For Online Publication - Online Appendix

On the Effects of Government Purchases and Their Transmission Mechanism

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Contents

These are the reasons why I mention the Appendix in the paper:

1. response of consumption during Vietnam and Korean war. **DONE A.3** - REPLICATION DONE
2. results on hours, employment and earnings at three different aggregation levels: different samples. and log-VAR **DONE D.1** - REPLICATION DONE
3. results for real wage 1: different samples. **DONE D.2** - REPLICATION DONE
4. results for real wage 2: Ramey(2012) VAR. **DONE D.2** - REPLICATION DONE
5. results for OpH 1: different samples.
6. results for OpH 2: Ramey(2012) VAR.
7. results on theory: model derivations and other results.

Appendices

A Output Effects of Defense Contracts - Extra and Robustness

A.1 Lead-Lag Correlation - Robustness

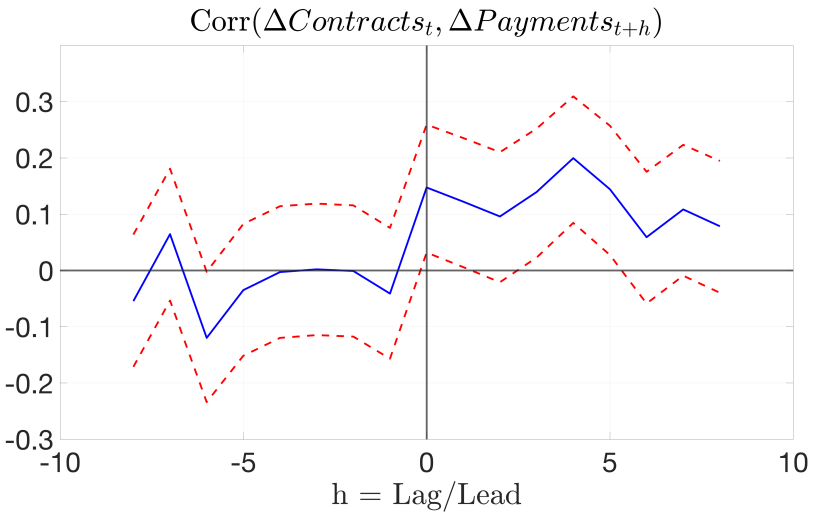


Figure 1: Lead-Lag Correlation Map Between Contracts/Spending

Notes: sample goes from 1947:1 to 2019:4. Here Δx_t means $x_t - x_{t-1}$. The price deflator used is the one of Intermediate goods and services purchased by the government, available from NIPA.

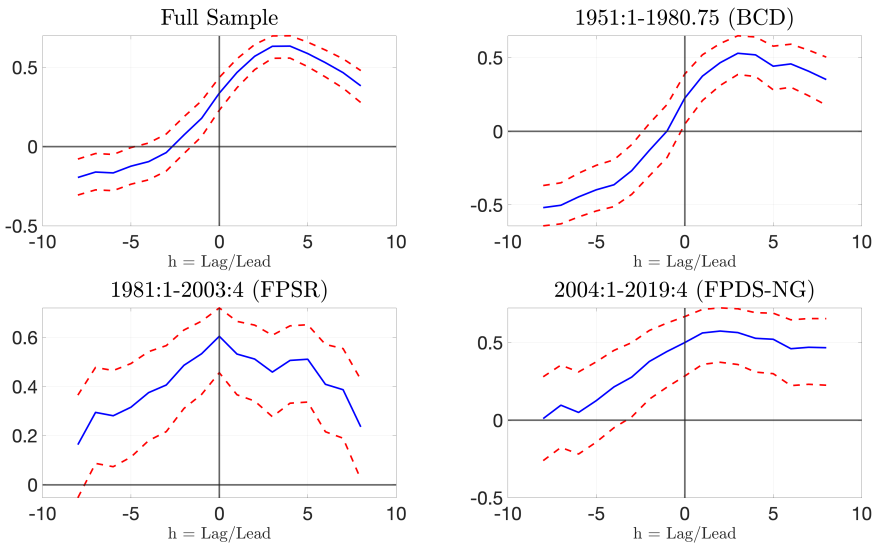


Figure 2: Lead-Lag Correlation Map Between Contracts/Spending

Notes: sample goes from 1947:1 to 2019:4. Here $\Delta_4 x_t$ means $x_t - x_{t-4}$. The price deflator used is the one of Intermediate goods and services purchased by the government, available from NIPA.

A.2 IRFs of GDP Components - Robustness

In this section I carry out robustness analysis for the IRFs of GDP's components:

- Figure 3: baseline VAR from 1947:1 to 2019:4.
- Figure 4: baseline VAR from 1954:1 to 2000:4.
- Figure 6: baseline VAR with quadratic trend from 1947:1 to 2000:4.
- Figure 5: baseline VAR with tax receipts from 1947:1 to 2000:4.
- Figures 7 and 8: mimic Ramey (2011)'s VAR:
  - *Purpose*: in the paper I follow Ramey (2016) and use the Gordon and Krenn (2010)'s transformation. Unlike her, I prefer using VAR over local projections since they deliver slightly more efficient results (see Li, Plagborg-Møller, and Wolf (2021)). The conclusion should not be affected, given that local projections and VAR estimate the same IRFs in population (see Plagborg-Møller and Wolf (2020)). Nonetheless, I provide a more standard VAR with the usual "log-real-percapita" specification as a further robustness check.
  - *Variables*: defense contracts, GDP, G, Hours worked in the private sector, 3 months T-Bill rate, Barro and Redlick (2011)'s average marginal tax rate and a quadratic trend. Nominal variables are deflated by the GDP price deflator and are expressed as logs of per capita values. Hours are in logs. Inventories are only in real per capita values - no logs - since they take on negative values and, they are not trending.
  - *Identification*: order log of real per capita defense contracts first in the VAR.
  - *Sample*: (i) 1947:1 - 2008:4 and (ii) 1954:1 - 2000:4 (sample capped by availability of Barro-Redlick's average marginal tax rate).

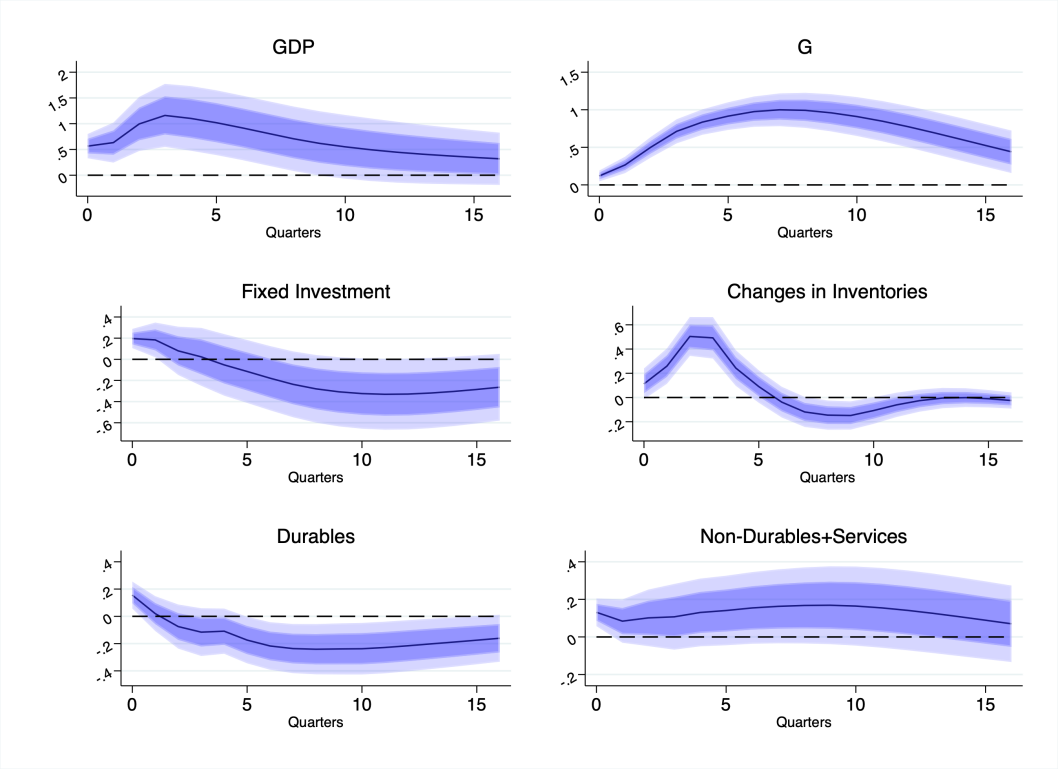


Figure 3: Baseline VAR - 1947:1 to 2019:4

Notes: Confidence bands are 68% and 90%. Values of the IRFs are normalized by the peak response of G.

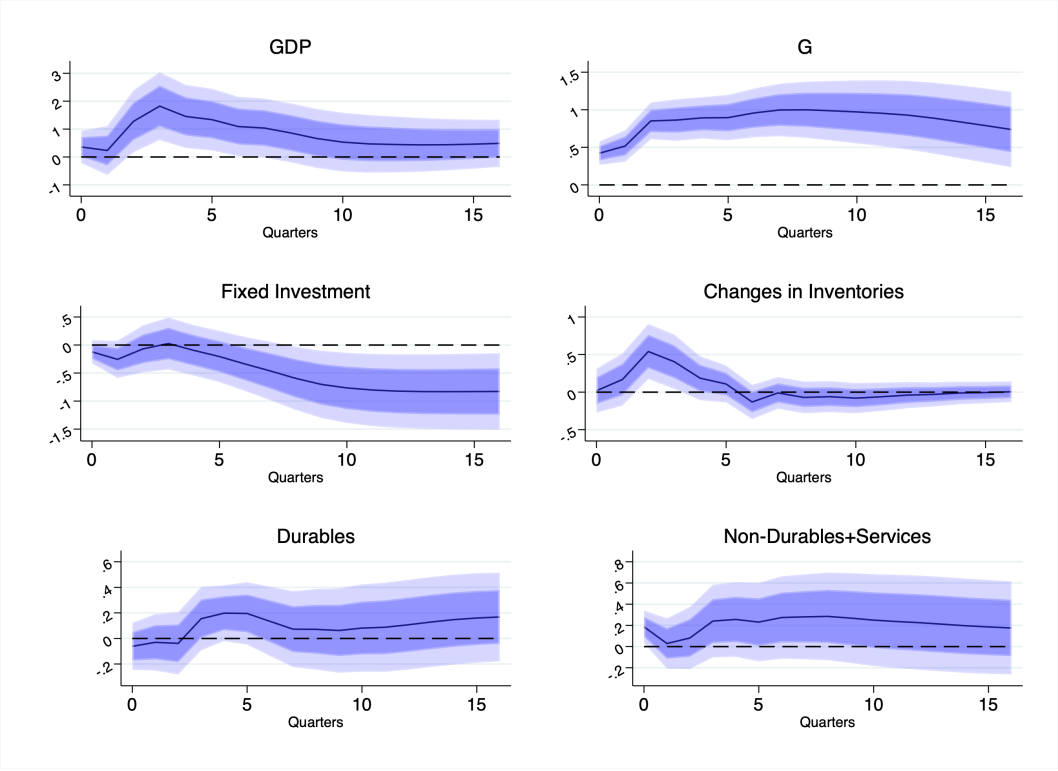


Figure 4: Baseline VAR - 1954:1 to 2000:4

Notes: Confidence bands are 68% and 90%. Values of the IRFs are normalized by the peak response of G.

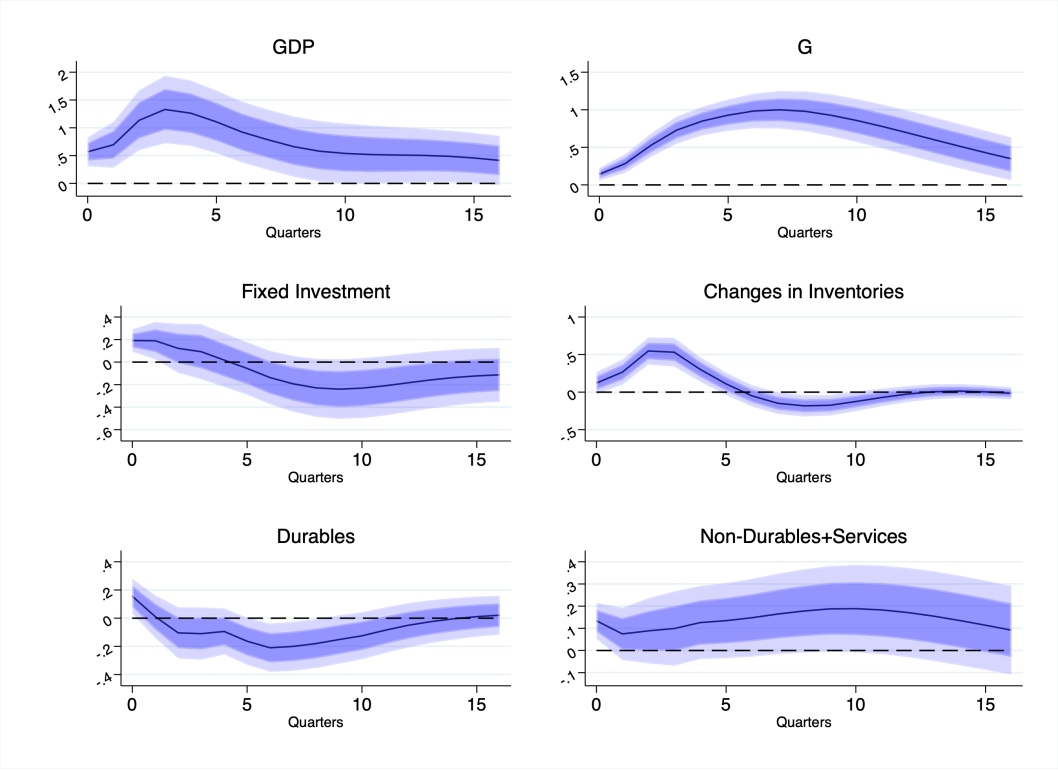


Figure 5: Baseline VAR - Tax Control

Notes: Sample goes from 1947:1 to 2000:4. The var also includes total tax receipts divided by potential output. Confidence bands are 68% and 90%. Values of the IRFs are normalized by the peak response of G.

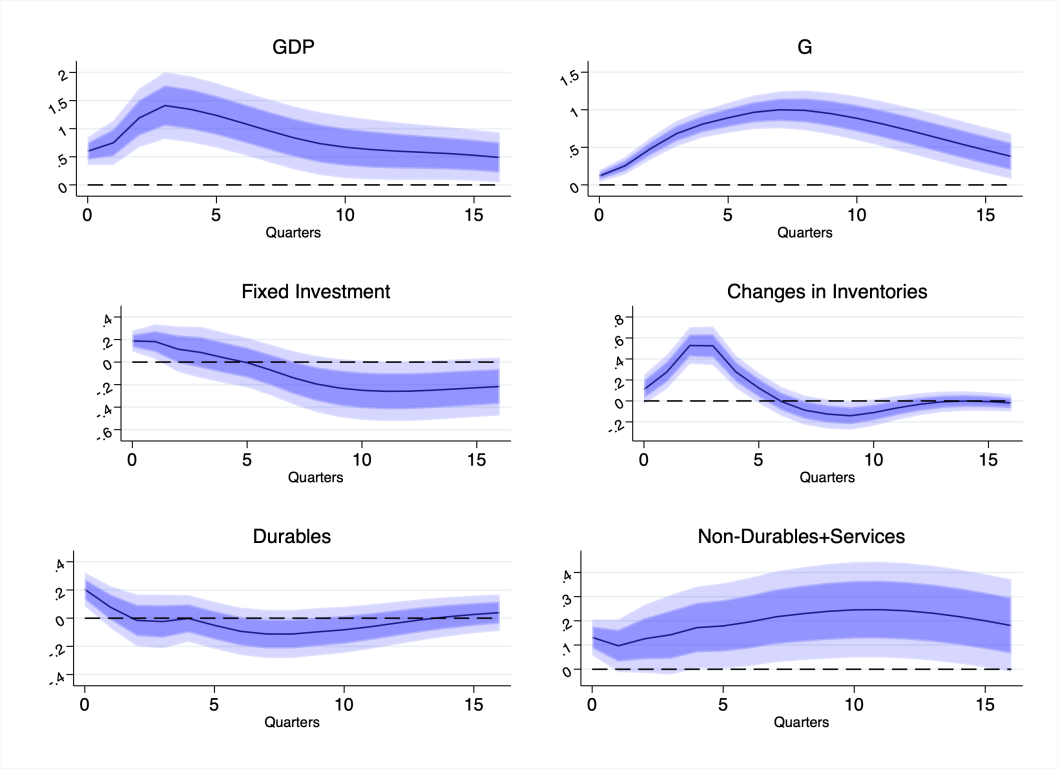


Figure 6: Baseline VAR - Quadratic Trend

Notes: Sample goes from 1947:1 to 2000:4. The var also includes total tax receipts divided by potential output. Confidence bands are 68% and 90%. Values of the IRFs are normalized by the peak response of G.

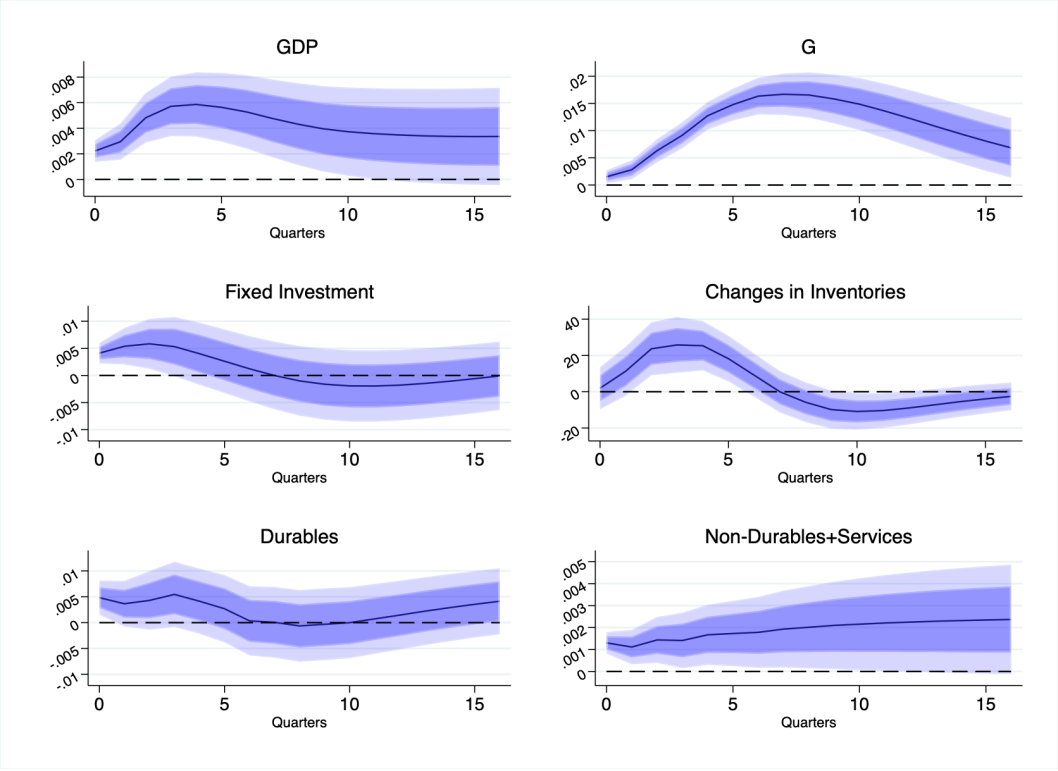


Figure 7: Ramey(2011)-type VAR - 1947:1 to 2008:4

Notes: Confidence bands are 68% and 90%.

