

# Government Bond Market Developments and the Usage of the DMO's Security Lending Facility - Evidence from Sweden\*

Marianna Blix Grimaldi<sup>†</sup> and Johanna Hirvonen<sup>‡</sup>

Swedish National Debt Office

May 2022

## Abstract

The Covid-19 pandemic halted economic and financial development in many parts of the world, placing substantial pressure on governments. It also created new risks and global challenges for Debt Management Offices (DMOs), with potentially significant implications for domestic-market functioning and investor behaviour. In this paper, we use a novel approach based on proprietary information of the Swedish Debt Management Office's security lending facility (SLF) to investigate key changes in government bond markets and their implications for market functioning. We show that quantitative easing (QE) policies have had a persistent influence on usage of the facility and demand from primary dealers, while the acute effects of the pandemic were temporary. We also show that the terms and conditions attached to a SLF are a powerful policy tool and that altering them can cause significant shifts in SLF usage.

**Keywords:** Government Bond Market, Quantitative Easing (QE), Public Debt Management, Covid-19.

**JEL Classification:** E52, E58, G12, H63.

---

\* We thank Johan Bergström, Karolina Ekholm, Erika Färnstrand Damsgaard, Klas Granlund, Jörg Hofmeister and seminar participants at SNDO for valuable comments. The opinions expressed in this paper are the sole responsibility of the authors and should not be interpreted as reflecting the views of the Swedish National Debt Office or of the Sveriges Riksbank.

<sup>†</sup> Marianna Blix Grimaldi, Swedish National Debt Office and Sveriges Riksbank, e-mail: marianna.blixgrimaldi@riksdagen.se.

<sup>‡</sup> Johanna Hirvonen, Swedish National Debt Office, e-mail: johanna.hirvonen@riksdagen.se.

# 1. Introduction

Not only was the rapid spread of Covid-19 in the spring of 2020 a serious threat to public health, but it also had a major impact on global financial markets. Public institutions and fiscal and monetary authorities swiftly implemented powerful macroeconomic policies aimed at improving the economic outlook and controlling financial volatility. Despite the pandemic's toll on public health through several waves of contagion and, tragically, the casualties involved, the crisis measures were arguably successful and perhaps even instrumental in restoring “normalcy” to the economy (OECD, 2021a). Although crisis responses were necessary, they also resulted in a rapid surge for central-bank balance sheets and government debt, which were already at high levels. Consequently, the medium- to long-term vulnerability of economies to potential future shocks has increased.

Most of the existing literature on crisis response focuses on the economic impact of fiscal and monetary policy measures during stress events like the Covid-19 pandemic. The effects on both bond markets and stock markets have been analysed (see, among many others, FSB, 2020). Yet the impact of economic policies on government bond markets and in particular their functioning, along with the response of Debt Management Offices (DMOs) and the implications for investor behaviour, remains an under-researched topic.

In this paper, we use a novel approach based on evidence from Sweden to describe government bond market developments and identify key changes that significantly influenced government bond market functioning. Such developments are not unique to Sweden but in fact common to many advanced and emerging economies.

More specifically, we analyse the impact that periods of increased financial stress, central bank quantitative easing policies, and changes in DMO policies have had on government bond market functioning and demand for government bonds.

For our analysis, we use highly granular and non-public data on the security lending facility (SLF) of the Swedish National Debt Office (the Swedish DMO). The general purpose of a security lending facility is to allow the DMO to mitigate a possible scarcity of securities in the government bond market by offering the DMO's primary dealers the possibility of borrowing government securities on a temporary basis. As such, the SLF is a powerful tool of a DMO. Through it, the DMO can influence government bond market functioning while contributing to market liquidity and financial stability.

The SLF is often the most detailed source of information available to policy makers on investor demand in the government bond market. Most importantly, it provides exclusive information about the inner workings of the government bond market and can offer unique insight into the broader dynamics of short-term funding markets. Usually only debt managers have direct access to information based on a SLF.

Our analysis is based on daily data and covers almost two decades, from 2002 to 2021. To our knowledge, the data in our study are the longest and most granular data on which research and policy analysis in this area have been based to date.

We show that the Covid-19 pandemic had a substantial but only temporary impact on the SLF. By contrast, QE policies have had a more persistent influence on the usage of the facility, leading to potentially permanent changes in market functioning. Proprietary data we obtained from market participants support our results by indicating that government bonds targeted in the QE programme have been trading as “specials”, i.e. they have become more expensive to borrow in the repurchase agreement (repo) market than other comparable bonds.

We also show that flight to quality and flight to liquidity were opposing forces in the Swedish government bond market and that flight to liquidity may have become more dominant after the QE was initiated.

Finally, we show that the terms and conditions attached to a SLF serve as a key tool for a DMO and that changes to these can cause significant shifts in usage of a SLF.

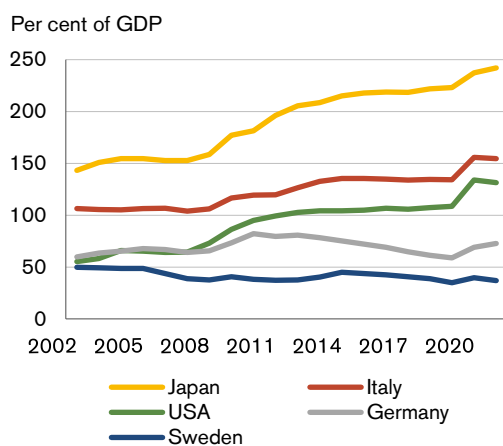
This paper is organised as follows. Section 2 briefly describes the impact of the Covid-19 crisis and the ensuing policy measures on supply and demand in the government bond market; Section 3 describes key long-term and potential structural changes that were already underway before the pandemic. In Section 4, we present the Swedish DMO’s SLF and its usage during the latest two decades. In Section 5, we formally analyse the drivers of the changes that occurred over the period of February 2015–November 2021. Our conclusions are presented in Section 6.

## 2. The impact of the Covid-19 crisis on government bond market supply and demand

Governments and central banks around the world implemented rapid and powerful policy responses in order to mitigate the effects of the shock to financial markets and the economic contraction due to the onset of the Covid-19 pandemic. These crisis measures resulted in a rapid surge in the already previously high levels of government debt, central bank balance sheets, and asset prices.

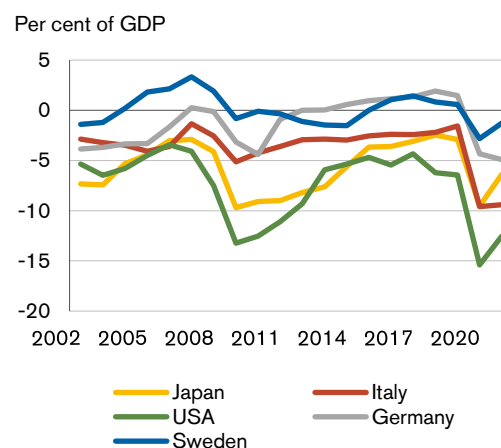
Expansion of central bank balance sheets during the Covid-19 crisis exceeded the expansion during the 2007–2009 global financial crisis. During the first half year of the pandemic, balance sheet expansion for the major central banks measured between 8 to 14 per cent of GDP, which was nearly two-fold (4 to 9 per cent of GDP) compared with the first six months of the global financial crisis (BIS, 2020). At the same time, governments’ fiscal deficits surged at a magnitude not seen since the Second World War (Baker et al., 2021).

**Figure 1. Government debt to GDP**



Source: OECD

**Figure 2. General government net lending**



Source: OECD

The policy responses affected the supply and demand of government bonds. In order to fund the crisis-induced fiscal policy measures, governments substantially increased their issuance of government securities (OECD, 2021a). In 2020 and 2021, the stock of outstanding government debt securities increased by over 50 per cent in Australia, Canada,

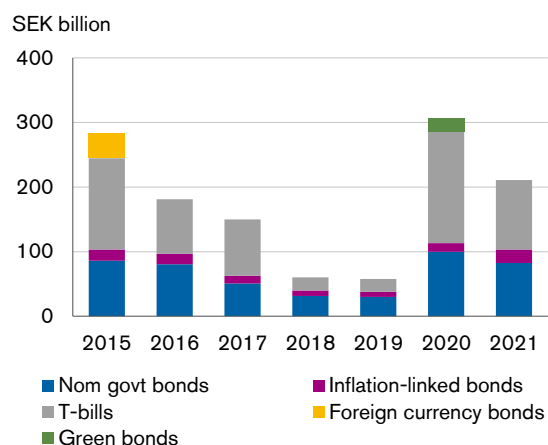
and New Zealand and by around 30 per cent in the United States and the United Kingdom (Baker et al., 2021). In Sweden, the increase amounted to about 10 per cent.

The Swedish government debt is low by international comparison. The debt-to-GDP ratio has generally been on a downward trajectory since the beginning of the 1990s. Apart from the temporary deficit arising from pandemic-related aid for households and firms, the Swedish government has had a budget surplus since 2015.

