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Discretionary tax changes and the macroeconomic activity: New narrative evidence from Australia

TTPI - Working Paper 6/2024
April 2024

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Abstract

This paper examines the impact of discretionary tax changes on economic activity in Australia. I use written records such as Budget Report and Election Speeches to identify the revenue effect, timing and motivation of all major Commonwealth tax policy actions from 1975 to 2018. This approach allows me to isolate legislated tax changes that are taken for exogenous reasons. My main finding reveals that tax cuts are ineffective in stimulating economic output in Australia.

Keywords: Narrative Approach, Tax Multiplier, Australia
JEL codes: E32, E62, H20, N17

** I am grateful to Solmaz Moslehi, Heather Anderson, Benjamin Wong, Giovanni Caggiano, James Morley, Christian Gillitzer, Mariano Kulish, Yiyong Cai, Jonathan Dark, Robert Breunig, Isaac Gross, Qingyuan Du and Siovio Contessi for their valuable feedback. I also appreciate insights from seminar participants at the Macro, International, and Finance Research Group, Sydney Macroeconomic Reading Groups, the Western Economic Association International Conference and Ozmac Workshop. Special thanks also go to the Macroeconomic Analysis Division and the Fiscal Analysis Division of the Australian Treasury. Data are available on request.*
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1 Introduction

While many have attempted to estimate the effects of discretionary fiscal policies across different countries, there has been a dearth of research focusing on this important yet long-neglected topic within commodity exporting economies such as Australia.

One method, following Romer and Romer (2010), utilises written records from official budget sources to construct a narrative measure of exogenous policy changes, which are uncorrelated with other macroeconomic shocks. This approach has been employed for identifying exogenous tax policy shocks in various countries: in Canada by Hussain and Liu (2019), Germany by Christofzik et al. (2022), Spain by Gil et al. (2019), the UK by Cloyne (2013), and the US by Romer and Romer (2010). Despite its widespread application, there remains a lack of consensus regarding the magnitude of tax policy effects. However, this methodology has not yet been applied to the Australian context.

This paper contributes new empirical evidence to the open economy literature. I construct a narrative time series dataset of legislated tax changes in Australia from 1975 to 2018, an exercise that is particularly suitable for Australia. The main conclusion is that a one percentage point cut in taxes as a percentage of GDP is ineffective in stimulating domestic output. These estimates stand in contrast to the narrative-based results for the US and the UK and provide new insights into the shock propagation and effectiveness of fiscal policies within commodity exporting economies. This paper also provides a detailed tax dataset for future studies.

The suitability of the narrative approach for Australia can be attributed to two primary factors. First, the country's extensive history with tax policy is marked by a comprehensive range of amendments, encompassing changes in superannuation, oil excise rates, and personal income tax rates. This historical depth provides a rich basis for narrative analysis. Second, the adoption of a budgeting framework in Australia that mirrors the practices of the UK provides additional support for this approach. In this system, tax policy is centralised within the Commonwealth government, with key announcements typically made on Budget night [1]. This process is augmented by detailed revenue forecasts accompanying each tax amendment, coupled with political debate for the motivations behind each legislative change. These components collectively underscore the suitability of a narrative approach in the Australian context, enabling a detailed and nuanced analysis of fiscal policy dynamics.

I adopt the identification strategy outlined by Cloyne (2013) to isolate tax policy changes in Australia from 1975 to 2018 that are not reactive to other macroeconomic shocks. Following the frameworks of Romer and Romer (2010) and Cloyne (2013), these tax changes are classified as "exogenous," in contrast to those considered "endogenous"

[1] In the Australian economic calendar, prior to 1993, the fiscal pronouncement, commonly referred to as the Budget, was traditionally delivered on the first Tuesday night. Post-1993, this convention has been modified, with the Treasurer presenting the budgetary overview on the second Tuesday of May.

to broader economic dynamics.

In categorising 880 discretionary tax changes, I primarily use the stated motivation of policymakers, which generates comparable categories to those in Cloyne (2013). The "exogenous" category contains tax acts intended to improve long-run economic growth, ideological changes aimed at improving social outcomes, and tax administration measures to enhance the fairness of the tax system. The endogenous changes are actions taken to reduce budget deficits, finance government spending programs, and mitigate the negative effects of other macroeconomic shocks.

Having constructed a quarterly series of "exogenous" tax changes, I follow Mertens and Ravn (2014) to treat the unanticipated "exogenous" tax changes as external instruments for structural tax shocks to estimate the effects of tax changes in Australia. In line with existing literature, my results should be interpreted as the average effects of exogenous tax changes.

2 Constructing the Narrative Time Series Dataset for Australia

This section delineates the methodology employed in assembling the narrative time series dataset for Australia.

2.1 Sources of Data

The foundation of the narrative analysis lies in an extensive examination of budgetary documents from both the executive and legislative branches of the Australian government.

From the executive side, the primary focus is on documents provided by the Australian Treasury. Key sources include the annual *Budget Economic and Fiscal Outlook Report*, the *Mid-Year Economic and Fiscal Outlook Report*, and the *Final Outcome Budget Report*[2]. These documents are instrumental in revealing the motivations driving significant tax policy changes at the time of their announcement.

On the legislative front, two pivotal sources are utilized. The *Hansard*[3], a transcript of parliamentary debates, is critical for understanding the underlying rationales and justifications for major tax reforms. Additionally, the *Explanatory Memorandum* accompanying each government bill[4] provides a detailed chronology, projected revenue implications, and fiscal impacts of proposed tax changes.

Supplementary sources, including Australian Federal Election Speeches[5] and Media

[2]An archive of these budget-related documents is available at https://archive.budget.gov.au

[3]A comprehensive record is housed at https://www.aph.gov.au/Parliamentary_Business/Hansard

[4]The collection can be accessed at https://www.legislation.gov.au

[5]These speeches are archived at https://electionspeeches.moadoph.gov.au

Releases from the Treasury[6], are consulted to capture the political intent and offer additional insights into the factors shaping legislated tax changes.

2.2 Identification of Legislated Tax Changes

The initial task involves pinpointing all legislated tax amendments spanning 1975-2018. This process requires thorough examination of bills archived in the Federal Register of Legislation[7]. In the Australian legislative process, each Bill is presented in the House of Representatives, accompanied by an *Explanatory Memoranda* that clarify the Bill's provisions for Parliament members. Following the 1984 amendments to the Acts Interpretation Act 1901, these memoranda are required to outline the Bill's primary objectives and fiscal impacts (Australia Parliament. House of Representatives et al., 2018). Once a Bill receives approval from both the Senate and the House of Representatives and is granted Royal Assent by the Governor-General, it becomes an Act of Parliament[8].

2.3 Classification of Motivations Behind Tax Changes

The next phase involves discerning the motivations behind each tax change. Drawing inspiration from Cloyne (2013) and Romer and Romer (2010), I analyze policymakers' explicit statements to deduce their stated intentions. Principal sources for this analysis include the Budget Speech, the *Explanatory Memorandum*, and *Budget Paper No.2 Budget Measures*. Further insights are gleaned from Australian Federal Election Speeches, discussions recorded in the *Hansard*, and Treasury media releases.

Informed by the methodologies of Romer and Romer (2010) and Cloyne (2013), tax changes are predominantly categorised as either "endogenous" or "exogenous". Endogenous changes are those enacted to mitigate non-policy factors influencing economic growth, while exogenous changes are implemented for reasons independent of current or future macroeconomic conditions.