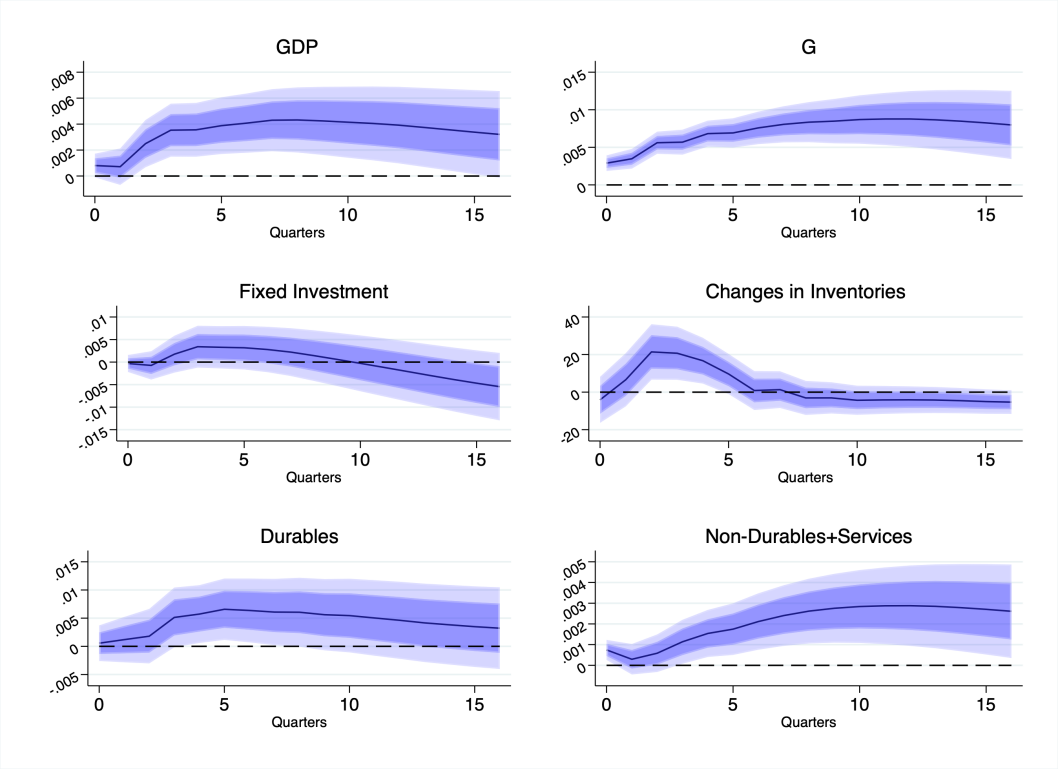


Figure 8: Ramey(2011)-type VAR - 1954:1 to 2000:4

Notes: Confidence bands are 68% and 90%.

A.3 On the Response of Consumption - Extra

The fiscal policy literature has been very divided on the response of consumption to a fiscal shock. Proponents of the identification via recursive assumption (i.e. Cholesky shocks) have consistently found positive responses of consumption. On the contrary, empirical work which used either war dates or defense news shock has found more negative responses of consumption, with some exception and caveats.[1] Table 1 summarizes the previous findings of the literature about the effects of fiscal shocks on different measures of consumption.

Paper	Shock	Method	Sample	Bands	C	$C^{\text{Dur.}}$	$C^{\text{NonDur.}}$	$C^{\text{Serv.}}$	$C^{\text{NonDur. + Serv.}}$
Ramey and Shapiro (1998)	War Dates	Distributed Lags	1947:1-1996:4	80%	NA	↑↓	↔	NA	NA
Edelberg, Eichenbaum, and Fisher (1999)	War Dates	VAR	1947:1-1996:4	68%	↔	↑↓	NA	NA	↔
Burnside, Eichenbaum, and Fisher (2004)	Weighted War Dates	Distributed Lags	1947:1-1995:4	95%	↔	NA	NA	NA	NA
Fisher and Peters (2010)	Top3 Excess Returns	VAR	1958:1-2008:4	68%	↓↑	NA	NA	NA	NA
Ramey (2011)	Defense News	VAR	1947:1-2008:4	95%	NA	↓	↓	↑	NA
Nekarda and Ramey (2011)	Bartik	CrossSectional	1960-2005	95%	NA	NA	NA	NA	NA
Ramey (2016)	Defense News	LP	1947:1-2008:4	90%	NA	↑↓	NA	NA	↓
Ben Zeev and Pappa (2017)	Defense News	VAR(MediumHorizon)	1947:1-2007:4	95%	↑↓	NA	NA	NA	NA
Fatas and Mihov (2001)	Cholesky	VAR	1960:1-1996:4	68%	↑	↑	↑	↑	NA
Galí, López-Salido, and Vallés (2007)	Cholesky	VAR	1954:1-2003:4	68%	↑	NA	NA	NA	NA
Monacelli and Perotti (2008)	Cholesky	VAR	1947:1-2003:4	68%	↑	NA	NA	NA	NA

Notes: NA means "Not Available" because researchers did not look into it. "0" means "response is not statistically significant". ↓↑ means the variable initially falls and then increases.

Table 1: Literature Review: Consumption Response to Fiscal Shocks

The literature review confirms the lack of a consenus around the effects of fiscal shocks on consumption. This is why I turn attention to the actual data during the two major military build-ups after WWII: the Korean and the Vietnam wars. Data on real service and non-durable consumption per capita during the Korean and Vietnam war suggest that consumption was almost never below trend, estimated either with a polynomial or Hamilton (2018)'s filter. First, Figure 9 shows the path of real service and non-durable consumption per capita during the Vietnam war, along with their long run trend. The dashed vertical line indicates the Tonkin incident on 1965:1, which marked the beginning of the military build-up.

The figure shows the path of real (i) service consumption per capita (left panel) and (ii) non-durable consumption per capita (right panel), during the Korean war and Vietnam war respectively. The thicker solid red line shows the data as they come from the NIPA tables. The blue line is a polynomial trend while the green dashed line shows the trend estimated via Hamilton (1994)'s filter.

Notice that in both cases, consumption tends to be above trend. In those years, the share of defense contracts relative to potential GDP increased right after the Tonkin incident and peaked in 1966:3. The apparent decrease in consumption

[1]For instance, service consumption increase after a defense news shock (see Ramey (2011)). Moreover, the initial positive response of durable consumption followed by its fall is primarily driven by the forwards buying at the onset of the Korean war (see Ramey (2016)). I summarize in detail the empirical evidence on the response of consumption in the Online Appendix A.3.

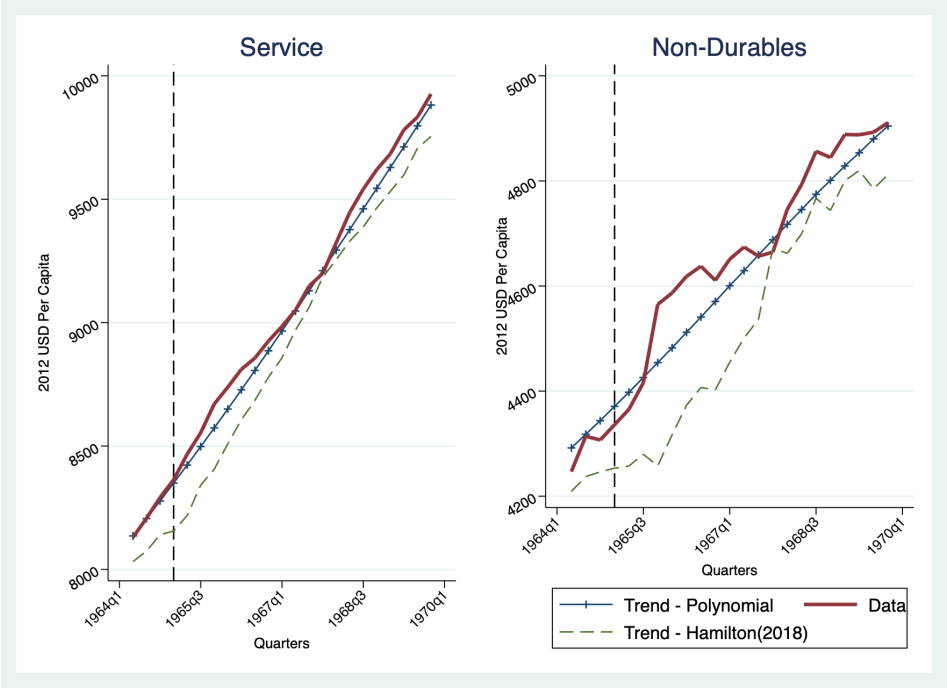


Figure 9: Consumption Path - Vietnam War

Notes: trends are calculated in the 30 years around the Vietnam war.

occurring from 1967 to 1968 was due to increased taxes. In March of 1966 the Tax Adjustment Act increased taxation by almost one billion of dollars and in November of the same year Public Law 89-800 increased taxation by another 1.5 billion dollars in order to finance the military operations in Vietnam (see C. D. Romer and D. H. Romer (2010)). Nevertheless, consumption never fell below trend.

Second, Figure 10 shows the path of real service and non-durable consumption per capita during the Korean war, along with their long run trend. The dashed vertical line emphasizes 1950:3, when the Korean war began following the North Korean surprise invasion of South Korea, which marked the beginning of the military build-up.

Notice that the service consumption was never below trend during the war. On the contrary, non-durable consumption was subject, as well as durable, to the buying wave driven by fear of rationing. Basically, individuals had fresh in their mind the rationing occurred during WWII and they rushed to buy all those goods which used to be in short supply: durables (like cars and kitchen appliance) and non-durables (like coffee and food). This is well known in the literature (see Ginsburg (1952), Hickman (1955), Ramey (2016) and Binder and Brunet (2021)).

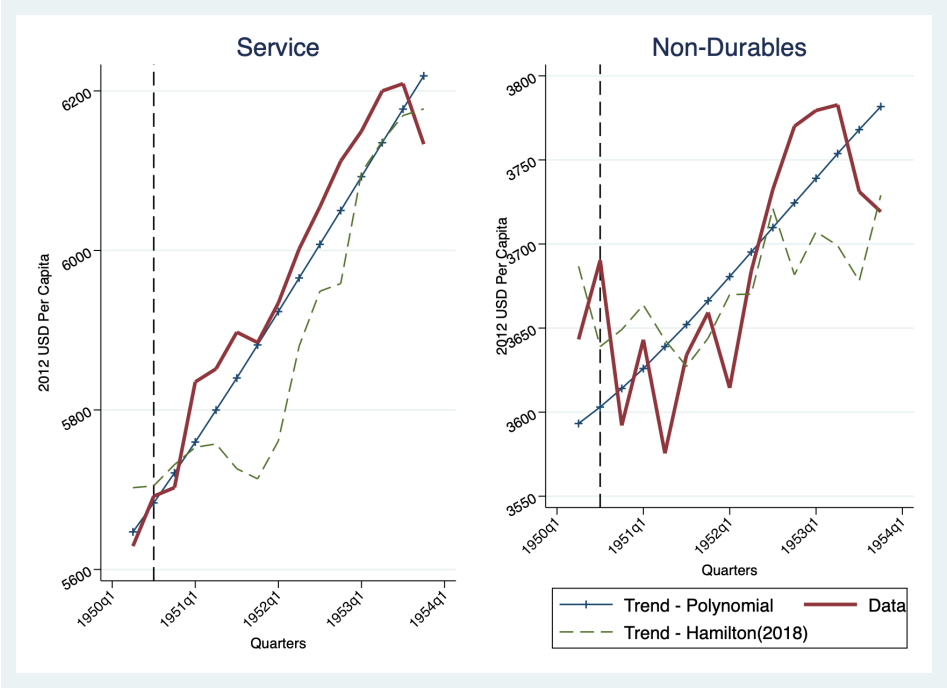


Figure 10: Real Consumption per Capita - Korea War

The forward buying wave caused non-durables to spike in 1950:3 (first wave) and in 1951:1 (second wave). Afterwards, individuals realized that the scale of the Korean war was minimal relative to WWII and the shelves in the grocery stores were promptly re-stocked. Therefore, non-durable consumption - as well as durable - fell since individuals had stockpiled enough items which could suffice for several months (intertemporal substitution).

Augmenting the VAR with Defense News Shocks: As a further robustness check, I estimate the baseline VAR by ordering the updated series of defense news shocks of Ramey and Zubairy (2018) first. I then look at the shocks to defense contracts, ordered second. This is done in the spirit of netting out the effects of news from the effects of contracts. The results are qualitatively identical to the one reported in the paper, obtained without defense news shocks ordered first. However, the response of consumption is now stronger relative to the previous one. Figure 11 shows the IRFs of non-durables-plus-service consumption in the two cases in response to a shock to contracts.

Notice that the response of consumption at early horizons is stronger when defense news shocks are ordered first in the VAR. The difference is never statistically significant, though. This evidence is consistent with a theory which see defense

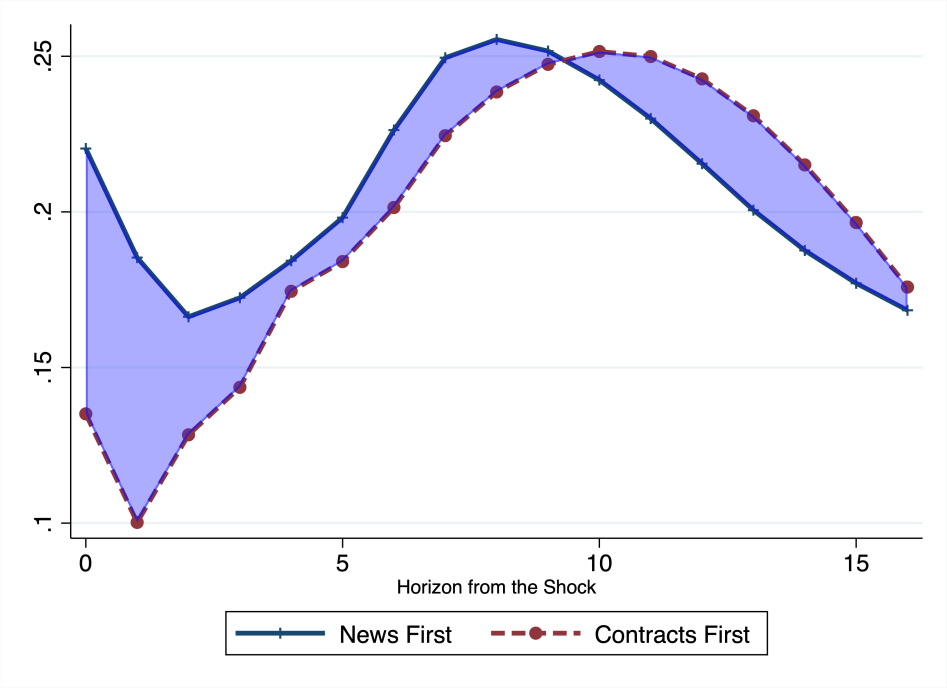


Figure 11: IRFs of Non-Durable-plus-Service Consumption to Contracts

Notes: Sample goes from 1947:1 to 2000:4. Values of the IRFs are normalized by the peak response of G. "*News First*" refers to the IRF of consumption in a VAR which orders defense news shocks first and contracts second. "*Contracts First*" reports the IRF showed in the paper.

news shocks as a stronger shifter of labor supply than labor demand and contracts as a shifter of labor demand.

B Fiscal Multipliers

In this section I estimate the fiscal multiplier implied by defense contract shocks. Secondly, I compare my estimates to the estimates of "*obligation-multipliers*" obtained by Dupor and Guerrero (2017) and Brunet (2020). Here, obligation-multipliers indicates a multiplier defined by the effects of a 1$ increase in federal obligations, rather than government spending, on GDP. Finally, I provide evidence that the multiplier estimated in this manner aligns with the characterization of an approximately closed-economy/no-monetary-policy-response/tax-financed national multiplier. The "closed economy" characterization follows since no international spillover is systematically detected in response to shocks to defense contracts.

B.1 Multiplier Estimates

My starting point is Ramey (2016), which suggests to calculate the multiplier using the one-step LP-IV method (see also Stock and Watson (2018)). The method consists in regressing the cumulative change in GDP on the cumulative change in G, instrumented by the shocks and incorporating relevant (lagged) variables as controls.

$$\sum_{h=0}^{H} y_{t+h} = \mathcal{M}_H \cdot \underbrace{\sum_{h=0}^{H} g_{t+h}}_{\text{Instrumented with Shock}_t} + \text{Lags \& Controls} + \varepsilon_{t+h} \tag{1}$$

where y_t is GDP divided by potential output, g_t is NIPA measure of G divided by potential output, Lags&Controls include 4 lags of y_t and g_t plus four lags of the Shock$_t$ as well as four lags of hours worked in the private business sector, the 3 months T-Bill rate plus four lags of consumption and investment also divided by potential output.[2] Shock$_t$ can be either defense news shocks (i.e. narrative method), NIPA government spending (i.e. Cholesky decomposition) or defense contracts, depending on what identification method the researcher decides to use.

This method is equivalent to a two steps procedure where the cumulative change in GDP is regressed on the shock via local projections and the estimated OLS coefficient is divided by the OLS coefficient of a regression of the cumulative change in G on the shock. The benefit of the one-step procedure is that it allows to obtain the standard errors of the multiplier as the TSLS' standard errors of $\hat{\mathcal{M}}_H$. Finally, notice that since local projections and VAR estimate the same IRFs in population (see Plagborg-Møller and Wolf (2020)), this method is asymptotically equivalent to calculating multipliers by dividing the area under the IRF of GDP by the area under the IRF of G.

Figure 12 shows the estimates of the fiscal multiplier by horizon obtained with defense contracts.[3]

For the initial two quarters, the estimates are infinite and thus omitted when the sample includes the Korean war. This infinite size of the multiplier is a typical occurrence due to the anticipation effect, where GDP components surge before G does. Given that the multiplier is asymptotically akin to the ratio of the area under GDP's IRF to that of G, the multiplier skyrockets when the denominator

[2] I have noticed that the inclusion of consumption and investment helps estimating multipliers more precisely, no matter the instrument used (i.e. defense news shocks, Cholesky shocks or defense contracts).

[3] This boils down in setting "Shock$_t$" equal to real defense contracts divided by real potential output in Equation (1).

