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Abstract

This paper examines the macroeconomic effects of government spending shocks in Canada for the period of 1949 - 2012. We construct a novel measure of news about exogenous government spending changes identified through the narrative approach. We use government documents, mostly the budget speech, to identify the size, timing, and principal motivation for all planned major federal government spending changes. To achieve identification, we consider those changes that are unrelated to the contemporaneous movements in the economy. The implied government spending multiplier estimates using our exogenous government spending news series are between 0.84 and 1.55.

JEL Classification: E62, H3.
Key Words: Government Spending Shocks, Government Spending Multiplier, Narrative Accounts, Canada.

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1 Introduction

The great recession of 2008 and COVID-19 induced economic crisis of 2020 forced governments worldwide into providing their economies with various stimulus plans. These plans have highlighted the importance of our understanding regarding their macroeconomic effects. However, despite its importance for current macroeconomic policy making, there is a surprising lack of consensus over the effects of government spending changes. Moreover, there is little empirical evidence for countries other than the US. The problem that arises in the study of government spending changes is that of simultaneity - while there is no doubt that government spending changes affect GDP, but at the same time, GDP itself can cause changes in government spending. This identification problem has been mainly tackled by two different approaches in the literature - the structural vector autoregression (SVAR) approach (Blanchard and Perotti (2002) and etc.) and the narrative approach (Ramey and Shapiro (1998) and etc.).

This paper contributes to the literature by estimating the government spending multiplier for Canada for the period of 1949 - 2012. We use the narrative record, mostly the budget speech, to identify the size, timing, and principal motivation for all planned major government spending changes. To achieve identification, we consider those proposed changes that are unrelated to the contemporaneous movements in the economy, called exogenous government spending changes. This is similar to the narrative approach adopted to study the effects of tax changes, pioneered by Romer and Romer (2010). We then construct a new measures of news about exogenous government spending changes along the lines of Ramey (2011b).

The estimation using our new measure of government spending shocks shows that the implied government spending multiplier is 0.88 for Canada, when the elasticity of output with respect to government spending is calculated as the ratios of their peak responses to governments spending shocks. When calculated through cumulative responses over 2 and 4 years, the implied multipliers are 1.05 and 1.16, respectively. After controlling for tax and monetary policies, the government spending multiplier is 1.17, calculated by the peak responses. When the cumulative responses over 2 and 4 years are used, the implied multipliers are 1.57 and 1.37, respectively. These multipliers are larger than the ones estimated by Owyang et al. (2013) with military spending news series for Canada, ranging from 0.57 to 0.79. They are also larger than the ones estimated with the structural VAR approach, ranging from 0.40 to 0.55.

One important difference between the results from the studies involving SVAR and narrative approaches is the effect of spending changes on consumption. Studies like Blanchard and Perotti (2002), Galí et al. (2007), Perotti et al. (2007), Mountford and Uhlig (2009), Auerbach and Gorodnichenko (2012) that use the SVAR approach generally find an expansionary effect of spending changes on consumption. On the other hand, studies like Ramey and Shapiro (1998), Ramey (2011b), Barro and Redlick (2011), and others that use the military spending news variable find contractionary effects of spending increases on consumption. Our results are in line with previous studies using the narrative approach: we find that spending increases in Canada result in consumption decreasing. However, unlike the SVAR studies for the US, we find that SVAR approach for Canada also gives a negative response of consumption to spending increases. However, the response estimated from the SVAR approach comes out to be much smaller and insignificant.

We also address the issue of the news variable losing its predictive power for government spending once large defense spending changes are removed. Ramey (2011b) noted that her news variable loses its explanatory power for government spending when the observations associated with WWII and Korean War are removed. We find a similar problem with our news variable: our news variable loses it explanatory power if we remove the observations associated with the large defense spending increases associated with the Korean War. This limits our ability to use to this variable to study only those sample periods that include the Korean War years.

To get around this problem, we construct a measure of announced and implemented government spending changes. This includes all those measures that were to be implemented in the same year as they were announced. If a spending change were to be implemented over a number of years then we only include the part that would be in implemented in the same year. We then assign the an dates of such spending changes to the quarter when the budgets were approved. For midyear announcements about spending changes, we use the announcement dates as implementation dates.While acknowledging that this assumption may result in some bias in our results, we argue that the bias would be small because 1) we omit the observations that are announced in one year and implemented in a future year, 2) we do not find strong evidence of anticipation effects when using our news variable: government spending starts increasing significantly in the same quarter when the announcement is made and increase in output lags increase in government spending, and 3) it is plausible to believe that the finance ministry makes preparations for upcoming changes before announcing them.

We normalize our measure of announced and implemented spending changes by lagged

GDP and use this variable to estimate the government spending multiplier. The estimated multiplier comes out to be 0.92 which is close to other estimates that we get. We also estimate the multiplier using annual data since, as argued by, the anticipation effects are less problematic in annual data. The multiplier that we estimate comes out to be 0.93 which is very close to the estimate from the quarterly data. We also find evidence that austerity measures of the mid 1980s's and 1990's have smaller contractionary effects than the expansionary effects of spending increases.

There have been extensive debates over the effects of government spending changes. Ramey (2011a) reviewed those studies for both aggregate and cross-locality estimates on a temporary deficit-financed government purchase increase in the US. Hall (2009) also focuses on the impact of government purchases, through both structural VAR and dynamic model estimations. Our paper is similar to those studies that use the narrative approach to estimate the government spending multiplier.[1] Some of the studies using this approach are Ramey (2011b), Ramey and Shapiro (1998), and Barro and Redlick (2011). There are also papers focusing on the asymmetric nature of the government spending multiplier, including Ramey and Zubairy (2018) , Owyang et al. (2013), Barnichon and Mathhes (2017) and etc.

The literature studying the macroeconomic effects of government spending changes for countries other than the US is rather sparse. Crafts and Mills (2013) reports estimates of the fiscal multiplier for interwar Britain by constructing a defense-news variable. There are also studies of multiple countries, such as by Perotti (2005) on the OECD countries, Beetsma et al. (2008) and Beetsma and Giuliodori (2011) on the EU. Owyang et al. (2013) extends military spending news data for Canada back to 1921. Alesina et al. (2017) and Guajardo et al. (2014) use the narrative record to identify episodes of fiscal consolidation - including both government spending decreases and tax increases - for OECD countries and find strong contractionary effects of such changes. Methodologically, our study is similar to both of these but we focus on a much larger sample, both in terms of time and in terms of types of government spending changes.

The paper is organized as following: section 2 describes the data and our methodology of constructing the narratives of exogenous changes in government spending. Section 3 provides the estimation results with our newly constructed data series. Section 4 compares

[1]The narrative approach has also been used to identify other economic variables. For example, Romer and Romer (2010), Mertens and Ravn (2013), Cloyne (2013a), Hayo and Uhl (2014), and M. and Lin (2018) use the narrative approach to study the macroeconomic effects of tax changes. Romer and Romer (2016) use the narrative approach to study macroeconomic effects of transfer payments for the US.

the government spending multipliers identified and estimated with other methods. Section 5 examines the effects of government spending shocks on consumption. Section 6 provides the effects of announced and implemented government spending changes. Section 7 concludes.

2 Data

The section begins with a brief overview of the fiscal policy in Canada, including a brief summary of how the government spending policy of the federal government has evolved over time. Then, we provide detailed description of the narrative approach and how we construct the data series on the planned major government spending changes or the government spending shocks.

2.1 An Overview of the Fiscal Policy in Canada

We begin by briefly reviewing the federal government's budget in Canada, the process by which it is made and approved.[2] The government budget in Canada consists of the revenue budget (government income) and the expenditure budget (government expenses). The government must get the approval of the Canadian parliament before enacting any implementing any spending change. To do so, the government must follow two steps.

First, it must present its budgets for the next year to Parliament for review. This is usually done annually in early spring (February or March). The government presents its budgets to Parliament with a Budget Speech given by the Minister of Finance. When the media refer to the "federal budget", they are usually referring to the Budget Speech, which is also the main source of information for us to construct the data series on the government spending shocks. The finance minister, in the speech to the house of commons, reviews the current and projected state of the economy, presents the financial health of the government at the end of the previous fiscal year, and announces any planned changes in taxation or government spending policy. There are usually three parts to the Finance Minister's budget address: 1) Details of the Revenue Budget, which includes economic projections for the Canadian economy, the total amount of monies the government expects to collect, and any changes to federal tax rates or structures; 2) a general overview of spending which includes information about the total amount of monies the government expects to spend, as well as its spending

[2]The information in this section is mainly collected from Maslove (2015) and the budget process described on the website of Department of Finance, Canada available at `https://www.budget.gc.ca/2010/budproc/budproc-eng.html`.

priorities (health, education, defence, debt) over the next year (or few years) are identified, and 3) overall financial state of the economy. The government outlines its overall financial position for the next year (or few years), and whether the government expects to record a deficit or a surplus. In addition to the details provided in the budget and Budget Speech documents, the President of the Treasury Board also provides Parliament with specifics concerning the government's spending plans through what is known as a Tabling of the Estimates.

Second, following the Budget Speech and the tabling of the Estimates, Parliament reviews the federal government's budgets and votes on whether or not to support them. This is a very important vote for the government. Not only is the parliamentary budget vote necessary for the government to begin collecting and spending public monies for the upcoming year, but it is also a measure of the confidence the government enjoys. In the case of majority governments, there is generally little chance that the government will fail in getting the approval of the parliament. In the case of minority governments, however, the situation can be different. For example, the government of Prime Minister Joe Clark in 1979, a minority government of the Progressive Conservative party, failed to have to its budget passed by the house of commons (Eeckelaert, 2019).

Budget secrecy in Canada is a long-standing tradition of keeping the contents of the budget hidden till the finance minister makes their speech in the house. In a famous and extreme example of this secrecy, Prime Minister Louis St. Laurent required that his Finance Minister type the entire budget himself, so that not even the Minister's secretary would know its details before they were public. Governments pursued budget secrecy for many reasons. There was the worry that individuals would use inside information from the budget to profit from upcoming government decisions. Governments also used budget secrecy to undermine the ability of opposition parties to criticize the government in an effective manner. In recent years, and especially under Liberal Prime Ministers Jean Chrtien and Paul Martin, there has been less secrecy surrounding the federal budget process. Major budget initiatives are now revealed publicly in advance of their official presentation in the Finance Minister's Budget Speech. This stems from a desire to get feedback from the populace and financial markets, and to forewarn the Canadian population as a whole about any major changes in the government's financial policies, or shifts in savings or spending. A certain degree of secrecy, however, is still maintained; the government never divulges the full details of the budget until the document is formally presented to Parliament through the Finance Minister's budget speech.