2.3.1 Endogenous Tax Changes

Endogenous fiscal policies typically aim to counteract macroeconomic shocks that could alter the trajectory of long-run economic growth. For instance, a tax reduction introduced to stimulate the economy in anticipation of a recession is considered endogenous, as it seeks to mitigate non-policy influences on economic dynamics. Such tax amendments are thus classified under the "endogenous" category.

[6]These releases are available at https://treasury.gov.au/media-release

[7]Details on legislated tax amendments are available at https://www.legislation.gov.au

[8]A detailed explanation of the legislative process is available in the House of Representatives Practice at https://www.aph.gov.au/About_Parliament/House_of_Representatives/Powers_practice_and_procedure/Practice7/HTML/Chapter10/Bills\OT1\textemdashthe_parliamentary_process

Three distinct sub-categories of endogenous tax changes are identified:

1. **Spending-driven Changes:** These adjustments are initiated primarily to fund specific government programs. An example is the increase in the Medicare levy surcharge in 2013, expressly aimed at financing the Disability Care Australia Fund.

2. **Deficit-driven Changes:** Motivated by concerns over short-term fiscal sustainability, these alterations often respond to deficit issues. The 2014 introduction of the Temporary Budget Repair Levy on high-income earners, a response to deficits stemming from the Global Financial Crisis, is a notable case.

3. **Counter-cyclical Measures:** Aimed at countering non-policy-driven economic fluctuations, these policies are tailored to stabilize standard economic growth patterns. The 2008 National Building and Jobs Plan, formulated to support employment and growth during the Global Financial Crisis, exemplifies this category.

2.3.2 Exogenous Tax Changes

According to Romer and Romer (2010), exogenous tax changes are those not motivated by past or anticipated macroeconomic conditions. They are typically enacted for reasons unrelated to immediate economic circumstances and do not correlate predictably with factors likely to influence output in the near future.

Exogenous tax changes are further divided into three categories:

1. **Long-run Growth-oriented Changes:** These changes aim to enhance long-term economic growth. An example is the Tax Laws Amendment (Personal Income Tax Deduction) Act 2005, which targeted long-term economic expansion without addressing immediate economic conditions.

2. **Ideological Changes:** These are motivated by philosophical or societal goals, such as the Excise Tariff Amendment (Tobacco) Bill 2016, which increased tobacco excise for public health objectives.

3. **Tax Integrity Measures:** Focused on improving the fairness of the tax system, these amendments often target tax compliance by large entities. The Treasury Laws Amendment (GST Integrity) Bill 2017, aiming to enhance tax system transparency, is an example.

This study's classification system draws parallels and distinctions from the frameworks of Romer and Romer (2010) and Cloyne (2013), aligning the "spending-driven" and "counter-cyclical" categories with Romer and Romer (2010), while the "deficit-driven" category mirrors Cloyne (2013). The exogenous categorizations of long-run growth and ideological changes correspond with Cloyne (2013), and our tax integrity measures align with "ideological" category.

2.4 Measuring the Size and Timing of Tax Changes

When formulating the dataset, it is critical to distinguish between the announcement and implementation dates of tax changes. These dates, sourced from the *Explanatory Memorandum*, serve distinct functions: the announcement date marks the policy's public introduction, while the implementation date indicates when the tax change becomes effective. The interval between these events is termed the 'implementation lag'.

Following Mertens and Ravn (2012), tax actions are categorised as either anticipated or unanticipated based on this lag. Changes with a lag shorter than 90 days are considered unanticipated, while those with a longer duration are categorized as anticipated.

For assessing the magnitude of tax changes, the 'full year' revenue estimate method, inspired by Cloyne (2013), is employed. Since the enactment of the *Charter of Budget Honesty Act 1998*, the Australian Treasury has provided revenue projections for four fiscal years. The stability of these forward estimates for most tax changes allows the use of the farthest year's projection as a representative 'full year' measure.

In determining the timing of revenue impacts, a methodology aligned with Romer and Romer (2010) is used. It assumes that tax changes are effective in the latter half of a quarter. If a change is legislated before a quarter's midpoint, its revenue effects are attributed to the current quarter. If legislated after the midpoint, the effects are allocated to the subsequent quarter.

2.5 Illustrative Tax Change Examples in Australia

To elucidate the construction of the narrative tax change dataset for Australia, three representative examples are presented:

Personal Income Tax Cut of 2006

Announcement Date: 9 May 2006

Implementation Date: 1 July 2006

Financial Implications

Revenue($m)				
	2006-07	2007-08	2008-09	2009-10
Australia Taxation Office	-6385.0	-9205.0	-9830.0	-10435.0

Introduced during the second reading of the *Appropriation Bill (No.1) 2006-07* on 9 May 2006, this legislative action marked a pivotal adjustment to the personal income tax system. Designed to enhance the tax system's competitiveness, the bill's underpinning motivation was articulated by Costello on Budget night 2006: "These changes will make the Australian tax system more competitive and bring Australia's upper-income tax rates into line with OECD averages." This sentiment was echoed in the Budget Paper No.2 Budget Measures 2006-07, which highlighted the tax cuts' potential to bolster disposable incomes, incentivised workforce participation, and enhance Australia's international

economic standing. Given its alignment with enhancing long-run growth, this change is classified as a long-run" exogenous tax alteration. Adhering to Romer and Romer (2010), the tax change is dated to 2006Q3 with an annualised revenue effect of −10435 million. This legislation's impacts are permanent.

Small Business and General Business Tax Break

Announcement Date: 13 December 2008

Implementation Date: 13 December 2008

Financial Implications

Revenue($m)				
	2008-09	2009-10	2010-11	2011-12
Australia Taxation Office	-	-840.0	-1350.0	-515.0

As part of the National Building and Job Plan during the Global Financial Crisis, this Bill, detailed in the *Tax Laws Amendment (Small Business and General Business Tax Break) Bill 2009*, was announced on 3 February 2009. It enabled small businesses to claim 30% of eligible assets acquired between 13 December 2008 and 30 June 2009, given installation by 30 June 2010. The 2009 Budget Speech and the *Updated Economic and Fiscal Outlook 2008-09* accentuated the deteriorating economic conditions, with projections of shrinking GDP and rising unemployment. The bill's Explanatory Memorandum encapsulated its essence: the Tax Break was introduced "to support economic activity and employment in Australia in the face of a deteriorating global economic environment." Given its design to counterbalance the adverse impacts of the Global Financial Crisis, this tax initiative is labelled as an endogenous, counter-cyclical tax action. The Revised Explanatory Memorandum underscores the size and temporal dimensions of the tax change, with an anticipated Budget cost of $2.7 billion from 2009-10 to 2011-12. Given its ephemeral nature, concluding before the financial year of 2011-12, an annualised revenue effect of −2703 million is recorded.

Personal income tax cut of 2007

Announcement Date: 5 May 2007

Implementation Date: The first stage of was effective on 1 July 2007, while the second stage of personal income tax cuts was enacted on 1 July 2008

Financial Implications

Revenue($m)				
	2007-08	2008-09	2009-10	2010-11
Australia Taxation Office	-5305.0	-8350.0	-8785.0	-9050.0

On May 8, 2007, the Australian Treasurer announced a significant modification to personal income tax structures, marking the fifth such adjustment since 2003. This reform was executed in two primary stages. The initial stage, effective July 1, 2007, introduced a 30% marginal tax rate on incomes exceeding AUD 30,000. The ensuing

stage, commencing on July 1, 2008, elevated the threshold for the 40% income tax bracket from AUD 75,000 to AUD 80,000 and for the 45% bracket from AUD 150,000 to AUD 180,000.