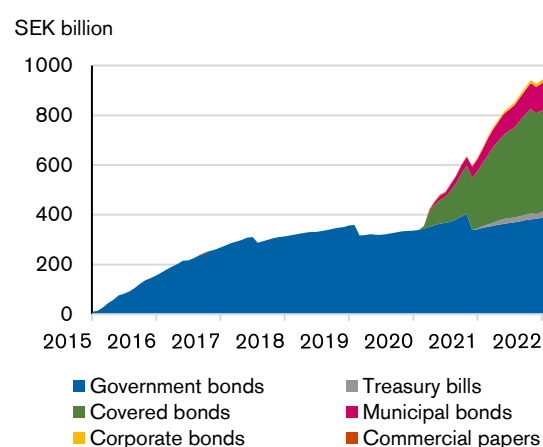
In many OECD countries, higher government borrowing requirements were largely accommodated by increasing the supply of treasury bills (OECD, 2012b). The rationale was to allow for greater borrowing flexibility in light of heightened volatility and uncertainty about future borrowing needs than would have been possible with longer-term debt securities (Baker et al., 2021). In 2020–2021, in accordance with the borrowing policies it already had in place, the Swedish DMO also concentrated the majority of its new issuance to T-bills (Figure 3). This made it possible to adjust the issuance to a lower-than-expected borrowing requirement when the recovery of the Swedish economy turned out to be stronger and more rapid than expected. In 2021, the fiscal surplus resulted in a contraction in government debt in Maastricht terms from 40 per cent of GDP at the end of 2020 to 38 per cent of GDP in 2021.<sup>1</sup>

---

<sup>1</sup> General government gross debt according to the convergence criteria set out in the Maastricht Treaty comprises currency, bills and short-term bonds, other short-term loans and other medium- and long-term loans and bonds, defined according to ESA 95. Source: The OECD Economic Outlook: Sources and Methods.

**Figure 3. Issuance of government securities**

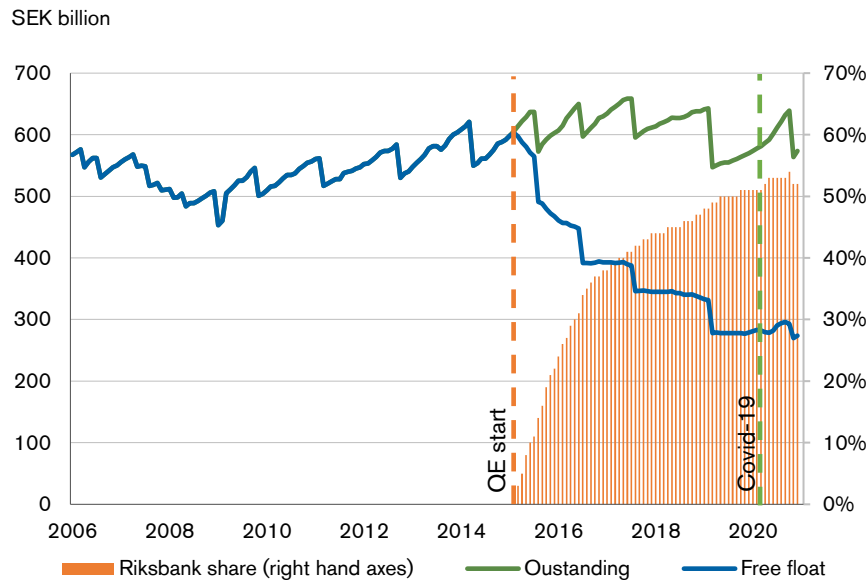
Source: Swedish National Debt Office  
 Note: The amount of T-bills refers to outstanding stock at year-end.

**Figure 4. Composition of Riksbank QE**

Source: Sveriges Riksbank

Emergency support in the form of expansionary policies by fiscal authorities was complemented with expansionary monetary policies. To mitigate strain in financial markets, central banks resorted to more outright asset purchases, among other measures. In the OECD countries, some central banks launched asset purchase programmes for the first time while others scaled up existing programmes and established new ones targeting new types of securities (BIS, 2020).

*Sveriges Riksbank* (the Riksbank) expanded its asset purchase programme both in size and by broadening the scope to include new types of securities. In addition to Swedish government bonds, which the Riksbank had already had been buying since 2015 when it first started its QE programme, the central bank started purchasing Swedish covered (mortgage), municipal, and corporate bonds, as well as Swedish government T-bills (see Figure 4). Although the programme grew significantly in size, the move to buy other types of securities, together with the increased issuance of government bonds, meant that there was no significant change in the so-called *free float* of nominal government bonds, i.e. outstanding bonds net of bonds held by the Riksbank. It also did not significantly change the overall share of the Riksbank's nominal government bond holdings (see Figure 5).

**Figure 5. Free float and Riksbank's share of nominal Swedish government bonds**

Source: Sveriges Riksbank and Swedish National Debt Office

Overall, central banks and fiscal authorities were successful in mitigating the fallout of the crisis. Interest rates on government bonds remained fairly stable at historically low levels in all major economies. In Sweden, as in most of the other OECD countries, the Covid-19 pandemic had only temporary effects on the economic output, similar to, for example, those of a natural disaster.

### 3. Trends and potential structural shifts in the government bond market

Before the Covid-19 pandemic, long-term trends and structural shifts were already changing market dynamics in the Swedish government bond market. In this section, we identify two of these effects and briefly discuss them.

The first effect relates to the long-term downward trend in public debt. Government debt has mostly been declining over the past two decades, both in nominal terms as well as in relation to GDP (see Figure 7). In 1995, the Swedish government debt as a share of GDP was close to 70 per cent and above the requirement of the Maastricht agreement. Positive growth coupled with a series of fiscal reforms – which had been agreed upon by all the

Swedish political parties in the aftermath of the country's banking crisis of the early 1990s and then implemented in successive governments – led the debt-to-GDP ratio to decline steadily over time. In March 2022, it was at 38 per cent, among the lowest of the OECD countries. A low and steadily declining government debt can pose challenges to DMOs. Over the years, the Swedish DMO has strived to concentrate mostly on the issuance of benchmark maturities. This has primarily been to ensure continued liquidity.

Second, similarly to other central banks, the Riksbank has engaged in large asset purchases as part of its monetary policy since launching its QE programme in 2015.

The implementation of the QE programme posed new challenges for the DMO by creating a significant shift in market dynamics and investor demand for government bonds. Both the pace and the size of the Riksbank's QE programme stand out by international comparison.

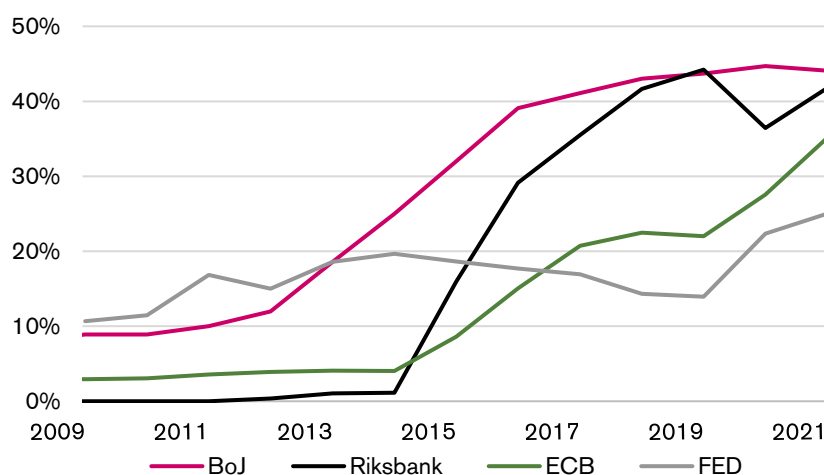
Compared with the QE programmes of other major central banks, the pace of the Riksbank's asset purchases has been significantly higher. Figure 6 shows the relatively steep upward slope of the curve representing the Riksbank's accumulated purchases. Only two years into the programme the Riksbank held more than 30 per cent of the Swedish domestic government securities.

Notably, when compared with other major central banks, the Riksbank's share of the government securities eligible for asset purchases is high. It is worth pointing out that, often because of limited availability of data, the size of a QE programme is measured in terms of the GDP of the country. GDP, though, is not the best reference for measuring the impact of QE on government bond markets. We therefore use as our reference measure the outstanding volume of government bonds that are eligible under the QE programme. By that measure, compared with major central banks' QE, the size of the Riksbank's QE is close to the largest, at around 40 per cent, and near that of the Bank of Japan (BoJ), which holds the largest share at 45 per cent. In contrast to the Riksbank, the BoJ started its QE programme almost a decade earlier, in 2001, and already held a relatively significant share of government securities by the time the Riksbank's – and other central banks' – QE programmes were launched.