In addition to the annual budget, government of Canada has also announced changes to its fiscal policy at other times. While typically the most important policy changes are reserved for the budget, at certain times the prevailing economic and political conditions necessitate the announcement of new measures outside the annual budget. For example, in 1950, after the Korean war broke out in June, the Canadian government announced an increase in military spending through a financial statement. Over the years, these statements have been called different names including Financial Statement, Mini-Budget, Supplementary Budget, and Economic and Fiscal Update. These statements are put forward typically in the middle of the fiscal year. For the remainder of this paper, we will use the term *budget speeches* to refer to all the statements made by the finance minister that include information about proposed changes in government spending.

Prior to 1945, fiscal policy did not play a significant role in government action regarding the economy. Following the end of the Second World War, the Canadian government, influenced by Keynesian economic principles, was committed to maintaining high and stable levels of employment and output. The economy experienced high levels of real growth, rising personal disposable income, and strong levels of employment. The government sector became a much greater factor in the overall economy, due to increasing tax revenues and the growth of the state through the implementation of social welfare programs. Figure 1 presents the paths of real government spending per capita and government spending as percentage of GDP in Canada over the period of 1949 - 2012.

Between 1949 and 1970, the government's share of GDP rose sharply, from 8.3 to 20.4 percent. In the 1970s, Canada faced both a recession and a large spike in oil prices, which resulted in a stagflation of the economy by the end of 1970s. To fight inflation, government pushed for tight monetary and fiscal policies, which contributed to the 1981-82 recession. These called into question the traditional approaches to fiscal policy. Moreover, during this period there was increased concern over government deficits and debt. While the government had attempted to bring in some contractionary fiscal policies during the late 1970s, it had nevertheless run consecutive fiscal deficits since 1976, with particularly large increases in the 1982-85 period. This deficit-financed spending was due, in large part, to rising costs associated with contributions to social-welfare programs. In addition, as the annual deficits mounted, the federal government was faced with rising debt charges. Beginning in the late 1980s, the government focused its economic policy on creating an environment for sustainable economic growth through the elimination of the deficit and the reduction of the debt. These advances were partially wiped out in the early 1990s, as Canada again went into recession, resulting in a decline in tax revenues. Beginning in 1993, however, the government's share

of GDP declines from 24.1 percent to 18.1 percent in 2006. In 2008-09, the global economy entered into a severe recession, and like other major economies, the Canadian economy suffered a major decline too. Central to the 2009 budget was a robust stimulus package, which involved a combination of personal income tax reductions, targeted tax credits, and new spending initiative to encourage demand in the Canadian economy. This resulted into an increase in the share of government spending to 22.3 percent in 2010.

2.2 Identification of Exogenous Government Spending Changes

The main source of information for constructing our series of government spending shocks is the budget speech. Budget speeches include announcement about changes in different parts of fiscal policy in Canada. There are other sources like the budget reports which contain detailed information on the government spending programs, but such sources are not available consistently for the entirety of our sample. Another reason for using the numbers quoted in the budget speeches rather than the budget reports is that our goal is to gather data on variables that would allow us to capture the *news* effect of government spending changed. And this effect is generally captured through the information provided in the budget speech rather than in other documents that have much limited viewership.

However, we do consult the budget reports and other budget documents when the budget speech does not contain some of the information. This was especially true for the last few years in our sample where the budget speeches would only mention the major new spending initiatives without mentioning their sizes or other details. For these years, we rely upon the budget reports to gather the missing information for the spending changes.

To construct the data series on the news about future government spending changes, we read through all of the budget speeches going back to 1949. We document the size, timing and principal motivations of each proposed government spending change. We then use the methodology employed by Romer and Romer (2010) and Cloyne (2013b) to classify each spending change as exogenous or endogenous. An exogenous spending change is one which is not made in response to contemporary events of the economy, while endogenous changes are those which are taken in response to contemporary events of the economy.

Following Cloyne (2013b), we classify exogenous government spending changes into four categories. First, *long-run* changes are those through which the government tries to improve the long-run performance of the economy. These changes can be implemented in times of recessions or booms. We find such changes spread out throughout our sample. For

example, in 1985, the Canadian government spent $ 1.8 billion on training and employment programs whose aim was to help in the career development of Canadian workers. Similarly, In 2000, the government provided $ 500 million to Canada Foundation for Innovation to help post-secondary institutions, research hospitals and not-for-profit organizations to modernize their laboratories, their equipment and their technologies. Second, the government spending changes can be driven by the *ideological* reasons. Such changes were also spread throughout our sample. For example, in 1994, the government budget intended to build a responsible social security system that was fair, compassionate and affordable, and announced $ 800 million funds to renew and revitalize Canada's social security system.

Third, *deficit consolidation* changes are the ones through which a government aim to improve the general fiscal health of the economy by reducing inherited debts. For example, between 1986 and 1995, there were a number of spending cuts (mostly in form of reduced department funding, reduced foreign aid, and reduced subsidies) enacted by the government in order to address the growing debt of the economy. Finally, *military spending* changes are increase or decrease in military spending. There were periods of increase in military spending, for example in 1950s because of the Korean war and in 2001 because of the increased terrorist threats in the aftermath of the 9/11 events, and decreases in military spending, for example in the early 1990's because of the end of the cold war.

We classify endogenous spending changes into two categories. First, *demand management* spending changes are generally undertaken to offset effects of cyclical fluctuations by adjusting aggregate demand. For example, in 2009, the government enacted a number of spending increases in infrastructure development and other programs in order to create jobs and mute the effects of the recession. This category also includes some spending cuts enacted by the government in 1993 in response to current deficit created by lower tax revenues in the previous year. Second, government can use *supply stimulus* spending change to counter effects of other shocks through supply-side policies. Examples would include spending by the government in 1981 on programs designed to help farmers and small businesses that were finding it difficult to operate at the prevailing high interest rates (which were in place to fight inflation resulting from the oil price increase in the preceding years).[3]

Having collected all the information from the budget speeches and other documents, we proceed to the construction of the news variable that is used in our analysis. We use the methodology of Ramey (2011b) to construct the news variable by calculating the present discounted value of all announced government spending changes. We use the average yields

[3]While we classify exogenous and endogenous spending changes into different categories; in this paper we do not study the effects of these categories separately.

on the 3-5 years Government of Canada Marketable bonds for the calculation of the present discounted values.

To calculate the present discounted value, we need information on whether the announced government spending changes were intended to be temporary or permanent. For the temporary changes, we simply use the number of years for which a particular change is announced to calculate the present discounted value. For the permanent change, we calculate the present discounted values in three ways. First, we assume the economy does not look beyond the current year for permanent changes since a new budget is announced every year. Second, we assume that the economy does not look beyond 5 years when forming its expectations and hence we calculate the present discounted values assuming that the permanent change would last for 5 years. Finally, we also construct a measure where we assume that the economy assumes the permanent changes to last forever and calculate the present discounted values accordingly. In this paper, we use the second of these measures where we assumed that permanent spending changes have a lifetime of 5 years. The results remain largely robust if we use the other two measures.

We date each observation in the quarter when the budget speech is made. We follow Romer and Romer (2010) and Cloyne (2013b) in assigning quarterly dates to the observations in the news series. If a speech is made in the second half of a quarter, we date it to the following quarter. We further divide the present discounted values by the annualized nominal GDP of the previous quarter to construct a quarterly time series of news about changes in government spending. This series can be viewed as an approximation to the changes in expectations of the government spendings at the time of the speech, which we call "government spending shocks".

2.3 Properties of the Government Spending Shocks

We now discuss the properties of our newly constructed news variable about exogenous government spending changes shown in panel A of Figure 2. It is this variable that is used in the empirical analysis in the paper. In the early 1950's, there were large increases in spending caused by increase in military spending in response to the Korean war. These spikes in government spending that we record from the budget speeches are consistent with the increases in military spending recorded in the news about defense spending by Owyang et al. (2013). In the late 1960's and 1970's, the focus of the government of Canada was to improve the long-run position of the labor market by introducing programs designed at boosting employment. Examples of such measures would include spending by the government

on industries like footwear and shipping with a view to expand employment opportunities within these industries and creation of new funds to aid provinces in establishing new job opportunities. The 1970's also saw modifications in the social security and pension programs along with other welfare programs designed to financially help the elderly and needy. For example, between 1972-1974, there were increases in pensions and also increase in allowances for orphans.

The 1980's also saw continued investment on part of the government in programs designed to boost employment. The government also adopted some contractionary policies, like reduction in budgets of some government departments and reduction in subsidies, aimed at improving efficiency of the economy. The 1990's saw the government continue to spend on programs to boost employment in the economy and various other programs related to health, research, and infrastructure. Early to middle 1990's were also marked by decrease in spending motivated by concerns about the debt of the economy. Early 2000's saw Canada, like most other countries, boosted spending on defence and military related expenses in response to the 9/11 attacks. These included increased spending on Canadian armed forces, intelligence services, and on improving security of airports and airline. In addition to huge defense spending increases, Canada also increased spending on improvement of the environment including increased spending on programs for preservation of natural resources, climate change, and improving air quality. The government also continued to increase spending on health related programs in the 2000's.

As a comparison, panel B of Figure 2 shows the endogenous government spending changes. In the mid 1970's, the focus of the government was to boost employment and the overall economic state of the economy which was suffering from the first of the first oil price shocks of 1973. The late 1970's saw the government investing in projects like the Export Development Corporation and the Federal Business Development Bank with a goal to stimulate investment and increase cost competitiveness by encouraging new entries to the market. The second round of oil price shocks hit the world economy in 1979. Rising production costs, caused by increasing oil prices, led to a new phase of stagflation in the Canadian economy. A number of spending changes were adopted in response to these challenges. These included investment in the energy sector to meet energy demands and funds to assist businesses and farmers in getting loans at cheaper interest rates. It is this period the first big spikes in the news variable about endogenous changes can be seen. Another major spending changes that we observe took place in the 2008-2010 period which were in response to the global financial crisis of 2008.

