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Fiscal consolidations and the dynamic of the Italian Public Debt: a narrative analysis of the 1986-1990 period.

RELATORE:

CH.MO PROF. Luciano Greco

LAUREANDO: Filippo Fortuna
MATRICOLA N.: 2006669

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Abstract

This paper employs an innovative narrative analysis methodology to extend to the period 1986-1990 the Italian section of the database of fiscal consolidation measures constructed by Alesina et al. (2020). These policy actions are considered to be exogenous with respect to the economic cycle by a vast strand of applied macroecnomic literature.

In order to perform this analysis, we use a broader set of historical sources than the one consulted by Alesina et al. (2020). It includes all those official documents related to the Italian budgetary procedure, which contain both qualitative and quantitative information that is useful to analyze the motivation and the budgetary effect of each measure.

The identified fiscal consolidations are then merged with the original series of Alesina et al. (2020) in order to assess their impact on the Italian debt-to-GDP dynamics. The empirical specification employed to carry out this analysis is the Local Projections approach firstly introduced by Jordà (2005).The behavior of the variable of interest following these exogenous changes indicates that fiscal consolidations have been *"self-defeating"* in their effect on the debt dynamic.

Keywords: Narrative Analysis, Fiscal Consolidation, Local Projection, Public Debt dynamic

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1 Introduction

The analysis of the drivers which determine the business cycle and the behavior of the principal macroeconomic aggregates is one of the pivotal questions in the history of economic analysis. Since the second part of the 19th century, authors such as Clément Juglar, Joseph Kitchin and Nikolaj Kondrat'ev started to develop an empirically based theory that evidenced periodical fluctuations in the behavior of the main macroeconomic variables (e.g., production, prices, interest rates etc.). Even Karl Marx, in his main opera *"Das Kapital"*, predicted the advent of the communist revolution based on the conviction that the increasing severity of the periodical crisis of the capitalist system would have led to the downfall of the system itself. Furthermore, this intuition was employed also by Joseph A. Schumpeter in *"The Theory of Economic Development"* to bind together the concept of the business cycle and economic development, identifying in the entrepreneur the engine of the process of dynamic *"creative destruction"* which determines the behavior of the economic system.

This cyclical conception of the macroeconomics fluctuations implies that the drivers of this process are inherently endogenous to the process itself, which is thus characterized by economic booms that create the conditions leading to the next bust.

This view was strongly questioned in 1927 by the Russian statistician Eugen Slutsky. In his paper titled *"The Summation of Random Causes as a Source of Cyclic Processes"*, he demonstrates that moving sums of random variables could produce time series that looked very much like the movements of economic time series (Ramey (2016)). Hence, what appears to be cyclical phenomenon can, in fact, be explained by essentially random shocks that average out over time. Since then, the mainstream research in economics has focused on the identification of such "random causes", or exogenous shocks, such as crop failures, wars, technological innovation, animal spirits, government actions, and commodity shock Ramey (2016). An example of such an approach is the Real Business-Cycle (RBC) theory associated with the neoclassical Chicago School of Economics. It postulates that the business-cycle fluctuations are caused by exogenous real shocks, such as technological innovation, changes in the regulatory legislation, etc..

Following this epistemological approach, a large branch of the applied macroeconomics literature focused on the development of tools used to identify exogenous (or "structural") macroeconomic shocks and to compute the impulse response function, i.e., the dynamic of a given variable after being hit by those shocks.

With regards to this topic, great attention has been given to the identification of fiscal policy shocks. Indeed, the legislative and executive branches of government use to make tax and spending decisions based on concerns which are unrelated to the current state of the macroeconomy. Thus, fiscal decisions are natural candidates for being classified as exogenous shocks.

This particular characteristic was exploited in the seminal paper by Romer and Romer (2010), which uses the narrative official record describing the history and motivation of

all the tax policy changes that occurred in the U.S. in the postwar era. That information was then used by the authors to quantify the impact of every policy action and to classify them as exogenous or endogenous based on their enacting reason.

A similar approach has been used by Leigh et al. (2011) and Alesina et al. (2020) to identify only those fiscal measures motivated by the political will of curbing the dynamic of the debt-to-GDP ratio, labeled as fiscal consolidation. The resulting panel database collects information mainly from international organizations and central banks, given that these are considered to be comparable information in a cross-country panel analysis. Regarding the Italian case, it has been individuated fiscal consolidations measure only after 1991.

Therefore, the main aim of this work is trying to extend this series to the period 1986-1990 employing a broader set of official documents stemming from the Italian budgetary procedures. Indeed, these historical sources have been neglected by the previous narrative analysis. Furthermore, the resulting fiscal consolidations are then merged with the original series in order to assess if, in fact, those measures have succeeded in achieving their main objective, i.e., the reduction of the Italian debt-to-GDP. Indeed, this topic is of particular interest if we regard the Italian public debate, which is often centered on if and/or how to decrease this quantity given the huge amount that has reached, especially in the post-pandemic period. This paper is structured as follows: Chapter 2 provides an overview of the narrative approach methodology and the history of the Italian budgetary procedures in the period 1970-1990. In addition, it delineates which official documents related to the budgetary process itself have been employed to perform the narrative analysis.

In Chapter 3, the identified fiscal consolidation measures have been classified and aggregated following the approach employed by the database of Leigh et al. (2011) and Alesina et al. (2020).

Chapter 4 introduces the empirical methodology, i.e. the Local Projections (LP) approach, used to evaluate the impact of the aforementioned shocks on the Italian debt-to-GDP dynamics.

Finally, Chapter 5 displays the empirical results stemming from the employed specification. Overall, the fiscal consolidations implemented in Italy in the period 1986-2014 seem to have exerted a negative impact on the Italian debt dynamics. Hence, they can be labeled as episodes of *"self-defeating"* fiscal consolidation.

2 Narrative analysis methodology

2.1 Literature Review

The narrative analysis is a methodology originally implemented to overcome the reverse causation problems related to the policy shock's identification in the Vector Autoregressive (VAR) Model framework. It consists of the construction of a direct measure of policy changes that are contemporaneously uncorrelated with the macroeconomic fluctuations related to the business cycle. In order to perform the aforementioned objective, this approach employs historical records originating from institutional sources to extract qualitative and quantitative information attributed to the shock of interest.

This type of technique has been used to identify monetary policy shocks in Romer and Romer (1989, 2004), government spending shocks in Ramey and Shapiro (1998); Ramey (2011), tax shocks in Romer and Romer (2010, 2009); Cloyne (2013); Riera-Crichton et al. (2015) and fiscal consolidation Guajardo et al. (2014); Leigh et al. (2011).

In Romer and Romer (1989) the authors developed the "narrative approach" pioneered by Friedman et al. (1963) in order to identify shocks as only episodes after the Second World War in which the Federal Reserve attempted to exert a contractionary influence on the economy to reduce inflation. The sources consulted to discern the intentions of the Federal Reserve are the *"Record of Policy Actions"* of the Board of Governors and the Federal Open Market Committee (FOMC), and the minutes of FOMC meetings up to 1976. Based on this criterion, this work identified seven events and set up a shock-series that consists of ones in correspondence with these events and zero elsewhere.

The actual exogeneity of this result was questioned in Leeper (1997) showing that the dummy variable containing the monetary shock, identified through the narrative analysis, can be predicted from past macro conditions using a logit equation. This implies that those shocks contain an endogenous component which makes it impossible to solve the reverse causation identification problem.

Such critique was faced in Romer and Romer (2004), where the authors consider changes in the federal funds rate in the period 1969-1996, which resulted from deliberate decisions by the Federal Reserve made at meetings, and for which there is a forecast prepared by the staff. The information combined for this purpose were both the published summaries of FOMC discussions contained in the *Record of Policy Actions of the Federal Open Market Committee* and the accounts contained in the Minutes of the Federal Open Market Committee and, later, the Transcripts of the Federal Open Market Committee. Moreover, it has also been consulted the FOMC document Monetary Policy Alternatives that is prepared for each FOMC meeting and the memos based on the *Weekly Report* of the Manager of Open Market Operations.

Such identified changes in the federal fund rate were subsequently regressed on the Federal Reserve's internal forecasts of inflation and real activity to extract changes in the intended funds rate not taken in response to anticipated developments, hence exogenous with respect

to the economic cycle.

The narrative analysis was also applied for the identification of fiscal shocks, such as tax and spending shocks. The former is analyzed in the seminal papers Romer and Romer (2010) and Romer and Romer (2009) with the main purpose of contributing to the literature examining the effects of changes in the level of taxes on output. The authors identified and classified all significant tax changes that receive more than incidental mention in the sources employed in the period 1945-2007 for the U.S.. Such sources are primary documents produced periodically by policymakers in the performance of their own duties and functions. They include the *Economic Report of the President* and presidential speeches and statements for the executive branch and reports prepared on each tax bill by the *House Ways and Means Committee* and the *Senate Finance Committee*, along with the floor debate in the Congressional Record, for the legislative branch. Furthermore, for Social Security tax changes, two additional sources are analyzed, i.e. the *Social Security Bulletin* and the *Annual Report of the Board of Trustees of the Federal Old Age and Survivors Insurance Trust Fund*.

All the legislated tax changes derived from the analysis were then divided into two broad categories according to the motivation which led the policy action. The first category includes those tax changes, labeled as endogenous, taken in response to other factors which could affect the output growth in the near future. Examples of such cases are countercyclical tax actions taken to offset developments that would cause output growth to differ from normal or tax increases intended to counterbalance the expansionary effects of government spending. The second category comprehends tax action, called exogenous, taken for any other reason, such as tax increases to deal with an inherited budget deficit or tax changes motivated by the desire to raise long-run growth.

This analysis identifies 54 quarterly exogenous tax actions which can be considered as a component of the vector of fiscal shocks used to compute respectively the effect of tax changes on output growth in Romer and Romer (2009, 2010) and on government spending in Romer and Romer (2007).

This database was slightly modified in Mertens and Ravn (2012, 2014), which introduced the distinction between anticipated and unanticipated tax shock based on a timing convention: for every tax act the announcement date and the implementation date of the tax liability changes is defined. The announcement date is assumed to correspond to the date at which the policy intervention became law while the implementation date is defined as the date at which the tax liability changes were to be implemented according to the tax acts. When these dates are no longer than 90 days apart, the corresponding tax liability changes are characterized as an unanticipated tax shock, while anticipated tax shocks are those changes in taxes for which the two dates differ by more than 90 days Mertens and Ravn (2012, 2014). This timing convention provided a methodological innovation to the problem of estimating anticipation effects in the macroeconomics literature on fiscal policy. Moreover, examining the predictability of such shocks reveals that, while it cannot be

rejected the exogeneity of tax shocks that were introduced for ideological reasons, there is scarce evidence in favor of the unpredictability of announcements of future deficit driven tax liability changes Mertens and Ravn (2012, 2014).

A similar approach was employed in Perotti (2012), where the author broke down each tax bill reported in Romer and Romer (2010) into its main items and, for each of them, he assigned the effective starting dates and the pattern of exogenous quarterly change over time.

The narrative analysis was also performed in Cloyne (2013) with the construction of a database of legislated tax changes in the U.K.. The sources employed are those afferent to the annual budget process. To obtain the revenue estimates, those sources include the *Financial Statement and Budget Report (FSBR)* published alongside the budget speech. As far as actions between budgets are concerned, it has been consulted the estimates given by the Chancellor of the Exchequer to Parliament and recorded by the official parliamentary record (Hansard). Other sources used for the identification of all the interim tax changes and the splitting of the series by motivation are the Chancellor's budget speeches and, since 1997, the *Economic and Fiscal Strategy Report (EFSR)*, the *Economic Surveys* in the early years, relevant White Papers (statements of government policy), technical notes, and additional debates and speeches recorded in Hansard.

All the identified tax changes are then divided into subcategories slightly different from those employed in Romer and Romer (2010). Indeed, it has been categorized as exogenous those actions taken to improve long-run economic performance, ideological changes related to party political or social causes, rulings from external bodies such as courts, and fiscal consolidation measures based on long-run consideration. Instead, it has been labeled as endogenous actions to manage demand, stimulate production, offset a debt crisis, and fund spending decisions (Cloyne (2013)).

Regarding the identification of spending shocks, the seminal paper by Ramey and Shapiro (1998) focused its attention on government spending's multipliers derived from military buildups, which are caused by geo-political shocks likely to occur unexpectedly and to be exogenous to other macroeconomic variables. Indeed, the spending shocks stemming from the VAR approach appear to miss the timing of the news about an increase in governing spending, hence originating distorted impulse response function due to the delays between the decision to increase military spending and the actual increase.

These political events are isolated using information from historical accounts, which give exact dates of events, and *Business Week*, which discusses relevant economic details of the events. Such events are then used to construct a military buildup dates dummy variable, which is equal to one in correspondence to the big upswing in military spending during the post WWII-period.

This methodology was later updated in Ramey (2011) both by extending the analysis back to WWII and by exploiting quantitative information to measure the expected discounted value of government spending changes due to foreign political events. This information

are gathered from reading periodicals, such as *Business Week* in order to construct a "Defense News" shocks vector. Official documents are not treated as a primary source given that they are not always released promptly and because government officials have at times purposefully underestimated the cost of military actions (Ramey (2011)). Moreover, a second news series based on the *Survey of Professional Forecasters* is constructed because of the low informativeness of the defense news variable if both WWII and the Korean War are excluded.

The narrative analysis methodology was also used to identify cases of fiscal consolidation (both taxes and spending) in Leigh et al. (2011); Guajardo et al. (2014) which were then employed to estimate fiscal multipliers in 17 OECD economies during the period 1978-2009. The identification process performed using the historical record followed the categorization introduced by Romer and Romer (2010) and consisted of two steps. Firstly, the authors check if the document examines or not the policymakers' desire to respond to current or prospective economic conditions. Secondly, they focused only on those fiscal policy changes which are motivated by the reduction of the budget deficit. Such fiscal action can be considered a response to past decisions and economic decisions, rather than to prospective conditions and is hence likely to be systematically correlated with other developments affecting output in the short term (Guajardo et al. (2014)).

The policy documents examined to identify the policy changes are budgets, central bank reports, *Convergence and Stability Programs* submitted by the authorities to the European Commission, *IMF Recent Economic Developments reports*, *IMF Staff Reports*, and *OECD Economic Survey*. Furthermore, country-specific sources were analyzed, such as the *Congressional Budget Office (CBO) reports* and the *Economic Report of the President* for the United States, the *Journal Officiel de la Republique Francaise* for France, and Ministry of Finance press releases and publications (Leigh et al. (2011); Guajardo et al. (2014)). The documentation consulted for Italy included issues of the *Banca d'Italia Assemblea Generale Ordinaria Dei Partecipanti*, *Bank of Italy Annual Report*, *IMF Recent Economic Development*, *IMF Staff Report*, *Italy Stability Program*, and *OECD Economic Surveys*.

The complete analysis identifies 173 deficit driven fiscal policy changes for 17 OECD economies during the period 1978-2009. The final multi-country database was then extended in Alesina et al. (2020) with the aim of testing the "expansive austerity" hypothesis. The sample period broadened by adding the years between 2010 and 2014, the fiscal shocks were categorized as both unexpected measures or announcements of measures to be implemented in the future in order to reconstruct the fiscal plans and to keep track of their implementations in line with the methodology introduced in Mertens and Ravn (2012) and unlike Guajardo et al. (2014); Leigh et al. (2011). Moreover, government spending and taxes were respectively separated among transfers and other spending and into direct and indirect taxes.

Additionally, Riera-Crichton et al. (2015) analyze the nature of the 19 VAT rate changes that occurred in the episodes of fiscal consolidation identified in Leigh et al. (2011) through

the narrative approach. These policy actions are then divided following the aforementioned methodology introduced in Romer and Romer (2010) in order to quantify the effect of exogenous fiscal consolidation tax rate changes on output.

2.2 Sources Employed

A common characteristic of all the aforementioned papers is the use of the fiscal shock's contemporaneous estimates contained in the consulted sources, given that retrospective impact assessments are rarely available (Romer and Romer (2010); Leigh et al. (2011); Cloyne (2013); Alesina et al. (2020)). This approach implies some drawbacks both regarding the estimates per se and the actual motivation behind the fiscal shock. Indeed, contemporaneous estimates of the planned budgetary impacts may tend to be optimistic in respect to ex-post budgetary outcomes, leading to an overstatement of the size of fiscal consolidation measures. Furthermore, the official motivation given by the policymakers for fiscal consolidation is the debt's long-term sustainability, while in fact being motivated by cyclical considerations (Leigh et al. (2011)).

This work tries to overcome this problem using the official documentation originating from the budgetary procedures of the Italian political system from the period 1970-1990. The only past paper which has applied the narrative approach methodology to Italy was Leigh et al. (2011), then followed and widened in Alesina et al. (2020). The focus of their analysis was the identification of deficit-driven contractionary fiscal shock in the period 1980-2014 and the sources consulted were the following: *Banca d'Italia, Assemblea Generale dei Partecipanti 1991, p.137*, *July Emergency Budget*, Law text, *IMF Recent Economic Developments 1992, p.22*, *OECD Economic Surveys*, *Bollettino Economico di Banca d'Italia*, *Stability Program Update*, Decree-Law text, *Documento di Economia e Finanza* (Alesina et al. (2020)).

Therefore, the vast majority of the documents released by the Italian Government in the period 1970-1990 have not been consulted, including those sources which contain the ex-post assessment of the identified fiscal shocks.

The peculiarity of the Italian budgetary procedure consists of its continuous process of revision throughout the years, which implied various changes in the number, type, timing and contents of official documents associated with the process itself. The preventive analysis of those changes can be useful to understand how the various sources have been consulted during each period of time defined by the changes in the legislation, with the final aim of identifying and classifying all the occurred fiscal shocks.

The initial legislation regarding the budget process was enacted after WWII and included the Article 81 of the new Republic of Italy's Constitution and Law 21/08/1949, n. 639. The former, along with Law 01/03/1964, n. 62 (″Legge Curti″) which amended Regio Decreto 18/11/1923, n. 2440, legislated the annual obligation for the government of pre-

senting within July [1] to the parliament both the final budget regarding the previous fiscal year (*"Rendiconto Consuntivo"*) and the annual budget (*"Bilancio di Previsione"*) for the year to come both on commitment basis (*"Conto di Competenza"*); moreover, it was stated the impossibility of the associated enacting law to introduce new taxes or spending. The latter implemented the creation of the *Relazione Generale sulla Situazione economica del Paese (RGE)*, the first auxiliary budgetary document, whose main task was to perform and present to the parliament within March an accurate analysis of the sectoral and overall macroeconomic conditions of the country in the previous fiscal year. Its internal structure was changed several times in the first two decades of publication and, after 1968, it was divided into three volumes, each of one covering a different macroeconomic topic [2].

Furthermore, the amendment to Law 21/08/1949, n.639 brought by Law 01/03/1964, n. 62 introduced a new document called *Relazione Previsionale e Programmarica (RPP)*, which had to be presented within September along with the annual budget and contained the short-term forecasts on the economic cycle used by the government to draft the annual budget itself [3]Ragioneria Generale dello Stato (2011).

This type of procedural framework lasted until 1978 with the introduction of Law 05/08/1978, n.468, and covers the first eight years (1970-1978) of interest for the narrative analysis performed in this work.

The aforementioned Law 05/08/1978, n.468 was brought into force to give new emphasis to the programming and controlling of the budgetary process. Even if this reform did not introduce new programming documents, it deeply renewed the content of the annual budget and of the existing auxiliary documentation with the focal aim of improving control over the trend of expenditure, while providing a medium-term financial programming instrument. The main changes were the following:

- the introduction of a commitment-based multi-year budget (*"Bilancio Pluriennale"*) within the annual budget law in order to support the public sector's effort in the national economic planning. The law obliged the government to redact this multi-year plan both at current legislation (*"a legislazione vigente"*), i.e. assuming no variation in the financial legislation, and in the programmatic version (*"versione programmatica"*), i.e. taking into account the planned policy choices. Moreover, given the annual nature of the budget as legislated in art.81 of the Constitution, the expenses committed in the first year of the multi-year plan are obliged to be equal

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[1]Before the implementation of Law 01/03/1964, n. 62 this final term was fixed at the end of January. Indeed, the aforementioned Law n.62 of 1964 introduced the coincidence between the solar and fiscal year, while in the period before 1964 the fiscal year started on the 1st of July and ended on the 30th of June.

[2]The first volume analyzed the income formation, the state action in the income distribution, the use of resources, and the business cycle's swings. The second volume focused on the demographic trend, the labor market, the financial and monetary market, the prices' dynamics, the public finance, the foreign trade flows, and the balance of payment. The third one contained a broad statistical appendix (Ministero dell'Economia e delle Finanze Dipartimento del Tesoro (2006))

[3]The Law 01/03/1964, n. 62 also introduced the functional division of the government spending between current expenses (*"Spese Correnti"*) and capital expenses (*"Spese in Conto Capitale"*) (Ragioneria Generale dello Stato (2011)).

to those contained in the annual budget, while the amount of money committed for the remaining years does not constitute a legally binding obligation.

- The internal reshaping of the final budget and anticipation of its submission date to the end of June.

- The draft of the Annual Budget both on commitment and on cash basis.

- The institution of a *Finance Act* (*"Legge Finanziaria"*) to be presented every September to the parliament along with the draft of the annual budget. This new instrument was introduced to specify the policy measures to be taken in order to achieve all the budget policy objectives determined in the general economic program (i.e. the *"Relazione Previsionale e Programmatica"*). More in detail, the *Finance Act* had the following tasks: setting the ceiling for the annual borrowing requirement; determining the amount allocated to the special funds destined for the financing of all the bills that are expected to be approved during the next fiscal year; determining the yearly amount of expenses approved by multi-year bills; modify the legislation relative to the revenue and the expenses of the Enlarged Public Sector (*"Settore Pubblico Allargato"*)[4] in order to comply with the budget policy objectives.

- The addition of a section to the *Relazione Previsionale e Programmatica* containing an overview of the annual budget and the analysis of the differences between the prediction contained in the current budget and those reported in the previous year's budget [5]. Moreover the art.15 of Law 05/08/1978, n.468 provides for the introduction of an annex document, called *"Relazione sulle Leggi Pluriennali di Spesa"*, aimed to analyze the status of all the multy-year law still in place (Ministero dell'Economia e delle Finanze Dipartimento del Tesoro (2006)).

This general reshaping of the budgetary procedure has also involved some modifications regarding the structure of the *Relazione Generale sulla Situazione Economica del Paese*, whose second and third volumes were respectively dedicated to the public finance, and to the labor market and the social security system (Ministero dell'Economia e delle Finanze Dipartimento del Tesoro (2006)). Moreover, as of the introduction of Law 20/07/1977, n.407, the Ministry of the Treasury started to present within February, and then updated every four months, a quarterly report on actual cash transactions and an estimate for the year as a whole (*"Relazione sulla stima del fabbisogno di cassa del settore pubblico"*) (OECD (1979)).

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[4]During the period of interest, it comprised of the Public Administration (i.e. Central Administration, Local Administrations, Social Security Institution) and some public enterprises such as *ENEL*, *Aziende Autonoma delle Ferrovie dello Stato* (then *Ente Ferrovie dello Stato* from 1986 to 1992), *Azienda Autonoma delle Poste e dei Telegrafi* (*Poste Italiane S.P.A.* after 1992), *Azienda Nazionale Autonoma delle Strade (ANAS)*, *Amministrazione degli Archivi Notarili, Istituto Agronomico per l'Oltremare, del fondo per il culto, per il Fondo di Beneficienza e di religione nella città di Roma, dei Patrimoni riuniti ex economali, Azienda di Stato per i servizi telefonici (ASST)* (*Iritel* from 1993), *ex Azienda di Stato per le foreste demaniali*, Aziende Municipalizzate (Modigliani and Padoa-Schioppa (1998))

[5]A first change to the structure of the *Relazione Previsionale e Programmatica* was brought by Law 20/07/1977, n.407

A further modification of the overall process occurred with the enactment of Law 23/08/1988, n.362, which amended Law 05/08/1978, n.468 with the main purpose of strengthening and rationalizing the medium-term economic and financial planning of the budgetary policy. The principal innovations were the following:

- the introduction of the *"Documento di Programmazione Economica e Finanziaria" (DPEF)*, a programming document to be submitted by the government to the parliament within the 15th of May. It had the task of defining the public finance policy for the period included in the multi-year budget and of setting the criteria, macroeconomic parameters and objectives on the basis of which the annual budget, the multi-year budget and the *Finance Act* had to be drafted [6]. More specifically, this report contained: the parameters employed to forecast the evolution of the enlarged public sector flows of revenue and spending with unchanged policy (*"a politiche invariate"*)[7]; the macroeconomic objectives regarding income and employment's development; the definition of multi-year targets in term of budget deficit (*"Fabbisogno"*) net and gross of both interest expenses and the financial transaction balance, overall borrowing requirement (*"Fabbisogno Complessivo"*)[8] and public debt level, along with the analysis of the causes of deviation from the spontaneous trend of these variables; the presentation of the policy interventions related with the budgetary process and aimed to achieve all the multi-year macroeconomic objectives defined in the document itself.

- The Ministry of the Budget and the Economic Programming has to sent within February to the parliament the *Relazione sull'Andamento dell'Economia nell'Anno precedente e Aggiornamento delle Previsioni per l'Anno in corso (AGGRPP)*, which had the function of updating the macroeconomic estimates of the previous year's *Relazione Previsionale e Programmatica* in order to reshape the programmatic targets delineated in the *Documento di Economia e Finanza (DEF)* and/or to implement the necessary budget correction measures.