At the onset of its QE programme, the Riksbank bought only nominal Swedish government bonds, but in 2016 it then broadened the programme to also include inflation-linked government bonds, as well as other securities during the pandemic. Throughout the programme, nominal bonds have accounted for the majority of the purchases, resulting in the Riksbank holding over 50 per cent of the nominal Swedish government bonds. The Riksbank's total holdings (nominal, inflation-linked bonds, and T-bills) as a share of all outstanding domestic government securities was about 40 per cent at the end of the sample (see Figure 6).

**Figure 6. Central bank holdings as share of domestic government securities eligible for asset purchase programme**



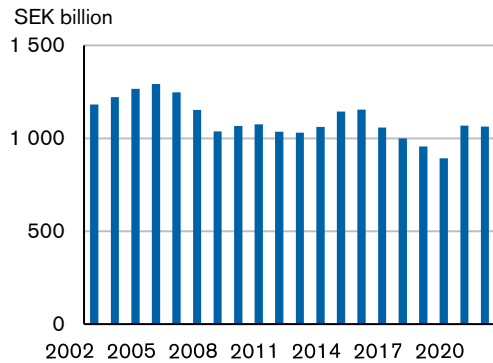
Source: Bank of Japan (BoJ), Sveriges Riksbank, Swedish National Debt Office, European Central bank (ECB), Eurostat, Federal Reserve (FED), US Treasury, IMF and authors' calculations.

The Riksbank's asset purchase programme significantly reduced the amount of government bonds that were available to trade in the market (so-called free float), especially for nominal bonds. This has likely contributed to deterioration in indicators that are commonly used by DMOs for identifying and assessing liquidity problems<sup>2</sup>. Foreign ownership has decreased significantly after QE start (see Figure 8) and daily market turnover, that has been deteriorating over a longer time period, has declined further (Figure 9). Also perceived liquidity has decreased significantly (see Figures 10). The share of foreign ownership

<sup>2</sup> Blommestein (2017) provides an overview of indicators for identifying and assessing liquidity problems.

increased somewhat during the Covid-19 pandemic as a result of syndicated offerings of bonds with longer maturities, which attracted foreign investors.

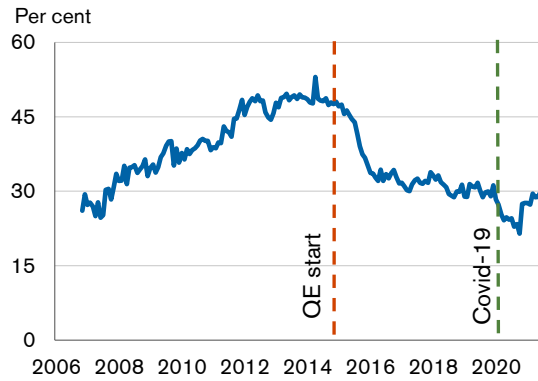
**Figure 7. Central government debt**



Note: Central government debt including on-lending and assets under management.

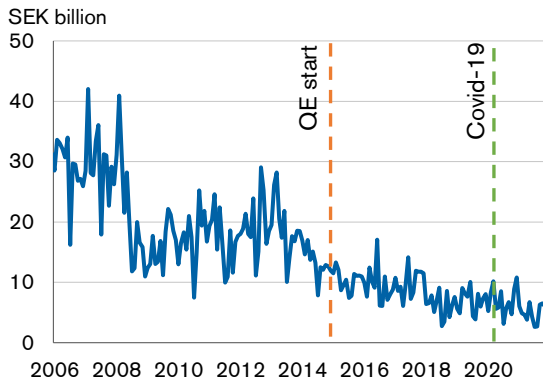
Source: Swedish National Debt Office

**Figure 8. Foreign ownership of government bonds**



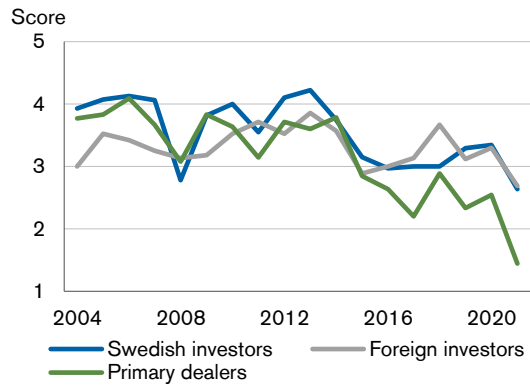
Source: Statistics Sweden

**Figure 9. Daily turnover of government bonds**



Source: Sveriges Riksbank

**Figure 10. Perceived liquidity of government bonds**



Note: Score relates to ranking of liquidity in the investors' survey conducted annually by Kantar Prospera on behalf of SNDO. A higher score stands for higher liquidity.

Source: Sveriges Riksbank and Swedish National Debt Office

## 4. The DMO's securities lending facilities

The main objective of the Swedish DMO is *to minimise the cost of central government debt in the long term while taking risk into account*.<sup>3</sup> This objective adheres to best global standards as described in the *Guidelines for Public Debt Management* (IMF, 2001 and 2014).

In practice, a DMO achieves its main objective through a set of related goals and operational procedures. The Swedish DMO has four related goals. These can be summarized as: (1) minimising risk-adjusted funding costs, (2) maintaining an efficient government debt market, (3) reducing uncertainty for investors, and (4) ensuring that the investor base is as diversified as possible.

The operational tools that a DMO employs involve decisions on what type of securities are issued, issuance maturity, size and schedule of auctions, degree of investor-base diversification, level of risk tolerance, and overall transparency. The mandate of the DMO also includes contributing to the development and liquidity of the government debt market.<sup>4</sup> It can do so by conducting security lending operations through its SLF. In fact, a SLF is the DMO's primary tool for safeguarding and enhancing, where possible, the liquidity of the government bond market and market functioning.<sup>5</sup>

A well-functioning bond market implies a lower liquidity premium and consequently lower borrowing costs for the government, which directly relates to the DMO's mandate. But a liquid government bond market is more than that. It is an invaluable public asset. Government bonds remain one of the key pricing benchmarks for a broad range of financial assets even as some other assets, such as cleared interest rate swaps, are emerging as alternative benchmarks.<sup>6</sup> Government bonds are also the security of choice of many

---

<sup>3</sup> See [Facts about central government debt – Riksgälden.se \(riksgalden.se\)](https://www.riksdagen.se/sv/om-riksdagen/riksdagens-utskott/finansutskottet/fakta-om-centrala-regeringens-schulden-riksgalden.se)

<sup>4</sup> Bond liquidity refers to the capacity of traders to undo positions at reasonable costs. For a discussion of liquidity in fixed-income markets, see Crosta and Zhang (2020) and references therein.

<sup>5</sup> Market liquidity can be affected by factors that are outside a DMO's influence, among others funding liquidity, defined as the ability to settle obligations immediately when due. Theoretical research has rationalised strong interactions between funding liquidity risk and market liquidity in periods of crisis (See M. Brunnermeier and L. H. Pedersen, "Market liquidity and funding liquidity", National Bureau of Economic Research Working Paper No 12939, February 2007).

<sup>6</sup> See ISDA (2022), for a description of interest rate swaps (IRS) and the emergence of cleared IRS as standard contracts.

investors for managing financial risks in capital markets. The key feature of a SLF is that its availability strengthens investors' *confidence* in the continued liquidity and functioning of the market. In this way, the DMO's SLF plays a critical role in maintaining and improving the liquidity of government bonds.

Because of this critical role, usage of the SLF can be associated with episodes or longer periods in which government bonds are difficult to obtain and traders thus resort to the facility to overcome that *scarcity*.<sup>7</sup> The usage of the facility strongly correlates to how well the government bond market and the repo market for government securities are functioning.<sup>8</sup> Notably, the information from the SLF can indicate the level of bond scarcity in the repo and government bond markets and, in other words, whether the bonds are sufficiently liquid. The SLF can therefore be seen as a measure of liquidity in the government bond market.

A complication in interpreting the information from the SLF *directly* as a measure of liquidity is that the relationship between SLF usage and market liquidity might be nonlinear. Higher usage of the facility can be associated with bond scarcity. However, it could also be associated with high liquidity if it is caused by high activity in the government bond market rather than scarcity. Based on the evidence we have, higher transacted volumes in the Swedish SLF tend to be associated with lower market liquidity (see Blix Grimaldi et al., 2021).

Another advantage of the SLF is that compared with other measures of market liquidity, which are normally derived measures based on *ex-post* information from the secondary market, the SLF-based measures are based on transacted volumes and, most importantly, are related to both the DMO's overarching mandate and the core purpose of a SLF.<sup>9</sup>

---

<sup>7</sup> For scarcity is meant the shrinkage in the available supply of bonds, see e.g. Pelizzon et al. 2019

<sup>8</sup> The market for repurchase agreements (repo) is a short-term market that facilitates the flow of cash and securities in the financial system. It is often described as the *plumbing* of the financial system. The market is in fact a key source of liquidity in the trading of government bonds. If banks, which make markets for investors, do not hold a specific bond themselves, they can use repo agreements for borrowing it in exchange for cash. Traders can also use repo transactions to obtain funding by using securities as collateral. In a repo transaction, a party sells government debt securities to a counterparty subject to an agreement to repurchase the securities later at an agreed price. Repos are economically similar to a collateralised loan.

