

Debt Office Commentary

Assessing the switch to single-price auctions for inflation-linked bonds*

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Since the beginning of 2025, the Debt Office has used single-price auctions instead of multiple-price auctions for issuing inflation-linked bonds. During this same period, the Riksbank has continued to sell off their holdings of inflation-linked bonds through multiple-price auctions. This setting has provided a unique opportunity to evaluate the change in auction format. The results we present herein indicate that the change in auction format has contributed to a lower issue yield for inflation-linked bonds, which has been driven by lower bid rates in the auctions. This is consistent with bidders in single-price auctions being less exposed to the risk associated with placing bids that deviate significantly from other bids (winner's curse).

In the report *Central Government Borrowing – Forecast and Analysis 2024:3*, the Debt Office announced a transition from multiple-price to single-price auctions for inflation-linked bonds as of 2025. The analysis that formed the basis for the decision was presented in *Debt Office Commentary No. 4 2024*. The change was made because the inflation-linked bond market is illiquid with uncertain pricing. With such market conditions, single-price auctions are expected to lead to higher participation and bids that better reflect the bidders' valuation of the bonds. This implied that changing the auction procedure would lead to better auction

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outcomes for inflation-linked bonds. In this Commentary, we evaluate whether the change has actually affected auction outcomes.

A general challenge in measuring how the change in auction format affects auction outcomes is that it is not possible to observe what the outcomes would have been had the change not been implemented. One way of addressing this would be by comparing with the outcome during the transitional period for nominal government bonds. There are, however, other factors that have probably affected developments for inflation-linked bonds during the transitional period; for example, the supply of inflation-linked bonds was reduced as of January 2025. A difference in developments between the debt categories could thus be explained by both the change in auction format and the reduced supply.

To perform an empirical evaluation of the effect of the change in auction format, we instead chose to compare the Debt Office's auction outcomes with the outcomes of the Riksbank's inflation-linked bond sales. In its endeavour to reduce its government-bond holdings, the Riksbank sells inflation-linked bonds through regularly held auctions and uses a multiple-price format.¹ This has enabled the outcomes of the Debt Office's single-price auctions during the transitional period to be compared with the those of multiple-price auctions for equivalent bonds.

As a whole, the evaluation shows that the issue yields for the Debt Office and the Riksbank coincided during the period before the change in auction format. After the change, however, the issue yield tends to be lower for the Debt Office, which indicates that the change in auction format has led to a lower issue yield. The result is driven by single-price auctions having contributed to significantly lower bid rates. This is consistent with the fact that single-price auctions reduce the risk of the *winner's curse* phenomenon, leading to bids that better reflect bidders' valuation.

Evaluation period includes auction outcomes before and after change

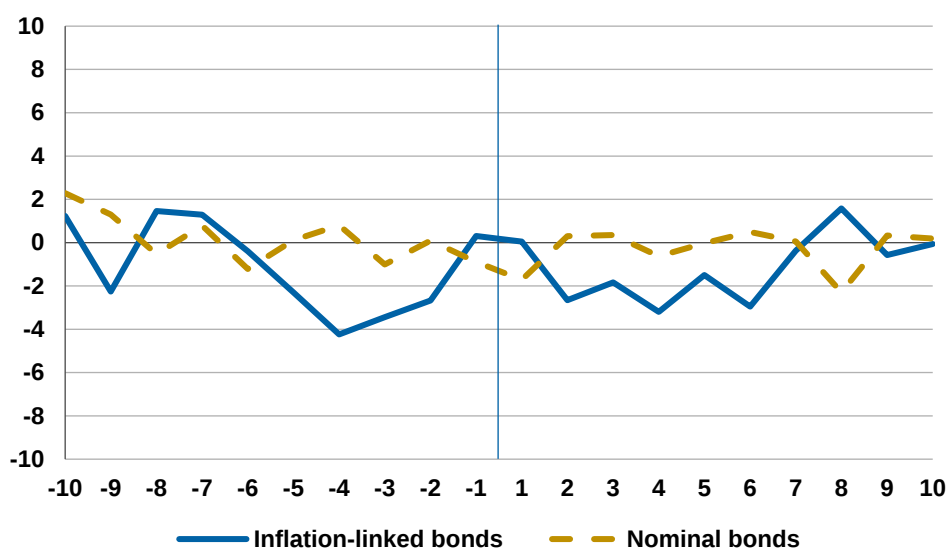
In order to evaluate the impact of the change in auction procedure on the outcome, the last ten auctions of 2024 and the first ten of 2025 are studied. At each auction, two bonds are usually sold. This is the case for both the Debt Office and the Riksbank. The outcome per auction is therefore a volume-weighted average for the bonds issued.