- The Finance Act can not include new expenditures or new taxes. It can simply adjust the parameters of existing legislation (e.g. tax rate, tax credit, deductions, scales), set out the amount of expenditure in the coming year under existing multi-year appropriations, decide the special fund's allocation and specify a multi-year ceiling for the overall borrowing requirement [9]. All the new measures required to imple-

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[6]The first document, regarding the economic and financial planning, was actually drafted on September 1986, following two parliamentary resolutions approved in the previous month of June. Then, another similar document was introduced by art.3 of the *Finance Act 1988* and drafted on May 1988. This bill introduced a transitory regulation which was eventually repealed by the enactment of Law 23/08/1988, n.362. Ministero dell'Economia e delle Finanze Dipartimento del Tesoro (2006)

[7]I.e. assuming for the mandatory and discretionary part of the expenses respectively the invariance of the legislation establishing both the recipient's right and the level of service to be provided, and the invariance of the public administration behavior (Ministero dell'Economia e delle Finanze Dipartimento del Tesoro (2006)).

[8]I.e. the budget deficit gross of past loan refunding.

[9]This modification was enacted to solve the problem of the so-called *"finanziarie omnibus"*, i.e. the con-

ment the objectives delineated in the *Documento di Programmazione Economica e Finanziaria (DEF)* have to be subject to a separate legislation (*"disegni di legge collegati alla manovra di finanza pubblica"*) specifying the multi-year expenditure programme and the nature and amount of new resources required to fund it.

- The annual budget is drafted following the public finance spontaneous trends for the year ahead on unchanged tax assumptions, and has to be presented in July, while the *Finance Act*, the multi-year budget, the *Relazione Previsionale e Programmatica* and the bills related to the budget policy are to be presented in mid-September (Ministero dell'Economia e delle Finanze Dipartimento del Tesoro (2006); OECD (1989)).

This setup was held in place with only a few formal modifications until 1997, when the process had to be harmonized with the new European budgetary procedure introduced by the Maastricht Treaty.

The period of interest, i.e. 1970 - 1990, can therefore be divided into three sub-period, each one characterized by different documents and procedures as shown below in Table 1.

	Current Legislation		
Year t	**Pre Law 05/08/1988, n.468** **1970 - 1978**	**Law 05/08/1988, n.468** **1979 - 1988**	**Law 23/08/1988, n.362** **1989 - 1992**
January			
February		Relazione sulla Stima del Fabbisogno di Cassa del settore pubblico (Year t, t - 1)	Relazione sulla Stima del Fabbisogno di Cassa del settore pubblico (Year t - 1, t) Relazione sull'Andamento dell' Economia nell'anno precedente e Aggiornamento delle Previsioni per l'anno in corso (Year t - 1, t)
March	Relazione Generale sulla Situazione Economica del Paese (RGE) (Year t - 1)	Relazione Generale sulla Situazione Economica del Paese (RGE) (Year t - 1)	Relazione Generale sulla Situazione Economica del Paese (RGE) (Year t - 1)
April			
May			Documento di Programmazione Economica e Finanziaria (DEF) (Year t, t + 1, t +2 , t + 3)
June		Final Budget ("Rendiconto Consuntivo") (Year t - 1)	Final Budget ("Rendiconto Consuntivo") (Year t - 1)
July	Final Budget ("Rendiconto Consuntivo") (Year t - 1)		Annual Budget ("Bilancio di Previsione") (Year t + 1)
August			
September	Annual Budget ("Bilancio di Previsione") (Year t + 1) Relazione Previsionale e Programmatica (RPP) (Year t, t + 1)	Annual Budget ("Bilancio di Previsione") (Year t + 1) Multi-Year Budget ("Bilancio Pluriennale) (Year t +1, t + 2, t + 3) Financial Act (Year t + 1) Relazione Previsionale e Programmatica (RPP) (Year t, t + 1)	Multi-Year Budget ("Bilancio Pluriennale) (Year t +1, t + 2, t + 3) Financial Act (Year t + 1) Relazione Previsionale e Programmatica (RPP) (Year t, t + 1) Bill related with the Financial Act (Year t + 1)
October			
November			
December			

Table 1: Overview of the Budgetary Process' History

Apart from the official sources related to the budgetary process, two additional reports have been examined given their annual availability for the span of time considered. These are the *OECD Economic Survey* and the *Bank of Italy Annual Report* (*"Banca d'Italia, Assemblea Generale dei Partecipanti"*), which were both already used in Alesina et al.

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vergence to the *Finance Act* of measures not directly related to the fiscal policy itself Ministero dell'Economia e delle Finanze Dipartimento del Tesoro (2006)

(2020) and Leigh et al. (2011)[10].

Notwithstanding the changing shape of the budgetary process, the methodology used to extract all the relevant information and estimates from the documents is based on the chronology of the documents themselves: assuming that the year of analysis is year t, firstly all the documents released in year t - 1 but containing projections about the public finance policy for the year t, t + 1 , t + 2 etc. (e.g. *Relazione Previsionale e Programmatica* , *Documento di Programmazione Economico Finanziaria*, *Financial Act* etc.) are examined in order to extract the motivation and a provisional estimate of the various fiscal shocks that are going to occur in year t. Then, given that some planned policies are eventually not inserted in the final draft of the corresponding enacting law, all the sources issued in year t and which reported the status of the economic development in the current year (e.g. *Bank of Italy Annual Report*, *Relazione sulla Stima del Fabbisogno di Cassa del Settore Pubblico*, *Relazione Previsionale e Programmatica*) are scrutinized to check both the actual implementation of the policy measures and the existence of estimates' updating. Finally, the documentation published in year t + 1 and containing the ex-post evaluation of the various identified fiscal shocks (e.g. *Relazione Generale sulla Situazione Economica del paese*, *Bank of Italy Annual Report*, *Relazione sulla Stima del Fabbisogno di Cassa del Settore Pubblico*, *Final Budget*) are analyzed to check and,if necessary, modify all the fiscal shocks' impact estimates previously extracted from the other sources.

Furthermore, the methodology employed to identify the estimates of the fiscal policy impact takes also into consideration the nature of the measures themselves. Indeed, an estimate of the budgetary impact extracted from the official documentation is required for those increases/decreases in taxes (e.g. changes in the marginal tax rates and the tax base etc) and cuts in spending (e.g. increase of the "ticket" for health care services, decrease of the *"fiscalization"* of social security contribution etc.) caused by the modification of the automatic mechanisms determining the flow of revenues and spending themselves. Instead, the actual budgetary impact can be retrieved for those annual or multi-annual increases/decreases in public spending directly specified in a Law or a Decree-Law (e.g. increase/decrease in the allocation to public enterprises' fund, increase/decrease in the multi-annual provision to public works etc.) and then checked throughout the years thanks to the *Final Budget*, the *Financial Act* and the *Relazione sulle Leggi pluriennali di Spesa* attached to the annual *Relazione Previsionale e Programmatica*.

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[10]The *OECD Economic Survey* had a variable releasing date throughout the years while the *Bank of Italy Annual Report* was, and still is, always available from the end of May.

3 Construction of the Fiscal Consolidation Series

The main aim of this section is to try to apply the narrative methodology delineated in the previous chapter to extend backward the work of Alesina et al. (2020). More in detail, the analysis identifies all the yearly fiscal consolidation exogenous shocks which occurred in Italy during the period 1986-1990 [11]. Indeed, both the database constructed by Leigh et al. (2011) and Alesina et al. (2020) did not recognize any deficit-driven exogenous shock in this period because of the limited amount of official sources consulted, which are instead employed in this work. Furthermore, this particular period of time has been chosen due to the introduction of the *Documento di Programmazione Economico-Finanziaria* in 1986, which was the first effort made by the Italian Government in trying to program and implement a medium-term strategy with the explicit aim of reducing the inherited public debt. Therefore, such clarity in government motivation's statement, reasserted and checked every year in the *"Relazione Previsionale e Programmatica*, made it easier to identify the exogenous shocks of interest, i.e., those driven by deficit-reduction concerns.

3.1 Motivation of Measures

The fiscal shock classification is performed following the methodology firstly introduced by Romer and Romer (2010) and then employed by Leigh et al. (2011) and Alesina et al. (2020). Therefore, it has been looked for clear sentences in the official documents that attributed to measures (both changes in tax revenue and government spending[12]), or packages of measures, with the aim of addressing the dynamics of the debt-GDP ratio or the public deficit. Therefore, it has been excluded all the fiscal shocks motivated by counter-cyclical motivation and hence labelled as endogenous with respect to the current economic development.

When the single package comprehends both deficit increasing and reducing policies, the episode is considered an exogenous fiscal consolidation if the budgetary impact of the expansionary measures is smaller than the impact of all contractionary measures (Alesina et al. (2020)).

The narrative reconstruction of the fiscal shocks' motivation for the period 1986-1990 can be recovered in the Appendix. It comprehends the year-by-year analysis of the fiscal policy's evolution throughout the budgetary process, along with the direct quotation of the government's main objectives extracted directly from the official documentation. The primary sources employed for this operation were the *Documento di Programmazione Economico-Finanziaria*, the *Relazione Previsionale e Programmatica*, the *OECD Economic Survey*, and the *Banca d'Italia, Assemblea Generale dei Partecioanti*. When sources

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[11]A preliminary quantification and classification of the various tax and spending shocks were also performed for the period 1970-1975 and the year 1979 to cover all three periods characterized by different budgetary procedures. The partial results are available on request.

[12]In this work the definition of *"government"* includes both the central state administration and all levels of local government.

disagree or multiple motivations are mentioned, it has been attempted to see if one is clearly emphasized over the others (Romer and Romer (2010)).

The policymakers' statements are taken at face value. This approach can create several problems if the official motivation expressed in the documentation is distinct from the actual one, i.e., cyclical consolidation. Indeed, this issue could cause the erroneous classification of some shocks, creating endogeneity problems when the identified vector of apparently exogenous shocks are used in various macroeconometric specification.

Furthermore, all the single fiscal measures have been categorized and aggregated following the scheme already proposed in Alesina et al. (2020). This analysis is presented in Table 6 of the Appendix and covers the span of time 1986-1990. The structure of the forenamed table is the following:

- the first column displays the year in which each measure has been implemented.

- The second column contains the legislation (law and decree-law) which introduced or reiterated the fiscal policy change.

- The third column classifies each item following the categories introduced in Alesina et al. (2020). These are represented in Table 2

Tax	Indirect	Goods and Services
	Direct	n.c. CvsP
		Personal Income Tax
		Property Tax Corporate
		Property Tax n.c.
		Property Tax Private
		Corporate Tax
	Other Tax	Other Tax
	n.c.Tax	n.c.Tax
Spending	Cons&Inv	Salaries
		Investment
		Consumption
	Transfers	Transfers
	Other Spending	Other Spending
	n.c.Spending	n.c.Spending

Table 2: FISCAL MEASURES DECOMPOSITION, REVISITED FROM ALESINA ET AL. (2020)

Some clarification on the notation used: n.c. (or NYC) means "not (yet) classified", whereas n.c. CvsP means "not classified Corporate vs Private. The *other* categorization includes measures that could not possibly belong to any of the remaining specific categories, while the "not classified" category includes measures that do belong to some specific categories but that it is impossible to credibly split among them Alesina et al. (2020).

- The fourth column contains a more accurate description of the measure implemented, which originates from the official documentation.

- The fifth and last column indicates the reference from which the fiscal action, and its related budgetary impact, have been identified.

Overall, the analysis performed in this work adds to the database of Alesina et al. (2020) 82 exogenous fiscal measures motivated by the objective of curbing the deficit/debt dynamic. The categorization derived from the aforementioned scheme brings the following results: 38 *"Goods and Services"*; 13 *"Personal Income Tax"*; 6 *"Property Tax Private"*; 3 *"Corporate Tax"*; 12 *"NYC Tax"*; 1 *"Consumption"*; 1 *"Salaries"*; 1 *"Investment"*; 2 *"Transfers"*; 5 *"Other Spending"*. Consequently, the vast majority of the fiscal actions are tax increases, i.e. 72 out of 82.

When considering the complete database, this latter collects 792 fiscal measures for the period 1986-2014, almost equally divided between tax measures (400) and spending measures (392). The budgetary impact of every item is then aggregated to construct a vector of yearly exogenous fiscal consolidation.

3.2 Budgetary Effects

The contemporaneous revenue estimates of the budgetary impact of each measure are collected from the official documentation mentioned in the previous chapter, following the methodology already used in Romer and Romer (2010), Leigh et al. (2011) and Alesina et al. (2020). In particular, the historical sources which provided the necessary information were the *Relazione Previsionale e Programmatica*, the *Relazione Generale sulla Situazione Economica del Paese*, the *Banca d'Italia, Assemblea Generale dei Partecipanti*, and the *Relazione sulla Stima del Fabbisogno di Cassa del Settore Pubblico*. If the various documents reported different estimates regarding a given measure, it has been used a chronological criterion to choose the most reliable impact assessment. Stated differently, it has been privileged to those sources which performed an analysis of as many ex-posts as possible concerning a given year. As mentioned above, this methodology has been employed to overcome the problems originating from the use of ex-ante impact estimates, which may tend to be optimistic relative to ex-post budgetary outcome (Guajardo et al. (2014)).

A further classification performed in this work in order to construct the vector of exogenous fiscal shock is the one employed in Alesina et al. (2020) but was firstly introduced by Mertens and Ravn (2012, 2014). It is centered on the idea of a *fiscal plan*, i.e., the recognition that many fiscal adjustments have a multi-year nature and can hardly be treated as isolated yearly shifts of the policy stance. Indeed, each new plan contains both measures which are implemented immediately, that we label as "unexpected", and announcements of future changes in taxes or spending in year $t + j$, $j = 1, 2, 3...$, which are equally available from the official documentation. Analytically, following the decomposition proposed in Alesina et al. (2020), the planned change in the primary budget deficit (f_t) introduced by the government in year t can be split into three autonomous parts: $f_t = e_t^u + e_{t,t+j}^a + e_{t-j,t}^a$,

where e represents the sum of spending cuts and tax increases (i.e. $e_t = \tau_t + g_t$)[13].

e_t^u denotes the unexpected component of the plan, i.e., those measures announced and implemented in year t and which are different from zero only in a "new plan" starting in year t; $e_{t,t+j}^a$ represents the policies announced in year t for implementation in year $t+j$; $e_{t-j,t}^a$ instead refers to policies that had been announced in year $t-j$ and are implemented in year t. Clearly, the three components must not be contemporaneously different from zero. Furthermore, we employ the convention, firstly introduced in Leigh et al. (2011) and Alesina et al. (2020), according to which whenever a plan is amended it is relabeled as a new plan. This decision underlies the assumption that plans are entirely credible, i.e., that people believe that the legislature will not revoke the measures it has adopted by law.

Therefore, starting from the framework delineated above, we constructed Table 7 reported in the Appendix. The first three columns of the latter follow the classification methodology already employed in Table 6, while the remaining part tries to reconstruct the multi-year impact of each fiscal measure identified in the previous section, choosing a five year time horizon. If a given policy action has a positive effect in year t which is counteracted by a negative impact in year $t+1$ of the same magnitude, it means that this particular measure has a temporary impact on the public deficit. Overall the merged-database contains 127 of those temporary fiscal consolidations and the average length of the each measure in the database is 1.2 years.

Table 3 reports the category-based aggregation, firstly introduced by Alesina et al. (2020), of all the fiscal measures identified in Table 7 for the period of time considered (1986-1990). This operation is performed following the methodology delineated above, which separates the unexpected component of the fiscal plan from the one announced by the government. Moreover, all the measures are scaled using the GDP of the year $t-1$, given that the contemporaneous level of GDP could reflect the effects of the fiscal plan and thus be endogenous (Alesina et al. (2020)).Hence, the u_t column contains the unexpected fiscal measures for any given year t, whereas the a_t column displays the cumulative impact (over five years in this case) of all the measures announced in year $t-1$ to be implemented in year t. Similarly, all the columns $a_{t+j}, j = 1, ..., 5$ denote the cumulative impact of the fiscal actions announced in year t (or before) for year $t+j$.

	Tax							Spending						
Year	u_t	a_t	a_{t+1}	a_{t+2}	a_{t+3}	a_{t+4}	a_{t+5}	u_t	a_t	a_{t+1}	a_{t+2}	a_{t+3}	a_{t+4}	a_{t+5}
1986	1,86874	0	-0,66072	-0,29571	0	0	0	0,5198	0	-0,23102	0	0	0	0
1987	0,838063	-0,66072	-0,44881	0	0	0	0	0,163855	-0,23102	0	0	0	0	0
1988	0,913847	-0,44881	-0,33754	0	0	0	0	0	0	0	0	0	0	0
1989	0,877163	-0,33754	-0,38683	0	0	0	0	0,885673	0	0	0	0	0	0
1990	1,374939	-0,38683	0	0	0	0	0	0,156456	0	0	0	0	0	0

Table 3: Fiscal Plan's Reconstruction (% of GDP_{t-1})

A further measures aggregation is performed in Table 4. The columns which are labeled with the terms *"Impact"* and *"Overall"* contain respectively the summation of the unex-

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[13]Note that a positive g means a spending cut and a positive τ an increase in tax revenue.

pected component u_t with the expected one a_t for each year t, and the summation of all measures, unexpected and announced (i.e., including the terms $a_{t+j}, j = 1,...5$), at any given year t. Furthermore, the last two columns contain only the unexpected component (u_t) of the fiscal consolidation, which are equal to the correspondent values presented in Table 3.

The *"impact"* classification is similar to the one employed by Leigh et al. (2011), where the authors sum up shifts in fiscal variables that were unexpected and changes that were expected, that is, implemented in the same year but legislated in previous years.

Year	Tax - Impact	Spending - Impact	Tax - Total	Spending - Total	Tax - Unexpected	Spending - Unexpected
1986	1,868740048	0,519800359	0,912307	0,288778	1,86874	0,5198
1987	0,177339182	-0,067166938	-0,27148	-0,06717	0,838063	0,163855
1988	0,465032828	0	0,127492	0	0,913847	0
1989	0,539621829	0,885673254	0,15279	0,885673	0,877163	0,885673
1990	0,988107263	0,156456443	0,988107	0,156456	1,374939	0,156456

Table 4: FISCAL SHOCKS AGGREGATION (% OF GDP_{t-1})

This operation assumes that a fiscal measure affects the other macroeconomic variables only when it is implemented, whereas nothing happens at the time it is announced. Differently, Romer and Romer (2010) added up unexpected and announced changes in fiscal variables, thus conjecturing that economic agents react to a shift in taxes when they learn about it, whether its implementation is instantaneous or delayed. The latter motivation justifies the aggregation performed with respect to the *"Overall"* series.

The results outlined above are then added to the previous database included in Alesina et al. (2020). Overall, the are almost split equally between expenditure-based (12 episodes) and tax-based (10 episodes) if we use as reference measure the *"Impact"* tax/spending. Furthermore, the average dimension of the overall fiscal consolidation is 1,65 % of the GDP, with no significant distinction between EB and TB consolidations.
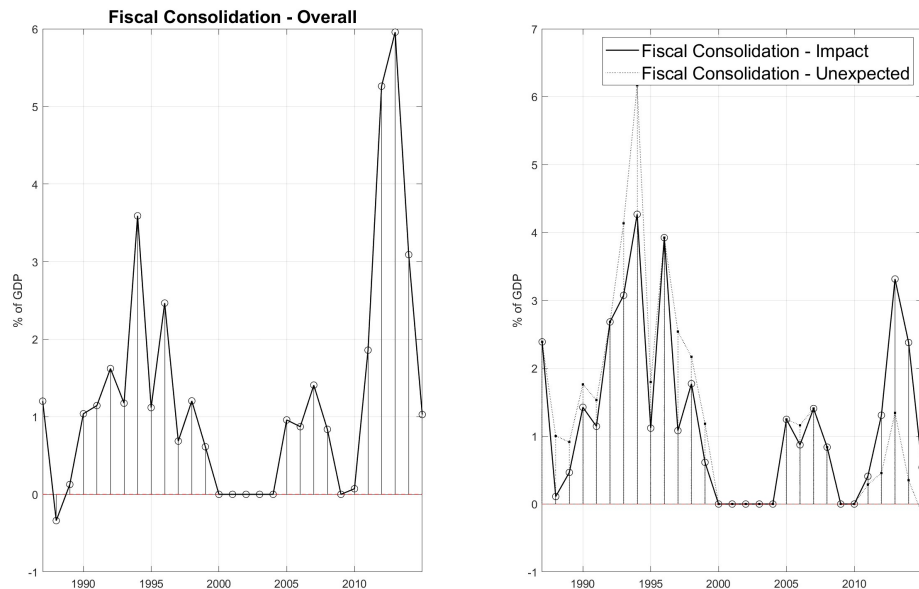

Figure 1: VARIABLES TIME SERIES' PLOT

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Figure 2 shows the complete yearly time series of fiscal consolidations, which merges the database created in Alesina et al. (2020) with the one presented in this work. The graphs display the two aggregation categories outlined above, i.e., respectively the *"Overall"*(left-hand image) and *"Impact"* (right-hand image). In addition, the unexpected fiscal consolidation series is plotted together with the latter, in order to visualize the difference between the unanticipated and the anticipated component of the actual consolidation occurred in each year t .

The two series exhibit a similar evolution, whose peaks occurred during the 90s and in the period of the sovereign-debt crisis after 2010. The difference in the scale of some shocks is due to the aggregation methodology itself; for example, the *"Overall"* series embeds the negative effect caused by the temporary nature of many fiscal measures. Indeed, this is the main reason why the latter shows 1988 as a negative fiscal consolidation, which is then dropped in the empirical analysis.

4 Empirical Application of the Exogenous Shock Series

4.1 Literature Review

The economics literature began to study the centrality of impulses and propagation mechanisms for explaining business cycle fluctuations at the beginning of the 20th century(Ramey (2016)). Since Frisch (1933) the focus shifted from a metronomic view of the business cycle to a search for the sources of the random shocks. Until the last 70s policy analysis was characterized by the use of large-scale models which included hundreds of equations and variables. These latter were characterized by the scarce modeling of agents' expectations, the arbitrary categorization of model variables into exogenous and endogenous, and the arbitrary restrictions and assumptions about the causal relationship among variables (Gambetti (2020)). A pivotal shift in this field of research occurred with the seminal paper of Sims (1980), which introduced a new approach called Vector Autoregression (VAR) model. It consists of a set of linear multivariate autoregressive equations characterizing the joint dynamics of economic variables.The residuals related to each equation, often also labeled as *"innovations"*, are considered to be combinations of the underlying mutually orthogonal structural economic shocks. Hence, imposing a set of restrictions (i.e., the identification strategy) makes the estimation of those relations possible, along with the possibility of expressing each variable as linear functions of current and past economic shocks(Gambetti (2020)). The impulse response function of the model variables to structural economic shocks can be constructed starting from the coefficients of the aforementioned equations.

It is useful to outline that the definition of *"shock"* employed in this work is in line with the one adopted by Ramey (2016), which in turn borrows the concept introduced in Blanchard and Watson (1986) and Bernanke (1986). According to those authors, the shocks should be *primitive* and *economically meaningful* exogenous forces that are uncorrelated with each other (Bernanke (1986)). Furthermore, they should be exogenous with respect to other current and lagged endogenous variables in the model, uncorrelated with other exogenous shocks, and represent either unanticipated changes in exogenous variables or *"news"* about future movements of the latter (Ramey (2016)). Therefore, this definition distinguishes the concept of *"shock"* (or *"structural shock"*) from those of *"innovation"*, i.e., the residuals from a reduced form VAR model, and *"instrument"* used in other works. The structural form of the VAR model with lag order p and N variables can be formalized as (here we ignore the constant vector):

$$\mathbf{A_0 Y_t = A_1 Y_{t-1} + ... + A_p Y_{t-p} + \Omega \varepsilon_t} \tag{1}$$

where A_0 is a $N \times N$ matrix that describes the contemporaneous relations among the variables, and the $N \times 1$ vector ε_t contains the fundamental unobserved structural shock associated to each component of the $N \times 1$ vector of variables Y. These latter are assumed by a large part of the literature to be both mutually and serially uncorrelated (i.e.,

$E[\varepsilon_t \varepsilon_t'] = I$ where I is the Identity Matrix) and to be distributed one for each equation (i.e., Ω is the identity matrix) (Hanson (2004); Christiano et al. (1999); Ramey (2016); Gambetti (2020)).

Empirically, the parameter of equation (1) has to be recovered starting from the estimation of the VAR residual form:

$$\mathbf{Y_t} = \mathbf{B_1 Y_{t-1}} + ... + \mathbf{B_p Y_{t-p}} + \mathbf{u_t} \quad , \qquad \mathbf{A_0^{-1} A_i} = \mathbf{B_i} \quad i = 1, ..., p \qquad (2)$$

where each equation expresses one of the variable as a linear function of both its own lagged values and the lagged values of the other variables in the system (Rudebusch (1998)) and the relation between the VAR residuals $\mathbf{u}$ and the structural errors is

$$\mathbf{A_0 u_t} = \varepsilon_\mathbf{t} \qquad (3)$$

where u_t are the reduced form VAR *innovations* which are assumed to be identically and independently distributed, centered at zero, and with constant variance Σ, s.t. $u_t \sim i.i.d.(0, \Sigma)$ (Ramey (2016)). The identification strategy of the relevant structural parameter, given the estimated reduced form parameters, requires imposing some restrictions on the elements of A_0.

The field of research related to the assessment of the exogenous shocks' impact on various economic variable has developed throughout the years around two different but related topics: the first one regards the identification strategy used to derive such structural shocks as outlined above, whereas the second one concerns the type of economic shock under analysis.

