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Informational Advantage and Influence of Communicating Central Banks

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Abstract

This paper studies empirically whether first the central bank has an informational advantage over the private sector and second influences it, for five countries in which the central bank publishes forecasts. It contributes to the literature in two ways. The first set of results show that only one out of five communicating central banks benefits from private information. The main outcome concerns the sources of this advantage: the impacts of advance knowledge of the future policy path and secrecy are minimized, while specific expertness seems reinforced. The second set of results show that three out of five central banks have influential power on private sector through forecasts' publication. This paper suggests then that there is no relationship between informational advantage and influence, that is central banks need not to be more informed to be influential.

Keywords: Influence, Monetary Policy, Forecasts, Information Asymmetry, Communication.

JEL Classification: E52, E58

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1. Introduction

In the last decades, there has been a strong interest for transparency and information issues in monetary policy emphasizing the role of expectations in policy outcomes. A part of this literature has focused on the theoretical effects of imperfect information of private agents or the central bank on monetary policymaking. Informational advantage of the central bank on the future state of the economy might allow stabilizing policies. This has led many authors, following **Romer and Romer (2000)**, to assess in the US which has the lowest forecast errors between the private sector and the Federal Reserve, a central bank that keep secret its forecasts for five years.
The first contribution of this paper is to test empirically whether central banks communicating their forecasts do, indeed, have private information. From this analysis, we investigate possible sources of private information (through comparisons between diverse central banks in terms of strategy or communication) and assess as a corollary if private information is sustainable with communication or depends on secrecy. Furthermore, we deduce in parallel whether communication of information tends to improve private agents' ability to forecast, according to the theoretical debate on the implications of release of information, positive for **Morris and Shin (2002)** and **Svensson (2006)** and negative according to **Amador and Weill (2008)**.
The second goal of this paper is to contribute to the literature by analysing in the five countries considered whether the central bank has influence on the private sector. Independently from asymmetry of information, testing whether the central bank forecasts are influential allows to determine the direction of the leader-follower scheme of the monetary process. Indeed, **Bernanke and Woodford (1997)** have shown that a monetary policy influenced by private expectations may lead to indeterminacy. Influential central bank is moreover supposed to make, due to its impact on private expectations, monetary policy implementation more effective. At the other hand, **Muto (2008)** argues that when private agents follow the central bank, this one must respond more strongly to expected inflation to achieve expectational stability. As an extension, we determine whether this potential influence arises from private information.

We then exploit data collected from five developed countries, namely the United Kingdom, Japan, Sweden, Canada and Switzerland, for which central banks communicate their forecasts, and use surveys of Consensus Forecasts for private sector forecasts. We find that only one out of five communicating central banks, the Riksbank from Sweden, has an informational advantage. When comparing these communicating central banks and the Federal Reserve, advance knowledge of future policy path, secrecy and the institutional framework appear not to be sufficient conditions for superior forecasts accuracy compared to private agents. Moreover, forecasts' communication from the central bank does not seem to improve private agents' forecasting capacity. Results about the influential power of the one's forecasts on the other's show that in three out of five countries, Sweden, the UK and Japan, the central bank influences the private sector, while evidence is mixed for Switzerland and Canada. There is therefore no indication of a relationship between private information and influential power.

The rest of the paper is organized as follows. Section 2 describes the theoretical and empirical literature related to these issues. Section 3 presents central banks' and private agents' forecasts. Section 4 displays the tests and results concerning information asymmetry, while Section 5 regroups tests and results for influence. Section 6 concludes this paper.

2. Related Literature

This paper deals with two strands of literature: the first concerns forecasts' accuracy of central banks compared to private sector and so theoretical impact of asymmetry of information in monetary policymaking. While imperfect information[1] from the central bank generally reinforces the case for commitment and aggressive response to inflation, information advantage in favour of the central bank deviates from the optimal monetary policy under rational expectations hypothesis by considering stabilizing real effects for monetary policy. The empirical work undertaken here tries then to give insight on the direction of a potential information advantage. For this, it lies on the seminal work of **Romer and Romer (2000)** finding Greenbook (from Federal Reserve) forecasts are superior to private sector forecasts. **Gavin and Mandal (2001)**, **Sims (2002)**, and **Peek, Rosengren and Tootell (1998, 2003)** supports this analysis, while **Joutz and Stekler (2000), Atkeson and Ohanian (2001), Faust, Swanson and Wright (2004), Baghestani (2008)** and to a lesser extent **Amornthum (2006)** arrive at a different conclusion. **Hubert (2008)** gathers methodologies, data and samples to show that Federal Reserve possesses an informational advantage on inflation, but not on GDP.

Outside the US, a few articles assess the potential informational advantage of the central bank with the private sector. In the UK, **Boero, Smith and Wallis (2008)** analyse the Survey of External Forecasters (SEF) and finds that its average point forecasts of inflation outperforms the Monetary Policy Committee's forecast, while comparisons for GDP growth show little difference. They note that SEF error is smaller than any (regular) individual error what supports pooled surveys. **Casillas-Olvera and Bessler (2006)** find a similar result with density forecasts. Last, **Groen, Kapetanios and Price (2008)** compare Bank of England (BoE hereafter)'s forecasts to real time model forecasts, but not to private forecasts. They find that simple univariate models do better than BoE's GDP forecasts, while inflation forecasts of the BoE strongly dominate. To my knowledge, there is no other empirical assessment of informational asymmetry between the central bank and private sector, except some boxes in *Inflation Report*s by the Bank of England and the Riksbank. It can be mentioned that **Andolfson et al. (2007)** compare forecasting performance of the Riksbank to BVAR and DSGE models. Those ones appear to outperform the former.

Second, a vast literature deals with the costs and benefits to publish forecasts, among which **Faust and Svensson (2001, 2002)**, **Geraats (2002, 2005)**, **Woodford (2005)** and **Eusepi and Preston (2007)**. Forecasts, with the development of inflation targeting policies, have become a central tool of central banks communication. However, only a few papers assess empirically whether there is influence from central banks to private agents trough forecasts and theoretical considerations associated. Indeed, poor forecasting performance can impair central bank's credibility and mislead private agents, while influential and accurate forecasts might improve the effectiveness of monetary policy. Thus, **Fujiwara (2005)** shows on Japanese data that the Bank of Japan influences private forecasters while the opposite is not true. **Kelly (2008)** assesses the causal relationship between inflation and inflation expectations through Granger causality tests in the UK and finds that while before inflation targeting has been introduced in the UK, expectations and inflation were linked, after its setting-up (and communication of forecasts), this link disappear and it causes public to

[1] See **Hubert (2008)** for a more detailed review of literature on impacts of informational advantage in favour of private agents or central banks.

anchor their expectations. Likewise, **Boero, Smith and Wallis (2008)** find that private forecasters have a tendency to follow the BoE for GDP growth forecasts, but not for inflation. Last, **Muto (2008)** sets a framework in which private agents refer to the central bank's forecasts. Considering central bank's forecast errors repeated by private agents, it must then respond more strongly to inflation. In order to analyze theoretical implications of influence, it is thus necessary to identify empirically whether it is the private sector or the central bank that influences the other.

3. Data

We focus on five developed countries for which the central bank publishes forecasts: Sweden, the UK, Canada, Japan and Switzerland. Some initial and general remarks are worth to be made before to focus on the characteristics of each data[2] set.

First, as emphasized in the previous section, we analyze potential informational advantage and influence through forecasts, since it is a hypothesis commonly accepted in the literature that forecasts of central banks and private agents map all information available to them. We then take those officially published by central banks and surveys of professional forecasters or consumers for the private sector. For these surveys, we consider the mean of the point forecasts[3] collected.

Second, two types of forecasts exist: fixed-event scheme and fixed-horizon scheme. The second is not contaminated by the effects of varying lead time and it is generally agreed that it is the most appropriate format to compare forecasts between them. For Sweden, the UK and Canada, the main forecasts on which we focus are at fixed horizon. For Japan and Switzerland, the only forecasts available from the central bank are for fixed events: the current and next years.

Third, we compare forecasts of central banks to individual private forecasts for the country, Sweden, for which we have comparable annual average data from central bank and private forecasters, the longest data and incentives to do so.[4]

Fourth, the period considered here falls within the great moderation period and predates the impact of the commodities price rise and fall and turbulence in financial markets. It could then be argued that the task of forecasters is made easier. However first, even if this was true, we here compare forecasters' performance between them *ceteris paribus*. Second, **Stock and Watson (2007)** show this assumption is not relevant as it is very difficult to beat simple and naïve forecast models during macroeconomic stability. Discrepancy between private sector and the central bank over a stable sample would then be even more significant.

For **Sweden**, the Riksbank provides two types of forecasts[5]: 12-month change at different quarters in the future and average annual change for the current and next calendar years.

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[2] Tests of stationary have been conducted for each group of series: the null hypothesis that each variable assumes a unit root process is always rejected at the 10% level and most of the time at the 5% level. The investigation is carried out with the Augmented Dickey-Fuller's and Phillips and Perron's tests. The latter proposes an alternative (nonparametric) method of controlling for serial correlation when testing for a unit root. These results are available upon request.

[3] **Engelberg, Manski and Williams (2008)** find point forecasts are in general more optimistic (lower inflation and higher output growth) than corresponding density forecast mean. However, **Boero, Smith and Wallis (2008)** note that analyses of errors in the density forecast mean and in point forecasts are similar.

[4] Comparison of aggregate forecasts shows a clear advantage in favour of the central bank. The question is whether this advantage holds only on some forecasters or on a large majority. When forecasts of the central bank and the mean of the private sector are closer, the rationale for individual comparisons is weaker as there will be inevitably some forecasters' errors smaller and higher.

The former are regularly available for inflation (CPI) for forecasts 1 year (Q+4) and 2 years (Q+8) ahead from 1997Q1 and for all quarters from the current one to Q+6 from 1999Q3. Concerning GDP, from current quarter to Q+6 forecasts are available since 2003Q4. The average annual change forecasts are available for both inflation and GDP since 1997.