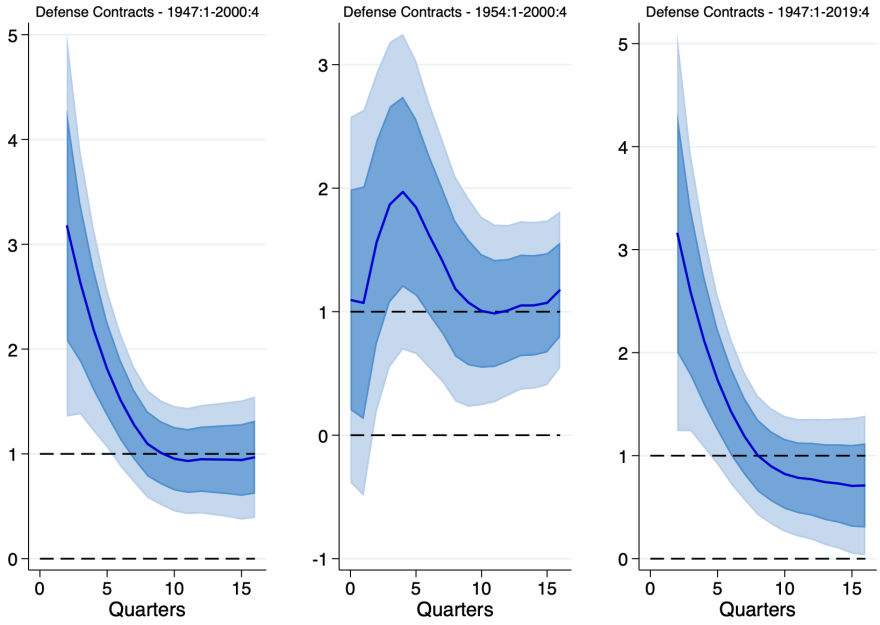


Figure 12: Cumulative Fiscal Multipliers - Defense Contracts

Notes: Multipliers are obtained using the same method outlined in the paper in Equation (1). Confidence bands are 68% and 90%.

is near zero. Eventually, the multiplier gradually decreases, settling at a value of one in the long-run (i.e., 4-year multiplier).

Inclusion of taxes and/or a quadratic trend leads to slightly higher estimates than the baseline. Using the sample from 1954:1-2000:4, which excludes the Korean War, results in slightly larger multipliers compared to the baseline sample (middle panel). Although these estimates are less precise, they still hold statistical significance. Lastly, estimates from the full sample are smaller and less precise in comparison to the baseline, with a long-run multiplier estimated at 0.71 (right panel).

Long-run Multiplier Distribution: In order to account for this variability, I also construct a distribution of the long-run (i.e., 4 years) multiplier via Monte Carlo experiment. This involves pooling estimates of the multiplier's asymptotic distributions for each specification and sample to gain insight into the most probable size of the fiscal multiplier across different specifications and samples. The distribution, when all samples are considered, is centered around one with a standard deviation of 0.45; see top panel of Figure 13. When specifications with the

full sample are excluded from the simulation, the distribution narrows, displaying a standard deviation of 0.40 and centering around 1.14; see bottom panel of Figure 13.

Varying specifications using defense contracts yield a distribution of the 4-year multiplier that aligns with the reasonable range of estimates found in Ramey (2016) meta-analysis: between 0.6 and 1.5.

Comparison of National Multiplier Estimates: Finally, I compare my estimates to those ones obtained with those ones obtained with (i) defense news shocks and (ii) Cholesky shocks.

I plot in Figure 14 the estimates of the fiscal multipliers obtained with (i) shocks to defense contracts (first column), (ii) defense news shocks (second column) and (iii) Cholesky shocks (third column). I consider three samples: (a) 1947:1 to 2000:4 (first row), (b) 1954:1 to 2000:4 (second row), (c) 1947:1 to 2019 (third row) and (d) 1954:1 to 2019:4 (fourth row).

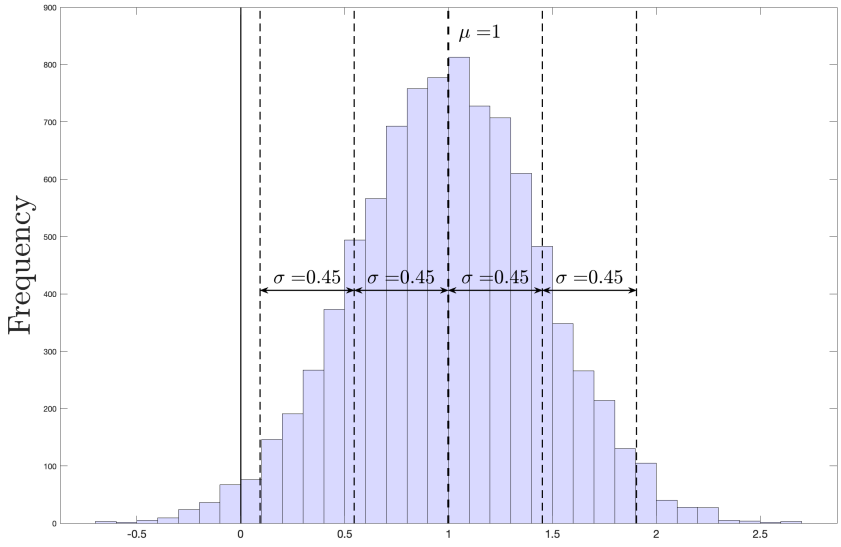
There are two main take-away from this figure. First, defense contracts allow for precise multiplier estimates and yield slightly larger multiplier point estimates compared to defense news shocks. Gains in efficiency are more evident in samples which exclude the Korean war (row 2 and 4). Second, multipliers derived from Cholesky shocks are smaller than those ones obtained with either defense news shocks or defense contracts due to a downward bias originating from their delay (as detailed in Briganti and Sellemi (2023)). Basically, Cholesky shocks miss the early-stage production of defense contractors, monitored by NIPA as inventories. This problem originates from using the delayed NIPA measure of G ordered first in the VAR to identify government spending shocks.

B.2 Comparison with Obligations Multipliers

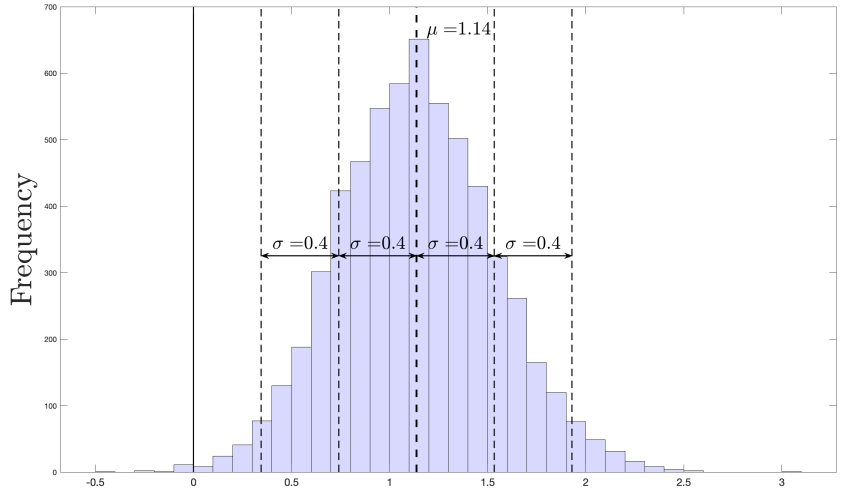
In this section, I aim to reconcile my multiplier estimates with those of Dupor and Guerrero (2017) and Brunet (2020), who used a measure of defense obligations, rather than spending, to estimate national multipliers. As defense contracts are a type of federal obligation, it's crucial to align these different yet related measures to establish a comprehensive view of fiscal policy impacts.[4]

Firstly, Dupor and Guerrero (2017) utilize Department of Defense (DoD) documents pertaining to state-level defense contracts, dating back to the fiscal year

[4]Nakamura and Steinsson (2014) and Auerbach, Gorodnichenko, and Murphy (2020) also estimate local multipliers using a measure of defense contracts. However they do not provide empirical estimates of the national multiplier.



(a) All Samples



(b) Excluding Sample 1947:1-2019:4

Figure 13: Distribution of 4 Years Multiplier Across Specifications

Notes: distribution of multipliers constructed in the same way as the one reported in the paper but omitting the full-sample. Notice that the distribution has a smaller standard deviation and a larger mean: multipliers are larger and estimated more precisely.

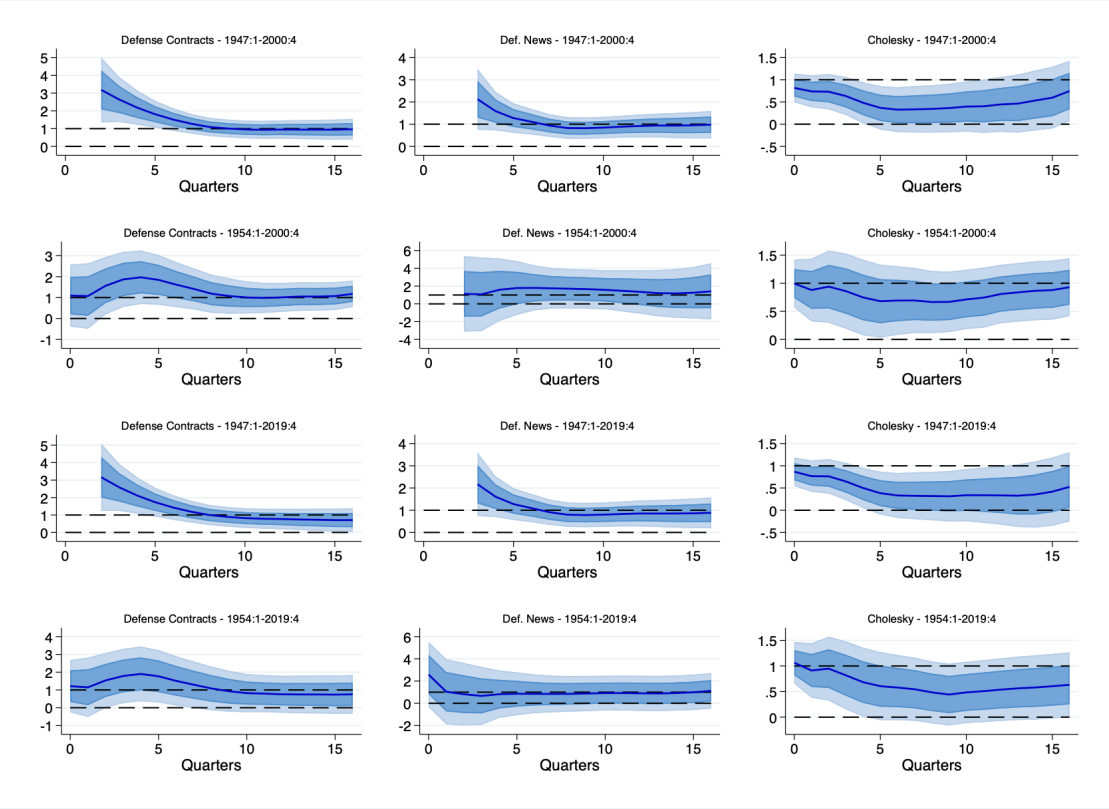


Figure 14: Cumulative Fiscal Multipliers

Notes: Multipliers are obtained by estimating Equation (1). Set Shock_t equal to either (i) defense contracts, (ii) defense news shocks or (iii) G as measured by NIPA.

of 1951. They assemble an annual panel of defense contracts at the state level, spanning from the fiscal year 1951 to 2014. After aggregating spending across states, they employ the following equation for their estimation:

$$\sum_{h=0}^{H} \frac{Y_{t+h} - Y_{t-1}}{Y_{t-1}} = \mathcal{M}_H \cdot \sum_{h=0}^{H} \underbrace{\frac{G_{t+h} - G_{t-1}}{Y_{t-1}}}_{\text{Instrumented}} + \text{Controls} + \varepsilon_{t+H}$$

where Y_t is national real GDP per capita in calendar year t, G_t is the aggregated real per-capita value of military contracts across state by fiscal year t, $\mathcal{M}_H$ is the cumulative fiscal multiplier at horizon H.[5] The instrument for the cumulative sum

[5]They use CPI inflation to deflate variables and the total US population to obtain per-capita values. Their set of controls includes four variables: the price of oil, the real interest rate and their lags.

of contracts at horizon H is: $\frac{G_t - G_{t-1}}{Y_{t-1}}$.

Brunet (2020) uses a similar specification but without instrumenting the cumulative sum of G_t. Moreover, her measure of G_t is a new variable called Budget Authority, which measures defense spending when it is authorized and before funds are dispersed from the Treasury, in a given fiscal year.

Firstly, notice that both works do not provide estimates of the fiscal multiplier, defined as the effect of 1$ of spending on GDP. In fact, they estimate the effect of 1$ of defense contracts and 1$ of Budget Authority on GDP. The advantage of using quarterly defense contracts as an instrument for the NIPA measure of G, is to preserve the traditional definition of multiplier and to account for potential different effects of fiscal shocks on other components of G, different from defense contracts and defense spending.

Secondly, both works provide estimates of the "multiplier" using measures of spending recorded by fiscal year on an annual measure of output recorded on a calendar year basis. In this sense, my measure of quarterly defense contracts is more precise.

Table 2 reports the estimates of the national multiplier calculated using my method (top panel), Dupor and Guerrero (2017)'s method (middle panel) and Brunet (2020)'s method (bottom panel).

Table 2: Comparison of Fiscal Multipliers

Instrument	Multiplier Interpretation	Frequency	Sample	1 Year	2 Year	3 Year	4 Year
Defense Contracts	Spending Multiplier	Quarterly	1947:1-2000:4	2.184***	1.096***	0.949***	0.968***
				(0.586)	(.311)	(0.312)	(0.350)
Defense Contracts	Spending Multiplier	Quarterly	1955:1-2000:4	1.970***	1.184**	1.010**	1.178***
				(0.772)	(0.550)	(0.417)	(0.383)
Defense Contracts	Spending Multiplier	Quarterly	1955:1-2014:4	1.761*	0.982	0.724	0.716
				(0.918)	(0.746)	(0.620)	(0.631)
Defense Contracts	Spending Multiplier	Quarterly	1951:1-2014:4	1.225	0.312	0.105	0.033
				(0.793)	(0.588)	(0.556)	(0.575)
Dupor and Guerrero (2017):							
Defense Contracts	Obligation Multiplier	Fiscal Year	1951-2014	-	0.33***	-	0.07
					(0.12)		(0.24)
Defense Contracts	Obligation Multiplier	Fiscal Year	1955-2014	-	1.00	-	-
					(0.64)		
Brunet (2020):							
(Defense) Budget Authority	Obligation Multiplier	Fiscal Year	1946-2007	1.291***	1.375***	1.512***	-
				(0.180)	(0.280)	(0.415)	
(Defense) Budget Authority	Obligation Multiplier	Fiscal Year	1954-2007	1.650***	1.420	1.291	-
				(0.774)	(1.137)	(1.385)	

Notes: symbol "-" means the estimate is not reported in the paper. SEs are reported in parenthes and they are heteroskedasticity robust for my estimates. $*$ means $p < 0.1$, $**$ means $p < 0.05$, $***$ means $p < 0.01$.

Comparing with Brunet (2020): Starting from the bottom panel, Brunet (2020) produces precise estimates exceeding 1.3 when the sample includes the

Korean War. However, when she excludes the Korean War from the sample, the estimates lose statistical significance and their magnitude diminishes. In contrast, estimates obtained using quarterly defense contracts as an instrument for G yield stable and robust results across these two samples, as illustrated in the first two rows of the top panel. In general, Brunet's estimates exceed mine and, in turn, are larger than those previously obtained via other methods such as Cholesky shocks and defense news shocks.

As a potential explanation for these results, she suggests that her new measure precedes the initiation of production by defense contractors, as monitored by inventories. This theory, confirmed in Briganti and Sellemi (2023), suggests that this only applies to Cholesky shocks, since defense news shocks also predate the start of production. Furthermore, as defense contracts are recorded at the time a new contract is awarded — which marks the onset of production — defense contracts do not omit any inventory response related to defense production. Thus, the larger size of Brunet's estimated multipliers could be attributable to her distinct estimation method and the annual aggregation.

Comparing with Dupor and Guerrero (2017): In examining the estimates of Dupor and Guerrero (2017), it's evident from the middle panel that they obtain very small point estimates: 0.33 for the 2-year multiplier and essentially zero for the 4-year multiplier. The authors note that this small magnitude is due to the inclusion of the years 1953 and 1954 in the sample, which are associated with the large drop in defense contracts following the end of the Korean War.[6] Thus, they adjust their sample to start from 1955 and find a multiplier of 1.00, which is slightly non-significant (p-value of about 12%). They conclude that the inclusion of the Korean War years is the primary reason for their small multiplier estimate.

I will now reconcile my estimates with theirs. I extend my estimation sample to cover the period from 1955:1 to 2014:4 and the multipliers become smaller and insignificant, except for the horizon 1. The 2-year multiplier is approximately 1, identical to theirs when they employ the same sample. However, my point estimate for the 4-year multiplier is 0.7, which is ten times higher than theirs when the sample starts in 1951. Consequently, I extend the sample back to 1951 to match theirs, and I find that the estimates suddenly decrease to 0.3 and 0 for the 2-year and 4-year multipliers, matching theirs. There are two reasons for this outcome. Firstly, extending the sample beyond 2000 adds minimal variation in G relative to GDP, which seems to make estimates less precise (see Figure **??**). Secondly, the

[6] Actually, the total value of defense contracts stops falling in the 4th quarter of 1953, according to BCD. However, since Dupor and Guerrero (2017)'s measure of defense contracts is recorded by fiscal year, 1953Q4 already belongs to fiscal year 1954 and this is likely the reason why they observe a fall of defense contracts in that year.

most significant drop in my estimates occurs when I extend the sample back to 1951, that is, right in the middle of the Korean War. In fact, initiating the sample from 1951 misses out on the outbreak of the Korean War, whose primary output effect occurred in the last quarter of 1950 with the large response of inventories, primarily capturing defense production. Starting the sample in the middle of the war can therefore bias the estimates of the multiplier downwards by missing out that initial response. Dupor and Guerrero (2017)'s sample choice simply omits the robust initial output effect of defense contracts at the onset of the Korean War, which did not have a zero multiplier, as indicated in my baseline estimate of a unity multiplier.

B.3 Characterizing the Nature of the National Multiplier

In this section, I examine the response of taxes, monetary policy, and imports to a positive shock to defense contracts. My findings suggest that an increase in government spending, triggered by this type of fiscal shock, is funded by distortionary taxation. It doesn't prompt any significant reaction from monetary policy and doesn't instigate any "expenditure switches" through the rise in imports. Therefore, I argue that my estimated multiplier aligns with the definition of a tax-financed, no-monetary-policy-response, close-economy national multiplier. It's essential to note that designating the multiplier as a "close-economy" one doesn't imply that the US economy is a closed economy, which, in reality, isn't the case. Instead, it indicates that the operative transmission channels don't exhibit the characteristics of an open economy, meaning no significant international spillover is detected in reaction to a shock.