Regarding the former argument, the most commonly employed methodology, and also the first introduced in Sims (1980), is the imposition of alternative sets of recursive zero restrictions on the contemporaneous coefficient contained in matrix A_0, also called *"triangularization"* or *"Cholesky Decomposition"*. The two widely used alternatives are the following: the policy variable, i.e., any variable from which we want to extract a shock component, does not respond within the period to the other endogenous variables (e.g., government spending in Blanchard and Perotti (2002)); the other endogenous variables do not respond to the policy shock within the period (e.g., federal funds rate as monetary shock in Bernanke and Blinder (1992)) (Ramey (2016)).

A similar and more general approach that uses either the economic theory or outside estimates to constrain parameters is called *structural* VAR (SVAR) and was first applied by Bernanke (1986), Blanchard and Watson (1986), and Blanchard and Perotti (2002).

Another widely used methodology is the Narrative Analysis already introduced in Chapter 2, which is based on the construction of a series of exogenous shocks whose reason and quantification can be identified through historical sources. Such an approach was originally outlined in the seminal paper by Friedman et al. (1963) and then developed to identify various categories of economic shocks (e.g., monetary shocks in Romer and Romer (1989, 2004), spending shocks in Ramey and Shapiro (1998); Ramey (2011), tax

shocks in Romer and Romer (2010), fiscal consolidations in Leigh et al. (2011), and oil shocks in Hamilton (1985). The empirical application of these series includes the use as exogenous shocks in sets of dynamic single equation regression[14], the inclusion in a Cholesky decomposition of an *exogenous* VAR (VARX) model, and the employment in the *"proxy SVAR"* method as an instrument for the true underlying shock (e.g. Mertens and Ravn (2012)).

Other more sophisticated approaches are the imposition of long-run restrictions on the behavior of some variables (e.g., Shapiro and Watson (1988); Blanchard and Quah (1988)), sign restrictions (e.g., Uhlig (2005)), factor-augmented VAR (or FAVAR) models, and mixed methodology such as the narrative-sign approach employed in Antolín-Díaz and Rubio-Ramírez (2018).

The second partition of the literature which can be performed is the one based on the type of economic shock analyzed. The study of the effects of monetary shocks on the economy is one of these strands of research. Early contributions were Christiano et al. (1999),Christiano et al. (1994),Bernanke and Blinder (1992), Bernanke and Mihov (1998), Leeper (1997), Pagan and Robertson (1995), Rudebusch (1998), Sims (1980), Sims and Zha (2006), Sims (1992), Romer and Romer (2004, 1989), Uhlig (2005), Boivin and Giannoni (2006). Given that monetary policy is typically guided by a rule which determines systematic movements in the variable of interest, the most discussed source of exogenous monetary shock is the change in central banks' preferences, whereas the key indicator of such policy stance is the interest rate[15] (Ramey (2016)). The principal empirical question that those works try to answer is about the impact of the identified monetary shock on output and prices. The results regarding the former agree on the negative sign of the effect, while the dynamic of the prices after the shock raises some doubts due to the presence in some applications of the so called *"price puzzle"*, i.e., an increase in prices after a contractionary monetary shock which is not in line with the classic theoretical predictions. Another important empirical question is the one regarding the macroeconomic effects of fiscal policy shocks. These latter are easier to identify than monetary shocks, given that the decisions taken by the legislative and executive branches of government are often justified by motivations which are not correlated with the state of the business cycle (Ramey (2016)).

If we consider the literature regarding government spending shocks, there is mixed evidence on the post-impact response of the other macroeconomic variables. For example, Blanchard and Perotti (2002), Fatás and Mihov (2001), Mountford and Uhlig (2009), Giordano et al. (2007), and De Castro Fernández and Hernández de Cos (2006) find a similar positive impact on private consumption, GDP, hours and real wages of various

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[14]Haug (2020), for example, tested and rejected empirically the Ricardian equivalence hypothesis using in a SVAR framework a subcategory of the narrative measures of the US tax shocks developed by Romer and Romer (2010).

[15]Bernanke and Blinder (1992) was the first paper which argues in favor of the federal fund rate instead of money the supply as main indicator of the monetary policy.

OECD countries. On the contrary, other papers, such as Ramey and Shapiro (1998)[16], Burnside et al. (2004), Edelberg et al. (1999),Ramey (2011), document a fall in consumption which implies a government spending multiplier smaller than one. Furthermore, there is also a debate on the state-dependency of the fiscal multipliers themselves. For example, Auerbach and Gorodnichenko (2012a) find evidence of larger multipliers during a recession, whereas Ramey (2016) notices no distinctions based on recessions, elevated unemployment rates, or the zero lower bound (Ramey (2016)).

Turning to the empirical evidence on tax shocks, results on this topic agree on the negative impact of those shocks on GDP but tend to differ regarding the size of the tax multiplier. Blanchard and Perotti (2002) apply an SVAR approach data with an identification based on the use of external estimates of net taxes to GDP and find a peak-to-impact multiplier ranging between -0.78 and -1.33. The sign restriction identification employed in Mountford and Uhlig (2009) results in a peak-to-impact multiplier of -3.6, while the imposition of probability restrictions on the output elasticities of taxes and spending proposed by Caldara and Kamps (2008) finds a value of -0.65. A much higher estimate of -2.5 to -3 at 3 years was obtained by Romer and Romer (2010) using the narrative methods to identify a series of exogenous tax shocks. The latter was then embedded by Favero and Giavazzi (2012) in a VAR framework, which results in a multiplier of -0.5. Moreover, by adopting a VAR approach that allows for a different impact of the discretionary and endogenous components of taxation, Perotti (2012) shows that a 1 percentage point of GDP increase in taxation is typically associated with a decline in GDP by about 1.3 percentage point after three years. A further modification of the R&R series was performed in Mertens and Ravn (2012, 2014), where the authors firstly split all the identified measures between anticipated and unexpected, and then applied the proxy-SVAR framework to asses the impact on GDP of the unexpected component alone, finding a multiplier of -3 at 6 quarters.

An even more specific topic of interest is the one regarding the macroeconomic effects of fiscal consolidations, defined as decisive reductions of governments deficits accomplished through tax increases and/or expenditure cuts. The first paper of this research strand was by Giavazzi and Pagano (1990), which studied the *"episodes"* of Denmark in the early 1980s and Ireland[17] at the end of the same decade and argued that these episodes represent cases of *"expansionary fiscal consolidation"*. A first multi-country assessment of this type of episodes was performed by Alesina and Perotti (1995, 1997), whose approach was then applied by other papers which confirmed the implied results (e.g., Alesina and Ardagna (1998, 2010)). The latter can be summarized as follows: spending-based adjustments

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[16]This work employs the narrative military buildup dummy to asses the impact assessment of government spending on other macroeconomic variables. The narrative reconstruction was then updated in Ramey (2011), which introduced a quantitative series of changes in the expected present value of government purchases caused by military events. This modification was implemented in order to account for the announcement effects of government spending. A similar approach was used in Fisher and Peters (2010), where the authors identify government spending shocks with statistical innovations to the accumulated excess returns of large US military contractors.

[17]The Irish consolidation was also deepened by Alesina and Ardagna (1998), which emphasized the importance of investment, labor costs, and net exports.

are less contractionary and are more likely to lead to a permanent stabilization or a reduction of the debt-to-GDP ratio. In some cases, spending-based adjustments have been associated with no recession at all, even in the short run, thus producing an expansionary fiscal adjustment. The theoretical motivation given for these findings was that an increase in consumers' and investors' confidence, associated with the drastic fiscal change and reflected in a sharp fall in long-term interest rates, compensated for the Keynesian effect of tax hikes and spending cuts(Alesina and Ardagna (2010)).

Up until the paper of Alesina and Ardagna (2010), the criteria applied to identify the episodes of large fiscal adjustment was the fall by a certain amount in the cyclically adjusted primary deficit over GDP. The rationale behind this choice was that such a large change was unlikely to be driven by the business cycle due to the construction of the cyclically adjusted primary deficit itself and was, instead, an indication of a discretionary active fiscal adjustment package. However, the main shortfall of the "cyclically adjusted" deficit was that it excludes budget changes induced by automatic stabilizers, but not discretionary changes in taxes and spending that might have been motivated by the state of the economy (Alesina et al. (2020)). Leigh et al. (2011) suggested a different approach based on the narrative reconstruction of the series of exogenous fiscal consolidations, i.e., those measures motivated by the will of reducing the inherited deficit and public debt. The results were essentially in line with the previous findings and were also confirmed by the recent work by Alesina et al. (2020), which incorporates also the concept of multi-year fiscal consolidation plans introduced by Perotti (2012).

A more neglected strand of literature related to the effect of fiscal consolidations is the one that takes into account in its framework the role of the public debt dynamics. The first paper which considered this issue was by Favero and Giavazzi (2007). The authors study the effects of fiscal shocks keeping track of the debt dynamic that arises following a fiscal shock and allowing for the possibility that taxes, spending and interest rates might respond to the level of the debt, as it evolves over time. They showed that omitting debt feedback can result in incorrect estimates of the dynamic effects of fiscal shocks. This approach was then embedded in various following works Favero et al. (2011), for example, used a global non-linear VAR which embed the debt dynamic equation to show that there are no unconditional fiscal policy multipliers, i.e., the effect of fiscal policy on output is different according to the different debt dynamics, the different degree of openness and the different fiscal reaction functions in different countries. Furthermore, Chung and Leeper (2007) impose the government's intertemporal government budget constraint on an estimated VAR to examine how innovations in debt produced by exogenous shocks to government spending, transfers, and taxes have been expected to be financed intertemporally. Other important contribution were Favero and Giavazzi (2012), which keeps track of a debt dynamic in a fiscal VAR that uses the narrative shocks identified in Leigh et al. (2011), and Caprioli and Momigliano (2011), where the authors include public debt and impose the government budget constraint in the estimation of the effects of fiscal policy

on macroeconomic developments in Italy over the period 1982-2010 using a Structural Vector Autoregression (SVAR) model.

Apart from the incorporation of public debt on VAR estimates, the literature does not perform an extensive analysis of the impulse responses of debt to macroeconomic shocks. Some contributions focus on testing for the sustainability of debt: Bohn (1998) showed that the U.S. government has historically responded to increases in the debt-GDP ratio by reducing the primary deficit, hence implying a mean reverting behavior and the intertemporal sustainability of the former. A similar result was reported for the Italian debt-GDP ratio in Piergallini and Postigliola (2012) and the U.S. by Sarno (2001).

Other works, such as Boussard et al. (2013) and Gros and Maurer (2012), analyzed from a theoretical standpoint the possibility of *"self-defeating"* fiscal consolidation. Both papers agree that the presence or absence of undesired effects from consolidations on debt dynamics is mainly driven in the short run by the size of th GDP multiplier. Indeed the latter, if higher than one, causes a fall in GDP that more than compensates for the cut in the deficit, leading to an increase in the debt-GDP ratio. However, such counter-intuitive effects should fade out in the long-run unless the multipliers have a high persistence, which can happen only in cases where the fiscal adjustments are repeatedly non-credible or the reaction of interest rates to the consolidation and to the debt developments are large (Boussard et al. (2013)).

Shifting the focus on the empirical literature, Heylen et al. (2013) study the evolution of the ratio of public debt to GDP during 132 fiscal episodes in 21 OECD countries from 1981–2008, using the cyclically adjusted primary balance to determine the periods of fiscal consolidation. The implied results confirm that consolidation programs entails a stronger reduction of the public debt ratio when they rely mainly on spending cuts, except public investment. Cherif and Hasanov (2012) analyze how macroeconomic shocks affect U.S. public debt dynamics using a VAR with debt feedback. The authors showed that, following a fiscal consolidation, the debt initially declines and then returns to its pre-shock path, even though the effect is not statistically significant. Furthermore, they find that in a weak economic environment the likelihood of a self-defeating consolidation is much higher than in normal times. Castro et al. (2015) employed a medium-scale DSGE model to show that, in the short-term, financial turmoils and hikes in the nationwide risk premia, together with high indebtedness level and stiff fiscal measures, severely affect the effectiveness of the fiscal consolidation plan in bringing the public debt-to-GDP ratio down. In addition, in the medium term, the credibility of the fiscal adjustments entails a decline in the debt-GDP ratio, although the potential losses in GDP can be significant if those adjustments are implemented under unfavorable budgetary and economic conditions. Finally, Cafiso and Cellini (2012) scrutinized the effect of fiscal consolidation policies identified by Leigh et al. (2011) in a set of EU countries, over the period 1980-2009. The paper finds that the analyzed measures appear to have a favorable contemporaneous effect on the debt/GDP ratio, but only if we considered those countries labeled as "virtuous". On the

contrary, the medium-term response of the debt-GDP dynamic seems to be self-defeating in all countries. The explanation given for these results is that the deficit responds contemporaneously and this causes a positive short-term effect on the debt-GDP ratio given that the GDP remains temporarily stable. However, when the GDP starts declining the debt-GDP worsens and this explains the adverse medium-term response. Moreover, the analysis shows that, when the fiscal consolidation succeeds, the debt-GDP decrease is larger on average when fiscal consolidations are based more on expenditure cut than on a tax increase.

4.2   Data Description

Table 5 contains the list of all the variables that were used in the empirical analysis, along with a short description. The main source of the time series is the online data appendix presented by Alesina et al. (2020), which in turn employed data taken mainly from the OECD and IMF databases. The time span of the sample is 1986 - 2014, with annual frequency. All the data are referring to the Italian economy, which is the focus of this work.

realgdpgrowthwb	Annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 2015 prices, expressed in U.S. dollars, annual, Italy, 1986 - 2014, World Bank Database
debtgdp	Debt-to-GDP ratio, annual, Italy, 1986 - 2014, IMF Historical Public Debt Database
infl	Inflation Rate, annual, Italy, 1986 - 2014, differentiation of the CPI - all items of the IMF International Statistics Database
unshock	Fiscal Consolidation Shock - Unexpected Component, annual, Italy, 1986- 2014, Alesina et al. (2020) database (1991 - 2014) and own integration (1986 - 1990)
fshockim	Fiscal Consolidation Shock - Impact Component, annual, Italy, 1986- 2014, Alesina et al. (2020) database (1991 - 2014) and own integration (1986 - 1990)
fshock	Fiscal Consolidation Shock - Overall Component, annual, Italy, 1986- 2014, Alesina et al. (2020) database (1991 - 2014) and own integration (1986 - 1990)
irlt	Long - Term Interest Rate, annual, Italy, 1986 - 2014, OECD Economic Outlook, n.97
irst	Short - Term Interest Rate, annual, Italy, 1986 - 2014, OECD Economic Outlook, n.97
EB_dummy	Dummy equal to 1 if Fiscal Consolidation Plan is expenditure - based, annual, Italy, 1986 - 2014, Alesina et al. (2020) database (1991 - 2014) and own integration (1986 - 1990)
TB_dummy	Dummy equal to 1 if Fiscal Consolidation Plan is tax - based, annual, Italy, 1986 - 2014, Alesina et al. (2020) database (1991 - 2014) and own integration (1986 - 1990)

Table 5: Variables Description

The variables labeled respectively as *"unshock"*, *"fschockim"*, and *"fshock"* are the exogenous fiscal consolidation shocks categorized in Chapter 3. The related time series merge together the database presented in Alesina et al. (2020), which span from 1991 to 2014, with the narrative reconstruction performed in this work using the methodology outlined in

Chapter 2, which extended the original database to the period 1986 - 1990. Furthermore, it has also been lengthened the dummy series *"EB_dummy"* and *"TB_dummy"*, which are equal to one respectively if the fiscal plan is expenditure (tax) based, i.e., if the expenditure (tax) component has a major share than the tax (expenditure) one.

Figure 1 plots the time series of the aforesaid variables.
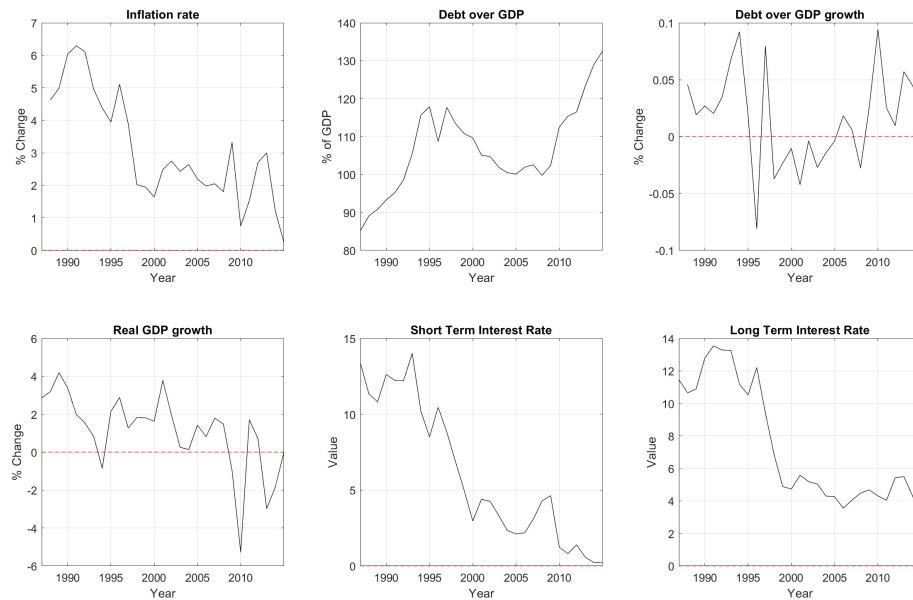
Figure 2: Fiscal Consolidation Time Series (% of GDP_{t-1})

The analysis of the time series performed through the Augmented Dickey-Fuller Test (with the constant and deterministic term) shows that almost all variables in our baseline specification display a non-stationary behavior. Furthermore, a cointegration relationship among the variables is detected using the Johansen Test[18]. However, following the suggestion of Montiel Olea and Plagborg-Møller (2021), all the estimations are performed with level variables without imposing differentiation or cointegration relationship[19].

In addition, the sample autocorrelation function (ACF) of the three different exogenous fiscal consolidation series has been assessed. The results are displayed in Figure 3.

This analysis shows that there is a certain degree of autocorrelation in each series, which is a fact that can be explained by the multi-year nature of the fiscal consolidation plan. Given that the *"Overall"* series is characterized by a lesser degree of autocorrelation (only the first-lag is significant), the latter will be used as a reference fiscal consolidation series in the empirical analysis.

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[18]All the test statistics are available from the author.

[19]A similar strategy is applied in the VAR framework. For more theoretical information see Sims et al. (1990) and Canova (2007).
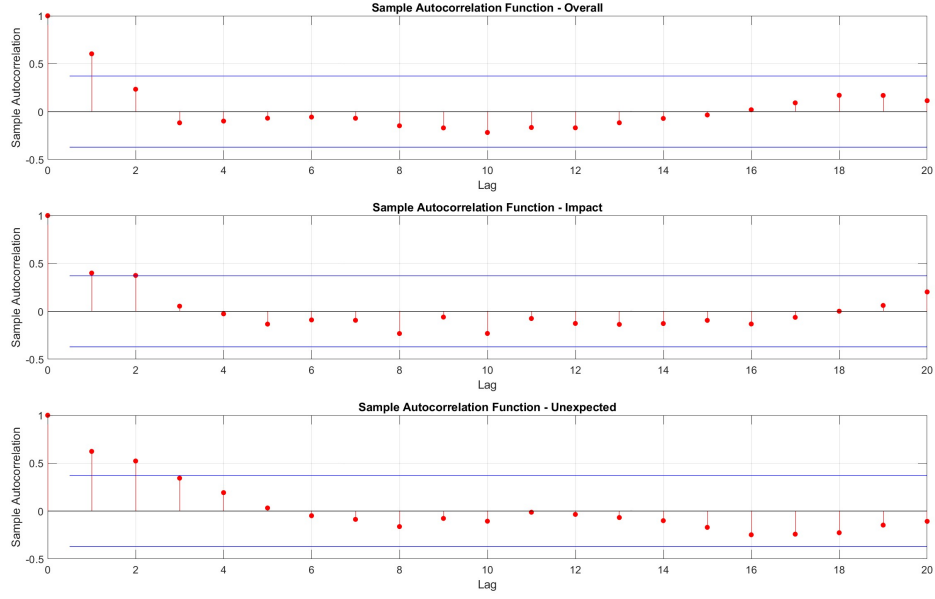
Figure 3: SAMPLE AUTOCORRELATION FUNCTION (ACF) PLOTS

4.3 Econometric Specification

Subsequently to the identification of the exogenous fiscal consolidation's vector with the narrative analysis methodology outlined in the previous chapters, the central problem is now how to measure the effects of these shocks on the endogenous variables of interest, i.e., the impulse response function.

The most common way to estimate the latter uses nonlinear (at horizons greater than one) functions of the estimated VAR parameters (Ramey (2016)). Indeed, given the reduced form representation of a VAR(p) model, $\mathbf{B}(\mathbf{L})\mathbf{Y_t} = \mathbf{u_t}$ with $B(L) = I - B_1 - ... - B_p$), if the invertibility condition is satisfied, the Wold representation theorem can be applied and the reduced form VAR can be rewritten in its moving average representation:

$$\mathbf{Y_t} = \mathbf{C}(\mathbf{L})\mathbf{u_t} \quad , \qquad \mathbf{C}(\mathbf{L}) = [\mathbf{B}(\mathbf{L})]^{-1} \tag{4}$$

Combining Eq. 4 with Eq. 3, the variable Y can be expressed in terms of the structural shocks after the elements of B_0 have been identified:

$$\mathbf{Y_t} = \mathbf{D}(\mathbf{L})\epsilon_\mathbf{t} \quad , \qquad \mathbf{D}(\mathbf{L}) = \mathbf{C}(\mathbf{L})[\mathbf{I} - \mathbf{B_0}]^{-1} \tag{5}$$

Writing out $D(L) = D_0 + D_1 L + D_2 L^2 + D_3 L^3...$ and denoting $D_h = [d_{ijh}]$, we can express the impulse response of variable Y_i at horizon $t + h$ to a structural shock ϵ_{jt} as:

$$\frac{\partial Y_{i,t+h}}{\partial \epsilon_{j,t}} = d_{ijh} \tag{6}$$

with d_{ijh} elements which are nonlinear functions of the reduced form VAR parameters(Ramey (2016)).

Nonetheless, this methodology can cause compounded specification errors at each horizon if the VAR is misspecified, as well as suffering from the curse of dimensionality inherent to VARs specification. To address this issue, Jordà (2005) introduced a novel methodology to estimate the impulse response functions, called *model-free* or *Local Projections (LP)*, whose estimation employs non-parametric techniques. The idea behind this procedure recalls the difference between "direct" forecasting and "iterated" forecasting. The former, which resembles the LP approach, allows forecasting future values of a variable using a horizon-specific regression. The latter performs the forecast iterating on a one-period ahead estimated model (Ramey (2016)).

Assuming that the vector of structural shocks ϵ has been identified, for example, using the prior mentioned narrative analysis, the impulse response of Y at horizon $h = 0, 1, ...$ can be estimated from the series of single regression:

$$Y_{t+h} = \beta^h \epsilon_t + C(L)^h \mathbf{X} + \nu_{t+h}, \quad h = 0, 1, 2, ... \tag{7}$$

where the coefficient B^h gives the estimate of the response Y at horizon $h = 0, 1, 2, ...$ to a structural shock ϵ_t at time t, X is the set of control variables and $C(L)^h$ id the lag-polynomial of order p associated with X. The latter typically includes deterministic terms (e.g., constant, time trends), lags of Y etc., which do not necessarily need to be the same for each regression at the given horizon h. The subscription h indicates that the coefficient estimates change at every h.

The literature outlined several advantages of this methodology in comparison with the VARs model: it does not impose specific dynamics on the variables of the system, can more easily accommodate nonlinearities, and, as already mentioned, does not suffer from the curse of dimensionality inherent to VARs (Barnichon and Brownlees (2019)). Moreover, the estimator is not constrained by the invertibility assumption requested in the VAR framework to compute the moving average representation of the system of variables (Brugnolini (2018)). Plagborg-Møller and Wolf (2021) both demonstrate that the linear local projections and VARs estimate in fact the exact same impulse responses in population, and that if only a fixed number p of lags are included in the LP and VAR, then the two impulse response estimands still approximately agree out to horizon p. Jordà (2005) shows that LP method can outperform a misspecified VAR model for the estimation of the impulse response function. Brugnolini (2018) displayed that when the sample size is small and the model lag-length is misspecified, the LP estimator is a competitive alternative to the standard VAR approach.

Given these particular characteristics, this methodology has been employed in several empirical works since its introduction. Auerbach and Gorodnichenko (2012a,b) and Ramey and Zubairy (2018) used local projections to estimate the state-dependent fiscal multipliers. Cesa-Bianchi et al. (2016), Tenreyro and Thwaites (2016), Miranda-Agrippino and Ricco (2017) assessed the response of real and financial variables to a monetary policy shock in a LP framework.

However, Kilian and Kim (2011) criticized those results, finding that in small samples, the asymptotic LP interval often is less accurate than the bias-adjusted bootstrap VAR interval, notwithstanding its excessive average length. Besides, other authors, such as Plagborg-Moller (2016) and Brugnolini (2018), noticed that regression-based impulse response function estimators are often less smooth and suffers from excessive variability in moderate samples, especially if the regression includes many controls[20]. Moreover, the methodology still suffer from the fact that it consumes data along both the lag(p) and the lead (h) dimensions, thus reducing the sample dimension (Brugnolini (2018)).