The 12-month rate forecasts in 1 year and 2 years ahead are compared to private forecasts gathered via a survey by Prospera AB available since 1996Q1 for inflation and used then since 1997Q1. It is only available for GDP since 2006Q4 and is then not used in this paper. These forecasts are split in two categories: All respondents to the survey and Market Players.

The 12-month rate forecasts in current and next 6 quarters are compared to the quarterly forecasts gathered by Consensus Forecasts. These are available since 1999Q2 for both inflation and GDP.

For these quarterly forecasts comparison, Inflation Reports which contain forecasts of the Riksbank are in average published around March 16th, June 8th, October 10th and December 7th, surveys of Consensus Forecasts in first half of March, June, September and December and those of Prospera AB in beginning of March, end of May, beginning of October and end of November. Timing of release is then not here a controversial issue.

The average annual rate forecasts of current and next calendar years are compared to the same measure available from Consensus Forecasts since 1999 on the fixed-event scheme. We compare to the mean of Consensus Forecasts and to major individual forecasters[6]. The calendar forecast is compiled as the average of all forecasts made for a year during the preceding and the current ones (except the forecast of December for the current year because the Riksbank already focus on two next years in each December report). For instance, for the year 2001, we compare the forecasts of March, June, September, December 2000, March, June, and September 2001.

For the **UK**, the BoE publishes year-over-year forecasts for current to next 8 quarters for only inflation since 1993Q1 with a scenario based on a constant interest rate and for both inflation and GDP as from 1998Q1 with 2 scenarios: the latter and a scenario based on the interest rate expected by the market[7]. Moreover, the measure of inflation has been RPIX until 2003Q4 and CPI-H since 2004Q1.

These forecasts can be compared to three types of private forecasts: first, those of Consensus Forecasts available until the 6th future quarter since 1999Q2 for both inflation and GDP. The switch from RPIX to CPI-H is here made in 2005Q1. Second, a survey of public attitudes to inflation is conducted by Gfk NOP and the BoE and provides private forecasts of inflation one year ahead since 1999Q4. Third, the BoE gathers, in each Inflation Report, inflation and GDP forecasts of "other forecasters" in 2 years ahead (called the SEF, that is in average 25 institutions, banks and miscellaneous forecasters), since 1998Q1 for inflation and 1998Q4 for GDP. The switch between both inflation measures is here in 2004Q1. Last, because of the change of measure for inflation, we separate the analysis of inflation forecasts' accuracy in two subsamples for comparisons with Consensus Forecasts: the first concerning RPIX until 2003Q4 and the second for CPI-H from 2005Q1, because the two institutions do not forecast the same measure of inflation in the year 2004.

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5 Riksbank's forecasts have been based before October 2005 on a constant interest rate scenario, until February 2007 on implicit forward rates (interest rate expected by financial markets), and since then on Riksbank's preferred path for the future interest rate.

6 Are considered as major forecasters those who respond to more than two third of surveys.

7 We report Mean Square Errors for both types of forecasts but focus afterwards on the constant interest rate scenario (*unconditional*). **Woodford (2000)** argues that forecasts based on forecasts of the private sector give too much weight to forward-looking variables when policymaking and **Faust and Leeper (2005)** show that unconditional forecasts are more effective communication tools then conditional forecasts. **Faust and Wright (2008)** provide specific tests for conditional forecasts and consider these types of forecast "represent a substantial impediment to the analysis of their quality".

Finally, the issue of the timing of publications is here in advantage of Consensus Forecasts, which consistently releases its surveys one month after the BoE.

For **Canada**, the Inflation Reports are published in January, April, July and October of each year and provide projections of the real GDP at average annual rate since 2002Q3 and forecasts of Total CPI and real GDP at year-over-year rate for current and next four quarters respectively since 2003Q2 and 2005Q2.
We compare the 12-month rate quarterly forecasts with similar projections made by Consensus Forecasts (CF). The timing of publication is however different: these quarterly forecasts are published in March, June, September and December. There is then strong timing disadvantage (and then information disadvantage) for Bank of Canada (BoC hereafter). It seems more logical to compare CF's forecasts from the preceding quarter to the BoC's forecasts of a current quarter than both in the current quarter. Indeed, CF's forecasts from quarter *q-1* are closer to BC's forecasts of quarter *q* (a gap of 1 month between both) than to BC's forecasts of quarter *q-1* (2 months gap). We therefore provide comparisons on the standard basis (the 'base specification' in the table) and with a timing correction.
Last, we compare on a fixed event scheme forecasts of the mean of average annual rate forecasts of real GDP provided by Consensus Forecasts to the equivalent forecasts made by the BoC.

For **Japan**, the central bank publishes, only two times by year, in the last days of April and October the lower and higher forecasts of the majority of policy board members, for real GDP and CPI excluding fresh food at an average annual rate basis. These forecasts are available for the current year since October 2000 and for next year at a regular frequency only since October 2004[8]. We take for this study the middle point of the range that very regularly coincides with the median forecast which has started to be published more recently.
The forecasts of the private sector are taken from Consensus Forecasts. They publish at the beginning of each month the forecasts of various institutions and we then take the survey of early May and November, for which the publication gap between both institutions is the smallest.

For **Switzerland**, the central bank publishes twice a year since 1999Q4 and on a quarterly basis since 2003Q1 forecasts of CPI for current, next year and the following one. We compare them to the Consensus Forecasts of current and next year calculated on the same basis: annual average rate. The Swiss National Bank publishes its Inflation Reports in March, June, September and December, what corresponds to the date of publication of Consensus Forecasts' surveys.

4. Measures of Potential Informational Advantage

In this section, we assess the accuracy of forecasts provided by both the central bank and the private forecasters in order to measure the direction and the size of a potential informational advantage. We apply two standard methods: the Mean Square Error and regressions in the spirit of **Fair and Shiller (1989, 1990)** and **Romer and Romer (2000).**

[8] For this reason, there is very little data available and we then report only MSE for next year forecasts and exclude them from regressions.

Mean Square Errors
The simplest method to compare forecasts accuracy of both institutions is to measure their Mean Square Errors. In order to calculate the *p-value* for the test of the null hypothesis that central bank's and private forecasts' MSE are equal, we estimate according to **Romer and Romer (2000)** the following regression:

$$(Y_{t+h} - CB_t^h)^2 - (Y_{t+h} - PS_t^h)^2 = \alpha + \varepsilon_t$$

where α is the difference between the squared errors of forecasts of both institutions and then allows to calculate the standard errors of α corrected for serial correlation with the Newey-West HAC method[9]. We can thus obtain a robust *p-value* for the test of the null hypothesis that $\alpha = 0$, in order to determine whether the forecast errors are significantly different.

Regressions
The second method consists of regressing the actual inflation on forecasts made by both institutions in order to know whether the Greenbook's forecasts contain information that could be useful to private agents to form their forecasts. This method is applied from **Fair and Shiller (1989, 1990)** and **Romer and Romer (2000).** The point as described by the latter is to see if individuals who know the private sector forecasts could make better forecasts if they also knew the central banks' ones. The regression takes the following form:

$$Y_{t+h} = \alpha + \beta_{CB} \cdot CB_t^h + \beta_{PS} \cdot PS_t^h + \varepsilon_t$$

Where Y_{t+h} is the actual value of inflation or GDP, CB_t^h is the forecast made by the central bank and PS_t^h by the private sector in date *t* for *h* horizons later. The main idea behind this regression is then to see if central bank's forecasts contains useful information to forecast inflation or GDP and more useful information than the one given by private sector's forecasts by testing whether β_{CB} is significantly different from zero, whether β_{CB} is near to 1 and β_{CB} is different and higher than β_{PS}. Standard errors are here again computed using the Newey-West's HAC methodology to correct serial correlation.

We present for each country the MSE for every comparable measure published, while we restrict the regression analysis to the longest and most regular data. Concerning the length of samples, availability and compatibility of data determines our sample. Although the available time series are relatively short (most of central banks that publishes forecasts started in late nineties or in this decade), the general sample corresponds to a period in which inflation has been very stable. There is then no problem of credibility of the central bank and its decisions (for instance, private agents' views that central banks won't succeed to fight strong inflation in the beginning of the eighties) that could have favor central banks to the detriment of private sector. The sample is stable here and rules out the **Atkeson and Ohanian (2001)**'s remark on this point.

Robustness
In order to check that regressions are not distorted by multicollinearity (forecasts are indeed highly correlated between themselves) as discussed by **Granger and Newbold (1977)**, the actual variable is regressed on only one forecast at the same time:

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[9] In regressions as the ones used hereafter, the problem due to the correlation between forecast errors leads to calculate robust standard errors to serial correlation. Indeed, when forecasts for four quarters ahead miss an unexpected change in the variable, this would definitely cause forecasts errors all in the same direction. Forecasts are then declared serially correlated. In order to deal with this problem, when considering forecasts for inflation h quarters ahead, the standard errors are computed correcting for heteroskedasticity and serial correlation according to the Newey and West's *HAC Consistent Covariances* method.

$$Y_{t+h} = \alpha + \beta_{CB\,or\,PS} \cdot [CB_t^h \text{ or } PS_t^h] + \varepsilon_t$$

The objective of this univariate regression is to assess the validity of the previous regression with forecasts combination by simply comparing the statistical tools of significance of the model between the different forecasts, so as to ensure that the explanatory power found in the main regression is still valid when forecasts are compared one by one and not together. It is then informative to look at the R^2, the significance of the coefficient associated to the forecast $\beta_{CB\,or\,PS}$ and in what extent this one is near to 1.

Results

For **Sweden**, table 1a displays Mean Square Errors for quarterly forecasts and shows that CPI's Riksbank errors are largely smaller than those of CF, while quite similar for GDP. When comparing in table 1b with Prospera's survey, CPI forecasts' errors of the central bank are lower than those from all respondents, but are similar then those from money market players. Individual forecasts from table 1c confirm that the superiority of the Riksbank is not only on the mean of Consensus Forecasts' respondents but also on almost each individual respondent for inflation. Finally, table 1d displays regressions that strongly validate these findings for CPI and let suppose that if the Riksbank has an advantage on GDP, evidence is in this case more mixed. These last outcomes are confirmed by the R^2 of the univariate regressions that show a higher predictive power of the Riksbank's inflation forecasts.