Consistent with the empirical framework established by Mertens and Ravn (2012), I analyze the 2007 personal income tax adjustment as comprising two distinct fiscal events. The revenue impact of the initial phase is quantified as a reduction of AUD 5,305 million. For the second phase, the fiscal impact is assessed as the difference in revenue outcomes between the terminal and initial years, resulting in a diminution of AUD 3,745 million.

The primary impetus for these tax reforms, as delineated in the 2007-08 Budget Paper No. 2 on Budget Measures, was 'to provide robust incentives for workforce participation and to recognize improved skills and productivity through enhanced remuneration.' A review of the 2007 Budget speech further suggests a strategic goal to invigorate the economy in anticipation of forthcoming economic challenges. Consequently, this fiscal adjustment is characterized as both 'long-run' and 'exogenous' in nature. In alignment with Mertens and Ravn (2012), I classify the initial phase of the 2007 personal income tax reform as 'unanticipated', whereas the latter phase is deemed 'anticipated'."

3 Properties of Narrative Time Series Dataset

3.1 Properties of Exogenous Tax Changes

Drawing from narrative sources, I identified 880 legislated tax actions, of which 660 qualify as exogenous. Adapting the methodology of Romer and Romer (2010), I express the estimated revenue effects as a fraction of the nominal GDP for the quarter of their respective implementation, as presented in Figure 1.

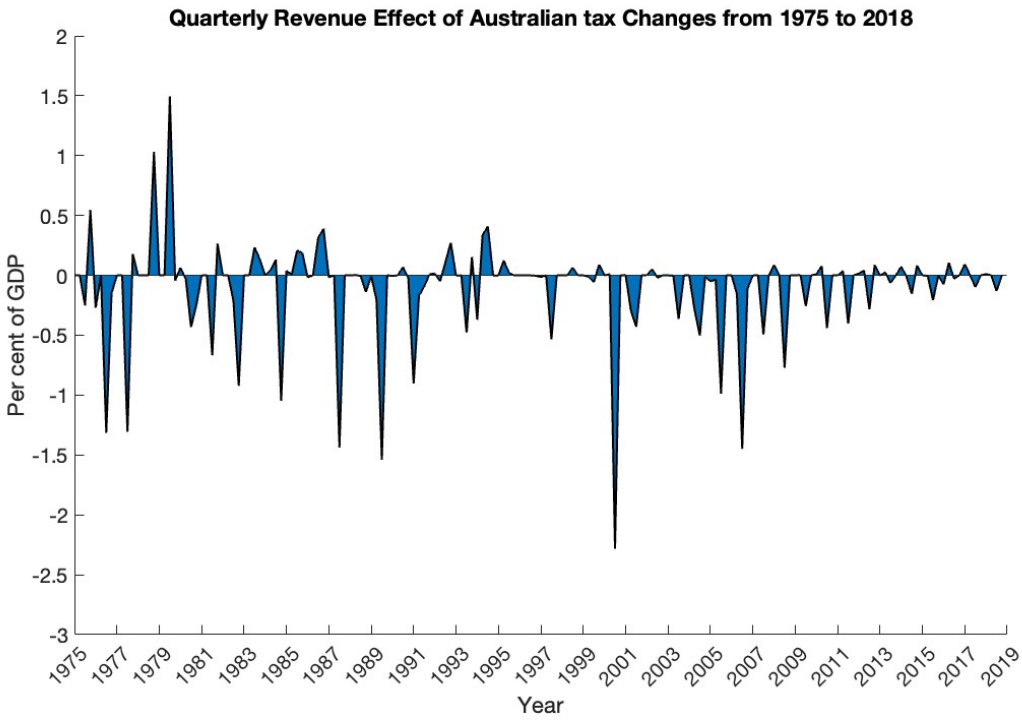


Figure 1: Narrative Measure of Exogenous Tax Changes in Australia from 1975 to 2018

The nature of exogenous tax changes is evident, akin to patterns observed in Romer and Romer (2010) and Cloyne (2013). A majority of the quarterly observations in the series register as zero, underscoring the discrete nature of legislated tax reforms. The series spans from 1975 to 2018 and displays exogenous tax actions distributed throughout this period. As seen in prior studies, tax reductions are more frequent, with the series averaging a change of -0.089%. Notably, the most pronounced reduction corresponding to the A New Tax System (Goods and Services Tax) Act 1999.

Figure 2 organises the exogenous tax alterations into three primary categories. Foremost among these are measures targeting Australia's long-term economic growth. Notable initiatives in this grouping encompass the Personal Income Tax Cuts Act of 1999, integral facets of the 1985 Tax System Reform, and a series of five personal income tax cuts spanning the commodity price surge from 2003 to 2007.

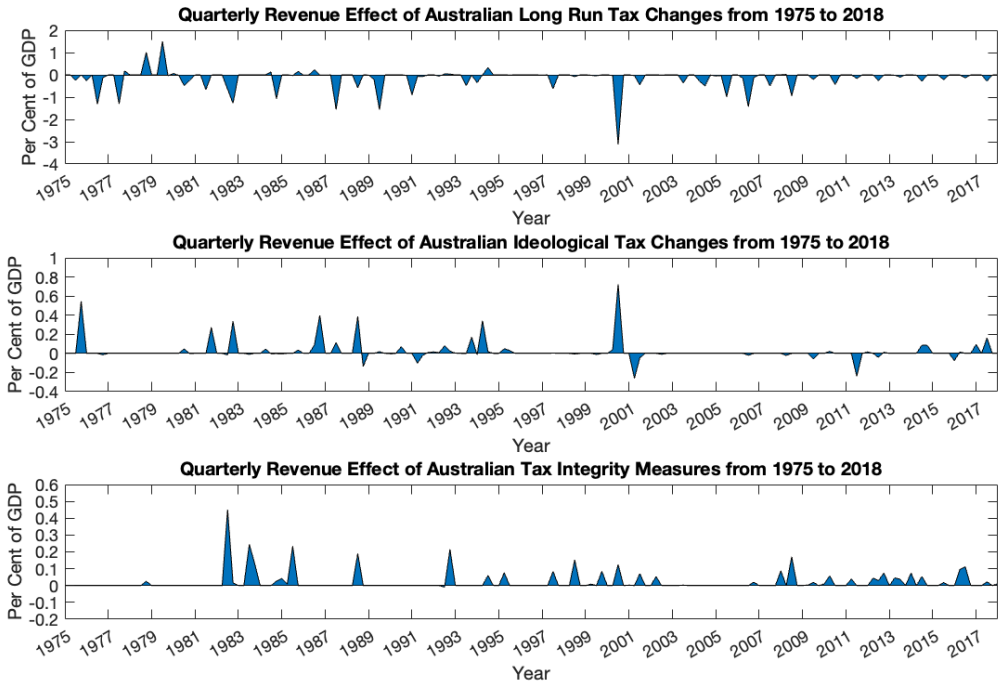


Figure 2: Decomposition of Australian Exogenous Tax Changes from 1975 to 2018

Second, the 1980s witnessed a surge in ideological tax changes, predominantly in the form of increase in oil excises. This period was characterised by heightened concerns over energy security, which led to the introduction of tax measures like the Excise Tariff Amendment Bills of 1987 and 1988. Furthermore, public health considerations also drove the imposition of excises on alcohol and tobacco products through out the sample period. These fiscal measures reflect a broader governmental objective to improve societal health outcomes.

