

IMF Working Paper

© 1998 International Monetary Fund

This is a *Working Paper* and the author(s) would welcome any comments on the present text. Citations should refer to a *Working Paper of the International Monetary Fund*. The views expressed are those of the author(s) and do not necessarily represent those of the Fund.

WP/98/44

INTERNATIONAL MONETARY FUND

Western Hemisphere Department

Economic Announcements and the Timing of Public Debt Auctions

Prepared by Marco Rossi¹

Authorized for distribution by Ana María Jul

April 1998

Abstract

Most treasuries around the world sell their securities at auctions either directly or indirectly through an agent, usually the central bank. Although they can control both the rules and the timing of the auction, they may not be able to control the information and valuations of bidders. The purpose of this paper is to identify those economic indicators whose announcement is likely to have a significant impact on government securities prices and, hence, on bidders' behavior at auctions of government securities. This information could be used to schedule treasury securities auctions so as to minimize public debt management costs.

JEL Classification Numbers: H63, D44, G14

Keywords: debt management, public debt auctions, financial markets efficiency

Author's E-Mail Address: mrossi@imf.org

¹This paper was initiated and data collected while the author was at the Bank of England. He would like to thank Creon Butler, Spencer Dale, and Jim Steeley at the Bank of England, Stephen Pickford at the U.K. Treasury, Paul Mills at the U.K. Debt Management Office, and Robert Feldman, Timothy Lane and Michael Leidy at the IMF for helpful comments. The views expressed are those of the author and not necessarily those of the above-mentioned individuals or institutions.

Contents	Page
Summary	3
I. Introduction	4
II. Methodology	6
III. Data	7
IV. Results	9
V. Conclusions	10
References	13

SUMMARY

Most treasuries around the world sell their securities at auctions either directly or indirectly through an agent, usually the central bank. The more efficiently they can issue their securities, the lower the cost for the government to meet its financing requirements. Cost minimization is, indeed, one of the objectives of effective public debt management.

The release of unexpected information about certain economic variables can affect bond prices as investors adjust their forecasts about future interest rates. It is likely, therefore, that, in periods immediately before certain events or immediately after if market prices react to news with a lag, the ex ante uncertainty about the true value (resale value) of government bonds increases. The higher the uncertainty, the stronger the winner's curse and, hence, the more conservatively participants would tend to bid at the auction.

Since an auction is a zero-sum game, the auctioneer, pursuing revenue maximization, should try to avoid selling debt at times when bidders may shade bids downwards. Thus, it seems sensible for treasuries to identify the domestic and external indicators whose announcement significantly affects bond prices. In turn, treasuries could reduce the cost of issuing new debt by timing their auctions in such a way that the bidders' attitude is the least affected by the release of new information.

The paper uses data on the U.K. gilt market to identify those economic indicators whose announcement is likely to have a significant impact on government securities prices. It shows that this market is affected immediately before, the same day, and immediately after news releases depending on the economic indicator announced, though the impact seems to be slight on average.

I. INTRODUCTION

Most empirical investigations into the codetermination of security prices and economic events aim at testing for market efficiency, that is both for the fact that asset prices should react only to the unexpected component of the announcement and for the fact that news should be encapsulated into asset prices (almost) instantaneously. Different is the motivation of this paper as its ultimate objective is to address one specific operational issue treasuries face in managing their public debt: the timing of auctions.

Most treasuries around the world sell their securities at auctions either directly or indirectly through an agent, usually the central bank. Although they can control both the rules and the timing of the auction—for instance, either a discriminatory or uniform-price method can be used and an issuance schedule may or may not be published in advance—they may not be able to control the information and valuations of bidders.²

Given, however, that the outcome an auction is likely to generate depends crucially on the information available to participants and on how this information impinges upon their valuations, a question one may ask is whether there is scope for treasuries to time their auctions in such a way that the bidders' bidding attitude be the least affected by the release of information not directly related to the object of the auction itself.³