For the **UK**, table 2a, 2b and 2c shows Mean Square Errors respectively of the Bank of England compared to Consensus Forecasts on current and the six next quarters, to Gfk-NOP survey for 1 year ahead inflation forecasts, and to SEF 2 years ahead. Forecasts errors are globally very similar and not significantly different either for inflation than for GDP. One can only note that for inflation at long horizons (Q+4, Q+6 and 2 years ahead) private forecasters have a very little advantage on the BoE. Regressions (table 2d) do not show evidence of any informational advantage in favor of one or the other actor and confirm the previous results.

For **Canada**, table 3a and 3b present Mean Square Errors of both institutions and show slightly better forecasts for Consensus Forecasts at short horizons and equivalent accuracy at longer horizons for both CPI and GDP. We have nevertheless to keep in mind that CF benefits from a strong (2 months) timing advantage. The regression analysis in table 3c specifies the results: with a base timing, there is a no clear-cut advantage of CF on short horizons (which is more visible for GDP) while similar forecast errors at longer horizons. With the timing correction, the weak advantage of CF disappears and there is no evidence of any informational advantage in favor of one or the other.

For **Japan**, results are hardly interpretable in order to evaluate a potential information asymmetry. Focusing on current year forecasts, Mean Square Errors of CPI forecasts (table 4a) are equivalent, while regressions (table 4b) give more weight to the BoJ. For GDP, MSEs are significantly smaller for the Bank of Japan (BoJ), but regressions do not confirm this outcome. All in all, there is no evidence of any informational advantage.

For **Switzerland**, results for current year CPI forecasts are mixed between Mean Square Errors (very close, see table 5a) and regressions (table 5b) and with-in regressions. At the contrary, the pattern for next year forecasts appears a little bit clearer: Consensus Forecasts has a small advantage on the central bank.

Discussion

All in all, Sweden is the only central bank of the set to benefit from a clear informational advantage on private agents on inflation. There is no evidence of any advantage for Canada and Japan. For the UK and Switzerland, while there is no more evidence for forecasts at short horizons, central banks seem not to have as good inflation forecasts as private agents for longer horizons.

In comparison to the literature, **Boero, Smith and Wallis (2008)** find that the SEF average point forecast of inflation outperforms the BoE's forecast. We confirm this specific result but limit its scope. Indeed, SEF is constructed asking for forecasts of the fourth quarter of the current year, of the following year and two years ahead, so at longer horizons than in Consensus Forecast. In this study, due to data availability, we focus on SEF's forecasts two year ahead. The comparison with Consensus Forecasts shows that while there is an advantage on inflation for private agents at longer horizons, both actors are equal for short horizons inflation forecasts. Moreover, **Blix, Wadefjord, Wienecke and Adahl (2001)** make a comprehensive work on the forecasting performance of 250 major institutions and finds among other patterns that growth is more difficult to forecast than inflation. This result is confirmed for 4 out of 5 countries, the Bank of Canada and private agents having a better record for GDP forecasts. In general, the relative good forecasting performance of surveys legitimates the choice to consider them as proxy of forecasts of private agents[10].

The results obtained in this section can be compared to those in **Hubert (2008)**, in which the Fed, a secret central bank that publishes its forecasts with a 5-year lag, is shown to benefit from an informational advantage on private agents about inflation. This comparison shed light on the possible sources of informational advantage.

First, the institutional and inherent advantage due to the advance knowledge of future policy path can be reconsidered. Four out of five central banks do not benefit from it. This appears to be confirmed by the fact that Sweden, the only country where the central bank experiences a significant informational advantage, is also the only one in our set to publish explicit interest rate paths. It might be an advantage for the central bank on private agents, but it is not a sufficient condition. Interest rate path results from macroeconomic forecasts and are in fact endogenous to the specific expertness of the central bank. Second, on can note that secrecy does not confer either an advantage to the central bank, as Sweden example demonstrates. Advantage of relative bigger information set due to non-publication of its forecasts is not a sufficient condition as well to explain Fed's informational advantage. Third, the monetary framework does not seem to play a role in benefiting from an informational advantage, as there are major institutional, status and strategic differences between the Fed and the Riksbank.

These findings reinforce the argument that informational advantage of some central banks stems from some specific expertness, in comparison to the institutional aspects cited above.

Communication impact on private agents' forecasting ability

Finally, we infer from a simple analysis of forecast errors whether communication of information tends to improve private agents ability to forecast, according to the theoretical debate on the implications of release of information, positive for **Morris and Shin (2002)** and **Svensson (2005)** and negative for **Amador and Weill (2008)**. Figures 1 show root mean square errors for CPI and GDP forecasts of private agents gathered in Consensus Forecasts, for the period from 1999Q2 to 2007Q4. These figures could be separate in three categories.

[10] One might even consider that respondents to these surveys are generally the better informed agents through a selection bias. This reinforces anyway the use of these surveys when assessing information asymmetry with the central bank.

Those for which the publication of forecasts by the central bank has started before our sample, namely both figures for the UK, can hardly shed light on this debate. We can only note that errors are varying considerably from 0 to 1.25-1.5 percentage point. The second category includes forecasts in countries for which central banks have started to publish forecasts at the beginning of our sample, as Sweden for CPI, Japan for CPI and GDP, and Switzerland for CPI. This configuration does not allow to compare with previous RMSE but if we suppose there is a learning mechanism at work and that private agents are not able to use central bank forecasts instantaneously, we can observe the effects of forecasts' communication after its setting-up. For CPI forecasts in Sweden and Japan, and Switzerland, figures do not show an increase in forecasting ability. For GDP forecasts in Japan, the picture is different: forecast errors are regularly decreasing. However, this does not seem robust as it is concomitant with a stabilisation of the GDP growth rate. Low forecast errors in a context of highest variance of the GDP growth rate as in the beginning of the sample would be more convincing evidence. Last, the third category comprises situations in which central banks have started to publish forecasts in the middle of the sample: Sweden for GDP and Canada for CPI and GDP. There is no evidence either of improve of forecasting ability after the publication of central banks' forecasts. The simple analysis introduced here appears then to confirm **Amador and Weill (2008)**'s statement.

5. Influence of Central Banks

We now assess in what extent the central bank or private sector, represented by surveys of Consensus Forecasts, influences the other. Here again, we consider the influence power of each actor through its forecasts. Practically, we calculate whether the central bank's (resp. the private sector) publication of forecasts influence private sector's (resp. central bank).

Two tests are implemented. The first one is a simple test of Granger causality between forecasts of private sector and central bank.

$$CB_t^h \text{ or } PS_t^h = \alpha + \beta_{CB} \cdot CB_{t-1}^h + \beta_{PS} \cdot PS_{t-1}^h + \varepsilon_t$$

We evaluate the influence of the central bank (resp. the private sector) regarding the significance of the coefficient associated to its forecast in the regression where the dependent variable is the private sector's forecast (resp. the central bank).

Because the Granger causality test compares series of forecasts at the same horizon, there is weak *practical* basis that forecasts for current (or next) quarter is influenced by the forecasts at the previous date for current (or next) quarter. It seems more plausible that forecasts for a given future quarter is influenced by previous forecasts for this same given future quarter.[11] We therefore introduce a second test, in which we assess the influence of each actor for the construction of a forecast at the *given* date for the *given* horizon, through the forecasts of both actors at the *previous* date for one horizon *later*.[12] The generic form of the regression is then the following, with i being the time-lag we want to introduce:

$$CB_t^h \text{ or } PS_t^h = \alpha + \beta_{CB} \cdot CB_{t-i}^{h+i} + \beta_{PS} \cdot PS_{t-i}^{h+i} + \varepsilon_t$$

Here again, we test whether the coefficient associated to CB's forecast is significant or not in determining the PS's forecast. We test for each country for various horizon h and date t, in order to assure of the robustness of our results.

[11] Theoretically however, both tests are consistent as agents are supposed to incorporate all information available at date t in their decision making process.

[12] Due to series' format and differences between the rhythm of publication and horizon of forecasts, the forecast for the next horizon (the next year) that is supposed to give information on the forecast for the current year is shifted back 4 periods for Switzerland (quarterly publications).

In this set of tests, we do not infer influence with accuracy of the forecasts. We evaluate whether the central bank forecasts are based on its forecasts or on those of the private sector. In other words, we do not consider whether it is desirable that the central bank use good or bad quality forecasts or whether it use *only* its information, while it could be optimal to take into account private sector's information. We focus beyond these considerations on the influence of each actor on the other.

Results
For **Sweden**, table 6a presents the Granger causality analysis. It shows that for CPI, private sector's forecasts are never significant when the central bank's forecasts are the dependant variable, while this latter is significant at 1% in the private sector equation. Concerning GDP, there is no evidence of influence in either direction. Table 6b shows the influence tests and gathering horizons and dates of forecasts, the two previous results are confirmed: the Riksbank has a clear influence on private sector for CPI. Its coefficients are always significant at 1%. There is no influence for GDP from either side. In general, we can note that influence from the central bank is more visible for the most recent forecasts.

For the **UK**, table 7a provides the Granger causality tests. These ones show that for RPIX and CPI-H, there is a strong influence of the central bank, as forecasts are very significant for the determination of the private sector's forecasts and the inverse is not true. For GDP, there is no influence from one to the other. Influence tests are gathered in table 7b. Influence of the central bank is robustly confirmed for inflation. The switch to CPI-H still presents an influential power of the BoE, but only visible for the last forecasts (those made in *t-1*). Last, we can note that there is evidence for influence from the central bank concerning GDP for forecasts of current quarter made recently (*t-1*, *t-2*).

For **Canada**, table 8a shows Granger causality tests. In the base specification (for which there is a timing advantage of 2 months for Consensus Forecasts), CF's forecasts are always significant for CPI, though at different levels according to horizons observed. When considering the timing correction specification, there is no evidence of influence from either side: forecasts of the one are respectively significant in determining the forecasts of the other. Concerning GDP and comparing both specifications, it appears that there is also no respective influence. Table 8b confirms it seems that no influence is exerted from either actor. No clear evidence arises from these calculations.