This work, hence, tries to apply this methodology, embedding in its framework the vector of exogenous fiscal consolidation shock described in Chapter 3, following the approach already employed by Ramey and Zubairy (2018) to estimate the impact of the Ramey (2011) military news variable on both the GDP and the government spending. The variable of interest, in this case, is the debt-to-GDP ratio, whose dynamics after a fiscal consolidation shock have been so far neglected by the vast majority of the literature as pointed out in Chapter 3.1. The focus of this empirical application is trying to asses if the fiscal consolidations enacted by the Italian government throughout the years succeeded in lowering the debt-to-GDP ratio or, instead, if they were *self-defeating* in their effects. Therefore, this work can be considered a case study on the Italian economy, given the *ad-hoc* nature of the narrative analysis methodology outlined in Chapter 2 and applied in Chapter 3.

The choice of the Local Projections methodology to determine the impulse response function of interest is motivated by the small time span of availability (29 observations) of the shock variable, which would have made it impossible to employ a VAR model given the much higher number of implied parameters to estimate. The problem regarding the choice of the number of lag and lead to use has been handled by restricting to 4 the horizon over which computing the impulse response function, which is still a significant period along which studying the effect of fiscal consolidations. Also, given the annual frequency of the data, the maximum lag of all the variables used in the model amounts to 1, as suggested by Ivanov and Kilian (2005).

The linear specification employed, which resembles a linearized form of the debt dynamics equation, looks as follows:

$$d_{t+h} = \alpha^h + \theta^h d_{t-1} + \beta^h FCshock_t + C(L)^h \mathbf{X} + \nu_{t+h} \quad , h = 0, 1, 2, ... \quad (8)$$

where d is the variable of interest (i.e., the debt-to-GDP ratio), $\mathbf{X}$ is the vector of control variables, $C(L)^h$ is a polynomial in the lag operator L, and $FCshock$ is the vector of fiscal consolidation shocks identified through the narrative analysis and divided for the nominal GDP in $t - 1$. The lagged value of the debt-to-GDP ratio (d_{t-1}) is included in the model because of two principal reasons: the first one regards the fact that many papers

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[20]To solve this problem, Barnichon and Brownlees (2019) proposed an impulse response estimation methodology based on B-spline smoothing called smooth local projections (SLP), which can substantially increase the estimates' precision.

(e.g., Chung and Leeper (2007); Piergallini and Postigliola (2012); Sarno (2001); Bohn (1998)), focusing on the empirical dynamics of the debt-to-GDP ratio, added this variable as regressor in their specifications, given also that it is part of the debt dynamics equation. The second reason is related to the motivation based on which the fiscal consolidation measures are taken, i.e., the decision of reducing the public deficit and the debt-to-GDP ratio. Indeed, not controlling for this variable can cause a problem of endogeneity, considering that those fiscal actions are indeed taken in response to the past level of the debt-to-GDP level, as pointed out by Favero and Giavazzi (2012), Favero et al. (2011) and Guajardo et al. (2014).

The consistent OLS estimate of the coefficient of interest is based on the assumption that the narrative shocks are exogenous, i.e., not systematically correlated with any component embedded in the error ν_{t+h} which affect the dependent variable in the current period. Since all the identified measures have a clear motivation, they are unlikely to be systematically correlated with other developments affecting the debt-to-GDP ratio in the short term, given that these are policy changes motivated by past economic conditions such as the lagged debt-to-GDP ratio. The baseline vector of shock employed is the one following the *"Overall"* classification,which sums up both the unexpected and the cumulative announced components and assumes that economic agents react to a shift in taxes/spending when they learn about it.

Given that, except for horizon $h = 0$, the error term ν_{t+h} is serially correlated because it is a moving average of the forecast error from t to $t + h$, the standard errors need to incorporate the corrections for serial correlation, such as the one proposed by Newey and West (1986) and applied in Jordà (2005).

5 Estimation Results and Robustness Check

The main results of the analysis are now presented along with some checks uses to assess the robustness of the aforesaid assumptions. The bands are 95 percent confidence bands calculated using the Newey-West standard errors that account for serial correlation induced in regressions when the horizon $h > 0$. The OLS estimator is employed to estimate the Local Projection impulse response function at a horizon of 4 years.

Figure 4 shows the results of the baseline model estimation, i.e., equation 8 with no control and employing the *"Overall"* classification for the exogenous series. After a fiscal consolidation of one percent of GDP is implemented, the debt-to-GDP ratio begins to rise and then peaks at around 3 years. Notwithstanding the positive trajectory of the impulse response function, the comparison between Figure 4a and Figure 4b suggests that including the lagged debt-to-GDP ratio in the baseline model does indeed affect the estimated parameters of interest (i.e., $\beta^h, h = 1, 2, 3, 4$), which scale is dampened as Figure 4b shows. These findings suggest that there exists a certain degree of correlation between the identified vector of fiscal consolidation and d_{t-1}, as suggested above. Furthermore, this debt dynamics suggests that the impact of the fiscal consolidations is indeed *"Self defeating"* in the Italian case, a result which is coherent with a part of the literature previously described.

(a) BASELINE SPECIFICATION WITHOUT d_{t-1} (b) BASELINE SPECIFICATION
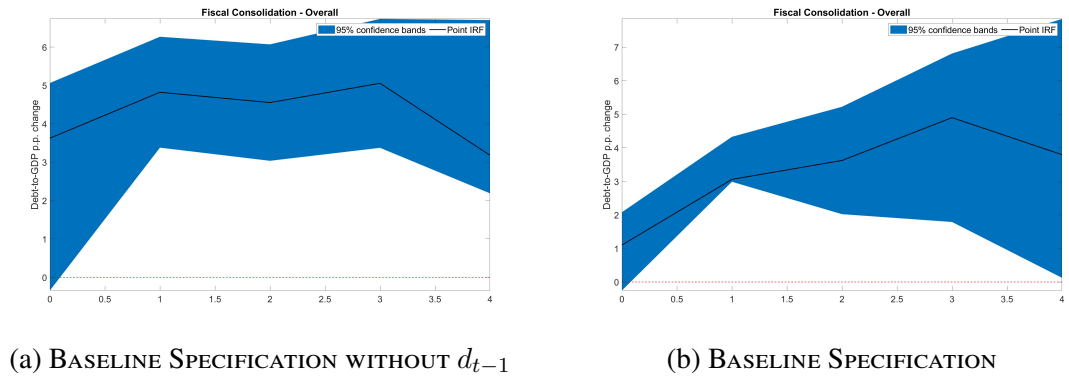
Figure 4: IMPULSE RESPONSE ESTIMATES

Figure 5 contains the results of the robustness analysis performed by adding variables to the control vector X. Such variables include all the components of the debt dynamics equation, i.e., the long and short-run interest rate, the inflation, and the real GDP growth, which the related lags. Moreover, the lag of the fiscal consolidation variable has also been added to account for the auto-correlation in the shock series.

Overall, the resulting impulse response functions confirm the dynamics path previously described. The various point estimates summarize an increase in the debt-to-GDP ratio, even if the size of the effect and its statistical significance vary among the different specifications. Almost every model shows some problems related to the drawbacks of the Local projections methodology. Indeed, the small size of the sample and the inclusion of many controls make the confidence band excessively variable, such that in some points

the point estimate lies outside the confidence interval itself.

(a) CONTROL: $FCshock_{t-1}$

(b) CONTROL: $infl_t$, $IRST_t$, $IRLT_t$, $FCshock_{t-1}$

(c) CONTROL: $infl_t$, $IRST_t$, $IRLT_t$

(d) CONTROL: $infl_{t-1}$, $IRST_{t-1}$, $IRLT_{t-1}$, $RealGDPgrowth_t$

(e) CONTROL: $infl_t$, $IRST_{t-1}$, $IRLT_{t-1}$, $RealGDPgrowth_t$
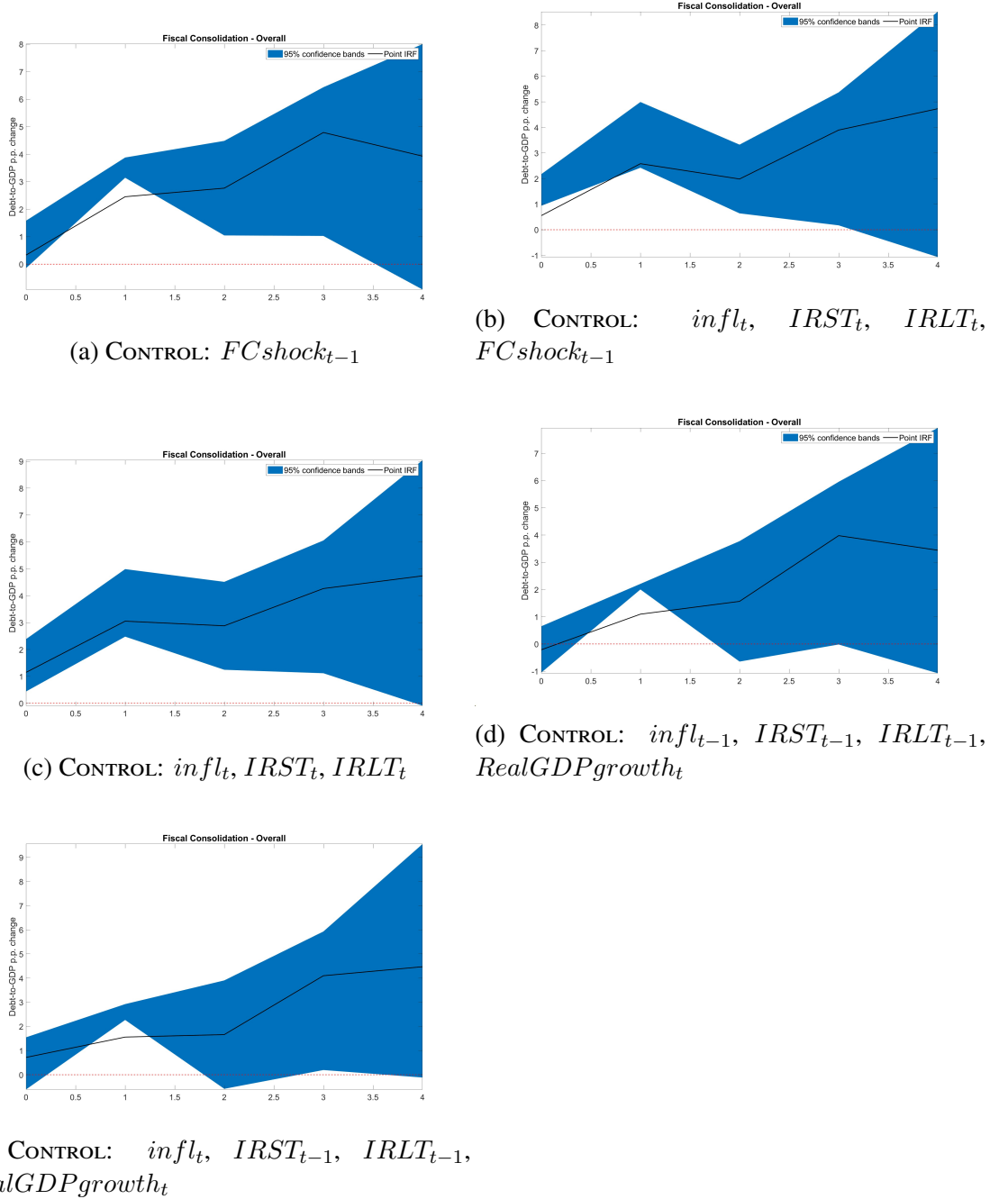
Figure 5: ROBUSTNESS ANALYSIS

Figure 6 presents the impulse responses identified using as fiscal consolidation measures ($FCshock$) the *"Impact"* and the *"unexpected"* component of the plan. The use of these two classifications implies some assumptions about the behavior of the economic agents. The former assumes that there is a response to the implementation of fiscal measures only when they are effectively implemented. The latter presupposes an agent's reaction only to those fiscal shocks which are unanticipated (Alesina et al. (2020)).

The resulting dynamics display a slightly different pattern than the previous specification. Despite the positive response in both cases of the debt-to-GDP ratio, the point estimates are significantly different from 0 at a horizon of 3 years in the model which uses the

"impact" classification.
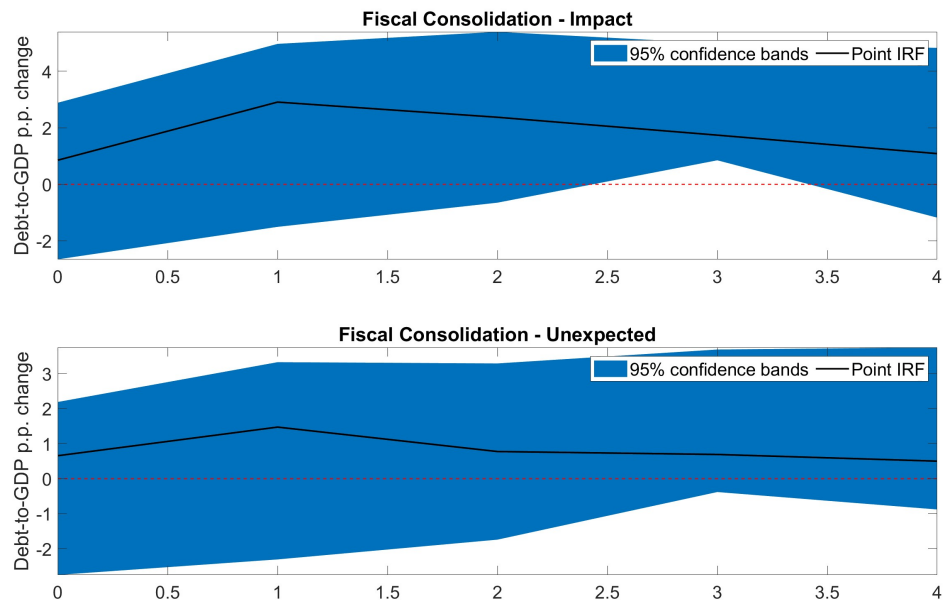
Figure 6: SPECIFICATION WITH DIFFERENT $FCshock$ CLASSIFICATION
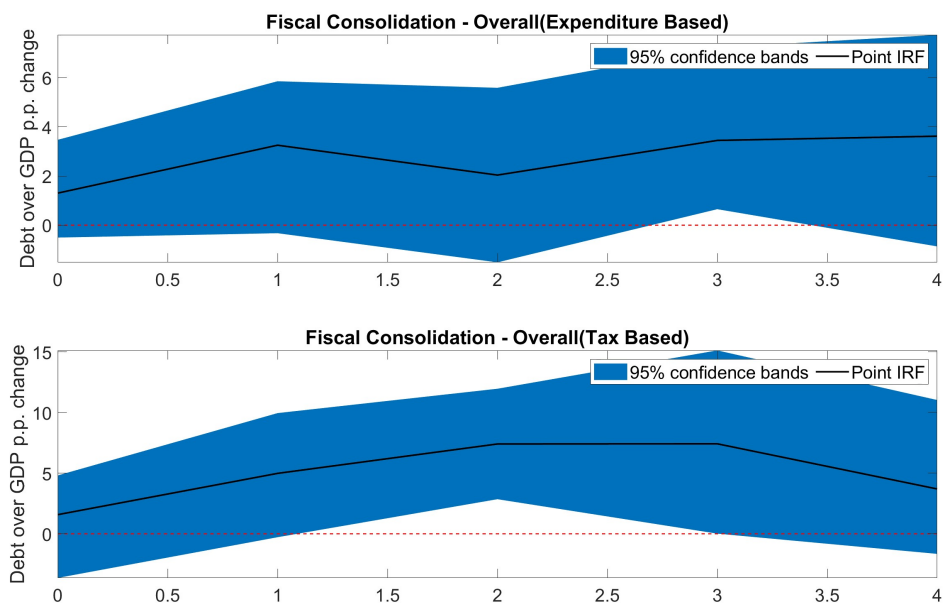
Figure 7: SPECIFICATION WITH EB_DUMMY AND TB_DUMMY INTERACTION

The last robustness check accounts for the difference between the Expenditure Based (EB) and Tax Based (TB) fiscal consolidations. In order to account for this difference, the baseline specification has been changed through the interaction between the $FCshock$ variable and the EB and TB dummies. The specification outlined in Chapter 4 changes as follows:

$$d_{t+h} = \alpha^h + \theta^h d_{t-1} + \beta_1^h FCshock_t * EB\_dummy_t + \beta_2^h FCshock_t * TB\_dummy_t + \nu_{t+h} \quad (9)$$

The impulse responses shown in Figure 7 are constructed respectively using the coefficient associated with the two different interaction terms (i.e., β_1^h and β_2^h). The plotted graphs displayed a more regressive effect of the tax-based fiscal consolidation in terms of an increase in the debt-to-GDP ratio, as witnessed by the statistically significant effect at a horizon between the first and the third year. The effect of expenditure-based measures are instead barely significant at a horizon of 3 years.

(a) BASELINE

(b) CONTROL: $RealGDPgrowth_{t-1}$
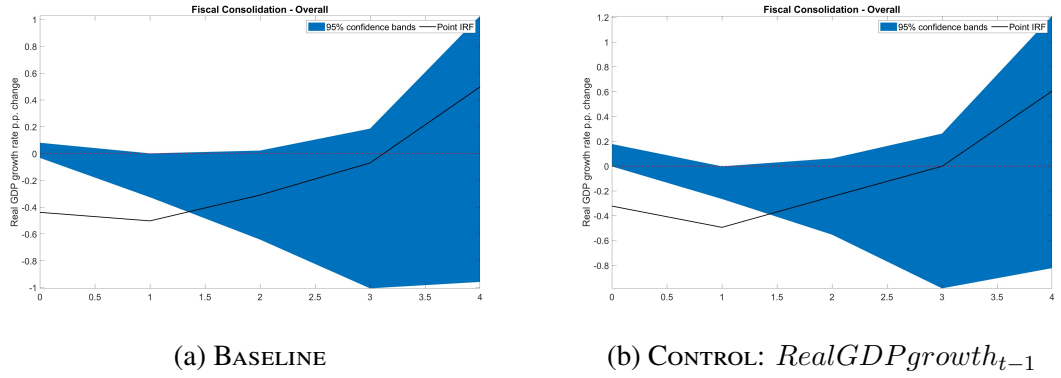
Figure 8: IMPULSE RESPONSE ESTIMATES OF $RealGDPgrowth$
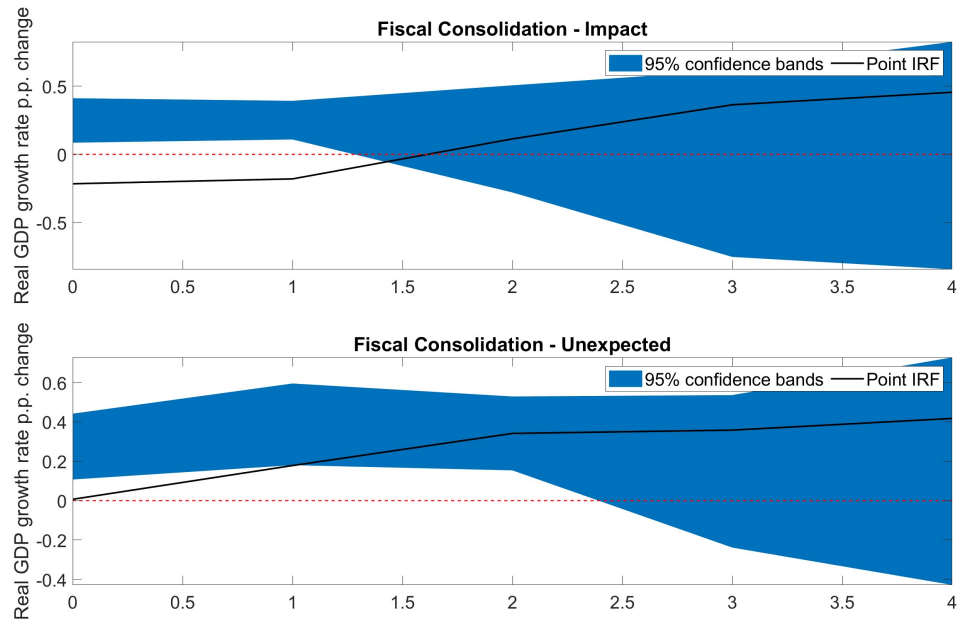
Figure 9: DEPENDENT VARIABLE: $RealGDPgrowth$, CONTROL: $RealGDPgrowth_{t-1}$, SPECIFICATION WITH DIFFERENT $FCshock$ CLASSIFICATION

These empirical findings can be interpreted assuming the fact that the negative effect of the fiscal consolidation on the GDP can be the main cause of the increase in debt-to GDP

ratio, as pointed out by Boussard et al. (2013) and Gros and Maurer (2012).

Hence, the empirical analysis, and the related robustness checks, of the impact of the Fiscal consolidations on the real GDP growth has been performed using the usual specification outlined above, which now looks as follows:

$$\Delta y = \alpha^h + \theta^h \Delta y_{t-1} + \beta^h FCshock_t + \nu_{t+h} \tag{10}$$

The results are summarized in Figure 8, Figure 9 and Figure 10. Overall, the point estimates signal a negative effect of these measures on the real GDP growth, even if it is difficult to interpret these results given the aforementioned inference problems related to the confidence band. The only exception to this pattern is the impulse response estimated using the *"unexpected"* classification. Moreover, Figure 10 shows a more recessionary effect of the tax-based fiscal consolidation, which is also significant after one year from the initial shock, while the expenditure based measures seem to have a positive but not statistically significant effect. This result is in line with the vast literature on the differentiated impact between TB and EB fiscal consolidation plan outlined in Chapter 4.
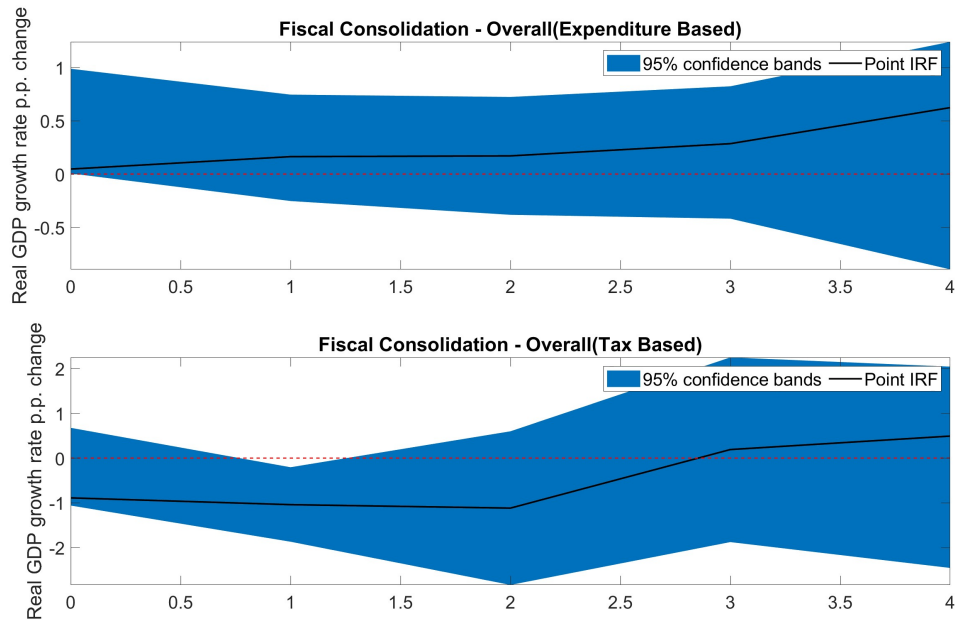
Figure 10: DEPENDENT VARIABLE: REAL GDP GROWTH, SPECIFICATION WITH EB_DUMMY AND TB_DUMMY INTERACTION

In conclusion, the empirical results show that the various fiscal consolidations plan implemented by the Italian government during the period 1986-2014 have failed in the objective of decreasing the debt-to-GDP ratio, and hence can be labeled as episodes of *self-defeating* consolidation plans. However, the uncertainty related to the small size of the sample and the consequent problems of statistical inference requires performing a more in-depth analysis of the topic.

6   Conclusion

The main contribution of this paper is the introduction of a narrative analysis methodology that deepen the previous approach employed to identify the information of interest related to the Italian economy.

Unlike the works already performed by Leigh et al. (2011) and Alesina et al. (2020) which make use principally of the documents drafted by international organizations or central banks, this approach employs a wider range of official historical sources for the identification and the classification of the various fiscal measures of interest. Those sources primarily include the documentation related to the Italian budgetary procedure, whose mechanism has been analyzed during the period 1970-1990 in order to better exploit the qualitative and quantitative information contained therein.

The principal advantage of those documents is the periodicity with which they are drafted, which permits to update the estimates of the various fiscal measures of interest and to check ex-post their effective implementation and impact. Furthermore, they provide more accurate details on the motivation behind the government's choices, which are fundamental knowledge to properly classify as endogenous or exogenous each fiscal action.

This innovative approach has been employed to expand during the period 1986-1990 the database of exogenous fiscal consolidations related to the Italian economy constructed by Alesina et al. (2020). Indeed, the authors, basing their work on the previous database created by Leigh et al. (2011), identified the fiscal consolidations only for the period after 1991, due mainly to the reduced number of sources employed.

The additional analysis performed in this paper adds to the database of Alesina et al. (2020) 82 exogenous fiscal measures (tax increases or expenditures cuts) motivated by the objective of curbing the deficit/debt dynamics. These measures are then classified according to their technical categorization (e.g., Personal Income tax, Corporate Tax, Investment) and their current and prospective budgetary impact is quantified using the estimates contained in the documentation. Furthermore, each fiscal action is aggregated following the methodology presented by Alesina et al. (2020), which divides the budgetary effect of every measure among its *"unexpected"* and *"announced"* components.

