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# Examining the relationship between oil and commodity prices and short term Canadian interest rates

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## Introduction

In the Economic literature, a large number of studies have examined the monetary policy response to changes in oil prices in the U.S. Yet when it comes to Canada, little research has been done on the subject. One important characteristic Canada does not share with the U.S. is its classification as an oil-exporting economy, rather than an oil-importing one. Hence, oil price changes do not affect the Canadian economy in the same way as they affect the U.S., and the extent to which the Bank of Canada (the Bank) accounts for these changes in its policy is unclear.

Furthermore, in February of 1991, The Bank underwent an important change in its policy, gearing towards an inflation-targeting regime. Such a framework employs a key interest rate (in this case, the overnight interest rate) as its main policy instrument, and raises or lowers the interest rate depending on the inflationary pressures the economy might be experiencing.

The goal of this project is to assess the Bank's reaction to changes in oil prices. We examine how the overnight rate and short term T-bill rates react to changes in oil and commodity prices, and give special attention to the period surrounding the policy reforms of 1991. This is accomplished by observing the parameter that measures the effect changes in oil and commodity prices have on the interest rates. The estimation is performed using ordinary least squares regressions with rolling windows of data.

## Methods

### Dataset

- Data collected from Statistics Canada, The Bank of Canada's database, and Federal Reserve Economics Data (FRED)
- Monthly data, going from February 1980 to January 2018
- Series used for the dataset: Overnight interest rate; 1 to 3 month T-bill rates; Consumer Price Index (CPI); Commodity Price Index (BCPI)
- Unemployment rate is used to measure real activity
- Spot price for West Texas Intermediate crude oil is used to measure oil prices
- Percentage change in commodity and oil prices is obtained by linearizing and differencing the data series for BCPI and oil prices
- Inflation rate is obtained by linearizing and differencing the CPI series with lag 12
- Natural unemployment is obtained by de-trending the unemployment rate series

### Model

- Multiple linear regression model (ordinary least squares method): interest rate regressed against the other variables
- Addition of a smoothing variable for the interest rate (auto-regression component of lag 3)
- Model is regressed through the dataset with rolling window of 9 years (window length of 108 observations)
- From each regression is extracted: the estimated parameter for the percentage change in oil and commodity prices; its confidence interval; its t statistic
- A 95% confidence level is used for the experiment
- Computations were performed in R