Table 1 provides the summary statistics for the newly constructed news variable. The news variable about exogenous government spending changes has a mean value of 0.28 percent of GDP whereas the standard deviation is 1.67. There are a total of 47 quarters with non-zero values out of which 41 are positive and 6 are negative which shows that most observations in our variable represent news about future increases in government spending. The endogenous news variable has a mean of around 0.08 percent of GDP with a standard deviation of 0.46. There are a total of 24 non-zero values for the endogenous news variable with all but two of them being positive.

2.4 Testing the Predictability of the Government Spending Shocks

To test our newly constructed exogenous series for exogeneity, we follow Mertens and Ravn (2012) and Cloyne (2013b) in testing whether our newly constructed government spending news variable can be predicted on the basis of past information about macroeconomic indicators. For this purpose, we run two kinds of tests. First, we run a linear regression with the government spending news variable as the dependent variable and 4 lags of first difference of (log) output, (log) real income tax revenues, interest rate, unemployment, and inflation as the macroeconomic indicators. Second, we test whether the timing of news about exogenous spending changes can be predicted by macroeconomic indicators. For the second test, we first define an indicator variable to capture the timing of announcement about each exogenous government spending change where the underlying latent process is our news variable. The indicator variable, ω_t, is defined as

$$\omega_t = \begin{cases} 1 & \text{if } news_t > 0 \\ 0 & \text{if } news_t = 0 \\ -1 & \text{if } news_t < 0 \end{cases}$$

We then test the exogeneity of this variable by performing an ordered probit regression of the indicator variable ω_t on the same macroeconomic indicator variables that we use in the linear regression.

The results are summarized in Table 2. First, the results from the linear regression show that there is no evidence to believe that the macroeconomic indicators have any predictive power for the exogenous government spending new series. The F-value of the regression is 1.23 with a p-value of 0.23. Furthermore, we also found that there was a strong correlation between the macroeconomic indicators and our newly constructed exogenous news series

during the Korean war years.

The huge increases in military spending associated with the Korean War that took place in early 1950's were at the same time when Canada was going through a period of extremely low unemployment and high output. This period of economic prosperity was a result of the post World War II boom experienced by most economies worldwide. The data clearly shows that unemployment, in particular, was unusually low during the early 1950's. The sample average of unemployment is close to 7 percent with only 17 values throughout the sample being less than 3 percent. However, all of these low unemployment values were found in the first eight years of our sample during which the Korean war also took place. Similarly, the sample average for the growth rate of real GDP is 0.9 percent per quarter but this was value was around 1.4 percent in the beginning of our sample.

When we re-run the linear regression by omitting the Korean war military spending observations from our data. The p-value of the F-statistic of the regression comes out to be 0.78 which shows that we cannot reject the null hypothesis that the macroeconomic indicators indeed have no predictive power for our newly constructed exogenous news series. When we run the same linear regression with the endogenous government spending news series (show in row 3), we get a p-value of 0.002 which clearly suggests that the endogenous news variable can indeed be predicted on the basis of past information.

The next two rows show the results from the ordered probit regression. The p-value of the Likelihood Ratio statistic from this ordered probit is 0.153 implying that we cannot reject the null hypothesis that the variables did not have any forecasting power for the government spending changes. When we repeat the analysis with the endogenous news variable, we get a p-value of 0.033 allowing us to reject the null hypothesis. Thus, this test suggests that our exogenous variable can not be predicted on the basis of past information and supports our claim of this series being exogenous.

We also test whether our exogenous news variable has predictive power for government spending and whether it is a relevant instrument for government spending. Following Ramey (2011b), we regress the growth rate of real government spending on contemporaneous and four lagged values of the exogenous news variable. The F-statistic from this regression comes out to be 15.49, with a p-value of 0.00, which allows us to reject the null hypothesis that the exogenous news variable has no predictive power for government spending.

2.5 Other Macroeconomic Variables

Other macroeconomic variables used in the analysis shown in Table 3, including GDP, government spending and consumption are mostly from statistics Canada. It provides quarterly data for these variables starting from 1961:1. For the years of 1949 - 1960, we take the quarterly GDP and government spending data from Owyang et al. (2013). Data of unemployment rate comes from Owyang et al. (2013). Data on interest rates comes from Bank of Canada. The income tax revenues required to compute the average income tax rates are available at a quarterly frequency from Statistics Canada starting from 1961:1. For the period of 1949 - 1960, we construct the quarterly series by recording the annual income tax revenues from the government accounts in the budget speeches and then temporally disaggregating them into quarterly frequency. Finally, inflation rates were calculated from the CPI data available from Statistics Canada.[4]

3 Effects of the Government Spending Shocks

In the section, we investigate the effect of exogenous changes in news about spending changes on output and government spending.

3.1 Baseline Model

In the baseline specification, we estimate the following VAR:

$$X_t = A_0 + A_1 t + A_2 t^2 + B(L)X_{t-1} + \epsilon_t, \tag{1}$$

where X_t is a vector of variables to be included in the VAR. In the baseline model, we include log of real output, log of real government spending, and the government spending news variable. $B(L)$ is a lag polynomial with P lags. We follow Ramey (2011b) in choosing 4 as the lag length. Our sample period for the baseline results is 1949:1 - 2012:1.

Figure 3 provides the results for the baseline specification. The impulse responses describe the percent changes in government spending and output with one percentage point increase in the government spending shocks, along with 68% confidence interval. The left panel shows that a one percentage point increase in the news variable leads to an immediate increase in

[4]We took averages of monthly data to convert it to quarterly frequency.

government spending of 0.45 percent. It peaks 3 quarters after of the initial shock at 1.16 percent, and gradually declines but remains significantly positive for several quarters. The right panel in Figure 3 shows the response of output to a one percentage point increase in the news variable. The figure shows that output increases initially, though insignificantly, and the increase in output reaches the peak seven quarters after the initial shock at 0.19 percent.

Next, we calculate the implied government spending multiplier from the results of the baseline model. To calculate the multiplier, we need a measure of elasticity of output with respect to government spending. This elasticity can be calculated in two different ways: first, we can divided the peak response of output by the peak response of government spending, and second, we can divide the cumulative response of output by the cumulative response of government spending. Finally, we multiply the implied elasticity of output with respect to government spending with the average of ratios of nominal GDP and nominal government spending over the entire sample period to get an estimate for the government spending multiplier. [5]

The estimates for government spending multipliers are in presented Table 4. It shows that the government spending multiplier is 0.84 for Canada when elasticity of output with respect to government is calculated using the peak responses. If we instead use the cumulative responses over two and four years after the initial shock, the estimates of the multiplier come out to be 1.04 and 1.14 respectively.

3.2 Controlling for Tax and Monetary Policies

The baseline specification includes output, government spending and the data series on government spending shocks. Next, we extend our analysis by including the Canadian overnight interest rate and average income tax rate in the baseline specification. The results are shown in Figure 4. The qualitative responses of government spending and output are very similar to the baseline case. The government spending peaks three quarters after the initial shock and is of a similar magnitude as in the baseline case. The responses of output reach the peak seven quarters after the shock and are larger than those in the baseline case. While the qualitative responses of government spending and output are very similar to the baseline case; the implied multipliers are larger when we control for interest rates and tax rates. The

[5]Note that this calculation depends on the ratio of nominal GDP and nominal government spending, which is 5.33 over the sample. This ratio was much higher for Canada in the earlier few years in our sample. The average ratio was 6.75 for the 1949-1960 period and 5 after the year 1960.

government spending multiplier is 1.16 when calculated using the peak responses. When the cumulative responses through two and four years are used, the multipliers are 1.55 and 1.36, respectively.

Figure 4 also shows the response of interest rate and average income tax rate to shocks to exogenous news series. Interest rate rises, but the response remains insignificant for several quarters. The peak response of the interest rate is 0.11 percentage points, taking place after 6 quarters of the initial shock and is marginally significant. This increase in interest rate may reflect the Bank of Canada's inflation targeting preferences. As a result of expansionary fiscal policy, inflation might increase which can prompt the central bank to increase interest rate to control it.

The response of average income tax rate is highly insignificant and quantitatively small as well. The maximum quantitative response of the average income tax rate is around 2.2 percent which takes place two quarters after the initial shock and dies down quickly. We conclude that in general, there is no evidence that spending increases in Canada are accompanied are tax increases.

The response of income tax rate in Canada is different from what Ramey (2011b) found for the US. She shows that average tax rates can increase by up to 10 percentage points after a exogenous news shock and the effect is significant whereas we find smaller and insignificant effects. In our reading of the budget documents, we do not find evidence that the government raises taxes when it increases expenditure substantially. For example, in the US, the Revenue act of 1950 was enacted to finance the war time expenditure associated with the Korean war which increased tax rates on individuals and corporations.[6]

In Canada, however, there were no substantial accompanying increases in taxes when military expenditure increased in the early 1950s. In the budget speech of September 1950, when it was announced that Canada would be increasing military spending, it was made clear that the intention of the government was not to have any effect on personal consumption expenditure. The government increased the tax rate on profits of corporations and commodity tax on alcohol by small amounts but the main channel through which the government was able to finance the expenditure was a reduction in its own spending on construction projects. While there was a defense surcharge imposed on individuals a year later, it was made clear that the government did not want to disturb private consumption in order to finance the increased defense spending.

[6]See Romer et al. (2009) for detail.

4 Comparison of Government Spending Multipliers

Recent literature about macroeconomic effects of fiscal policy shocks has tackled the identification problem in two ways – the narrative approach and the structural VAR (SVAR) approach. In this section, we compare our results with the key papers in these two strands of literature in estimating government spending multiplier for Canada.

4.1 The Narrative Approach: ORZ(2013) Military Spending News Shocks

Military spending changes or "war dates" have commonly been used in the literature using the narrative approach to estimate government spending multipliers. [7]. It provides multiplier estimates for the temporary, deficit-financed increases in government purchases, that closely mirror the textbook definition of government spending multiplier. Owyang et al. (2013) (henceforce, called ORZ (2013) for simplicity) examine the government spending multipliers in Canada using news about large military spending changes. Though our paper also adopts narrative approach, there are some important differences.