The resulting fiscal consolidations identified for the period 1986-1990 are then merged with the original series in order to be employed in a Local Projection framework to assess the effective impact of these measures on the dynamics of the Italian public debt. The empirical results show that, in fact, the latter failed in limiting the increase of the debt-to-GDP ratio and, hence, should be labeled as episodes of *"self-defeating"* consolidations.

This paper should be viewed as a preliminary part of the more ambitious objective of identifying and classifying all the legislated fiscal change implemented by the Italian government in the period 1970-1990, an idea that follows the work performed by Romer and Romer (2010) for all the U.S. legislated tax changes in the postwar period. A draft of this analysis for the time interval which goes from 1970 to 1976 and or the year 1978 is already available from the author. In addition, the decomposition performed in Chapter

3 can be employed to analyze the single macroeconomic impact of each tax/expenditure component (e.g., direct taxes, indirect taxes, government wage expenditure, etc.).

A more promising route for extending the analysis is to investigate the importance of the official sources produced by the parliamentary discussion over the budgetary procedures. Indeed that information, and, in particular, the report drafted by the opposition parties into the various parliamentary commissions could be possibly useful in order to check the real motivation behind the implementation of given fiscal policy measures.

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Appendix

Fiscal Shock Narrative Reconstruction

Italy 1986

Fiscal consolidation was performed in order to reduce the deficit and the debt-to-GDP ratio as stated in the *Documento di Pogrammazione Economico-Finanziaria, 1986 (pagg. 19-20)* presented on September 1986: *"Public finance objectives have long been clearly defined, and it has been specified that, on the quantitative side, the aim should be to achieve substantial containment of the borrowing requirements net of interest, with the goal of restoring, by the end of the 1980s, overall borrowing requirements to values not exceeding 7-8 percent of GDP, i.e., equal to those before the 1973 crisis and the subsequent explosion of public spending. Considering interest, the target could coincide with substantially zeroing current requirements, thus aligning overall borrowing requirements with capital expenditures, or with the indication, as a goal, of freezing the ratio of public debt to GDP" (Ministero del Bilancio e della Programmazione Economica (1986)).*

The fiscal adjustment was firstly set in the 1986 Financial Act (Law 28/02/1986, n.41) and then supported by additional measures taken throughout the year. These include: increase in social insurance contributions for both employers and employees; revision of IRPEF tax base for some groups of taxpayers; revision of the fiscal treatment of the government securities' interests; public application of the new half-yearly *"scala mobile"*; decline in the number of recipients of social insurance benefits; cuts in health spending through the increase of *"tickets"*. Moreover, it has been enacted some extraordinary measures with a transient revenue effect such as amnesty on building irregularities, the delay in the definition of civil servants' contracts and the pooling of central,local government and non-state public bodies' cash reserves in a single Treasury account Nevertheless, tax revenues were adversely affected by the income tax reform introduced in April 1986 (OECD (1987)).

The overall fiscal consolidation's contemporaneous effect was equal to 2.39 % of the 1985 GDP and was composed of 78.2 % by various categories of tax cuts.

Italy 1987

The main motivation of the 1987 fiscal policy was set in continuity with the plan presented in 1986, as stated in the *Relazione Provisionale e Pro-*

grammatica (Pag. 107): *"The fiscal policy, however, cannot be considered already completed: other results are expected from the concrete implementation of the new design of the decision-making process for financial planning, a design that will have to make it possible to govern the flows of public finance within a framework of coherence between instruments and medium-term objectives, leading to reducing the weight of requirements (net of interest) on GDP by another two points in 1987 and to reduce it completely to zero by 1990. This is essentially the path intended to be taken along the lines of the outline document drafted under the terms of the resolutions approved by the House and Senate Budget Committees in June 1986, a document outlining the economic policy guidelines for the three-year period 1987-89 together with the constraints and objectives of public finance"* (Ministero del Bilancio e della Programmazione Economica (1987)).

Throughout 1987, the actual deficit was far removed from the initial targets set in the 1987 Financial Act. The leading cause of this out-turn was the political crisis that happened at the beginning of 1987, which prevented the government to enact those fiscal measures aimed to curb the increase of various spending aggregate. Moreover, the macroeconomic conditions which helped the decrease in government deficit in 1986 (e.g., increase in oil price, revenue from a fine on unauthorized buildings, etc.) did not occur in 1987 (OECD (1989); Ministero del Bilancio e della Programmazione Economica (1988b)).

In order to counteract these budget overruns, a new package of fiscal measures was introduced at the end of August 1987. In particular, it comprehended higher taxes on oil products, a temporary 4-point rise in VAT rates on a number of consumer durables (e.g., cars, household furniture, audiovisual amplifiers etc.), the increase of the advance payment of the IRPEG, ILOR on legal entities and withholding tax on bank interest, and the advancing of the date for doubling the tax on government securities (OECD (1989); Ministero del Bilancio e della Programmazione Economica (1988b)).

The overall fiscal consolidation's contemporaneous effect was equal to 0.11 % of the 1986 GDP and was uniquely composed by various of tax cuts, whereas there was a small increase in government spending (0,07 of the 1986 GDP) .

Italy 1988

The stance of the fiscal policy was explained on Pagg. 19-20-21 of the new *Documento di Programmazione Economico-Finanziaria* for the period

1988-1992 presented to the parliament on May 1988: *"[...]the downward trend in the debt-to-GDP ratio needs to be changed.[...]A reduction in borrowing requirements net of interest plays a particularly important role not only because of the contribution it independently makes to reducing the growth of the debt ratio but also because it can lead to favorable changes in the other explanatory factors of the debt ratio trend. [...]An economic policy that intends to correct the trend in the debt-to-GDP ratio must therefore aim for a reduction in net-of-interest borrowing requirements that can also allow for a concomitant progressive reduction in interest. [...]It can be assumed, on the basis of available assessments, that a reduction in borrowing requirements net of interest of 0.7 points (as a percentage of GDP) in each year of the period under consideration (1988-1992) is bearable by the economic system. Such a reduction would allow, in the final year of the time period under consideration (i.e., 1992), a slight surplus in the overall public sector balance net of interest, and a decline in interest rates such that the debt-to-GDP ratio would be stabilized at the end of the period. (Ministero del Bilancio e della Programmazione Economica (1988a))"*.

The initial draft of the Financial Act was approved by Parliament in September 1987 with the intention of stabilizing the deficit in nominal terms at the level expected at the time for 1987. This target was then revised in October 1987 with the main aim of a further cut of the Treasury deficit targeted in the September draft. This had to be accomplished by a mix of tax increasing (e.g., one-point rise in VAT rates, increase in road tax and super-tax on diesel fuel, doubling of stamp duty on stock market transactions etc.) and spending cuts (e.g., savings in health expenditure, reducing budgétisation of social security contributions etc.). However, the final draft of the 1988 Financial Act approved in march 1988 was substantially altered during the course of the Parliamentary discussion. Most of the expenditure-cuts measures were amended, whereas almost all the tax increases were retained (OECD (1989)). The latter include the increase in the withholding tax on the bank and postal deposit interest, non-deductibility of VAT related to car and fuel purchases, increase in various indirect taxes on business and production, and the extension of the advance payment's increase of the IRPEG, ILOR on legal entities (OECD (1989); Ministero del Bilancio e della Programmazione Economica (1988b)). Notwithstanding, tax revenues were adversely affected by both the reduction in social security health contributions and the increase in tax credits related to IRPEF.

Furthermore, at the end of the months of May and July, the government adopted new measures with the main aim of starting the fiscal consolidation defined in the *"Documento di Programmazione Economico-Finanziaria*

1988-1992. These included advanced or augmented payments of direct taxes (e.g., IRPEF and ILOR on a natural person) and higher stamp duties, an increase in the standard VAT rate from 18 to 19 percent, and higher taxes on fuel and electricity.

The overall fiscal consolidation amounted to 0.46 % of the 1987 GDP and was composed in its entirety of various categories of tax cuts.

Italy 1989

The *Documento di Programmazione Economico-Finanziaria 1990-1992* drafted by the government on May 1989 confirmed the objectives stated in the previous year's document: *"The continuation of the course of action taken thus appears to be consistent with government action to date, the reasons for which are found in the intent to comply with the budgetary policy decisions made by parliament in the motion approving last year's economic and financial planning document. The government believes that it is necessary to confirm, for 1990 first and foremost, the will to continue implementing the path already outlined(Ministero del Bilancio e della Programmazione Economica (1989))".*

The initial fiscal policy was outlined in the 1989 Financial Act approved on December 1988 along with the decree-law containing the related accommodating legislation. This package comprehended: the lowest VAT rates of 0 and 2 percent raised to 4 percent; personal income tax schedules linked to inflation; a tax amnesty for self-employed workers opting for the flat-rate new tax regime; ceiling to the increase in each ministry's current expenditure; débudgétisation of part of employers' social insurance contributions; reduction in transfers to local authorities; decrease in health spending. However, due to both political difficulties in implementing these measures and the erroneous forecast of some macroeconomic variables' development, the government was obliged to enact a new fiscal consolidation package on March 1989. It included the increase in the advance payment of VAT, a further reduction of the budgétisation of employers' social insurance contributions, a curb on local authority cash credits, a cut in health expenditure and on the purchase of goods and services by the government. Finally, some fiscal measures related to the 1990 Financial Act, mainly an increase in indirect taxes such as energy tax, stamp duties etc., have been anticipated for September 1989 (OECD (1989); Ministero del Bilancio e della Programmazione Economica (1990)).

The overall fiscal consolidation accounted for 1.42% of the 1988 GDP and was composed of the majority (i.e., 62 %) by cuts in public spending.

Italy 1990

The main motivation leading the fiscal policy stance of the government was again defined in the *Documento di Programmazione Economico-Finanziaria 1991-1993, Pag.16*: *"In the context of the economic policy for the next three years, the centrality of the consolidation of public finance should be emphasized, on the one hand, and the need to strengthen the intensity of corrective action with respect to what was established in last year's economic and financial planning document, on the other. (del Bilancio e della Programmazione Economica (1990)")*.

The 1990's fiscal consolidation was fundamentally split into two parts: the first package of measures was implemented on September 1989 along with the initial budget proposal and was composed mainly of an increase in indirect taxes such as stamp duties and excise on production. Moreover, it was supported by the Financial Act's accommodating legislation enacted through decree-law in December and aimed mainly at both the reduction of tax evasion and the increase in the overall tax base. However, in March 1990 the deficit on unchanged policies was revised upwards because of the failure of tax amnesties announced in 1989, the overshooting of limits for public sector wage growth, and the increase in interest payments. Therefore, the government announced on May 1990 a second package of fiscal consolidation measures, then re-proposed on September 1990, containing predominantly an increase in indirect taxes such as VAT on some commodities, excises on the production of oil products etc. (Ministero del Bilancio e della Programmazione Economica (1991); OECD (1991)).

The overall fiscal consolidation accounted for 1.14% of the 1989 GDP and was composed of almost (i.e., 86 %) by an increase in taxes.

Table 6: FISCAL SHOCKS CLASSIFICATION

Year	Law	Components	Measure	Source
1986	- Legge 17.04.1986, n. 109 che, oltre a convertire il D.L. 05.03.1986 n. 58, ha fatto salvi gli effetti dei DD.LL. n. 40 del 28 febbraio e n. 63 del 13 marzo - Legge 25.03.1986, n. 73	Goods and Services	Increase in Oil Product's excises	- Banca d'Italia, Assemblea Generale dei Partecipanti 1986, pag. 167
1986	- Legge 31.01.1986, n.11 che ha convertito con modifiche il D.L. 02.12.1985, n. 688 - Legge 28.02.1986, n. 41 (Legge Finanziaria 1986)	Personal Income Tax	Increase in Social Security tax rate, decrease in social security contribution's fiscalization, acceleration in social secuirty contribution's collection	- Banca d'Italia, Assemblea Generale dei Partecipanti 1986, pag. 167
1986	- Legge 17.02.1985, n.17 che ha convertito il D.L. 19.12.1984, n. 853 - Legge 18.04.1986, n. 121 coverte D.L. 05.03.1986, n.57	Not Yet Classified Taxes	Revision of IRPEF tax base for some groups of taxpayers and flat-rate IVA's deduction	- Banca d'Italia, Assemblea Generale dei Partecipanti 1986, pag. 167
1986	- Legge 17.11.1986, n. 759 Conversione in legge, con modificazioni, del D.L. 19.09.1986, n. 556	Property Tax Private	Revisione regime fiscale dei titoli pubblici (ritenuta di acconto del 6,25% e del 12,50 % per titoli emessi dopo il 30/09/1987	- Relazione Generale sulla Situazione Economica del Paese (1986), Volume Secondo, Pag.11
1986	- Legge 18.04.1986, n. 121 coverte D.L. 05.03.1986, n.57	Personal Income Tax	Revision of IRPEF structure	- Banca d'Italia, Assemblea Generale dei Partecipanti 1986, pag 167
1986	- Legge 31.01.1986, n.11 convertito da D.L. 22.07.1985, n.356	Not Yet Classified Taxes	Mandatory cash excesses deposit by Special Credit Institution in the State's Treasury	- Banca d'Italia, Assemblea Generale dei Partecipanti 1986, pag 175
1986	- Legge 29.10.1984, n. 720 (Tesoreria Unica), è stata resa operativa dal 01.06.1986 dal D.M. 19.02.1986 - Legge 28.02.1986, n. 41 (Legge Finanziaria 1986)	Not Yet Classified Taxes	Mandatory cash excesses deposit by Regions and Special Provinces in the State's Treasury	- Banca d'Italia, Assemblea Generale dei Partecipanti 1986, pag 175 - Banca d'Italia, Assemblea Generale dei Partecipanti 1987, pag 155
1986	- Legge 29.10.1984, n. 720 (Tesoreria Unica), è stata resa operativa dal 01.06.1986 dal D.M. 19.02.1986 - Legge 28.02.1986, n. 41 (Legge Finanziaria 1986)	Not Yet Classified Taxes	Mandatory cash excesses deposit in the State's Treasury by public bodies specified in Table A of Law n.720 of 1984 in the State's Treasury	- Banca d'Italia, Assemblea Generale dei Partecipanti 1986, pag 175
1986	- Legge 28.02.1985, n. 47	Not Yet Classified Taxes	Amnesty on buildings irregularities	- Banca d'Italia, Assemblea Generale dei Partecipanti 1987, pag. 160
1986		Salaries	Rinvio nella definizione dei contratti di lavoro del comparto pubblico	- Banca d'Italia, Assemblea Generale dei Partecipanti 1986, pag.167

Table 6 continued from previous page

1986	- Legge 28.02.1986, n. 41 (Legge Finanziaria 1986)	Transfers	Modifiche apportate alla periodicità della scala mobile, l'introduzione di limiti di reddito piú stringenti per gli assegni familiari, la decurtazione delle indennità per l'integrazione guadagni e, infine, l'inasprimento dei tickets sulle prestazioni sanitarie	- Banca d'Italia, Assemblea Generale dei Partecipanti 1986, pag.167
1987	- D.P.R. del 06.02.1987, n.17 e D.P.R. 13.02.1987, n.24 - Legge 09.10.1987, n.417 (Rinnova delega al governo)	Goods and Services	Aumento imposta di fabbricazione su prodotti petroliferi (Gasolio e Benzina)	- Relazione Generale sulla Situazione Economica del Paese (1987), Volume Secondo, Pag.11
1987	- Legge 29.02.1988 n.48 che converte D.L. 30.12.1987, n.536	Personal Income Tax	Riduzione dei benefici contributivi (fiscalizzazione oneri sociali)	- Banca d'Italia, Assemblea Generale dei Partecipanti 1987, pag. 166
1987	- Legge 21.11.1987, n.477 che converte D.L. 24.09.1987, n. 391 che riprende D.L. 27.08.1987, n. 348	Corporate Tax	Aumento dal 92 al 98% acconti IRPEG per le persone giuridiche	- Relazione Generale sulla Situazione Economica del Paese (1987), Volume Secondo, Pag.11
1987	- Legge 21.11.1987, n.477 che converte D.L. 24.09.1987, n. 391 che riprende D.L. 27.08.1987, n. 348	Corporate Tax	Aumento dal 92 al 98% acconti ILOR per le persone giuridiche	- Relazione Generale sulla Situazione Economica del Paese (1987), Volume Secondo, Pag.11
1987	- Legge 21.11.1987, n.477 che converte D.L. 24.09.1987, n. 391 che riprende D.L. 27.08.1987, n. 348	Property Tax Private	Aumento dal 90 al 100% per l'imposta sostitutiva sugli interessi dei depositi bancari	- Relazione Generale sulla Situazione Economica del Paese (1987), Volume Secondo, Pag.11
1987	- Legge 21.11.1987, n.477 che converte D.L. 24.09.1987, n. 391 che riprende D.L. 27.08.1987, n. 348	Goods and Services	Increase in Oil Product's excises	- Relazione Generale sulla Situazione Economica del Paese (1987), Volume Secondo, Pag.11
1987	- Legge 21.11.1987, n.477 che converte D.L. 24.09.1987, n. 391 che riprende D.L. 27.08.1987, n. 348	Goods and Services	Addizionale temporanea IVA del 4 per cento su alcuni beni di consumo durevole (autovetture a uso privato, mobili, elettrodomestici), ridotto al 2 per cento per i beni già soggetti all' imposta erariale sul consumo (apparecchi audiovisivi e cine-foto-ottici)	- Relazione Generale sulla Situazione Economica del Paese (1987), Volume Secondo, Pag.11
1987	- Legge 21.11.1987, n.477 che converte D.L. 24.09.1987, n. 391 che riprende D.L. 27.08.1987, n. 348	Property Tax Private	Anticipo dell'innalzamento dal 6,25 al 12,50 % della ritenuta sugli interessi e sugli altri proventi dei titoli pubblici al 31 agosto	- Banca d'Italia, Assemblea Generale dei Partecipanti 1987, pag.162
1987	- D.M. 17.12.1986 - D.M. 05.10.1987	Goods and Services	Aumento dell'imposta di consumo dei tabacchi	- Relazione Generale sulla Situazione Economica del Paese (1987), Volume Secondo, Pag.11
1987		Investment	Diminuzione dei conferimenti ai fondi di dotazione dell'ENEL e delle Partecipazioni statali	- Banca d'Italia, Assemblea Generale dei Partecipanti 1987, pag. 159

Table 6 continued from previous page

1988	- Legge 11.03.1988, n.67 (Finanziaria 1988)	Property Tax Private	Aumento del 25 al 30% delle ritenute sugli interessi dei depositi bancari e postali e aumento dal 45 al 60% della percentuale di acconto	- Relazione Generale sulla Situazione Economica del Paese (1988), Volume Secondo, Pag.10
1988	- Legge 11.03.1988, n.67 (Finanziaria 1988)	Goods and Services	Indetraibilità dell'IVA relativa all'acquisto di autovetture e carburante fino al 31/12/90	- Relazione Generale sulla Situazione Economica del Paese (1988), Volume Secondo, Pag.10
1988	- Legge 11.03.1988, n.67 (Finanziaria 1988)	Corporate Tax	Estensione aumento acconti IRPEG e ILOR delle persone giuridiche dal 92 al 98% fino al 1990	- Relazione Generale sulla Situazione Economica del Paese (1988), Volume Secondo, Pag.10
1988	- Legge 11.03.1988, n.67 (Finanziaria 1988)	Goods and Services	Aumento di altre imposte su affari e sulla produzione	- Relazione Generale sulla Situazione Economica del Paese (1988), Volume Secondo, Pag.10
1988	- Legge 11.03.1988, n.67 (Finanziaria 1988)	Personal Income Tax	Riduzione dei contributi sociali di malattia	- Relazione Generale sulla Situazione Economica del Paese (1988), Volume Secondo, Pag.10
1988	- Legge 13.05.1988, n.154, converte D.L. del 14.03.1988, n.70	Personal Income Tax	Aumento detrazioni IRPEF	- Relazione Generale sulla Situazione Economica del Paese (1988), Volume Secondo, Pag.10
1988	- Legge 13.03.1988, n.68 che converte il D.L. 12.01.1988, n.2	Not Yet Classified Taxes	Estensione Condono Edilizio	- Relazione Generale sulla Situazione Economica del Paese (1988), Volume Secondo, Pag.12
1988	- Legge 26.07.1988, n.291 che converte D.L. 30.05.1988, n.173	Personal Income Tax	Elevazione percentuale di acconto IRPEF e ILOR delle persone fisiche dal 92 al 95%	- Relazione Generale sulla Situazione Economica del Paese (1988), Volume Secondo, Pag.10
1988	- Legge 26.07.1988, n.291 che converte D.L. 30.05.1988, n.173	Goods and Services	Anticipo versamenti IVA dal 5 del secondo mese al 22 del mese successivo a quello di riferimento	- Relazione Generale sulla Situazione Economica del Paese (1988), Volume Secondo, Pag.10
1988	- Legge 26.07.1988, n.291 che converte D.L. 30.05.1988, n.173	Goods and Services	Aumento delle concessione governative in materia di iscrizione nel registro delle imprese e di quelle annuali	- Relazione Generale sulla Situazione Economica del Paese (1988), Volume Secondo, Pag.10
1988	- D.L. 30.07.1988, n. 303 - D.L. 30.07.1988, n. 304 - D.L. 30.07.1988, n. 307	Goods and Services	Aumento dell'aliquota ordinaria IVA dal 18 al 19% e delle imposte di fabbricazione sul gas metano e sui prodotti petroliferi	- Banca d'Italia, Assemblea Generale dei Partecipanti 1988, pag. 143
1988	- D.L.30.07.1988, n. 303 - Legge 09.10.1987, n.417	Goods and Services	Increase in Oil Product's excises	- Relazione Generale sulla Situazione Economica del Paese (1988), Volume Secondo, Pag.10
1988	- D.M. 05.10.87	Goods and Services	Aumento imosta di consumo sui tabacchi	- Relazione Generale sulla Situazione Economica del Paese (1988), Volume Secondo, Pag.10

Table 6 continued from previous page

1989	- Legge 24.12.1988, n. 541 (Legge Finanziaria 1989)	Goods and Services	Diminuzione quota forfettaria dell'aliquota IVA per la zootecnica dal 14 al 10%	- Relazione Generale sulla Situazione Economica del Paese (1989), Volume Secondo, Pag.11
1989	- Legge 01.02.1989, n.37	Transfers	Blocco del prezzo dei farmaci, revisione del prontuario, introduzione del tickets per la diagnostica e la specialistica, inasprimento disciplina delle esenzioni dalla partecipazione alla spesa sanitaria.	- Relazione Previsionale e Programmatica per il 1990, Volume Primo, Pag.139
1989	- Legge 25.01.1990, n.8 che ha convertito con modificazioni il D.L. 25.11.1989, n. 382, il quale aveva riproposto alcune norme contenute nei decreti legge non convertiti 25.09.1989,n. 329, 28.07.1989, n. 265, 29.05.1989, n. 199, 27.04.1989, n. 152, e 25.03.1989, n. 111	Other Spending	Riordino delle Unità Sanitarie Locali e loro inserimento nella lista degli enti soggetti alla "Tesoreria Unica	- Relazione Previsionale e Programmatica per il 1990, Volume Primo, Pag.139
1989	- D.L.28.03.1989, n. 112, Norme riproposte con D.L. 29.05.1989, n. 200, D.L. 28.07.1989, n. 266, D.L. 25.09.1989, n. 330, D.L. 25.11.1989, n. 383	Not Yet Classified Taxes	Norme in materia di accertamenti dei redditi dei fabbricati e per la presentazione di dichiarazioni sostitutive ("Condono Immobiliare")	- Relazione Generale sulla Situazione Economica del Paese (1989), Volume Secondo, Pag.11
1989	- Legge 27.04.1989, n.154 che converte D.L. 02.03 1989, n.69	Personal Income Tax	Modifiche apportate alle aliquote di scaglione, agli scaglioni ed alle detrazioni dell'IRPEF	- Relazione Generale sulla Situazione Economica del Paese (1989), Volume Secondo, Pag.11
1989	- Legge 27.04.1989, n.154 che converte D.L. 02.03 1989, n.69	Not Yet Classified Taxes	Presentazione di dichiarazioni sostitutive e sanatoria delle irregolarità formali e minori infrazioni da parte dei lavoratori autonomi	- Relazione Generale sulla Situazione Economica del Paese (1989), Volume Secondo, Pag.11
1989	- Legge 27.04.1989, n.154 che converte D.L. 02.03 1989, n.69	Not Yet Classified Taxes	Aumento della ritenuta d'acconto sui redditi da lavoro autonomo dal 18 al 19% e dell'aliquota ridotta dell'IVA dal 2 al 4%	- Relazione Generale sulla Situazione Economica del Paese (1989), Volume Secondo, Pag.11
1989	- Legge 27.04.1989, n.154 che converte D.L. 02.03 1989, n.69	Not Yet Classified Taxes	Norme in materia di antielusione e di determinazione forfettaria del reddito e dell' IVA	- Relazione Generale sulla Situazione Economica del Paese (1989), Volume Secondo, Pag.11
1989	- Legge 27.04.1989, n. 154 che converte D.L. 02.03 1989, n.69	Goods and Services	Istituzione di una tassa di concessione governativa sull'attribuzione del numero di partita IVA	- Relazione Generale sulla Situazione Economica del Paese (1989), Volume Secondo, Pag.11
1989	- DM 11.11.1988	Goods and Services	Aumento imposta di consumo dei tabacchi	- Relazione Generale sulla Situazione Economica del Paese (1989), Volume Secondo, Pag.12