Lastly, to enhance the integrity of the tax system and reduce tax evasion and avoidance practices, various legislative measures were instituted. The most significant among these were the Tax Integrity Act of 2018 and the Multinational Tax Avoidance Bill of 2017, both of which sought to ensure a fair and transparent taxation system.

3.2 Properties of Endogenous Tax Changes

Utilising the narrative analysis, this study identifies a total of 220 tax policy changes categorised as "endogenous" tax changes. These modifications are further detailed in Figure 3. The mean value of these endogenous tax adjustments is computed to be approximately 0.05% of GDP, with an associated standard deviation of 0.22. Predominantly, these fiscal modifications manifest as increases in taxation.

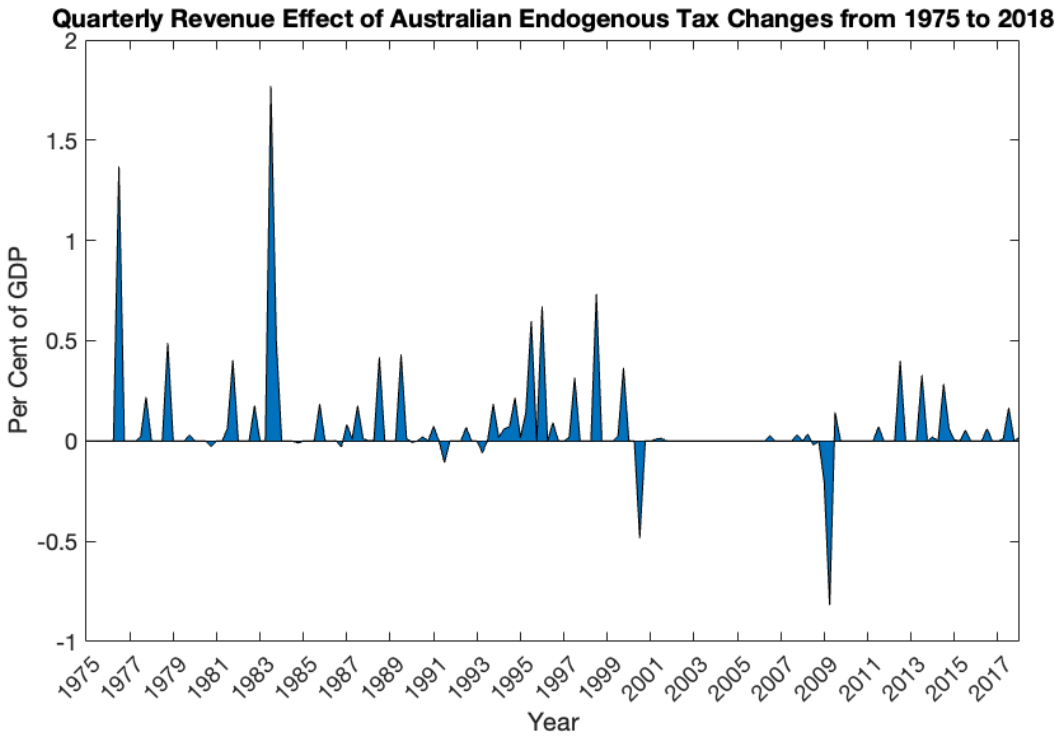


Figure 3: Narrative Measure of Endogenous Tax Changes in Australia from 1975 to 2018

In analysing the motivations behind endogenous tax policies, Figure 4 details the nature of these changes. It is observed that all spending-driven tax increases in Australia are aimed at specific objectives. A prominent example is the consistent rise in the Medicare levy since 1983, primarily to fund crucial health programs like Medicare and the National Disability Insurance Scheme. This intent is evident in legislation such as the Income Tax Laws Amendment (Medicare Levy) Act of 1983 and the Medicare Levy Amendment (Disability Care Australia) Bill of 2013. Furthermore, these tax increases have also been deployed for specific objectives, including financing reconstruction efforts following natural disasters and covering the administrative costs of regulatory bodies.

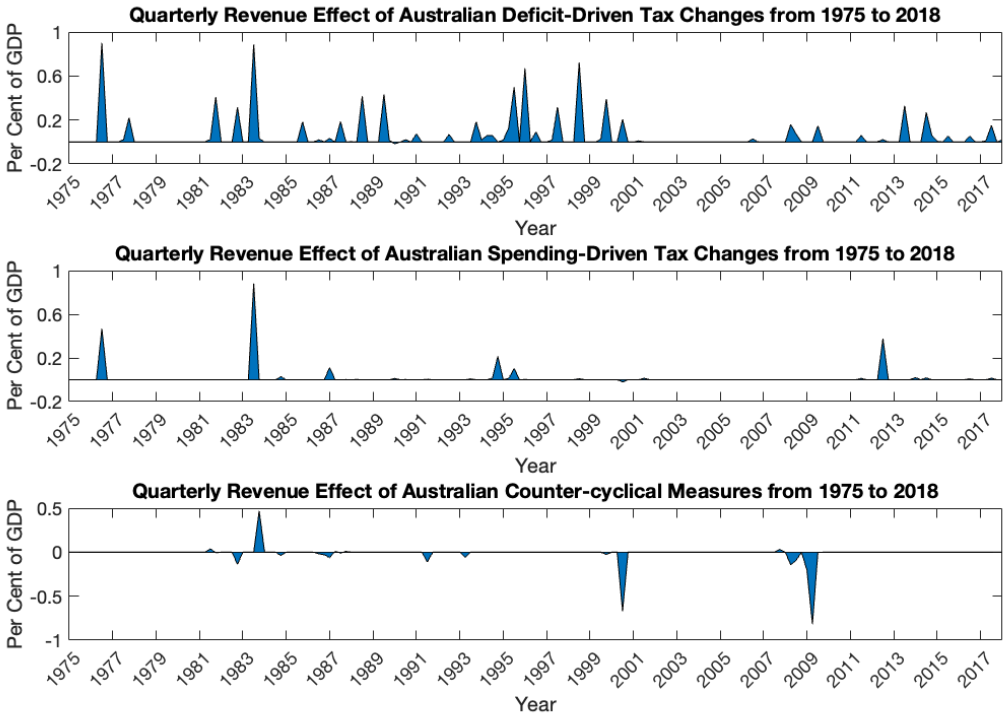


Figure 4: Decomposition of Endogenous Tax Changes in Australia from 1975 to 2018

Taxes targeting reducing budget deficits have significantly contributed to medium-term deficit reduction. The fiscal consolidation undertaken by the Hawke government following the recessions of the 1990s serves as a primary illustration. This included a 15% tax on superannuation contributions and the removal of the 5/3 depreciation allowance. Likewise, the Morrison government employed Bank Levies and Budget Repair Levies to address the budget deficit following the Global Financial Crisis.

The period from 2000 to 2007 marks a heyday for counter-cyclical tax policy adjustments. A notable exception to this trend was the reduction in personal and corporate income taxes during the Global Financial Crisis, driven by lower expectations of future economic growth.