¹ In February 2015, the Riksbank began purchasing government bonds with the intention of making monetary policy more expansionary. Purchases increased in March 2020 to mitigate the effects of the Covid-19 pandemic. In April 2023, the Riksbank began selling off government bonds with the intention of making monetary policy more contractionary. The Riksbank – like the Debt Office – sells government securities through regularly held auctions.

Figure 1 shows the progression of the interest rate differential over the evaluation period for the Debt Office's inflation-linked and nominal bonds – with the interest rate differential being calculated as the difference between the average issue yield and the mid-market rate at the close of auction. The results show that the interest rate differential for inflation-linked bonds varied considerably more during the evaluation period compared with nominal bonds. The difference between the debt categories confirms that nominal bonds are not an appropriate reference for evaluating the change in auction format.

Figure 1 Progression of the interest rate differential

Basis points



Note: On the X-axis, -10 to -1 refers to the last ten auctions of 2024, and 1 to 10 refers to the first ten auctions of 2025. The interest rate differential is calculated as the difference between the average issue yield and the mid-market rate at the close of auction. The outcome by auction is calculated as the volume-weighted average of the bonds issued at that time.

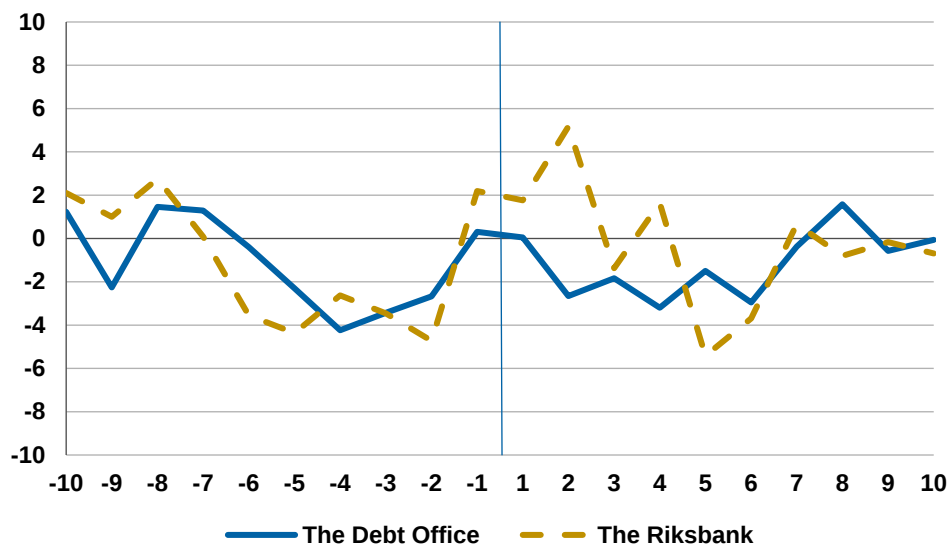
Source: The Debt Office.

Panel A in Figure 2 shows the progression of the interest rate differential during the evaluation period for the Debt Office's and the Riksbank's inflation-linked bond auctions. The interest rate differential refers to the difference between the average issue yield and the mid-market rate at the close of auction. The progression of the interest rate differential follows the same pattern for the Debt Office's and the Riksbank's auctions during the period before the change (-10 to -1) and tends to diverge after the change (1 to 10). The fact that the progression correlates before the change indicates that the Riksbank's auction outcomes are a good reference for evaluating the impact of the change.