First, we rely upon the budget speeches made by the minister of Finance and some other budget documents to identify news about upcoming changes in government spending. ORZ (2013), on the other hand, use newspaper sources to gather information about changes in military spending. Ramey (2011b) points out that relying upon government sources can be problematic since they are either not released in a timely fashion or understate the cost of certain military actions. This may not be too problematic for Canada, due to the budget secrecy which ensures that there is little knowledge of announcements about government spending changes. Second, ORZ(2013) use subjective assumptions regarding the dating of announcements.[8] We do not need to make these assumptions, as we rely upon the budget speeches and use the dates when those speeches are made in our data set.

[7] See Ramey and Shapiro (1998), Ramey (2011b), Owyang et al. (2013), Ramey and Zubairy (2014)

[8] ORZ(2013) is a short paper and we could not find detailed accounts on how the variables are constructed for Canada. However, Ramey (2011b) and its companion paper present detailed accounts on different pieces of news that lead up to the construction of every particular observation in the US. However, the dating of each observation varies and other dates for the same observation can be argued for. For example, in the measure of Ramey (2011b), there is an increase in military spending of around 26 billion dollars each year for 5 years announced in 1991 in response to the invasion of Kuwait by Saddam Hussein. The present discounted value of this change is dated to the fourth quarter of 1991. However, the news items included in the companion paper show that the actual invasion and the first news about the US involvement in the war were in the third quarter of 1991. Thus it can be argued that the present discounted value of this change should be dated to the third quarter of 1991.

ORZ (2013) investigate whether the government spending multipliers are greater during periods of slack (defined as period with high unemployment), and extend the series back in time to include World war II and the Great Depression, which have potentially rich sources of information on economic fluctuations. Here, in order to compare with our results, we restrict their news series to be from 1949Q1 to 2011Q4. In both data series, the largest changes in government spending is driven by the news on Korean war during the early 1950's. These are also the only observations with non-zero values for ORZ (2013) series after the second world war. In our data series, there are a total of 16 quarters with news about military spending changes and 4 of them are negative. Apart from the huge increases in military and defence spending in the early 1950's, there were other military spending changes in the 1980's and then in the early 2000's in response to the 9/11 attacks.

We estimate the impulse responses with the baseline VAR with controls using the ORZ (2013) data series. The results are shown in Figure 5. Qualitatively, the responses using ORZ (2013) data series look similar with those using our data series. Both government spending and output display hump-shaped responses. Both government spending and output reach their peaks 4 quarters after the initial shock. In contrast, in our estimation results, government spending reaches the peak 3 quarters after the shock and output reaches the peak 6 quarters after the shock. The implied multipliers estimated with ORZ(2013) data series is 0.78 when calculated with the peak response and 0.89 when calculated with either 2-year integral, and 0.94 when calculated using the 4-year integral. The multipliers are larger than those in ORZ (2013), where they look at a longer sample period from 1921 to 2012, with the government spending multiplier estimated to be between 0.57 and 0.79. When we control for monetary and fiscal policies, the responses remain qualitatively similar (figures are omitted) and the multiplier is 1.13 when calculated with the peak response, 1.40 calculated with 2-year integral and 1.11 calculated with 4-year integral.

4.2 The Structural VAR Approach

Blanchard and Perotti (2002) have perhaps the most careful and comprehensive approach to estimating macroeconomic effects of fiscal shocks using VARs. To identify fiscal shocks, they first incorporate institutional information on taxes, transfers, and spending to identify key parameters, and then estimate the VAR. The key identification assumption is that it typically takes longer than a quarter for discretionary fiscal policy to respond to shocks in the economy. Perotti (2005) applies the structural VAR methodology developed in Blanchard and Perotti (2002) to study the effects of fiscal policy in five OECD countries, including

Canada. Here, we adopt the structural VAR, essentially relying upon Choleski ordering (in which government spending is ordered before the other variable) to identify fiscal shocks.

Figure 6 provides the estimated IRFs using the structural VAR approach with four variables - government spending, output, interest rates, and average income tax rate. Following a positive government spending shock, government spending declines steadily. Output rises and reaches the peak 4 quarters after the shock, and then declines gradually. This is similar to the findings in Perotti (2005), who examines the period of 1961Q1 to 2001Q4 for Canada.

In response to a positive government spending shock, both government spending and output increase. However, the overall shape of the impulse responses and the implied government spending multipliers are different from our earlier estimates that used news shocks. The narrative approaches using either our exogenous government spending shocks or ORZ (2013) military news variables, generate hump-shaped responses for both government spending and output. In contrast, in the structural VAR estimation, government spending rises immediately after the shock and then declines gradually. The output response is hump-shaped, though it peaks much earlier, compared with those estimated with the narrative shock series. Moreover, the implied multipliers estimated with the SVAR approach, in the rage of 0.29 to 0.54, are much smaller than those with the narrative approaches.

4.3 Importance of Non-Defense Shocks

As pointed out by Barro and Redlick (2011), government spending multipliers estimated with military war dates are not particularly useful when we want to evaluate the impact of various government funded programs and projects. It is hard to pin down even theoretically whether the total government spending multipliers or the non-defense spending multipliers should be larger or smaller than the military spending multipliers. Military spending are temporary and hence may have smaller multipliers. But some government funded programs are also short-lived. The impact of military spending is to have negative wealth effect on the economy. In contrast, many government programs are proposed and implemented to improve long-run economic performance or redistributive purpose, which may have positive effect on the economy. Baxter and King (1993) argue that an increase in government investment has a much stronger impact on the economy than a pure rise in government purchase of goods and services.

However, Barro and Redlick (2011) points out that it is hard to be optimistic about using the macroeconomic time series to isolate multipliers for non-defense spending for two

reasons. One is that compared with the military and defense spending due to the events like the Korean war, the variation in non-defense spending is always likely to be small. So, it is very unlikely that there is enough information in the variation of non-defense spending to gauge an accurate estimate of the non-defense multiplier. The other reason is that the changes in non-defense spending are likely to be endogenous, that is, correlated with changes in output.

We overcome the second of these challenges by carefully reading the government documents and constructing news about exogenous government spending changes that are uncorrelated with contemporaneous movement in the economy. Even though we can not accurately estimate the effects of non-defense spending changes only due to their small variations, we can estimate the defense spending multiplier by isolating news about changes in defense spending. We can then compare this defense spending multiplier with the overall government spending multiplier to gauge the importance of inclusion of non-defense spending measures in the data set.

To see the effects of changes in defense spending, we restrict our exogenous government spending news variable to only include news about defense spending changes. We include this defense spending news variable in the four variable VAR that includes government spending, output, interest rate, and average income tax rate. The results are in figure 7. Qualitatively the responses are very similar to the case when we use our overall news variable. However, quantitatively, the implied multipliers using defense spending news are between 0.97, 1.26, and 1.07 which are smaller than the multipliers that we estimated using overall news variable. This is likely due to the fact that the overall exogenous spending news variables includes various non-defense spending changes that lead to higher output. In contrast, defense spending changes are often thought to have only negative wealth effects on the economy. This potentially explains that why the multipliers estimated with our news series are larger than those with ORZ (2013) defense news series.

To further see the importance of non-defense spending changes, we combine our news variable with the ORZ (2013) series. Generally, it is reasonable to assume that announcements in budgets are the main source of information for the economy regarding upcoming changes in government spending. This is especially true for Canada given their traditional budget secrecy discussed earlier in the paper. However, when significant events like a war take place, it is likely that the economy becomes aware of planned spending changes before news about them is officially released. ORZ (2013) rely upon newspaper sources to identify news about defense spending changes associated with the Korean War. That is why, it is reasonable to

assume that it captures the anticipation effects associated with the Korean War better than our series. We form a new mixed news series where we replace the observations associated with Korean War in our series with those from the ORZ (2013) series.

We use this mixed news series in our 4 variable VAR and the results are in figure 8. Qualitatively, the responses look similar with those using the narrative approaches with either the HL shocks or the ORZ(2013) shocks. Both government spending and output display hump-shaped responses. Government spending reaches the peak 4 quarters after the shock, and output reaches the peak 7 quarters after the shock. Quantitatively, the multipliers - 1.51, 1.76, and 1.43 when using peak responses, 2-year integral, and 4-year integral - are the largest across different identification and estimation methods. These results show that not only is it important to capture the anticipation effects - which the ORZ (2013) series does the best for the Korean War, it is also important to take into account non-defense spending changes which our series does.[9]

5 Response of Consumption

In this section, we examine how consumption is affected by changes in government spending. The response of consumption has been at the centre of the debate about the effects and mechanisms of government spending shocks. Empirical estimates range from being negative to being almost zero to being positive. Narrative studies that use the war dates (e.g. Ramey and Shapiro, 1998, Burnside et al., 2004, and Ramey, 2011b) find a negative effect of government spending increases on consumption. This negative response of consumption is in line with the neoclassical model (see Baxter and King, 1993 for example), where an increase in government spending, financed by lump-sum taxes, leads to negative wealth effects and hence a decline in consumption.

On the other hand, studies using the structural VAR identification including Blanchard and Perotti (2002), Fatas and Mihov (2001), Mountford and Uhlig (2009), Galí et al. (2007) and others find that positive innovations in government spending are followed by strong and persistent increase in consumption. This can not be matched by several variations to a

[9]It should be noted that this mixed shock series consists of some defense spending changes from the 1990's and 2000's from our data set. If we compute the multipliers from a mixed defense news shock series comprising of Korean war observations from the ORZ (2013) series and other defense spending changes from our data set then the multipliers are 1.32, 1.52, and 1.21. These are still smaller than the ones that we get from the overall mixed shock series which shows that including non-defense spending changes can make a substantial quantitative difference to the estimated multiplier.

standard real business cycle model with plausible parameter values, as shown in Fatas and Mihov (2001). Galí et al. (2007) extend the standard New Keynesian model to allow for the presence of rule-of-thumb consumers and show that how the interaction of the latter with sticky prices and deficit financing can account for the fact that consumption rises in response to an increase in government spending. However, Ramey (2011b) stresses that the response of consumption is an empirical question. The key difference in structural VAR and the narrative approach is the timing of the shock, which explains the different estimation results on consumption responses. Thus, both macroeconomic theories and empirical estimates, mostly using the US data, can not agree on the exact effects of government spending shocks on consumption. Here, with our newly constructed data series on government spending shocks, we can provide some evidence regarding the response of Consumption for Canada. We also compare our estimates with those estimated with the structural VAR approach. To make the comparison of results easier, we normalize the results from both approaches so that the peak response of government spending is 1 percent.