A significant deviation in Australian endogenous tax policy was observed during the five-year period from 2003 to 2007, marked by an absence of adjustments as indicated in budget documents. This lack of tax modifications is primarily attributed to the improved fiscal balance in Australia, notably supported by windfalls from commodity prices. This scenario highlights the direct influence of external economic factors, such as commodity price fluctuations, on fiscal policy strategies. It illustrates how global economic trends can temporarily influence fiscal policy decisions in a commodity-exporting economy.

3.3 Comparison with All Legislated Tax Changes

Figure 5 displays the narrative estimates corresponding to the full spectrum of legislated tax policy changes. The mean value of these legislative changes registers at -0.03% of GDP, and is accompanied by a standard deviation of 0.444. Notably, the time series encapsulating all legislated tax amendments exhibits a remarkable congruence with the exogenous series. The most significant points of divergence between these two series are attributable to the fiscal consolidation initiatives promulgated in the early 1990s and the institution of Medicare Levy during the 1970s and 1980s.[9].

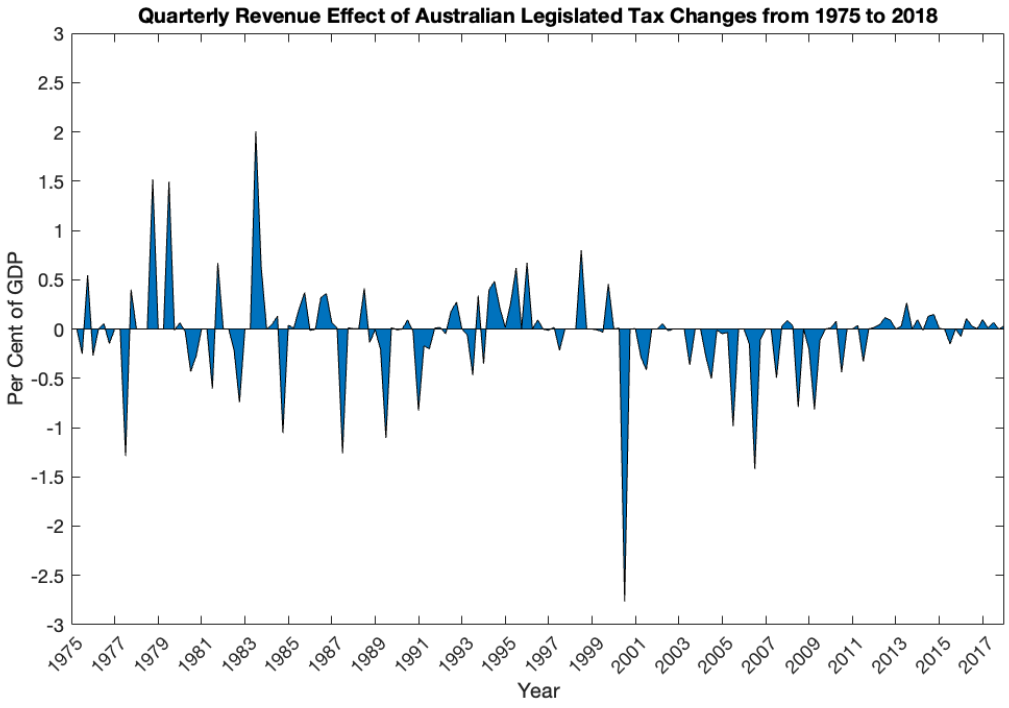


Figure 5: Narrative Measure of All Tax Changes in Australia from 1975 to 2018

3.4 Properties of Unanticipated Tax Changes

Figure 6 delineates narrative estimates of unanticipated tax modifications in Australia spanning from 1975 to 2018. Constituting a specialized subset of a broader array of exogenous tax variations, this quarterly series specifically focuses on tax policies characterized by an implementation lag of fewer than 90 days. Adhering to the framework established by Mertens and Ravn (2014), these unanticipated tax alterations serve as external instruments for isolating structural tax shocks in the context of the Australian economy for the ensuing empirical investigation.

Based on the narrative analysis, 434 out of a total of 880 legislated tax changes qualify as unanticipated. On average, these unanticipated tax changes represent -0.04%

[9]For details on the fiscal consolidation plans, see Alesina et al. (2015)

of Australia's GDP, with a standard deviation of 0.29. Among these, the two most significant unanticipated tax modifications are the personal income tax cuts of 1989 and 1977, introduced by the Hawke and Fraser governments, respectively.

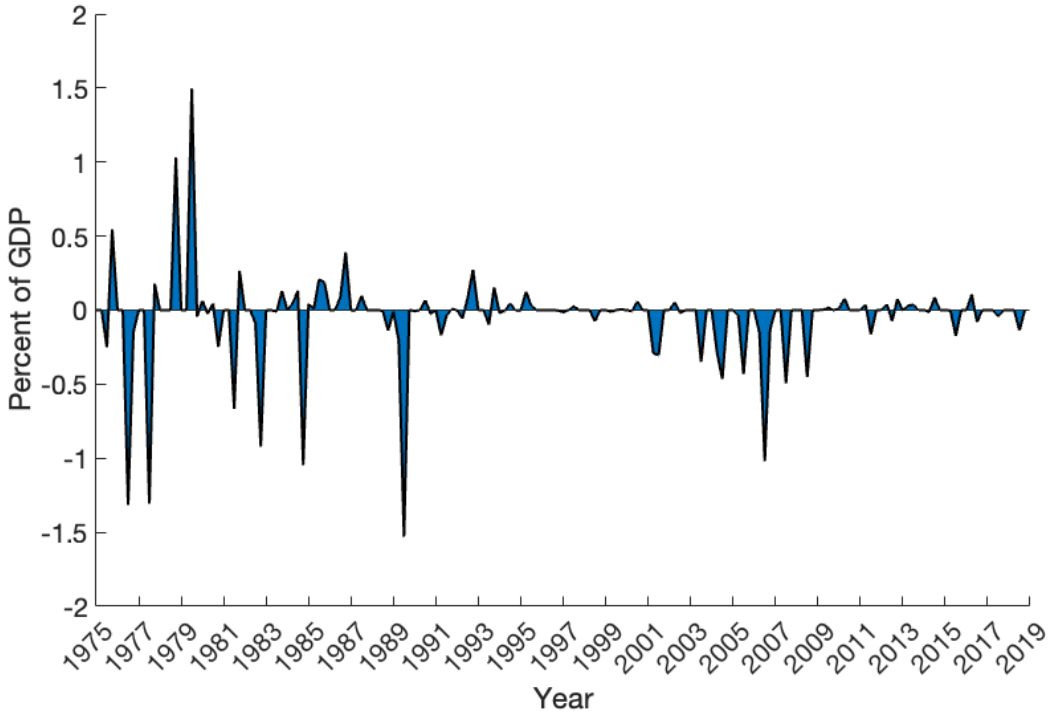


Figure 6: Narrative Measure of Unanticipated Tax Changes in Australia from 1975 to 2018

3.5 Testing the Exogeneity of the "Exogenous" Tax Changes

I test the exogeneity of 'exogenous' tax series by regressing key economic variables—tax revenue, government expenditure, and real output, interest rate, inflation and real exchange rate—on a set of unanticipated tax changes, along with the inclusion of two lags, a linear time trend, and a constant. The detailed outcomes of this regression are presented in Table 1.