For next both countries studied, because forecasts are published in fixed horizon scheme and very little data are available, there are no many specifications to test the robustness of our results. We then reintroduce for each test the univariate regressions. We now compare the weight of the forecasts of each actor in determining the forecasts of the other. Appreciation of influence is made with the value of the coefficient associated to forecasts and the R^2.

For **Japan**, outcomes from table 9 are straightforward. Whatever the forecasts are for CPI or GDP, the BoJ influences the private sector. These results are consistent with those of **Fujiwara (2005)**.

For **Switzerland**, it has to be noted first that the influence tests have not the same content here than previously. Indeed, the regressors here are still forecasts made one quarter before but for the next calendar year. Results (tables 10) show that for forecasts of current year, there seems to be an influence of the private sector, however not firmly confirmed by univariate regressions; and likewise for forecasts of next year, evidence is mixed and do not allow to conclude on a possible influential power.

Discussion
Finally, Sweden, the UK and Japan display strong influence of the central bank on private agents through inflation forecasts, while for Canada and Switzerland evidence is mixed. There is no clear empirical support for influence of the private sector on policymakers. In general, influence is more significant from the nearest forecasts (those made in *t-1* and *t-2*). Similarly, influence is more significant for forecasts at very short horizons (current or next quarters). Evidence of influential power of GDP forecasts is weak, and these two patterns are besides the limits of the scope of central bank influence when there is.
It has to be noted that there is no clear relation between informational advantage and influence. Switzerland experiences some slight informational advantage of private sector but no evidence of influence, while the BoE is in the same situation of lower forecast accuracy compared to private sector but clearly influences it. Similarly, central banks of Sweden, Japan and the UK influence all three their respective private sector, with different degrees of informational advantage. We can only note that at both extreme: Sweden has the most pronounced informational advantage and the most stated evidence of influential power, whereas Switzerland for which there is signs of asymmetry in favour of private agents, evidence of influence of the central bank is the weakest and of private sector the most perceptible.

Thus, while publication of forecasts allows dissemination of information about the views, models and preferences of the central bank, this paper suggests that central bank need not to be more informed to be influential. One possible interpretation of the influence of central banks' forecasts might arise from coordination games between economic agents to form their expectations. In a context of imperfect information and higher order expectations, central banks' forecasts may be view as a signal from an actor that can be acknowledged as the leader in the monetary policy game. Influence may then stem from a recognized position of leader of central banks and an accepted position of follower of private agents.

6. Conclusion

In this paper, we contribute to the literature in two ways: first, we provide an empirical assessment of the potential information asymmetry between the central bank and private agents, in five countries for which central banks publish forecasts. We find that only one out of five, the Riksbank, benefits from an informational advantage. Differences between these central banks and the Fed suggest that advance knowledge of future policy path, secrecy and the institutional framework are not sufficient conditions for higher forecasts accuracy compared to private agents. Second, we test the influential power of central bank's forecasts on private agents' and the inverse. We find that in three out of five countries, Sweden, the UK and Japan, the central bank influences the private sector. There is no support in our results of a direct link between private information and influence. One possible source for this influence of central banks might then be its position of leader in expectations' formation.

Lastly, it is possible that the sample used in this study is too short to examine informational advantage and influence of central banks, especially in the case of Canada for which the central bank has started only five years ago to publish forecasts and there is a strong timing issue with private forecasts. However, significant evidence is all the more so noteworthy than inflation and GDP growth rate have been extremely stable on the period considered.

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Tables 1 - Forecasts' Accuracy of central bank and private sector in Sweden

1a. Mean Square Errors for CPI-GDP forecasts

	CPI - Riksbank	CPI - Consensus Forecasts	p-value
Current	0.05	0.30	0.19
Q+1	0.21	0.43	0.17
Q+2	0.32	0.70	0.17
Q+3	0.46	0.91	0.13
Q+4	0.57	1.07	0.11
Q+5	0.80	1.25	0.09
Q+6	0.99	1.52	0.03
	GDP - Riksbank	GDP - Consensus Forecasts	p-value
Current	0.67	0.60	0.69
Q+1	0.80	0.87	0.77
Q+2	0.93	0.96	0.92
Q+3	0.71	0.95	0.39
Q+4	0.68	1.03	0.25
Q+5	0.60	1.11	0.11
Q+6	0.63	1.19	0.04

The p-value is for the test of the null hypothesis that the central bank errors and private sector errors are equal.

1b. Mean Square Errors for CPI forecasts

		Riksbank	p-value
1 year ahead (Q+4)			
Prospera - ALL	1.60	1.18	0.11
Prospera - Money Market Players	1.30		0.45
2 years ahead (Q+8)			
Prospera - ALL	1.62	1.36	0.29
Prospera - Money Market Players	1.31		0.32

1c. MSE for Individual forecasts

CPI forecasts			GDP forecasts		
from 1999 to 2007		Riksbank	from 1999 to 2007		Riksbank
National Institute - NIER	0.14	0.14	HQ Bank	0.85	
JP Morgan	0.16		Nordea	1.12	
Morgan Stanley	0.17				1.13
Nordea	0.21		SE Banken	1.14	
MEAN	0.22		Svenska Handelsbanken	1.32	
HQ Bank	0.23		MEAN	1.35	
Merrill Lynch	0.26		Öhman	1.41	
SE Banken	0.26		JP Morgan	1.46	
Öhman	0.30		Morgan Stanley	1.52	
Confed of Swed Enterprise	0.35		National Institute - NIER	1.54	
Svenska Handelsbanken	0.41		Merrill Lynch	1.56	
			Confed of Swed Enterprise	1.90	
from 1999 to 2005			from 1999 to 2005		
Finanskonsult	0.76	**0.17**	Finanskonsult	1.77	**1.36**
from 1999 to 2004			from 1999 to 2004		
Alfred Berg	0.57	**0.17**	Alfred Berg	1.92	**1.53**
from 2000 to 2007			from 2000 to 2007		
Swedbank	0.31	**0.12**	Swedbank	1.24	**0.89**
UBS	0.25	**0.12**	UBS	0.97	**0.89**
from 2002 to 2007			from 2002 to 2007		
Skandiabanken	0.37	**0.10**	Skandiabanken	**0.50**	0.53
from 2003 to 2007			from 2003 to 2007		
SBAB	0.15	**0.11**	SBAB	0.62	**0.60**
from 2004 to 2007			from 2004 to 2007		
Econ Intelligence Unit	0.46	**0.12**	Econ Intelligence Unit	0.95	**0.74**
ING Financial Markets	0.41	**0.12**	ING Financial Markets	**0.59**	0.74

1d. Regressions

Variable	CPI	GDP	CPI		GDP	
	Y_{t+h}	Y_{t+h}	Y_{t+h}	Y_{t+h}	Y_{t+h}	Y_{t+h}
$CB^{h=0}_t$	0.885***	1.162**	0.950***		0.487*	
	(0.026)	(0.410)	(0.027)		(0.240)	
$PS^{h=0}_t$	0.079*	-0.965		0.810***		0.429
	(0.038)	(0.603)		(0.189)		(0.274)
R^2	0.94	0.43	0.93	0.67	0.29	0.15
$CB^{h=1}_t$	0.890***	1.118***	0.993***		0.378	
	(0.100)	(0.345)	(0.082)		(0.215)	
$PS^{h=1}_t$	0.132*	-1.507***		0.843***		-0.129
	(0.066)	(0.420)		(0.218)		(0.436)
R^2	0.74	0.51	0.74	0.52	0.16	0.01
$CB^{h=2}_t$	1.036***	0.980**	1.044***		0.126	
	(0.134)	(0.421)	(0.112)		(0.361)	
$PS^{h=2}_t$	0.012	-1.876***		0.709**		-0.606
	(0.083)	(0.577)		(0.345)		(0.583)
R^2	0.61	0.34	0.61	0.27	0.01	0.08
$CB^{h=3}_t$	1.118***	0.780**	1.128***		0.415	
	(0.178)	(0.319)	(0.180)		(0.287)	
$PS^{h=3}_t$	0.028	-1.591		0.538		-0.597
	(0.118)	(0.880)		(0.489)		(1.073)
R^2	0.45	0.21	0.45	0.08	0.09	0.02
$CB^{h=4}_t$	1.107***	0.817	1.110***		0.812**	
	(0.324)	(0.577)	(0.325)		(0.273)	
$PS^{h=4}_t$	0.028	-0.023		0.29		1.246
	(0.172)	(1.735)		(0.427)		(0.819)
R^2	0.25	0.19	0.25	0.02	0.19	0.06

Numbers in parentheses are robust standard errors. *,**,*** means respectively significant at 10%, 5% and 1%.

Tables 2 - Forecasts' Accuracy of central bank and private sector in the UK

2a. Mean Square Errors for quarterly forecasts

	BoE - Constant Rate	BoE - Market Rate	Consensus Forecasts	p-value
RPIX - 1999.2 - 2003.4				
Current	0.07	0.07	0.08	0.46
Q+1	0.10	0.10	0.10	0.89
Q+2	0.10	0.10	0.11	0.78
Q+3	0.14	0.14	0.13	0.80
Q+4	0.14	0.14	0.15	0.96
Q+5	0.17	0.18	0.15	0.67
Q+6	0.24	0.25	0.17	0.11
CPI - 2005.1 - 2007.4				
	BoE - Constant Rate	BoE - Market Rate	Consensus Forecasts	p-value
Current	0.07	0.07	0.07	0.97
Q+1	0.13	0.13	0.15	0.51
Q+2	0.20	0.20	0.20	0.95
Q+3	0.26	0.25	0.25	0.93
Q+4	0.47	0.46	0.40	0.04
Q+5	0.62	0.57	0.48	0.11
Q+6	0.59	0.53	0.56	0.05
GDP - 1999.2 - 2007.4				
	BoE - Constant Rate	BoE - Market Rate	Consensus Forecasts	p-value
Current	0.57	0.58	0.68	0.38
Q+1	0.65	0.65	0.78	0.37
Q+2	0.71	0.71	0.87	0.36
Q+3	0.75	0.74	0.84	0.67
Q+4	0.56	0.54	0.64	0.67
Q+5	0.41	0.38	0.50	0.54
Q+6	0.36	0.35	0.52	0.34

The p-value is for the test of the null hypothesis that the central bank's constant rate errors and private sector errors are equal.

