset by the increase in indirect holdings – i.e. holdings via ICPFs. This category has accelerated to the point where holdings of investment fund units exceeded 50 per cent of the assets of the ICPF sector in 2023, up from 5 per cent in 1996.

The growth in investment funds has occurred against the backdrop of a series of regulatory changes since the early 1990s. These include:

- The premium pension system, put in place in 1995, requires employers to put 2.5 per cent of employees 'pensionable income' into an account held with the Swedish Pension Authority. This amount is automatically placed into an investment fund. While alternative investment funds can be selected, it is not possible to move the assets outside of the investment fund sector until after retirement (Palmer, 2000).
- At the same time as the premium pension reform, occupational pensions started to move toward a defined contribution format (Palmer, 2000). Many pensions now offer pension savers a choice between products, including the option to save through unit linked products. These unit linked products in turn often invest exclusively in investment (mutual) funds. While pension savers are usually able to select between various fund options, the default unit linked products for most age groups allocate substantial majorities - often 100 per cent - of contributions to investment in listed equity funds. Since the mid 1990s, the use of unit linked products has substantially increased, and now account for around 40 per cent of pension and insurance liabilities of the ICPF sector.
- Special savings accounts (ISKs) were introduced in 2012 which simplified and effectively lowered tax rates payable by individuals on their investment funds units held through these accounts. At the same time, investment funds were exempted from tax at the fund level (Gunne, 2012).

Traditional ICPFs have also increased their use of investment funds, for example as a vehicle for investing in private equity, consistent with international trends.

Despite the importance of the domestic market for investment funds, it is also important to note that investment funds in Europe have, since 2001 (for UCITS funds/mutual funds) and 2011 (for AIFs), been subject to significant cross-country harmonisation under EU law. In many cases, domicile no longer determines either the market for the fund units or the investment portfolio of the fund (see Myers, 2023 for a discussion with reference to the Swedish case). Subsequently, Europe now has a significant concentration of investment funds in a small number of domiciles.

The final subsector is the other financial intermediaries subsector. This sector is the most dispersed, and includes fund managers, private equity firms, securities firms, estates and trusts, and other entities. It is also the most opaque. While this sector also includes securitisation in many countries, in Sweden this activity is limited. Mortages tend to remain on bank balance sheets, and instead fundraising is conducted through issuance of covered bonds (Hansson, Oscarius, and Söderberg, 2014).

2.1 Comparisons between Sweden and the US

Despite its significant growth, Sweden's non-bank sector comprises a smaller share of the total financial system than in the US. The differences between the two systems (normalized as shares given the US system is much larger) can be seen in Figure 1. One reason for the difference is the structure of the mortgage market in the US, where a significant share of mortgages are created under an originate-to-distribute model. These are then securitized either by government sponsored enterprises or mortgage pools. As securitization of mortgages is currently not undertaken in Sweden (mortgages are originated and retained almost exclusively by banks), we split entities involved in the issuance and securitization of mortgages - namely mortgage real estate trusts, mortgage pools and government sponsored enterprises - into a separate category in the US data.

Even accounting for this difference, the banking sector in Sweden makes up a larger share than in the US. The main difference appears to be the size of the investment fund sector in the US, as both ICPFs and other OFIs represent similar shares in both countries. This difference is likely to be understated, as the US data does not include funds of funds, while the Swedish data does.

Within the largest categories of entities there are also differences in the activities those entities undertake. Pension funds in the US, for instance, have a significantly larger share of loan assets than in Sweden (near zero), which are closer to traditional shadow banking activities. At the same time, they appear to invest a significantly smaller share through investment funds. Investment funds in the US themselves invest a somewhat higher share in debt securities and other assets than their Swedish counterparts (excluding funds of funds).

3 Data

In this paper, we assess the Swedish non-bank sector from two angles, with a view of identifying financial stability risks arising from this sector. First, we examine the drivers of the sector's growth, and particularly the potential role of banking sector substitution and/or complementarity. Second, we examine the drivers of non-bank selection of investment markets cross-border.

In order to assess the first question we primarily utilize the Swedish financial accounts data from Statistics Sweden.[2] This data is available quarterly from 1996Q1 to 2023Q2, and on an aggregated sectoral basis. Both transactions and balances at market prices are available by instrument class (debt, equity, investment fund units and so forth). We use this data to consider changes in balances arising from transactions, and also from passive revaluations (calculated as the difference between balances in different quarters, less transactions).

The raw data highlights some interesting stylized facts. First, while the overall growth of the non-bank sector is faster than the banking sector (Figure 2a,2c), once the within-sector balance sheet links (i.e. those between non-banks and non-banks and those between banks and banks) are removed, the relative growth rate declines (Figure 2b,2d). This suggests that additional care must be taken when considering non-bank growth in particular, as increased complexity of investment management arrangements can lead to a kind of double-counting. For instance if an investment fund owns a 1 kronor unit in another investment fund that owns a 1 kronor unit in a third that owns a 1 kronor stock, adding these assets together will create a total of 3 kronor of financial assets, whereas the underlying security is still valued at only 1 kronor.

Drilling deeper into these connections highlights that in the Swedish case, the strongest within-sector interlinkages are between pension funds and investment funds. These links have grown faster than other interlinkages within the sector, and even faster than within-banking sector linkages (which are largely driven by cross holdings of covered bonds), see Figure 3a. The growth in interlinkages within the non-bank sector could potentially be related to the increase in unit linked pension products, particularly the premium pension, which as noted in section 2 attracts compulsory contributions that are required to be placed in investment funds. This is a hypothesis we also explore further in our specification.

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[2] The raw data for the financial accounts was downloaded from Statistics Sweden's website through the following link: `https://www.statistikdatabasen.scb.se/pxweb/en/ssd/START__FM__FM0103__FM0103A/FirENS2010ofKv/`

On the other hand, based on the raw data both asset and liability-side linkages between the bank and non-bank sectors are small and/or have declined since 1996. This can be seen by constructing tables similar to Acharya et al. (2024)'s asset and liability dependence matrices for the US. We present the 2023 tables for Sweden in Table 1, and highlight in red the linkages that are *smaller* in 2023 than they would have been if the table were created using 1996 data. Both the level and the decline in linkages between banks and non-banks stands in sharp contrast to Acharya et al. (2024)'s findings for the US. Although this finding is based on larger subsectors for assessing these interlinkages than Acharya et al. (2024) use, we also note that many of the smaller subsectors they assess - including MMFs and securitization - are either very small or even completely absent from the Swedish non-bank landscape. While this provides preliminary evidence that complementarity with the banking sector is likely to be low, nevertheless we note that there are other types of off-book complementarity that could drive growth (for example, many Swedish fund managers are also part of banking groups). We explore this question further in our specifications.

A breakdown of the largest two growth drivers in each (netted) sector also highlights the role of equity revaluations as a driver of growth across all three non-bank subsectors. Transactions have relatively little impact - indeed the only significant growth is in ICPFs net purchases of foreign investment funds (Figure 3b).

Finally, we see that the growth in credit assets by Swedish non-banks has been relatively slow in comparison to the banking sector (Figure 3c). Swedish non-bank holdings of debt securities have also not come close to keeping pace with total non-bank debt securities issued by Swedish entities (proxied by total debt securitites liabilities of Swedish entities), see Figure 3d. This raises an interesting puzzle - market based finance is growing, but the sector we would typically expect to drive such growth (the non-bank sector) is growing its holdings of these assets much more slowly. The difference is not the result of geographical diversification: Figure 3d shows the entire value of non-bank holdings of debt securities, not just those issued by Swedish entities. Significantly, much of the stock of Swedish debt securities appears to be owned by foreign investors whose type is unspecified in the data (this can also be seen by looking at the rest of world row in the asset interdependence panel in Table 1). While we cannot identify if these foreign investors are non-banks, to consider the substitutability or complementarity between market based finance and banking we therefore run a similar test on the growth in market based issuance of debt.

The above puzzle also highlights the importance of cross border activity to the non-bank sector. While we do not have the data to assess the activities of foreign non-banks in Sweden, we can examine the drivers of Swedish non-banks investments abroad to test for search for yield behaviour. For this analysis, we use IMF data, including the coordinated portfolio investment survey (CPIS), GDP and interest rate differentials, FX rates and the output gap.[3] CPIS data is limited to portfolio investment. However, as debt securities, equity and investment fund units constitute 90 per cent of the assets of the non-bank sector, we consider this limitation is likely to have little effect on our analysis.

4 What drives the growth of the Swedish non-bank sector?

First, we consider the drivers of the growth of the Swedish non-bank sector. We consider a number of hypotheses regarding non-bank growth that are found in the literature.

Our primary testable hypothesis is the degree to which Swedish banks and non-banks can be considered complements or substitutes (either of which could be considered as indicators of regulatory arbitrage). In order to assess this question we take a macro time-series approach. We consider several different potential explanatory variables. These include not only previous sector growth in the banking sector itself, but also the potential for regulatory arbitrage directly, via the BIS index of the change in capital requirement for banks. We control for several macroeconomic factors, including economic growth, stock markets, exchange rate, and crisis dummies.

In addition, we note that prevalence of mark-to-market accounting in the non-bank sector means that some of the change in total assets from quarter to quarter will come from asset revaluations. Such revaluations can potentially dominate transaction volumes, giving rise to a potential ‘false positive’ result if the assumption is that sector is changing its activity or risk profile. In effect, it may look as though capital is flowing in and out of the sector, when in fact sector assets have simply been revalued. In order to avoid this pitfall, in addition to considering the drivers of the total assets of the sector, we also run the analysis separately for both transactions and passive revaluations.

