

Debt Office Commentary

The choice of auction format is influenced by market dynamics

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An important matter for the Swedish National Debt Office and other government debt management offices is the choice of auction format for issuing government securities. The two predominant procedures from which to choose are the multiple-price auction and the single-price auction. This Debt Office Commentary describes how both theory and empirical studies indicate that the auction format should be chosen on the basis of how well the pricing works. For a market exhibiting low liquidity and significant pricing uncertainty, single-price auctions are preferable. This is because they reduce uncertainty for the bidder and can thereby increase the incentive to participate. An example of such a market is the Swedish market for inflation-linked bonds, which suggests that it would be more cost-effective to issue inflation-linked bonds through single-price auctions instead of multiple-price auctions.

The Debt Office currently uses closed multiple-price auctions for all types of government securities: nominal government bonds, inflation-linked bonds, and treasury bills. This means that bidders receive an allotment based on their own bid rate in the auction.¹ If several bids are placed at levels below the highest accepted yield, the allotment is based on the bid rates. The bid with the lowest yield is accepted first, followed by the bid with the next-lowest yield and so forth until the desired volume is reached. The bidders thereby purchase the government security at different yields in the auction. With closed bidding, primary dealers see only their own bids.

¹ Investors place their auction bids via the Debt Office's primary dealers.

The other procedure – single-price auctions – is commonly used by debt management offices in other countries, such as the US, Canada, and New Zealand. For this type of auction, the government security is allotted by the highest accepted yield, even if one or several bidders have placed bids at lower rates. This means that all bidders receiving an allotment purchase the government security at the same yield.

The aim of this Debt Office Commentary is to review the two auction formats, comparing their advantages and disadvantages. The reason for limiting the focus to these two auction formats is that several debt management offices in other countries have recently switched from multiple-price auctions to single-price auctions.

The Debt Office's choice of auction format has been discussed on a number of occasions over the years. In SOU 1997:66 Statsskuldspolitik ("Central government debt management policy"), it was proposed that the choice of auction format be evaluated through testing different procedures.² Several years later, the possibility of switching auction format was discussed in *Central Government Borrowing – Forecast and Analysis 2002:1*. That discussion focused on a potential transition from multiple-price to single-price auctions for inflation-linked bonds. Finally, a broad review of different auction formats was conducted and presented in *Central Government Borrowing – Forecast and Analysis 2007:2*.³

The previous evaluations did not result in a change of auction procedure. One argument presented for retaining multiple-price auctions was that the market for inflation-linked bonds functioned well. Today's situation is different though, in that primary dealers and investors have rated liquidity as unsatisfactory in recent years.⁴ Another aspect is that the planned reduction of the stock of inflation-linked bonds in accordance with the Government's debt management guidelines for 2025–2027 may increase the liquidity premium and lead to greater pricing uncertainty in auctions.

Both auction formats are common in other countries

Data for OECD countries from 2023 show that both multiple-price and single-price auctions are commonly used when issuing government securities.⁵ As shown in table 1, a number of countries use both auction formats, with multiple-price auctions for nominal bonds and single-price auctions for inflation-linked bonds – such as the UK, Japan, Canada, and New Zealand.⁶

² See page 123 (in Swedish) ff. <https://lagen.nu/sou/1997:66>

³ See page 11 (in Swedish) https://www.riksgalden.se/globalassets/dokument_sve/press-och-publicerat/rapporter/statsupplaning/2007/statsupplaningsrapport-2007-2.pdf

⁴ See *Central Government Debt Management – Basis for Evaluation 2023*.

⁵ OECD Sovereign Borrowing Outlook 2023.

⁶ In 2022, Canada's debt management office announced that it was terminating its funding program in inflation-linked bonds.