2b. MSE for 1 year ahead forecasts

	RPIX & CPI-H
BoE -Constant rate	0.26
BoE -Market rate	0.26
Gfk-NOP	0.22
p-value	0.55

2c. MSE for 2 years ahead forecasts

	Inflation	GDP
BoE-CR	0.30	0.36
BoE-MR	0.30	0.43
SEF	0.23	0.37
p-value	0.06	0.86

2d. Regressions

Variable	RPIX Y_{t+h}	CPI Y_{t+h}	GDP Y_{t+h}	RPIX Y_{t+h}	RPIX Y_{t+h}	CPI Y_{t+h}	CPI Y_{t+h}	GDP Y_{t+h}	GDP Y_{t+h}
$CB^{h=0}_t$	0.799*	0.535	0.381	0.746***		0.977***		0.510***	
	(0.381)	(0.715)	(0.415)	(0.134)		(0.244)		(0.172)	
$PS^{h=0}_t$	-0.070	0.581	0.143		0.762***		1.178***		0.497**
	(0.399)	(0.770)	(0.556)		(0.158)		(0.250)		(0.238)
R^2	0.57	0.66	0.26	0.57	0.44	0.64	0.63	0.26	0.24
$CB^{h=1}_t$	0.493	0.481	0.361	0.658**		0.775**		0.391**	
	(0.853)	(0.566)	(0.267)	(0.239)		(0.322)		(0.175)	
$PS^{h=1}_t$	0.235	0.421	0.043		0.785***		0.969*		0.359
	(0.933)	(1.026)	(0.406)		(0.177)		(0.478)		(0.259)
R^2	0.34	0.36	0.12	0.33	0.30	0.35	0.33	0.12	0.09
$CB^{h=2}_t$	0.668	-0.297	0.335	0.681***		0.582		0.188	
	(0.485)	(0.836)	(0.257)	(0.153)		(0.503)		(0.240)	
$PS^{h=2}_t$	0.022	1.501	-0.358		0.761**		1.129*		-0.114
	(0.683)	(1.025)	(0.366)		(0.265)		(0.521)		(0.282)
R^2	0.31	0.29	0.05	0.31	0.21	0.16	0.28	0.02	0.00
$CB^{h=3}_t$	0.420	-0.553*	0.027	0.490*		0.712**		-0.099	
	(0.350)	(0.281)	(0.296)	(0.281)		(0.229)		(0.370)	
$PS^{h=3}_t$	0.337	3.074***	-0.969**		0.891		2.313***		-0.960**
	(0.687)	(0.680)	(0.394)		(0.568)		(0.497)		(0.390)
R^2	0.13	0.56	0.16	0.12	0.06	0.16	0.52	0.00	0.16
$CB^{h=4}_t$	0.457	0.076	-0.023	0.43		-0.66		-0.003	
	(0.285)	(3.691)	(0.486)	(0.285)		(0.883)		(0.563)	
$PS^{h=4}_t$	-0.499	-2.228	-1.279**		-0.259		-2.019		-1.278
	(0.996)	(9.338)	(0.469)		(1.249)		(1.953)		(0.456)
R^2	0.09	0.10	0.16	0.08	0.00	0.09	0.10	0.00	0.16

Numbers in parentheses are robust standard errors. *,**,*** means respectively significant at 10%, 5% and 1%.

Tables 3 - Forecasts' Accuracy of central bank and private sector in Canada

3a. MSE of Quarterly forecasts

	2003Q2 - 2007Q4		
	CPI - BoC	CPI - CF	p-value
Current	0.38	0.22	0.05
Q+1	0.43	0.34	0.17
Q+2	0.65	0.40	0.07
Q+3	0.48	0.45	0.71
Q+4	0.46	0.46	0.98
	2005Q2 - 2007Q4		
	GDP - BoC	GDP - CF	p-value
Current	0.17	0.10	0.03
Q+1	0.36	0.14	0.01
Q+2	0.34	0.33	0.83
Q+3	0.30	0.34	0.75
Q+4	0.25	0.19	0.32

The p-value is for the test of the null hypothesis that the central bank and private sector errors are equal.

3b. MSE of Annual Average Real GDP forecasts

	from 2002 to 2007	p-value
Consensus Forecasts	0.21	0.811
Bank of Canada	0.20	

The p-value is for the test of the null hypothesis that the central bank and private sector errors are equal.

3c. Regressions

	Base (2 months gap)						Timing Correction (1month gap)		
Variable	CPI Y_{t+h}	GDP Y_{t+h}	CPI Y_{t+h}	CPI Y_{t+h}	GDP Y_{t+h}	GDP Y_{t+h}		CPI Y_{t+h}	GDP Y_{t+h}
$CB^{h=0}_t$	-0.161	-0.699**	0.492***		0.829***		$CB^{h=0}_t$	0.436	0.249
	(0.435)	(0.309)	(0.158)		(0.255)			(0.288)	(0.651)
$PS^{h=0}_t$	1.101	2.345***		0.876***		1.469***	$PS^{h=1}_{t-1}$	0.122	0.731
	(0.697)	(0.438)		(0.251)		(0.173)		(0.280)	(0.882)
R^2	0.41	0.88	0.30	0.40	0.50	0.81	R^2	0.26	0.52
$CB^{h=1}_t$	0.115	-0.925**	0.409**		0.269		$CB^{h=1}_t$	0.330	0.141
	(0.256)	(0.381)	(0.187)		(0.368)			(0.483)	(0.733)
$PS^{h=1}_t$	0.433	1.753***		0.551**		1.010***	$PS^{h=2}_{t-1}$	0.159	0.117
	(0.335)	(0.416)		(0.242)		(0.271)		(0.660)	(1.184)
R^2	0.22	0.75	0.18	0.21	0.04	0.51	R^2	0.19	0.03
$CB^{h=2}_t$	-0.318	-0.420	0.095		0.001		$CB^{h=2}_t$	-0.264	0.391
	(0.199)	(1.130)	(0.310)		(0.776)			(0.325)	(1.249)
$PS^{h=2}_t$	0.780**	0.500		0.527*		0.280	$PS^{h=3}_{t-1}$	0.985	-0.913
	(0.263)	(0.690)		(0.293)		(0.476)		(0.791)	(1.331)
R^2	0.21	0.05	0.01	0.16	0.00	0.03	R^2	0.08	0.02
$CB^{h=3}_t$	0.277	1.318	0.452		0.439		$CB^{h=3}_t$	-0.051	-0.022
	(0.424)	(1.302)	(0.456)		(0.923)			(0.207)	(1.070)
$PS^{h=3}_t$	0.362	-2.065		0.562		-0.283	$PS^{h=4}_{t-1}$	-0.173	-0.082
	(0.542)	(1.084)		(0.561)		(1.008)		(0.779)	(2.705)
R^2	0.07	0.14	0.06	0.06	0.04	0.00	R^2	0.00	0.00
$CB^{h=4}_t$	0.011	0.866	0.000		0.219				
	(0.326)	(1.303)	(0.349)		(0.384)				
$PS^{h=4}_t$	-0.192	-2.144		-0.191		-0.133			
	(0.772)	(5.169)		(0.775)		(2.292)			
R^2	0.00	0.07	0.00	0.00	0.01	0.00			

Numbers in parentheses are robust standard errors. *,**,*** means respectively significant at 10%, 5% and 1%.

Tables 4 - Forecasts' Accuracy of central bank and private sector in Japan

4a. Mean Square Errors for annual forecasts

	BoJ	CF	p-value
CPI - Current Year	0.039	0.036	0.876
CPI - Next Year	0.162	0.103	0.251
GDP - Current Year	0.364	0.674	0.052
GDP - Next Year	0.313	0.509	0.473

The p-value is for the test of the null hypothesis that the central bank's constant rate errors and private sector errors are equal.

4b. Regressions

Variable	CPI	GDP	CPI		GDP	
	Y_{t+h}	Y_{t+h}	Y_{t+h}	Y_{t+h}	Y_{t+h}	Y_{t+h}
$CB^{h=0}_t$	0.551**	0.482	0.725***		0.681***	
	(0.207)	(0.302)	(0.071)		(0.060)	
$PS^{h=0}_t$	0.216	0.176		0.785***		0.557***
	(0.233)	(0.246)		(0.064)		(0.066)
R^2	0.87	0.78	0.86	0.78	0.78	0.74

Numbers in parentheses are robust standard errors. *,**,*** means respectively significant at 10%, 5% and 1%.

Tables 5 - Forecasts' Accuracy of central bank and private sector in Switzerland

5a. Mean Square Errors for annual forecasts

	BNS	CF	p-value
CPI - Current Year	0.027	0.019	0.077
CPI - Next Year	0.250	0.124	0.044

The p-value is for the test of the null hypothesis that the central bank's constant rate errors and private sector errors are equal.

5b. Regressions

Variable	CPI	CPI	
	Y_{t+h}	Y_{t+h}	Y_{t+h}
$CB^{h=0}_t$	-0.064	0.707***	
	(0.270)	(0.097)	
$PS^{h=0}_t$	0.807***		0.746***
	(0.265)		(0.078)
R^2	0.82	0.75	0.82
$CB^{h=1}_t$	-0.196	0.096	
	(0.279)	(0.080)	
$PS^{h=1}_t$	0.537		0.248**
	(0.385)		(0.096)
R^2	0.13	0.04	0.10

Numbers in parentheses are robust standard errors.
*,**,*** means respectively significant at 10%, 5% and 1%.