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[3] The raw data are available in annual frequency from 2001 to 2022, and can be downloaded from IMF Data Portal through the following link: `https://data.imf.org/?sk=388dfa60-1d26-4ade-b505-a05a558d9a42&sid=1479329334655`

Demand from institutional investors is also a potential driver of shadow banking growth, for instance via financial market development (see for example Scharfstein, 2018). This can be a confounding factor as these same institutional investors (such as ICPFs) can also be key parts of the shadow banking sector themselves (Lemma, 2016). Taking a broad definition of non-banks means that most institutional investors (i.e. ICPFs) fall within the scope of the dependent variable rather than a control, which corrects for this issue. That said, we do note that the institutional context discussed in section 2 suggests that we might expect growth in ICPFs - and in particular unit-linked ICPFs - to have an impact on the size of the Swedish investment fund sector. We therefore control for transactions into and out of unit-linked ICPFs when analyzing the growth in investment funds specifically. Similarly, we also consider whether growth in personal incomes is a relevant driver of growth in ICPF assets (due, for example, to pension savings requirements).

Our overall specification is therefore as follows:

$$\begin{aligned} NBGrowth_t = \alpha + \beta_1 Macro_{t-1} + \beta_2 RegulatoryArbitrage_{t-1} + \beta_3 BankLiquidity_{t-1} \\ + \beta_4 BankGrowth_{t-1} + \beta_5 Shock_{t-1} + \beta_6 Controls_t + \epsilon_t \end{aligned} \tag{1}$$

where $NBGrowth_t$ is the growth of non-banks/ICPFs/IFs/OFIs in terms of total assets, or transactions, or asset revaluations, $Macro_{t-1}$ indicates macroeconomic factors such as real GDP growth, world stock index return, FX, 3-month rate and the spread between the 10-year government yield and the 3-month rate. $RegulatoryArbitrage_t$ represents the regulatory arbitrage proxy, which includes two dummy variables, $Basel2.5$ and $BaselIII$ that reflects different bank capital requirement regimes implemented in Sweden during the sample period. $Basel2.5$ is a dummy variable equals one for the period of 2011Q4-2013Q4 (Basel II.5), and zero otherwise. $BaselIII$ is a dummy variable equals one for the period of 2014Q1-2023Q2 (Basel III), and zero otherwise. An omitted Basel II period of 1996Q1-2011Q3 can be represented by the case when both $Basel2.5$ and $BaselIII$ dummies are zeros. For $BankLiquidity_{t-1}$, we use the aggregate liquidity coverage ratio of the Swedish banking sector as the liquidity measure. $BankGrowth_{t-1}$ represents the growth of the banking sector after netting out the within banking sector holdings, $Shock_{t-1}$ represents the exogenous shocks of GFC and COVID-19 crises. It includes a dummy variable GFC that equals one for the period 2008Q1-2009Q4 and zero otherwise, and another dummy variable $COVID$ that equals one for the period of 2020Q1-2022Q2 and zero otherwise. $Controls_t$ represents the growth of within-sector holdings for the total non-bank sector specification, personal income growth for the ICPF regression specification, and the growth of unit-linked ICPFs for the investment fund regression specification. ϵ_t is the error term.

The overall specification is most similar to that used in Hodula et al. (2020), although without use of the panel structure. A panel structure in this context assumes a degree of independence between the processes across EU countries, which is contradicted by the harmonized, single market institutional arrangements for investment funds noted in section 2. By focusing on a single jurisdiction, we can not only include idiosyncratic elements, we can also treat the activities and decisions of other EU countries as exogenous. We also expand beyond just the OFI and investment fund sectors, to include the entire non-bank sector.

Our results are presented in Tables 2–4. Table 2 shows the results for the determinants of growth in the non-bank sector. Tables 3 and 4 show the results for the decomposition of growth in the non-bank sector: transactions and revaluations.

It is clear that in the Swedish case, neither the non-bank sector as a whole nor any of its subsectors responds in a significant way to changes in the size of the banking sector, or to changes in banking sector regulation. We do see some small significant negative growth in new transactions into the ICPF and investment fund sectors in during the period of implementation of Basel 2.5 and Basel III, suggesting possible complementarity with the banking sector. However, these findings are the opposite of what we would expect under a scenario of regulatory arbitrage, and for investment funds they are almost completely eliminated once growth in unit linked pension products is controlled for.

By far the most significant driver of growth comes from the world index return, which operates through asset revaluations. This may be a direct implication of the fact that around one half of the gross assets of the Swedish non-bank sector are equities, and one quarter of the gross assets are foreign equities. Alternatively, it may in part be that valuation of other assets in which these entities invest is closely tied to global equity market movements.

The second driver of growth in the non-bank sector is increased complexity, indicated by the positively significant estimates on the growth of within-sector holdings. Further, higher incomes seem to have an impact on transactions into ICPFs, as expected. Increased use of unit linked products also positively impact growth in investment funds, through both transactions and asset revaluations. These findings are consistent with our institutional arguments regarding required pension savings and the necessitated use of unit-linked saving via investment funds for some proportion of that saving. Thus a significant proportion of the sector's growth is arising not from increased activity, but from increased complexity.

In addition, there is some evidence that interest rates play a small role. Higher interest rates result in positive transactions into both OFIs and investment funds, although there is some indication that they also lead to negative revaluations in the investment fund sector.

Notwithstanding these results, we do note the possibility that, given the harmonized arrangements for investment funds and the degree of cross border market activity in the EU more generally, it is possible that there is a degree of increased shadow banking activity in Sweden that is either a substitute for or complementary to banks and that is partially or entirely undertaken by foreign-domiciled entities (and therefore not included in our data). This could occur either through markets or through direct issuance of credit.

Unfortunately, we cannot determine whether foreign-issued loans to Swedish residence are issued by foreign banks or non-banks. However, we do observe the total amount of debt security liabilities, which is a subset of shadow banking (i.e. credit intermediation outside the banking sector). We therefore also consider the drivers of the growth in this form of finance, to determine whether it acts as a substitute or complement for bank finance. To test this, we perform a regression using a similar specification as that above, but with total issuance of debt securities by Swedish entities as the dependent variable (note that we cannot determine whether foreign holders of these are non-banks or other economic actors).

Table 5 presents the results. Not surprisingly, the growth in balances of total issued debt securities is negatively correlated with the spread between the 10-year sovereign yield and the 3-month rate, which is mainly driven by the revaluation effect. However, the regression provides no evidence of regulatory arbitrage, substitution or complementarity between market based finance and the banking sector in Sweden.

5 Cross-border investment of Swedish non-banks

As noted previously, growth in the Swedish non-bank sector is heavily driven by prices in global equity markets. This is likely to reflect in part the share of foreign assets held by Swedish non-banks. On aggregate, foreign assets have doubled as a share of the sector's assets since 1996, to a little over 39 per cent in 2023. Such cross-border flows, while potentially beneficial for a small country from a diversification perspective (Driessen and Laeven, 2007), also have potential financial stability impacts. On the inflows side, a large presence of non-bank actors driven by risk-taking behavior could result in a sudden reversal, which could be destabilizing for the underlying markets. On the outflows side, risky investment in foreign markets could result in 'importing' crises in those markets into the home market of the non-bank.

Previous evidence suggests that much of the cross-border investment activity, at least in the case of investment funds, is concentrated in the US (Myers, 2023). However, there is little evidence regarding the drivers of that decision, and whether these vary over time. In particular, it is unclear the degree to which the geographical distribution of investment is driven by search for yield (high risk taking behavior). If so, it would lend support to the hypothesis that non-bank growth is driven by search for yield, and also highlight a potential channel for increasing systemic risk.

In this section, we therefore investigate cross-border flows out of Sweden resulting from non-bank sector activities. Ideally, we would also assess the drivers of foreign non-banks' decisions to invest in Swedish markets. Unfortunately, while data on Swedish ownership of assets abroad provides a good panel data set, the data on foreign non-banks investing in Sweden is relatively thin. We therefore focus exclusively on the cross-border activities of Swedish non-banks.

First, we investigate how cross-country flows out of Sweden evolve on the basis of slow-moving factors such as relative economic growth and interest rate differentials between counter-party jurisdictions and Sweden. The regression specification is shown in equation (2).

$$\Delta\frac{NB_{j,t}}{TA_{j,t}} = \alpha + \beta_1 gap(\Delta GDP)_{j,t-1} + \beta_2 gap(\Delta IR)_{j,t-1} + \gamma Controls_{j,t-1} + \theta_j + \epsilon_t \tag{2}$$

Where $NB_{j,t}$ is the portfolio investment of the Swedish non-bank sector in country j at time t,

$TA_{j,t}$ is the total foreign portfolio investment in country j at time t, $gap(\Delta IR)_{j,t-1}$ is the interest rate gap between country j and Sweden at time $t-1$, $gap(\Delta GDP)_{j,t-1}$ is the GDP growth gap between country j and Sweden at time $t-1$. $Controls_{j,t-1}$ includes net export and output gap between country j and Sweden, as well as the exchange rate between Swedish kronor and country j's currency. θ_j is the country fixed-effect. ϵ_t is the error term.

We limit our analysis to countries where data is available for all periods from 2001, and for whom Sweden has a positive investment value totaling at least 0.1 per cent of the total foreign portfolio investment in that country for at least 5 consecutive periods in the sample.[4] This automatically excludes most offshore financial centers from consideration, as the IMF does not report macro data for these jurisdictions. Among the 80 jurisdictions covering the years 2001-2022 inclusive in our panel, we only have data on interest rate gap and output gap for 25 jurisdictions. However, we conduct the regression analysis for both the bigger sample with 80 jurisdictions (excluding interest rate and output gaps) and the smaller sample with 25 jurisdictions (including interest rate and output gaps).