The Granger causality test results shows that the exogenous series exhibits a p-value of 0.645, and the unanticipated exogenous tax changes have a p-value of 0.669, implying that the "exogenous" tax series are not predictable from past values of the tested macroeconomic variables, thus enhancing the exogeneity of the narrative tax measures.+

Table 1: Granger Causality Results - Six Variable VAR

	Test Statistic	p-Value
Exogenous Series	0.706	0.645
Unanticipated Series	0.676	0.669

Additionally, the complexity of analyzing tax policy changes in economies heavily reliant on commodities is addressed. Literature, notably Céspedes and Velasco (2014), indicates that commodity price volatility simultaneously influences GDP and tax policies, affecting the reliability of tax revenue as an instrument for studying tax policy changes.

Consequently, I conduct a regression of the real exchange rate against unanticipated tax changes, incorporating two lags and a constant. The findings, shown in Table 2, reveal that the null hypothesis—stating the real exchange rate does not Granger-cause the exogenous tax series—stands unrefuted at a 5% significance level. This result further affirms the tax series' exogeneity.

In summary, the empirical tests conducted verify the exogeneity of the tax series under study, a crucial element for the analysis of tax policy effects in commodity-exporting economies.

Table 2: Granger Causality Results - Real Exchange Rate

	Test Statistic	p-Value
Exogenous Series	0.002	0.997
Unanticipated Series	0.572	0.565

4 LP-IV Methodology

4.1 Methodology

The estimation of dynamic causal effects of Australian tax changes is achieved by using the local projections-IV (LP-IV) method of Stock and Watson (2018), who combine the local projections proposed by Jordà (2005) with the use of instrument variables. Following Mertens and Ravn (2014), I treat the narrative measure of unanticipated exogenous tax changes as an external instrument for structural tax shocks. The causal effect of exogenous tax changes is estimated by a linear regression of

$$Y_{i,t+h} = \Theta_{h,i1} Y_{1,t} + \gamma_h' W_t + u_{i,t+h}^{h\perp} \tag{1}$$

$Y_{i,t+h}$ represents the forecasted value of the macroeconomic variable of interest for h

periods into the future, and W_t comprises a vector of control variables that includes the lagged values of Y. The notation '$\perp$' indicates the orthogonal residual resulting from the projection of population data onto W_t; for example, $x_t^{\perp} = x_t - \text{Proj}(x_t|W_t)$ adjusts variable x_t with respect to the controls in W_t. Additionally, $u_{i,t+h}^{h\perp}$ encapsulates a series of orthogonal residuals, such as $\varepsilon_{t+h}^{\perp}, \ldots, \varepsilon_{t+1}^{\perp}, \varepsilon_{2:n,t}^{\perp}, \varepsilon_{t-1}^{\perp}, \varepsilon_{t-2}^{\perp}, \ldots$, where n denotes the total number of variables and $\varepsilon_{1,t}$ is identified as the exogenously determined structural tax shock. $\Theta_{h,i1}$ quantifies the dynamic causal impact of changes in tax policy on the variable i. The constant term is omitted for brevity.

Let Z_t be a vector of tax proxies. The assumptions for instrument validity are

Assumption 1. *LP-IV*$^{\perp}$

(i) $E\left(\varepsilon_{1,t}^{\perp} Z_t^{\perp\prime}\right) = \alpha' \neq 0$ (*relevance*)

(ii) $E\left(\varepsilon_{2:n,t}^{\perp} Z_t^{\perp\prime}\right) = 0$ (*contemporaneous exogeneity*)

(iii) $E\left(\varepsilon_{t+j}^{\perp} Z_t^{\perp\prime}\right) = 0$ *for* $j \neq 0$ (*lead-lag exogeneity*)

Assumption (i) implies that the proxy z_t is correlated with the shocks to tax revenue. Assumption (ii) requires z_t to be systematically correlated with other concurrent macroeconomic events. Assumption (iii) implies that z_t is systematically uncorrelated with pastor future shocks other than the tax shock $\varepsilon_{1,t}$. With the scale normalisation $\Theta_{0,11} = 1$, I assume that a unit decrease in $\varepsilon_{1,t}$ decreases $Y_{1,t}$ by one percentage points.

Then $\Theta_{h,i1}$ can be estimated from equation (1) following Stock and Watson (2018):

$$\Theta_{h,i1} = \frac{E\left(Y_{i,t+h}^{\perp} Z_t^{\perp\prime}\right) \mathrm{H} E\left(Z_t^{\perp} Y_{1,t}^{\perp}\right)}{E\left(Y_{1,t}^{\perp} Z_t^{\perp\prime}\right) \mathrm{H} E\left(Z_t^{\perp} Y_{1,t}^{\perp}\right)} \tag{2}$$

Where H is any positive semi-definite matrix.

Hence, the policy effect of a one unit intervention in ε_t, h periods ahead is

$$\Theta_{h,i1} = E_t\left(Y_{i,t+h} \mid \varepsilon_{1,t} = 1\right) - E_t\left(Y_{i,t+h} \mid \varepsilon_{1,t} = 0\right) \tag{3}$$

Before turning to the main result, I provide a formal statistical test for the relevance of Z_t as proxies or instruments. The first stage F-statistics is obtained using a Newey and West (1987) HAC-robust residual covariance matrix following Olea et al. (2021). The first stage F-statistics is 1.13 and it is below the threshold of 10 suggested by Stock and Yogo (2002), indicating that z_t is a weakly relevant instrument for tax revenues.

5 Empirical Results

The baseline model, adhering to the frameworks established by Mertens and Ravn (2014) and Cloyne (2013), comprises six variables: tax revenue, government spending,

output, interest rates, inflation, and real exchange rates, each with two lags, and a constant. In the theoretical framework of open economy macroeconomics, commodity prices and exchange rates are pivotal determinants of macroeconomic activity, particularly in a commodity-exporting economy like Australia, as corroborated by Fernández et al. (2018). Reflecting this, the study employs the real exchange rate as a representative indicator of commodity price fluctuations throughout the sample period.

To rigorously control for the effect of the real exchange rate's role, the analysis extends the five variable VAR model of Perotti (2005) by including the real exchange rate. This extension is predicated on established economic theories that posit the exchange rate as a variable in the transmission of fiscal policies, especially in the context of international trade and capital flows which are prominent in open economies. The real exchange rate is thus sequenced after inflation in the VAR model, consistent with the theory that it acts as a mediator in fiscal policy transmission.

The model's impulse response functions reveal the per capita output to a one percent contraction in tax revenue relative to GDP with a standard 68% confidence intervals, as depicted in Figure 7.

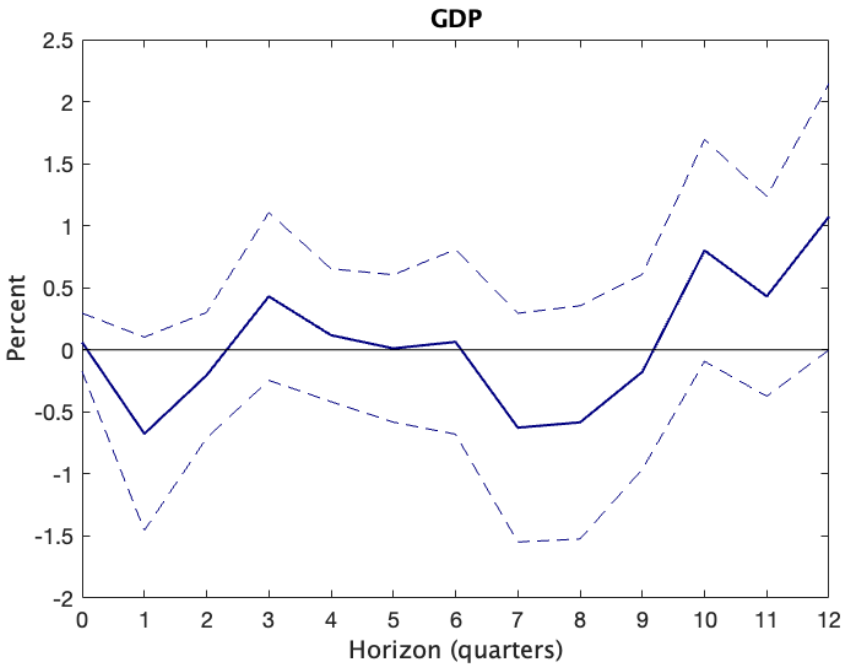


Figure 7: Response of real output per capita to a one unit decrease in narrative tax changes as a percentage of GDP in Australia from 1975:1 to 2018:4 (Six variable local projections with two lags and a constant)