Tables 6 - Influence of central bank and private sector in Sweden

6a. Granger Causality Tests

	CPI		GDP	
	CB^h_t	PS^h_t	CB^h_t	PS^h_t
	h=0		h=0	
CB^h_{t-1}	0.765***	0.870***	0.915**	0.359
	(0.148)	(0.119)	(0.386)	(0.246)
PS^h_{t-1}	0.060	-0.014	-0.605	0.291
	(0.093)	(0.092)	(0.541)	(0.333)
R^2	0.57	0.73	0.39	0.66
	h=1		h=1	
CB^h_{t-1}	0.925***	0.837***	0.843**	0.344***
	(0.143)	(0.062)	(0.362)	(0.111)
PS^h_{t-1}	-0.048	-0.017	-0.473	0.239
	(0.105)	(0.047)	(0.414)	(0.235)
R^2	0.65	0.78	0.39	0.67
	h=2		h=2	
CB^h_{t-1}	0.772***	0.591***	0.898***	0.198
	(0.185)	(0.074)	(0.263)	(0.140)
PS^h_{t-1}	-0.082	0.026	-0.688*	0.321
	(0.105)	(0.074)	(0.380)	(0.317)
R^2	0.41	0.56	0.41	0.45
	h=3		h=3	
CB^h_{t-1}	0.705***	0.436***	0.645**	0.078
	(0.237)	(0.091)	(0.282)	(0.144)
PS^h_{t-1}	0.034	0.157*	-0.523	0.263
	(0.105)	(0.087)	(0.521)	(0.338)
R^2	0.37	0.54	0.32	0.13
	h=4		h=4	
CB^h_{t-1}	0.785***	0.305***	0.697***	0.095
	(0.150)	(0.083)	(0.224)	(0.148)
PS^h_{t-1}	0.048	0.298*	-0.687	0.239
	(0.096)	(0.169)	(0.634)	(0.276)
R^2	0.54	0.41	0.37	0.12

Numbers in parentheses are robust standard errors. *,**,*** means respectively significant at 10%, 5% and 1%.

6b. Influence Tests

	CPI		GDP	
	CB^h_t	PS^h_t	CB^h_t	PS^h_t
	h=0		h=0	
CB^1_{t-1}	1.014***	0.997***	0.875***	0.537***
	(0.101)	(0.115)	(0.224)	(0.137)
PS^1_{t-1}	0.035	-0.004	-0.367	0.213
	(0.081)	(0.133)	(0.413)	(0.247)
R^2	0.79	0.84	0.50	0.76
	h=0		h=0	
CB^2_{t-2}	1.011***	0.884***	0.764*	0.636**
	(0.132)	(0.138)	(0.364)	(0.239)
PS^2_{t-2}	0.129	0.158	-0.533	-0.106
	(0.084)	(0.149)	(0.639)	(0.365)
R^2	0.64	0.65	0.21	0.45
	h=0		h=0	
CB^3_{t-3}	1.148***	0.954***	0.520	0.460
	(0.182)	(0.130)	(0.411)	(0.338)
PS^3_{t-3}	0.085	0.308*	-1.072	-0.254
	(0.149)	(0.173)	(1.005)	(0.591)
R^2	0.47	0.49	0.07	0.16
	h=0		h=0	
CB^4_{t-4}	1.092***	1.113***	1.626***	1.245***
	(0.347)	(0.315)	(0.332)	(0.241)
PS^4_{t-4}	0.270	0.358*	-3.878***	-2.424**
	(0.196)	(0.196)	(0.778)	(1.056)
R^2	0.27	0.32	0.61	0.59

	CPI		GDP	
	CB^h_t	PS^h_t	CB^h_t	PS^h_t
	h=1		h=1	
CB^2_{t-1}	0.962***	0.800***	1.084***	0.429***
	(0.119)	(0.109)	(0.324)	(0.137)
PS^2_{t-1}	0.086	0.132	-0.645	0.420
	(0.073)	(0.149)	(0.423)	(0.307)
R^2	0.72	0.76	0.45	0.72
	h=1		h=1	
CB^3_{t-2}	1.008***	0.882***	0.641	0.265
	(0.194)	(0.124)	(0.520)	(0.261)
PS^3_{t-2}	0.222	0.257*	-1.034*	0.013
	(0.132)	(0.134)	(0.545)	(0.416)
R^2	0.48	0.57	0.16	0.11
	h=1		h=1	
CB^4_{t-3}	1.290***	1.002***	1.155***	0.611***
	(0.313)	(0.195)	(0.266)	(0.131)
PS^4_{t-3}	0.296	0.372*	-2.919**	-1.640**
	(0.206)	(0.188)	(1.232)	(0.606)
R^2	0.38	0.36	0.38	0.50

	CPI		GDP	
	CB^h_t	PS^h_t	CB^h_t	PS^h_t
	h=2		h=2	
CB^3_{t-1}	1.123***	0.772***	0.605	0.232
	(0.138)	(0.063)	(0.465)	(0.186)
PS^3_{t-1}	0.037	0.181	-0.167	0.527
	(0.106)	(0.111)	(0.523)	(0.359)
R^2	0.70	0.76	0.23	0.37
	h=2		h=2	
CB^4_{t-2}	1.322***	0.832***	0.751**	0.237
	(0.279)	(0.124)	(0.241)	(0.222)
PS^4_{t-2}	0.296*	0.431***	-2.054***	-0.587
	(0.156)	(0.138)	(0.485)	(0.388)
R^2	0.49	0.49	0.47	0.13

Numbers in parentheses are robust standard errors. *,**,*** means respectively significant at 10%, 5% and 1%.

Tables 7 - Influence of central bank and private sector in the UK

7a. Granger Causality Tests

	RPIX		CPIH		GDP	
	CB^h_t	PS^h_t	CB^h_t	PS^h_t	CB^h_t	PS^h_t
	h=0		h=0		h=0	
CB^h_{t-1}	0.585*	0.616**	0.103	0.574**	0.880***	0.499*
	(0.299)	(0.233)	(0.354)	(0.235)	(0.229)	(0.268)
PS^h_{t-1}	0.086	0.079	0.473	-0.203	-0.249	0.221
	(0.402)	(0.343)	(0.456)	(0.304)	(0.246)	(0.262)
R^2	0.40	0.59	0.38	0.34	0.50	0.62
	h=1		h=1		h=1	
CB^h_{t-1}	1.083***	0.943***	0.246	0.574**	0.738***	0.135
	(0.342)	(0.242)	(0.300)	(0.220)	(0.186)	(0.173)
PS^h_{t-1}	-0.476	-0.342	0.577	0.039	-0.163	0.485***
	(0.370)	(0.249)	(0.454)	(0.373)	(0.235)	(0.170)
R^2	0.58	0.78	0.62	0.62	0.47	0.50
	h=2		h=2		h=2	
CB^h_{t-1}	0.940***	0.896***	0.431	0.718***	0.570***	0.008
	(0.247)	(0.193)	(0.330)	(0.173)	(0.157)	(0.116)
PS^h_{t-1}	-0.463	-0.678**	0.374	-0.091	-0.128	0.545***
	(0.274)	(0.289)	(0.482)	(0.260)	(0.226)	(0.140)
R^2	0.47	0.62	0.44	0.56	0.33	0.35
	h=3		h=3		h=3	
CB^h_{t-1}	0.745***	0.321***	0.626	0.847**	0.502***	-0.109
	(0.199)	(0.076)	(0.398)	(0.291)	(0.146)	(0.071)
PS^h_{t-1}	-0.319	-0.151	-0.128	-0.610	-0.009	0.558***
	(0.714)	(0.192)	(0.969)	(0.744)	(0.264)	(0.172)
R^2	0.41	0.52	0.23	0.39	0.27	0.27
	h=4		h=4		h=4	
CB^h_{t-1}	0.469**	0.069	1.546***	1.732***	0.452***	-0.152***
	(0.174)	(0.085)	(0.346)	(0.275)	(0.162)	(0.047)
PS^h_{t-1}	-0.336	0.281	-2.383*	-2.983***	0.019	0.721***
	(0.657)	(0.204)	(1.108)	(0.855)	(0.317)	(0.240)
R^2	0.20	0.13	0.26	0.36	0.21	0.43

Numbers in parentheses are robust standard errors. *,**,*** means respectively significant at 10%, 5% and 1%.

7b. Influence Tests

	RPIX		CPIH		GDP	
	CB^h_t	PS^h_t	CB^h_t	PS^h_t	CB^h_t	PS^h_t
	h=0		h=0		h=0	
CB^1_{t-1}	1.060**	0.864***	0.246	0.574**	0.694	0.312**
	(0.366)	(0.284)	(0.300)	(0.220)	(0.135)	(0.135)
PS^1_{t-1}	-0.205	0.036	0.577	0.039	0.221	0.685***
	(0.430)	(0.348)	(0.454)	(0.373)	(0.187)	(0.138)
R^2	0.63	0.80	0.62	0.62	0.74	0.83
	h=0		h=0		h=0	
CB^2_{t-2}	0.597*	0.856***	0.299	-0.044	0.588**	0.359**
	(0.334)	(0.231)	(0.371)	(0.525)	(0.222)	(0.163)
PS^2_{t-2}	0.405	-0.106	0.552	0.732	0.109	0.426
	(0.415)	(0.324)	(0.638)	(0.911)	(0.284)	(0.253)
R^2	0.43	0.52	0.47	0.34	0.35	0.38
	h=0		h=0		h=0	
CB^3_{t-3}	0.597*	0.585*	-0.160	-0.044	0.481*	0.323
	(0.299)	(0.289)	(0.296)	(0.291)	(0.257)	(0.270)
PS^3_{t-3}	-0.072	-0.505	1.762**	1.016	-0.395	-0.134
	(0.723)	(0.640)	(0.540)	(0.760)	(0.395)	(0.403)
R^2	0.15	0.16	0.56	0.30	0.14	0.07
	h=0		h=0		h=0	
CB^4_{t-4}	0.054	0.176	0.307	-0.223	0.495	0.239
	(0.502)	(0.398)	(2.031)	(1.257)	(0.339)	(0.326)
PS^4_{t-4}	-0.867	-0.743	-1.161	-0.256	-0.614	-0.440
	(1.039)	(0.795)	(5.726)	(3.646)	(0.459)	(0.512)
R^2	0.03	0.04	0.01	0.06	0.13	0.05