The characterization of the multiplier is crucial for at least three reasons. Firstly, it helps unravel some primary transmission channels at play. For instance, as shocks to defense contracts are financed via distortionary taxation, work incentives are affected, subsequently impacting the multiplier's magnitude, as it is well known in theoretical literature (see Baxter and King (1993), Ohanian (1997) and Burnside, Eichenbaum, and Fisher (2004)). Likewise, the role of the monetary policy response in determining the multiplier's size is well-recognized in theoretical models (see Woodford (2011), Christiano, Eichenbaum, and Rebelo (2011) and Nakamura and Steinsson (2014)).[7] However, my study shows that monetary policy was either extremely weak - as suggested in Clarida, Galí, and Gertler (2000) - or non-responsive given these shocks' limited inflationary effect. Grasping these transmission channels' significance for the propagation of fiscal shocks is essential

[7]In particular, an accommodating policy discourages intertemporal substitution and reduces the crowding out of consumption by boosting the multiplier, while "*leaning against the wind*" has the opposite effect and dampens the multiplier.

for formulating the simplest yet empirically consistent model to (i) simulate the effects of fiscal policy and then (ii) create policy counterfactuals.

Secondly, the multiplier's characterization enables me to compare my estimate to those derived from model-simulated data, facilitating discrimination between models. For example, Nakamura and Steinsson (2014) develop a regional New Keynesian model to produce a cross-sectional multiplier and a tax-financed, non-monetary-policy-response, close-economy national multiplier. With my multiplier characterization, I can compare my estimate with those generated by different versions of their model and draw conclusions about which version approximates the empirical one I obtain and which transmission mechanism allows that.

Finally, this national multiplier characterization notably narrows the gap between regional and national estimates. It is well known in the literature that national and regional estimates are significantly different. Specifically, Chodorow-Reich (2019) shows that a regional multiplier is a lower-bound for a deficit-financed, non-monetary-policy-response, close-economy national multiplier. This is because regional spillovers reduce the regional multiplier's size, unlike the national one, which fully encompasses all potential cross-regional effects. Incorporating government deficits into a structural model calibrated to match my estimates, would allow me to transform my tax-financed, non-monetary-policy-response, close-economy national multiplier into a deficit-financed one. This would enable comparison with available cross-sectional estimates derived from more recent regional databases, allowing me to test empirically the lower-bound result's validity.

Given the importance of the multiplier's characterization, I will first analyze the response of taxes to a positive shock to defense contracts in the following paragraph. Then, I will examine the response of monetary policy, and finally, I will study the import response.

The Response of Taxes. The fiscal policy literature commonly acknowledges that military expansions were primarily financed through distortionary taxation up until the 2000s.[8] For instance, during the onset of the Korean war, both personal income and production taxes saw significant increases, with President Truman firmly advocating for fiscal equilibrium despite the considerable military expenditure. Although the fiscal response to the Vietnam war was less immediate compared to that of the Korean war, President Johnson had been recommending tax hikes from as early as 1967. By June of 1968, the Revenue and Expenditure Control Act was enacted to curb an overheating economy, primarily brought about by the military stimulus required for the operations in Vietnam, as per the Sur-

[8]See Ohanian (1997), Edelberg, Eichenbaum, and Fisher (1999), Burnside, Eichenbaum, and Fisher (2004), Eichenbaum and Fisher (2005) and Ramey (2016).

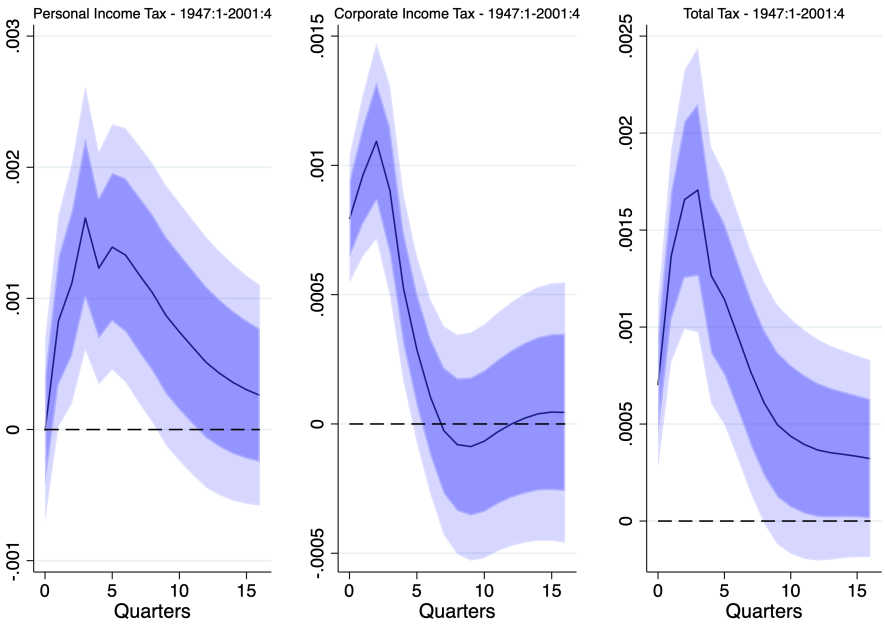


Figure 15: Tax Response

vey of Current Business.[9] This increased taxation predominantly impacted excise taxes, as well as personal income and corporate taxes.

To substantiate this historical evidence, I expand the baseline VAR from the paper by rotating in and out the average labor income tax rate, the average capital income tax rate, and the average total tax rate. The average labor tax rate was determined by dividing personal income tax receipts by total wages, as per NIPA data. Similarly, I obtain a proxy for the average capital income tax rate by dividing the sum of taxes on corporate income and production by nominal GDP. Lastly, as with Ramey (2016), the average total tax rate is constructed by dividing total tax receipts by nominal GDP. Figure 15 depicts the IRFs of these three variables in reaction to defense contracts for the baseline sample period of 1947:1 to 2001:4.

All average tax rates rise, reinforcing that variations in G triggered by defense contracts shocks are financed through taxation. Consequently, the estimated fiscal multiplier can be interpreted as a tax-financed multiplier.

[9]The other major reason was a tax credit on business investments on new plant and equipment, introduced before the outbreak of the Vietnam war.

Interest Rates, Inflation and the Monetary Policy Response. Several compelling reasons suggest that both real and nominal interest rates should rise following a positive government spending shock.

First, viewed through the lens of the standard Real Business Cycle (RBC) model, an increase in government spending implies additional taxation, which escalates competition for resources, subsequently crowding out investment and consumption. To counteract this negative income effect, households expand their labor supply, which boosts capital productivity due to labor-capital complementarity, thereby increasing the real interest rate. Formally:

$$R_t\uparrow - 1 = f_k\left(\underset{(-)}{K_t}, \underset{(+)}{N_t\uparrow}, \underset{(+)}{u_t}\right) - \delta$$

where R_t is the gross real interest rate, f_K is the marginal product of capital, which, in turn, is a negative function of the level of capital K_t and a positive function of hours worked N_t and capital utilization, u_t. Second, from a Neo-Keynesian perspective, an increase in government spending triggers inflation, and according to a Taylor-type monetary policy rule, this would cause a surge in nominal interest rates (e.g. see Galí, López-Salido, and Vallés (2007), Woodford (2011) and Christiano, Eichenbaum, and Rebelo (2011)). Lastly, a more intuitive explanation is that military build-ups, even when tax-financed, might be viewed by financial markets as a potential precursor to a larger deficit. This perception would then trigger an increase in government bond interest rates.

Given these reasons, one would anticipate an uptick in both nominal and real interest rates following a positive shock to defense contracts. I examine this assumption by augmenting my baseline VAR with some outcome of interests. Specifically, I observe the reactions of the 3-month T-Bill rate, the CPI inflation, and the real interest rate, derived from the difference between the two. The IRFs to a shock to defense contracts are presented in Figure 16.

Firstly, it is clear from the middle panel that the nominal interest rate, represented by the 3-month T-Bill rate, remains unaffected by defense contracts. This finding holds true even when various other interest rate measures are used. For example, I look at the response of the Aaa corporate bond yields (Figure 17), the Baa corporate bond yields (Figure 18) and the federal funds effective rate (Figure 19).

The lack of movement in the nominal interest rate could be viewed as an indication of a strongly accommodating monetary policy, where nominal rates are kept fixed while strong inflation dampens the real interest rate. This experiment is analyzed in Nakamura and Steinsson (2014), and their model produces either

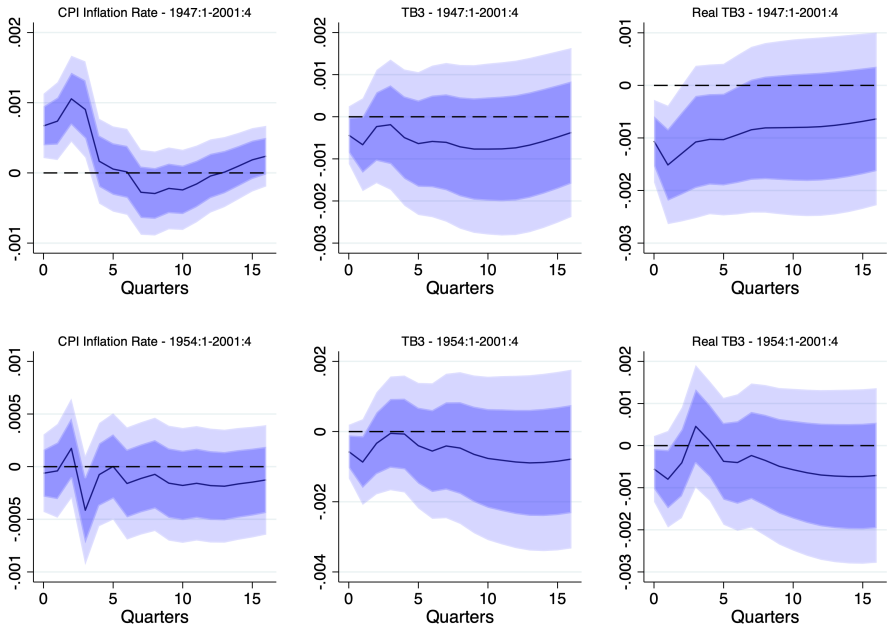


Figure 16: IRFs of Inflation and Interest Rates to Contracts

Notes: in the top panel the sample goes from 1947:1 to 2000:4. In the bottom panel the sample goes from 1954:1 to 2000:4.

infinite or very large national multipliers. At a superficial analysis, this story is consistent with the empirical evidence showed in the left and right graphs panels of Figure 16: the real interest rate declines in the right panel, a result entirely driven by increased inflation, showed in the left panel. However, the positive response of inflation and the consequent fall in the real interest rate, is not robust to the exclusion of the Korean war. This finding remains consistent when the GDP price deflator inflation measure is used in place of the CPI inflation measure.

The lack of movement in the real interest rate might again be viewed as evidence of accommodating monetary policy as it was analyzed in Woodford (2011) and Nakamura and Steinsson (2014). However, even in this limiting scenario, the nominal interest rate should rise in response to current and future increases in government spending to keep the real interest rate constant.[10] However, this is at odds with null response of nominal rates.

Moreover, note that neither the nominal nor the real interest rates move sig-

[10]See end of Section IIIA in Woodford (2011). Plug his Equation (14) into his Equation (24), use the definition of $\hat{G}_t$, a first-order Taylor approximation and the Fisher equation to obtain this result.

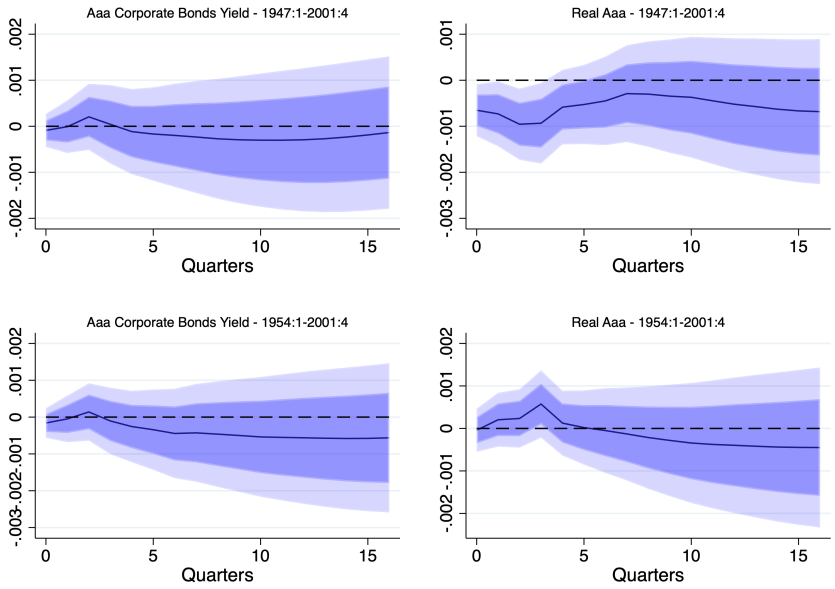


Figure 17: IRF to Defense Contracts - AAA Corporate Bonds Yield

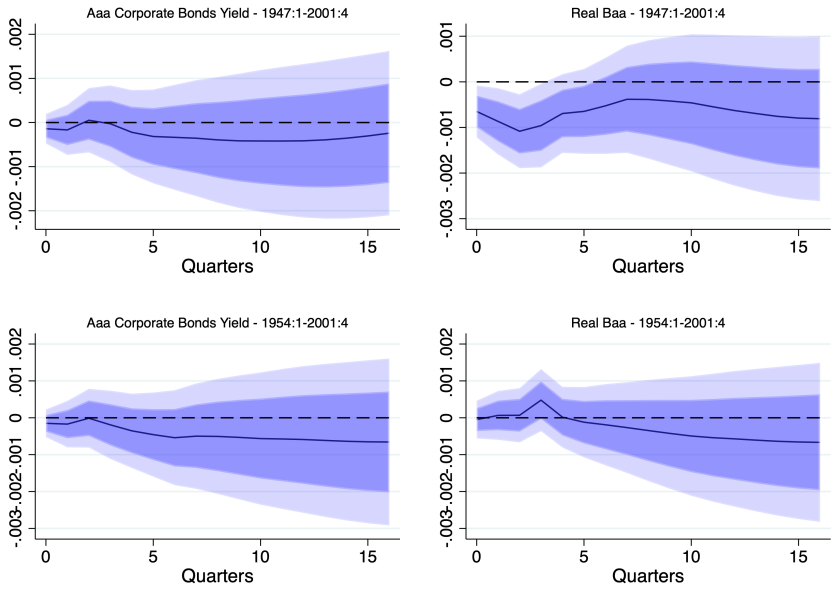


Figure 18: IRF to Defense Contracts - Baa Corporate Bonds Yield

nificantly when using either defense news shocks or Cholesky shocks. If there is

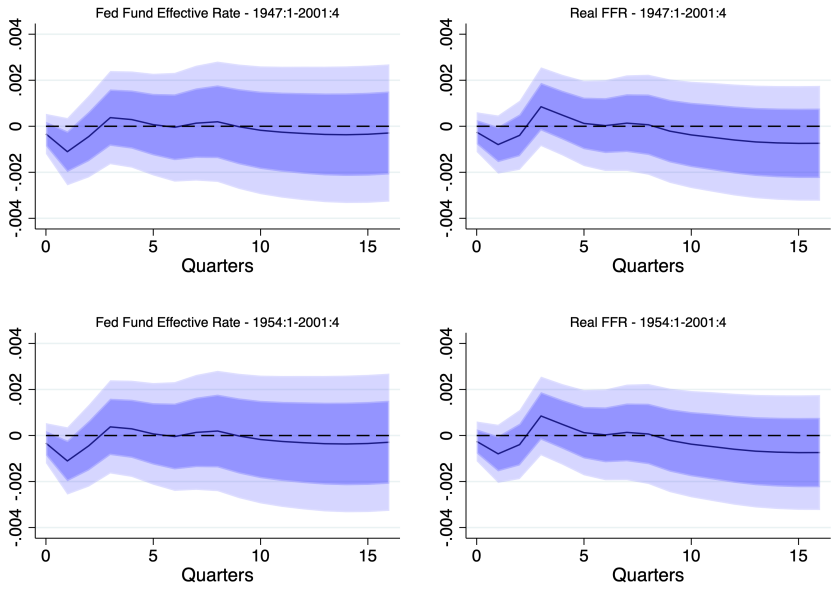


Figure 19: IRF to Defense Contracts - Effective FFR

movement, it is in a negative direction, which motivated the work of Murphy and Walsh (2022) and Bredemeier, Juessen, and Schabert (2022) on accommodating monetary policy in response to a fiscal shock.[11] However, I find that also these responses are not robust to the exclusion of the Korean war: Figure 20 shows the response of nominal and real TB3 and CPI inflation to a defense news shock.

[11] Murphy and Walsh (2022) find that Cholesky shocks to NIPA measures of government spending have negative effects on the Treasury General Account at the Fed, suggesting a money creation process in response to positive shocks, which decrease nominal rates. Bredemeier, Juessen, and Schabert (2022) find that several measures of liquidity spreads increase in response to a shock to government spending forecast errors by the Survey of Professional Forecasters. They construct a model where the interest rate set by the Fed is different from the one on corporate bonds. When the government increases its demand of goods, the liquidity spread increases even if the FFR does not.

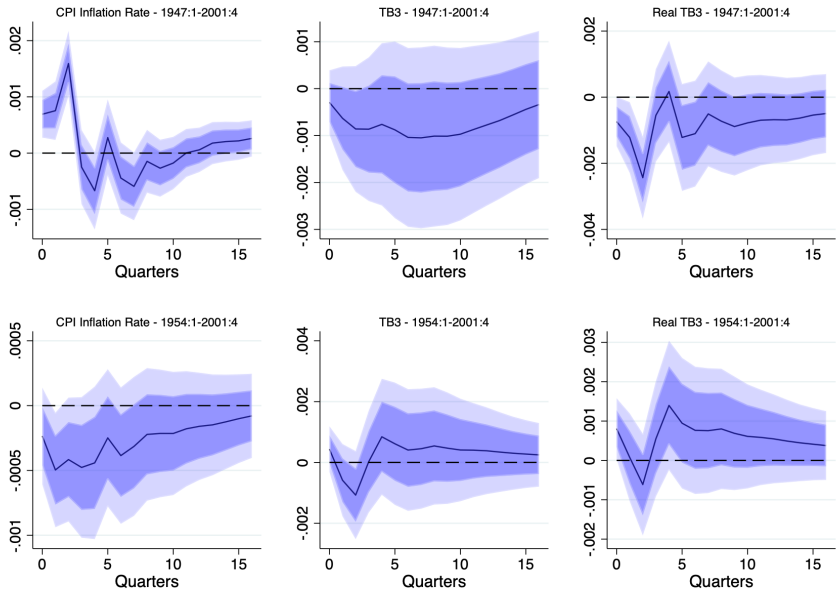


Figure 20: IRFs to Defense News Shocks - Inflation and TB3

Overall, in samples which exclude the Korean war, monetary policy was not reacting since the inflationary effect of fiscal shocks was very small. This is plausible for two reasons. First, I defense purchases are highly concentrated in few firms, for example, during the Vietnam war, the top 5 defense contractors accounted for one fourth of total defense purchases. Second, positive shocks to defense contracts increase labor productivity which decrease the price of products, dampening the upward pressure on prices due to scarce resources (in fact, in my model, the relative price of manufacturing goods fall after an increase in government purchases).