## Results

Figure 1: Estimated effect of change in oil prices on overnight rate

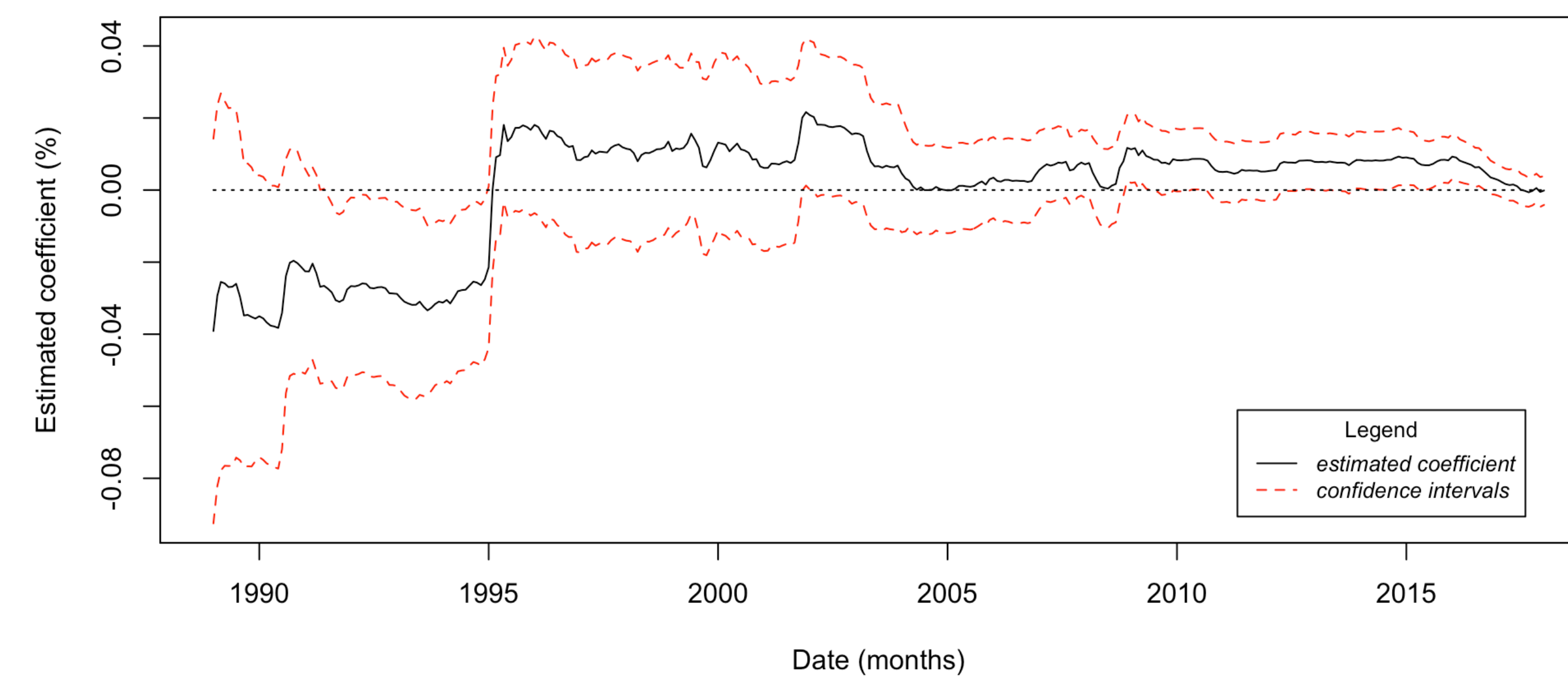


Figure 2: Estimated effect of change in commodity prices on overnight rate