That unexpected economic announcements can affect asset prices is hardly surprising as news urge investors to reconsider the economic scenario which their forecasts of future interest rates are based upon. It is also reasonable to expect that announcements about a particular country economic indicator can impact not only on asset prices in that country, but also elsewhere as financial markets tend to become more and more intertwined. Anecdotal evidence is often provided by real-time news agencies: "Belgian bond prices are ending lower late Friday, after stronger-than-expected U.S. November employment data ended some investors' complacency about the interest rate outlook [...] The data revived fears that a tight labor market could prompt the Federal Reserve to raise interest rates and the benchmark 30-year U.S. Treasury bond yield shot as high as 6.15 percent [...] German and Belgian

²For example, since March 1995 the U.K. Treasury has published an annual Debt Management Report and Remit to the Bank of England, its agent, which sets out details of the annual issuing activity. Responsibility for debt management was transferred from the Bank of England to the U.K. Debt Management Office on April 1, 1998.

³This question is clearly different from that of how the auction should be designed to control for the amount of information **about** the object of the auction available either before or during the auction.

government bonds didn't react as strongly, indicating that investors are more comfortable with the inflation scenario in Europe."⁴

But why should treasuries be concerned with the bidders' bidding attitude? Revenue maximization is the answer. An auction is a zero-sum game: higher profits for the seller mean lower profits for the bidder. It seems, therefore, sensible for treasuries to avoid auctioning debt at times when bidders may shade bids downwards. The winner's curse is the main factor likely to affect the participants' bidding behavior.⁵ The more uncertain the value of the object to be auctioned, the stronger the winner's curse as more likely is an over-optimistic assessment of its value.⁶ Applying this argument to the government bond primary market, we might expect that, since government securities are usually bought at auctions with the perspective of reselling them in the secondary market, uncertainty about their value (their resale price) might make auction participants bid more conservatively.⁷ This, in turn, would adversely affect the seller's revenue.

On these grounds, it seems sensible for treasuries to identify an optimal time to auction their securities, optimal in the sense that securities prices are not (or likely not to be) 'disrupted' by the arrival of economic news. Should we find that, for instance, monetary aggregate announcements have statistically significant effects on treasuries securities prices, it would make sense to avoid auctions around the time of such announcements. Such a choice of auction dates would also be consistent with one of the objectives of debt management, namely, the minimization of the cost of meeting the government's funding requirements.

Moreover, if treasuries securities were auctioned close to sensitive news announcements, market participants might feel uncomfortable to take positions not only in the actual auction, but also in the when-issued market.⁸ This, again, would be detrimental to the government as,

⁴From Dow Jones News, December 5, 1997.

⁵The winner's curse refers to the likelihood that the highest bidder incur a loss as a result of his/her above-average assessment of the object resale value. Its existence in Outer Continental Shelf oil lease auctions was first reported in Capen, Clapp and Campbell (1971).

⁶Useful surveys of auction theory are Bikhchandani and Huang (1993), McMillan (1994), Milgrom (1989), Riley (1989) and Wilson (1987). Hendricks and Porter (1987) found a strong support for the prediction of auction theory concerning price and profit for federal sale of leases on the Outer Continental Shelf in the Gulf of Mexico.

⁷Bidders may also bid below their estimates to make sure that they make a profit from winning a discriminatory price auction, which is very often the format of government bonds auctions.

⁸The when-issued market starts at the moment the amount of securities to be issued is
(continued...)

ceteris paribus, information revelation in the when-issued market before the auction reduces the winner's curse and, hence, raises auctioneer's expected revenues.

In this exercise, data on the U.K. gilt market are used to assess whether and for how long announcements of both domestic and foreign indicators significantly affect gilt prices.⁹ The rest of the paper is organized as follows. Section II presents the empirical framework. Section III describes the data and tests for unbiasedness and efficiency in expectations as measured by the 'consensus forecasts', which are routinely published ahead of announcements. Section IV examines the results and, finally, Section V concludes.