Furthermore, my readings of the Survey of Current Business indicated the willingness of the Federal Reserve to follow a "lean against the wind"-type of policy during war-times, which is against the constant-rate/accommodating policy view. Nonetheless, recall that Clarida, Galí, and Gertler (2000) have shown how in the pre-Volcker era, the estimated reaction parameter to expected inflation of a Taylor-type monetary policy rule was much smaller than those during the Volcker disinflation and subsequent periods. As most of the variation in defense contracts comes from periods when monetary policy was weak, and the inflationary effects of these shocks was small, it is quite safe to assume that monetary policy did not play a significant role in explaining the aggregate effects of these shocks.

Concerning the fall in the real rate and the inflationary response in samples with the Korean war, the response appears to be driven by this specific event and the quantitative evidence needs to be complemented with historical evidence from

that period.

Korean War and Monetary Policy. At the onset of the Korean war, despite initial inflationary concerns, the Fed did not respond until March 1951 due to a disagreement with the Treasury, which aimed to keep borrowing costs low. The Fed, on the other hand, sought to increase the long-term bond ceiling above 2.5%, a move opposed by the Treasury.[12] However, by the time the Fed regained control of monetary policy, other policies had already begun to put downward pressures on prices.[13] Consequently, the rise in the 3-month T-Bill rate in March was very small.

One might think that the constraint on the yield of long-term government bonds could have stimulated consumption by lowering the real interest rate, a scenario discussed in Nakamura and Steinsson (2014) where the nominal interest rate is held constant, or in Christiano, Eichenbaum, and Rebelo (2011) when they examine the impacts of fiscal policy at the zero lower bound. However, this is very unlikely for two reasons. First, the 2.50% constraint on the 10-year yield on Treasuries was not binding and the short term interest rate, TB3, had been increasing since the outbreak of the war.[14] Second, the surge in durable and non-durable goods consumption only affected those items which were in short supply during WWII, such as coffee, sugar, clothing, refrigerators and cars (see Hickman (1955)). Therefore, this buying wave was not driven by a decrease in the real interest rate (i.e., crowding-in), but by fears of rationing and inflation; indeed, this buying wave subsided when households realized product availability was not significantly affected by the military effort and despite inflation expectations were still high (see Ginsburg (1952) and the Survey of Consumer Finances of 1951). Therefore, monetary policy played a minor role during the Korean War.

In summary, the lack of response from nominal interest rates, the non-robust response of the real interest rate, the findings of Clarida, Galí, and Gertler (2000), and anecdotal evidence from the Korean War all suggest that monetary policy did not play a significant role in explaining the aggregate effects of defense contracts.

[12]The Fed only introduced in September and October of 1950 Regulation W and X, which limited financing abilities of individuals to (i) purchase durable goods (appliances and motor vehicles) and (ii) get a mortgage (see Perotti (2014)). These measures however did not affect nominal interest rates in those quarters.

[13]For instance, the Revenue Act of September 23, 1950 and the Excess Profits Tax Act signed on January 3, 1951, which increased labor income tax and business profit tax respectively; additionally, price controls were implemented in January, and the rush to purchase durable goods and food supplies had already subsided, driving durable and non-durable consumption below trend because households had previously stockpiled supplies through intertemporal demand substitution (see Ginsburg (1952)).

[14]This can be easily checked by looking at the discontinued series of composite yield on U.S. Treasury bonds with maturity over 10 years on Fred.

Consequently, the multiplier I've calculated can be interpreted as a no-monetary-policy-response multiplier.

The Response of Import and Net-Export: The final distinction Chodorow-Reich (2019) highlights between national and local multipliers pertains to the open versus closed economy condition. Suppose the world consists of two regions, home and foreign, and government spending only increases in the home region. In such a case, firms operating in the home region might face increased competition for inputs required by contractors to produce government-purchased items. Increased demand could lead to higher prices, forcing producers to rely on foreign imports. This phenomenon, known as "expenditure switching", is discussed in the context of the Vietnam War in the Survey of Current Business, where a scarcity of production inputs led producers to increase imports. However, this circumstance may be specific to the Vietnam War, given the already high economic activity levels. Nakamura and Steinsson (2014), for example, found no evidence of local consumer price increases following a rise in local government spending, suggesting that the inflationary effects of defense contracts might not be as pronounced, thus reducing the likelihood of a systematic increase in imports following a defense contract shock.

Another potential driver of imports could be increased labor earnings following a military build-up. As income increases in response to a positive shock to contracts, import levels, being a positive function of home income, might rise as well. For instance, higher labor earnings might induce individuals to increase their demand for foreign-produced goods. Both "expenditure switching" and this "income effect" should diminish the size of the national multipliers relative to a closed economy, where all production is domestic.

Lastly, he suggests that migration flows, or "factor mobility", from the foreign region —stimulated by higher labor demand and wages— should increase the open economy multiplier compared to the closed one. However, Nakamura and Steinsson (2014) estimated the cross-state population response to local government spending and found no response. Given that migration costs are much lower between U.S. states than between countries, it is doubtful whether increased defense contracts should significantly boost immigrant inflow.

In light of these discussions, I test whether shocks to defense contracts significantly impact import and net-export levels. I do this by augmenting the baseline VAR, first rotating import in and out, then doing the same with net-export. The bottom panel of Figure 21 shows the Impulse Response Functions (IRFs) of these two variables in response to a positive shock to defense contract.

My findings show that neither import nor net-export levels change in response

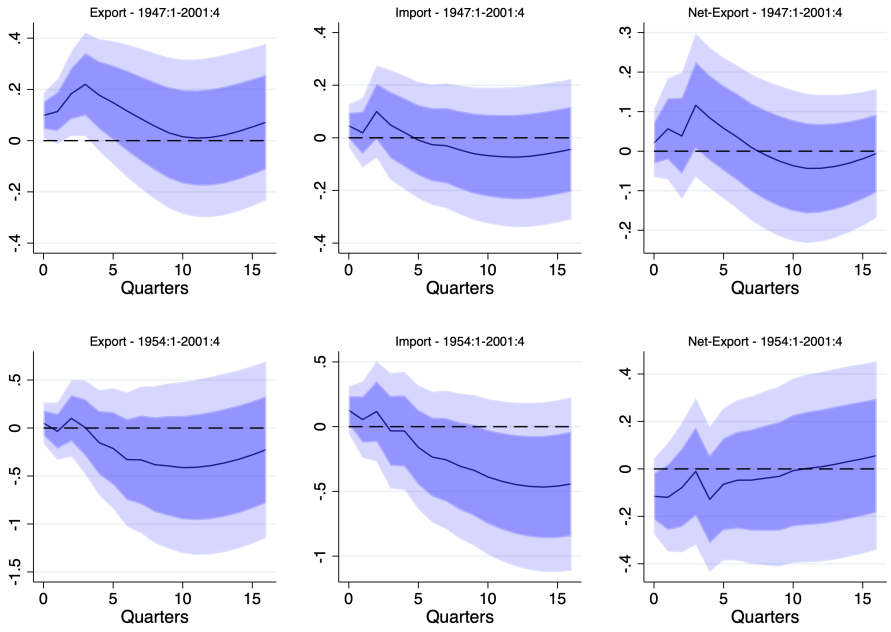


Figure 21: IRFs of EX/IM/NX to Contracts

Notes: the sample goes from 1947:1 to 2000:4. Values are normalized by the peak response of government spending to a positive shock to defense contracts in the same VAR.

to a positive shock to defense contracts. This result suggests that there is no systematic "expenditure switch" or "income effect" from abroad when defense contracts increase.

Since there isn't a systematic response of imports to defense contracts, the estimates of the multiplier aren't subject to economic spillovers towards foreign regions, which would otherwise diminish the size of the multiplier. Theoretically, expenditure-switches and income effects, reflected in the import response, are the primary channels that should render the closed economy multiplier a lower bound to the open economy multiplier. Given that these channels don't appear to be operative, I can deduce that the multiplier estimated via defense contracts approximates a closed-economy multiplier.

I also find a positive response of export. However, this response is not robust to the exclusion of the Korean war from the sample. My readings of the SCB during the Korean war, unveiled that export boomed in that period for very extraordinary circumstances.[15]

[15]The reasons listed in the SCB are: UK's blockade of Iranian's petroleum due to the nation-

Conclusion (Multipliers): In summary, in this section, I have provided estimates of the fiscal multiplier obtained using defense contracts as an instrument for G. Pooling estimates from the all samples and different specifications deliver an average multiplier of 1.0, while samples ending in 2000:4 provide more precise estimates, centered around 1.14. Secondly, I reconciled my estimates with those found in similar works, emphasizing the benefits of my approach: my estimates offer greater precision and are more easily interpretable as a traditional fiscal multiplier. Lastly, I demonstrated that shocks to defense contracts are financed with distortionary taxes, aligning with previous research. I argued that the central bank did not accommodate shocks to defense contracts, or if it did, the response was a weak "leaning against the wind" that did not significantly affect the overall impact: nominal and real interest rates never have robust responses. Furthermore, the lack of import responses indicates that expenditure switches and income effects, as defined in Chodorow-Reich (2019), were, at best, very weak or non-existent. Hence, my estimates of the national multiplier adhere to the definition of an approximate tax-financed/closed economy/no-monetary-policy-response national multiplier.

alization of the Anglo-Iranian-Oil-Company (then BP); contraction of the grain crops in India, Canada, Argentina and other producing countries; the revived need of American coal by Europe; finally, military aid due to the Mutual Defense Assistance Act after the outbreak of the first Indochina war between the French and Vietnam, backed by the Soviet Union.

C Evidence on Markup

I investigate the response of the price-cost markup by rotating in and out four measures of the markup in the baseline VAR. Firstly, I construct the markup in the manufacturing sector as in Monacelli and Perotti (2008).[16] Secondly, I use the negative of the log share of labor income in the non-finacial-corporate-business (NFCB) sector, also analyzed by Monacelli and Perotti (2008). The third and fourth measures are the negative of the log-share of labor income in the economy and in the non-farm-business (NFB) sector, taken from Nekarda and Ramey (2020)'s online database.

Figure 22 shows the IRFs of these four measures of the markup to a positive shock to defense contracts. In particular, the first row shows results for sample 1947:1 to 2001:4; the second row shows sample 1954:1 to 2000:4; and the third row shows sample 1947:1 to 2019:4. Concerning the markup-measures: first column shows the response of the markup in manufacturing industries; the second column shows the response of the markup of the non-financial-corporate-business sector; the third column shows the response of the markup of the non-farm business sector; and the fourth column shows the response of the markup in the economy. All measures are based on the Cobb-Douglas production function: negative log-shares of labor income.

[16] I follow the indications in the appendix of their paper and construct the markup by taking the log of the ratio of manufacturing national income less capital consumption adjustment and manufacturing wages.

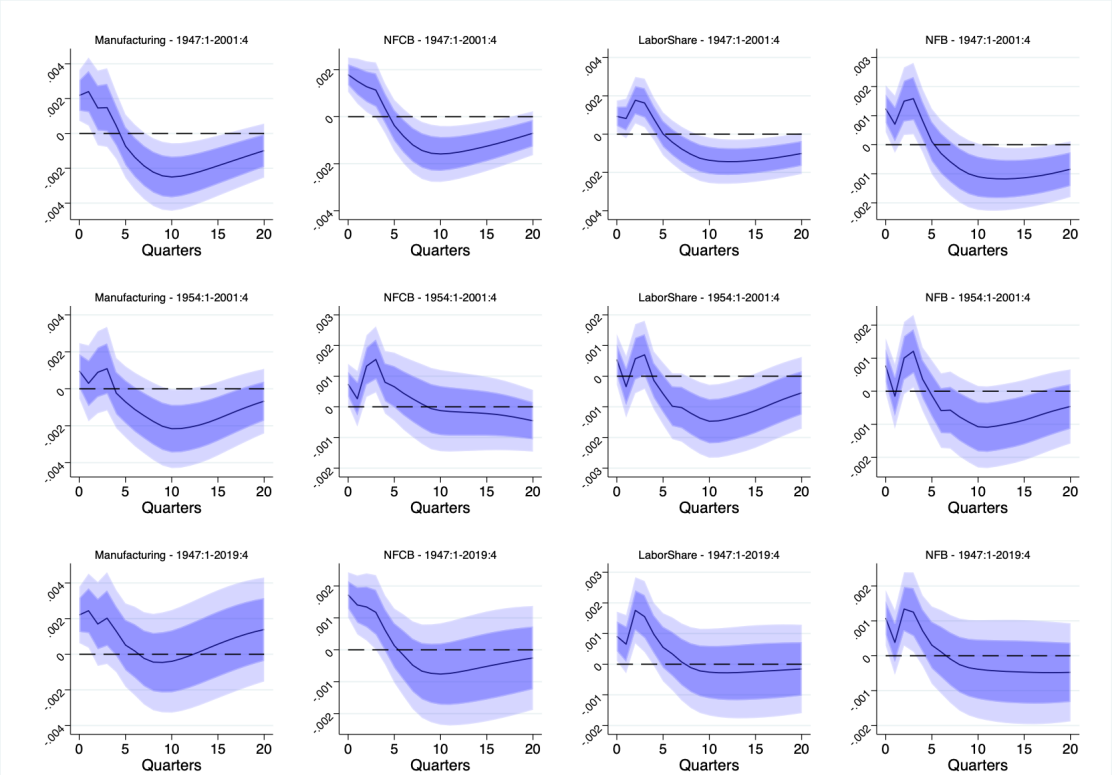


Figure 22: IRFs of Markups to Contracts - Baseline VAR

The markup exhibits a positive response at short horizons, then diminishes and turns negative across all measures. This initial positive and significant response of the markup is consistent across all sample periods.

For robustness, I also study the response of the price-cost markup to a shocks to defense contracts by also adopting a VAR model similar to the one used by Nekarda and Ramey (2020). In this case the VAR includes the log of real GDP and G per capita, the log of GDP price deflator, the 3 months TB3 rate. I order the log of real per capita defense contracts first in the VAR and obtain qualitatively the same results for all three samples. Results are shown in Figure 23.

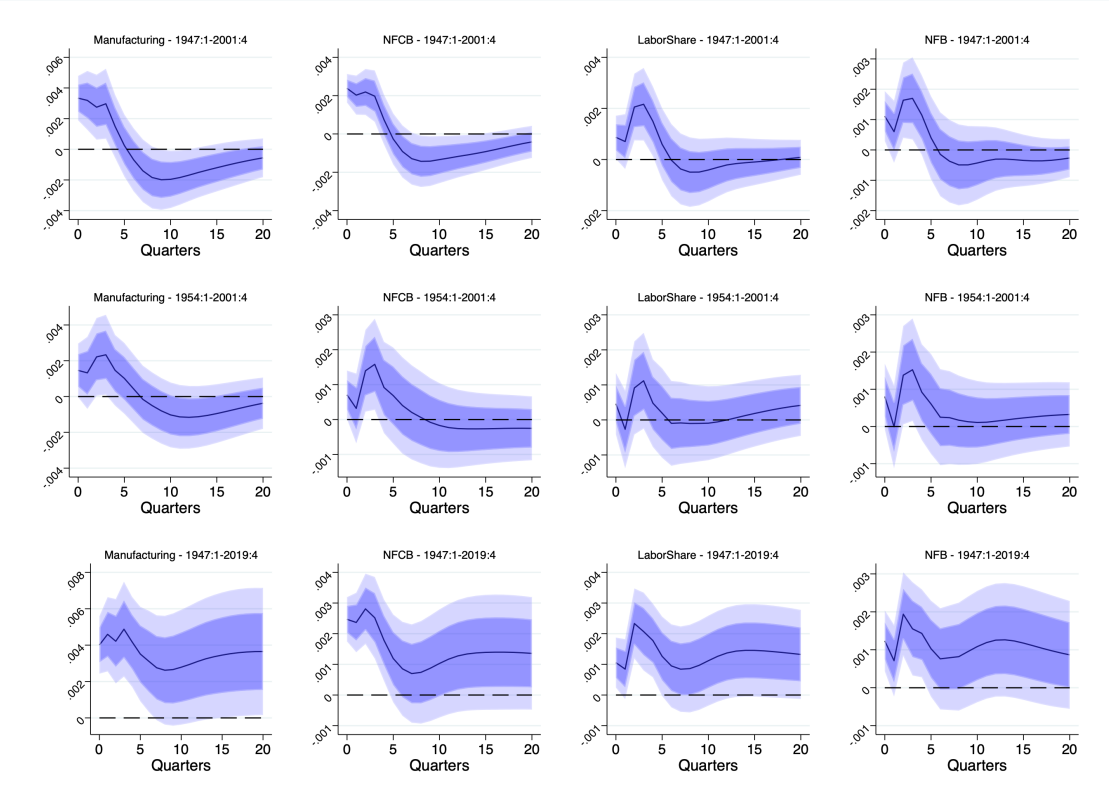


Figure 23: IRFs of Markups to Contracts - Nekarda and Ramey (2020)'s VAR

Notes: Rows and columns shows the same graphs as in Figure 22.

It is evident that the initial positive response intensifies, while the subsequent decrease in the markup is less pronounced, thereby reinforcing the conclusion drawn from the baseline analysis.

I also look at the IRFs of the four markup measures to a positive defense news shock using the same VAR of Nekarda and Ramey (2020): log of real per capita GDP, the log of the GDP price deflator, the 3 months T-Bill rate and defense news shocks divided by output ordered first. The specification also includes a quadratic time trend. Results are shown in Figure 24.