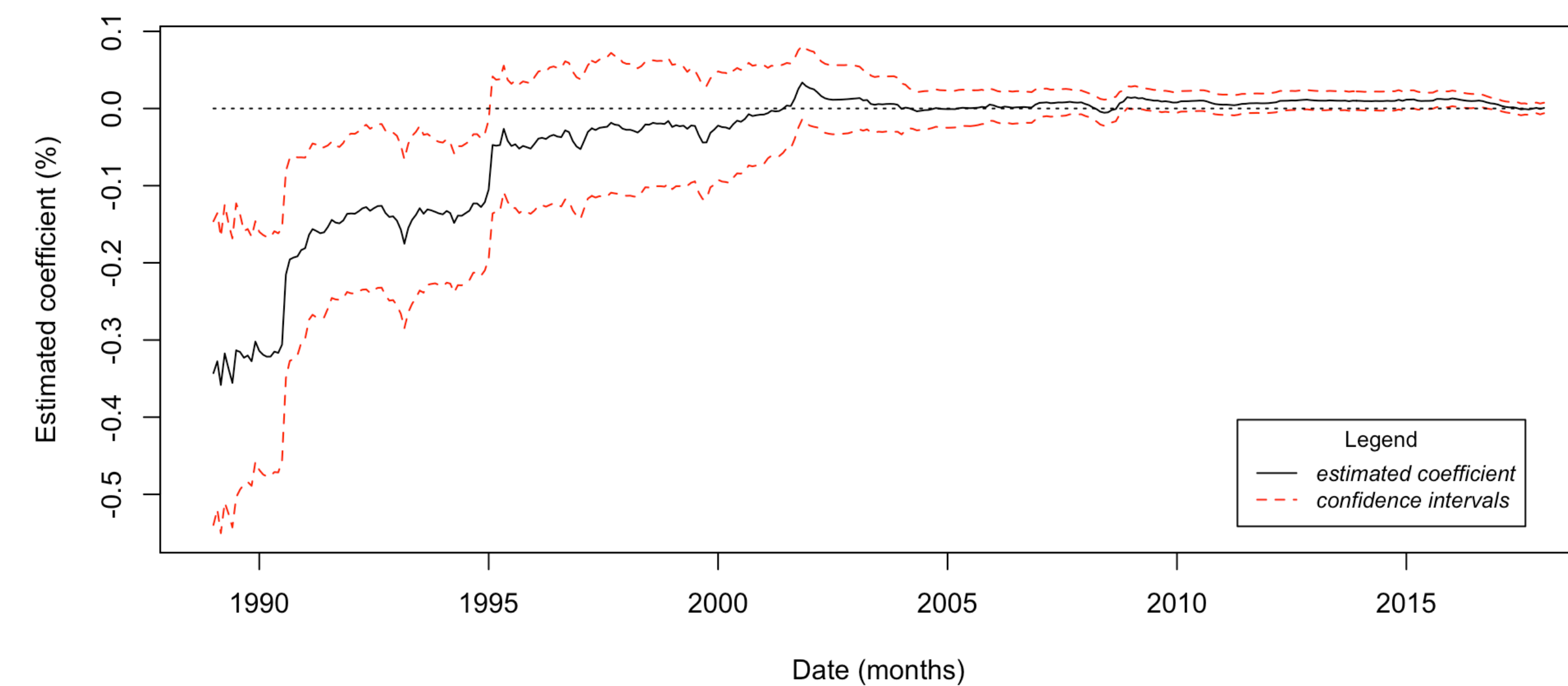


Figure 3: Estimated effect of change in oil prices on 1-month T-bill rates

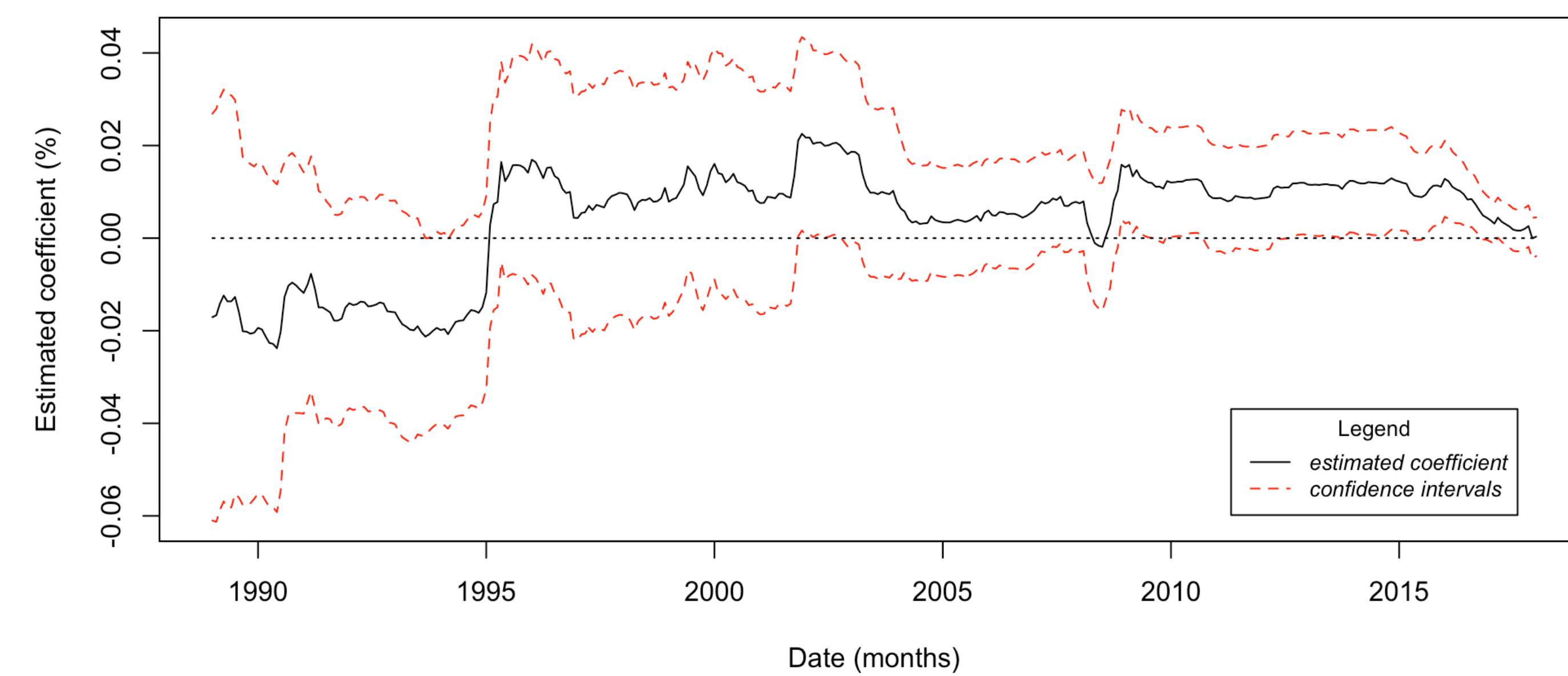
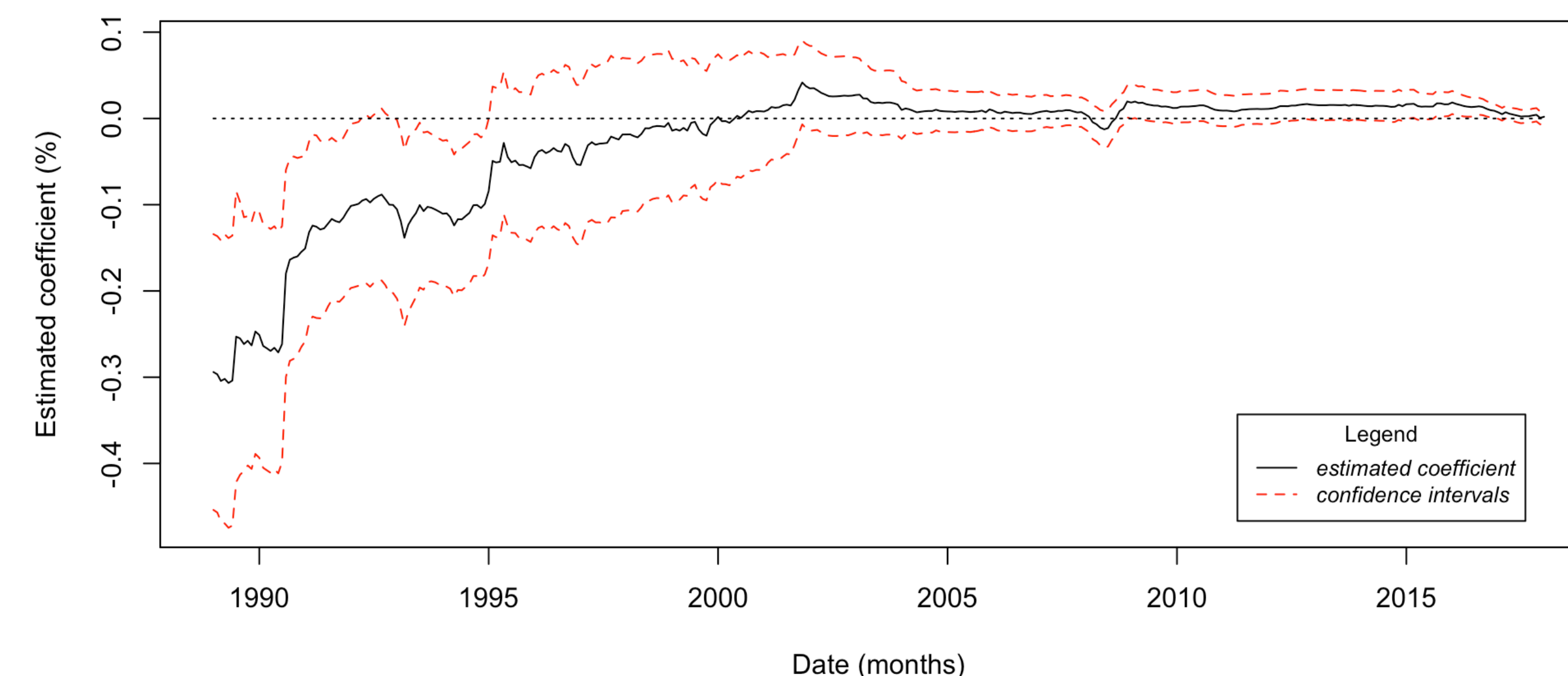