<sup>9</sup> Market liquidity is widely recognized as a multidimensional concept, which is difficult to capture with a single measure. It is instead described by a variety of measures included traded volumes and ex-ante and post-trade metrics. Post-trade measures are rare and hard to come by as they are based on supervisory reporting, see

A SLF can take many forms (World Bank, 2015). The Swedish DMO's SLF consists of two type of facility: a *repo cash facility* and a *repo swap facility*.<sup>10</sup>

In the *repo cash facility*, government securities – usually bonds – are traded overnight (ON) or tomorrow-next (T/N) at a set price (the *repo cash facility* thus comprises what we refer to here as the O/N repo facility and T/N repo facility).<sup>11</sup> The DMO has conducted O/N and T/N reverse repos on a daily basis since 2000. As of 2004, it also manages a *repo swap facility*, whereby government bonds can be swapped for another government security, including T-bills, at a set price with the swap having a one-week maturity on a cash-neutral basis, meaning that the transactions cancel each other out.<sup>12</sup>

The DMO provides its repo facilities only to its primary dealers. The Swedish SLF is governed by primary dealers' demand and is offered irrespective of the borrowing requirement. Operationally, the SLF contributes to the smooth functioning of the short-term funding market by *fine-tuning the supply of bonds* in the government bond market.

The different types of SLFs have somewhat different purposes, while all contribute to the liquidity of Swedish government debt by enhancing trust and confidence among investors and primary dealers in always having access to the bonds they need for their commitments.<sup>13</sup> The primary dealers only use the O/N repo facility to avoid fails to delivery. The SLF's task is to offer government securities to facilitate trading and settlement. The purpose of the T/N

---

Blix Grimaldi et al. (2021) for an overview of post-trade liquidity measures and their application to the Swedish government bond market.

<sup>10</sup> The Swedish SLF is available as buy-/sell-back transactions.

<sup>11</sup> O/N repo transaction is settled on the same date as it trades (T) and the collateral is repurchased on the next business day (T + 1). The T/N repo transaction is settled at T + 1 (one business day after the repo trade date), whereas the bond is repurchased at T + 2.

<sup>12</sup> More specifically, the buy-/sell-back and sell-/buy- back transactions cancel each other out. A transaction in the repo swap facility (T/W) is settled T+1.

<sup>13</sup> The SLF is not the only tool the Swedish DMO uses to promote liquidity in the secondary government bond market. It also uses switches from time to time. Switches are a common tool among DMOs and are typically used for achieving several goals within debt management (Blommestein, Elmadag and Ejsing, 2012). In a switch operation, a DMO provides investors with the opportunity to exchange existing bonds – typically less-liquid and off-the-run – with newly issued bonds of higher liquidity. The Swedish DMO uses switches mainly to build up the volume of selected bonds more quickly. In the past, it has also used switches to concentrate liquidity across the yield curve by consolidating issuances into larger and more liquid maturities. This was done, for example, at times of declining public debt and significantly reduced issuance needs (SNDO, 2017). Switches are performed through auctions, the terms and conditions of which are announced well in advance, – up to four weeks – to give investors time to adjust by a large margin.

and repo swap facility is to help primary dealers fulfil their commitments of quoting two-way prices and to manage market risk (market-making).

In practical terms, the arrangements of the SLF allow primary dealers to borrow *any* bond from the DMO against cash, of *unlimited size*, overnight or tomorrow-next. In the repo swap facility there is a maximum volume that can be transacted.<sup>14</sup> Notably, both facilities come with the option of rolling over the transactions *indefinitely*.<sup>15</sup>

Through their exclusive participation agreement in the DMO's SLF, primary dealers are provided access to bonds outside the regular securities auctions in the primary markets. In exchange, primary dealers have to comply with a set of requirements. For example, they are to quote buy and sell prices in the secondary market. They also need to maintain a market share that is at least 2.5 per cent of the total turnover in the primary market at every auction, and they are expected to submit bids that, at the time of the auction, are reasonable in terms of market pricing in all government securities auctions.<sup>16</sup> Once dealers become primary dealers, they are expected to continue to comply with the DMO's standards and eligibility criteria on an ongoing basis.

An apparent paradox of a SLF is that it is “best used when little used”.<sup>17</sup> The rationale is that the facility is intended to be a last-resort mechanism. Primary dealers are expected to first try to cover their positions by finding securities in the market. A SLF is intended to provide only a safety net: if dealers encounter a delivery problem or need to cover (or create) a position in the market and cannot meet their commitments, the DMO provides for the missing securities via a repo or a repo-swap transaction. In this way, the DMO acts as a “*securities lender of last resort*”.

In general, a SLF is an effective backstop insofar as it supports bond market liquidity without hampering the normal functioning of short-term funding markets. As with any backstop or

---

<sup>14</sup> Repo swaps (T/W) of government securities are transacted in multiples of SEK 500 million and up to SEK 2 billion, per government security and primary dealer. The transaction is cash neutral.

<sup>15</sup> Primary dealers can use the SLF for subsequent transactions of the same bonds until one day prior to maturity.

<sup>16</sup> See [Primary dealers – Riksgälden.se \(riksgalden.se\)](https://www.riksdagen.se/riksdagen/riksdagarnas/utskott/utskottet-for-ekonomiska-fraganer/utskottsrapporter/2016/primary-dealers-riksgalden.se)

<sup>17</sup> It is worth noting that the mere existence of a SLF can affect investors' behaviour by increasing confidence in their understanding that the government bond market is functioning well.

safety net, there is a risk of a SLF being “gamed”. Such a risk, which relates to potential moral hazard behaviour and speculative arbitrage, can damage general investor confidence and the overall functioning of the government bond market.

The terms and conditions attached to a SLF are the key features that ensure the SLF is only used as a safety net. A critical tool is the pricing framework. By setting a lending fee at a premium in relation to short-term funding market interest rates, a DMO can ensure that its SLF is used only as a last resort.<sup>18</sup> The choice of the short-term funding market rate is therefore a key policy choice of the DMO.

The choice of the short-term funding market rate can vary. The Eurosystem central banks have chosen the repo market rate as the reference rate for setting the premium of the SLF. In the repo market, government securities that primary dealers acquired through the SLF enter transactions as collateral.<sup>19</sup> The advantage of choosing the repo market rate as a reference rate (over a fixed fee) is that it allows the SLF premium to vary with market rates thereby reducing the risk of primary dealers extracting rents from non-primary dealers.

Arrata et al. (2020) and Jank et al. (2021) show that the repo market rates declined significantly following the ECB’s QE (APP and PEPP) programmes. A *specialness premium* arose, which made it more expensive for market actors to borrow specific government bonds against cash.<sup>20</sup> This is in line with Schaffner et al. (2019), who show that collateral scarcity from ECB asset purchases boosted activity in specific collateral segments of the European government-bond repo market and reduced it in the general collateral segments. This change is consistent with a shift in the European repo market towards transactions that are more securities-driven and less funding-driven, i.e. the repo market is used to obtain securities rather than cash funding.

Proprietary market data we obtained from market participants indicate that a *specialness premium* arose also in the Swedish repo market following the Riksbank’s QE. The data show

---

<sup>18</sup> See World Bank (2015). Generally, changes in the SLF’s charged premium are rare as to foster the DMO’s predictability and reduce uncertainty for primary dealers and investors.

<sup>19</sup> See [Securities lending under the APP and PEPP | Deutsche Bundesbank](#)

<sup>20</sup> A *specialness premium* arises when borrowing a specific bond in the repo market against cash may come at a cost and require a premium to be paid for it in the form of a lower cash remuneration.

that the prevailing rate in the repo market declined to a significantly lower level than the monetary policy rate. The repo rate for bonds that were in high demand in the QE programme dropped lower than the SLF premium.<sup>21</sup>

In the period covered by this study, January 2002 – November 2021, the SLF premium for the Swedish O/N and T/N repo facilities was set at the monetary policy rate minus 45 and 40 basis points, respectively. For the repo swap facility, this price was 30 basis points below the monetary policy rate since its inception.<sup>22</sup> In January 2020, the terms for the repo swap facility were changed to 20 basis points below the monetary policy rate, and the maximum volume was raised to SEK 4 billion per government security and primary dealer.

In September 2021, the ordinary terms for the repo swap facility were restored to their previous levels of 30 basis points below the monetary policy rate, whereas the maximum volume was allowed to remain at SEK 4 billion up to September 2022.<sup>23</sup>

#### 4.1. Usage of the SLF

Figure 11 shows the volumes of nominal government bonds created in the facility and lent out to the primary dealers from 2002 to 2021.