We augment the vector of endogenous variables in VAR with log of real consumption. Consumption, shown in Figure 9, declines immediately upon the arrival of news about government spending changes. The impact drop is insignificant however. The drop in consumption becomes significantly negative after one quarter of the initial shock. The response of consumption remains negative throughout the forecast horizon although after the initial quarters, the responses become statistically insignificant.

Figure 10 shows the response of consumption estimated from a structural VAR model. The figure shows that consumption falls in response to a increase in government spending and the response stays negative for most quarters in the forecast horizon. Despite the qualitative similarities between the results from the two approaches; there are some quantitative differences. First, when using our newly constructed news series, we find that consumption shows a strong short-run response after the shock whereas the response from the SVAR approach is close to 0 for the first several quarters after the initial shock. Second, the maximum drop in consumption when using the news series is large and significant - around 7.5% after one quarter of the shock. However, the maximum drop in consumption using the SVAR approach comes out to be 2.4% after 4 years of the initial shock. Furthermore, this result is highly insignificant.

As discussed earlier, Ramey (2011b) argues that response of consumption estimated using the SVAR approach misses the anticipation effects of government spending changes and that results in an apparent positive response of consumption. perotti (2011), however, argues

that the different results using the narrative and the SVAR approaches found by Ramey (2011b) are because she never estimates the two specifications on the same sample for the US. He shows that the narrative and the SVAR approaches give virtually the same results when estimated on the same sample using the same variables.

Our results are somewhere in-between the claims made by these two studies. While, we do not find the strong positive response of consumption that other studies using the SVAR approach have found for the US, we also do not find the virtually same results from the two approaches despite using the same sample period for both. Overall, we find our results more in line with what Ramey (2011b) found i.e. that consumption shows a strong negative response to increases in government spending.

6 Effects of Announced and Implemented Government Spending Changes

Earlier in the paper, we showed that our news variable has strong predictive power for government spending changes. However, we find that this predictive power significantly diminishes once we remove the observations associated with the Korean War. This is problematic for two reasons. First, it means that it might be difficult to extend our study to other countries that have not experienced large spending changes akin to those associated with the Korean War. Second, this problem limits our study to the those samples that include the Korean war period.

For Canada in particular, we are interested in how the effect of fiscal policy has changed since the mid 1980's. The 1980's saw a shift in federal government's policy towards reducing deficits and debt. The deficits had started to accumulate since before the oil price shocks of 1973 and the counter-cyclical policies of the government during the recessions of the 1970's worsened the debt position of the country. Hence, the government responded to these rising deficits by engaging in fiscal austerity measures from the mid 1980's to the mid 1990's (Thiessen, 2001; Di Matteo, 2017). Our own narrative also makes it clear that there were significant changes in the way spending policy was conducted after the mid 1980's. For example, all the six negative values that we have in our news variable are in the post-1985 period and correspond to deficit consolidation changes enacted by the government to tackle its debt problem.

For the post-1985 period, the regression of growth in real government spending on con-

temporaneous value and 4 lags of our news variable yields an F-statistic of 2 with a p-value of 0.08. Even though the p-value is low, the F-statistic falls well short of the threshold used in literature of 10 (see Ramey, 2011b and Staiger and Stock, 1997). This indicates that our news variable is a weak instrument for the post-1985 sub-sample. Indeed, if we estimate the 5-variable VAR for this sub-sample, the response of government spending comes out to be small and insignificant with estimated multipliers being implausibly large.

Ramey (2011b) faces the same problem when using her defense spending news variable for the US for the post Korean war years. The way she gets around the weak predictive nature of her news variable in the post Korean war period is to construct an alternate measure of news about future government spending based on the difference between actual spending and forecasted spending from the survey of professional forecasters. However, no such measure is available for Canada.[10]

Instead, we introduce a different methodology. We construct a new variable consisting of announced and implemented government spending changes. This variable is constructed from the information that we collect to construct our exogenous new variable. We isolate those government spending changes that are announced and implemented in the same year. We ignore any changes that are announced in the previous years. If a change is to be implemented over a number of years then we only take the part of it that is implemented in the same year. We call these the announced and implemented government spending changes.

We then assume that these changes have the same implementation dates as the dates when the budgets are officially approved (the royal assent dates). For older budgets, we could not find data on the royal assent dates. Our reading of later budgets showed that the budgets were always approved about 3 months after the initial tabling of them. Thus, we assume that all budgets were implemented with a lag of one quarter. Spending changes that are announced midyear through other types of announcements like Financial Statement or Mini Budget are those that are to be implemented immediately. For such changes, we take the announcement date as the implementation date. In short: we assume that the implementation dates of measures announced in yearly budgets are one quarter after the speech and the implementation dates of measures announced midyear are the same as the announcement dates.

We acknowledge that our assumption of assigning the approval date as the implementation

[10] Also, perotti (2011) discusses that the forecast error - difference between actual and forecasted spending - has high predictive power for the actual spending in Ramey (2011b) for the *wrong* reason: the forecast of spending is itself not informative of the actual spending at all. That is why the forecast error is effectively the actual spending minus noise.

date is somewhat restrictive. Ideally, we would want to find out the implementation date of each spending change. However, unlike tax changes, government spending changes often do not have a specific start date. By assigning the approval dates as the implementation dates, we are ignoring potentially important announcement effects associated with government spending changes. Ramey (2011b) discusses that there are often long lags between the decision to increase defense spending and the actual increase in spending because of various administrative steps involved. While acknowledging the restrictiveness of this assumption, we argue that the bias induced by this assumption in our results should be minimal. We, however, believe that the bias in the our results because of our assumption that spending changes are implemented in the same quarter when they are announced is small. That is because of three reasons.

First, we have already omitted all the spending changes that have anticipation lags more than 3 quarters i.e. the changes that are announced and implemented in different years. Second, our baseline results have shown that the anticipation effects are not very important since we do not observe output responding to news about spending change: the increase in government spending happens before output starts to increase. Third, Ramey (2011b) correctly argues that defense spending changes are always such that there is a lag between announcement about spending change and the implementation of it since a lot of time is needed to, for example, analyze the type of weapons needed, the amount of funding required, and choice of providers. In our case, however, it is reasonable to assume that the implementation lag is not very long since the work required before implementation is done by Finance ministry prior to making the announcements.[11]

We normalize the announced and implemented government spending changes by the GDP of the previous quarter. This way, the estimated coefficients on this variable will directly give us the size of the spending multiplier. We estimate a 4-variable VAR with log of output, our measure of announced and implemented spending changes, interest rate, and average income tax rate. The result for the entire sample is shown in Figure 11. When government spending increases by 1 percent of GDP, output starts to increase significantly after 1 quarter. The peak response of output, an increase of 0.92 percent, takes place 7 quarters after the initial

[11]Most governments in Canada have been majority governments and in case of majority governments, the budget is guaranteed to pass. In case of minority governments, the government often includes concessions to smaller parties to ensure passage of the budget. This is because the passage of budget is a confidence measure: if the House votes against the budget the government can fall like in the case of the minority government of Joe Clark in 1980. Thus, finance ministers are confident about the passage of the budget before announcement and that is why is reasonable to believe that they make all the necessary arrangement for spending changes ahead of time.

shock. This estimate of spending multiplier is in line with other estimates that we found in this paper. The response of output then starts to taper off but remains significantly positive for several quarters.

We also estimate the spending multiplier using the announced and implemented changes using annual data.[12] Beetsma et al. (2008) and Guajardo et al. (2014) argue that use of annual data minimizes the anticipation effects of fiscal policy changes. We include log of output, interest rate, and average income tax rates as endogenous variables in the VAR and include the annual measure of announced and implemented spending changes as exogenous variable to allow for its contemporaneous effect on output. We include two lags of the endogenous variables and the contemporaneous and one lagged value of the spending measure. We also include a quadratic time trend in the model.

The results from this exercise are shown in Figure 12. The response of output is insignificant on impact but becomes significant with a lag of one year The peak response of output - an increase of 0.91 percent - takes place in the second year after the initial shock. The response of output then becomes smaller but stays significantly positive for one more year before becoming insignificant. The results from this exercise are remarkably similar to when we used quarterly data. The multiplier when we use annual data (0.91) is very close to the multiplier we got from the quarterly data (0.92). Furthermore, qualitatively the responses from output are very similar from both exercises. Thus, the results from using annual data provides support to our claim that our assumption regarding implementation dates being the same as announcement dates in quarterly data does not introduce a significant bias in our results.

Finally, we ask the question whether the size of the spending multiplier has changed over time. In particular, we return to our quarterly data and estimate the 4-variable VAR (with 4 lags of log of output, interest rate, average income tax rate, and quarterly measure of announced and implemented spending changes) for the pre and post 1984:2 periods. The results are in Figure 13. We document two main differences across the responses of output. First, output responds much more quickly in the pre-1984:2 period. The peak response takes place 5 quarters after the initial shock. In the post-1984:2 period, the response of output starts to become significantly positive only after 9 quarters of the initial shock and hits its peak after 11 quarters. Second, the multiplier from the post-1985 period - 0.73 - is quantitatively smaller than multiplier from the pre-1984:2 period - 0.81.

[12] We take the average of quarterly data of output, interest rate, and income tax revenues to convert it to annual frequency. For the announced and implemented government spending changes, we simply assign the observations to the relevant year and then normalize the series by current year's nominal GDP.

Here, we briefly try to explain the second difference i.e. the multiplier being smaller for the post-1984:2 period. Our immediate guess was that the austerity measures adopted by the government in the post-1984:2 period may explain the difference in estimated multipliers. To check this, we break our post-1984:2 measure of announced and implemented spending changes into spending increases and decreases. We then re-estimate our model for the post-1984:2 period by including spending increases and decreases separately. The implied multiplier for spending increases comes out to be 0.81 which is very close to the multiplier for the pre-1984:2 period.

While we cannot directly estimate the multiplier associated with spending decreases because of the low number of observations in that series, the results suggest that spending decreases are less contractionary than spending increases are expansionary. A detailed reading of the budget documents supports this result. We found that most of the austerity measures adopted by the government were aimed at reducing surplus spending rather than essential spending. The government would always announce that the austerity measures would not affect the transfer payments and only in instance, in 1994, did the government reduce unemployment benefits. This suggests that a careful choice of program during times of austerity can mute the negative effects of government spending decreases.