Table 6 continued from previous page

1989	- Legge 27.11.1989, n. 384 che converte D.L. 30.09.1989, n. 332	Goods and Services	Aumento dell'imposta di fabbricazione sui prodotti petroliferi (benzina, gasolio, oli combustibili, lubrificanti), l'energia elettrica, le imposte di registro, ipotecarie, catastali, di registrazione e di trascrizione dei veicoli	- Relazione Generale sulla Situazione Economica del Paese (1989), Volume Secondo, Pag.12
1989	- Legge 24.04.1989, n. 144 che converte D.L. 02.03.1989, n.66	Personal Income Tax	Istituzione Imposta Comunale per l'esercizio di imprese e di arti e professioni (ICIAP)	- Banca d'Italia, Assemblea Generale dei Partecipanti 1989, pag. 173
1989	- D.P.C.M. 09.12.1988, n.525	Personal Income Tax	Aumento aliquota contributiva dello 0,41% per il FPLD e del contibuto capitario aggiuntivo dovuto da coltivatori diretti, mezzadri e coloni	- Relazione Generale sulla Situazione Economica del Paese (1989), Volume Secondo, Pag.54
1989	- Legge 29.12.1988, n.544 - D.L. 27.07.1989, n.260	Other Spending	Reclutamento del personale fissato entro il limite del 25 (10) % del turn-over.	- Relazione Previsionale e Programmatica per il 1990, Volume Primo, Pag.139
1989	- Legge 07.12.1989, n.389 che converte D.L. 09.10.1989, n. 338, il quale aveva riproposto alcune delle norme contenute nei DD.LL. non convertiti 05.08.1989, n. 279; 29.05.1989, n. 196; 28.03.1989, n. 110; 30.12.1988, n. 548	Personal Income Tax	Diminuzione Fiscalizzazione contibuti di malattia e sgravio degli oneri sociali a favore delle imprese operanti nel Mezzogiorno	- Relazione Previsionale e Programmatica per il 1990, Volume Primo, Pag.139
1989	- D.L. 28.03.1989, n. 112, norme riproposte con D.L. 29.05.1989, n. 201	NYC Tax	Riversamento da parte degli istituti di credito speciale delle somme non ancora utilizzate a fronte di mutui concessi agli enti locali	Banca d'Italia, Assemblea Generale dei Partecipanti 1989, pag. 156
1989	- Legge 05.05.1989, n.160 - D.L. 28.07.1989, n.160	Other Spending	Razionalizzazione dei servizi e adeguamenti tariffari dei trasporti locali. Aumento Tariffe Ferroviarie	- Relazione Previsionale e Programmatica per il 1990, Volume Primo, Pag.139
1989	- D.L. 28.07.1989, n.262	Consumption	Riduzione del 2 % delle spese per acquisto di beni e servizi dello Stato e degli enti pubblici	- Relazione Previsionale e Programmatica per il 1990, Volume Primo, Pag.139
1989	Legge 24.04.1989, n. 144 che converte D.L. 02.03.1989, n.66	Other Spending	Minore dotazione assegnata al Fondo ordinario per la finanza locale	- Relazione Generale sulla Situazione Economica del Paese (1989), Volume Secondo, Pag.17
1990	- Legge 27.11.1989, n. 384 che ha convertito con modifiche il D.L. 30.09.1989, n.332	Goods and Services	Aumento imposta fissa di registro	- Relazione Previsionale e Programmatica per il 1991, Volume Primo, Pag.137
1990	- Legge 27.11.1989, n. 384 che ha convertito con modifiche il D.L. 30.09.1989, n.332	Goods and Services	Aumento del 20 per cento delle tasse di concessione governativa diverse dai canoni di abbonamento RAI	- Relazione Previsionale e Programmatica per il 1991, Volume Primo, Pag.137

Table 6 continued from previous page

1990	- Legge 27.11.1989, n. 384 che ha convertito con modifiche il D.L. 30.09.1989, n.332	Goods and Services	Aumento della tassa di iscrizione delle società nel registro delle imprese (diritto camerale)	- Relazione Previsionale e Programmatica per il 1991, Volume Primo, Pag.137
1990	- Legge 27.11.1989, n. 384 che ha convertito con modifiche il D.L. 30.09.1989, n.332	Goods and Services	Aumento imposta di registrazione e trascrizione deli autoveicoli	- Relazione Previsionale e Programmatica per il 1991, Volume Primo, Pag.137
1990	- Legge 27.11.1989, n. 384 che ha convertito con modifiche il D.L. 30.09.1989, n.332	Goods and Services	Aumento imposte ipotecarie e catastali	- Relazione Previsionale e Programmatica per il 1991, Volume Primo, Pag.137
1990	- Legge 27.11.1989, n. 384 che ha convertito con modifiche il D.L. 30.09.1989, n.332	Goods and Services	Aumento tassa lotterie e premi	- Relazione Previsionale e Programmatica per il 1991, Volume Primo, Pag.137
1990	- Legge 27.11.1989, n. 384 che ha convertito con modifiche il D.L. 30.09.1989, n.332	Goods and Services	Aumento tassa erariale automobilistica	- Relazione Previsionale e Programmatica per il 1991, Volume Primo, Pag.137
1990	- Legge 27.11.1989, n. 384 che ha convertito con modifiche il D.L. 30.09.1989, n.332	Goods and Services	Introduzione addizionale erariale sul consumo di energia elettrica	- Relazione Previsionale e Programmatica per il 1991, Volume Primo, Pag.137
1990	- Legge 27.11.1989, n. 384 che ha convertito con modifiche il D.L. 30.09.1989, n.332	Goods and Services	Increase in Oil Product's excises	- Relazione Generale sulla Situazione Economica del Paese (1990), Volume Secondo, Pag.13
1990	- Legge 28.02.1990, n. 38 che converte D.L. 28.12.1989, n. 415	Goods and Services	Aumento componente regionale della tassa di circolazione	- Relazione Previsionale e Programmatica per il 1991, Volume Primo, Pag.137
1990	- D.M. 18.11.1989	Property Tax Private	Aumento coefficienti moltiplicativi del reddito catastale	- Relazione Previsionale e Programmatica per il 1991, Volume Primo, Pag.137
1990	- DD.MM. 16.01.1990 e 19.12.1990	Goods and Services	Aumento tariffe vendita di tabacchi	- Relazione Previsionale e Programmatica per il 1991, Volume Primo, Pag.137
1990	- D.P.C.M. 18.05.1990	Goods and Services	Aumento imposte di bollo e concessioni governative sulle rivendite di tabacchi	- Relazione Previsionale e Programmatica per il 1991, Volume Primo, Pag.138
1990	- Legge 26.06.1990, n. 165, converte con modificazioni D.L. 27.04.1990, n. 90, che ripropone D.L. 01.03.1990, n. 40 e D.L. 28.12.1989, n. 414 (D.P.C.M. 18.05.1990, D.P.C.M. 21.12.1990)	Goods and Services	Le aziende e gli istituti di credito sono tenuti a effettuare, in luogo dell'unico versamento annuale, due versamenti semestrali dell'imposta sostitutiva delle imposte di registro, di bollo, ipotecarie e catastali e delle tasse di concessione governative cui sono assoggettatele operazioni di credito a medio e a lungo termine	- Relazione Previsionale e Programmatica per il 1991, Volume Primo, Pag.137

Table 6 continued from previous page

1990	- Legge 26.06.1990, n. 165, converte con modificazioni D.L. 27.04.1990, n. 90, che ripropone D.L. 01.03.1990, n. 40 e D.L. 28.12.1989, n. 414 (D.P.C.M. 18.05.1990, D.P.C.M. 21.12.1990)	Goods and Services	Istituzione imposta su diritti aereoportuali di approdo e partenza degli aerei	- Relazione Previsionale e Programmatica per il 1991, Volume Primo, Pag.137
1990	- Legge 26.06.1990, n. 165, converte con modificazioni D.L. 27.04.1990, n. 90, che ripropone D.L. 01.03.1990, n. 40 e D.L. 28.12.1989, n. 414 (D.P.C.M. 18.05.1990, D.P.C.M. 21.12.1990)	Goods and Services	Aumento addizionale erariale sul consumo di energia elettrica	- Banca d'Italia, Assemblea Generale dei Partecipanti 1990, pag. 146
1990	- Legge 26.06.1990, n. 165, converte con modificazioni D.L. 27.04.1990, n. 90, che ripropone D.L. 01.03.1990, n. 40 e D.L. 28.12.1989, n. 414 (D.P.C.M.18.05.1990, D.P.C.M. 21.12.1990)	Personal Income Tax	Indetraibilità oneri contributivi in agricoltura e limitazione deducibilità interessi passivi	- Relazione Previsionale e Programmatica per il 1991, Volume Primo, Pag.138
1990	- Legge 26.06.1990, n. 165, converte con modificazioni D.L. 27.04.1990, n. 90, che ripropone D.L. 01.03.1990, n. 40 e D.L. 28.12.1989, n. 414 (D.P.C.M.18.05.1990, D.P.C.M. 21.12.1990)	Personal Income Tax	Limitazione regime sugli ammortamenti anticipati	- Relazione Previsionale e Programmatica per il 1991, Volume Primo, Pag.138
1990	- Legge 26.06.1990, n. 165, converte con modificazioni D.L. 27.04.1990, n. 90, che ripropone D.L. 01.03.1990, n. 40 e D.L. 28.12.1989, n. 414 (D.P.C.M. 18.05.1990, D.P.C.M. 21.12.1990)	Goods and Services	Limitazioni rimborsi IVA	- Relazione Previsionale e Programmatica per il 1991, Volume Primo, Pag.138
1990	- Legge 26.06.1990, n. 165, converte con modificazioni D.L. 27.04.1990, n. 90, che ripropone D.L. 01.03.1990, n. 40 e D.L. 28.12.1989, n. 414 (D.P.C.M. 18.05.1990, D.P.C.M. 21.12.1990)	Property Tax Private	Determinazione reddito dominicale per colture in serra e funghicolture	- Relazione Previsionale e Programmatica per il 1991, Volume Primo, Pag.138

Table 6 continued from previous page

1990	- Legge 12.11.1990, n. 331, converte D.L. 15.09.1990, n. 261, che ripropone D.L. 21.07.1990, n. 192 che ha riproposto con modifiche la manovra aggiuntiva varata a maggio con il D.L. 22.05.1990, n. 120	Goods and Services	Aumento aliquota oli lubrificanti e combustibili	- Relazione Previsionale e Programmatica per il 1991, Volume Primo, Pag.138
1990	- Legge 12.11.1990, n. 331, converte D.L. 15.09.1990, n. 261, che ripropone D.L. 21.07.1990, n. 192 che ha riproposto con modifiche la manovra aggiuntiva varata a maggio con il D.L. 22.05.1990, n. 120	Goods and Services	Introdotto un limite massimo al quantitativo di prodotti petroliferi in esenzione d'imposta ottenibile annualmente dalle aziende agricole	- Relazione Previsionale e Programmatica per il 1991, Volume Primo, Pag.138
1990	- Legge 12.11.1990, n. 331, converte D.L. 15.09.1990, n. 261, che ripropone D.L. 21.07.1990, n. 192 che ha riproposto con modifiche la manovra aggiuntiva varata a maggio con il D.L. 22.05.1990, n. 120	Goods and Services	Aumento aliquota dell'imposta di consumo sul GPL per autotrazione e per usi domestici	- Relazione Previsionale e Programmatica per il 1991, Volume Primo, Pag.138
1990	- Legge 12.11.1990, n. 331, converte D.L. 15.09.1990, n. 261, che ripropone D.L. 21.07.1990, n. 192 che ha riproposto con modifiche la manovra aggiuntiva varata a maggio con il D.L. 22.05.1990, n. 120	Goods and Services	Aumento aliquota gravante sui consumi di gas metano usato come combustibile e assoggettamento all'imposta di categorie di consumo precedentemente esenti (domestici nelle aree del Mezzogiorno e industriali esclusi consumi finalizzati alla produzione di energia elettrica)	- Relazione Previsionale e Programmatica per il 1991, Volume Primo, Pag.138
1990	- Legge 12.11.1990, n. 331, converte D.L. 15.09.1990, n. 261, che ripropone D.L. 21.07.1990, n. 192 che ha riproposto con modifiche la manovra aggiuntiva varata a maggio con il D.L. 22.05.1990, n. 120	Goods and Services	Aumento dal 9 al 19% dell'aliquota dell'IVA sulla birra e sull'acqua minerale	- Relazione Previsionale e Programmatica per il 1991, Volume Primo, Pag.138
1990	- Legge 12.11.1990, n. 331, converte D.L. 15.09.1990, n. 261, che ripropone D.L. 21.07.1990, n. 192 che ha riproposto con modifiche la manovra aggiuntiva varata a maggio con il D.L. 22.05.1990, n. 120	Goods and Services	Aumento dell'imposta di fabbricazione sugli spiriti	- Relazione Previsionale e Programmatica per il 1991, Volume Primo, Pag.138
1990	- D.L.15.09.1990, n. 261	Not Yet Classified Taxes	Prima rata condono introdotto nel settembre 1990	- Banca d'Italia, Assemblea Generale dei Partecipanti 1990, pag. 151

Table 6 continued from previous page

1990	- Legge 28.02.1990, n. 38 - Legge 14.06.1990, n.158 (Contenimento spesa regionale)	Other Spending	Erogazioni nette per le Regioni	- Banca d'Italia, Assemblea Generale dei Partecipanti 1990, pag.156
1990	- Legge 21.03.1990, n.52 che converte D.L. 20.01.1990, n. 3 - Legge 03.08.1990, n.210 che converte D.L. 04.06.1990, n.129	Personal Income Tax	Diminuzione Fiscalizzazione degli oneri sociali	- Relazione Generale sulla Situazione Economica del Paese (1990), Volume Secondo, Pag.14

Table 7: Fiscal Shocks Decomposition (trillion of Italian Liras)

Year	Components	Measure	Type	Impact t	Impact t+1	Impact t+2	Impact t+3	Impact t+4	Impact t+5
1986	Goods and Services	Increase in Oil Product's excises	Change	5,20	0,00	0,00	0,00	0,00	0,00
1986	Personal Income Tax	Increase in Social Security tax rate, decrease in social security contribution's fiscalization, acceleration in social secuirty contribution's collection	Change	4,50	0,00	0,00	0,00	0,00	0,00
1986	Not Yet Classified Taxes	Revision of IRPEF tax base for some groups of taxpayers and flat-rate IVA's deduction	Change	2,00	0,00	0,00	0,00	0,00	0,00
1986	Property Tax Private	Revisione regime fiscale dei titoli pubblici (ritenuta di acconto del 6,25% e del 12,50 % per titoli emessi dopo il 30/09/1987	Change	0,32	0,00	0,00	0,00	0,00	0,00
1986	Personal Income Tax	Revision of IRPEF structure	Change	-5,40	-2,18	-1,22	0,00	0,00	0,00
1986	Not Yet Classified Taxes	Mandatory cash excesses deposit by Special Credit Institution in the State's Treasury	Change	1,20	-1,20	0,00	0,00	0,00	0,00
1986	Not Yet Classified Taxes	Mandatory cash excesses deposit by Regions and Special Provinces in the State's Treasury	Change	3,54	1,34	0,00	0,00	0,00	0,00
1986	Not Yet Classified Taxes	Mandatory cash excesses deposit in the State's Treasury by public bodies specified in Table A of Law n.720 of 1984 in the State's Treasury	Change	0,60	-0,60	0,00	0,00	0,00	0,00
1986	Not Yet Classified Taxes	Amnesty on buildings irregularities	Change	4,22	-3,08	0,00	0,00	0,00	0,00
1986	Salaries	Rinvio nella definizione dei contratti di lavoro del comparto pubblico	Change	2,00	-2,00	0,00	0,00	0,00	0,00
1986	Transfers	Modifiche apportate alla periodicità della scala mobile, l'introduzione di limiti di reddito piú stringenti per gli assegni familiari, la decurtazione delle indennità per l'integrazione guadagni e, infine, l'inasprimento dei tickets sulle prestazioni sanitarie	Change	2,50	0,00	0,00	0,00	0,00	0,00
1987	Goods and Services	Aumento imposta di fabbricazione su prodotti petroliferi (Gasolio e Benzina)	Change	1,71	0,00	0,00	0,00	0,00	0,00
1987	Personal Income Tax	Riduzione dei benefici contributivi (fiscalizzazione oneri sociali)	Change	1,00	0,00	0,00	0,00	0,00	0,00
1987	Corporate Tax	Aumento dal 92 al 98% acconti IRPEG per le persone giuridiche	Change	0,70	0,00	0,00	0,00	0,00	0,00

1987	Corporate Tax	Aumento dal 92 al 98% acconti ILOR per le persone giuridiche	Change	0,50	0,00	0,00	0,00	0,00	0,00
1987	Property Tax Private	Aumento dal 90 al 100% per l'imposta sostitutiva sugli interessi dei depositi bancari	Change	1,20	0,00	0,00	0,00	0,00	0,00
1987	Goods and Services	Increase in Oil Product's excises	Change	0,57	0,00	0,00	0,00	0,00	0,00
1987	Goods and Services	Addizionale temporanea IVA del 4 per cento su alcuni beni di consumo durevole (autovetture a uso privato, mobili, elettrodomestici), ridotto al 2 per cento per i beni già soggetti all' imposta erariale sul consumo (apparecchi audiovisivi e cine-foto-ottici)	Change	0,27	-0,27	0,00	0,00	0,00	0,00
1987	Property Tax Private	Anticipo dell'innalzamento dal 6,25 al 12,50 % della ritenuta sugli interessi e sugli altri proventi dei titoli pubblici al 31 agosto	Change	1,49	0,00	0,00	0,00	0,00	0,00
1987	Goods and Services	Aumento dell'imposta di consumo dei tabacchi	Change	0,60	0,00	0,00	0,00	0,00	0,00
1987	Investment	Diminuzione dei conferimenti ai fondi di dotazione dell'ENEL e delle Partecipazioni statali	Change	1,57	0,00	0,00	0,00	0,00	0,00
1988	Property Tax Private	Aumento del 25 al 30% delle ritenute sugli interessi dei depositi bancari e postali e aumento dal 45 al 60% della percentuale di acconto	Change	2,20	0,00	0,00	0,00	0,00	0,00
1988	Goods and Services	Indetraibilità dell'IVA relativa all'acquisto di autovetture e carburante fino al 31/12/90	Change	1,20	0,00	0,00	0,00	0,00	0,00
1988	Corporate Tax	Estensione aumento acconti IRPEG e ILOR delle persone giuridiche dal 92 al 98% fino al 1990	Change	1,60	0,00	0,00	0,00	0,00	0,00
1988	Goods and Services	Aumento di altre imposte su affari e sulla produzione	Change	2,20	0,00	0,00	0,00	0,00	0,00
1988	Personal Income Tax	Riduzione dei contributi sociali di malattia	Change	-2,00	0,00	0,00	0,00	0,00	0,00
1988	Personal Income Tax	Aumento detrazioni IRPEF	Change	-1,10	0,00	0,00	0,00	0,00	0,00
1988	Not Yet Classified Taxes	Estensione Condono Edilizio	Change	-0,86	0,00	0,00	0,00	0,00	0,00
1988	Personal Income Tax	Elevazione percentuale di acconto IRPEF e ILOR delle persone fisiche dal 92 al 95%	Change	0,48	0,00	0,00	0,00	0,00	0,00
1988	Goods and Services	Anticipo versamenti IVA dal 5 del secondo mese al 22 del mese successivo a quello di riferimento	Change	2,25	-2,25	0,00	0,00	0,00	0,00

1988	Goods and Services	Aumento delle concessione governative in materia di iscrizione nel registro delle imprese e di quelle annuali	Change	1,06	0,00	0,00	0,00	0,00	0,00
1988	Goods and Services	Aumento dell'aliquota ordinaria IVA dal 18 al 19% e delle imposte di fabbricazione sul gas metano e sui prodotti petroliferi	Change	1,70	0,80	0,00	0,00	0,00	0,00
1988	Goods and Services	Increase in Oil Product's excises	Change	0,46	0,00	0,00	0,00	0,00	0,00
1988	Goods and Services	Aumento imosta di consumo sui tabacchi	Change	0,36	0,00	0,00	0,00	0,00	0,00
1989	Goods and Services	Diminuzione quota forfettaria dell'aliquota IVA per la zootecnica dal 14 al 10%	Change	0,56	0,00	0,00	0,00	0,00	0,00
1989	Transfers	Blocco del prezzo dei farmaci, revisione del prontuario, introduzione del tickets per la diagnostica e la specialistica, inasprimento disciplina delle esenzione dalla partecipazione alla spesa sanitaria	Change	5,00	0,00	0,00	0,00	0,00	0,00
1989	Other Spending	Riordino delle Unità Sanitarie Locali e loro inserimento nella lista degli enti soggetti alla "Tesoreria Unica"	Change	2,60	0,00	0,00	0,00	0,00	0,00
1989	Not Yet Classified Taxes	Norme in materia di accertamenti dei redditi dei fabbricati e per la presentazione di dichiarazioni sostitutive ("Condono Immobiliare")	Change	0,14	0,00	0,00	0,00	0,00	0,00
1989	Personal Income Tax	Modifiche apportate alle aliquote di scaglione, agli scaglioni ed alle detrazioni dell'IRPEF	Change	-5,95	-2,50	0,00	0,00	0,00	0,00
1989	Not Yet Classified Taxes	Presentazione di dichiarazioni sostitutive e sanatoria delle irregolarità formali e minori infrazioni da parte dei lavoratori autonomi	Change	0,76	0,00	0,00	0,00	0,00	0,00
1989	Not Yet Classified Taxes	Aumento della ritenuta d'acconto sui redditi da lavoro autonomo dal 18 al 19% e dell'aliquota ridotta dell'IVA dal 2 al 4%	Change	2,40	0,00	0,00	0,00	0,00	0,00
1989	Not Yet Classified Taxes	Norme in materia di antielusione e di determinazione forfettaria del reddito e dell' IVA	Change	2,10	0,00	0,00	0,00	0,00	0,00
1989	Goods and Services	Istituzione di una tassa di concessione governativa sull'attribuzione del numero di partita IVA	Change	0,80	0,00	0,00	0,00	0,00	0,00
1989	Goods and Services	Aumento imposta di consumo dei tabacchi	Change	0,30	0,00	0,00	0,00	0,00	0,00

1989	Goods and Services	Aumento dell'imposta di fabbricazione sui prodotti petroliferi (benzina, gasolio, oli combustibili, lubrificanti), l'energia elettrica, le imposte di registro, ipotecarie, catastali, di registrazione e di trascrizione dei veicoli	Change	0,70	0,00	0,00	0,00	0,00	0,00
1989	Personal Income Tax	Istituzione Imposta Comunale per l'esercizio di imprese e di arti e professioni (ICIAP)	Change	1,90	0,00	0,00	0,00	0,00	0,00
1989	Personal Income Tax	Aumento aliquota contributiva dello 0,41% per il FPLD e del contibuto capitario aggiuntivo dovuto da coltivatori diretti, mezzadri e coloni	Change	1,00	0,00	0,00	0,00	0,00	0,00
1989	Other Spending	Reclutamento del personale fissato entro il limite del 25 (10) % del turn-over	Change	0,70	0,00	0,00	0,00	0,00	0,00
1989	Personal Income Tax	Diminuzione Fiscalizzazione contibuti di malattia e sgravio degli oneri sociali a favore delle imprese operanti nel Mezzogiorno	Change	3,50	0,00	0,00	0,00	0,00	0,00
1989	NYC Tax	Riversamento da parte degli istituti di credito speciale delle somme non ancora utilizzate a fronte di mutui concessi agli enti locali	Change	2,00	0,00	0,00	0,00	0,00	0,00
1989	Other Spending	Razionalizzazione dei servizi e adeguamenti tariffari dei trasporti locali. Aumento Tariffe Ferroviarie	Change	0,60	0,00	0,00	0,00	0,00	0,00
1989	Consumption	Riduzione del 2 % delle spese per acquisto di beni e servizi dello Stato e degli enti pubblici	Change	0,40	0,00	0,00	0,00	0,00	0,00
1989	Other Spending	Minore dotazione assegnata al Fondo ordinario per la finanza locale	Change	1,00	0,00	0,00	0,00	0,00	0,00
1990	Goods and Services	Aumento imposta fissa di registro	Change	0,15	0,00	0,00	0,00	0,00	0,00
1990	Goods and Services	Aumento del 20 per cento delle tasse di concessione governativa diverse dai canoni di abbonamento RAI	Change	0,30	0,00	0,00	0,00	0,00	0,00
1990	Goods and Services	Aumento della tassa di iscrizione delle società nel registro delle imprese (diritto camerale)	Change	0,20	0,00	0,00	0,00	0,00	0,00
1990	Goods and Services	Aumento imposta di registrazione e trascrizione deli autoveicoli	Change	0,25	0,00	0,00	0,00	0,00	0,00
1990	Goods and Services	Aumento imposte ipotecarie e catastali	Change	0,10	0,00	0,00	0,00	0,00	0,00
1990	Goods and Services	Aumento tassa lotterie e premi	Change	0,30	0,00	0,00	0,00	0,00	0,00
1990	Goods and Services	Aumento tassa erariale automobilistica	Change	0,70	0,00	0,00	0,00	0,00	0,00