Table 6 reports the results. The positively significant coefficient on the GDP gap in Column (1) indicates that the Swedish non-bank sector invests more money in destinations that have higher GDP growth than Sweden, although the significance disappears when we use the smaller sample with 25 jurisdictions (see Column (2) in Table 6). Meanwhile, the exchange rate plays an important role in destination choice. Jurisdictions where currencies appreciate against Swedish kronor are the preferred locations for the Swedish non-bank sector. It is worth noticing that exchange rate has a stronger (more significant) effect on destination choice than the GDP gap. This may reflect the imperfect correlation between GDP growth and equity market growth. In summary, the Swedish non-bank sector tends to diversify their investment portfolios in destinations that have better growth and appreciating currencies, which implies higher investment returns in the long run.

To further explore which investment destinations drive the results, we divide the 80 jurisdictions covered in the sample into two groups: (1) US, UK, and Euro-zone (14 jurisdictions in total); (2) all other jurisdictions excluding US, UK, and Euro-zone (66 jurisdictions in total). The first group is the main foreign investment destination for the Swedish non-bank sector as the investment into those jurisdictions accounts for around 3 quarters of the total foreign investment portfolio. We repeat the same regression analysis on both the bigger sample and the smaller sample for the two destination groups separately. The results are reported in Column (3)-(6) in Table 6. It can be seen that the results are fairly similar between the main investment destinations and other jurisdictions.

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[4] This limitation only excludes 3% of Sweden's total foreign investment portfolio on average during the sample period of 2001-2022. For each single year, 95%-100% of the total foreign investment has been included in the analysis.

Finally, we investigate the risk-taking behavior of Swedish non-banks in cross-border investment. We use the implied volatility indices as the risk taking proxy, in addition to the value of Swedish kronor in relation to a broad basket of other currencies. The regression specification is as follows:

$$\Delta\frac{NB_{i,j,t}}{TA_{j,t}} = \alpha + \beta_1 IV_{-i,t} + \beta_2 FX_{i,t-1} + \gamma Controls_{i,t-1} + \theta_j + \epsilon_{i,t} \tag{3}$$

Where i indicates Sweden, and j indicates counterparty jurisdictions. $NB_{i,j,t}$ is the portfolio investment of the Swedish non-bank sector in country j at time t, and $TA_{j,t}$ is the total foreign portfolio investment in country j at time t. Here we use two sets of proxies for risk taking. One is the world implied volatility index together with the FX between Swedish kronor and a broad basket of other currencies measured by the IMF. To reduce the effects of endogeneity between implied volatility and FX rates, we also use the average of implied volatilities in reserve-currency countries (Sweden not included), $IV_{-i,t}$, together with the FX between Swedish kronor and the reserve-currencies.[5] The effect of FX rates for reserve currencies can be viewed as the determinants of global financial conditions (Bruno and Shin, 2015). $Controls_{i,t-1}$ include macroeconomic variables that reflect domestic investment opportunities: real GDP growth, house price growth, the difference in stock market returns between the world (or the reserve currency jurisdictions) and Sweden, 3-month interbank rate and the spread between the 10-year government bond yield and the 3-month interbank rate. θ_j is the country fixed-effect. ϵ_t is the error term.

As shown in Table 7, the estimated coefficients for both the world implied volatility index and the average of implied volatilities in reserve-currency countries are negative and significant, indicating risk averse behavior of the Swedish non-bank sector when investing abroad. The low risk appetite together with the investment preference for better economic development destinations suggests that the Swedish non-bank sector follows a relatively conservative overseas investment strategy. This reduces - although does not necessarily eliminate - the likelihood of importing a local shock from another economy.

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[5] Here reserve currencies include USD and Euro, as almost 70% of the Swedish investment funds' foreign exposures are in the US and the Euro area. We also tried another measure by including UK in the reserve-currency countries as well, the result is very similar. However, the volatility index for UK has shorter time series, so we decided to restrict the reserve-currency countries to the US and the Euro area.

6 Conclusion

In this paper, we examined the drivers of the growth in the Swedish non-bank sector, and in their choices of investments abroad. Unlike the US literature, we found no evidence of regulatory arbitrage, and little evidence of correlation between non-bank and bank growth for the sector as a whole or any of its subsectors. Rather, growth is driven by increased complexity of (largely pension fund) investments, together with income growth and returns on global equity markets. We also found that evidence that Swedish non-banks' investment abroad is affected by slow moving factors such as GDP differentials, but is relatively conservative in its approach to risk.

These results indicate the importance of individual countries' regulatory and institutional structures in determining how the sectors develop. These features affect not only the types of entities present in each country's financial sector, but also the activities that those entities regularly undertake. These activities are not always the same, even when the entities involved have the same name.

Our findings also suggest that significant growth in the non-bank sector is not conditional on growth in shadow banking activities. There are clearly multiple drivers of world-wide growth in the non-bank sector, and to address financial stability risks policymakers will need to understand which of these drivers are most relevant to their individual jurisdiction.

It should be noted that our findings do not indicate that Swedish non-banks - or similar non-banks in other jurisdictions - cannot be a source of financial instability. Such analysis would require more granular exploration of their business models and activities, including use of leverage and degree of liquidity/maturity transformation, and off-balance sheet interconnectedness with banks and each other (for instance via counterparty status in derivative markets). They do indicate, however, that those financial stability issues are more likely - at this stage - to arise from different channels than relocation of risks from domestic banks to domestic non-banks. Further work could therefore be done to assess alternative risk transmission channels, and their implications for the financial system more broadly.

In addition, as these results are based on aggregates, we cannot make claims regarding individual institutions, or small changes which may later develop into substantial drivers of future growth. While there does not appear to be large substitution from banks to non-banks during our period of study, future changes to this dynamic are not ruled out. Further monitoring and analysis would be necessary to trace nascent substitution between the sectors.

Our results also highlight the importance of the cross border dimension when assessing issues related to interconnections between banks and non-banks. Cross-border interconnectedness has previously been identified as an issue in the EU (Abad, D'Errico, Killeen, Luz, Peltonen, Portes, and Urbano, 2017). Financial stability issues could therefore also arise via feedback from non-banks domiciled offshore, either in the EU or globally. This observation also points to an important gap for further work. The data currently available was sufficient to allow us to assess the drivers of the outflows of non-bank funding from Sweden, but we were not able to obtain sufficient data to equivalently assess the drivers of inflows. Assessment of these drivers - and of cross-border feedback loops - would provide insight into the potential stability risks arising from deepening global interconnectedness.

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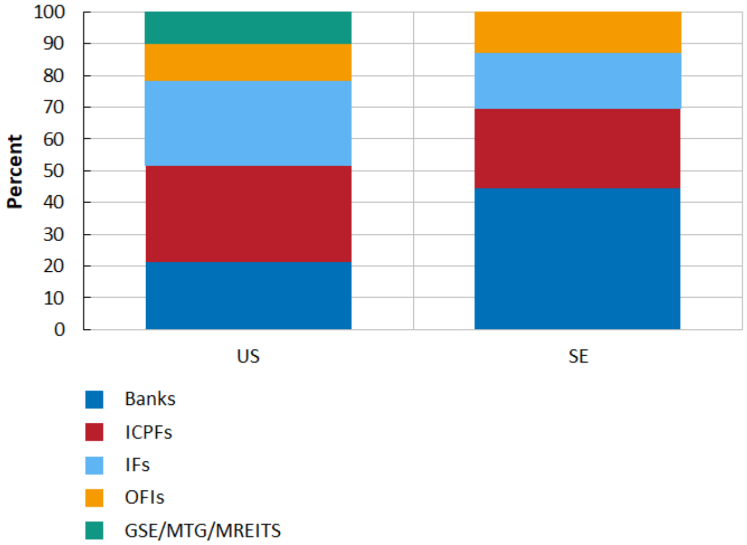
Figures and Tables

Figure 1. Composition of financial sector: US vs Sweden



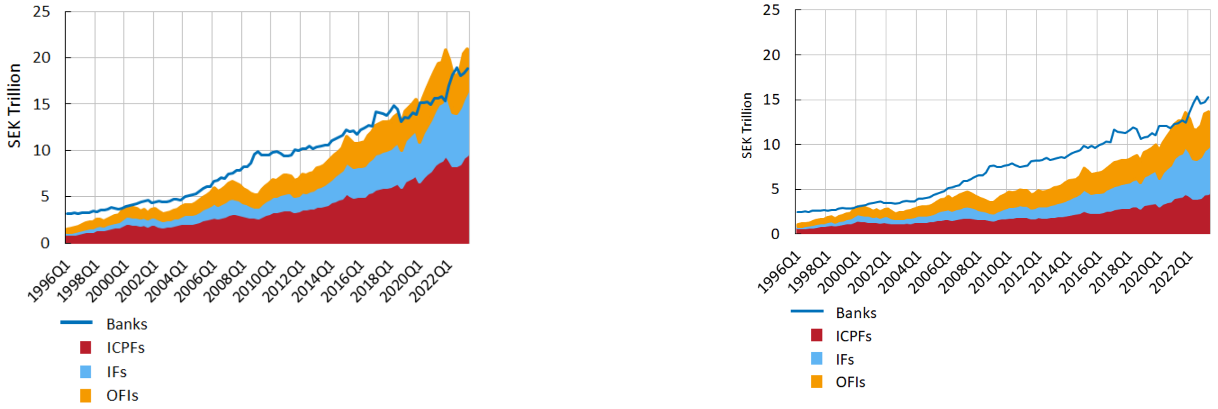
Notes: This Figure presents a comparison of the composition of the financial sector between the US and Sweden for the year of 2023. "GSE/MTG/MREITS" represents the sum of the financial assets held by government-sponsored enterprises, agency-and GSE-backed mortgage pools and mortgage real estate investment trusts. This sector doesn't exist in Sweden as the mortgage loans are kept on banks' balance sheet.