II. METHODOLOGY

There is a vast body of research in empirical financial economics seeking to measure unexpected or abnormal asset returns.¹⁰ Empirical investigations into the co-determination of security prices and economic events usually adopt a two-step procedure.¹¹ First, a model of expected returns is considered and residuals (abnormal returns) calculated over an estimation period. Second, the relationship between residuals and events is examined and the null hypothesis of no abnormal returns during the event period is tested using either some form of a t-statistic or a nonparametric rank test.¹²

In this case, however, a multiple regression approach is chosen.¹³ Multiple regression is "similar in spirit (and asymptotically equivalent) to a specific form of residual analysis when

⁸(...continued)

announced. Primary dealers begin trading forward contracts on the securities to be auctioned. The seller of a forward contract guarantees to deliver and the buyer of a forward contract guarantees to take delivery of a certain amount of securities. The price the buyer pays at delivery is the forward price which prevailed at the time the forward contract was sold. The delivery date for the forward contract is the issue (auction) date of the underlying security.

⁹A gilt is a coupon-bearing U.K. government bond.

¹⁰See Armitage (1995) for a review of event studies in shares markets.

¹¹See Fama, Fisher, Jensen and Roll (1969), Collins and Dent (1984), and Corrado (1989).

¹²Residual analysis was not appropriate in this instance as it would need at least 100 daily observations 'uncontaminated' by the announcements for the estimation period, whereas, since indicators are announced every month, only some 15–20 observations are available.

¹³Goodhart and Smith (1985), Gowland (1985), and Hardouvelis (1988) are some examples of papers on news effects on asset prices in which price changes on the day of the announcement are regressed on the unexpected component of the announcement itself.

market model parameters are estimated excluding event periods and the mean shift is estimated as the average forecast error or residual in the event periods.”¹⁴

The system of equations that is estimated to assess whether and for how long announcements of both domestic and foreign indicators significantly affect gilt prices has the following form:

$$\underline{R}_t = \underline{A} \underline{MK}_t + \underline{B} \underline{D}_t + \underline{\Gamma} \underline{N}_t + \underline{\Sigma}_t \quad (1)$$

where: \underline{R}_t is a 5x1 vector of returns on short, medium, and long conventionals (nominal gilts), and short and long index-linked gilts, respectively, at time t ;

\underline{A} is a 5x5 diagonal matrix of coefficients;

\underline{MK}_t is a 5x1 vector of *market* returns on conventionals and index-linked gilts, respectively, at time t ; the first three rows contain the same *market* returns for conventionals whereas the last two rows contain the same *market* returns for index-linked gilts;

\underline{B} is a 5x5 matrix of coefficients;

\underline{D} is a 5x1 vector of daily dummies, Monday to Friday;

$\underline{\Gamma}$ is a 5x11 matrix of coefficients;

\underline{N} is a 11x1 vector of news variables expressed as the absolute value of the difference between the actual announcement and its forecast;

$\underline{\Sigma}$ is a 5x1 vector of errors with covariance matrix Ω .

This system is estimated over the same calendar period for each gilt. The purpose of an event study is to estimate the parameters of system (1) and to assess the magnitude and significance of γ . A multiple regression framework can prove useful when interest focuses simultaneously upon more than one type of announcement and the return-generating process is conditioned on a set of events. Multiple regression automatically controls for multicollinearity among the explanatory variables sharing the same announcement periods, eliminating, therefore, the need for discarding these common periods in the regression.

III. DATA

The data set contains daily observations (returns on the price index) for five types of gilts between November 1993 and April 1996:¹⁵

- short conventionals (under 5 years);

¹⁴Thompson (1985), page 152. Interested readers may refer to it for an exhaustive discussion of how the multiple regression approach compares with the empirical methods used in residual analysis.

¹⁵These data are available from Datastream.

- medium conventionals (5–15 years);
- long conventionals (over 15 years);
- short index-linked gilts (under 5 years); and
- long index-linked gilts (over 5 years).