7 Conclusion

In this paper, we construct a novel measure of news about exogenous government spending changes for the post war period in Canada to estimate government spending multiplier. Previous studies have typically used news about military spending as an instrument for overall government spending, whereas we include all exogenous government spending changes. We rely upon government budget documents, mostly the budget speech, to document all announced government spending changes and classify them as exoegnous or endogenous. Our results show that government spending multiplier for Canada is around 0.88 to 1.57, which is higher than those estimates by the narrative approach with war dates and the structural VAR approach.

There are several important results that can be drawn from our paper. First, we have shown that including non-military spending changes is important in the narrative approach even if they (as a set) alone do not have enough explanatory power for overall spending changes. Second, our methodology of constructing announced and implemented spending changes is a useful tool to study the government spending multipliers for those countries

that have not experienced large increases in military spending or for periods when such increases are absent. Finally, it is important to study how government spending changes are financed. The effect of spending on consumption crucially depends upon the source of financing of spending increases. If a new program is not draining resources from the economy then negative effects on consumption, as predicted by the new classical model, should not be expected.

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Table 1: Summary Statistics

Variable	Mean	Standard Deviation	Non-Zero Values	Negative Values
Exogenous series	0.28	1.67	47	6
Endogenous series	0.08	0.46	24	2
All (exogenous + endogenous)	0.35	1.73	59	8

Table 2: Test of Exogeneity and Test of Predictive Power

Dependent Variable	Regression	Test Statistic	p-value
Test of exogeneity:			
Exogenous (All)	Linear	1.23 (F)	0.228
Exogenous (without Korean War Obs.)	Linear	0.74 (F)	0.78
Endogenous	Linear	2.29 (F)	0.002
Exogenous	Ordered Probit	26.39 (LR)	0.153
Endogenous	Ordered Probit	33.08 (LR)	0.033
Tests of predictive power:			
Government Spending	Linear	15.43 (F)	0.000

Table 3: Data Sources

Varaible	Source
GDP	Table 36-10-0240-01 (formerly CANSIM 380-0002)
Government Expenditure	Table 36-10-0240-01 (formerly CANSIM 380-0002)
Unemployment Rate	Owyang et al. (2013)
Income Tax Revenues	Table36-10-0245-01 (formerly CANSIM 380-0007) budget speeches
Interest Rates	
- Bank Rate	Table 10-10-0122-01 (formerly CANSIM 176-0043)
- Government of Canada 1-3 year bonds	Table 10-10-0122-01 (formerly CANSIM 176-0043)
Inflation	Table 18-10-0004-01 (formerly CANSIM 326-0020)
Consumption	Table 36-10-0240-01 (formerly CANSIM 380-0002) Historical Statistics of Canada, Table F14-32
Investment	Table 36-10-0240-01 (formerly CANSIM 380-0002)

Table 4: Government Spending Multipliers

	Peak Responses	2-year Integral	4-year Integral
HL government spending shocks			
Baseline	0.84	1.04	1.14
Controlling for policies	1.16	1.55	1.36
ORZ(2013) military spending news series			
without controlling for policies	0.78	0.89	0.94
controlling for policies	1.13	1.40	1.11
Structural VAR approach			
without controlling for policies	0.29	0.37	0.35
controlling for policies	0.39	0.54	0.53
Defense Spending Shocks			
controlling for policies	0.97	1.26	1.07
Mixed News Series			
controlling for policies	1.51	1.76	1.43

Notes: HL government spending shocks are the newly constructed data series on the news of exogenous government spending changes. ORZ(2013) military spending news series are the data series constructed by Owyang et al. (2013) using news sources on military spending changes. Structural VAR approach is where the government spending shocks are identified by the structural VAR with recursive identification assumptions. Mixed news series are the data series which incorporate ORZ(2013) military spending variables and HL non-military spending observations.

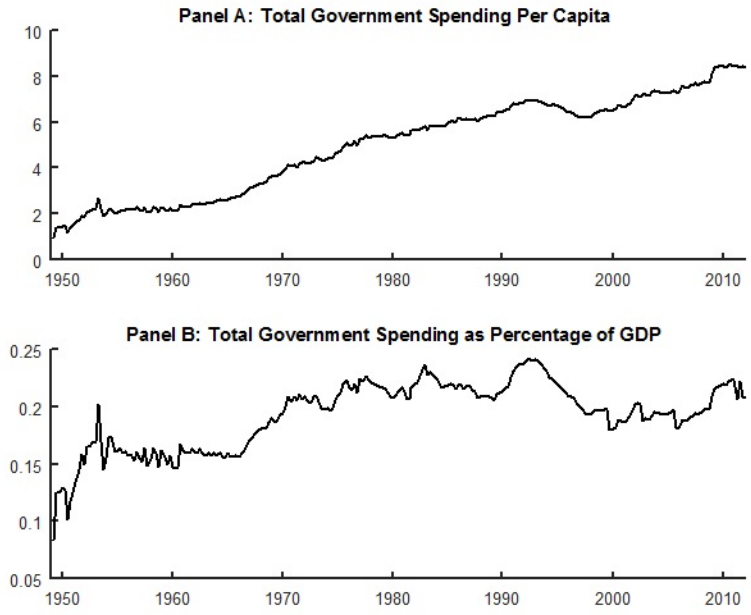

Figure 1: Total Government Spending in Canada 1949 - 2012

Notes: Panel A is total real government spending per capita in thousands of dollars in 2002. Panel B is the total government spending as percentage of GDP.

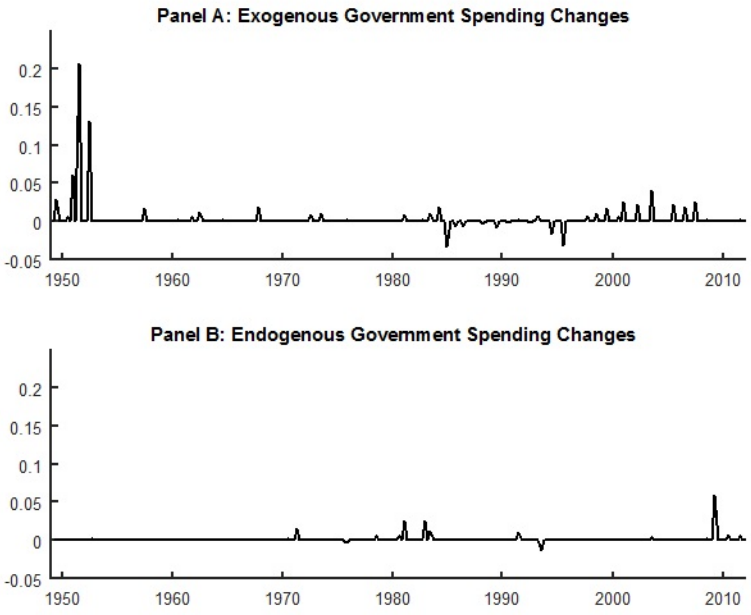

Figure 2: Government Spending Changes in Canada 1949 - 2012

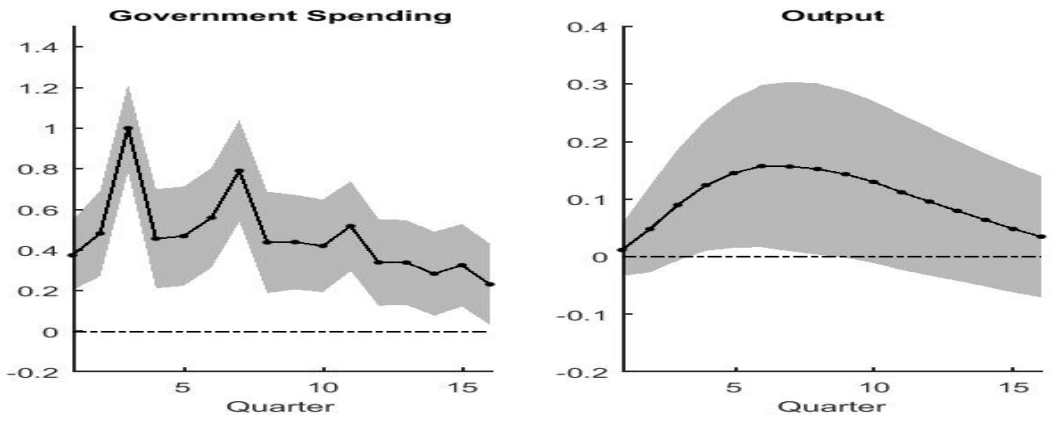

Figure 3: Macroeconomic Effects of Government Spending Shocks - Baseline Specification

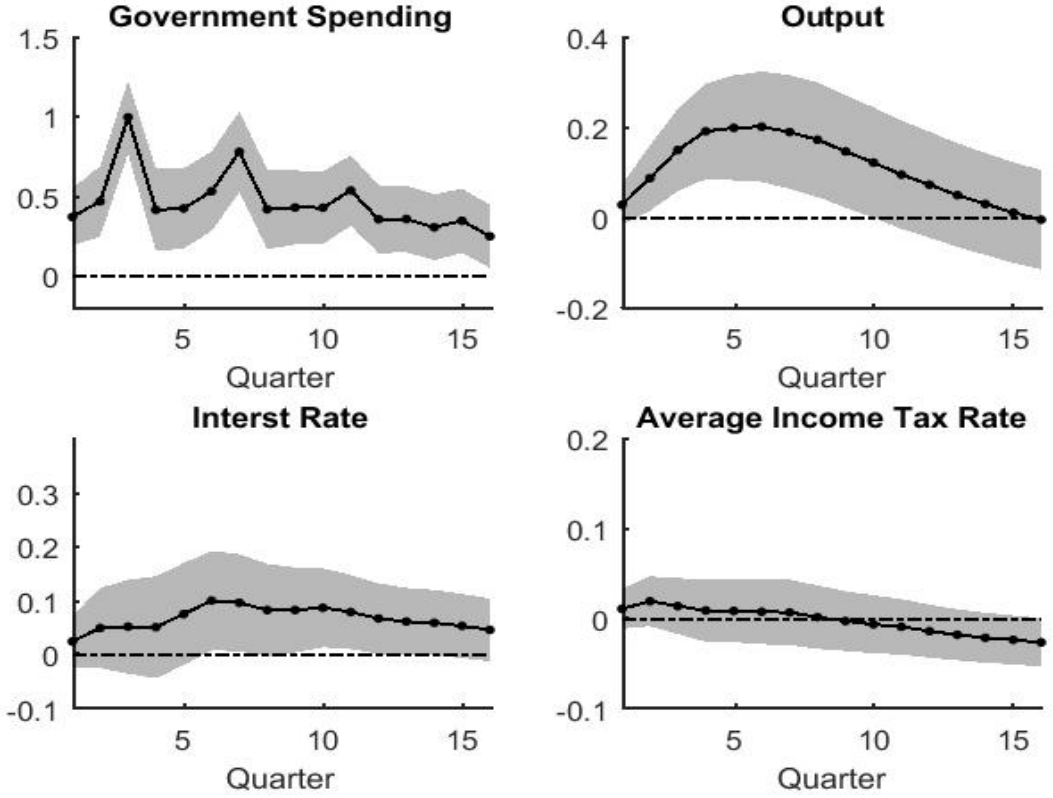

Figure 4: Macroeconomic Effects of Government Spending Shocks - Baseline Controlling for Tax and Monetary Policy