In recent years, several countries have transitioned from multiple-price auctions to single-price auctions. One example is New Zealand’s debt management office, which recently switched auction format for its inflation-linked bonds. The main argument behind the transition is that the inflation-linked bond market has low liquidity and significant pricing uncertainty. In such conditions, single-price auctions are considered more advantageous for both issuer and investor.⁷

Table 1. Overview of auction formats in selected OECD countries

Country	Multiple-price auction	Single-price auction
Australia	X	
Denmark		X
Finland		X
France	X	
Italy	X	X
Japan*	X	X
Canada*	X	X
Mexico	X	X
Netherlands		X
Norway		X
New Zealand*	X	X
Switzerland		X
UK	X	X
Germany	X	
US		X

Note: *Single-price auction only for inflation-linked bonds.

Source: OECD Sovereign Borrowing Outlook 2023

Factors affecting choice between multiple-price and single-price auctions

An important factor addressed in the academic literature on the choice of auction format is what is called *winner’s curse*. This is the risk of a bidder in a multiple-price auction placing a bid that significantly deviates from other bids placed and from the price in the secondary market.⁸ If the yield on a winning bid is significantly lower, it implies a loss for the bidder. This uncertainty may make bidders less inclined to participate in auctions or cause them to increase their bid rates in order to manage the risk. Single-price auctions reduce the risk of *winner’s curse* and may thus provide greater incentive for bidders to both participate and place bids that better reflect their valuation of the bonds.

⁷ [New Zealand Debt Management Insights - Supporting the New Zealand Inflation Indexed Bond Market - 19 May 2022 \(treasury.govt.nz\)](#)

⁸ See Malvey and Archibald (1998) for an overview.

Even if single-price auctions reduce the risk of *winner's curse*, there are factors suggesting that, for the issuer, this auction format is not necessarily preferable to multiple-price auctions. First, single-price auctions only offer a cost advantage if participation is so high and bid rates so low that the yield for the highest accepted bid is lower than the average yield that would be obtained in a multiple-price auction. Second, single-price auctions may provide an incentive for bidders to try to affect the equilibrium interest rate in the auction. The highest accepted yield can be affected by strategically spreading out bids. This could potentially become problematic when auctions are held regularly, thereby enabling bidders to adapt and coordinate their strategies over time.

A factor that reduces the risk of bidders being able to affect the closing price is if the issuer – as is the case with the Debt Office – has the possibility of rejecting bids that are considered to deviate more than what is justified market-wise and may therefore affect the highest accepted yield. Another factor that counteracts bidders adapting their strategies is that increased incentive to participate in single-price auctions vis-à-vis multiple-price auctions is expected to lead to greater competition and thereby reduce the risk of coordination.

Altogether, an overview of the theoretical literature indicates that it is not evident which auction format is preferable.⁹ The optimal choice is affected by market conditions. To compare the advantages and disadvantages in more detail, we will next discuss the empirical evaluations that have been conducted.

Empirical studies offer some guidance

A number of empirical evaluations have been conducted on multiple-price and single-price auctions for the US government securities market. The background is that in 1992 the US Treasury began a transition from multiple-price auctions to single-price auctions. This transition took place over several years and resulted in all US Treasury marketable securities being issued via single-price auctions as of 1998. The change was made in order to attract more investors, which was expected to lead to lower funding costs.¹⁰

In connection with the transition, the US Treasury conducted two empirical studies to evaluate how the different auction formats affected the cost of borrowing.¹¹ The outcome variable studied was the difference between the issue yield and the yield observed for the same bond in the secondary market. The results showed that multiple-price auctions are associated with an issue yield that significantly exceeds the yield in the secondary market. On the other hand, single-price auctions did not demonstrate any significant difference between the issue yield and the market rate. These results indicate that single-price auctions are thought to provide a

⁹ Ausubel and Cramton (2002).

¹⁰ This was motivated on the basis of research by Carson (1959), Friedman (1960, 1963) and Smith (1966).