Data source: Statistics Sweden financial accounts and the Federal Reserve financial accounts guide

Figure 2. Size of the Swedish bank and non-bank sectors

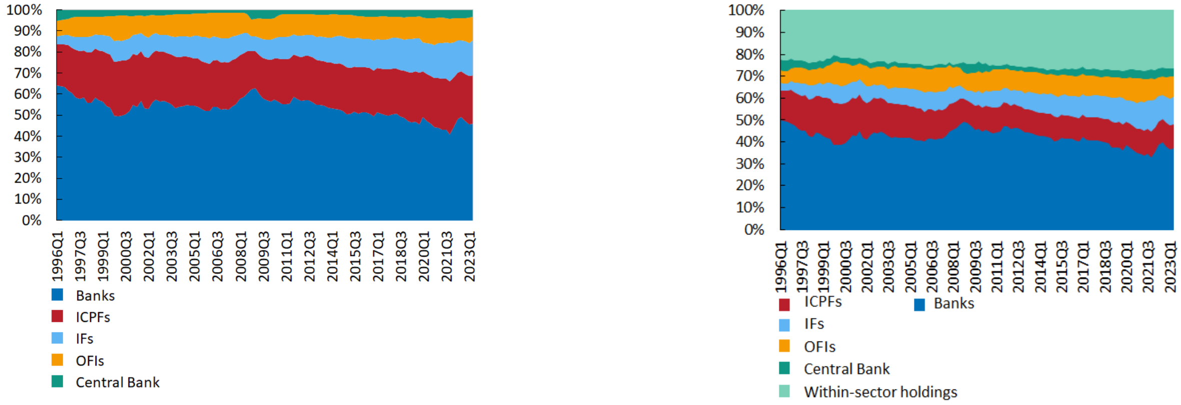
(a) Total assets

(b) Total assets after netting within-sector holdings



(c) Share of bank and non-bank sectors

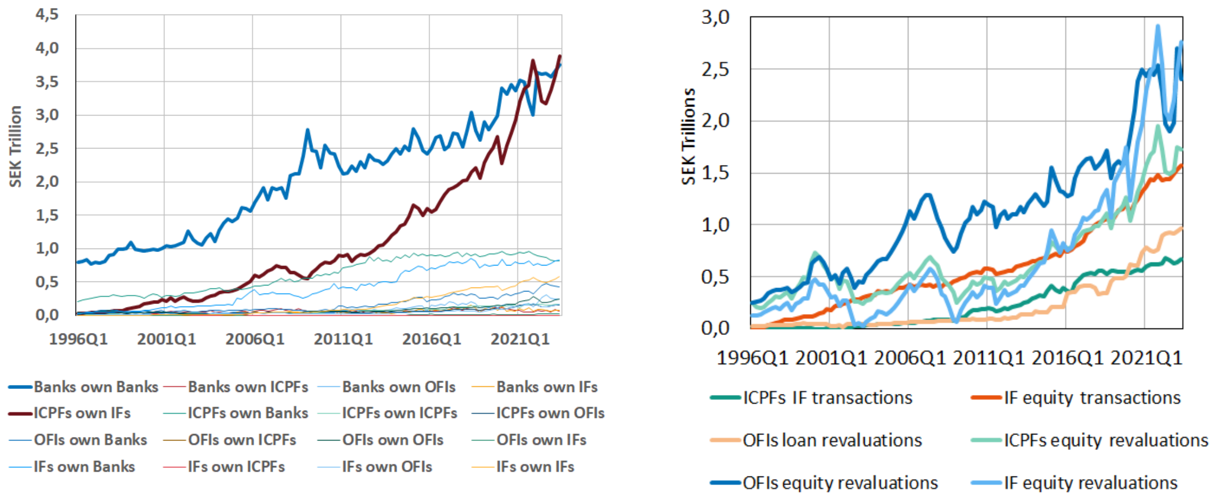
(d) Share of bank and non-bank sectors after netting within-sector holdings



Notes: This Figure presents the size of the Swedish bank and non-bank sectors during the period of 1996Q1-2023Q2. Figure (a) shows the total financial assets for the banking sector and each of the following non-bank sectors: ICPFs, IFs, and OFIs. Figure (b) shows the total financial assets by sector after netting within-sector holdings. Figure (c) shows the share of the assets for each sector in relation to the total assets for the whole financial sector. Figure (d) shows the relative size of each sector in relation to the total financial assets after netting within-sector holdings. The within-sector holdings are asset holdings between non-banks and non-banks, and asset holdings between banks and banks.

Data source: Statistics Sweden financial accounts

Figure 3. Asset holdings by the Swedish financial sector

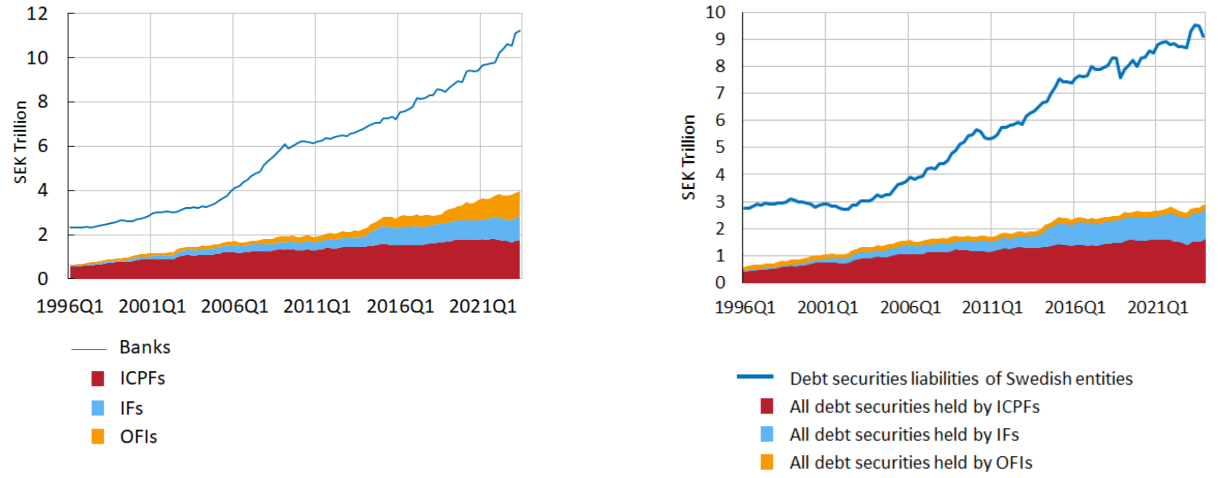


(a) Value of sectoral cross links

(b) non-bank major transactions and revaluations cumulative

(c) Loans and debt securities held by banks and non-banks

(d) Debt securities held by non-banks



Notes: This Figure presents stylized facts on asset holdings by the Swedish financial sector during the period of 1996Q1-2023Q2. Figure (a) shows the cross-holdings of assets within and between each of the following financial sectors: banks, ICPFs, IFs, and OFIs. Figure (b) shows the major transactions and revaluations cumulative that drive the growth of the Swedish non-bank sector: ICPFs equity revaluations, IFs equity revaluations, OFIs equity revaluations, OFIs loan revaluations, IFs equity transactions, ICPFs foreign investment fund transactions. Figure (c) shows the loans and debt securities assets held by the Swedish bank and non-bank sectors. In Figure (d), the blue line shows the total debt securities liabilities of Swedish entities. The areas show the total debt securities (issued by both Swedish and non-Swedish entities) held by ICPFs, IFs, and OFIs.

Data source: Statistics Sweden financial accounts

Table 1. Matrix of Interdependence for the Swedish bank and non-bank sectors

Panel A: Asset Interdependence

Issuers	Holders						
% of assets	Banks	IFs	OFIs	ICPFs	Real sector	Gov+CB	Rest of World
Banks	17	13	8	9	12	11	37
IFs	1*	8	0	41	5	2	1
OFIs	1	3	6	2	4	0	14
ICPFs	0	0	0	2	17	0	1
Real Sector	46	19	55	12	43	43	44
Gov + CB	8	2	0	4	4	13	3
Rest of World	26	55	30	30	16	30	-
Total	100	100	100	100	100	100	100

Panel B: Liability Interdependence

Issuers	Holders							
% of liabilities	Banks	IFs	OFIs	ICPFs	Real sector	Gov+CB	Rest of World	Total
Banks	17	5	2	5	28	4	39	100
IFs	1**	8	0	58	27	2	4	100
OFIs	4	4	6	3	32	0	52	100
ICPFs	1	0	0	2	94	0	3	100
Real Sector	19	3	7	3	42	7	20	100
Gov + CB	30	2	0	9	30	17	12	100
Rest of World	22	18	7	14	30	9	-	100

Notes: This table reports the dependency matrix for the Swedish bank and non-bank sectors in 2023, computed in a similar way as that in Acharya et al. (2024). Acharya et al. (2024) use more specific subsectors, many of those dependent subsectors (such as ABS issuers, GSE and Agency, Mortgage REITs, MMFs) are small to non-existent in Sweden. In addition, we have added in government and central bank (GOV+CB) as well. Panel A shows the asset interdependence between the bank and non-bank sectors. For example, the number "1" marked with * can be interpreted as follows: 1 per cent of banks' asset holdings are liabilities of investment funds. Panel B shows the liability interdependence between the bank and non-bank sectors. For example, the number "1" marked with ** can be interpreted as follows: 1 per cent of investment funds' liabilities are held by banks (as asset holdings). The numbers highlighted in red are the linkages that are smaller in 2023 than they would have been if the table were created using 1996 data.