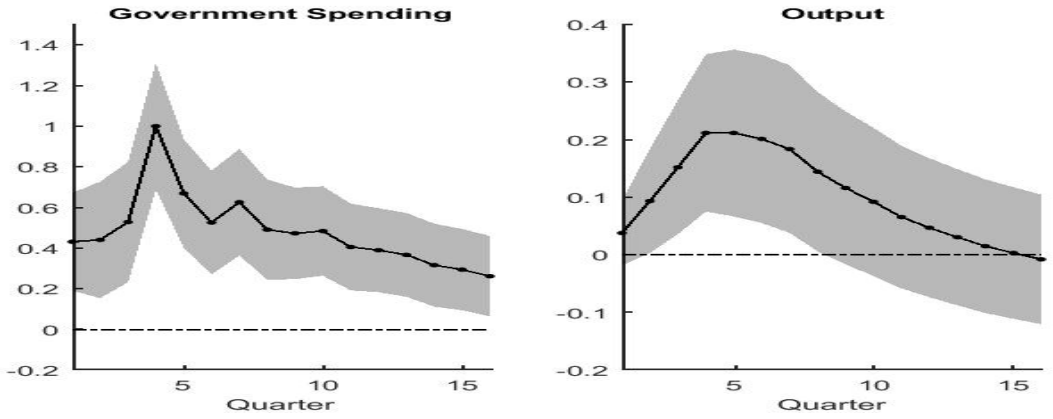

Figure 5: Macroeconomic Effects of Government Spending Shocks - ORZ(2013) Military Spending News Shocks

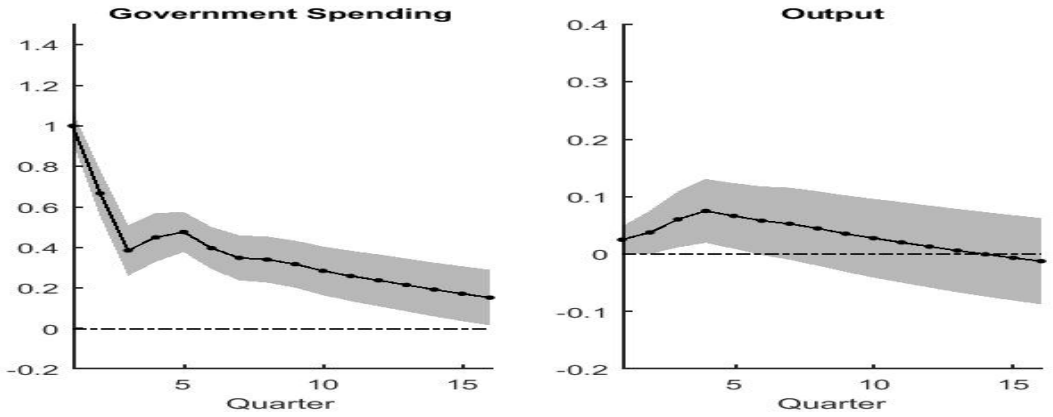

Figure 6: Macroeconomic Effects of Government Spending Shocks - the SVAR Approach

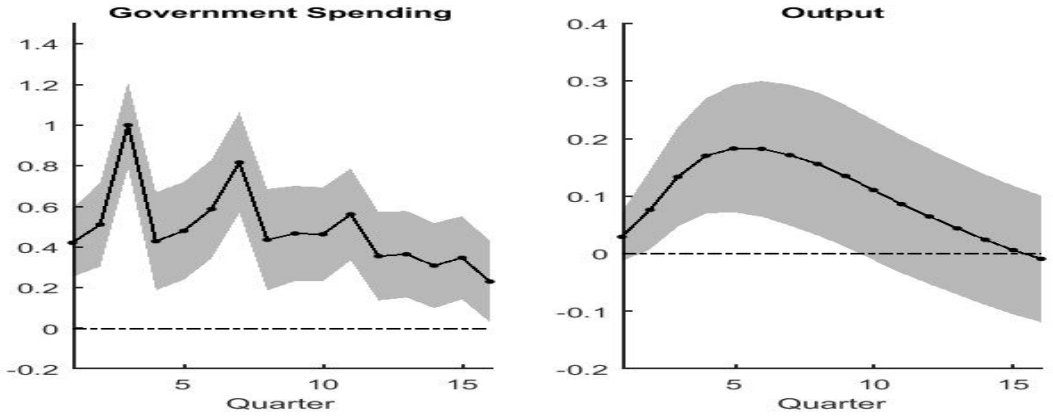

Figure 7: Macroeconomic Effects of Government Spending Shocks - Defense spending Shocks

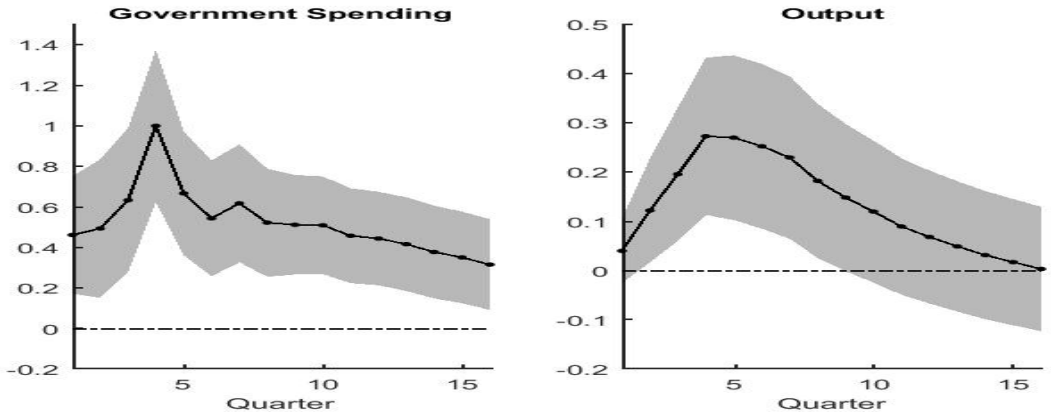

Figure 8: Macroeconomic Effects of Government Spending Shocks - Mixed News Series

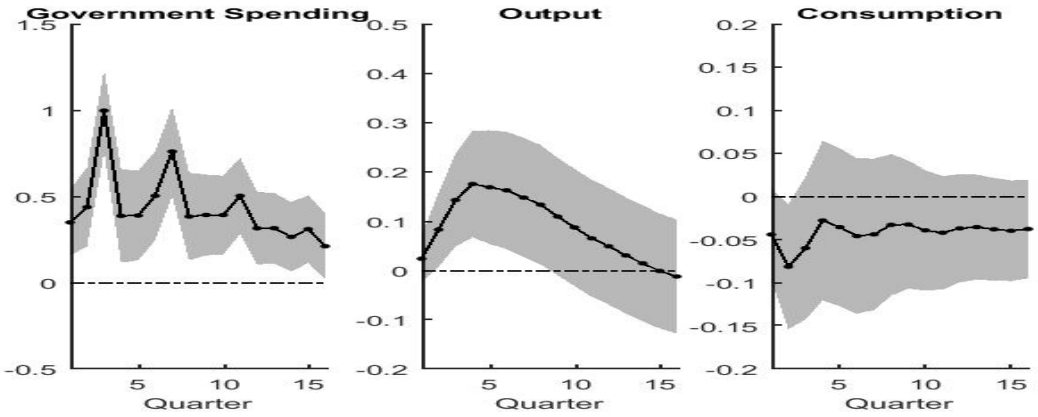

Figure 9: Responses of Consumption - the Narrative Approach

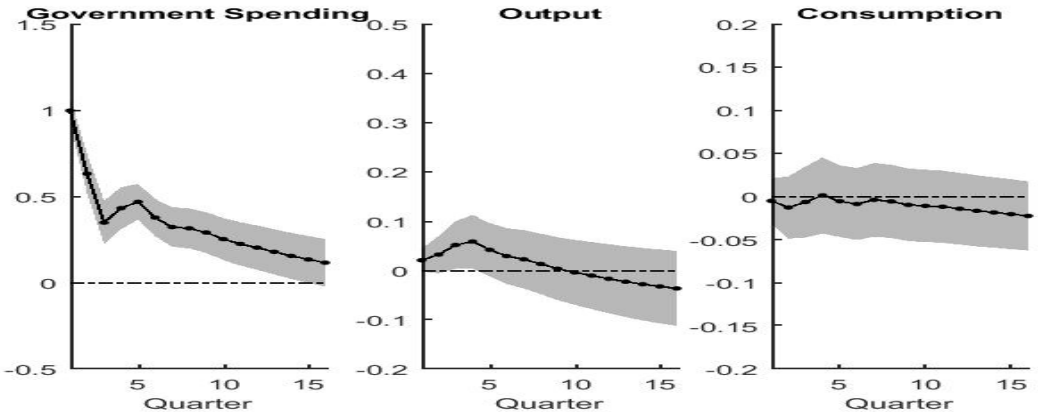

Figure 10: Responses of Consumption - the SVAR Approach

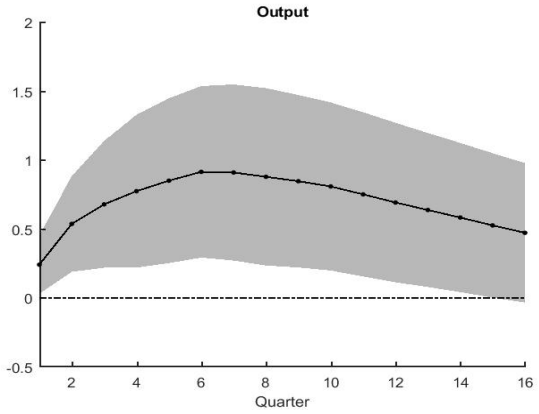

Figure 11: Macroeconomic Effects of Announced and Implemented Shocks - Quarterly Data