We observe heightened usage of the SLF in several periods.<sup>24</sup> We identify four main periods, which coincide with the 2007–2009 global financial crisis (GFC), the subsequent European sovereign debt crisis in 2010–2012, the quantitative easing period starting in 2015, and the Covid-19 pandemic period from March 2020 to the end of our sample in November 2021 (see Figure 11).

---

<sup>21</sup> The monetary policy rate is also called the repo rate in Sweden. It is the interest rate at which banks can borrow or deposit funds at the Riksbank for a period of one week.

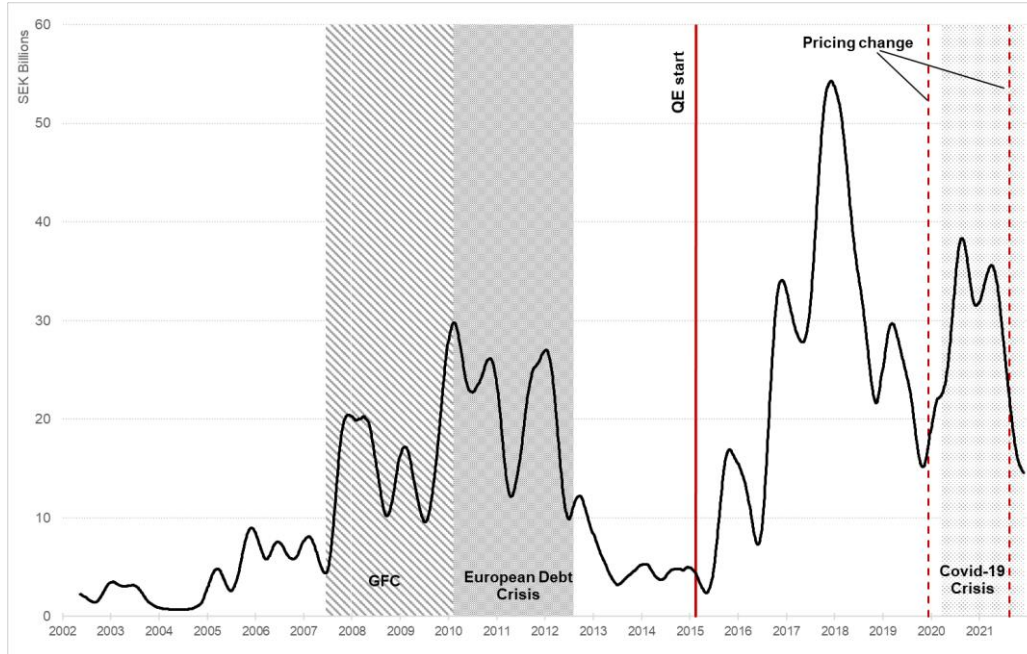
<sup>22</sup> The maximum volume allowed to be transacted was in multiples of SEK 500 million. See footnote 11.

<sup>23</sup> See [Market-supporting repos and switches – Riksgälden.se \(riksgalden.se\)](https://riksgalden.se/riksgalden/se/market-supporting-repos-and-switches).

<sup>24</sup> In this paper, we mainly focus on nominal government bonds because this fits the general purpose and scope of our analysis. We refer to other government debt securities such as T-bills and inflation-linked bonds only for comparison where appropriate.



**Figure 11. Lending volumes in SLF**

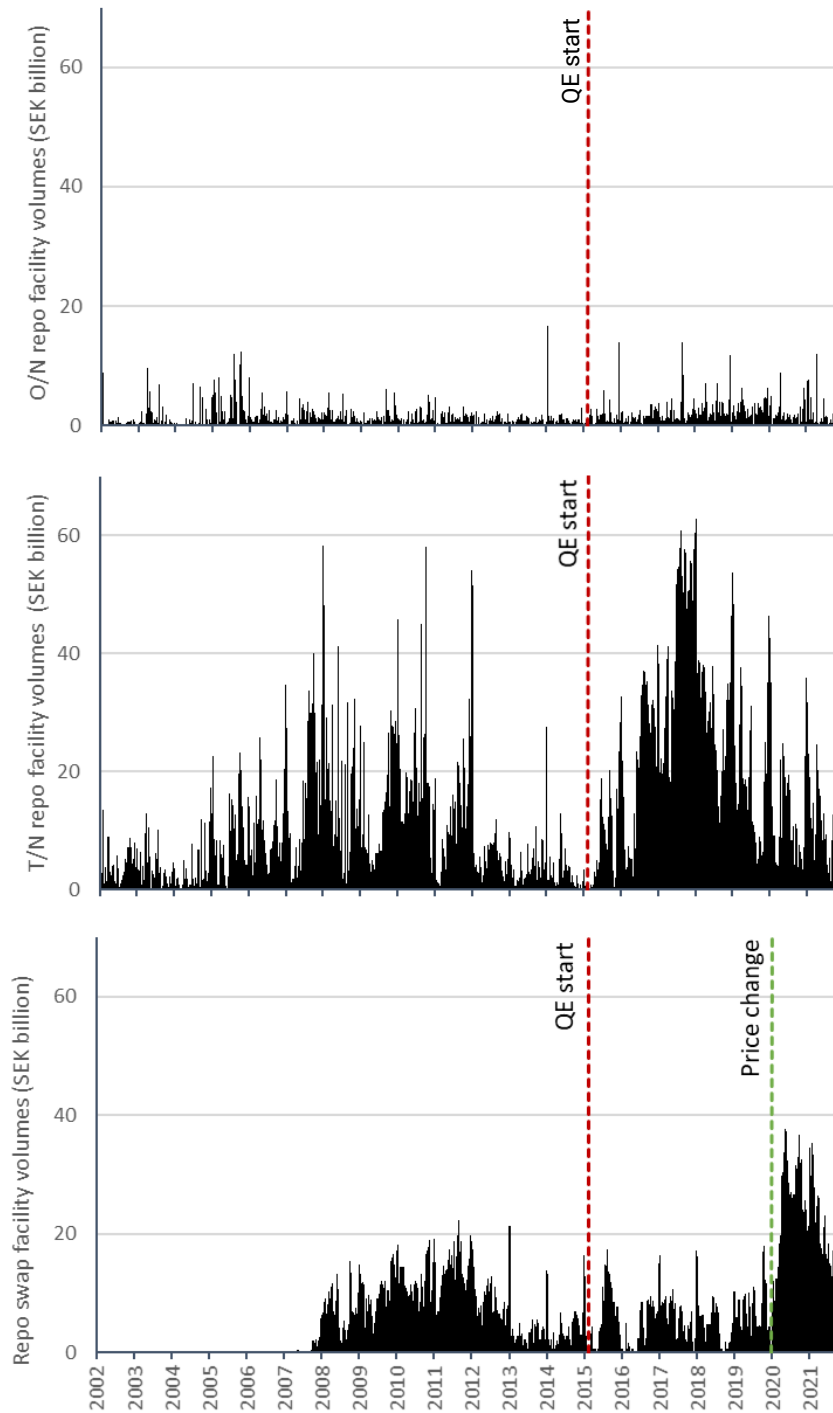


Note: Figure 11 shows a three-month moving average of the daily total volumes of nominal government bonds lent out in the SLF expressed in SEK billion. GFC stands for global financial crisis.

Source: Swedish National Debt Office and authors' calculations.

We separate the volumes by facility type. The usage over time of the SLF significantly differs across types. The T/N repo facility is notably the largest facility with average daily volume of about 10 billion and is significantly larger than the O/N and repo swap facilities combined. Compared with the other types, the O/N facility has the lowest volume at about 0.5 billion on average over the period we analysed (Figure 12).

Figure 12. Volumes lent out in the repo facility by facility type



Note. Figure 12 shows volumes of nominal government bonds lent out in the O/N, T7N and repo swap facility in SEK billion at daily frequency. The vertical lines show the date of the start of the QE programme in February 2015 and the date the Swedish DMO announced the change in the pricing and volume policy for the repo swap facility.