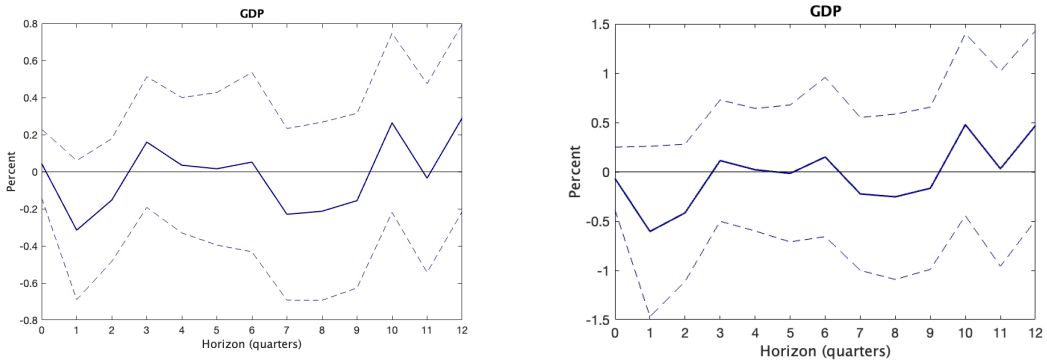
The impulse response function presented in Figure 7 contrasts with the central findings of Romer and Romer (2010) and Cloyne (2013), suggesting that the effects of tax policy changes on output in Australia are not statistically significant. In terms of magnitude,

following a one per cent cut in tax revenue relative to GDP, the immediate effect on output is negligible. The peak expansionary impact is observed as a 1.07 per cent increase, manifesting after a three-year period.

5.1 Alternative Narrative Measures

In supporting the argument for zero tax multipliers within the Australian economy, I use the same methodology to estimate the output response using a few alternative definition of exogenous tax shocks series: one that includes all exogenous tax changes and one only includes exogenous tax changes that were motivated due to long run economic growth. Notably, all aspects of the GST Act are excluded from the both series of exogenous tax changes [10].

Panel (a) and (b) of Figure 8 depicts the estimated output response when using the alternative versions of tax instruments. Neither of these alternative measures for unanticipated shocks has significant effect on the zero tax multiplier.



(a) Response of real output per capita (Instrument: Exogenous Tax Changes)

(b) Response of real output per capita (Instrument: Long Run Tax Changes)

Figure 8: Responses of output per capita to a one unit decrease in exogenous and long run tax changes.

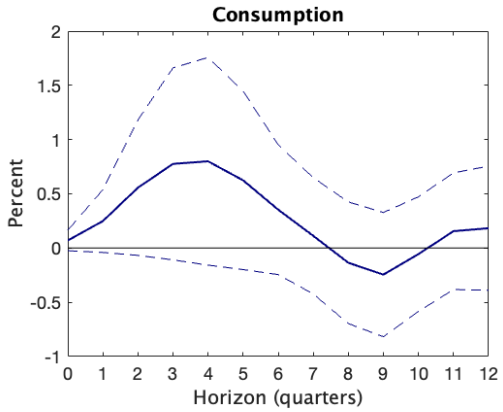
6 Transmission Mechanism

This section delves into the mechanisms underlying the observed negative impact of fiscal changes on output within an open macroeconomic framework. By decomposing the gross domestic product (GDP) into its constituent elements, such as consumption and

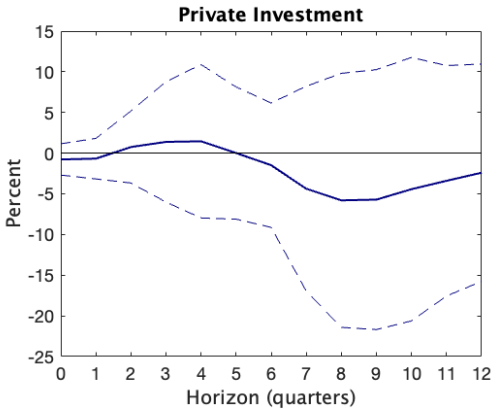
[10]The GST Act was announced by the Australian government in 1999 and implemented on 1 July 2000. The main objective of the tax reform package was to create a simpler and more efficient tax system. The tax reform package as a whole is completely exogenous as it is designed to increase long run economic growth, but the motive for changing corporate and personal income taxes was to partially offset the distributional implications of introducing the GST and keep total tax liability unchanged. To yield unbiased estimates of output, all aspects of the GST Act are excluded from the series of exogenous tax changes.

investment, this analysis leverages a narrative approach to unanticipated tax changes, offering deeper insights into their economic ramifications.

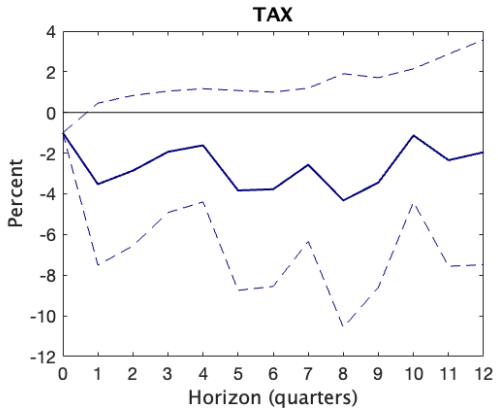
Figure 9(a) in Panel (a) elucidates the response of per capita consumption to a one-percentage-point diminution in tax revenue relative to GDP. Following this fiscal adjustment, an immediate surge in consumption of 0.07 percent is observable, escalating to a 0.8 percent increase at the one-year interval. This phenomenon may be attributable to the marginal propensity to consume among lower and middle-income households, which could be influenced by the reductions in personal income tax, as postulated in Mertens and Montiel Olea (2018). In spite of the observed tendencies, econometric analyses indicate a persistent lack of statistical significance throughout the various forecast intervals.