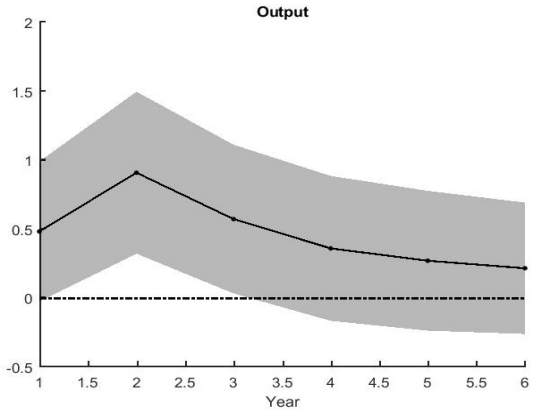

Figure 12: Macroeconomic Effects of Announced and Implemented Shocks - Annual data

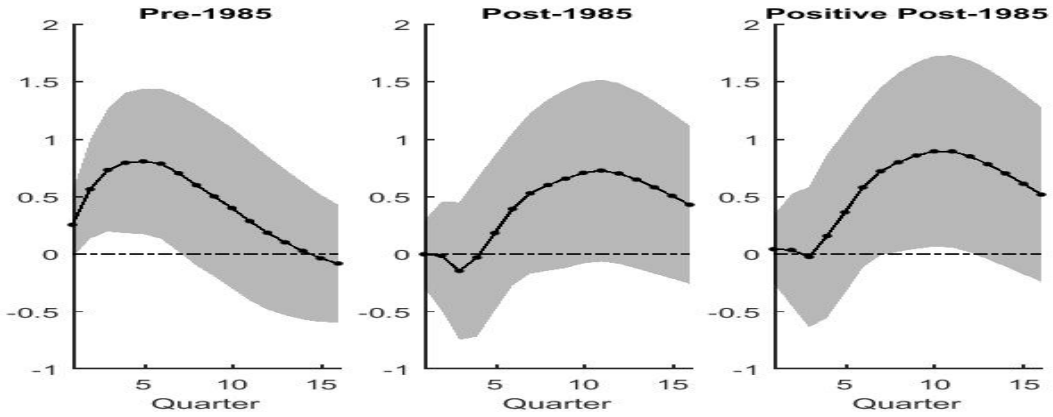

Figure 13: Macroeconomic Effects of Announced and Implemented Shocks - Subsample

A Appendix

A.1 Robustness Checks with Jorda's method

Here, we follow the econometric methods in ORZ (2013) to calculate impulse responses using Jorda's local projection technique, which does not impose the implicit dynamic restrictions involved in VARs.[13] Following ORZ (2013), we estimate a set of regressions for each horizon h as follows:

$$z_{t+h} = \alpha_0 + \psi(L)y_{t-1} + \phi(L)g_{t-1} + \beta_h s_t + \text{quadratic time trend} + \epsilon_t,$$

where y and g are the logs of output and government spending, s is a measure of news shock. ORZ (2013) point out that using VAR methods to obtain multipliers can lead to biases as it uses the sample average of Y/G to convert the percent changes to dollar changes, since the ratio of Y/G varies greatly over years. Thus, following ORZ (2013), here we define our dependent variables z as $(Y_{t+h} - Y_{t-1})/Y_{t-1}$ and $(G_{t+h} - G_{t-1})/Y_{t-1}$. By doing so, it converts the percent changes to dollar changes using the value of Y/G at each point in time rather than the average over the entire sample. Figure A.1 shows the responses of government spending and output estimated with Jorda's projection method. Panel A is the impulse responses from using our data series, while Panel B is those from using ORZ(2013) data series.

The results from this exercise are rather erratic for both measures of news shocks. Furthermore, the response of output oscillates at longer horizons. Both of these features of the results can be found in other studies that use the Jorda's local projection method. Ramey (2012) noted in her comment on a study using the Jorda's method that it is possible for responses calculated using the Jorda's method to exhibit oscillatory behavior at longer horizons. She also notes in Ramey (2016) that Jorda's method can often result in erratic point estimates.

Nonetheless, we still impute the government spending multipliers from this exercise. We find that when we use our measure of exogenous government spending news variable, the implied multipliers come out to be 0.54, 0.72, and 0.65 when using the peak responses, 2-year integral, and 4-year integral respectively. The multipliers when using the ORZ (2013) defense spending news variables come out to be 0.78, 0.89, and 0.94 respectively. We should note that the results from using our measure of exogenous spending is sensitive to the choice

[13] See Jord (2005) for more details.

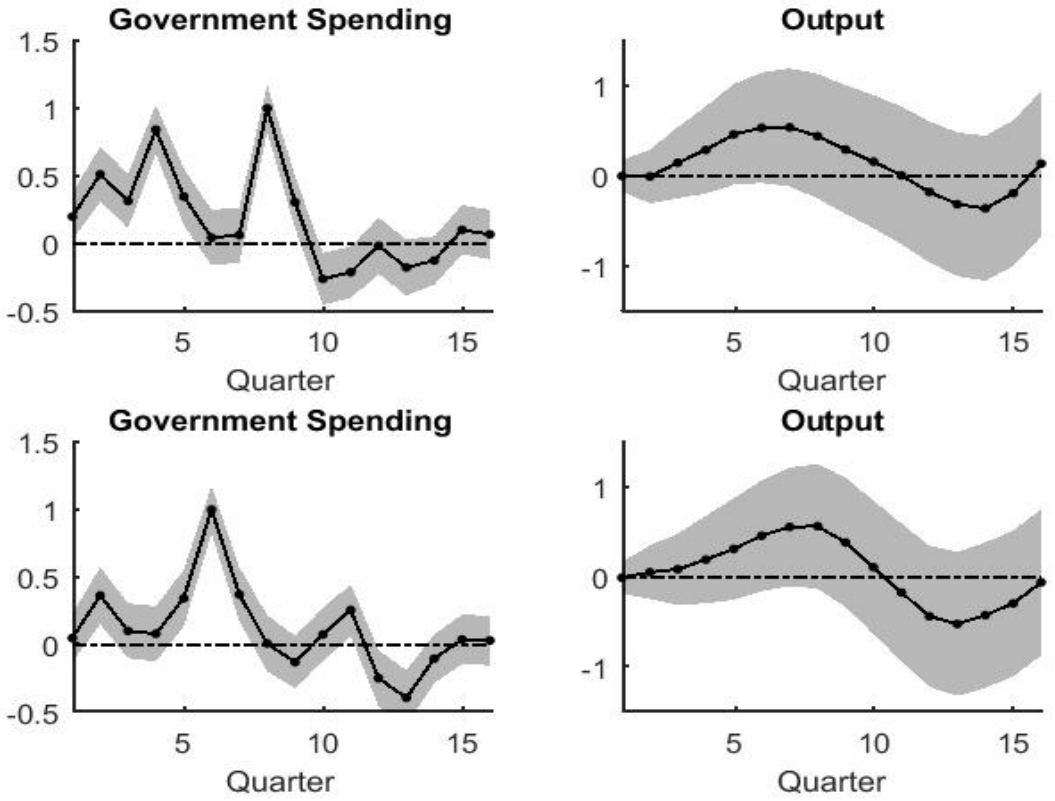

Figure A.1: Macroeconomic Effects of Government Spending Shocks - Jorda's Method

of horizon length that we choose to calculate the multiplier. The biggest responses of output take place after the 4-year horizon. If we consider a 5-year horizon after the initial shock then we find the multiplier estimates to be 0.8, 0.72, and 1.47 for peak response, 2-year integral, and 5-year integral. The results from using the ORZ (2013) shock series remain largely unaffected if we use a 5-year horizon to calculate the multipliers.

A.2 Role of Transfer Payments

In this paper, we included changes in transfer payments as part of government spending. However, the textbook definition of government purchases of goods and services excludes transfer payments. In our data, there were a few scattered observations that concerned transfer payments. In this section, we compute the government spending multiplier after dropping the observations that were associated with transfer payments.

We estimate the 5 variable VAR with log of output, log of government spending, exogenous government spending news variable that does not include transfer payments, interest rate,

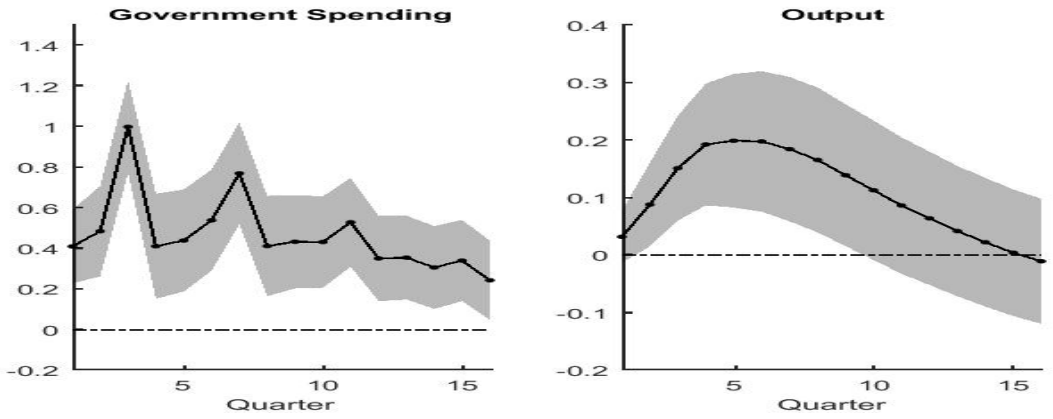

Figure A.2: Macroeconomic Effects of Government Spending Shocks - Non-Transfers Payments

and average income tax rate. The results are shown in Figure A.2. We find that qualitatively the responses of both government spending and output are very similar to the case when we include transfer payments in our news variable. The multipliers in this case are slightly smaller though. The multipliers come out to be 1.06, 1.45, and 1.2 when using peak response, 2-year integral and 4-year integral respectively. Nonetheless, the differences are small and hence we conclude that inclusion of transfer payments does not make important differences to our results.