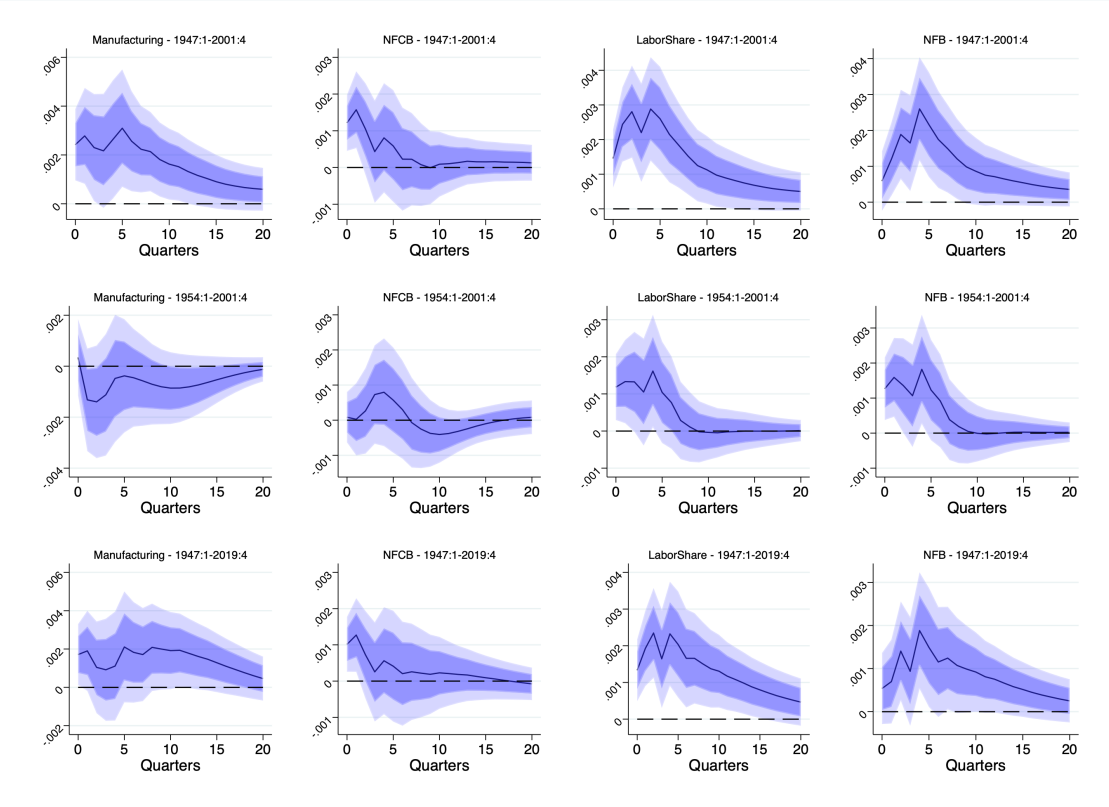


Figure 24: IRFs of Markups to Defense News - Nekarda and Ramey (2020)'s VAR

Notes: Rows and columns shows the same graphs as in Figure 22.

Similar to the previous observations, ordering defense news shocks first also generates positive responses at short horizons, complementing the results of Nekarda and Ramey (2020) who did not use the manufacturing markup measure used here and only looked at the full sample.

Lastly, I look at the IRFs of the four measures of the markup in response to a positive Cholesky shock. In this case the VAR includes the log of real per capita GDP and G, the log of the GDP price deflator, the 3 months T-Bill rate, the Barro and Redlick (2011)'s marginal tax rate. Identification is achieved by ordering G first in the VAR. Consistently with Monacelli and Perotti (2008), I include a linear time trend. Results are shown in Figure 25.

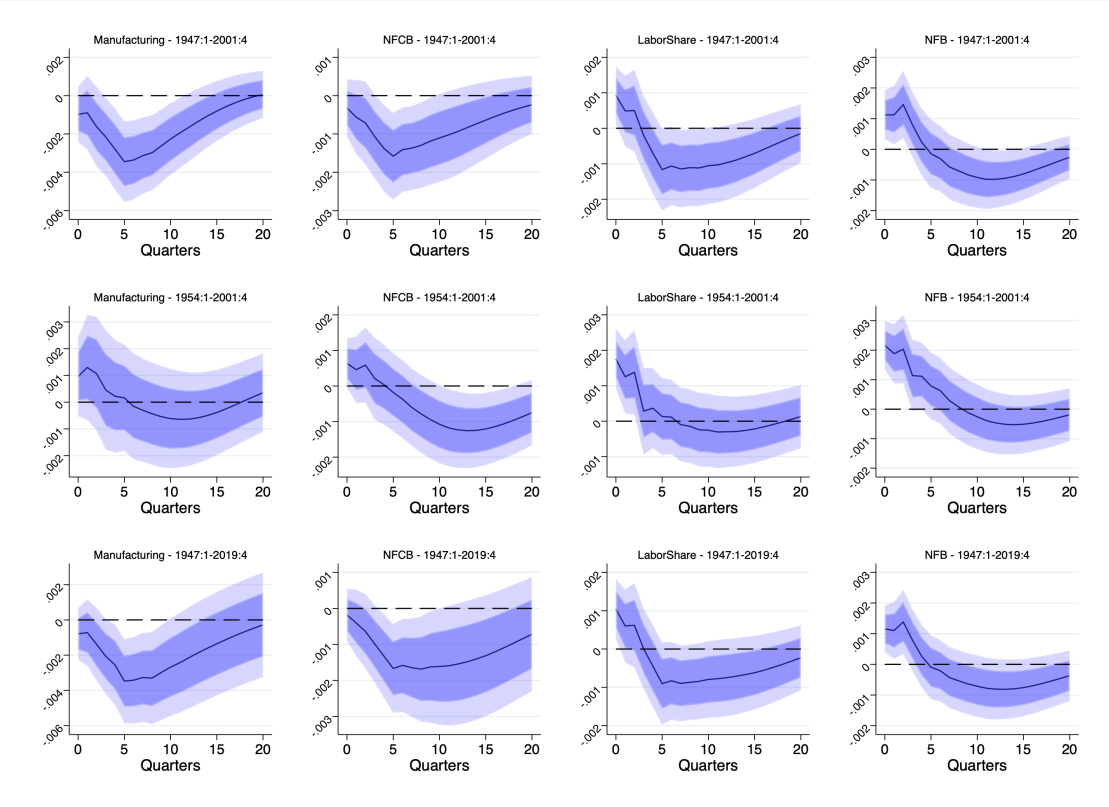


Figure 25: IRFs of Markups to Cholesky Shocks - Nekarda and Ramey (2020)'s VAR

Notes: Rows and columns shows the same graphs as in Figure 22.

Notice that when I employ the Cholesky shocks to government spending, the results align with those found in Monacelli and Perotti (2008), with the markup declining. Yet, these findings are not robust when the Korean war is excluded from the sample; in this case, the markup seems to increase. Furthermore, when the markup is quantified as the negative of the log share of labor income in the economy and the non-farm business sector, Cholesky shocks lead to positive markup responses.

In conclusion, my results indicate that a fiscal shock typically triggers a positive response of the markup. This finding implies that the observed positive reaction of consumption is unlikely to be driven by price stickiness, as in Galí, López-Salido, and Vallés (2007), Monacelli and Perotti (2008) and Bilbiie (2011).

D In Search of the Transmission Mechanism - Robustness

D.1 Labor Market Outcomes - Robustness

In this section I robustify the results for the baseline VAR of section IIIb in the paper. First, I replicate those results using the samples (i) 1954:1 to 2000:4 and (ii) 1947:1-2019:4.

Figure 26 shows the IRFs of hours, employment and earnings/income for the baseline VAR for the sample without the Korean war: 1954:1-2000:4.

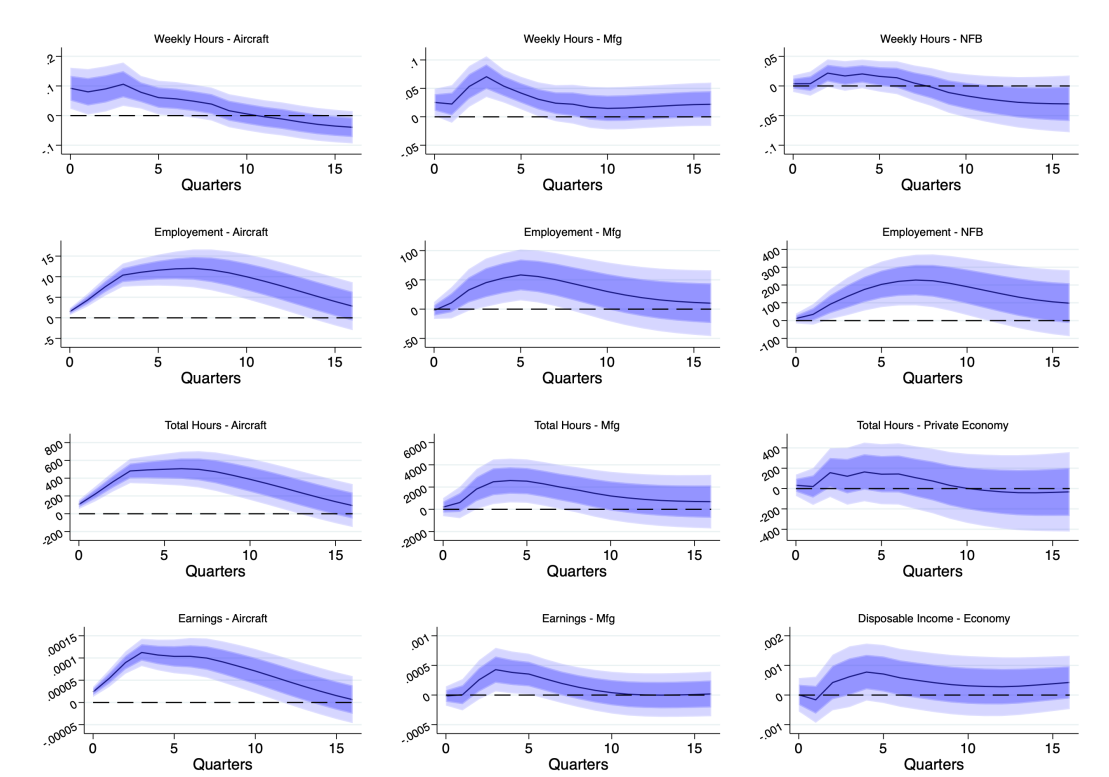


Figure 26: IRFs of Hours, Employment and Income - 1954:1-2000:4

Figure 27 shows the IRFs of hours, employment and earnings/income for baseline VAR using the full sample: 1947:1-2019:4.

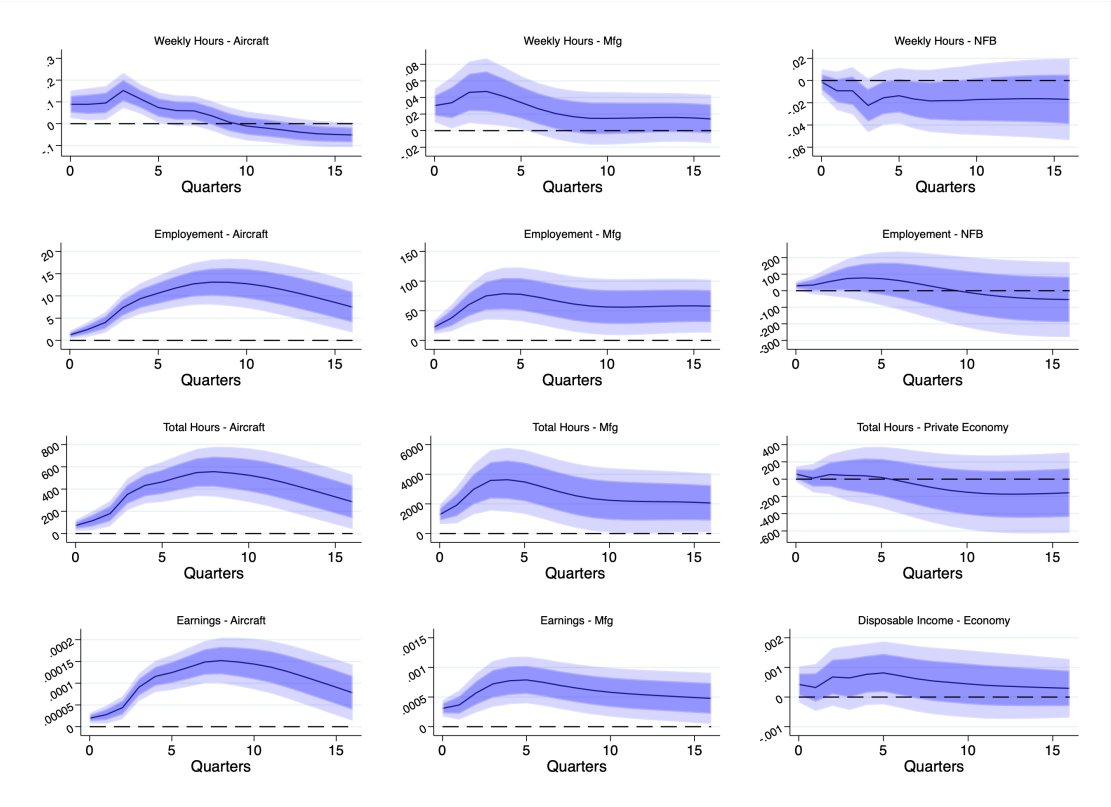


Figure 27: IRFs of Hours, Employment and Income - 1947:1-2019:4

Secondly, I mimic the approach of Ramey (2012) to study labor market outcomes, using a VAR specification in logs of real per capita values. In particular, the VAR includes defense contracts, GDP, G and total tax receipts in log of real per capita values, the log of hours in the private sector and the 3 months T-Bill rate. Concerning the outcome variables, weekly hours worked, employment, and real product wages are in logs. Earnings and disposable income are in log of real per capita values. In all cases the deflator is the GDP price deflator.

Figure 28 shows the results for the baseline sample 1947:1 to 2000:4.

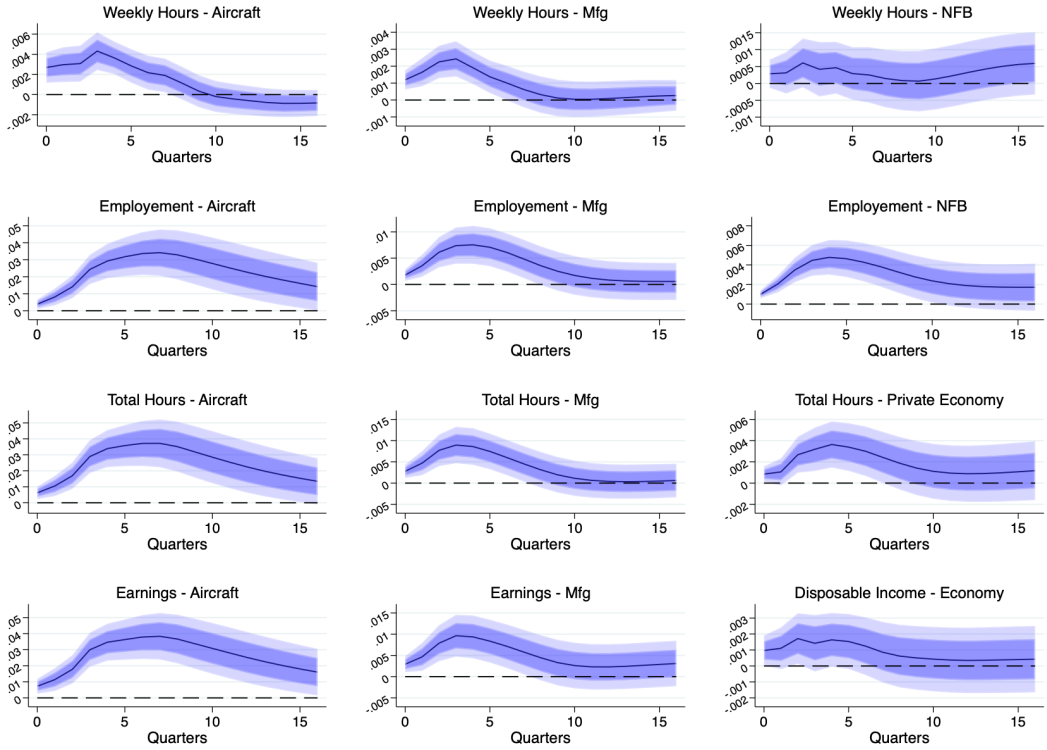


Figure 28: IRFs of Hours, Employment and Income - Log-VAR - 1947:1-2000:4

Figure 29 shows the results for the baseline sample without the Korean war: 1954:1 to 2000:4.

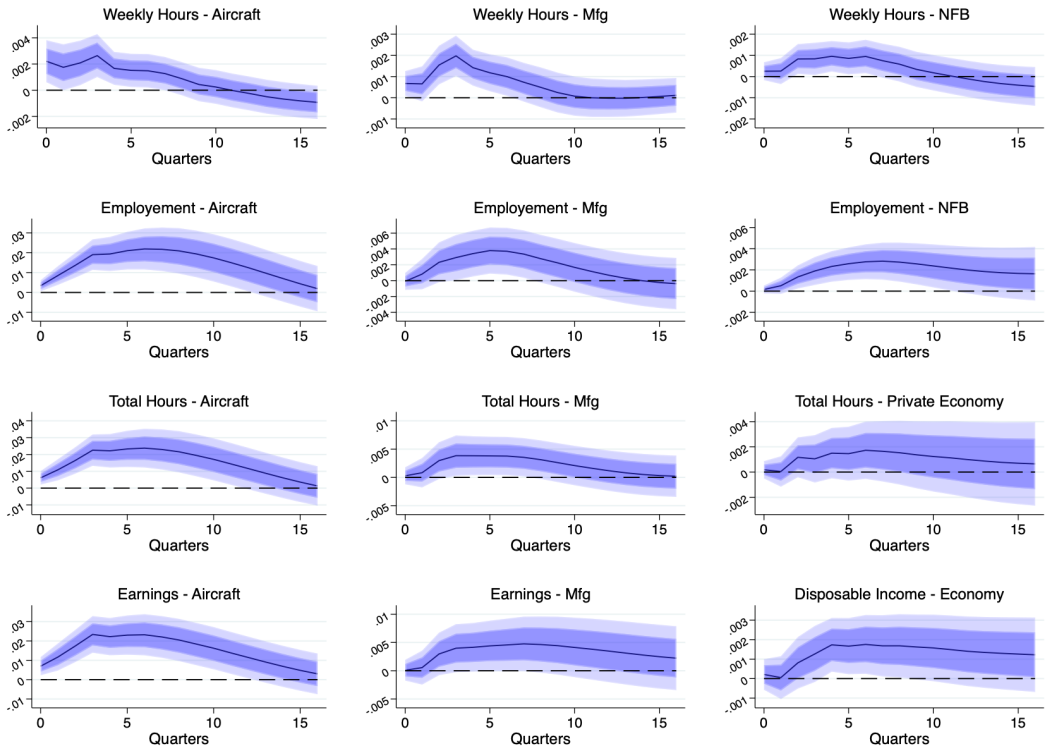


Figure 29: IRFs of Hours, Employment and Income - Log-VAR - 1954:1-2000:4

Figure 30 shows the results for the baseline sample without the Korean war: 1954:1 to 2000:4.