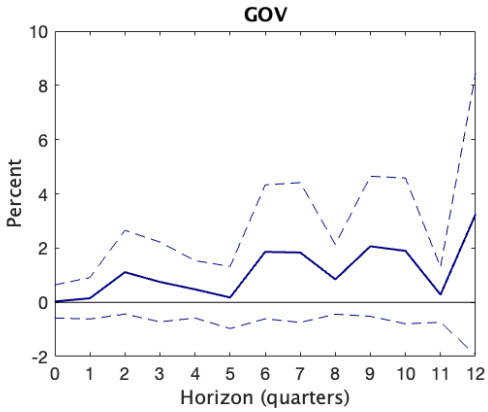
(a) Response of consumption per capita



(b) Response of investment per capita



(c) Response of tax revenue per capita



(d) Response of government spending per capita

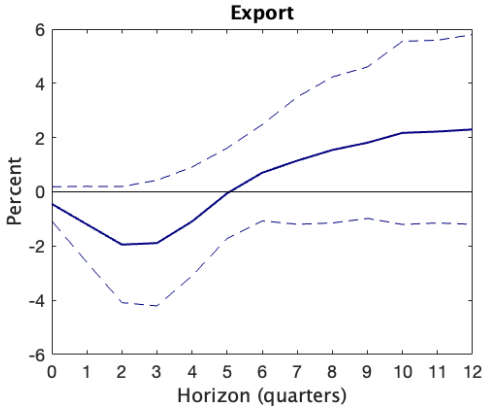
Figure 9: Responses of various economic indicators to a unit decrease in unanticipated tax changes.

The dynamic response of investment to fiscal policy alterations is depicted in Figure 9(b). Contrary to expectation and findings of Cloyne (2013), an exogenous tax reduction corresponding to a one percent decrease in tax revenue relative to GDP induces an immediate 0.77 percent decline in investment, intensifying to a 5.8 percent decrement after two years. This pattern, divergent from the anticipated positive effects, is notably

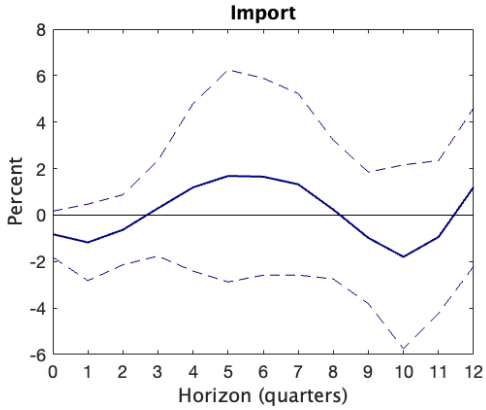
insignificant in the Australian context.

Figure 9(c) illustrates the immediate and subsequent responses of per capita tax revenue to a tax cut of one percent of GDP. The data reveal an instant one percent reduction in tax revenue, deepening to a 3.2 percent decrease by the end of the first quarter. This contractionary effect maintains statistical significance for the initial two quarters, peaking at a 3.85 percent reduction after eight quarters.

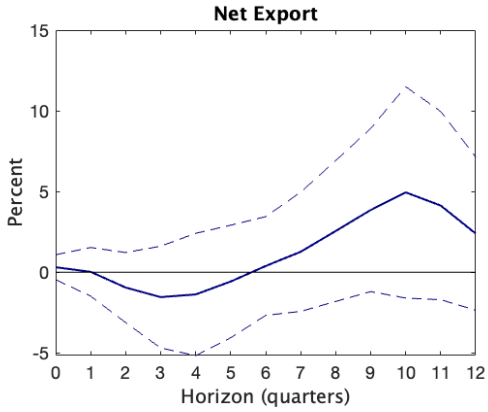
As shown in Figure 9(d), government expenditure exhibits a progressive increase over a span of three years, yet this trend fails to attain statistical significance beyond the ninth quarter. The apex of this expansionary effect is a 2.4 percent elevation in government spending at the three-year mark. Notably, the ascent in GDP per capita, as presented in Figure 7, is primarily attributable to the expansion of government spending programs.



(a) Response of exports per capita



(b) Response of imports per capita



(c) Response of net exports per capita

Figure 10: Responses of export and import to a unit decrease in unanticipated tax changes.

Panels (a) and (b) of Figure 10 present the per capita export and import responses to a decrease in exogenous tax changes. The impulse response function for exports, shown in Figure 10(a), demonstrates a notable pattern over the next three years. Initially, there is a decrease in exports by 3.88 percent in the first year, followed by a recovery, leading

to an increase of 2.3 percent after three years. Figure 10(b) indicates that following the tax cut, imports decrease by 0.88 percent initially, with a peak increase of 1.88 percent after five quarters. In terms of overall impact, the net export response mirrors the export pattern, exhibiting an S-shape. The most significant positive impact on net exports is observed as an increase of 4.94 percent after ten quarters. These results are statistically insignificant for exports, imports, and net exports.

7 Conclusion

This study built a quarterly narrative time series dataset in Australia from 1975 to 2018 using the narrative approach developed by Romer and Romer (2010) and Cloyne (2013). Using the unanticipated series of exogenous tax shocks as an instrument for structual tax shocks, this study finds that tax cuts cannot stimulate macroeconomic activity in Australia.

By examining the transmission mechanism of tax policies in Australia, I conclude that the lower estimates of tax multipliers can be explained by the response of net exports. Specifically, the lower elasticity of output to tax revenue in the short term is associated with decline in net exports, whereas the positive response of output in the mid-term and long term can be attributable to improved trade balance.

A Data Sources

The dataset contains six quarterly time series data for Australia covering 1975 to the 2018. These are:

1. Real tax revenue per capita(T), which is the seasonally adjusted total taxes in current price [11] divided by GDP Implicit Price Deflator in Australia[12], then divided by the size of population[13].. This series is linearly detrended and enters in log form.

2. Real government spending per capita(G), which is the sum of seasonally adjusted public gross fixed capital formation and government final consumption expenditure, then divided by the size of population. This series is linearly detrended and enters in log form.

3. Real GDP per capita(Y): Seasonally adjusted Gross domestic product in chain volume measures (ABS Catalogue 5206.001),then divided by the size of population.. This series is linearly detrended and enters in log form.

4. Three-month Treasury Bill Rates (r): The monthly series is converted into quarterly frequency by arithmetic averaging.[14]

5. Consumer price index (π): percentage change of CPI index from corresponding quarter of previous year (ABS Catalogue 6401.0).

6. Real exchange rate(E), which is the Australian dollar trade-weighted exchange rate index adjusted for relative consumer price levels (see Ellis (2001) for details)[15]. This series enters in log form.

7. Real Consumption per capital (C): Seasonally adjusted household final consumption expenditure (ABS Catalogue 5206.0) divided by the size of population. This series is linearly detrended and enters in log form.

8. Real Investment per capita (I) : Seasonally adjusted private gross fixed capital formation (ABS Catalogue 5206.0) divided by the size of population. This series is linearly detrended and enters in log form.

[11] Data for tax revenue, government spending and output are downloaded from Australia National Accounts available at https://www.abs.gov.au/statistics/economy/national-accounts/australian-national-accounts-national-income-expenditure-and-product/latest-release

[12] The series is reported in the FRED database available at https://fred.stlouisfed.org/series/AUSGDPDEFQISMEI

[13] The size of population for Australia is recorded in the FRED database available at https://fred.stlouisfed.org/series/POPTOTAUA647NWDB

[14] The 90-day Treasury Bill Rates is are downloaded from RBA statistical stables $F1.1$ available at https://www.rba.gov.au/statistics/tables/

[15] Data for real exchange rate and commodity price measured in US dollars are downloaded from RBA statistical stables $I2$ and $F15$ respectively, available at https://www.rba.gov.au/statistics/tables/

9. Real Export per capita (EX): Seasonally adjusted export of goods and service (ABS Catalogue 5206.0) divided by the size of population. This series is linearly detrended and enters in log form.

10. Real Import per capita (IM): Seasonally adjusted export of goods and service (ABS Catalogue 5206.0) divided by the size of population. This series is linearly detrended and enters in log form.

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