¹¹ Malvey, Archibald and Flynn (1995) as well as Malvey and Archibald (1998).

lower issue yield and thereby contribute to lower borrowing cost. Nevertheless, a direct comparison between the two auction formats showed no significant difference, thus ruling out a conclusion that they differ in regard to borrowing cost.¹²

In addition to studies based on US data, empirical studies have been conducted for other countries. A newly completed study by Noël and Wu (2022) examines issuance data on Icelandic government bonds. The authors make the case that their results indicate that there is a cost advantage from a transition to single-price auctions. However, studies for other countries show varying results, so it is not evident which of the two auction formats is most advantageous.¹³

For Swedish data, a study has been conducted by Nyborg, Rydqvist, and Sundaresan (2002). The study analyses auction data for Swedish nominal government bonds and treasury bills during the period from 1990 to 1994. One of the main results presented is that *winner's curse* is an important factor affecting bidders in auctions. Even though the analysis focused on nominal government bonds and treasury bills, it is likely that *winner's curse* affects inflation-linked bonds as well.

Altogether, the empirical studies are not unequivocal as to which of the two auction formats is most cost-effective for the issuer. If anything, single-price auctions potentially have the advantage when pricing is uncertain. As far as Sweden is concerned, this benefit is likely greater when issuing inflation-linked bonds than with nominal government bonds. For inflation-linked bonds, single-price auctions may help reduce the risk for bidders and thereby provide greater incentive for higher participation and lower bid rates.

Swedish market conditions

So, what are conditions like in the Swedish government securities market regarding the choice of auction format? As a whole, the arguments presented below show that the market for inflation-linked bonds is functioning much worse than the market for nominal government bonds. The former is characterised by low liquidity and significant uncertainty in terms of pricing. Moreover, market conditions may deteriorate further if the outstanding stock of inflation-linked bonds decreases in accordance with the Government's debt management guidelines for 2025–2027.

Liquidity has decreased in secondary market

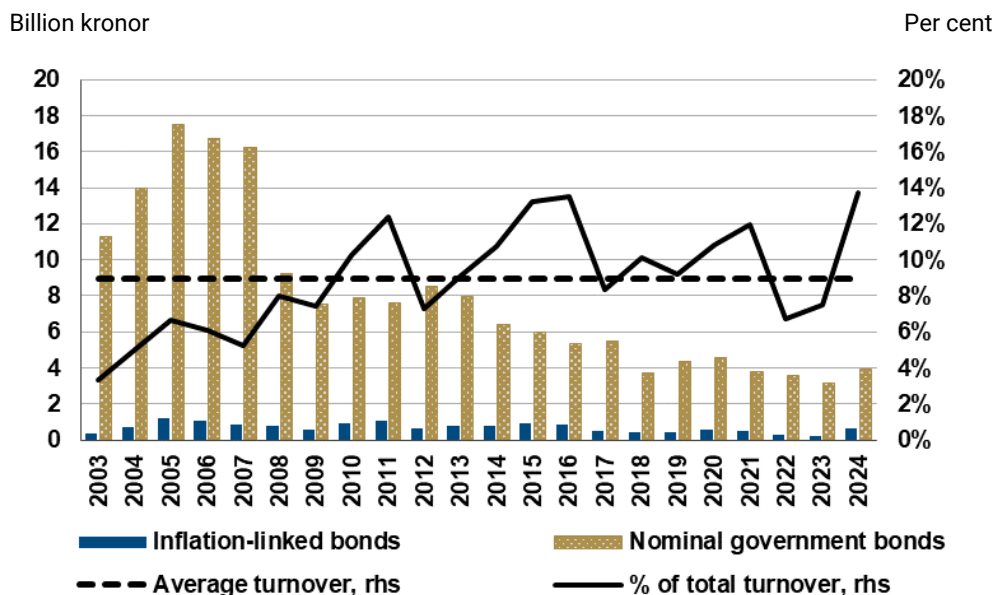
Figure 1 shows the average daily turnover for inflation-linked and nominal government bonds as of 2003. The turnover in the secondary market for Swedish government securities has shown a marked decline since the financial crisis. The figure also shows the turnover of inflation-linked bonds as a proportion of total turnover (right-hand scale), which has been 8.9 per cent on average during the period. The low turnover indicates that market liquidity has deteriorated for

¹² A follow-up study by Goldreich (2007) documented that the transition from multiple-price to single-price auctions led to significantly lower borrowing cost for the US Treasury.