Source. Swedish National Debt Office

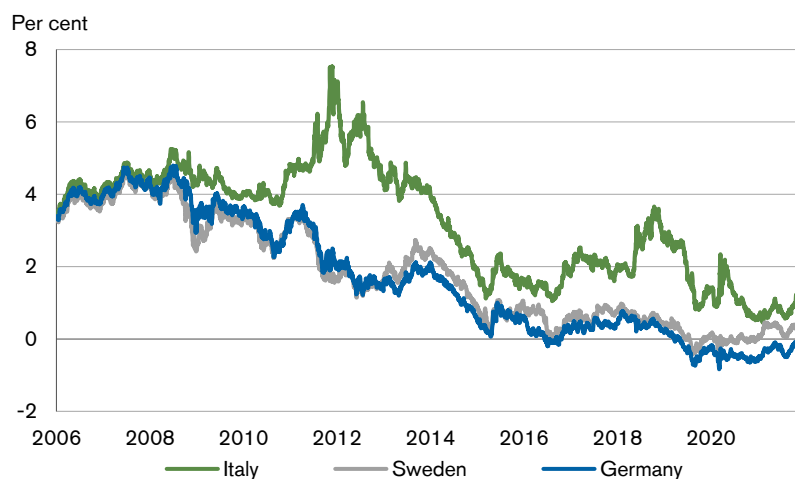
**The global financial crisis and the European sovereign debt crisis**

During the global financial crisis (GFC), the volumes of government bonds lent out in the cash T/N repo facility and the repo swap facility increased significantly – from an average of about 5 SEK billion and 1 SEK billion before the GFC to 10 SEK billion and 8 SEK billion during the crisis, respectively. At the peak of the GFC, the volume transacted in the T/N repo facility increased to about 30 SEK billion. During the GFC and the European sovereign debt crisis, demand for safe and liquid government bonds increased significantly. The importance of flight to liquidity flows in government bond markets has been documented before (see, among many others, ECB (2009)).<sup>25</sup> Swedish government bonds belong to a very small group of ultra-safe (AAA credit rating) European bonds. However, the Swedish government bond market is relatively small compared with other European countries, and while it may be an attractive alternative for investors driven by flight to quality concerns, the intrinsic low liquidity of the government bond market may carry more weight when liquidity is perceived to be especially low.

Figure 13 shows that yields on Swedish government bonds decreased during the European sovereign debt crisis (2010-2012), similar to the German bond yields, possibly indicating some flight to quality flows into the Swedish government bond market. At the same time, we observed a relatively moderate increase in the usage of the SLF, which will be addressed further in the empirical section of this report.

---

<sup>25</sup> De Santis (2013) and Garcia and Gimeno (2014) discuss the prominence of flight to liquidity during the European sovereign debt crisis.

**Figure 13. Government bond yields (10-year) in selected European countries**

Source: Macrobond

**Central bank quantitative easing**

Usage of the SLF has increased significantly since the Riksbank launched its QE programme in 2015. The volumes in the facility reached an all-time high, over 70 SEK billion, during 2017. They declined somewhat after 2017 but have remained at a significantly higher level than the average level from before the QE period. Blix Grimaldi et al. (2021), show that the unusually high usage of the Swedish SLF is related to bond scarcity and demand from the central bank. As the so-called free float – the amount of bonds available to private investors for trading – diminishes, primary dealers resort more to the SLF to avoid fails to deliver and be able to continue to fulfil their market-making commitments. Survey data from the DMO provide supportive evidence of a scarcity-induced usage of the SLF and the key role of the SLF in mitigating a decrease in free float.

In addition, demand from the central bank increases the *specialness premium* of government bonds in the repo market (Arrata et al., 2020). *Specialness premiums* can also be related to the bargaining power that primary dealers, who have access to the SLF, acquire in the money (repo) market as they can remunerate non-primary dealers at a lower rate. Our proprietary data from Swedish market actors provide supportive evidence of the existence of a specialness premium in the Swedish market.

### **The Covid-19 pandemic**

In the previous section, we described how the fiscal response to the Covid-19 crisis led to a larger government borrowing requirement for most OECD countries, but that by the second half of 2020 economic conditions had already improved, although with significant variation from country to country.

In Sweden, by the end of 2021 the DMO's net borrowing was once again back to negative and in line with the trend from before the pandemic. Nevertheless, the increased supply of sovereign debt in 2020 may have contributed to keeping the lending volumes in the T/N and O/N facilities at a relatively low level during the period of the Covid-19 crisis covered in this analysis (up to November 2021).

### **Change in the SLF pricing in early 2020**

Volumes in the repo swap facility increased significantly at the beginning of 2020, before the Covid-19 crisis. In January 2020, the DMO temporarily decreased the premium that primary dealers need to pay to use the repo swap facility, by 10 basis points to 20 basis points below the monetary policy rate, and it increased the maximum volume to SEK 4 billion per security and primary dealer while leaving premiums on the O/N and T/N facilities unchanged.<sup>26</sup> Following the change, in the first two months of 2020 the average volume of securities transacted in the repo swap facility increased to around 8 SEK billion on average, from an average level of about 4 SEK billion recorded in 2015–2019. Volumes fell back to the previous level or even lower by September 2021 when the premium was restored to 30 basis points below the monetary policy rate. In the next section, we show evidence suggesting that the effects of the pricing change in the repo swap facility were not limited to this facility but affected T/N volumes as well. The change in the swap facility's premium may have encouraged primary dealers to switch from the T/N facility to the repo swap facility thereby contributing to lower volumes in the T/N facility.<sup>27</sup>

---

<sup>26</sup> There are no limits on the volumes allowed to be transacted in the repo cash facility.

<sup>27</sup> Another possible contributing factor to the higher usage of the repo swap facility during 2020 is the increased supply of T-bills during that period. T-bills were used as collateral.

## 5. Data and Estimation Procedure

### 5.1. Data

To compute the nominal bond volumes traded in the SLF, we use proprietary daily data provided by the DMO at the security level.<sup>28</sup> For each SLF transaction, we have the trade and settlement dates, the nominal amount, and the ISIN identifier. We aggregate the data to monthly frequency to mitigate noisiness in the daily, transaction-based data and compute the bond-by-bond ratio of the SLF volumes to the outstanding volume of the bond. The outstanding volume of each bond is also provided by the DMO. We also use the DMO data to explore changes in the investors base and investors' holding structure. For each bond, we complement the daily SLF volumes with the Riksbank's purchases retrieved from the Riksbank's webpage and compute its holdings and the ratios of each bond purchase and holdings of the total bonds outstanding.<sup>29</sup> We also retrieve variables from Macrobond such as the bond volatility index IIMA.<sup>30</sup>

Our data consists of a total of 699 monthly observations. We use 14 nominal bonds. We organise the data in a panel. Our panel data is unbalanced because not all bonds are transacted in the SLF on each date. The time period in the panel regression is February 2015 - November 2021.

Table A1 in Appendix shows key descriptive statistics of the main variables we use in our empirical exercises.

### 5.2. Estimation results

We estimate a panel regression with bond fixed effects. The left-hand variable is therefore the volumes of the SLF for each bond in a given month. Our main independent variables

---

<sup>28</sup> See footnote 24.

<sup>29</sup> The Riksbank started purchasing Swedish government bonds as early as 2012 on a small scale. We only include in our analysis the government bonds that were purchased for QE purposes (14 bonds). There were 16 outstanding nominal bonds during the period of February 2015- November 2021. Five months into the QE program the Riksbank made purchases in all outstanding nominal bonds.

<sup>30</sup> The IIMA index is the global market volatility index (bond) produced by the Institute for International Monetary Affairs. Correlation between bond volatility indices IIMA index and MOVE is about 75 per cent.

are the ratio of the Riksbank's purchases and holdings to outstanding amount. To account for the possibility that error terms may be correlated across similar bonds, we adjust the standard error for cross-sectional and serial correlation. Our baseline specification is as follows:

$$SLF_{i,t} = \alpha_i + \beta_1 Holdings_{i,t-1} + \beta_2 Purchases_{i,t} + \beta_3 Issuance_{i,t-1} + \beta_4 Vol_t + \beta_5 RSdummy_t + \epsilon_{i,t} \quad (1)$$

where  $Holdings_{i,t-1}$  denotes the lagged Riksbank's holdings as a share of outstanding volumes,  $Purchases_{i,t}$  are bond purchases by the Riksbank as a share of outstanding,  $Issuance_{i,t-1}$  is the lagged ratio of bond issuance volumes to outstanding amount,  $Vol_t$  denotes macroeconomic variables such as the IIMA index, which captures changing market conditions.<sup>31</sup> We also include a dummy variable,  $RSdummy_t$ , which picks up the temporary change in the repo swap facility premium.<sup>32</sup> The dummy variable takes the value one for the period in which the premium was changed and set to 20 basis points below the monetary policy rate and zero otherwise.<sup>33</sup> Table 1 summarises our main results.<sup>34</sup>

---

<sup>31</sup> We lag the variables in order to reduce potential multicollinearity.

<sup>32</sup> The maximum volume allowed to be transacted also changed to SEK 4 billion per security and primary dealer.

<sup>33</sup> With the exception of the period January–September 2020, the premium in the repo swap facility has been set at 30 basis points below the monetary policy rate.

<sup>34</sup> We use Arellano robust standard error in our main regression which corrects for cross sectional and serial correlation. In robustness checks, we use cross sectional robust standard error. We also use time fixed effects instead of bond fixed effects and two-way fixed effects. We also use alternative regressors for  $Vol_t$ , such as the MOVE Index. We also run alternative specification of equation (1) by adding a new variable  $RSdummy_t * Issuance_{i,t-1}$  to take into account possible interactions between the repo swap facility pricing change and government bond issuance volumes. To account for non-normal residuals due to skewed distribution in the dependent variable, which only takes positive values, we log transform the dependent variable and run the regression in log - levels. We also run the regression as a pooled GLM panel regression. The results of all robustness checks are qualitatively similar to those of our main regression.