Figure 2 The Debt Office and the Riksbank

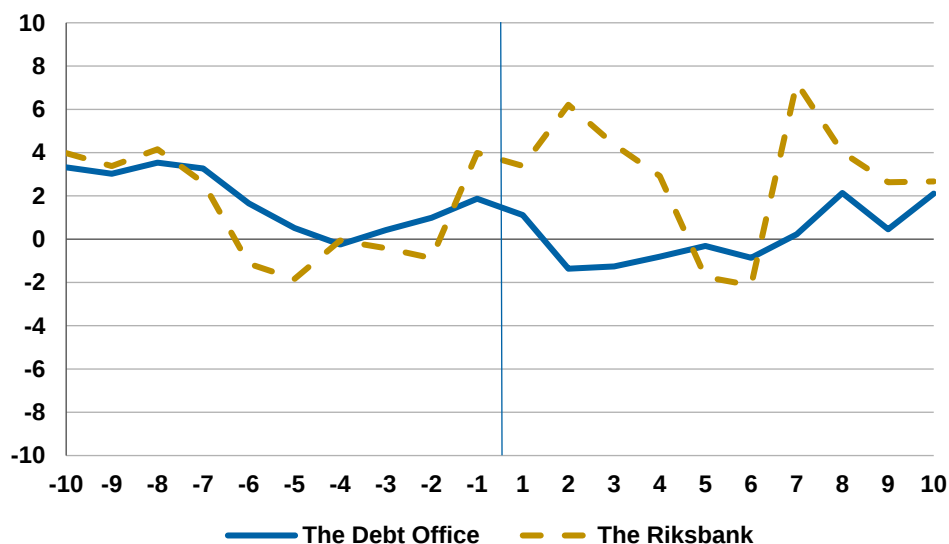
Panel A Interest rate differential (Issue yield)

Basis points



Panel B Interest rate differential (Bid rate)

Basis points



Note: On the X-axis, -10 to -1 refers to the last ten auctions of 2024, and 1 to 10 refers to the first ten auctions of 2025. The interest rate differential is calculated as the difference between the average issue yield and the market mid-rate at the close of auction. The outcome by auction is calculated as the volume-weighted average of the bonds issued at that time.

Source: The Debt Office, the Riksbank, and Bloomberg.

Finally, Panel B of Figure 2 shows the interest rate differential calculated as the difference between the average bid rate and the market mid-rate at the close of auction. The figure shows that the outcomes follow the same pattern for the Debt Office's and the Riksbank's auctions during the period before the change (-10 to -1) and diverge after the change (1 to 10). This reinforces the view that the Riksbank's auction outcomes are an adequate reference for the evaluation.

Comparison of auction outcomes

To measure how the change in auction procedure has affected auction outcomes, the progression during the evaluation period can be compared between the Debt Office and the Riksbank.² More specifically, by comparing the average before the change with that afterwards, an estimate of the progression during the evaluation period is obtained.³ The difference in the progression between the Debt Office and the Riksbank provides an estimate of how the change in auction procedure has affected the outcome variable:

$$\begin{aligned}(1.) \gamma &= \left(\text{Mean}(y_{Rgk}^{After}) - \text{Mean}(y_{Rgk}^{Before}) \right) - \left(\text{Mean}(y_{Rb}^{After}) - \text{Mean}(y_{Rb}^{Fore}) \right) \\ &= \Delta_{Rgk}^y - \Delta_{Rb}^y.\end{aligned}$$

Table 1 below shows the progression of the average during the evaluation period. Panel A shows the result for the progression of the interest rate differential, referring to the difference between the average issue yield and the market mid-rate at the close of auction. The variable thus reflects the borrowing cost.

The average interest rate differential in Panel A was -1.1 basis points before the change for both the Debt Office and the Riksbank. After the change, the average interest rate differential was -1.2 and -0.3 basis points, respectively. The outcome indicates a decrease of -0.1 basis points for the Debt Office's auctions and an increase of 0.8 basis points for those of the Riksbank. The difference in change was thus -0.8 basis points. The table also shows a one-tailed statistical test of the estimated change where the *p*-value of 0.245 indicates that the difference is not statistically significantly lower than zero.

Panel B shows the interest rate differential for the bid rate. The change amounts to -3.3 basis points, which indicates that the change in auction format has led to lower-rate bids. The one-tailed test indicates that the change is statistically significant at a 5 per cent level.

Panel C shows the result for the yield spread, with the latter calculated as the difference between the bid rates for the 90th and 10th percentiles. The result

² This approach is called *difference-in-differences* in academic literature. See Roberts and White (2013) for a detailed overview of the method.

³ Given that there are usually two bonds issued at each auction, the average is calculated based on the volume-weighted outcome by auction – consistent with the observations presented in Figure 1.

indicates that the change in auction format led to a narrower spread equalling -2.0 basis points. The effect is statistically significant at a 10 per cent level.

Finally, Panel D shows the result for bid volume concentration. The measurement used to measure volume concentration is based on the Herfindahl–Hirschman index.⁴ Reduced volume concentration is consistent with increased investor participation – whereby investors are able to place bids in an auction through primary dealers. The result indicates a decrease of -1.9, although the estimate is not statistically significant.