¹³ See Noël and Wu (2022) for an overview of the current empirical studies.

inflation-linked bonds in particular. The deterioration in liquidity is also confirmed by the Debt Office’s annual survey in which market participants rated liquidity as unsatisfactory in recent years¹⁴. Market conditions have thus changed significantly since the review of auction formats presented in *Central Government Borrowing – Forecast and Analysis 2007:2*.

Figure 1. Average daily turnover of Swedish government securities



Note: Daily turnover is calculated as the average with regard to all bonds outstanding. The solid line corresponds to the turnover of inflation-linked bonds as a proportion of total turnover. Source: The Debt Office.

Descriptive analysis of Swedish multiple-price auctions

To further study the Swedish primary market – the Debt Office’s auctions – we referred to previous studies of the US government securities market in structuring our evaluation.¹⁵ More specifically, in evaluating US Treasury auctions, the difference between the issue yield and the market offer rate is used. This, in other words, is the difference between the yield at which the US Treasury issues and the yield at which the bond is sold at auction in the secondary market. A positive difference indicates that the bond is issued at a yield that exceeds the market interest rate.

For Swedish auctions, the Debt Office saves data on market bid- and offer rates at the time of each auction.¹⁶ Table 2 shows that the difference between the average auction yield and the market offer rate amounted to 2.76 basis points for inflation-linked bonds and 1.08 basis points for nominal bonds during the period from 2009

¹⁴ See the report *Central Government Debt Management – Basis for Evaluation 2023*.

¹⁵ See Malvey, Archibald and Flynn (1995) as well as Malvey and Archibald (1998).

¹⁶ The data material contains a few extreme observations. To manage these observations, the variables shown are truncated with respect to the 1st and 99th percentiles.

to 2024. In the last two years, the difference was significantly higher: 7.10 basis points for inflation-linked bonds and 1.27 basis points for nominal bonds.

Table 2. Interest rate differential for Swedish government securities

Basis points

Period	Inflation-linked bonds	Nominal government bonds
2009–2024	2.76	1.08
2021–2024	7.10	1.27

Note: Interest rate differential is the difference between the average auction yield and the market offer rate at the time of auction. The statistics are mean values.

Source: The Debt Office.

Table 3 shows the yield spread as the difference between the highest and lowest yield for all bids in the auction. The yield spread is notably higher for inflation-linked bonds than for nominal bonds. For the entire period, the yield spread was 8.64 basis points for inflation-linked bonds and 3.66 basis points for nominal bonds. The shorter period shows a yield spread corresponding to 15.42 and 5.37, respectively.

Table 3. Yield spread for inflation-linked and nominal government bonds

Basis points

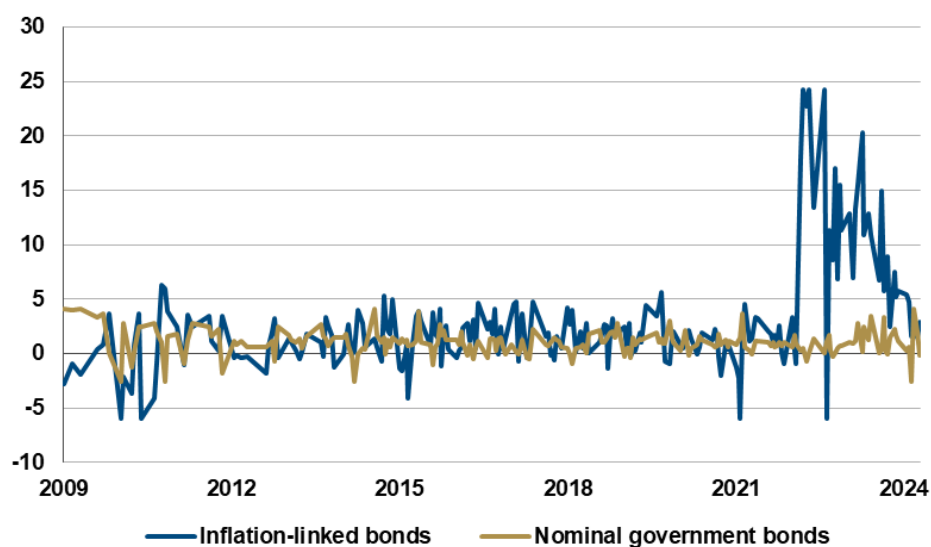
Period	Inflation-linked bonds	Nominal government bonds
2009–2024	8.64	3.66
2021–2024	15.42	5.37

Note: Yield spread is the difference between the highest and lowest yield per auction. The statistics are mean values.