In addition two *market* price indices, one for conventionals and the other for index-linked gilts, are considered.¹⁶

As far as announcements of domestic and foreign economic indicators are concerned, the following first releases are considered:¹⁷

United Kingdom

1. retail price index (RPI);
2. public sector borrowing requirement (PSBR);
3. unemployment;
4. monetary aggregates (M4); and
5. Chancellor/Governor meetings.

Germany

6. monetary aggregates (M3); and
7. Bundesbank meetings.

United States

8. monetary aggregates (M3);
9. consumer price index (CPI);
10. nonfarm payrolls; and
11. Federal Reserve Board meetings.

Forecasts of economic announcements are based on a telephone survey of market analysts' expectations conducted at least one week before the announcement.¹⁸ In the regression, only the unexpected component of the forecast is considered. News variables for Chancellor/Governor, Bundesbank, and Federal Reserve meetings are calculated as the difference between the new official rate and the interbank rate the previous day corrected for the average differential between these two rates.

¹⁶Since returns are highly correlated, it seems natural to consider indices of gilt prices rather than the price of a specific gilt. Moreover, and in particular for short gilts, the use of indices avoids problems with stocks going ex dividend, with accrued interests, with changing maturities over the sample period, and other measurement problems.

¹⁷These indicators are expressed in percentage.

¹⁸Consensus forecasts were obtained from Money Market Services Inc.

A standard test for unbiasedness was performed by regressing actual values on forecasts for each individual announcement:

$$\text{Actual} = \alpha + \beta \text{ Forecast} + \text{error}$$

$$H_0 : \alpha = 0, \beta = 1 \text{ and serially uncorrelated errors}$$

Results suggest that, at the 5 percent significance level, all monetary and financial forecasts, but U.S. M3, are unbiased. By contrast, forecasts of U.K. unemployment and U.S. nonfarm payroll are biased.

Asset prices fully reflect all available information, if market participants use this information efficiently. As described in Pesando (1975), weak-form efficient expectations are obtained when actual and expected data can be thought as being generated by a common time series model. The following regression is used to test this hypothesis:

$$(\text{Actual} - \text{Forecast})_t = \alpha + \beta_1 \text{Actual}_{t-1} + \beta_2 \text{Actual}_{t-2} + \dots + \beta_p \text{Actual}_{t-p} + \text{error}$$

$$H_0 : (\beta_1, \beta_2, \dots, \beta_p) = (0, 0, \dots, 0).$$

where p is the maximum lag with which past information is assumed to affect current expectations. Forecasts of U.K. unemployment, German M3, United States M3, and federal reserve meetings fail to satisfy the weak-efficiency hypothesis.

IV. RESULTS

The system of equations (1) is estimated over the sample period using ordinary least squares.¹⁹ The significance of the impact of the unexpected component of economic announcements on gilt prices is tested separately on the day, one and two days before, and one and two days after the announcement. Estimations results are shown in Table 1 below, whereas Table 2 reports the average impact for significant individual announcements calculated as the product of γ_i and the average surprise N_i over the sample period.

Significant impacts on short conventionals (SHCs) have a magnitude of between 2 and 6 basis points. The RPI in the United Kingdom and the CPI in the United States have a 2-day lagged effect, whereas U.S. monetary aggregates have an impact on gilt prices both the same and the

¹⁹Since the set of explanatory variables is almost the same in each equation, the OLS estimates are roughly as efficient as the estimates from a seemingly unrelated regressions procedure. Besides, with OLS it was easier to control for serial correlation in some regressions, where the error terms appeared to have an AR structure.

following day.²⁰ Moreover, SHCs also seem to be significantly affected on both Monday (5 basis points) and Friday (3 basis points) and by German monetary aggregates immediately before the announcement. Medium conventionals (MCs) seem to react on Monday (2 basis points) and to Chancellor/Governor meetings starting two days before the meeting takes place.²¹ Long conventionals (LCs) are the most affected with returns on the index varying on average by between 5 and 10 basis points. Again, announcements from the United States, in particular M3 and CPI, have significant same-day and 1-day lagged impacts on gilt prices; Monday (4 basis points) and Friday (4 basis points) are also significant.