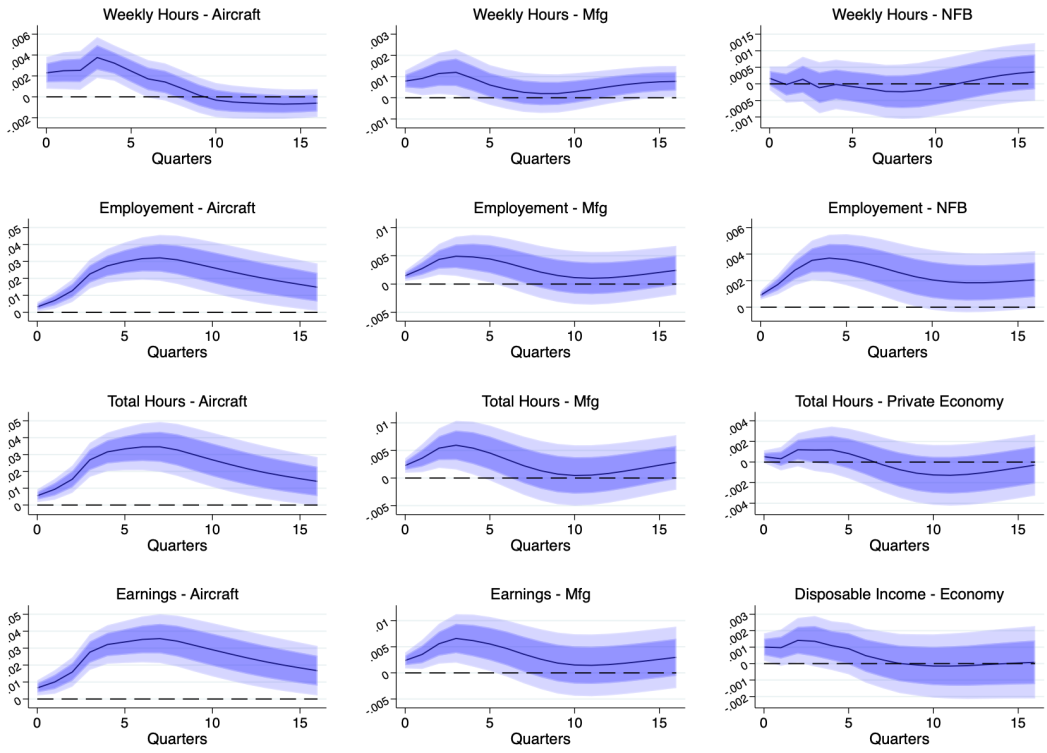


Figure 30: IRFs of Hours, Employment and Income - Log-VAR - 1947:1-2019:4

Summary: To conclude, the results showed here, indicate that the baseline results showed in the paper are robust across different samples and specifications. The response of aircraft manufacturing increases as well as total manufacturing. Responses of the total private economy are generally weaker but still positive and significant in most of the cases.

D.2 Real Product Wage - Robustness

For the hourly product wage I also check the results for (i) the baseline VAR showed in the paper but using the other two samples and (ii) the log-VAR for all samples.

Figure 31 shows the IRFs of the four measures of real product wage in response to a shock to defense contracts, for the baseline sample without the Korean war: 1954:1 to 2000:4.

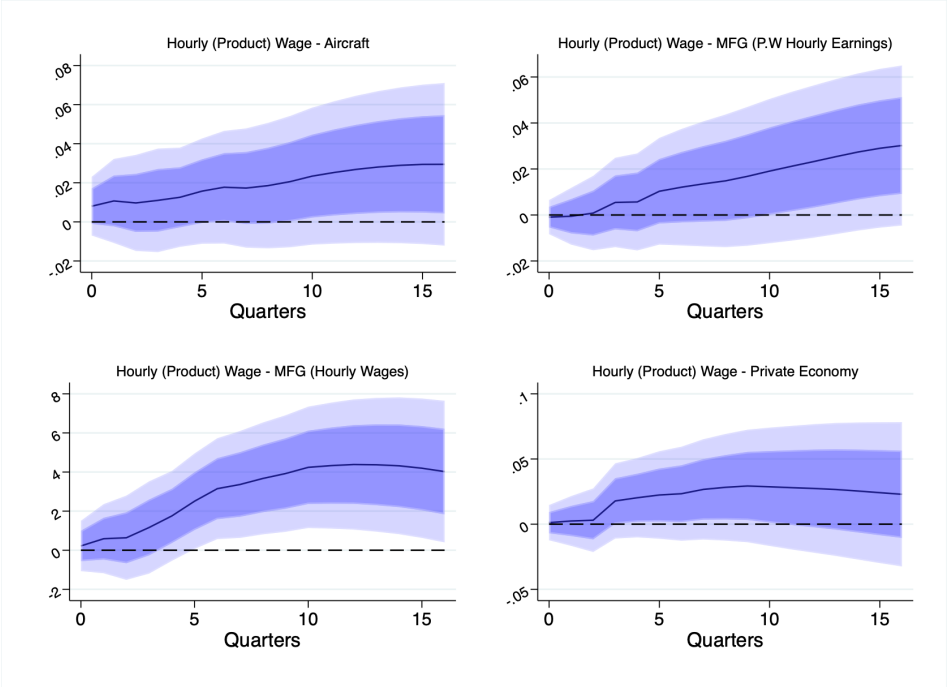


Figure 31: IRFs of Real (Product) Wage to Contracts - Baseline VAR - 1954:1-2000:4

Figure 32 shows the IRFs of the four measures of real product wage in response to a shock to defense contracts, for the full sample: 1947:1 to 2019:4.

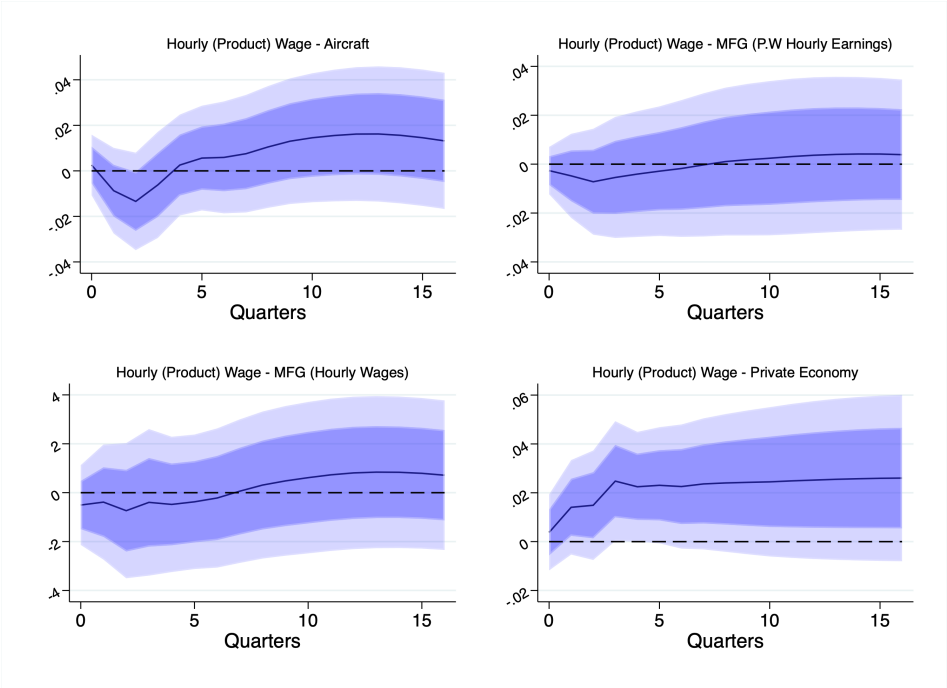


Figure 32: IRFs of Real (Product) Wage to Contracts - Baseline VAR - 1947:1-2019:4

I then use again the VAR in log of real per capita values. In particular, the VAR includes defense contracts, GDP, G and total tax receipts in log of real per capita values, the log of hours in the private sector and the 3 months T-Bill rate. The deflator is, as usual the GDP price deflator.

Concerning the outcome variables, I simply take the logs of the hourly (product) wage measures used in the baseline VAR.

Figure 33 shows the IRFs of the four measures of real product wage in response to a shock to defense contracts, for the full sample: 1947:1 to 2000:4.

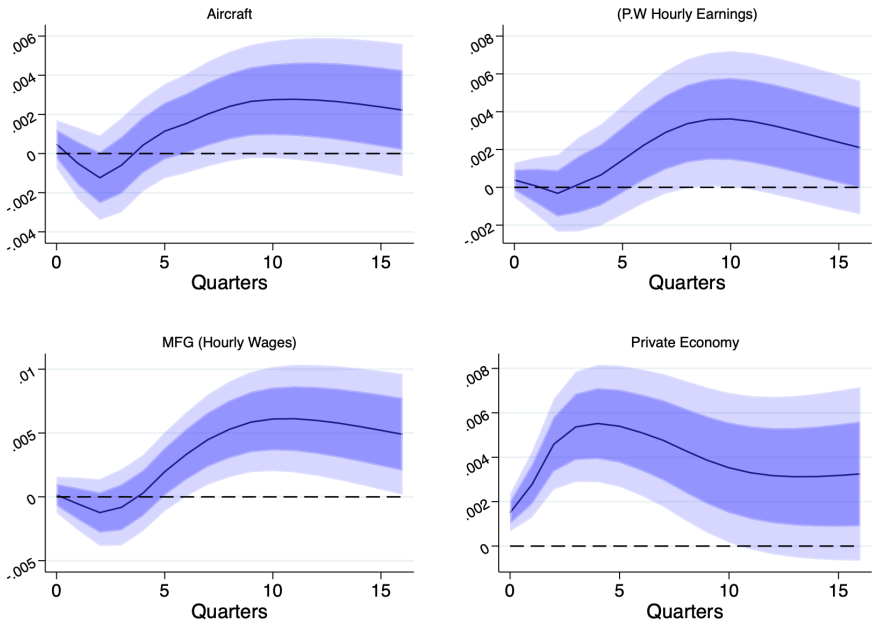


Figure 33: IRFs of Real (Product) Wage to Contracts - log-VAR - 1947:1-2000:4

Figure 34 shows the IRFs of the four measures of real product wage in response to a shock to defense contracts, for the full sample: 1954:1 to 2000:4.

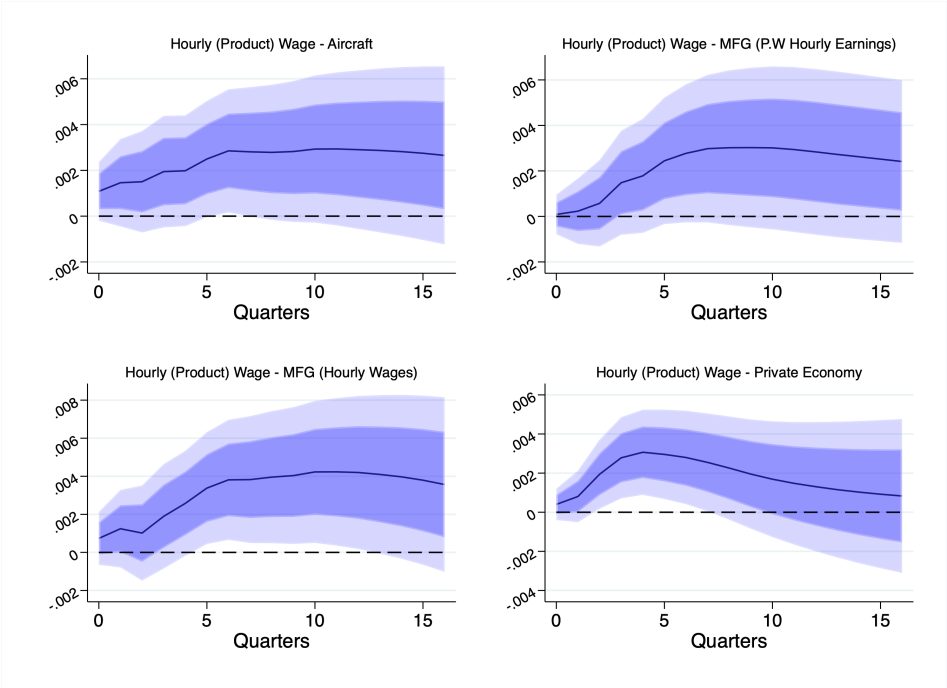


Figure 34: IRFs of Real (Product) Wage to Contracts - log-VAR - 1954:1-2000:4

Figure 35 shows the IRFs of the four measures of real product wage in response to a shock to defense contracts, for the full sample: 1947:1 to 2019:4.

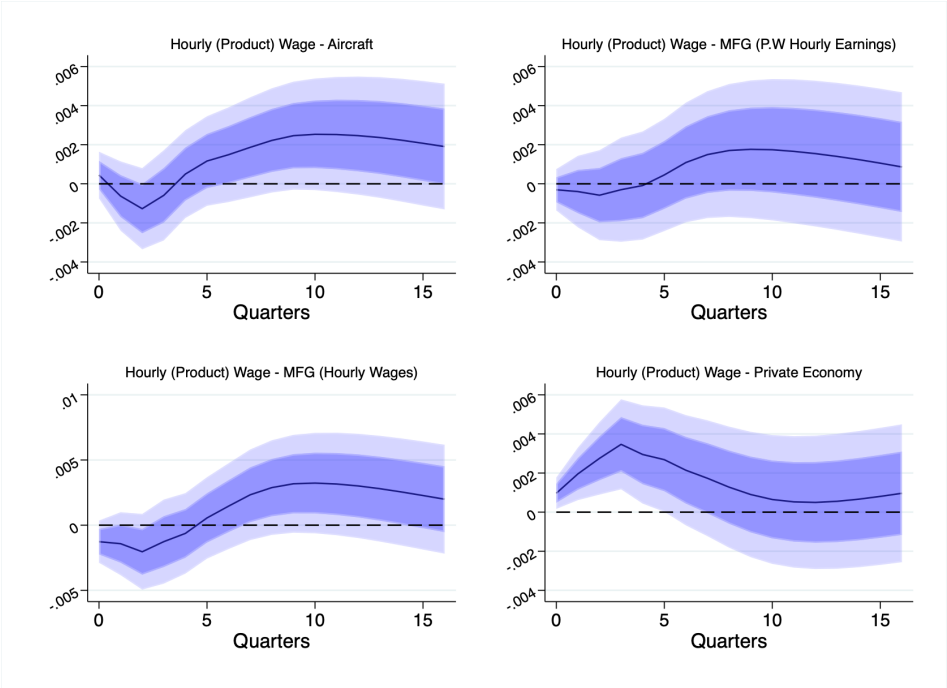


Figure 35: IRFs of Real (Product) Wage to Contracts - log-VAR - 1947:1-2019:4

Summary: To conclude, the results showed for the baseline VAR and sample reported in the paper are confirmed by all these robustness checks. Actually, the produce wage in manufacturing, as measured by the NIPA wages, is positive and significant. Furthermore, almost all results for the log-VAR indicate a more positive and statistically significant response of the hourly product wage.

In all cases, samples with the Korean war exhibit a slower response of the real wage, probably due to the high PPI inflation in durables experienced at the onset of the Korean war because of the buying waves caused by the fear of rationing.

D.3 Output per Hour - Robustness

The robustness analysis on Output-per-Hour (OpH) is carried out for three different sectors: total private, non-farm business and non-financial-corporate-business. I check the IRFs of these three measures of labor productivity in all three samples: 1947:1 to 2000:4 (baseline), 1954:1 to 2000:4 (baseline less Korea) and 1947:1 to 2019:4 (full sample).

I use two VAR models: (i) the baseline with potential output and (ii) the log-VAR with log-real per capita values. Furthermore, I check results with and without taxes.

Figure 36 shows the IRFs to a positive shock to defense contracts for OpH in the private sector (left column), in the NFB sector (middle column) and in the NFCB sector (right column). The VAR employed is the baseline used in the paper. The first row shows results for the baseline sample, the second row shows results for the baseline less Korea sample, and the last row exhibits the results for the full sample. Notice that this pattern of the figure with sectors by column and samples by rows is maintained throughout the remaining of the section.

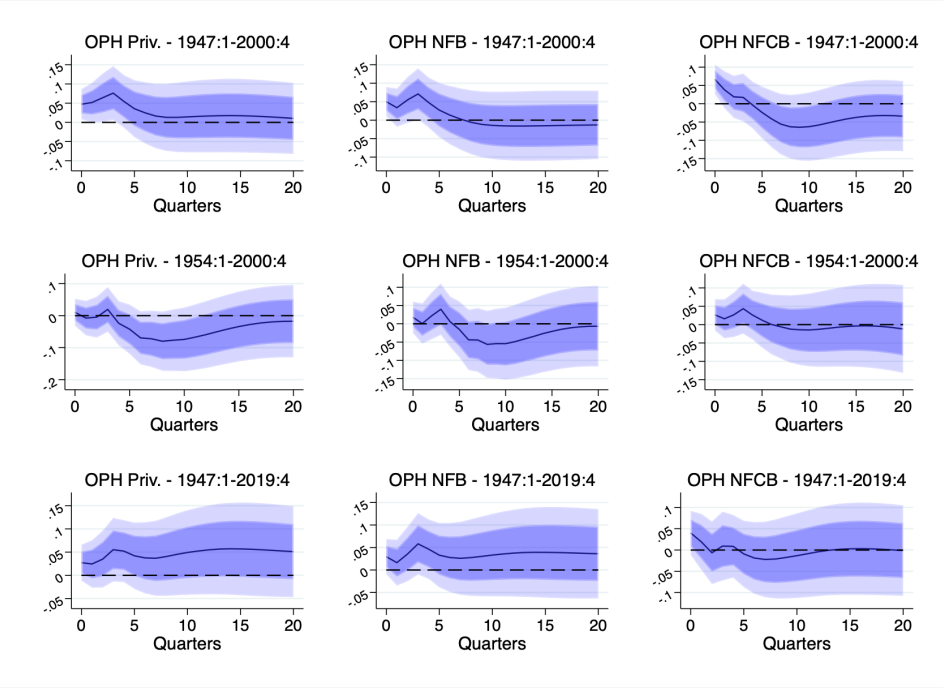


Figure 36: IRFs of OpH to Contracts - Baseline VAR - No Taxes

Figure 36 shows the results for the same VAR but augmented with total tax receipts divided by potential output.

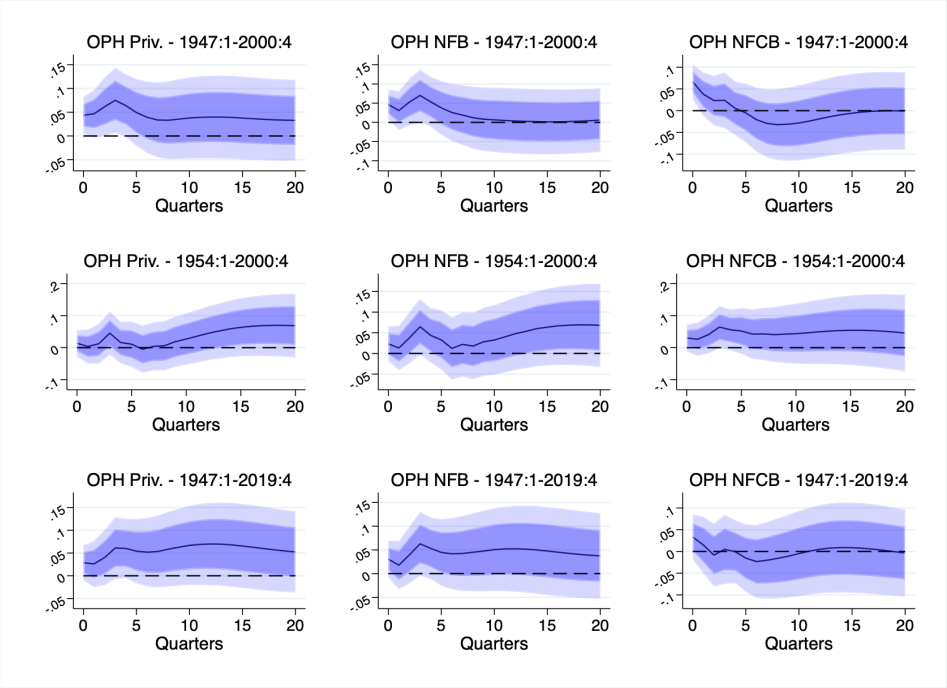


Figure 37: IRFs of OpH to Contracts - Baseline VAR - With Taxes

Figure 38 shows the results for the Log VAR. It includes defense contracts, GDP and G in log of real per capita values, the log of hours in the private sector and the 3 months T-Bill rate. The deflator is, as usual the GDP price deflator.