Table 2. Determinants of non-bank growth

	(1) non-banks	(2) non-banks	(3) ICPFs	(4) ICPFs	(5) IFs	(6) IFs	(7) OFIs
L.Real GDP growth	-0.516*	-0.364	-0.323	-0.318	-0.515	-0.237	-1.017***
	(0.264)	(0.240)	(0.263)	(0.246)	(0.453)	(0.287)	(0.377)
World index return (in USD)	0.463***	0.374***	0.389***	0.375***	0.724***	0.245**	0.395***
	(0.035)	(0.039)	(0.034)	(0.037)	(0.048)	(0.101)	(0.109)
D.FX (USDSEK)	0.017	0.011	0.016	0.016	0.033	0.017	0.010
	(0.014)	(0.012)	(0.011)	(0.011)	(0.020)	(0.022)	(0.030)
L.3-month rate	-1.785	-0.699	-1.366	-2.670	-2.585	-0.671	-0.374
	(1.879)	(1.349)	(1.412)	(2.312)	(3.211)	(1.160)	(2.541)
L.Spread	0.106	1.481	-1.107	-1.485	0.837	2.502*	3.822
	(1.534)	(1.285)	(1.179)	(1.432)	(2.779)	(1.323)	(2.574)
L.Bank Liquidity	-0.003	-0.002	0.001	0.004	0.020	0.017	-0.027
	(0.017)	(0.014)	(0.018)	(0.020)	(0.031)	(0.016)	(0.035)
L.Bank growth	-0.092	-0.140	-0.056	-0.033	-0.023	-0.037	-0.187
	(0.116)	(0.094)	(0.098)	(0.100)	(0.162)	(0.125)	(0.218)
L.Basel 2.5	-0.019	-0.018	-0.026	-0.030	-0.018	0.021	-0.013
	(0.069)	(0.020)	(0.052)	(0.106)	(0.138)	(0.028)	(0.033)
L.Basel III	-0.031	-0.016	-0.032	-0.058	-0.023	0.026	-0.024
	(0.067)	(0.034)	(0.052)	(0.110)	(0.135)	(0.040)	(0.059)
L.GFC	-0.053**	-0.033	-0.046	-0.041	-0.048	0.012	-0.071
	(0.025)	(0.020)	(0.029)	(0.031)	(0.055)	(0.028)	(0.059)
L.COVID	-0.005	0.001	0.008	0.006	-0.024	-0.005	-0.011
	(0.028)	(0.017)	(0.040)	(0.035)	(0.035)	(0.018)	(0.055)
Growth of within-sector holdings		0.563***					
		(0.095)					
Personal income growth				0.527			
				(0.978)			
Growth of unit-linked ICPFs						0.718***	
						(0.118)	
Constant	0.138**	0.056	0.121**	0.128	0.140	-0.040	0.122
	(0.066)	(0.040)	(0.056)	(0.089)	(0.123)	(0.048)	(0.074)
No of obs	104	104	104	102	104	104	104
Adj R2	0.647	0.730	0.653	0.654	0.678	0.842	0.262

Notes: This table reports the results of the time series regression for the determinants of non-bank growth for the period of 1996Q1-2023Q2

$$\begin{aligned} NBGrowth_t = \alpha + \beta_1 Macro_{t-1} + \beta_2 RegulatoryArbitrage_{t-1} + \beta_3 BankLiquidity_{t-1} \\ + \beta_4 BankGrowth_{t-1} + \beta_5 Shock_{t-1} + \beta_6 Controls_t + \epsilon_t \end{aligned}$$

where $NBGrowth_t$ is the growth rate of the total financial assets outstanding for non-banks/ICPFs/IFs/OFIs in Sweden, $Macro_{t-1}$ indicates macroeconomic factors such as real GDP growth, world index return, FX, 3-month rate and the spread between the 10-year government yield and the 3-month rate. $RegulatoryArbitrage_t$ represents the regulatory arbitrage proxy, which includes two dummy variables, $Basel2.5$ and $BaselIII$ that reflects different bank capital requirement regimes implemented in Sweden during the sample period. $Basel2.5$ is a dummy variable equals one for the period of 2011Q4-2013Q4 (Basel II.5), and zero otherwise. $BaselIII$ is a dummy variable equals one for the period of 2014Q1-2023Q2 (Basel III), and zero otherwise. An omitted Basel II period of 1996Q1-2011Q3 can be represented by the case when both $Basel2.5$ and $BaselIII$ dummies are zeros. For $BankLiquidity_{t-1}$, we use the aggregate liquidity coverage ratio of the Swedish banking sector as the liquidity measure. $BankGrowth_{t-1}$ represents the growth of the banking sector after netting out the within banking sector holdings, $Shock_{t-1}$ represents the exogenous shocks of GFC and COVID-19 crises. It includes a dummy variable GFC that equals one for the period 2008Q1-2009Q4 and zero otherwise, and another dummy variable $COVID$ that equals one for the period of 2020Q1-2022Q2 and zero otherwise. $Controls_t$ represents the growth of within-sector holdings for regression specification (2), personal income growth for regression specification (4), and the growth of unit-linked ICPFs for regression specification (6). ϵ_t is the error term. GLS method (Prais-Winsten and Cochrane-Orcutt regression) is used to deal with serially correlated errors and heteroskedasticity. Standard errors are estimated using robust variance calculation Davidson and MacKinnon (1993). Coefficients are listed in the first row and the standard errors are reported between parentheses in the second row. *, **, *** refer to significance at 10%, 5% and 1% respectively.

Table 3. Decomposition of non-bank growth: transactions

	(1) non-banks	(2) non-banks	(3) ICPFs	(4) ICPFs	(5) IFs	(6) IFs	(7) OFIs
L.Real GDP growth	0.046	0.059	0.065	0.008	0.098	0.128	-0.008
	(0.063)	(0.061)	(0.065)	(0.058)	(0.138)	(0.140)	(0.131)
L.World index return (in USD)	0.012	0.011	0.007	0.003	-0.013	-0.006	0.046**
	(0.012)	(0.012)	(0.011)	(0.011)	(0.032)	(0.033)	(0.019)
LD.FX (USDSEK)	-0.003	-0.002	-0.002	-0.002	0.001	0.005	-0.004
	(0.005)	(0.005)	(0.004)	(0.004)	(0.013)	(0.012)	(0.009)
L.3-month rate	0.881	0.958	0.374	0.087	2.275	2.467*	1.662**
	(0.581)	(0.581)	(0.416)	(0.405)	(1.442)	(1.459)	(0.744)
L.Spread	0.614	0.703	0.273	0.176	1.538	1.259	1.270*
	(0.540)	(0.544)	(0.421)	(0.419)	(1.476)	(1.391)	(0.672)
L.Bank Liquidity	-0.005	-0.005	-0.002	-0.003	-0.000	-0.001	-0.005
	(0.014)	(0.013)	(0.011)	(0.011)	(0.029)	(0.028)	(0.013)
L.Bank growth	-0.022	-0.027	-0.016	-0.017	-0.029	-0.022	-0.067
	(0.046)	(0.045)	(0.041)	(0.040)	(0.104)	(0.102)	(0.072)
L.Basel 2.5	-0.015	-0.015	-0.016	-0.017*	-0.046**	-0.045*	0.028
	(0.014)	(0.019)	(0.012)	(0.009)	(0.021)	(0.024)	(0.018)
L.Basel III	-0.022	-0.021	-0.020	-0.027**	-0.061*	-0.056	0.030
	(0.015)	(0.018)	(0.012)	(0.011)	(0.036)	(0.035)	(0.021)
L.GFC	0.000	0.002	-0.003	-0.002	0.008	0.008	0.006
	(0.026)	(0.023)	(0.014)	(0.014)	(0.067)	(0.057)	(0.016)
L.COVID	-0.001	-0.001	0.004	0.002	0.005	0.003	-0.016
	(0.008)	(0.007)	(0.007)	(0.007)	(0.022)	(0.020)	(0.011)
Growth of within-sector holdings		0.073**					
		(0.031)					
Personal income growth				0.549***			
				(0.175)			
Growth of unit-linked ICPFs						0.081***	
						(0.031)	
Constant	0.047**	0.038	0.044**	0.034*	0.093*	0.075	-0.027
	(0.022)	(0.024)	(0.018)	(0.018)	(0.051)	(0.052)	(0.027)
No of obs	104	104	104	102	104	104	104
Adj R2	0.138	0.184	0.093	0.125	0.153	0.206	0.098