**Table 1. Panel regression results**

	(1)	(2)	(3)	(4)
Holdings	0.22*** (0.07)	0.22*** (0.08)	0.22*** (0.08)	0.08** (0.04)
Purchases	10.69*** (4.09)	11.90*** (3.67)	11.88*** (3.68)	10.38** (4.14)
Issuance		-1.84*** (0.66)	-1.85*** (0.66)	-1.63** (0.64)
HIMA Index			0.94 (1.87)	-0.02*** (0.01)
RS dummy				-0.01 (0.01)
Bond FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	No
N. obs	699	699	699	699
R-Sq.	0.13	0.14	0.14	0.08

Note: Total SLF volumes are the dependent variable for each regression in Table 1. Standard errors in parentheses. \*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ .

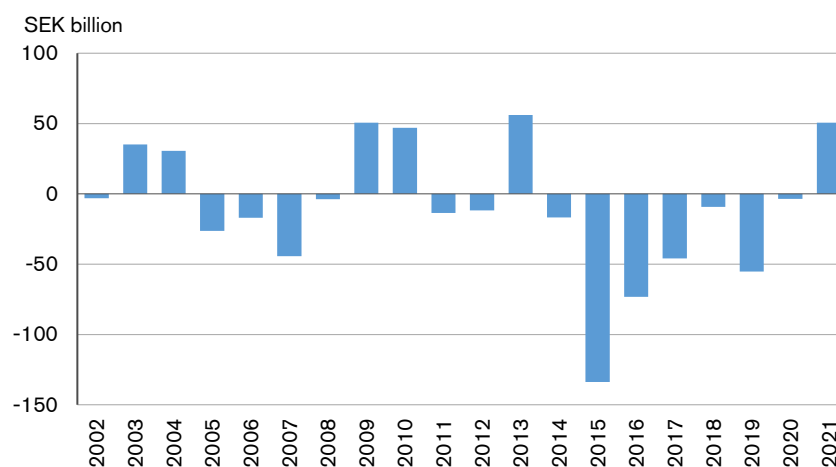
The central bank QE programme significantly affects the total volumes of the SLF, across all specifications.<sup>35</sup> Both purchases and holdings increase the usage of the repo facility. The coefficient of *Purchases* is greater than the one of *Holdings* suggesting that the Riksbank's demand has a large effect on the bonds transacted in the SLF. Blix Grimaldi et al. (2021) discuss the differential impact of central bank purchases and holdings on government bond liquidity. They find that although the effect of purchases is larger than that of holdings, the economic significance of holdings tends to be greater, as purchases are one-off events while holdings continually grow with new purchases. A similar rationale may also be applied to the usage of the SLF and the fact that the impact of one-off purchases tends to be smaller than that of holdings (i.e. accumulated purchases that can cause scarcity) over time. As expected, we find that an increase in issuance lowers the usage of the repo facility.

<sup>35</sup> In Appendix II we show alternative specifications of our baseline estimation and robustness checks.



An alternative way of assessing the impact of purchases is by visualising the market's net supply, i.e. net issuance volumes of purchases. Net supply of nominal government bonds turned significantly negative in 2015 and remained negative until 2020. In 2021, net supply turned positive with the supply increase from fiscal stimulus in response to the pandemic (Figure 14).

**Figure 14. Net supply of nominal government bonds**



Note: Net supply of nominal government bonds is defined as the difference between the annual change in nominal government bonds outstanding and the annual change in the Riksbank's holdings of the nominal government bonds.

Source: Sveriges Riksbank, Swedish National Debt Office and authors' calculations.

The impact of deteriorating economic conditions on the usage of the SLF is a priori ambiguous, depending on whether flight to quality or flight to liquidity concerns tend to dominate.<sup>36</sup> We found that an increase in the IIMA index, i.e. deteriorating financial conditions and heightened financial stress, is associated with a decline in the usage of the SLF, thereby offering some support to the prevalence of flight to liquidity flows. It is reasonable that flight to liquidity concerns have tended to dominate after the start of the QE and ensuing bond scarcity. Figure 8 in Section 3 shows the changes in foreign investors' share of Swedish government bonds. The share of foreign investors, an indicator for liquidity problems, which can be interpreted as measure of flight to liquidity, declined noticeably after

<sup>36</sup> Flight to quality concerns may create additional demand for Swedish government bonds that may in part be absorbed through the increased supply via the SLF, even if on a temporary basis.

2015, when QE was launched, and has remained at a low level since. Altogether, flight to quality and flight to liquidity work as opposing forces in the Swedish government bond market. We find that heightened financial stress is associated with a decline in SLF usage, lending support to the prevalence of flight to liquidity flows.

Finally, we included the change in pricing for the repo swap facility and found that it is not statistically significant for the overall volumes in the SLF.

Table 2 shows estimation results as in Table 1 but for the different types of the SLF. Column 1 shows the results for the overall volumes in the SLF as in column (4) of Table 1 to facilitate comparison. Columns (2)-(4) show the results for the repo T/N, O/N, and repo swap facilities, respectively. There are three key results.

First, the QE appears to affect all types of the SLF, albeit to differing degrees. The QE impact is significantly lower for the O/N repo facility. This is not surprising, given that the purpose of the O/N facility is to help primary dealers avoiding fails to deliver, which occur when a trade fails to settle on schedule. In general, settlement fails are not treated as a default event by market participants but more as operational friction. Therefore, while imbalances in supply and demand such as those potentially associated with QE programmes can create more and/or larger fails to deliver, their frequency and/or size remains relatively low. Figure 12 shows the daily volumes traded in the O/N facility. Clearly, while volumes have increased since 2015, the overall volumes remain comparatively low at about 3 per cent of the total volumes transacted in the SLF.

The T/N and the repo swap facilities, which account for about 55 and 42 per cent of the total volumes respectively, absorb most of the impact of the QE. The main common purpose of both types of facility is to contribute to smooth market functioning and support market liquidity in the government bond market. It is therefore reasonable that both facilities are used more when demand increases, all other things being equal. As we noted before, the usage of the T/N facility increased significantly during 2015-2017 and peaked in the end of 2017 (see Figure 12). We will discuss this further below.

The results in Table 2 also show the differential impact of the change in the premium of the repo swap facility. Column (4) shows that – as expected – the pricing change affected the

volumes transacted in the repo swap facility positively. The impact of the change in the repo swap facility was not confined to this facility. In fact, the results in columns (2) and (3) show that both the volumes in the O/N and, especially, the T/N facility were affected. This suggests a substitution effect rather than an overall enhanced liquidity effect, which could have been expected by the change of the pricing policy. This can also explain why the coefficient on the RS dummy is not significant in column (1). More analysis needs to be done to further corroborate these findings.

---

**Table 2. Panel regression results**

	Total (1)	T/N (2)	O/N (3)	Swap (4)
Holdings	0.08** (0.04)	0.04* (0.02)	0.004* (0.002)	0.02 (0.02)
Purchases	10.38** (4.14)	6.06* (3.30)	0.68* (0.41)	4.10** (1.87)
Issuance	-1.63** (0.64)	-1.04* (0.55)	0.05 (0.07)	0.24 (0.62)
IIMA index	-0.02*** (0.01)	-0.03*** (0.01)	-0.00 (0.00)	0.01 (0.01)
RS dummy	-0.01 (0.01)	-0.03*** (0.01)	-0.002*** (0.001)	0.02** (0.01)
Bond FE	Yes	Yes	Yes	Yes
Time FE	No	No	No	No
N. obs	699	674	656	382
R-Sq.	0.08	0.13	0.03	0.14

Note: Volumes by total and type of SLF are the dependent variable for each regression in Table 2. Standard errors in parenthesis. \* p<0.1; \*\*p<0.05; \*\*\*p<0.01.

---

## Riksbank's demand affects usage of the SLF

The above results show that usage of the SLF increased with the implementation of the QE programme. Government bond scarcity was a driving force, which the SLF, at least partly, helped mitigate through additional on-demand issuance.

By the end of 2017, the Riksbank's nominal bond holdings had reached about 40 per cent of the nominal bonds outstanding. In the following years, as we have shown in previous sections, government bond scarcity continued to increase. In early 2020, before the start of the Covid-19 pandemic, the Riksbank's holdings of nominal bonds had reached 50 per cent of total nominal bonds outstanding.

Yet by 2017, despite the continuing increase in the Riksbank's holding ratio (*scarcity*), usage of the SLF peaked, although it fell to a higher level than that observed in the period before QE, as we pointed out in section 4.1. This may seem puzzling.