	RPIX		CPIH		GDP	
	CB^h_t	PS^h_t	CB^h_t	PS^h_t	CB^h_t	PS^h_t
	h=1		h=1		h=1	
CB^2_{t-1}	1.265***	0.941***	0.722	0.754***	0.692***	0.200
	(0.198)	(0.177)	(0.417)	(0.214)	(0.142)	(0.121)
PS^2_{t-1}	-0.602**	-0.256	-0.100	-0.202	0.222	0.796***
	(0.244)	(0.253)	(0.538)	(0.255)	(0.256)	(0.158)
R^2	0.75	0.82	0.58	0.70	0.58	0.66
	h=1		h=1		h=1	
CB^3_{t-2}	0.740***	0.707***	0.236	-0.182	0.549**	0.157
	(0.242)	(0.212)	(0.347)	(0.315)	(0.263)	(0.189)
PS^3_{t-2}	-0.328	-0.664	0.515	0.999	0.019	0.338
	(0.744)	(0.549)	(0.915)	(0.654)	(0.402)	(0.328)
R^2	0.28	0.36	0.23	0.26	0.20	0.08
	h=1		h=1		h=1	
CB^4_{t-3}	0.238	0.174	-1.025	-0.898	0.498*	0.058
	(0.309)	(0.201)	(1.027)	(0.859)	(0.249)	(0.304)
PS^4_{t-3}	-1.209	-1.420**	3.135	1.800	-0.429	-0.106
	(0.835)	(0.555)	(2.251)	(2.351)	(0.532)	(0.516)
R^2	0.11	0.20	0.20	0.13	0.13	0.00

	RPIX		CPIH		GDP	
	CB^h_t	PS^h_t	CB^h_t	PS^h_t	CB^h_t	PS^h_t
	h=2		h=2		h=2	
CB^3_{t-1}	0.976***	0.715***	0.503**	0.504***	0.663***	0.129
	(0.207)	(0.147)	(0.213)	(0.131)	(0.178)	(0.109)
PS^3_{t-1}	-0.444	-0.417	0.258	0.190	0.124	0.808***
	(0.656)	(0.647)	(0.319)	(0.174)	(0.284)	(0.179)
R^2	0.57	0.54	0.47	0.58	0.39	0.45
	h=2		h=2		h=2	
CB^4_{t-2}	0.322	0.332**	-0.775	-1.003**	0.630**	-0.058
	(0.211)	(0.148)	(0.697)	(0.318)	(0.244)	(0.165)
PS^4_{t-2}	-1.690*	-1.140*	2.565	2.572**	-0.202	0.334
	(0.819)	(0.640)	(2.203)	(0.872)	(0.442)	(0.499)
R^2	0.24	0.26	0.20	0.25	0.22	0.04

Numbers in parentheses are robust standard errors. *,**,*** means respectively significant at 10%, 5% and 1%.

Tables 8 - Influence of central bank and private sector in Canada

8a. Granger Causality Tests

	Base - 2months gap					Timing Correction - 1month gap			
	CPI		GDP			CPI		GDP	
	CB^h_t	PS^h_t	CB^h_t	PS^h_t		CB^h_t	PS^h_t	CB^h_t	PS^h_t
	h=0		h=0			h=0		h=0	
CB^h_{t-1}	-0.380	-0.277	-0.870	-1.004***	CB^h_{t-1}	0.908***	0.545***	1.091***	0.712**
	(0.425)	(0.310)	(0.466)	(0.245)		(0.147)	(0.140)	(0.207)	(0.241)
PS^h_{t-1}	1.304*	0.815	2.151**	1.860***	PS^h_{t-2}	-0.762***	-0.502***	-0.887	-0.784*
	(0.639)	(0.467)	(0.826)	(0.465)		(0.126)	(0.104)	(0.484)	(0.381)
R^2	0.38	0.28	0.72	0.68	R^2	0.47	0.38	0.49	0.36
	h=1		h=1			h=1		h=1	
CB^h_{t-1}	-0.234	-0.403	-0.393*	-0.747**	CB^h_{t-1}	0.749***	0.430**	0.597	0.370
	(0.365)	(0.354)	(0.177)	(0.250)		(0.181)	(0.158)	(0.459)	(0.479)
PS^h_{t-1}	1.021**	0.675	1.118***	0.946**	PS^h_{t-2}	-0.501**	-0.814***	-0.293	-0.644
	(0.450)	(0.435)	(0.314)	(0.307)		(0.229)	(0.215)	(0.481)	(0.566)
R^2	0.41	0.14	0.62	0.42	R^2	0.35	0.37	0.16	0.16
	h=2		h=2			h=2		h=2	
CB^h_{t-1}	-0.365*	-0.080	0.728	0.354	CB^h_{t-1}	0.239	0.462***	1.038**	0.903***
	(0.186)	(0.164)	(0.433)	(0.525)		(0.280)	(0.099)	(0.305)	(0.191)
PS^h_{t-1}	0.924***	0.232	0.064	0.049	PS^h_{t-2}	-0.018	-0.834***	-0.341	-0.7445*
	(0.273)	(0.238)	(0.331)	(0.348)		(0.259)	(0.254)	(0.358)	(0.357)
R^2	0.36	0.03	0.36	0.09	R^2	0.06	0.49	0.53	0.47
	h=3		h=3			h=3		h=3	
CB^h_{t-1}	0.170	-0.260	0.451*	0.104	CB^h_{t-1}	0.260	0.315	0.885	1.092
	(0.197)	(0.224)	(0.218)	(0.235)		(0.313)	(0.263)	(0.547)	(0.627)
PS^h_{t-1}	0.528**	0.536***	1.169**	1.120	PS^h_{t-2}	0.258	-0.545*	-0.147	-1.501
	(0.197)	(0.177)	(0.363)	(0.698)		(0.345)	(0.303)	(1.255)	(1.265)
R^2	0.43	0.18	0.76	0.46	R^2	0.24	0.18	0.55	0.44
	h=4		h=4			h=4		h=4	
CB^h_{t-1}	0.665***	0.154	-0.667	-0.194	CB^h_{t-1}	0.645	0.174	0.188	0.000
	(0.196)	(0.140)	(0.565)	(0.126)		(0.209)	(0.144)	(0.439)	(0.206)
PS^h_{t-1}	0.058	0.120	3.667	0.968	PS^h_{t-2}	-0.323	-0.657**	0.625	0.500
	(0.253)	(0.253)	(1.916)	(0.459)		(0.401)	(0.243)	(1.446)	(0.865)
R^2	0.49	0.06	0.66	0.39	R^2	0.49	0.38	0.16	0.11

Numbers in parentheses are robust standard errors. *,**,*** means respectively significant at 10%, 5% and 1%.

8b. Influence Tests

	Base - 2months gap					Timing Correction - 1month gap			
	CPI		GDP			CPI		GDP	
	CB^h_t	PS^h_t	CB^h_t	PS^h_t		CB^h_t	PS^h_t	CB^h_t	PS^h_t
	h=0		h=0			h=0		h=0	
CB^1_{t-1}	0.187	0.152	0.108	-0.239	CB^1_{t-1}	0.846***	0.613***	1.215**	0.684
	(0.146)	(0.133)	(0.186)	(0.215)		(0.220)	(0.191)	(0.428)	(0.387)
PS^1_{t-1}	0.792***	0.397**	1.035***	0.923***	PS^2_{t-2}	-0.127	-0.251	-0.563	-0.400
	(0.162)	(0.139)	(0.262)	(0.233)		(0.252)	(0.197)	(0.592)	(0.569)
R^2	0.74	0.52	0.90	0.78	R^2	0.62	0.50	0.56	0.26
	h=0		h=0			h=0		h=0	
CB^2_{t-2}	0.097	0.055	-0.240	-0.043	CB^2_{t-2}	0.387	0.065	0.545	0.558
	(0.145)	(0.098)	(0.638)	(0.613)		(0.297)	(0.149)	(0.715)	(0.658)
PS^2_{t-2}	0.742***	0.391*	0.972*	0.416	PS^3_{t-3}	0.421	0.647*	0.140	-0.528
	(0.230)	(0.192)	(0.499)	(0.381)		(0.604)	(0.357)	(1.170)	(0.727)
R^2	0.41	0.25	0.39	0.15	R^2	0.28	0.26	0.12	0.09
	h=0		h=0			h=0		h=0	
CB^3_{t-3}	-0.490	-0.254	-0.630	0.288	CB^3_{t-3}	-0.445	-0.232	-0.265	-0.040
	(0.362)	(0.358)	0.967	(0.820)		(0.552)	(0.715)	(0.650)	(0.375)
PS^3_{t-3}	1.395***	0.933**	1.870	-0.019	PS^4_{t-4}	0.968	0.654	0.580	0.062
	(0.386)	(0.380)	(0.862)	(0.713)		(0.847)	(0.403)	(2.943)	(1.561)
R^2	0.27	0.29	0.13	0.04	R^2	0.13	0.12	0.01	0.00
	h=0		h=0						
CB^4_{t-4}	-0.298	-0.073	1.215	0.680					
	(0.560)	(0.298)	(1.305)	(0.675)					
PS^{*}_{t-4}	0.845	0.580	-2.853	-1.609					
	(0.801)	(0.391)	(3.739)	(2.572)					
R^2	0.08	0.08	0.12	0.12					

	Base - 2months gap					Timing Correction - 1month gap			
	CPI		GDP			CPI		GDP	
	CB^h_t	PS^h_t	CB^h_t	PS^h_t		CB^h_t	PS^h_t	CB^h_t	PS^h_t
	h=1		h=1			h=1		h=1	
CB^2_{t-1}	0.046	-0.027	0.308	0.047	CB^2_{t-1}	0.235	0.486	0.680**	1.067*
	(0.156)	(0.125)	(0.221)	(0.516)		(0.348)	(0.385)	(0.232)	(0.482)
PS^2_{t-1}	1.109***	0.758***	1.010**	0.738**	PS^3_{t-2}	1.155**	-0.164	1.184**	-1.096
	(0.173)	(0.144)	(0.293)	(0.308)		(0.472)	(0.499)	(0.439)	(0.734)
R^2	0.74	0.47	0.85	0.41	R^2	0.53	0.21	0.55	0.25
	h=1		h=1			h=1		h=1	
CB^3_{t-2}	-0.236	0.009	-0.070	0.440	CB^3_{t-2}	0.076	-0.191	0.810	0.093
	(0.316)	(0.303)	(0.564)	(0.734)		(0.474)	(0.286)	(0.935)	(0.443)
PS^3_{t-2}	1.635***	0.489	2.345**	0.013	PS^4_{t-3}	1.306	1.473*	-0.593	-0.478
	(0.283)	(0.341)	(0.902)	(0.991)		(1.151)	(0.680)	(2.503)	(2.003)
R^2	0.52	0.09	0.48	0.08	R^2	0.15	0.27	0.13	0.01
	h=1		h=1						
CB^4_{t-3}	-0.537	-0.256	-0.139	0.764					
	(0.756)	(0.406)	(1.270)	(0.837)					
PS^4_{t-3}	1.397	1.435*	1.588	-2.039					
	(0.997)	(0.678)	(3.505)	(2.778)					
R^2	0.20	0.27	0.06	0.10					