Short index-linked gilts (SIGs) react to news with a magnitude of between 5 and 6 basis points. Bundesbank meetings have contemporaneous effects, whereas U.K. monetary aggregates show a 2-day lead effect. Significant abnormal returns are also detected on Friday (4 basis points). Finally, long index-linked gilts (LIGs) are the least affected with returns on the index moving by one basis point in relation to surprises in the U.S. nonfarm payrolls figures. No specific day of the week matters.

V. CONCLUSIONS

The idea motivating this paper was that treasuries could benefit from scheduling their auctions when bond prices are the least affected by the release of information concerning economic indicators. The rationale is that, during periods around certain events, uncertainty about the value (resale price) of government bonds in the secondary market could be higher as data releases, if unexpected, could urge a reassessment of the economic scenario which expectations about future interest rates were based upon. Higher uncertainty, in turn, would make the winner's curse stronger and, hence, induce bidders' to bid more conservatively. Since the auction is a zero-sum game, this would reflect in a reduction in the auctioneer's expected revenue.

This exercise aimed at identifying those economic indicators whose announcement is likely to have a significant impact on government securities prices taking the U.K. gilt market as an example. It shows that the U.K. gilt market is affected immediately before, the same day, and immediately after news releases depending on the economic indicator announced, though the impact seems to be slight on average. Results would, however, suggest that the Treasury should avoid issuing specific types of gilts around the day of release of monetary aggregates and inflation figures, both in the United Kingdom and in the United States, German monetary

²⁰Information about U.S. monetary aggregates is usually released late in the morning, while markets in London are closing. By contrast, CPI and nonfarm payroll figures can impact upon gilt prices in London the same day as these are released in the U.S. early in the morning, usually before 9 a.m..

²¹In few occasions, Chancellor/Governor meetings last for more than a single day.

aggregates, in occasion of Chancellor/Governor and Bundesbank meetings, and on specific days of the week.²²

It is clear that changes to operational practices, if necessary, could be hardly recommended on the basis of a single exercise, if only because it is reasonable to expect that announcement effects depend, among other things, on the monetary policy framework in place and the effective openness of the economy. Be that as it may, the idea that, treasuries could maximize auction's proceeds by avoiding periods of heightened uncertainty about bond prices, remains appealing. Its potential policy relevance should be assessed on a case-by-case basis.

²²In May 1997, the Bank of England was given operational responsibility for setting interest rates. Since then, the Chancellor/Governor meeting has been replaced by the Monetary Policy Committee meeting.

Table 1. Estimation Results: Coefficients of News Variables

(Absolute values, in percent)

SHCs				MCs			LCs		SIGs		LIGs
$\gamma_{6,t-1} = 0.02$ (.05)	$\gamma_{8,t} = 118.2$ (.06)	$\gamma_{8,t+1} = 127.3$ (.02)	$\gamma_{1,t+2} = 0.33$ (.02)	$\gamma_{5,t-2} = 0.16$ (.05)	$\gamma_{5,t-1} = 0.18$ (.03)	$\gamma_{5,t} = 0.17$ (.04)	$\gamma_{8,t} = 182$ (.04)	$\gamma_{9,t+1} = 0.77$ (.02)	$\gamma_{4,t-2} = 0.11$ (.01)	$\gamma_{7,t} = 0.3$ (.01)	$\gamma_{10,t+1} = 8.74$ (.01)
			$\gamma_{9,t+2} = 0.47$ (.02)								
S.E. : .001	S.E. : .001	S.E. : .001	S.E. : .001	S.E. : .001	S.E. : .001	S.E. : .001	S.E. : .002	S.E. : .002	S.E. : .002	S.E. : .002	S.E. : .0002
$\bar{R}^2: 0.69$	$\bar{R}^2: 0.69$	$\bar{R}^2: 0.69$	$\bar{R}^2: 0.69$	$\bar{R}^2: 0.98$	$\bar{R}^2: 0.98$	$\bar{R}^2: 0.98$	$\bar{R}^2: 0.92$	$\bar{R}^2: 0.92$	$\bar{R}^2: 0.21$	$\bar{R}^2: 0.22$	$\bar{R}^2: 1.00$
DW: 2.00	DW: 2.00	DW: 2.00	DW: 2.00	DW: 2.00	DW: 2.00	DW: 2.00	DW: 2.00	DW: 2.00	DW: 2.05	DW: 2.08	DW: 2.04

Note: pvalues in brackets.