Figure 4: Estimated effect of change in commodity prices on 1-month T-bill rates



## Conclusions

It is evident from the graphs that the change in monetary policy had an important impact on the effect oil and commodity price changes bear on the interest rates. Before the policy reform, changes in oil and commodity prices had a negative relationship with the interest rates, possibly indicating an expansionary policy. It is also apparent that before the policy reform, commodity prices did bear the bigger effect on the interest rates.

Following the policy reform, the parameters for changes in oil and commodity prices shift upwards so as to include the x-axis within the confidence intervals, meaning that the effects changes in oil and commodity prices bear on the interest rates become statistically insignificant. This is in accordance with previous findings (Cologni & Manera, 2006).

Interestingly, the parameters do seem to regain a statistical significance for regressions going from 2003 to 2012, to regressions going from 2007 to 2016. Considering the small variance in the overnight rate, it is possible these results are faulty. Yet the same result is present when regressing for the T-bill rates, which do have a greater variance than the overnight rate. Possible explanations for this occurrence are the rising oil prices for periods from 2003 to 2007, and the Financial Crisis of 2007. Nevertheless, the small but positive effect of changes in oil and commodity prices on the interest rates is indicative of an inflation-targeting regime.

Further steps to take in this topic would be to more explicitly analyze the period of statistical significance. Also, since changes in commodity prices have a direct effect on inflation, and oil price shocks have a stimulative effect on the Canadian aggregate demand (Hou et al., 2016), one should examine the relationship between interest rates, inflation and GDP, which ought to be more pronounced.

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