Source: The Debt Office.

Figure 2. Interest rate differential between issue yield and market rate

Basis points



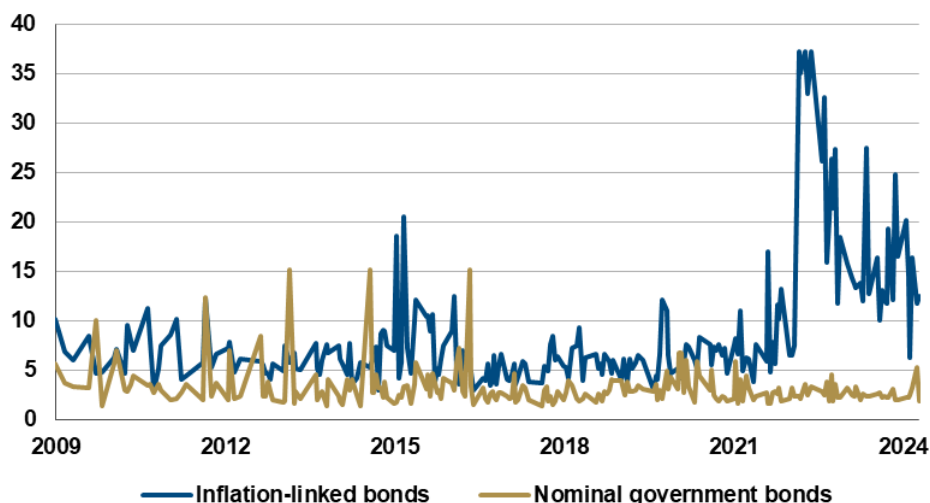
Note: Interest rate differential is the difference between the average auction yield and the market offer rate at the time of auction.

Source: The Debt Office.

Figures 2 and 3 show the development over time of the difference between the issue yield and the market interest rate (interest rate differential) and of the yield spread, respectively. Consistent with the results in the tables, the figures show that the interest rate differential and yield spread for inflation-linked bonds increased in recent years. The yield spread has also increased for nominal bonds in recent years, although not to the same extent as for inflation-linked bonds (see figure 3).

Figure 3. Yield spread for inflation-linked and nominal government bonds

Basis points



Note: Yield spread is the difference between the highest and lowest yield per auction.

Source: The Debt Office.

Overall, the statistics indicate that liquidity has decreased and uncertainty regarding pricing has increased. This is reflected in an increased difference between the issue yield and the market rate as well as a greater yield spread in the auctions. The increased uncertainty is more prominent for inflation-linked bonds than for nominal government bonds.

Conclusions

From an international perspective, primarily two standpoints have been presented by the countries that have gone from multiple-price auctions to single-price auctions. The first is that single-price auctions contribute to increased participation and lower bid rates. Increased demand and more favourable bids help reduce the cost of borrowing when issuing government securities. This is a general rationale and has formed the basis for the US Treasury's implementation of single-price auctions for all debt types.

The other standpoint is based on the first but emphasises that the advantages of a transition to single-price auctions are greatest for markets with poor liquidity and uncertain pricing. This argument has been put forth by, among others, the debt management office in New Zealand as part of its decision to switch to single-price auctions for issuing inflation-linked bonds.

The Swedish inflation-linked bond market is characterised by low liquidity and uncertain pricing, which could deteriorate further when the stock of inflation-linked bonds decreases in periods ahead. This report shows that a transition from multiple-price auctions to single-price auctions may help reduce the impact of elevated uncertainty on borrowing cost. Such a change could thereby contribute to more cost-effective inflation-linked bond borrowing.

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The Swedish National Debt Office is the central government financial manager and the national resolution and deposit insurance authority. The Debt Office thus plays an important role in the Swedish economy as well as in the financial market.



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