	Base - 2months gap					Timing Correction - 1month gap			
	CPI		GDP			CPI		GDP	
	CB^h_t	PS^h_t	CB^h_t	PS^h_t		CB^h_t	PS^h_t	CB^h_t	PS^h_t
	h=2		h=2			h=2		h=2	
CB^3_{t-1}	0.324	-0.395	0.396**	-0.175	CB^3_{t-1}	0.724*	0.276	0.500	0.518
	(0.303)	(0.473)	(0.139)	(0.457)		(0.348)	(0.340)	(0.455)	(0.711)
PS^3_{t-1}	1.135***	1.344***	1.380**	1.990***	PS^4_{t-2}	0.718	0.616	1.000	-0.305
	(0.347)	(0.408)	(0.448)	(0.433)		(0.876)	(0.882)	(1.009)	(1.484)
R^2	0.59	0.45	0.78	0.63	R^2	0.26	0.11	0.54	0.11

Numbers in parentheses are robust standard errors. *,**,*** means respectively significant at 10%, 5% and 1%.

Table 9 - Influence of central bank and private sector in Japan

9. Granger Causality Tests

	CPI		GDP		CPI		GDP	
	CB^h_t	PS^h_t	CB^h_t	PS^h_t	CB^h_t	PS^h_t	CB^h_t	PS^h_t
	h=0		h=0		h=0		h=0	
CB^h_{t-1}	1.252***	1.037***	1.480**	1.678**		0.809***		0.894***
	(0.279)	(0.132)	(0.526)	(0.584)		(0.092)		(0.186)
PS^h_{t-1}	-0.498	-0.285	-0.725	-0.693	0.787***		0.449***	
	(0.327)	(0.203)	(0.474)	(0.611)	(0.127)		(0.145)	
R^2	0.73	0.86	0.52	0.61	0.46	0.84	0.29	0.56

Numbers in parentheses are robust standard errors. *,**,*** means respectively significant at 10%, 5% and 1%.

Tables 10 - Influence of central bank and private sector in Switzerland

10a. Granger Causality Tests

	CPI		CPI	
	CB^h_t	PS^h_t	CB^h_t	PS^h_t
	h=0		h=0	
CB^h_{t-1}	0.060	0.162		0.737***
	(0.203)	(0.176)		(0.094)
PS^h_{t-1}	0.712***	0.604***	0.770***	
	(0.142)	(0.136)	(0.096)	
R^2	0.67	0.65	0.67	0.62
	h=1		h=1	
CB^h_{t-1}	1.016***	0.427**		0.361***
	(0.310)	(0.194)		(0.112)
PS^h_{t-1}	-0.727**	-0.132	0.795**	
	(0.341)	(0.292)	(0.289)	
R^2	0.45	0.38	0.20	0.37

Numbers in parentheses are robust standard errors. *,**,*** means respectively significant at 10%, 5% and 1%.

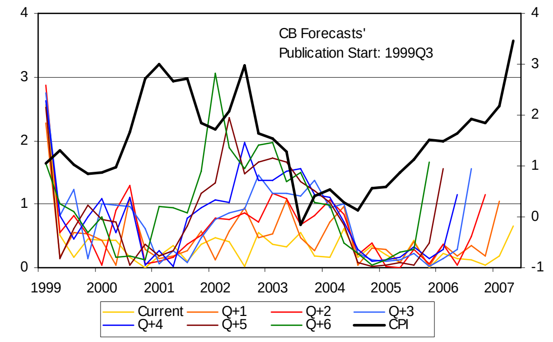
10b. Influence Tests

	CPI			
	CB^h_t	PS^h_t	CB^h_t	PS^h_t
	h=0		h=0	
CB^1_{t-1}	0.172	0.078		0.345**
	(0.304)	(0.321)		(0.146)
PS^1_{t-1}	0.443	0.530	0.701***	
	(0.417)	(0.444)	(0.146)	
R^2	0.37	0.31	0.36	0.26

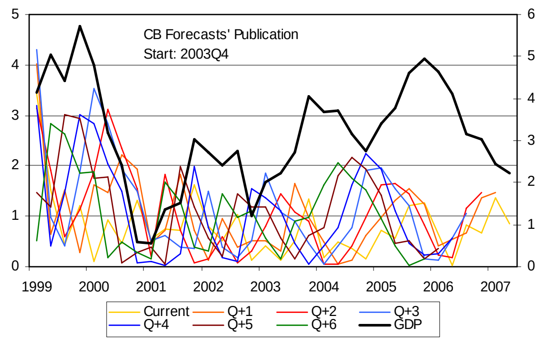
Numbers in parentheses are robust standard errors. *,**,*** means respectively significant at 10%, 5% and 1%.

Figures 1 – Root Mean Square Errors of private sector forecasts (Consensus Forecasts) Sample 1999Q2 – 2007Q4. Left scale: RMSE, Right Scale: Inflation or GDP growth rate.

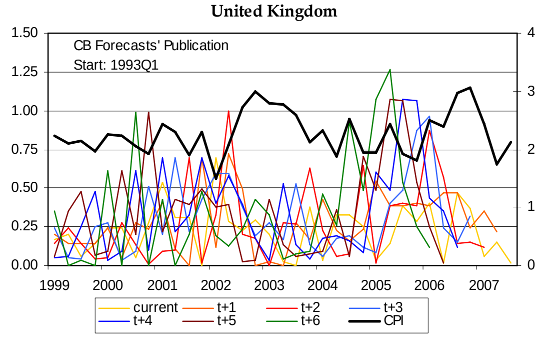
Root Mean Square Errors for CPI forecasts - Sweden



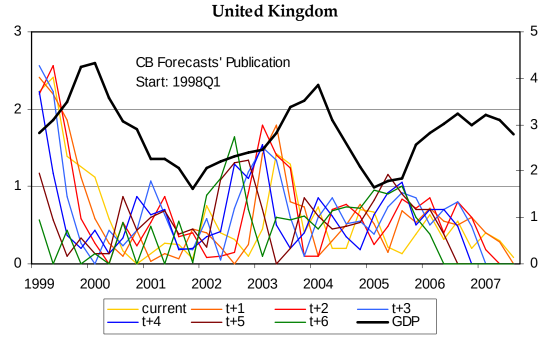
Root Mean Square Errors for GDP forecasts - Sweden



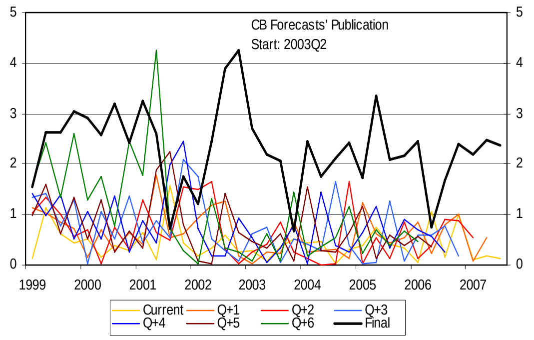
Root Mean Square Errors for RPIX-CPIH forecasts United Kingdom



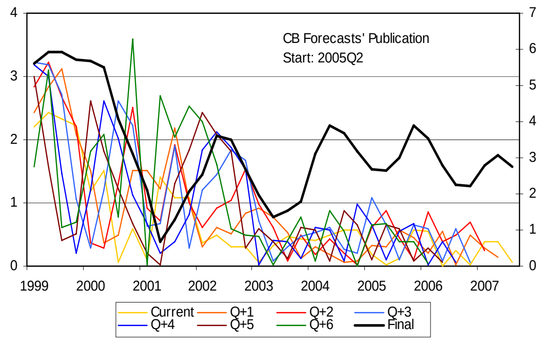
Root Mean Square Errors for GDP forecasts United Kingdom



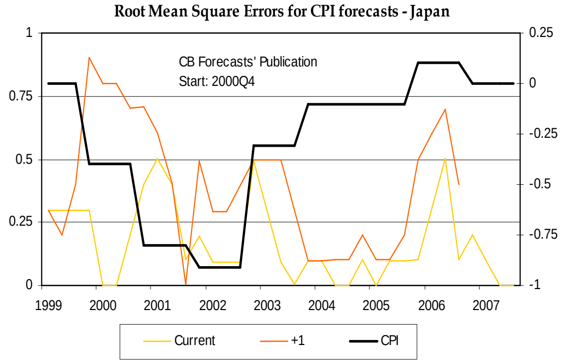
Root Mean Square Errors for CPI forecasts - Canada



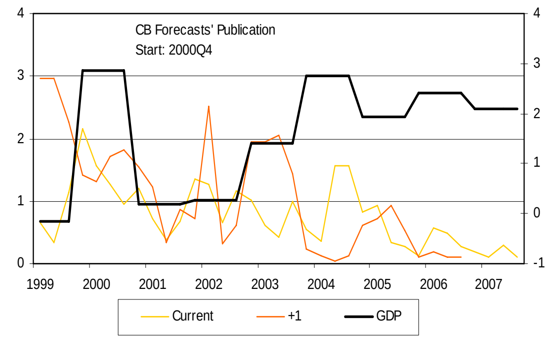
Root Mean Square Errors for GDP forecasts - Canada



Root Mean Square Errors for CPI forecasts - Japan



Root Mean Square Errors for GDP forecasts - Japan



Root Mean Square Errors for CPI forecasts - Switzerland