Table 1 Progression of auction outcomes

	The Debt Office	The Riksbank	Difference γ	(p -value)
Panel A. $y = \text{Interest rate differential (Issue yield)}$				
Before	-1.1	-1.1		
After	-1.2	-0.3		
Δ	-0.1	0.8	-0.8	(0.228)
Panel B. $y = \text{Interest rate differential (Bid rate)}$				
Before	1.8	1.4		
After	0.1	3.0		
Δ	-1.7	1.6	-3.3	(0.015)
Panel C. $y = \text{Yield spread}$				
Before	6.8	5.3		
After	6.0	6.5		
Δ	-0.8	1.2	-2.0	(0.082)
Panel D. $y = \text{Volume concentration}$				
Before	11.9	12.4		
After	14.2	16.5		
Δ	2.3	4.1	-1.9	(0.110)

Note: The table shows the progression for auction outcomes, according to Equation (1.). The interest rate differential (Issue yield) is calculated as the difference between the average issue yield and the market mid-rate at the close of auction. The interest rate differential (Bid rate) is calculated as the difference between the average bid rate and the mid-market rate at the close of auction. The yield spread is measured by auction as the difference between the 90th and 10th percentiles for the bid rate. Volume concentration refers to the Herfindahl–Hirschman index for the size of the bid as a percentage of total bid volume by auction. P -values are the probability of the coefficient being greater than or equal to zero.

Source: The Debt Office, the Riksbank, and Bloomberg.

Although the Debt Office and the Riksbank hold equivalent auctions for inflation-linked bonds, there are differences that may affect the evaluation. An example is a difference in bond maturity, with the Riksbank selling inflation-linked bonds with a shorter term to maturity on average. There may also be differences in market conditions given that the Debt Office's and the Riksbank's auctions are not held on

⁴ The Herfindahl–Hirschman index for an auction and bond is measured as: $HHI = 100 \cdot \sum w_i^2$, where w is bid i 's size as a percentage of total bid volume ($\sum w = 1$).

the same day. To account for possible differences, in the following section we present an approach that includes control variables.

Controlling for other factors

To control for factors that could potentially affect the outcome, the following regression model is applied:

$$(2.) y_{i,t,o} = \alpha + \beta \cdot I_t^{After} + \delta \cdot Rgk_{i,t} + \gamma \cdot I_t^{After} \cdot Rgk_{i,t} + \theta \cdot X_{i,t,o} + \varepsilon_{i,t,o},$$

where $y_{i,t,o}$ is the outcome variable for participant $i = [Rgk, Rb]$ at time t and bond o ; I_t^{After} is an indicator variable that takes the value one for auctions after the change and zero before; $Rgk_{i,t}$ is an indicator variable that takes the value one for the Debt Office's auction outcomes and zero for the Riksbank's; and $X_{i,t,o}$ is a set of control variables. In order to make the results directly comparable with the estimates presented in Table 1, we use a weighted regression approach in which the observations are weighted based on the issuance volume for the specific bond o , calculated as a proportion of the total issuance volume at the time of auction.⁵ The standard errors are clustered at bond level – six clusters – according to Wild's method (see Cameron, Gelbach, and Miller, 2008). In this model, the γ coefficient, as in Equation (1.), captures how the change in auction format affects the outcome variable.

Panel A in Table 2 below presents results for estimates of Equation (2.) in which a variable has been included to account for the logarithm of the bond's residual maturity at the time of auction – the maturity variable is included both linearly and quadratically.⁶ To further control for market conditions, we have also included variables related to the level of the nominal two-year yield at the time of the auction as well as the volatility for the nominal two-year yield during the 30 days prior to the auction. The coefficient in row (I) indicates a statistically significant lower issue yield by -1.9 basis points. The estimation for volume concentration in row (II) is also negative and statistically significant. For the other outcome variables, the results are in line with those reported in Table 1.

A difference between the approaches of the Debt Office and the Riksbank is that the Debt Office also applies switch auctions. Panel B shows the results from a specification in which switch auctions are excluded. The results for all outcome variables except for the yield spread remain the same. This could indicate that a reduced spread is primarily affected by the switch auctions since the introduction of single-price auctions.

⁵ More specifically, if two bonds are issued in a specific auction in which volumes per bond amount to 100 million and 400 million, then the weights $(100/500=)$ 20 and $(400/500=)$ 80 per cent, respectively, are applied for the two observations.

⁶ The average term to maturity of the bonds issued by the Debt Office is 10.2 years compared with 5.1 years for the Riksbank.