Notes: This table reports the results of the time series regression for the determinants of non-bank growth for the period of 1996Q1-2023Q2

$$NBGrowth_t = \alpha + \beta_1 Macro_{t-1} + \beta_2 RegulatoryArbitrage_{t-1} + \beta_3 BankLiquidity_{t-1} \\ + \beta_4 BankGrowth_{t-1} + \beta_5 Shock_{t-1} + \beta_6 Controls_t + \epsilon_t$$

where $NBGrowth_t$ is the growth rate of transactions (or net capital inflows) into non-banks/ICPFs/IFs/OFIs in Sweden, $Macro_{t-1}$ indicates macroeconomic factors such as real GDP growth, world index return, FX, 3-month rate and the spread between the 10-year government yield and the 3-month rate. $RegulatoryArbitrage_t$ represents the regulatory arbitrage proxy, which includes two dummy variables, $Basel2.5$ and $BaselIII$ that reflects different bank capital requirement regimes implemented in Sweden during the sample period. $Basel2.5$ is a dummy variable equals one for the period of 2011Q4-2013Q4 (Basel II.5), and zero otherwise. $BaselIII$ is a dummy variable equals one for the period of 2014Q1-2023Q2 (Basel III), and zero otherwise. An omitted Basel II period of 1996Q1-2011Q3 can be represented by the case when both $Basel2.5$ and $BaselIII$ dummies are zeros. For $BankLiquidity_{t-1}$, we use the aggregate liquidity coverage ratio of the Swedish banking sector as the liquidity measure. $BankGrowth_{t-1}$ represents the growth of the banking sector after netting out the within banking sector holdings, $Shock_{t-1}$ represents the exogenous shocks of GFC and COVID-19 crises. It includes a dummy variable GFC that equals one for the period 2008Q1-2009Q4 and zero otherwise, and another dummy variable $COVID$ that equals one for the period of 2020Q1-2022Q2 and zero otherwise. $Controls_t$ represents the growth of within-sector holdings for regression specification (2), personal income growth for regression specification (4), and the growth of unit-linked ICPFs for regression specification (6). ϵ_t is the error term. GLS method (Prais-Winsten and Cochrane-Orcutt regression) is used to deal with serially correlated errors and heteroskedasticity. Standard errors are estimated using robust variance calculation Davidson and MacKinnon (1993). Coefficients are listed in the first row and the standard errors are reported between parentheses in the second row. *, **, *** refer to significance at 10%, 5% and 1% respectively.

Table 4. Decomposition of non-bank growth: asset revaluations

	(1) non-banks	(2) non-banks	(3) ICPFs	(4) ICPFs	(5) IFs	(6) IFs	(7) OFIs
L.Real GDP growth	-0.572*	-0.442	-0.385	-0.341	-0.618	-0.475	-1.018***
	(0.299)	(0.274)	(0.301)	(0.279)	(0.491)	(0.382)	(0.374)
World index return (in USD)	0.438***	0.356***	0.364***	0.354***	0.646***	0.315**	0.401***
	(0.035)	(0.040)	(0.035)	(0.038)	(0.054)	(0.125)	(0.094)
D.FX (USDSEK)	0.021	0.016	0.020*	0.022*	0.045**	0.031	0.013
	(0.014)	(0.012)	(0.012)	(0.012)	(0.022)	(0.021)	(0.025)
L.3-month rate	-2.211	-1.356	-1.296	-2.065	-2.884	-3.445**	-1.915
	(1.726)	(1.288)	(1.341)	(1.919)	(2.534)	(1.651)	(2.177)
L.Spread	0.000	1.223	-0.874	-0.989	1.682	1.927	2.327
	(1.436)	(1.216)	(1.203)	(1.312)	(2.251)	(1.630)	(2.166)
L.Bank Liquidity	0.006	0.005	0.006	0.010	0.024	0.007	-0.012
	(0.018)	(0.018)	(0.015)	(0.017)	(0.036)	(0.023)	(0.030)
L.Bank growth	-0.045	-0.094	-0.032	-0.012	0.010	0.019	-0.060
	(0.119)	(0.097)	(0.101)	(0.103)	(0.183)	(0.153)	(0.200)
L.Basel 2.5	-0.006	-0.001	-0.010	-0.018	0.026	0.060	-0.036
	(0.069)	(0.028)	(0.053)	(0.085)	(0.082)	(0.036)	(0.045)
L.Basel III	-0.007	0.010	-0.007	-0.031	0.041	0.061	-0.047
	(0.062)	(0.037)	(0.050)	(0.080)	(0.081)	(0.057)	(0.059)
L.GFC	-0.049	-0.030	-0.041	-0.038	-0.057	-0.027	-0.060
	(0.034)	(0.025)	(0.034)	(0.033)	(0.070)	(0.037)	(0.049)
L.COVID	-0.003	0.002	0.004	0.005	-0.026	-0.015	0.006
	(0.021)	(0.018)	(0.033)	(0.029)	(0.027)	(0.027)	(0.054)
Growth of within-sector holdings		0.520***					
		(0.091)					
Personal income growth				-0.023			
				(0.960)			
Growth of unit-linked ICPFs						0.476***	
						(0.142)	
Constant	0.076	0.002	0.062	0.080	-0.000	-0.075	0.132**
	(0.064)	(0.041)	(0.056)	(0.075)	(0.094)	(0.063)	(0.065)
No of obs	104	104	104	102	104	104	104
Adj R2	0.640	0.722	0.631	0.628	0.613	0.742	0.341

Notes: This table reports the results of the time series regression for the determinants of non-bank growth for the period of 1996Q1-2023Q2

$$\begin{aligned} NBGrowth_t = \alpha + \beta_1 Macro_{t-1} + \beta_2 RegulatoryArbitrage_{t-1} + \beta_3 BankLiquidity_{t-1} \\ + \beta_4 BankGrowth_{t-1} + \beta_5 Shock_{t-1} + \beta_6 Controls_t + \epsilon_t \end{aligned}$$

where $NBGrowth_t$ is the growth rate of asset revaluation in the total financial assets for non-banks/ICPFs/IFs/OFIs in Sweden, $Macro_{t-1}$ indicates macroeconomic factors such as real GDP growth, world index return, FX, 3-month rate and the spread between the 10-year government yield and the 3-month rate. $RegulatoryArbitrage_t$ represents the regulatory arbitrage proxy, which includes two dummy variables, $Basel2.5$ and $BaselIII$ that reflects different bank capital requirement regimes implemented in Sweden during the sample period. $Basel2.5$ is a dummy variable equals one for the period of 2011Q4-2013Q4 (Basel II.5), and zero otherwise. $BaselIII$ is a dummy variable equals one for the period of 2014Q1-2023Q2 (Basel III), and zero otherwise. An omitted Basel II period of 1996Q1-2011Q3 can be represented by the case when both $Basel2.5$ and $BaselIII$ dummies are zeros. For $BankLiquidity_{t-1}$, we use the aggregate liquidity coverage ratio of the Swedish banking sector as the liquidity measure. $BankGrowth_{t-1}$ represents the growth of the banking sector after netting out the within banking sector holdings, $Shock_{t-1}$ represents the exogenous shocks of GFC and COVID-19 crises. It includes a dummy variable GFC that equals one for the period 2008Q1-2009Q4 and zero otherwise, and another dummy variable $COVID$ that equals one for the period of 2020Q1-2022Q2 and zero otherwise. $Controls_t$ represents the growth of within-sector holdings for regression specification (2), personal income growth for regression specification (4), and the growth of unit-linked ICPFs for regression specification (6). ϵ_t is the error term. GLS method (Prais-Winsten and Cochrane-Orcutt regression) is used to deal with serially correlated errors and heteroskedasticity. Standard errors are estimated using robust variance calculation Davidson and MacKinnon (1993). Coefficients are listed in the first row and the standard errors are reported between parentheses in the second row. *, **, *** refer to significance at 10%, 5% and 1% respectively.

Table 5. Growth of debt securities

	(1) Balance	(2) Revaluation	(3) Transactions
L.Real GDP growth	-0.230	-0.093	-0.129
	(0.173)	(0.175)	(0.137)
L.3-month rate	-1.426	-0.021	-0.732
	(1.072)	(0.718)	(0.959)
L.Spread	-2.112**	-1.650**	0.043
	(0.915)	(0.794)	(0.950)
L.Bank Liquidity	0.020	0.022*	-0.001
	(0.015)	(0.013)	(0.012)
L.Bank growth	-0.030	0.018	-0.064
	(0.079)	(0.065)	(0.058)
L.GFC	0.034	-0.002	0.033
	(0.025)	(0.018)	(0.031)
L.Basel 2.5	-0.013	-0.035	0.023
	(0.039)	(0.028)	(0.016)
L.Basel III	-0.048	-0.032	-0.004
	(0.041)	(0.028)	(0.030)
L.COVID	-0.013	-0.008	-0.008
	(0.016)	(0.024)	(0.020)
Constant	0.106**	0.034	0.054
	(0.047)	(0.034)	(0.043)
No of obs	104	104	104
Adj R2	0.118	0.161	0.093

Notes: This table reports the results of the time series regression for the determinants of debt securities growth for the period of 1996Q1-2023Q2

$$\begin{aligned} DebtSecuritiesGrowth_t = \alpha + \beta_1 Macro_{t-1} + \beta_2 RegulatoryArbitrage_{t-1} + \beta_3 BankLiquidity_{t-1} \\ + \beta_4 BankGrowth_{t-1} + \beta_5 Shock_{t-1} + \epsilon_t \end{aligned}$$

where $DebtSecuritiesGrowth_t$ is the growth rate of outstanding balance, transaction, and revaluation in the total issuance of debt securities by Swedish entities, $Macro_{t-1}$ indicates macroeconomic factors of real GDP growth, 3-month rate and the spread between the 10-year government yield and the 3-month rate. $RegulatoryArbitrage_t$ represents the regulatory arbitrage proxy, which includes two dummy variables, $Basel2.5$ and $BaselIII$ that reflects different bank capital requirement regimes implemented in Sweden during the sample period. $Basel2.5$ is a dummy variable equals one for the period of 2011Q4-2013Q4 (Basel II.5), and zero otherwise. $BaselIII$ is a dummy variable equals one for the period of 2014Q1-2023Q2 (Basel III), and zero otherwise. An omitted Basel II period of 1996Q1-2011Q3 can be represented by the case when both $Basel2.5$ and $BaselIII$ dummies are zeros. For $BankLiquidity_{t-1}$, we use the aggregate liquidity coverage ratio of the Swedish banking sector as the liquidity measure. $BankGrowth_{t-1}$ represents the growth of the banking sector after netting out the within banking sector holdings, $Shock_{t-1}$ represents the exogenous shocks of GFC and COVID-19 crises. It includes a dummy variable GFC that equals one for the period 2008Q1-2009Q4 and zero otherwise, and another dummy variable $COVID$ that equals one for the period of 2020Q1-2022Q2 and zero otherwise. ϵ_t is the error term. GLS method (Prais-Winsten and Cochrane-Orcutt regression) is used to deal with serially correlated errors and heteroskedasticity. Standard errors are estimated using robust variance calculation Davidson and MacKinnon (1993). Coefficients are listed in the first row and the standard errors are reported between parentheses in the second row. *, **, *** refer to significance at 10%, 5% and 1% respectively.