1990	Goods and Services	Introduzione addizionale erariale sul consumo di energia elettrica	Change	1,45	0,00	0,00	0,00	0,00	0,00
1990	Goods and Services	Increase in Oil Product's excises	Change	1,60	0,00	0,00	0,00	0,00	0,00
1990	Goods and Services	Aumento componente regionale della tassa di circolazione	Change	0,90	0,00	0,00	0,00	0,00	0,00
1990	Property Tax Private	Aumento coefficienti moltiplicativi del reddito catastale	Change	0,67	0,00	0,00	0,00	0,00	0,00
1990	Goods and Services	Aumento tariffe vendita di tabacchi	Change	0,31	0,00	0,00	0,00	0,00	0,00
1990	Goods and Services	Aumento imposte di bollo e concessioni governative sulle rivendite di tabacchi	Change	0,25	0,00	0,00	0,00	0,00	0,00
1990	Goods and Services	Le aziende e gli istituti di credito sono tenuti a effettuare, in luogo dell'unico versamento annuale, due versamenti semestrali dell'imposta sostitutiva delle imposte di registro, di bollo, ipotecarie e catastali e delle tasse di concessione governative cui sono assoggettate le operazioni di credito a medio e a lungo termine	Change	0,15	0,00	0,00	0,00	0,00	0,00
1990	Goods and Services	Istituzione imposta su diritti aereoportuali di approdo e partenza degli aerei	Change	0,04	0,00	0,00	0,00	0,00	0,00
1990	Goods and Services	Aumento addizionale erariale sul consumo di energia elettrica	Change	1,80	0,00	0,00	0,00	0,00	0,00
1990	Personal Income Tax	Indetraibilità oneri contributivi in agricoltura e limitazione deducibilità interessi passivi	Change	0,29	0,00	0,00	0,00	0,00	0,00
1990	Personal Income Tax	Limitazione regime sugli ammortamenti anticipati	Change	2,00	0,00	0,00	0,00	0,00	0,00
1990	Goods and Services	Limitazioni rimborsi IVA	Change	1,90	0,00	0,00	0,00	0,00	0,00
1990	Property Tax Private	Determinazione reddito dominicale per colture in serra e funghicolture	Change	0,13	0,00	0,00	0,00	0,00	0,00
1990	Goods and Services	Aumento aliquota oli lubrificanti e combustibili	Change	0,40	0,00	0,00	0,00	0,00	0,00
1990	Goods and Services	Introdotto un limite massimo al quantitativo di prodotti petroliferi in esenzione d'imposta ottenibile annualmente dalle aziende agricole	Change	0,14	0,00	0,00	0,00	0,00	0,00
1990	Goods and Services	Aumento aliquota dell'imposta di consumo sul GPL per autotrazione e per usi domestici	Change	0,15	0,00	0,00	0,00	0,00	0,00

1990	Goods and Services	Aumento aliquota gravante sui consumi di gas metano usato come combustibile e assoggettamento all'imposta di categorie di consumo precedentemente esenti (domestici nelle aree del Mezzogiorno e industriali esclusi consumi finalizzati alla produzione di energia elettrica)	Change	0,21	0,00	0,00	0,00	0,00	0,00
1990	Goods and Services	Aumento dal 9 al 19% dell'aliquota dell'IVA sulla birra e sull'acqua minerale	Change	0,06	0,00	0,00	0,00	0,00	0,00
1990	Goods and Services	Aumento dell'imposta di fabbricazione sugli spiriti	Change	0,06	0,00	0,00	0,00	0,00	0,00
1990	Not Yet Classified Taxes	Prima rata condono introdotto nel settembre 1990	Change	1,50	0,00	0,00	0,00	0,00	0,00
1990	Other Spending	Erogazioni nette per le Regioni	Change	2,00	0,00	0,00	0,00	0,00	0,00
1990	Personal Income Tax	Diminuzione Fiscalizzazione degli oneri sociali	Change	1,57	0,00	0,00	0,00	0,00	0,00

Matlab code

```matlab
clear; clc;
%% Import data from spreadsheet
% Script for importing data from the following spreadsheet:
%
%       Workbook: C:\Users\filof\OneDrive\Desktop\DatabaseTesi.xlsx
%       Worksheet: Sheet1
%
% Auto-generated by MATLAB on 22-Sep-2022 12:16:26

%% Set up the Import Options and import the data
opts = spreadsheetImportOptions("NumVariables", 61);

% Specify sheet and range
opts.Sheet = "Sheet1";
opts.DataRange = "A2:BI38";

% Specify column names and types
opts.VariableNames = ["Year", "r_sh", "r_lo", "popt", "ggfl", "
    gdp",...
    "debti","yrg", "oco", "sspg", "cgv", "RealGDP", "ggdeficit",
        "CPI",...
    "CC", "IC", "SMC","BC", "debt_new", "debta", "netint", "
        deficit",...
    "primary_def", "dis","receipts", "cap_transf_paid", ...
    "gov_cons_fixedcap", "captrans_gdp",...
    "govconscap_gdp", "currentdisb", "currentdisb_gdp", "igaa",
        "cgaa",...
    "costOfDebt", "rec_index", "ExogenousTax", "ExogenousSpend",
        ...
    "TotFiscalShock","TaxImpact", "SpendingImpact", ...
    "TotFiscalShockImpact", "EB", "TB", "u_tt", "a_tt", ...
    "a_t1t", "a_t2t", "a_t3t", "a_t4t", "a_t5t", "u_ts", "a_ts
        ",...
    "a_t1s", "a_t2s", "a_t3s", "a_t4s", "a_t5s", "TotUnexpected
        ",...
    "RealGDPgrowthWB","OverallEB", "OverallTB"];
opts.VariableTypes = ["datetime", "double", "double", "double",
    ...
    "double","double", "double", "double", "double", "double",
        ...
    "double", "double","double", "double", "double", "double",
        ...
    "double", "double", "double","double", "double", "double",
        ...
    "double", "double", "double", "double","double", "double
        ",...
    "double", "double", "double", "double", "double", ...
    "double", "double", "double", "double", "double", "double",
        ...
    "double", "double", "double", "double", "double", "double",
```

```matlab
                    ...
        "double", "double", "double", "double", "double", "double",
            ...
        "double", "double", "double","double", "double", "double
            ",...
        "double","double","double","double"];

% Specify variable properties
opts = setvaropts(opts, "Year", "InputFormat", "");

% Import the data
DatabaseTesi = readtable("C:\Users\filof\OneDrive\Desktop\" +
    ...
        "DatabaseTesi.xlsx", opts, "UseExcel", false);

%% Clear temporary variables
clear opts

%% Variable Creation

% Obtain relevant variables
DatabaseTesi=DatabaseTesi(9:37,:);

year=datetime(DatabaseTesi.Year);

ngdp=DatabaseTesi.gdp; % GDP value, market prices
% (OECD Economic Outlook, n.97)

realgdp=DatabaseTesi.RealGDP; %GDP (Constant Local Currency)—
% World Bank national accounts data,

debtgdp=DatabaseTesi.debti; % Debt over GDP
% (IMF Historical Public Debt Database)

unshock=DatabaseTesi.TotUnexpected;%Fiscal Consolidation
% Unexpected component

untax=DatabaseTesi.u_tt;%Tax Shock − Unexpected

unspending=DatabaseTesi.u_ts;%Spending Shock − Unexpected

fshockimp=DatabaseTesi.TotFiscalShockImpact; % Fiscal
    Consolidation
% Impact Vector

taxshockimp = DatabaseTesi.TaxImpact; %Tax Shock
% Impact Vector

spendshockimp=DatabaseTesi.SpendingImpact; %Spending Shock
    Impact Vector

fshock=DatabaseTesi.TotFiscalShock;% Fiscal Consolidation Vector
```

```matlab
taxshock = DatabaseTesi.ExogenousTax; %Tax Shock Vector

spendshock=DatabaseTesi.ExogenousSpend; %Spending Shock Vector

irst=DatabaseTesi.r_sh; %Short Term Interest Rate
% (OECD Economic Outlook, n.97)

irlt=DatabaseTesi.r_lo;%Long Term Interest Rate
% (OECD Economic Outlook, n.97)

cpi=DatabaseTesi.CPI; %Consumer Price Index − All items (IMF
    International
% Statistics database)

EB_dummy=DatabaseTesi.EB; %Dummy equal to 1 if Consolidation
% Plan is expenditure based

TB_dummy=DatabaseTesi.TB; %Dummy equal to 1 if Consolidation
    Plan is tax
%based

OverallEB=DatabaseTesi.OverallEB; %Vector of Overall Fiscal
    Consolidation
% s.t. EB_dummy=1

OverallTB=DatabaseTesi.OverallTB;%Vector of Overall Fiscal
    Consolidation
% s.t. TB_dummy=1

realgdpgrowthwb=DatabaseTesi.RealGDPgrowthWB; %Real GDP Growth
    Series −
% World Bank Database

T=timetable(year,ngdp, debtgdp, fshockimp,taxshockimp, ...
    spendshockimp, fshock,taxshock,spendshock,irst,irlt,cpi, ...
    'VariableNames',{'ngdp','debtgdp', 'fshockimp','taxshockimp'
        , ...
    'spendshockimp','fshock','taxshock','spendshock','irst','
        irlt', ...
    'cpi'});

infl=price2ret(cpi)*100;
lnngdp=log(ngdp);
gdpgrowth=diff(lnngdp)*100;
debtgdpgrowth=price2ret(debtgdp);
%% Time Series Ploth
figure(1)

subplot(2,3,1)
plot(year(2:end),infl, "black");
title('Inflation rate');
ylabel('% Change');
xlabel('Year');
```

```
hold on
plot([min(year) max(year)],[0 0],'r—');
grid on

subplot(2,3,2)
plot(year,debtgdp, "black");
title('Debt␣over␣GDP');
ylabel('%␣of␣GDP');
xlabel('Year');
grid on

subplot(2,3,3)
plot(year(2:end),debtgdpgrowth, "black");
title('Debt␣over␣GDP␣growth');
ylabel('%␣Change');
xlabel('Year');
hold on
plot([min(year) max(year)],[0 0],'r—');
grid on

subplot(2,3,4)
plot(year,realgdpgrowthwb, "black");
title('Real␣GDP␣growth');
ylabel('%␣Change');
xlabel('Year');
hold on
plot([min(year) max(year)],[0 0],'r—');
grid on

subplot(2,3,5)
plot(year,irst, "black");
title('Short␣Term␣Interest␣Rate');
ylabel('Value');
xlabel('Year');
hold on
plot([min(year) max(year)],[0 0],'r—');
grid on

subplot(2,3,6)
plot(year,irlt, "black");
title('Long␣Term␣Interest␣Rate');
ylabel('Value');
xlabel('Year');
hold on
plot([min(year) max(year)],[0 0],'r—');
grid on

%% Plot the shock variable
figure(2)
subplot(1,2,1)
stem(year,fshock,"black")
ylabel('%␣of␣GDP')
title("Fiscal Consolidation − Overall", 'Fontsize',16)
```

```matlab
grid on
hold on
plot ([min(year) max(year)],[0  0],'r—')
plot(year,fshock,"black",'LineWidth',1)

subplot(1,2,2)
plot(year,fshockimp,"black",'LineWidth',1)
ylabel('%_of_GDP')
hold on
plot(year, unshock,"k:",'LineWidth',0.7)
stem(year, fshockimp,"black")
grid on
stem(year, unshock,"k:",'LineWidth',0.7,'Marker', '.')
plot ([min(year) max(year)],[0  0],'r—')
legend('Fiscal_Consolidation_−_Impact',['Fiscal_Consolidation_−_
    ', ...
    'Unexpected'],'FontSize',16,'Orientation','vertical')
hold off

%% Analysis Time seris
%Stationarity Test
% Values of 1 indicate rejection of the unit−root null model in
    favor
% of the alternative model.
%Values of 0 indicate failure to reject the unit−root null model
[h1,pValueDF1,statDF1,cValueDF1] = adftest(realgdpgrowthwb,Lags
    =1, ...
    Model=["TS" "AR" "ARD"]);
[h2,pValueDF2,statDF2,cValueDF2] = adftest(debtgdp,Lags=1, ...
    Model=["TS" "AR" "ARD"]);
[h3,pValueDF3,statDF3,cValueDF3] = adftest(unshock,Lags=2, ...
    Model=["TS" "AR" "ARD"]);
[h4,pValueDF4,statDF4,cValueDF4] = adftest(fshock,Lags=2, ...
    Model=["TS" "AR" "ARD"]);
[h5,pValueDF5,statDF5,cValueDF5] = adftest(infl,Lags=1, ...
    Model=["TS" "AR" "ARD"]);
[h6,pValueDF6,statDF6,cValueDF6] = adftest(irst,Lags=1, ...
    Model=["TS" "AR" "ARD"]);
[h7,pValueDF7,statDF7,cValueDF7] = adftest(debtgdpgrowth,Lags=1,
    ...
    Model=["TS" "AR" "ARD"]);
[h8,pValueDF8,statDF8,cValueDF8] = adftest(irlt,Lags=1, ...
    Model=["TS" "AR" "ARD"]);

%Autocorrelation Test Shocks Series
[acf1,lags1,bounds1]= autocorr(fshock);
[acf2,lags2,bounds2]= autocorr(fshockimp);
[acf3,lags3,bounds3]= autocorr(unshock);

figure(15)
subplot(3,1,1)
autocorr(fshock)
title('Sample_Autocorrelation_Function_−_Overall')
```

```matlab
subplot(3,1,2)
autocorr(fshockimp)
title('Sample Autocorrelation Function - Impact')
subplot(3,1,3)
autocorr(unshock)
title('Sample Autocorrelation Function - Unexpected')
%% Local Projections - Debt/GDP

% The contemporaneous shock is
shock = fshock;

% Create a constant
const = ones(size(shock,1),1);

% The full RHS is given by
X0 = [const, shock];

% The dependent variable is Debt over GDP
y = debtgdp;

hor = 5;
N = size(y,2);
se = zeros(size(X0,2),hor,N);
reglin = zeros(size(X0,2),hor, N);

    for i=1:hor

        yy=y(i:end);
        % Compute the estimated parameters and Newey West
            corrected SE
        results=nwest(yy, X0(1:end-i+1,:),i);
        reglin(:,i)=results.beta;
        se(:,i)=results.se;
    end

crit = 1.96; % Corresponds to 95% confidence intervals
confidence = zeros(2,hor,N);
shockpos = 2;

for j = 1:N
    confidence(1,:,j)=reglin(shockpos,:,j)-(se(shockpos,:,j)*
        crit);
    % Lower bound
    confidence(2,:,j)=reglin(shockpos,:,j)+(se(shockpos,:,j)*
        crit);
    % Upper bound
end

prc = 95;
varnames = {'Debt-to-GDP p.p. change'};
shockname = {'Fiscal Consolidation - Overall'};
figure(3);
for i=1:N
```

```matlab
        subplot(N, 1, i)

        fill([0:hor-1 fliplr(0:hor-1)]' ,[squeeze(confidence(2,:, i)
            )'; ...
            flipud(squeeze(confidence(1, :, i)))'],...
    [0 0.4470 0.7410],'EdgeColor','None'); hold on;
    plot(0:hor-1,reglin(shockpos,:,i),'-','LineWidth',1.5,'Color
        ','k');
    hold on;
    line(get(gca,'Xlim'),[0 0],'Color',[1 0 0],'LineStyle','—',
        ...
        'LineWidth',1); hold off;

    ylabel(varnames{i}, 'FontSize', 16);
    title(shockname, 'FontSize', 16);
    xlim([0 hor-1]);
    axis tight
    set(gca,'FontSize',16)

end

%% Local Projections - Real GDP growth
% The contemporaneous shock is
shock = fshock;

% Create a constant
const = ones(size(shock,1),1);

% The full RHS is given by
X0 = [const, shock];

% The dependent variable is Real GDP growth
y = realgdpgrowthwb;

hor = 5;
N = size(y,2);
se = zeros(size(X0,2),hor,N);
reglin = zeros(size(X0,2),hor, N);

    for i=1:hor

        yy=y(i:end);
        % Compute the estimated parameters and Newey West
            corrected SE
        results=nwest(yy, X0(1:end-i+1,:),i);
        reglin(:,i)=results.beta;
        se(:,i)=results.se;

    end

crit = 1.96; % Corresponds to 95% confidence intervals
confidence = zeros(2,hor,N);
```

```matlab
shockpos = 2;

for j = 1:N
    confidence(1,:,j)=reglin(shockpos,:,j)-(se(shockpos,:,j)*
        crit);
    % Lower bound
    confidence(2,:,j)=reglin(shockpos,:,j)+(se(shockpos,:,j)*
        crit);
    % Upper bound
end

prc = 95;
varnames = {'Real GDP growth rate p.p. change'};
shockname = 'Fiscal Consolidation - Overall';
figure(5);
for i=1:N

    subplot(N, 1, i)

    fill([0:hor-1 fliplr(0:hor-1)]',[squeeze(confidence(2,:, i)
        )'; ...
        flipud(squeeze(confidence(1, :, i)))'],...
    [0 0.4470 0.7410],'EdgeColor','None'); hold on;
    plot(0:hor-1,reglin(shockpos,:,i),'-','LineWidth',1.5,'Color
        ','k');
    hold on;
    line(get(gca,'Xlim'),[0 0],'Color',[1 0 0],'LineStyle','--'
        ,['' ...
        'LineWidth'],1); hold off;

    ylabel(varnames{i}, 'FontSize', 16);
    title(shockname, 'FontSize', 16);
    xlim([0 hor-1]);
    axis tight
    set(gca,'FontSize',16)

end

legend({strcat(num2str(prc), '% confidence bands'),'Point IRF'},
    ...
    'FontSize',16,'Orientation','Horizontal')

%% Local Projections - Robustness Check 1 (Shock: fshockimp -
% fshockunexpected, debtgdp t-1)
% Make the (lagged) regressor (design) matrix of the controls
p = 1;
X = debtgdp;
X = lagmakerMatrix(X,p);
% The contemporaneous shock is
shock = fshockimp(p+1:end);
shocku=unshock(p+1:end);
% Create a constant
const = ones(size(shock,1),1);
```

```matlab
% The dependent variable is Debt over GDP
y = [debtgdp(p:end)];

% Implement the local projection by looping over the direct
% forecasts for each dependent variable
N = 2;
hor = 5;
se = zeros(3,hor,N);
reglin = zeros(3,hor, N);

for j=1:N
    for i=1:hor
        if j == 1
            X0 = [const, shock,X];
        else
            X0 = [const, shocku,X];
        end
        yy=y(i+1:end);
        % Compute the estimated parameters and Newey West
            corrected SE
        results=nwest(yy, X0(1:end-i+1,:),i);
        reglin(:,i,j)=results.beta;
        se(:,i,j)=results.se;

    end
end
% Obtain the confidence intervals
crit = 1.96; % Corresponds to 95% confidence intervals
confidence = zeros(2,hor,N);
shockpos = 2;

for j = 1:N
    confidence(1,:,j)=reglin(shockpos,:,j)-(se(shockpos,:,j)*
        crit);
    % Lower bound
    confidence(2,:,j)=reglin(shockpos,:,j)+(se(shockpos,:,j)*
        crit);
    % Upper bound
end

% Plot the responses
prc = 95;
varnames = {'Debt-to-GDP␣p.p.␣change'};
shockname = {'Fiscal␣Consolidation␣-␣Impact', ...
    'Fiscal␣Consolidation␣-␣Unexpected'};
figure(6);
for i=1:N

    subplot(N, 1, i)

    fill([0:hor-1 fliplr(0:hor-1)]', [squeeze(confidence(2,:, i)
        )'; ...
```

```matlab
            flipud(squeeze(confidence(1, :, i)))'],...
        [0 0.4470 0.7410],'EdgeColor','None'); hold on;
        plot(0:hor-1,reglin(shockpos,:,i),'-','LineWidth', ...
            1.5,'Color','k'); hold on;
        line(get(gca,'Xlim'),[0 0],'Color',[1 0 0],'LineStyle', ...
            '--','LineWidth',1); hold off;

        ylabel(varnames, 'FontSize', 16);
        title(shockname{i}, 'FontSize', 16);
        xlim([0 hor-1]);
        axis tight
        set(gca,'FontSize',16)
        legend({strcat(num2str(prc), '% confidence bands'),'Point ...
            IRF'}, ...
            'FontSize',16,'Orientation','Horizontal')
end

%% Local Projections - Robustness Check 2 (Shock:
% fshockimp/fshockunexpected, GDPgrowth t-1)
% Make the (lagged) regressor (design) matrix of the controls
p=1;
X = realgdpgrowthwb;
X = lagmakerMatrix(X,p);

% The contemporaneous shock is
shock = fshockimp(p+1:end);
shocku=unshock(p+1:end);

% Create a constant
const = ones(size(shock,1),1);

% The dependent variables is Real GDP Growth
y = [realgdpgrowthwb(p+1:end)];

hor = 5;
N = 2;
se = zeros(3,hor,N);
reglin = zeros(3,hor, N);

for j=1:N
    for i=1:hor
        if j == 1
            X0 = [const, shock,X];
        else
            X0 = [const, shocku,X];
        end
        yy=y(i:end);
        % Compute the estimated parameters and Newey West
            corrected SE
        results=nwest(yy, X0(1:end-i+1,:),i);
        reglin(:,i,j)=results.beta;
        se(:,i,j)=results.se;
```

```matlab
        end
end
crit = 1.96; % Corresponds to 95% confidence intervals
confidence = zeros(2,hor,N);
shockpos = 2;

for j = 1:N
    confidence(1,:,j)=reglin(shockpos,:,j)-(se(shockpos,:,j)*...
        crit);
    % Lower bound
    confidence(2,:,j)=reglin(shockpos,:,j)+(se(shockpos,:,j)*...
        crit);
    % Upper bound
end

prc = 95;
varnames = {'Real GDP growth rate p.p. change'};
shockname = {'Fiscal Consolidation - Impact', ['Fiscal ...
    Consolidation ' ...
    '- Unexpected']};
figure(7);
for i=1:N

    subplot(N, 1, i)

    fill([0:hor-1 fliplr(0:hor-1)]' ,[squeeze(confidence(2,:, i)...
        )'; ...
        flipud(squeeze(confidence(1, :, i)))'],...
    [0 0.4470 0.7410],'EdgeColor','None'); hold on;
    plot(0:hor-1,reglin(shockpos,:,i),'-','LineWidth', ...
        1.5,'Color','k'); hold on;
    line(get(gca,'Xlim'),[0 0],'Color',[1 0 0],'LineStyle', ...
        '--','LineWidth',1); hold off;

    ylabel(varnames, 'FontSize', 16);
    title(shockname{i}, 'FontSize', 16);
    xlim([0 hor-1]);
    axis tight
    set(gca,'FontSize',16)
    legend({strcat(num2str(prc), '% confidence bands'),'Point ...
        IRF'}, ...
        'FontSize',16,'Orientation','Horizontal')
end

%% Local Projections - Robustness Check 3 (Control: debtgdp(t ...
    -1))
% Make the (lagged) regressor (design) matrix of the controls
p = 1;
X = debtgdp;
X = lagmakerMatrix(X,p);

% Create a constant
const = ones(size(X,1),1);
```

```matlab
% The contemporaneous shock is
shock = fshock(p+1:end);

% The full RHS is given by
X0 = [const, shock,X];

% The dependent variable is Debt over GDP
y = [debtgdp(p+1:end)];

hor = 5;
N = size(y,2);
se = zeros(size(X0,2),hor,N);
reglin = zeros(size(X0,2),hor, N);

    for i=1:hor

        yy=y(i:end);
        % Compute the estimated parameters and Newey West
            corrected SE
        results=nwest(yy, X0(1:end-i+1,:),i);
        reglin(:,i)=results.beta;
        se(:,i)=results.se;

    end

crit = 1.96; % Corresponds to 95% confidence intervals
confidence = zeros(2,hor,N);
shockpos = 2;

for j = 1:N
    confidence(1,:,j)=reglin(shockpos,:,j)-(se(shockpos,:,j)*
        crit);
    % Lower bound
    confidence(2,:,j)=reglin(shockpos,:,j)+(se(shockpos,:,j)*
        crit);
    % Upper bound
end

prc = 95;
varnames = {'Debt-to-GDP p.p. change'};
shockname = 'Fiscal Consolidation - Overall';
figure(16);
for i=1:N

    subplot(N, 1, i)

    fill([0:hor-1 fliplr(0:hor-1)]' ,[squeeze(confidence(2,:, i)
        )'; ...
        flipud(squeeze(confidence(1, :, i)))'],...
    [0 0.4470 0.7410],'EdgeColor','None'); hold on;
    plot(0:hor-1,reglin(shockpos,:,i),'-','LineWidth',1.5,'Color
        ','k');
```

```matlab
        hold on;
        line(get(gca,'Xlim'),[0 0],'Color',[1 0 0],'LineStyle','--',
            ...
            'LineWidth',1); hold off;

        ylabel(varnames{i}, 'FontSize', 16);
        title(shockname, 'FontSize', 16);
        xlim([0 hor-1]);
        axis tight
        set(gca,'FontSize',16)

end

legend({strcat(num2str(prc), '% confidence bands'),'Point IRF'},
    ...
    'FontSize',16,'Orientation','Horizontal')

%% Local Projections - Robustness Check 4 (Control: debtgdp(t
    -1),
% fshock(t-1))
% Make the (lagged) regressor (design) matrix of the controls
p = 1;
X = [debtgdp, fshock];
X = lagmakerMatrix(X,p);

% Create a constant
const = ones(size(X,1),1);

% The contemporaneous shock is
shock = fshock(p+1:end);


% The full RHS is given by
X0 = [const, shock,X];

% The dependent variable is Debt over GDP
y = [debtgdp(p+1:end)];

hor = 5;
N = size(y,2);
se = zeros(size(X0,2),hor,N);
reglin = zeros(size(X0,2),hor, N);

    for i=1:hor

        yy=y(i:end);
        % Compute the estimated parameters and Newey West
            corrected SE
        results=nwest(yy, X0(1:end-i+1,:),i);
        reglin(:,i)=results.beta;
        se(:,i)=results.se;
    end
```

```matlab
crit = 1.96; % Corresponds to 95% confidence intervals
confidence = zeros(2,hor,N);
shockpos = 2;

for j = 1:N
    confidence(1,:,j)=reglin(shockpos,:,j)-(se(shockpos,:,j)*
        crit);
    % Lower bound
    confidence(2,:,j)=reglin(shockpos,:,j)+(se(shockpos,:,j)*
        crit);
    % Upper bound
end

prc = 95;
varnames = {'Debt-to-GDP p.p. change'};
shockname = 'Fiscal Consolidation - Overall';
figure(8);
for i=1:N

    subplot(N, 1, i)

    fill([0:hor-1 fliplr(0:hor-1)]' ,[squeeze(confidence(2,:, i)
        )'; ...
        flipud(squeeze(confidence(1, :, i)))'],...
    [0 0.4470 0.7410],'EdgeColor','None'); hold on;
    plot(0:hor-1,reglin(shockpos,:,i),'-','LineWidth',1.5,'Color
        ','k');
    hold on;
    line(get(gca,'Xlim'),[0 0],'Color',[1 0 0],'LineStyle','—',
        ...
        'LineWidth',1); hold off;

    ylabel(varnames{i}, 'FontSize', 16);
    title(shockname, 'FontSize', 16);
    xlim([0 hor-1]);
    axis tight
    set(gca,'FontSize',16)
end

legend({strcat(num2str(prc), '% confidence bands'),'Point IRF'},
    ...
    'FontSize',16,'Orientation','Horizontal')

%% Local Projections - Robustness Check 5 (Control: debtgdp t
    -1, infl t-1
% long term IR (t-1), short term IR (t-1), real gdp growth)
% Make the (lagged) regressor (design) matrix of the controls
p = 1;
X = [debtgdp(p+1:end), infl, irlt(p+1:end), irst(p+1:end)];
X = lagmakerMatrix(X,p);

% Create a constant
const = ones(size(X,1),1);
```

```matlab
% The contemporaneous shock is
shock = fshock(p+2:end);

% The full RHS is given by
X0 = [const, shock, X, realgdpgrowthwb(p+2:end)];

% The dependent variable is Debt over GDP
y = [debtgdp(p+2:end)];

hor = 5;
N = size(y,2);
se = zeros(size(X0,2),hor,N);
reglin = zeros(size(X0,2),hor, N);

    for i=1:hor

        yy=y(i:end);
        % Compute the estimated parameters and Newey West
            corrected SE
        results=nwest(yy, X0(1:end-i+1,:),i);
        reglin(:,i)=results.beta;
        se(:,i)=results.se;
    end

crit = 1.96; % Corresponds to 95% confidence intervals
confidence = zeros(2,hor,N);
shockpos = 2;

for j = 1:N
    confidence(1,:,j)=reglin(shockpos,:,j)-(se(shockpos,:,j)*
        crit);
    % Lower bound
    confidence(2,:,j)=reglin(shockpos,:,j)+(se(shockpos,:,j)*
        crit);
    % Upper bound
end

prc = 95;
varnames = {'Debt-to-GDP_p.p._change'};
shockname = 'Fiscal_Consolidation_-_Overall';
figure(9);
for i=1:N

    subplot(N, 1, i)

    fill([0:hor-1 fliplr(0:hor-1)]',[squeeze(confidence(2,:, i)
        )'; ...
        flipud(squeeze(confidence(1, :, i)))'],...
    [0 0.4470 0.7410],'EdgeColor','None'); hold on;
    plot(0:hor-1,reglin(shockpos,:,i),'-','LineWidth',1.5,'Color
        ','k');
    hold on;
```

```matlab
        line ( get ( gca , ' Xlim ' ) , [0  0] , ' Color ' , [1  0  0] , ' LineStyle ' , ' —— ' ,
            ...
            ' LineWidth ' ,1) ;  hold  off ;

        ylabel ( varnames { i } ,  ' FontSize ' ,  16) ;
        title ( shockname ,  ' FontSize ' ,  16) ;
        xlim ([0  hor −1]) ;
        axis  tight
        set ( gca , ' FontSize ' ,16) ;
end

legend ({ strcat ( num2str ( prc ) ,  ' %  confidence  bands ' ) , ' Point  IRF ' } ,
    ...
    ' FontSize ' ,16, ' Orientation ' , ' Horizontal ' )
%% Local  Projections  −  Robustness  Check  6  ( Control :  debtgdp  t
    −1,
% long  term  IR  ( t −1),  short  term  IR  ( t −1),  real  gdp  growth ,
    inflation )
% Make  the  ( lagged )  regressor  ( design )  matrix  of  the  controls
p = 1;
X = [ debtgdp ,  irst ,  irlt ];
X = lagmakerMatrix (X, p) ;

% Create  a  constant
const = ones ( size (X,1) ,1) ;

% The  contemporaneous  shock  is
shock = fshock ( p+1: end ) ;

% The  full  RHS  is  given  by
X0 = [ const ,  shock ,X,  infl ,  realgdpgrowthwb ( p+1: end ) ];

% The  dependent  variable  is  Debt  over  GDP
y = [ debtgdp ( p+1: end ) ];

hor = 5;
N = size (y,2) ;
se = zeros ( size (X0,2) , hor ,N) ;
reglin = zeros ( size (X0,2) , hor ,  N) ;

    for  i =1: hor

        yy=y ( i : end ) ;
        % Compute  the  estimated  parameters  and  Newey  West
            corrected  SE
        results=nwest ( yy ,  X0(1: end −i +1 ,:) , i ) ;
        reglin (: , i )=results . beta ;
        se (: , i )=results . se ;
    end

crit = 1.96; % Corresponds  to  95%  confidence  intervals
confidence = zeros (2 , hor ,N) ;
shockpos = 2;
```

```matlab
for j = 1:N
    confidence(1,:,j)=reglin(shockpos,:,j)-(se(shockpos,:,j)*
        crit);
    % Lower bound
    confidence(2,:,j)=reglin(shockpos,:,j)+(se(shockpos,:,j)*
        crit);
    % Upper bound
end

prc = 95;
varnames = {'Debt-to-GDP_p.p._change'};
shockname = 'Fiscal_Consolidation_-_Overall';
figure(17);
for i=1:N

    subplot(N, 1, i)

    fill([0:hor-1 fliplr(0:hor-1)]',[squeeze(confidence(2,:, i)
        )'; ...
        flipud(squeeze(confidence(1, :, i)))'],...
    [0 0.4470 0.7410],'EdgeColor','None'); hold on;
    plot(0:hor-1,reglin(shockpos,:,i),'-','LineWidth',1.5,'Color
        ','k');
    hold on;
    line(get(gca,'Xlim'),[0 0],'Color',[1 0 0],'LineStyle','--',
        ...
        'LineWidth',1); hold off;

    ylabel(varnames{i}, 'FontSize', 16);
    title(shockname, 'FontSize', 16);
    xlim([0 hor-1]);
    axis tight
    set(gca,'FontSize',16)

end

legend({strcat(num2str(prc), '%_confidence_bands'),'Point_IRF'},
    ...
    'FontSize',16,'Orientation','Horizontal')
%% Local Projections - Robustness Check 7 (Control: debtgdp(t
    -1),
% short term IR(t), long term IR(t), Inflation(t))
% Make the (lagged) regressor (design) matrix of the controls
p = 1;
X = debtgdp;
X = lagmakerMatrix(X,p);

% Create a constant
const = ones(size(X,1),1);

% The contemporaneous shock is
shock = fshock(p+1:end);
```

```
% The full RHS is given by
X0 = [const, shock,X,irlt(p+1:end),irst(p+1:end),infl];

% The dependent variable is Debt over GDP
y = [debtgdp(p+1:end)];

hor = 5;
N = size(y,2);
se = zeros(size(X0,2),hor,N);
reglin = zeros(size(X0,2),hor, N);

    for i=1:hor

        yy=y(i:end);
        % Compute the estimated parameters and Newey West
            corrected SE
        results=nwest(yy, X0(1:end−i+1,:),i);
        reglin(:,i)=results.beta;
        se(:,i)=results.se;
    end

crit = 1.96; % Corresponds to 95% confidence intervals
confidence = zeros(2,hor,N);
shockpos = 2;

for j = 1:N
    confidence(1,:,j)=reglin(shockpos,:,j)−(se(shockpos,:,j)*
        crit);
    % Lower bound
    confidence(2,:,j)=reglin(shockpos,:,j)+(se(shockpos,:,j)*
        crit);
    % Upper bound
end

prc = 95;
varnames = {'Debt−to−GDP␣p.p.␣change'};
shockname = 'Fiscal␣Consolidation␣−␣Overall';
figure(10);
for i=1:N

    subplot(N, 1, i)

    fill([0:hor−1 fliplr(0:hor−1)]' ,[squeeze(confidence(2,:, i)
        )'; ...
        flipud(squeeze(confidence(1, :, i)))'],...
    [0 0.4470 0.7410],'EdgeColor','None'); hold on;
    plot(0:hor−1,reglin(shockpos,:,i),'−','LineWidth',1.5,'Color
        ','k');
    hold on;
    line(get(gca,'Xlim'),[0 0],'Color',[1 0 0],'LineStyle','−−',
        ...
        'LineWidth',1); hold off;
```

```matlab
        ylabel(varnames{i}, 'FontSize', 16);
        title(shockname, 'FontSize', 16);
        xlim([0 hor-1]);
        axis tight
        set(gca,'FontSize',16)

end

legend({strcat(num2str(prc), '% confidence bands'),'Point IRF'}, ...
        'FontSize',16,'Orientation','Horizontal')

%% Local Projections - Robustness Check 8 (Control: debtgdp(t
    -1),
% short term IR(t), long term IR(t) Inflation(t), fshock(t-1))
% Make the (lagged) regressor (design) matrix of the controls
p = 1;
X = [debtgdp(p:end), fshock(p:end)];
X = lagmakerMatrix(X,p);

% Create a constant
const = ones(size(X,1),1);

% The contemporaneous shock is
shock = fshock(p+1:end);

% The full RHS is given by
X0 = [const, shock,X,irst(p+1:end),irlt(p+1:end),infl];

% The dependent variable is Debt Over GDP
y = [debtgdp(p+1:end)];

hor = 5;
N = size(y,2);
se = zeros(size(X0,2),hor,N);
reglin = zeros(size(X0,2),hor, N);

    for i=1:hor

        yy=y(i:end);
        % Compute the estimated parameters and Newey West
            corrected SE
        results=nwest(yy, X0(1:end-i+1,:),i);
        reglin(:,i)=results.beta;
        se(:,i)=results.se;
    end

crit = 1.96; % Corresponds to 95% confidence intervals
confidence = zeros(2,hor,N);
shockpos = 2;

for j = 1:N
```

```matlab
        confidence(1,:,j)=reglin(shockpos,:,j)-(se(shockpos,:,j)*
            crit);
        % Lower bound
        confidence(2,:,j)=reglin(shockpos,:,j)+(se(shockpos,:,j)*
            crit);
        % Upper bound
end

prc = 95;
varnames = {'Debt-to-GDP p.p. change'};
shockname = 'Fiscal Consolidation - Overall';
figure(11);
for i=1:N

    subplot(N, 1, i)

    fill([0:hor-1 fliplr(0:hor-1)]' ,[squeeze(confidence(2,:, i)
        )'; ...
        flipud(squeeze(confidence(1, :, i)))'],...
    [0 0.4470 0.7410],'EdgeColor','None'); hold on;
    plot(0:hor-1,reglin(shockpos,:,i),'-','LineWidth',1.5,'Color
        ', ...
        'k'); hold on;
    line(get(gca,'Xlim'),[0 0],'Color',[1 0 0],'LineStyle','--',
        ...
        'LineWidth',1); hold off;

    ylabel(varnames{i}, 'FontSize', 16);
    title(shockname, 'FontSize', 16);
    xlim([0 hor-1]);
    axis tight
    set(gca,'FontSize',16)

end

legend({strcat(num2str(prc), '% confidence bands'),'Point IRF'},
    ...
    'FontSize',16,'Orientation','Horizontal')

%% Local Projections - Robustness Check 9 (Control: GDP growth
    (t-1))
% Make the (lagged) regressor (design) matrix of the controls
p = 1;
X = realgdpgrowthwb;
X = lagmakerMatrix(X,p);

% Create a constant
const = ones(size(X,1),1);

% The contemporaneous shock is
shock = fshock(p+1:end);

% The full RHS is given by
```

```matlab
X0 = [const, shock,X];

% The dependent variable is Real GDP growth
y = [realgdpgrowthwb(p+1:end)];

hor = 5;
N = size(y,2);
se = zeros(size(X0,2),hor,N);
reglin = zeros(size(X0,2),hor, N);

    for i=1:hor

        yy=y(i:end);
        % Compute the estimated parameters and Newey West
            corrected SE
        results=nwest(yy, X0(1:end-i+1,:),i);
        reglin(:,i)=results.beta;
        se(:,i)=results.se;
    end

crit = 1.96; % Corresponds to 95% confidence intervals
confidence = zeros(2,hor,N);
shockpos = 2;

for j = 1:N
    confidence(1,:,j)=reglin(shockpos,:,j)-(se(shockpos,:,j)*
        crit);
    % Lower bound
    confidence(2,:,j)=reglin(shockpos,:,j)+(se(shockpos,:,j)*
        crit);
    % Upper bound
end

prc = 95;
varnames = {'Real GDP growth rate p.p. change'};
shockname = 'Fiscal Consolidation - Overall';
figure(12);
for i=1:N

    subplot(N, 1, i)

    fill([0:hor-1 fliplr(0:hor-1)]' ,[squeeze(confidence(2,:, i)
        )'; ...
        flipud(squeeze(confidence(1, :, i)))'],...
    [0 0.4470 0.7410],'EdgeColor','None'); hold on;
    plot(0:hor-1,reglin(shockpos,:,i),'-','LineWidth',1.5,'Color
        ','k');
    hold on;
    line(get(gca,'Xlim'),[0 0],'Color',[1 0 0],'LineStyle','—',
        ...
        'LineWidth',1); hold off;

    ylabel(varnames{i}, 'FontSize', 16);
```

```matlab
        title(shockname, 'FontSize', 16);
        xlim([0 hor-1]);
        axis tight
        set(gca,'FontSize',16)

end

legend({strcat(num2str(prc), '%␣confidence␣bands'),'Point␣IRF'},
    ...
    'FontSize',16,'Orientation','Horizontal')

%% Local Projections - Robustness Check 10 (Control: Dummy EB-
    TB)
% Make the (lagged) regressor (design) matrix of the controls
p = 1;
X = realgdpgrowthwb;
X = lagmakerMatrix(X,p);

% The contemporaneous shock is
shock1 = OverallEB(p+1:end);
shock2 = OverallTB(p+1:end);
shock=[shock1 shock2];

% Create a constant
const = ones(size(shock,1),1);

X0=[const, shock1, shock2, X];

% The dependent variable is Real GDP growth
y = [realgdpgrowthwb(p+1:end)];

N = 1;
hor = 5;
se = zeros(4,hor,N);
reglin = zeros(4,hor, N);

        for i=1:hor

        yy=y(i:end);
        % Compute the estimated parameters and Newey West
            corrected SE
        results=nwest(yy, X0(1:end-i+1,:),i);
        reglin(:,i,1)=results.beta;
        se(:,i,1)=results.se;
          end

crit = 1.96; % Corresponds to 95% confidence intervals
confidence = zeros(2,hor,N);
confidence1 = zeros(2,hor,N);
shockpos = 2;

    confidence(1,:,j)=reglin(shockpos,:,1)-(se(shockpos,:,1)*
        crit);
```

```matlab
    % Lower bound
    confidence(2,:,1)=reglin(shockpos,:,1)+(se(shockpos,:,1)*
        crit);
    % Upper bound

    confidence1(1,:,1)=reglin(3,:,1)-(se(3,:,1)*crit); % Lower
        bound
    confidence1(2,:,1)=reglin(3,:,1)+(se(3,:,1)*crit); % Upper
        bound

prc = 95;
varnames = {'Real GDP growth rate p.p. change'};
shockname = {'Fiscal Consolidation - Overall(Expenditure Based)'
    ,...
    ['Fiscal ' 'Consolidation - Overall(Tax Based)']} ;
figure(20);

    subplot(2, 1,1)

    fill([0:hor-1 fliplr(0:hor-1)]' ,[squeeze(confidence(2,:, 1)
        )'; ...
        flipud(squeeze(confidence(1, :, 1)))'],...
    [0 0.4470 0.7410],'EdgeColor','None'); hold on;
    plot(0:hor-1,reglin(shockpos,:,1),'-','LineWidth',1.5,'Color
        ','k');
    hold on;
    line(get(gca,'Xlim'),[0 0],'Color',[1 0 0],'LineStyle','—',
        ...
        'LineWidth',1); hold off;

    ylabel(varnames, 'FontSize', 16);
    title('Fiscal Consolidation - Overall(Expenditure Based)',
        ...
        'FontSize', 16);
    xlim([0 hor-1]);
    axis tight
    set(gca,'FontSize',16)
    legend({strcat(num2str(prc), '% confidence bands'),'Point IRF
        '}, ...
        'FontSize',16,'Orientation','Horizontal')

    subplot(2, 1,2)
    fill([0:hor-1 fliplr(0:hor-1)]' ,[squeeze(confidence1(2,:,
        1))'; ...
        flipud(squeeze(confidence1(1, :, 1)))'],...
    [0 0.4470 0.7410],'EdgeColor','None'); hold on;
    plot(0:hor-1,reglin(3,:,1),'-','LineWidth',1.5,'Color','k');
        hold on;
    line(get(gca,'Xlim'),[0 0],'Color',[1 0 0],'LineStyle','—',
        ...
        'LineWidth',1); hold off;

    ylabel(varnames, 'FontSize', 16);
```

```matlab
        title('Fiscal Consolidation - Overall (Tax Based)', '
            FontSize', 16);
      xlim([0 hor-1]);
      axis tight
      set(gca,'FontSize',16)
      legend({strcat(num2str(prc), '% confidence bands'),'Point IRF
          '}, ...
            'FontSize',16,'Orientation','Horizontal')
```