Table 2. Average Impacts

(Absolute values, in basis points)

SHCs				MCs			LCs		SIGs		LIGs
$X_{6,t-1} = 2$	$X_{8,t} = 4$	$X_{8,t+1} = 4$	$X_{1,t+2} = 5$	$X_{5,t-2} = 2$	$X_{5,t-1} = 2$	$X_{5,t} = 2$	$X_{8,t} = 5$	$X_{9,t+1} = 10$	$X_{4,t-2} = 6$	$X_{7,t} = 5$	$X_{10,t+1} = 1$
			$X_{9,t+2} = 6$								

Note: please refer to Section III in the text for name of individual indicators.

References

- Armitage, S., 1995, "Event Study Methods and Evidence on their Performance," *Journal of Economic Surveys*, Vol. 8 No. 4.
- Bikhchandani, S. and Huang, C., 1993, "The Economics of Treasury Securities Markets," *Journal of Economic Perspectives*, Vol. 7, No. 3 (Summer), pp. 117-34.
- Capen, E.C., Clapp, R.V. and Campbell, W.M., 1971, "Competitive Bidding in High Risk Situations," *Journal of Petroleum Technology*, 23, 641-53.
- Collins, D.W. and Dent, W.T., 1984, "A Comparison of Alternative Testing Methodologies Used in Capital Markets Research," *Journal of Accounting Research*, 22, 48-84.
- Corrado, C.J., 1989, "A Non-parametric Test for Abnormal Security-price Performance in Event Studies," *Journal of Financial Economics*, 23, 385-95.
- Fama, E.F., Fisher, L., Jensen, M.C. and Roll, R., 1969, "The Adjustment of Stock Prices to New Information," *International Economic Review*, 10, 1-21.
- Goodhart, C.A.E. and Smith, R.G., 1984, "The relationship between Exchange Rate Movements and Monetary Surprises," *The Manchester School* 53.
- , 1985, "The Impact of News on Financial Markets in the United Kingdom", *Money, Credit and Banking*, Vol. 17, No. 4.
- Gowland, D.H., 1985, "Rationality, Efficiency and News in the Gilt-Edged Market," *University of York Institute of Social and Economic Research*, Discussion Paper No. 113.
- Hardouvelis, G.A., 1988, "Economic News, Exchange rates and Interest Rates," *Journal of International Money and Finance*, 7, 23-25.
- Hendricks, K. And Porter, P., 1988, "An Empirical Study of An Auction with Asymmetric Information," *American Economic Review*, December, 78, 865-83.
- McMillan, J., 1994, "Selling Spectrum Rights," *Journal of Economic Perspectives*, Vol. 8, No. 3 (Summer), pp. 145-62.
- Milgrom, P., 1989, "Auctions and Bidding: A Primer," *Journal of Economic Perspectives*, Vol. 3, No. 3 (Summer), pp. 3-22.
- Pesando, J.E., 1975, "A Note on Rationality of the Livingston Price Expectations," *Journal of Political Economy*, Vol. 83, No. 4, pp. 849-58.
- Riley, J.G., 1989, "Expected Revenue from Open and Sealed Bid Auctions," *Journal of Economic Perspectives*, Vol. 3, No. 3 (Summer), pp. 41-50.
- Thompson, R., 1985, "Conditioning the Return-Generating Process on Firm-Specific Events: A discussion of Event Study Methods," *Journal of Financial and Quantitative Analysis*, Vol. 20, No. 2.
- Wilson, R., 1987, "Bidding" in *The New Palgrave: A Dictionary of Economics* (London: The Macmillian Press).