Table 6. Slow-moving factors and cross-border flows

	(1)	(2)	(3)	(4)	(5)	(6)
L.GDP growth gap	0.01048*	0.02227	0.01095	-0.00174	0.01042	0.09185
	(0.00627)	(0.02494)	(0.00814)	(0.01434)	(0.01059)	(0.06948)
L.Net Export/GDP	-0.00723	-0.00374	0.04467	0.02097	-0.15823**	-0.05804
	(0.11144)	(0.06662)	(0.13867)	(0.09047)	(0.07282)	(0.11697)
LD.FX	-0.00001***	-0.00001***	-0.00001***	-0.00001***	-0.00063***	-0.00087***
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00006)	(0.00017)
L.IR gap		0.00170		0.00991		-0.00458
		(0.01039)		(0.01682)		(0.01947)
L.Output Gap		-0.01974		-0.01175		-0.02870
		(0.01695)		(0.00794)		(0.05643)
Constant	0.00001	0.00007	0.00003	0.00020*	0.00004	0.00005
	(0.00007)	(0.00014)	(0.00008)	(0.00010)	(0.00010)	(0.00058)
No of obs	1600	499	1320	359	280	140
No of groups	80.000	25.000	66.000	18.000	14.000	7.000
Overall R2	0.001	0.004	0.001	0.001	0.021	0.101
Country FE	YES	YES	YES	YES	YES	YES
Cluster SE	YES	YES	YES	YES	YES	YES

Notes: This table reports the results of the panel data regression for the slow-moving factors that determine the cross-country outflows of the Swedish non-bank sector

$$\Delta\frac{NB_{j,t}}{TA_{j,t}} = \alpha + \beta_1 gap(\Delta GDP)_{j,t-1} + \beta_2 gap(\Delta IR)_{j,t-1} + \gamma Controls_{j,t-1} + \theta_j + \epsilon_t$$

Where $NB_{j,t}$ is the portfolio investment of the Swedish non-bank sector in country j at time t, $TA_{j,t}$ is the total foreign portfolio investment in country j at time t, $gap(\Delta IR)_{j,t-1}$ is the interest rate gap (the difference in monetary policy rate) between country j and Sweden at time $t-1$, $gap(\Delta GDP)_{j,t-1}$ is the gap of GDP growth between country j and Sweden at time $t-1$. $Controls_{j,t-1}$ includes net export and output gap between country j and Sweden, as well as the exchange rate between Swedish kronor and country j's currency. The net export is defined by the net export (the netting between export and import) from Sweden to country j, and normalized by the GDP of Sweden. All variables except the FX are in %. θ_j is the country fixed-effect. ϵ_t is the error term.

The panel is at yearly frequency for the period of 2001-2022 and covers 80 foreign investment destinations for the Swedish non-bank sector. Among the 80 jurisdictions, we only have data on the interest rate gap and the output gap for 25 jurisdictions. The odd columns report the results without the interest rate gap and the output gap as control variables. The even columns report the results with the interest rate gap and the output gap as control variables. Columns (1)-(2) include all the foreign investment destinations for the Swedish non-bank sector in the panel. Columns (3)-(4) include the foreign investment destinations for the Swedish non-bank sector except US, UK and Euro-zone. Columns (5)-(6) include the foreign investment destinations of US, UK and Euro-zone for the Swedish non-bank sector. All regression specifications have counterparty country fixed effects. Coefficients are listed in the first row and the standard errors are reported between parentheses in the second row. Standard errors are clustered at the counterparty country level. *, **, *** refer to significance at 10%, 5% and 1% respectively.

Table 7. Risk taking proxies and cross-border flows

	(1)	(2)	(3)	(4)
L.IV_World	-0.0015*	-0.0039**		
	(0.0008)	(0.0015)		
LD.FX_World		-0.0077		
		(0.0054)		
L.Stock return diff (World-SE)		0.0043		
		(0.0041)		
L.IV_Reserve			-0.0013*	-0.0018*
			(0.0007)	(0.0011)
LD.FX_Reserve				-0.0047
				(0.0054)
L.Stock return diff (Reserve-SE)				0.0059
				(0.0048)
L.3-month rate		0.0249		0.0135
		(0.0172)		(0.0114)
L.Spread		0.1046**		0.0977**
		(0.0401)		(0.0387)
L.Real GDP growth		-0.0306**		-0.0209***
		(0.0119)		(0.0067)
L.House price growth		0.0038		0.0055
		(0.0033)		(0.0047)
Constant	0.0015*	0.0030**	0.0013**	0.0009
	(0.0008)	(0.0012)	(0.0006)	(0.0009)
No of obs	1680	1600	1680	1600
No of groups	80.000	80.000	80.000	80.000
Overall R2	0.001	0.007	0.001	0.005
Country FE	YES	YES	YES	YES
Cluster SE	YES	YES	YES	YES

Notes: This table reports the results of the panel data regression for the risk-taking behavior of the Swedish non-banks in cross-border investment

$$\Delta\frac{NB_{i,j,t}}{TA_{j,t}} = \alpha + \beta_1 IV_{-i,t} + \beta_2 FX_{i,t-1} + \gamma Controls_{i,t-1} + \theta_j + \epsilon_{i,t} \tag{4}$$

Where i indicates Sweden, and j indicates counterparty jurisdictions. $NB_{i,j,t}$ is the portfolio investment of the Swedish non-bank sector in country j at time t, and $TA_{j,t}$ is the total foreign portfolio investment in country j at time t. The panel is at yearly frequency for the period of 2001-2022 and covers 80 foreign investment destinations for the Swedish non-bank sector. In column (1)-(2), the proxy for risk taking is the world implied volatility index (IV_Wolrd). FX_World is the exchange rate between SEK and a broad basket of other currencies measured by the IMF. In column (3)-(4), the proxy for risk taking is the volatility index for the reserve currency markets $IV\_Reserve$, which is measured by the average of the volatility indices for the US and the Euro area. $FX\_Reserve$ is the average of the exchange rates between SEK and reserve currencies including USD and EURO. $Controls_{i,t-1}$ include macroeconomic variables that reflect domestic investment opportunities: real GDP growth, house price growth, the difference in stock market returns between the world (or the reserve currency jurisdictions) and Sweden, 3-month interbank rate and the spread between the 10-year government bond yield and the 3-month interbank rate. θ_j is the country fixed-effect. ϵ_t is the error term. All regression specifications have counterparty country fixed effects. Coefficients are listed in the first row and the standard errors are reported between parentheses in the second row. Standard errors are clustered at the counterparty country level. *, **, *** refer to significance at 10%, 5% and 1% respectively.

Table A1. Summary statistics

	Panel A: Non-bank growth					
	N	Mean	Std. Dev.	p25	Median	p75
Dependent variables						
Growth of balance: non-banks	106	0.106	0.128	0.033	0.115	0.174
Growth of balance: ICPFs	106	0.089	0.097	0.035	0.093	0.156
Growth of balance: IFs	106	0.152	0.203	0.026	0.127	0.258
Growth of balance: OFIs	106	0.110	0.173	-0.009	0.106	0.202
Growth of balance: Debt securities	106	0.047	0.054	0.005	0.052	0.080
Growth of asset revaluation: non-banks	106	0.042	0.119	-0.023	0.067	0.110
Growth of asset revaluation:ICPFs	106	0.040	0.089	-0.006	0.055	0.103
Growth of asset revaluation:IFs	106	0.001	0.188	-0.092	0.032	0.114
Growth of asset revaluation:OFIs	106	0.088	0.161	-0.012	0.089	0.187
Growth of asset revaluation:Debt securities	106	0.018	0.049	-0.017	0.019	0.047
Growth of transaction: non-banks	106	0.064	0.042	0.038	0.055	0.081
Growth of transaction: ICPFs	106	0.050	0.030	0.028	0.045	0.059
Growth of transaction: IFs	106	0.151	0.137	0.063	0.112	0.188
Growth of transaction: OFIs	106	0.023	0.039	-0.002	0.019	0.043
Growth of transaction: Debt securities	106	0.030	0.051	-0.005	0.038	0.059
Controls						
Real GDP growth	106	0.025	0.027	0.012	0.029	0.039
World index return (in USD)	106	0.063	0.186	-0.058	0.093	0.165
FX (USDSEK)	106	8.115	1.206	7.093	8.039	8.872
3-month rate	106	0.020	0.018	0.001	0.021	0.038
Spread	106	0.009	0.009	0.003	0.009	0.015
Bank liquidity	106	0.537	0.410	0.309	0.350	0.444
Bank growth	106	0.072	0.062	0.029	0.067	0.112
Basel 2.5	106	0.085	0.280	0.000	0.000	0.000
Basel III	106	0.358	0.482	0.000	0.000	1.000
GFC	106	0.075	0.265	0.000	0.000	0.000
COVID	106	0.094	0.294	0.000	0.000	0.000
Growth of within-sector holdings	106	0.089	0.064	0.039	0.086	0.139
Personal income growth	104	0.039	0.012	0.033	0.039	0.047
Growth of unit-linked ICPFs	106	0.256	0.422	0.102	0.207	0.339