%% *Local Projections - Robustness Check 11 (Control: Dummy EB-TB)*

```matlab
% Make the (lagged) regressor (design) matrix of the controls
p = 1;
X = debtgdp;
X = lagmakerMatrix(X,p);

% The contemporaneous shock is
shock1 = OverallEB(p+1:end);
shock2 = OverallTB(p+1:end);

% Create a constant
const = ones(size(shock,1),1);

X0=[const, shock1, shock2, X];
% The dependent variable is Real GDP growth
y = [ debtgdp(p+1:end)];

N = 1;
hor = 5;
se = zeros(4,hor,N);
reglin = zeros(4,hor, N);

        for i=1:hor

        yy=y(i:end);
        % Compute the estimated parameters and Newey West
            corrected SE
        results=nwest(yy, X0(1:end-i+1,:),i);
        reglin(:,i,1)=results.beta;
        se(:,i,1)=results.se;

        end

crit = 1.96; % Corresponds to 95% confidence intervals
confidence = zeros(2,hor,N);
confidence1 = zeros(2,hor,N);
shockpos = 2;

    confidence(1,:,j)=reglin(shockpos,:,1)-(se(shockpos,:,1)*
        crit);
    % Lower bound
    confidence(2,:,1)=reglin(shockpos,:,1)+(se(shockpos,:,1)*
        crit);
```

```
% Upper bound

confidence1 (1 ,: ,1)= reglin (3 ,: ,1)−(se (3 ,: ,1)∗ crit ); % Lower
    bound
confidence1 (2 ,: ,1)= reglin (3 ,: ,1)+(se (3 ,: ,1)∗ crit ); % Upper
    bound

prc = 95;
varnames = { 'Debt␣over␣GDP␣p.p.␣change' };
shockname = { 'Fiscal␣Consolidation␣−␣Overall(Expenditure␣Based)'
    ,...
    [ 'Fiscal␣' 'Consolidation␣−␣Overall(Tax␣Based)']}  ;
figure(21);

    subplot(2, 1,1)

    fill([0:hor−1 fliplr(0:hor−1)]' ,[squeeze(confidence(2,:, 1)
        )'; ...
        flipud(squeeze(confidence(1, :, 1)))'],...
    [0 0.4470 0.7410],'EdgeColor','None'); hold on;
    plot(0:hor−1,reglin(shockpos ,: ,1) ,'−','LineWidth',1.5,'Color
        ','k');
    hold on;
    line(get(gca,'Xlim'),[0 0],'Color',[1 0 0],'LineStyle','−−',
        ...
        'LineWidth',1); hold off;

    ylabel(varnames, 'FontSize', 16);
    title('Fiscal␣Consolidation␣−␣Overall(Expenditure␣Based)',
        ...
        'FontSize', 16);
    xlim([0 hor−1]);
    axis tight
    set(gca,'FontSize',16)
legend({ strcat(num2str(prc), '%␣confidence␣bands'),'Point␣IRF
    '}, ...
        'FontSize',16,'Orientation','Horizontal')

    subplot(2, 1,2)
    fill([0:hor−1 fliplr(0:hor−1)]' ,[squeeze(confidence1(2,:,
        1))'; ...
        flipud(squeeze(confidence1(1, :, 1)))'],...
    [0 0.4470 0.7410],'EdgeColor','None'); hold on;
    plot(0:hor−1,reglin(3 ,: ,1) ,'−','LineWidth',1.5,'Color','k');
    hold on;
    line(get(gca,'Xlim'),[0 0],'Color',[1 0 0],'LineStyle','−−',
        ...
        'LineWidth',1); hold off;

    ylabel(varnames, 'FontSize', 16);
    title('Fiscal␣Consolidation␣−␣Overall(Tax␣Based)', '
        FontSize', 16);
    xlim([0 hor−1]);
```

```matlab
        axis tight
        set(gca,'FontSize',16)
        legend({strcat(num2str(prc), '% confidence bands'),'Point IRF
            '}, ...
            'FontSize',16,'Orientation','Horizontal')
%% Function lagmakerMatix
function x = lagmakerMatrix(y,p)

% Function to create the matrix of regressors according to the
% SUR representaiton for a VAR

% Inputs:    y = T x N matrix of endogeneous variables
%            p = VAR lag order
% Outputs:   x = T-p x Np matrix of lagged dependent variables
% as regressors

[T, N] = size(y);

x = zeros(T-p, N*p);
counter = 0;
for i=1:p
    for j=1:N
        counter = counter + 1;
        x(:,counter) = y(p+1-i:T-i,j);
    end
end


end
%% Function nwest
function results=nwest(y,x,nlag)
% PURPOSE: computes Newey-West adjusted heteroscedastic-serial
%          consistent Least-squares Regression
%-----------------------------------------------------------------
% USAGE: results = nwest(y,x,nlag)
% where: y = dependent variable vector (nobs x 1)
%        x = independent variables matrix (nobs x nvar)
%     nlag = lag length to use
%-----------------------------------------------------------------
% RETURNS: a structure
%          results.meth  = 'newlyw'
%          results.beta  = bhat
%          results.tstat = t-stats
%          results.yhat  = yhat
%          results.resid = residuals
%          results.sige  = e'*e/(n-k)
%          results.rsqr  = rsquared
%          results.rbar  = rbar-squared
%          results.dw    = Durbin-Watson Statistic
%          results.nobs  = nobs
%          results.nvar  = nvars
%          results.y     = y data vector
%-----------------------------------------------------------------
% SEE ALSO: nwest_d, prt(results), plt(results)
```

```
%─────────────────────────────────────
% References:   Gallant, R. (1987),
%  "Nonlinear Statistical Models," pp.137−139.
%─────────────────────────────────────
```

```
% written by:
% James P. LeSage, Dept of Economics
% University of Toledo
% 2801 W. Bancroft St,
% Toledo, OH 43606
% % jlesage@spatial−econometrics.com

if (nargin ~= 3); error('Wrong # of arguments to nwest'); end;

[nobs nvar] = size(x);

results.meth    = 'nwest';
results.y       = y;
results.nobs    = nobs;
results.nvar    = nvar;

xpxi = inv(x'*x);
results.beta    = xpxi*(x'*y);
results.yhat    = x*results.beta;
results.resid   = y − results.yhat;
sigu = results.resid'*results.resid;
U = sigu/(nobs−nvar);
W=xpxi*U*xpxi;
results.e= sqrt(diag(W));
% perform Newey−West correction
emat = [];
for i=1:nvar;
emat = [emat
        results.resid'];
end;

    hhat=emat.*x';
    G=zeros(nvar,nvar); w=zeros(2*nlag+1,1);
    a=0;

    while a~=nlag+1;
        ga=zeros(nvar,nvar);
        w(nlag+1+a,1)=(nlag+1−a)/(nlag+1);
        za=hhat(:,(a+1):nobs)*hhat(:,1:nobs−a)';
          if a==0;
            ga=ga+za;
          else
            ga=ga+za+za';
          end;
        G=G+w(nlag+1+a,1)*ga;
        a=a+1;
    end; % end of while
```

```
            V=xpxi*G*xpxi;
            nwerr= sqrt(diag(V));

results.tstat = results.beta./nwerr; % Newey−West t−statistics
ym = y − ones(nobs,1)*mean(y);
rsqr1 = sigu;
rsqr2 = ym'*ym;
results.rsqr = 1.0 − rsqr1/rsqr2; % r−squared
rsqr1 = rsqr1/(nobs−nvar);
rsqr2 = rsqr2/(nobs−1.0);
results.rbar = 1 − (rsqr1/rsqr2); % rbar−squared
ediff = results.resid(2:nobs) − results.resid(1:nobs−1);
results.dw = diag((ediff'*ediff)./(sigu))'; % durbin−watson
results.se=nwerr;
end
```