We argue that the apparent contradiction of increasing scarcity and significantly decreased usage of the SLF is likely related to the *demand effect* induced by outright purchases and the impact of the Riksbank's communication about its QE programme.

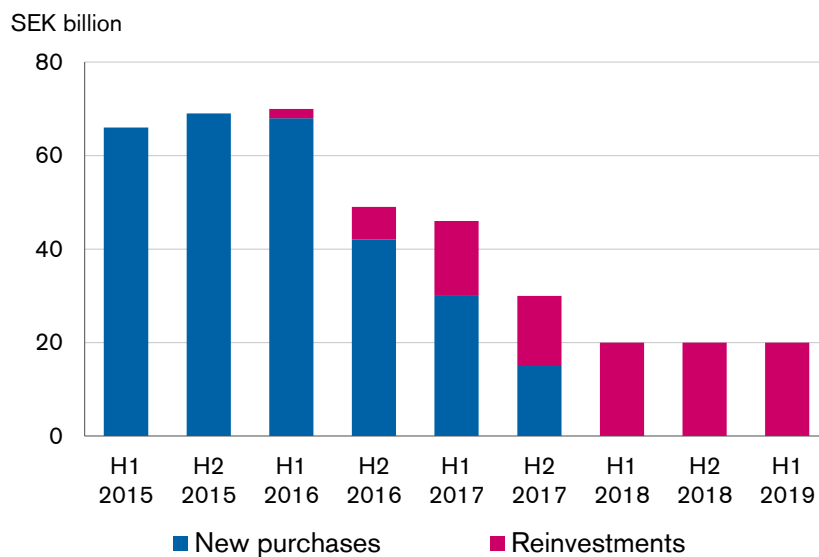
In December 2017, the Riksbank announced that it would reinvest redemptions and coupons payments (until the monetary policy rate had reached an appropriate level) but would not make *new* purchases. The change was communicated as part of the Riksbank's strategy for a gradual normalisation of monetary policy (Riksbank, 2017).<sup>37</sup>

From a market participant's perspective, this implied that trading opportunities with the central bank would significantly diminish (see Figure 15). Starting in December 2017, following the announcement of the change in the demand from the Riksbank, primary dealers significantly reduced usage of the SLF.

The announcement of the change in policy provides a distinct way of separating the demand from scarcity-induced usage of the SLF. We plan to publish a detailed analysis on this in future research.

---

<sup>37</sup> See Press Release at [Monetary policy report, December 2017 | Sveriges Riksbank](#)

**Figure 15. Riksbank's purchases and reinvestments**

Source: Sveriges Riksbank and authors' calculations

## Conclusions

In this paper, using a novel approach based on proprietary information of the Swedish DMO securities lending facility from 2002 to 2021, we investigate key changes in the government bond market. We focus on the usage of the SLF and primary dealers' demand.

Governments and central banks around the world were successful in implementing rapid and powerful policy responses, and they managed to mitigate the effects of the shock to financial markets and the economic contraction that resulted from the Covid-19 crisis. In Sweden, the Covid-19 crisis had only temporary effects on the Swedish economic output and the government bond market.

We can observe heightened usage of the SLF in several periods. We identify four main periods coinciding with the 2007–2009 global financial crisis (GFC), the subsequent European sovereign debt crisis in 2010–2012, the quantitative easing period starting in 2015, and the Covid-19 pandemic period from March 2020 to the end of our sample (November 2021).

We find that QE policies have had a significant influence on the usage of the facility, leading to potential persistent changes in market structure. We find that the central bank QE programme significantly affected the total volumes of the SLF across all specifications.

Our results show that flight to quality and flight to liquidity were opposing forces in the Swedish government bond market. We find that deteriorating financial conditions and heightened financial stress is associated with a decline in the usage of the SLF, thereby giving some support to the prevalence of flight to liquidity flows.

Finally, we show that the terms and conditions attached to a SLF are a powerful DMO policy tool and that changes can bring about significant shifts in the usage of the SLF. We show that a temporary pricing change in the repo swap facility did not affect total lending volumes in the SLF. The increase in the volumes transacted in the repo swap facility appear to have been offset by lower volumes in the cash facilities. While more analysis needs to be done to fully understand such a change, this finding suggests a substitution effect rather than an enhanced liquidity effect of the DMO's pricing change.

## References

Arrata, W., Nguyen, B., Rahmouni-Rousseau, I., Vari, M. (2020), “The scarcity effect of QE on repo rates: Evidence from the euro area”, *Journal of Financial Economics*, Vol. 137, Issue 3, 2020, Pages 837-856.

Baker, N., Miller, M. and Rankin, E. (2021), “Government bond markets in advanced economies during the pandemic”, *Reserve Bank of Australia Bulletin*, September 2021.

BIS (2020), *Annual Economic Report*, June 2020.

Blix Grimaldi, M., Crosta, A., Zhang, D. (2021), “The Liquidity of the Government Bond Market – What Impact Does Quantitative Easing Have? Evidence from Sweden”, *Sveriges Riksbank working paper series* No 402, 2021.

Blommestein, H.J., Elmadag, M.E. and Wellendorph Ejsing, J. (2012), “Buyback and exchange operations: policies, procedures and practices among OECD public debt managers”, *OECD Working Papers on Sovereign Borrowing and Public Debt Management*, No 5, OECD Publishing.

Blommestein, H.J. (2017), “Impact of regulatory changes on government bond market liquidity”, *Journal of Financial Regulation and Compliance*, June 2017.

Crosta, A., Zhang, D. (2020), “New liquidity indicators for the fixed-income market”, *FI Analysis*, No 21, Swedish Financial Stability.

De Santis, R. (2013) “The Euro Area Sovereign Debt Crisis: Identifying Flight-to-Liquidity and the Spillover Mechanisms”, *Journal of Empirical Finance*.

European Central Bank (2009), “New evidence on credit and liquidity premia in selected euro area sovereign yields”, *ECB Monthly Bulletin* September 2009. García, J.A., Gimeno, R. (2014), “Flight to liquidity flows in the euro area sovereign debt crisis”, *Bank of Spain working paper*, No 1429.

FSB (2020), “Holistic Review of the March Market Turmoil”, *Report to the G20*, Financial Stability Board, November 2020.

ISDA (2020), “Interest rate swaps: cleared and customized”, July 2020.

Jank, S., Moench, E., Schneider, M. (2021), “Safe asset shortage and collateral reuse”, *Deutsche Bundesbank Discussion Paper*, No 39/2021.

Nakamura, H. (2017), “Evolving monetary policy - the Bank of Japan's experience”, speech delivered at the Central Banking Seminar, hosted by the Federal Reserve Bank of New York, New York City, 18 October 2017.

OECD (2021a), “Covid-19 government financing support programmes for businesses: 2021 update”, OECD Paris.

OECD (2021b), *Sovereign Borrowing Outlook for OECD countries*, 2021.

Pelizzon, L., Subrahmanyam M. G., Tobe R. and Uno J. (2018), “Scarcity and spotlight effects on liquidity: quantitative easing in Japan”, <https://ssrn.com/abstract=3107603> or <http://dx.doi.org/10.2139/ssrn.3107603> .

Schaffner, P., Ranaldo, A. and Tsatsaronis, K. (2019), “Euro repo market functioning: collateral is king”, *BIS Quarterly Review*, December 2019

Sveriges Riksbank (2017), “The Riksbank’s strategy for a gradual normalisation of monetary policy”, article in *Monetary Policy Report*, December 2017.

Swedish National Debt Office (2017), *Central Government Borrowing Report*, SNDO 2017:3.

Swedish National Debt Office (2020), *Central Government Borrowing Report*, SNDO 2020:1.

World Bank Group (2015), “Securities lending and related standing facilities: background note”, World Bank, Washington, DC.



## Appendix Descriptive statistics of key variables

**Table A1. Summary statistics of key variables**

Variable	mean	min	max	median
Nom. outstanding volume (SEK billion)	57.38	0.00	108.10	53.37
Total SLF volume (SEK billion)	0.48	0.00	9.01	0.54
ON SLF volume (SEK billion)	0.20	0.00	2.57	0.11
TN SLF volume (SEK billion)	0.46	0.00	9.00	0.54
RS SLF volume (SEK billion)	0.60	0.00	2.58	0.55
Riksbank's purchases (SEK billion)	0.03	0.00	3.50	0.00
Riksbank's holdings (SEK billion)	27.10	0.50	66.21	27.10

Source: SNDO, Sveriges Riksbank and authors' calculations.

Standard errors in parenthesis. \*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ .

Note: Summary statistics are based on nominal government bonds included in the Riksbank's QE program.



Visit: Olof Palmes gata 17 | Postal: SE-103 74 Stockholm, Sweden | Phone: +46 8 613 45 00

E-mail: [riksgalden@riksgalden.se](mailto:riksgalden@riksgalden.se) | Web: [riksgalden.se](http://riksgalden.se)