	Panel B: Cross-border investment					
	N	Mean	Std. Dev.	p25	Median	p75
NB/TA (%)	1760	0.664	1.389	0.059	0.252	0.593
GDP growth gap (%)	1759	1.036	4.134	-0.913	0.883	3.001
Net Export/GDP (%)	1760	0.014	0.277	-0.005	0.008	0.058
FX	1759	1.517	6.373	0.945	1.111	1.456
IR gap (%)	550	-0.191	1.294	-1.000	-0.250	0.125
Output Gap (%)	549	-1.000	2.602	-1.898	-0.716	0.347
IV_World	22	0.940	0.234	0.765	0.877	1.066
IV_Reserve	22	0.892	0.265	0.669	0.820	1.102
FX_World	22	1.092	0.106	1.020	1.077	1.202
FX_Reserve	22	1.077	0.116	0.990	1.060	1.190
Stock return diff (World-SE)	22	-0.013	0.083	-0.067	-0.022	0.050
Stock return diff (Reserve-SE)	22	-0.012	0.073	-0.072	0.015	0.036
Real GDP growth	22	0.022	0.024	0.016	0.026	0.036
House price growth	22	0.065	0.043	0.031	0.070	0.090
3-month rate	22	0.016	0.017	-0.000	0.011	0.026
Spread	22	0.008	0.008	0.003	0.010	0.012

Notes: This table shows descriptive statistics for the dependent and control variables in the regression analysis. Panel A presents the summary statistics for the quarterly time series data sample during the period of 1996Q1-2023Q2 for the non-bank growth analysis in section 4. Panel B presents the summary statistics for the annual panel data sample during the period of 2001-2022 for the cross-border investment analysis in section 5.

Table A2. Correlation matrix of control variables

	L.Real GDP growth	World index return (in USD)	D.FX (USDSEK)	L.3-month rate	L.Spread	L.Bank Liquidity	L.Bank growth	L.Basel 2.5	L.Basel III	L.GFC	L.COVID	Growth of within-sector holdings	Personal income growth	Growth of unit-linked ICPFs
L.Real GDP growth	1.0000													
World index return (in USD)	0.1254	1.0000												
D.FX (USDSEK)	0.1846	-0.2222	1.0000											
L.3-month rate	0.0821	-0.2436	-0.0066	1.0000										
L.Spread	0.1580	0.4157	-0.2246	-0.0962	1.0000									
L.Bank Liquidity	-0.0652	0.0233	0.0921	-0.3871	-0.0774	1.0000								
L.Bank growth	-0.1088	-0.1800	0.0656	0.1648	-0.0059	-0.1645	1.0000							
L.Basel 2.5	-0.2376	0.0717	-0.0551	-0.0416	-0.2442	0.4076	-0.1301	1.0000						
L.Basel III	0.0091	-0.0004	0.1770	-0.7988	-0.1690	0.2989	-0.1229	-0.2220	1.0000					
L.GFC	-0.5290	-0.2374	0.0647	0.1432	-0.0842	-0.1461	0.2049	-0.0898	-0.2082	1.0000				
L.COVID	-0.0132	0.1038	0.0501	-0.3454	-0.1656	-0.1726	0.0478	-0.1015	0.4571	-0.0952	1.0000			
Growth of within-sector holdings	0.0039	0.4458	0.0385	-0.0430	0.2186	0.0246	0.2446	-0.0178	-0.0665	-0.0963	-0.0029	1.0000		
Personal income growth	0.6074	-0.0417	0.3454	0.2041	-0.1025	-0.0502	0.0707	-0.1828	0.1155	-0.4257	0.1325	-0.1703	1.0000	
Growth of unit-linked ICPFs	0.1315	0.5549	0.0762	0.2088	0.5065	-0.0654	-0.0387	-0.0617	-0.2391	-0.1899	-0.1014	0.4783	0.1047	1.0000

Notes: This table shows the correlation matrix of control variables in the time series regression equation

$$\begin{aligned} NBGrowth_t = \alpha &+ \beta_1 Macro_{t-1} + \beta_2 RegulatoryArbitrage_{t-1} + \beta_3 BankLiquidity_{t-1} \\ &+ \beta_4 BankGrowth_{t-1} + \beta_5 Shock_{t-1} + \beta_6 Controls_t + \epsilon_t \end{aligned}$$

for the non-bank growth analysis in section 4.

Table A3. Variable definitions

Variable Name	Definition
Non-bank growth	
Growth of balance: non-banks/ICPFs /IFs/OFIs	The growth rate of the total financial assets outstanding for non-banks/ICPFs/IFs/OFIs in Sweden, in decimal
Growth of balance: Debt securities	The growth rate of the total debt securities liabilities of Swedish entities, in decimal
Growth of transaction: non-banks /ICPFs/IFs/OFIs	The growth rate of transactions (or net capital inflows) into non-banks/ICPFs/IFs/OFIs in Sweden, in decimal
Growth of transaction: Debt securities	The growth rate of transactions (or the netting between newly issued and matured) in debt securities liabilities of Swedish entities, in decimal
Growth of asset revaluation: non-banks /ICPFs/IFs/OFIs	The growth rate of asset revaluation in the total financial assets for non-banks/ICPFs/IFs/OFIs in Sweden, in decimal
Growth of revaluation: Debt securities	The growth rate of the revaluation in the total debt securities liabilities of Swedish entities, in decimal
Real GDP growth	The growth rate of real GDP in Sweden, in decimal
World index return (in USD)	The price return for the MSCI world equity index (USD), in decimal
FX (USDSEK)	The exchange rate between USD and SEK, measured by the amount of SEK for 1 USD.
3-month rate	The 3-month interbank rate, in decimal
Spread	The difference between the 10-year government yield and the 3-month interbank rate, in decimal
Bank liquidity	The aggregate liquidity coverage ratio (liquid assets to short-term liabilities ratio) of the Swedish banking sector, in decimal
Bank growth	The growth rate of total financial assets outstanding for banks after netting the within banking sector holdings, in decimal
Basel 2.5	A dummy variable that equals one for the period of 2011Q4-2013Q4 when Basel II.5 was implemented in Sweden, and zero otherwise.
Basel III	A dummy variable that equals one for the period of 2014Q1- 2023Q2 when Basel III was implemented in Sweden, and zero otherwise.
GFC	A dummy variable that equals one for the period of 2008Q1-2009Q4 and zero otherwise.
COVID	A dummy variable that equals one for the period of 2020Q1-2022Q2 and zero otherwise.

Table A3. Variable definitions

Variable Name	Definition
Growth of within-sector holdings	The growth rate of within-sector holdings, in decimal. The within-sector holdings are asset holdings between non-banks and non-banks, and asset holdings between banks and banks.
Personal income growth	The growth rate of income for persons with age 20-64 in Sweden, in decimal
Growth of unit-linked ICPFs	The growth rate of unit-linked pension products, in decimal
Cross-border investment	
NB/TA	The ratio between the portfolio investment of the Swedish non-bank sector in the destination jurisdiction j and the total foreign portfolio investment in jurisdiction j, in %
GDP growth gap	The gap of GDP growth between the destination jurisdiction j and Sweden, in %
Net export/GDP	The net export from Sweden to the destination jurisdiction j, normalized by the GDP of Sweden, in %
FX	The exchange rate between SEK and currency in the destination jurisdiction j, measured by the amount of currency in the destination jurisdiction j for 1 SEK. The exchange rates are normalized based on their values in the year of 2000 (FX=1 in 2000) due to the large variation in the original values of the exchange rates.
IR gap	The difference in monetary policy rate between the destination jurisdiction j and Sweden, in %
Output gap	The output between the destination jurisdiction j and Sweden, in %
IV_World	The world volatility index (IIMA global market volatility index). The index is normalized based on its value in the year of 2000 (IV_World=1 in 2000)
IV_Reserve	The average of the volatility indices for the US (CBOE S&P 500 VIX) and the Euro area (VSTOXX index). The index is normalized based on its value in the year of 2000 (IV_Reserve=1 in 2000)
FX_World	The exchange rate between SEK and a broad basket of other currencies measured by the IMF, measured by the amount of a broad basket of other currencies for 1 SEK and normalized based on its value in the year of 2000 (FX_World=1 in 2000).

Table A3. Variable definitions

Variable Name	Definition
FX_Reserve	The average of the exchange rates between SEK and reserve currencies including USD and EURO. The exchange rate between SEK and USD (EURO) is measured by the amount of USD (EURO) for 1 SEK, and normalized based on its value in the year of 2000 (FX_SEKUSD(SEKEURO)=1 in 2000).
Stock return diff (World-SE)	The difference in stock index returns between the MSCI world equity index and the OMX Stockholm stock index, in decimal
Stock return diff (Reserve-SE)	The difference in stock index returns between the average of the US stock index and the Euro area stock index, and the OMX Stockholm stock index, in decimal
Real GDP growth	The growth rate of real GDP in Sweden, in decimal
House price growth	The growth rate of house price index in Sweden, in decimal
3-month rate	The 3-month interbank rate, in decimal
Spread	The difference between the 10-year government yield and the 3-month interbank rate, in decimal

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