Finally, Panel C presents results from a specification in which the logarithm of the issuance volume is included – both linearly and quadratically – together with the control variables used in Panel A. For this specification, the volume is not used to weight the observations. The estimates indicate a significantly lower issue yield and bid rate. However, the coefficients for yield spread and volume concentration are not statistically significant for this specification.

One difference for which it is difficult to perform controls is that the Debt Office – unlike the Riksbank – has a primary-dealer programme with five Nordic banks. The primary-dealer programme has been in place throughout the evaluation period. However, an adjustment made during the period is that participation in auctions for inflation-linked bonds has played a smaller role in the calculation of annual remuneration for primary dealers. This could potentially have led to marginally reduced demand for inflation-linked bonds in the Debt Office's auctions.

Table 2 Estimates of Equation (2.)

$y =$	Difference y	p -value	No. obs.
Panel A. Control variables			
(I) <i>Interest rate differential (Issue yield)</i>	-1.9	(0.060)	74
(II) <i>Interest rate differential (Bid rate)</i>	-3.9	(0.023)	74
(III) <i>Yield spread</i>	-2.1	(0.015)	74
(IV) <i>Bid volume koncentration</i>	-3.4	(0.015)	74
Panel B. Control variables and switch auctions omitted			
(V) <i>Interest rate differential (Issue yield)</i>	-1.5	(0.080)	69
(VI) <i>Interest rate differential (Bid rate)</i>	-3.4	(0.015)	69
(VII) <i>Yield spread</i>	-1.0	(0.154)	69
(VIII) <i>Bid volume koncentration</i>	-2.5	(0.048)	69
Panel C. Volume included as control variable			
(IX) <i>Interest rate differential (Issue yield)</i>	-2.4	(0.077)	74
(X) <i>Interest rate differential (Bid rate)</i>	-4.4	(0.019)	74
(XI) <i>Yield spread</i>	-7.6	(0.114)	74
(XII) <i>Bid volume koncentration</i>	-2.0	(0.113)	74

Note: The table shows the results for estimates of Equation (2.). The interest rate differential (Issue yield) is calculated as the difference between the average issue yield and the mid-market rate at the close of auction. The interest rate differential (Bid rate) is calculated as the difference between the average bid rate and the mid-market rate at the close of auction. The yield spread is measured by auction and bond as the difference between the 90th and 10th percentiles for the bid rate. Volume concentration refers to the Herfindahl–Hirschman index for the size of the bid as a percentage of total bid volume by bond and auction. P values are the probability of the coefficient being greater than or equal to zero. These p values have been calculated based on standard errors clustered at the bond level according to Wild's method (six clusters). Control variables refer to the residual maturity of the bond, and the level and 30-day volatility of the nominal two-year yield.

Source: The Debt Office, the Riksbank, and Bloomberg.

Overall, the results indicate that the change in auction format has resulted in a significantly lower issue yield. The analysis also indicates that the lower issue yield is an outcome driven by single-price auctions being associated with significantly

lower bid rates. Nevertheless, the results for yield spread and volume concentration do not establish an explicit effect.

Conclusions

In recent years, the inflation-linked bond market has been illiquid with a low turnover. A significant proportion of the turnover has been in connection with the Debt Office's regularly held auctions. Aiming to ease market conditions and simultaneously attain more cost-effective borrowing, the Debt Office therefore changed the auction format for inflation-linked bonds from multiple-price to single-price auctions.

Since the change in auction format, the feedback from primary dealers and investors has been positive overall. The most-cited advantage of the new auction procedure is the reduced risk of receiving an allotment at a bid rate that significantly deviates from that of other participants – i.e. the *winner's curse* phenomenon. The analysis in this Commentary shows that the change has also affected auction outcomes.

In order to evaluate whether the change has affected auction outcomes, an adequate reference is required that reflects what the outcomes would have been had the change not been made. To this end, the issue yield in the Debt Office's auctions is compared with that in the Riksbank's auctions of equivalent inflation-linked bonds. The evaluation shows that the issue yield and bid rate coincided for the Debt Office and the Riksbank during the period before the change, indicating that the Riksbank's auctions are a good reference for the evaluation.

Furthermore, the evaluation shows a substantial decline in the progression of issue yields and bid rates for the Debt Office compared with the Riksbank during the period following the change in auction format. This indicates that the change has led to lower borrowing cost for inflation-linked bonds. The findings should be interpreted with caution given that the number of observations is limited. The documented outcome is nevertheless a good indication that the transition has contributed to an outcome in line with expected developments.

References

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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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