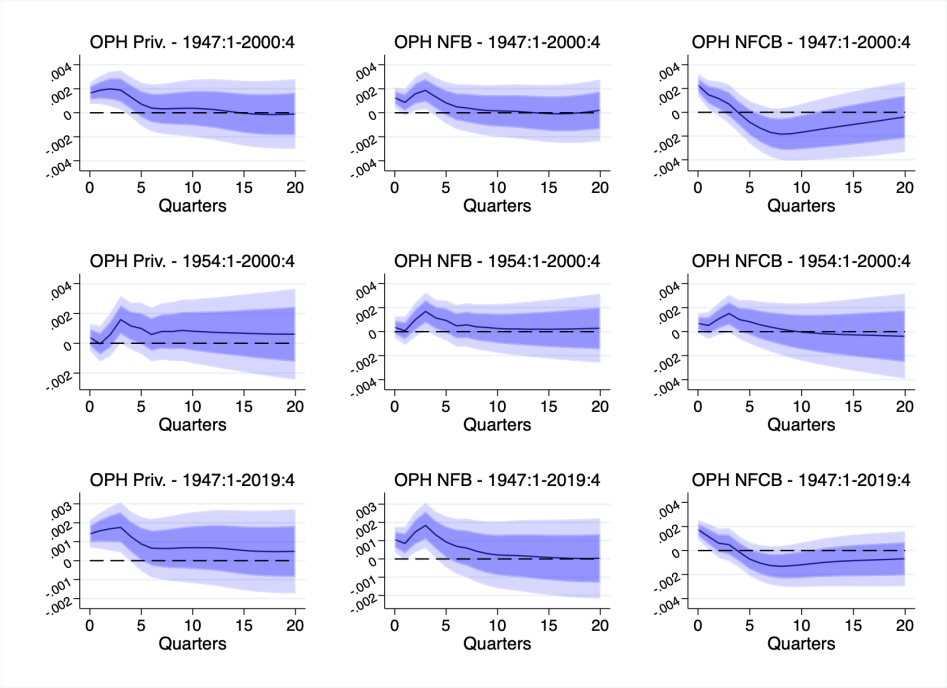


Figure 38: IRFs of OpH to Contracts - Log-VAR - No Taxes

Lastly, Figure 39 shows the results for the same Log-VAR but augmented with the log of real total tax receipts per capita.

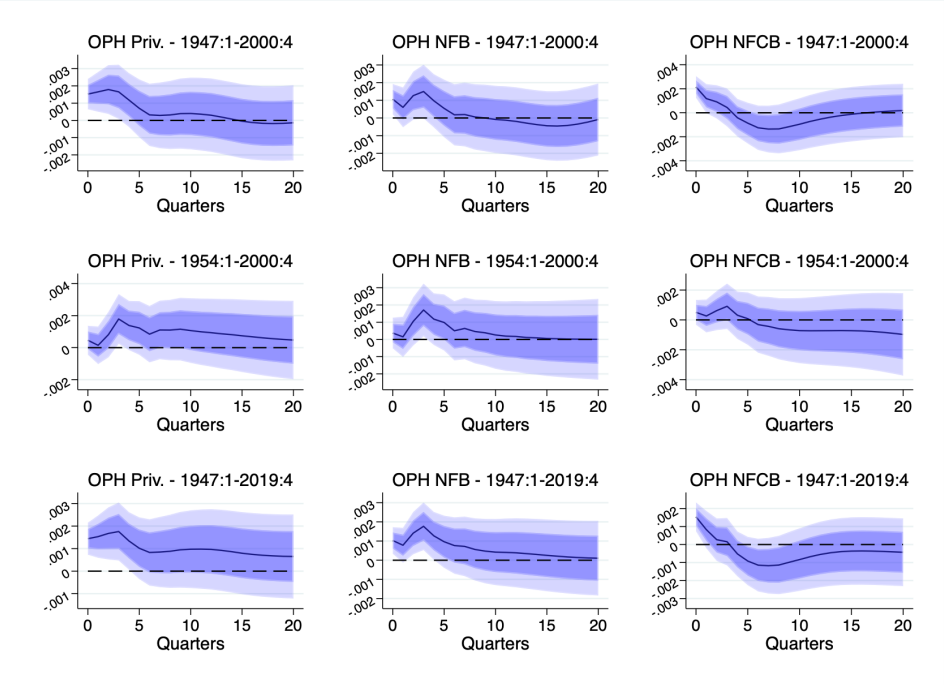


Figure 39: IRFs of OpH to Contracts - Log-VAR - With Taxes

Summary: To conclude, all IRFs of OpH exhibit a spike at horizon 3 with more positive results at short horizons. NFCB is the only sector which exhibits a U-shape pattern, but only for samples with the Korean war. For the samples wouthout the Korean war also NFCB assumes the common pattern with a peak at horizon 3. Taxes help estimating the effects more precisely and, the log-model, also delivers more precise estimates.

Overall, the results point to a rapid increase in labor productivity observed in all three measures.

E Theory

In this section I provide more details on the model.

E.1 Households' Problem:

The Lagrangean of the problem is:

$$\begin{aligned}\mathcal{L} := &\sum_{t=0}\beta^t \cdot \left(\frac{\tilde{C}_t^{1-\sigma}}{1-\sigma} - \psi \cdot \frac{N_t^{1+\varphi}}{1+\varphi}\right) + ... \\ &...+\beta^t \cdot \lambda_t \cdot \Big[W_t\ N_t + \left(r_{1,t}^k\ u_{1,t}\ K_{1,t-1} + r_{2,t}^k\ u_{2,t}\ K_{2,t-1}\right)\Big) - T_t - ... \\ &\quad ...\left(C_{1,t} + P_t \cdot C_{2,t} + I_{1,t} + P_t \cdot I_{2,t}\right)\Big] + ... \\ &...+\beta^t \cdot \lambda_t \cdot q_{1,t} \cdot \left[(1-a(u_{1,t})) \cdot K_{1,t-1} + I_{1,t} \cdot \left(1 - S(\frac{I_{1,t}}{I_{1,t-1}})\right) - K_{1,t}\right] + ... \\ &...+\beta^t \cdot P_t \cdot \lambda_t \cdot q_{2,t} \cdot \left[(1-a(u_{2,t})) \cdot K_{2,t-1} + I_{2,t} \cdot \left(1 - S(\frac{I_{2,t}}{I_{2,t-1}})\right) - K_{2,t}\right]\end{aligned}$$

The Kuhn-Tucker's FOCs of the problem are:

$$\begin{aligned}
[C_{1,t}]: &\quad \lambda_t = (1-\phi) \cdot \frac{\tilde{C}_t}{C_{1,t}} \\
[C_{2,t}]: &\quad \lambda_t \cdot P_t = \phi \cdot \frac{\tilde{C}_t}{C_{2,t}} \\
[N_t]: &\quad \psi\ N_t^{\varphi} = \lambda_t W_t \\
[K_{1,t}]: &\quad q_{1,t} = \text{SDF}_t \cdot \Big[r_{1,t+1}^k\ u_{1,t+1} + q_{1,t+1} \cdot (1-a(u_{1,t+1}))\Big], \quad \text{SDF}_t := \beta \cdot \frac{\lambda_{t+1}}{\lambda_t} \\
[K_{2,t}]: &\quad q_{2,t} = \frac{P_{t+1}}{P_t} \cdot \text{SDF}_t \cdot \Big[\frac{r_{2,t+1}^k\ u_{2,t+1}}{P_{t+1}} + q_{2,t+1} \cdot (1-a(u_{2,t+1}))\Big] \\
[I_{1,t}]: &\quad 1 = q_{1,t} \cdot \Big[1 - S(x_{1,t}) - x_{1,t} \cdot S'(x_{1,t})\Big] + \text{SDF}_t \cdot q_{1,t+1} \cdot x_{1,t+1}^2 \cdot S'(x_{1,t+1}), \quad x_{i,t} := \frac{I_{i,t}}{I_{i,t-1}} \\
[I_{2,t}]: &\quad 1 = q_{2,t} \cdot \Big[1 - S(x_{2,t}) - x_{2,t} \cdot S'(x_{2,t})\Big] + \frac{P_{t+1}}{P_t} \cdot \text{SDF}_t \cdot q_{2,t+1} \cdot x_{2,t+1}^2 \cdot S'(x_{2,t+1}) \\
[u_{1,t}]: &\quad r_{1,t}^k = a'(u_{1,t}) \cdot q_{1,t} \\
[u_{2,t}]: &\quad \frac{r_{2,t}^k}{P_t} = a'(u_{2,t}) \cdot q_{2,t}
\end{aligned}$$

E.2 Equilibrium

The equilibrium is characterized by the following equations.

Households:

$$\lambda_t = (1-\phi)\cdot\frac{\tilde{C}_t}{C_{1,t}} \quad \text{(MUC 1)} \tag{E1}$$

where $\tilde{C}_t = \left(C_{1,t}^{1-\phi}\cdot C_{2,t}^{\phi}\right)^{1-\sigma}$

$$\lambda_t \cdot P_t = \phi\cdot\frac{\tilde{C}_t}{C_{2,t}} \quad \text{(MUC 2)} \tag{E2}$$

$$\psi\ N_t^{\varphi} = \lambda_t\ W_t \quad \text{(Labor-Leisure)} \tag{E3}$$

$$q_{1,t} = \text{SDF}_t\cdot\left[r_{1,t+1}^{k}\ u_{1,t+1} + q_{1,t+1}\cdot(1-a(u_{1,t+1}))\right] \quad \text{(Euler 1)} \tag{E4}$$

with $\text{SDF}_t := \beta\cdot\frac{\lambda_{t+1}}{\lambda_t}$.

$$q_{2,t} = \frac{P_{t+1}}{P_t}\cdot\text{SDF}_t\cdot\left[\frac{r_{2,t+1}^{k}\ u_{2,t+1}}{P_{t+1}} + q_{2,t+1}\cdot(1-a(u_{2,t+1}))\right] \quad \text{(Euler 2)} \tag{E5}$$

$$1 = q_{1,t}\cdot\Big[1-S(x_{1,t})-x_{1,t}\cdot S'(x_{1,t})\Big]+\text{SDF}_t\cdot q_{1,t+1}\cdot x_{1,t+1}^2\cdot S'(x_{1,t+1}) \quad \text{(Optimal Investment 1)} \tag{E6}$$

with $x_{i,t} := I_{i,t}/I_{i,t-1}$.

$$1 = q_{2,t}\cdot\Big[1-S(x_{2,t})-x_{2,t}\cdot S'(x_{2,t})\Big]+\frac{P_{t+1}}{P_t}\cdot\text{SDF}_t\cdot q_{2,t+1}\cdot x_{2,t+1}^2\cdot S'(x_{2,t+1}) \quad \text{(Optimal Investment 2)} \tag{E7}$$

$$r_{1,t}^{k} = a'(u_{1,t})\cdot q_{1,t} \quad \text{(Optimal Capital Utilization 1)} \tag{E8}$$

$$\frac{r_{2,t}^k}{P_t} = a'(u_{2,t}) \cdot q_{2,t} \quad \text{(Optimal Capital Utilization 1)} \tag{E9}$$

Production:

$$Y_{1,t} = N_{1,t}^{\alpha_1} \cdot \left(K_{1,t}^*\right)^{1-\alpha_1} \quad \text{(Production Technology 1)} \tag{E10}$$

where $K_{i,t}^* := u_{i,t} \cdot K_{i,t-1}$

$$W_t = \alpha_1 \cdot \frac{Y_{1,t}}{N_{1,t}} := \text{MPN}_{1,t} \quad \text{(Labor Demand 1)} \tag{E11}$$

$$r_{1,t}^k = (1-\alpha_1) \cdot \frac{Y_{1,t}}{K_{1,t}^*} := \frac{\text{MPK}_{1,t}}{u_{1,t}} \quad \text{(Capital Demand)} \tag{E12}$$

$$Y_{2,t} = (E_t \cdot N_{2,t})^{\alpha_2} \cdot \left(K_{2,t}^*\right)^{1-\alpha_2} \quad \text{(Production Technology 2)} \tag{E13}$$

$$E_t = (1-\delta_E) \cdot E + \delta_E \cdot E_{t-1} + \theta \cdot (Y_{2,t-1} - Y_2) \quad \text{(Experience)} \tag{E14}$$

$$W_t = P_t \cdot \alpha_2 \cdot \frac{Y_{2,t}}{N_{2,t}} := P_t \cdot \text{MPN}_{2,t} \quad \text{(Labor Demand 2)} \tag{E15}$$

$$r_{2,t}^k = P_t \cdot (1-\alpha_2) \cdot \frac{Y_{2,t}}{K_{2,t}^*} := P_t \cdot \frac{\text{MPK}_{2,t}}{u_{2,t}} \quad \text{(Capital Demand)} \tag{E16}$$

Markets Clearing:

$$Y_{1,t} = C_{1,t} + I_{1,t} + G_{1,t} \quad \text{(Resources 1)} \tag{E17}$$

$$Y_{2,t} = C_{2,t} + I_{2,t} + G_{2,t} \quad \text{(Resources 2)} \tag{E18}$$

$$K_{1,t} = (1 - a(u_{1,t})) \cdot K_{1,t-1} + I_{1,t} \cdot (1 - S(x_{1,t})) \quad \text{(Capital Accumulation 1)} \tag{E19}$$

$$K_{2,t} = (1 - a(u_{2,t})) \cdot K_{2,t-1} + I_{2,t} \cdot (1 - S(x_{2,t})) \quad \text{(Capital Accumulation 2)} \tag{E20}$$

Fiscal Policy:

$$T_t = G_{1,t} + P_t \cdot G_{2,t} \quad \text{(Government Budget)} \tag{E21}$$

$$A_t = (1 - \rho_A)\ A + \rho_A \cdot A_{t-1} + \varepsilon_t^A \quad \text{(New Military Contracts)} \tag{E22}$$

$$G_{1,t} = G_1 \quad \text{(Government Spending 1)} \tag{E23}$$

$$G_{2,t} = \frac{\sum_{h=1}^{H} A_{t-h}}{H} \quad \text{(Government Spending 2)} \tag{E24}$$

There are 24 equations for 24 variables:

$$\begin{aligned} \text{Sector 1: } & C_{1,t}\ I_{1,t}\ Y_{1,t}\ u_{1,t}\ K_{1,t}\ N_{1,t} \\ \text{Sector 2: } & C_{2,t}\ I_{2,t}\ Y_{2,t}\ u_{2,t}\ K_{2,t}\ N_{2,t}\ E_t \\ \text{Fiscal Policy: } & A_t\ T_t\ G_{1,t}\ G_{2,t} \\ \text{Prices: } & \lambda_t\ P_t\ W_t\ r_{1,t}^k\ r_{2,t}^k\ q_{1,t}\ q_{2,t} \end{aligned}$$

E.3 Steady State

From the Optimal Investment Equations, the Tobin's Qs are equal to one in steady state. Since $\delta_1 = r+\delta$, where $r = 1/\beta - 1$, combining the optimal capital utilization equations and the Euler equations, allows to find that the steady state capital utilization is also equal to one. Therefore, I have

$$q_1 = u_1 = q_2 = u_2 = 1.$$

From the Euler equation I find the value of the rental rate of capital:

$$r_1^k = r + \delta$$
$$r_2^k = P \cdot r_1^k$$

Non-Mfg Production: Using the capital FOC of sector 1, I find the capital output ratio:

$$\frac{K_1}{Y_1} = \frac{1-\alpha_1}{r_1^k} \Longleftrightarrow \text{MPK}_1 := (1-\alpha_1) \cdot \frac{Y_1}{K_1} = r_1^k.$$

Using the production function, I can express the output-per-hour of sector 1 as a function of its capital-output ratio:

$$\frac{Y_1}{N_1} = \left(\frac{K_1}{Y_1}\right)^{\frac{1-\alpha_1}{\alpha_1}}.$$

Using the firm's FOC for optimal labor demand we can find the steady stae value of the wage:

$$W = \text{MPN}_1 = \alpha_1 \cdot \frac{Y_1}{N_1}$$

Mfg Production: Using the sector 2's FOC for capital demand and the link between rental rates of capital, I find the capital output ratio:

$$\frac{K_2}{Y_2} = \frac{1-\alpha_2}{r_1^k} \Longleftrightarrow \text{MPK}_2 := (1-\alpha_2) \cdot \frac{Y_2}{K_2} = \text{MPK}_1.$$

Analogously to what done for sector 1, I find output-per-hour in sector 2:

$$\frac{Y_2}{N_2} = E \cdot \left(\frac{K_2}{Y_2}\right)^{\frac{1-\alpha_2}{\alpha_2}},$$

which allows me to find the marginal product of labor:

$$\text{MPN}_2 = \alpha_2 \cdot \frac{Y_2}{N_2}.$$

Using sector 2's FOC for optimal labor demand, I can find the steady state price level:

$$P = \frac{\text{MPN}_1}{\text{MPN}_2}$$

and notice that as long as $\alpha_1 = \alpha_2$, I have $P = 1/E$. Therefore, if $E = 1$ and labor shares are equal, the relative price is one, as in Ramey and Shapiro (1998)'s model. In turn, the steady state price level allows to find the rental rate of capital in sector 2: $r_2^k = P \cdot r_1^k$.

Households' FOC: combining the two households' FOC for optimal consumption demand, I have:

$$\frac{C_2}{C_1} = \frac{\phi}{1-\phi} \cdot \frac{1}{P}.$$

Resources: From the capital accumulation equation of sector 1, $I_1 = \delta\ K_1$. Using this in the resource constraint, I can find the consumption-hours ratio:

$$\frac{C_1}{N_1} = \left(1 - \delta \cdot \frac{K_1}{Y_1} - \gamma_1\right) \cdot \frac{Y_1}{N_1}.$$

Similarly, from sector 2:

$$\frac{C_2}{N_2} = \left(1 - \delta \cdot \frac{K_2}{Y_2} - \gamma_2\right) \cdot \frac{Y_2}{N_2}.$$

Labor Ratio: Given all the values found so far, I can find the sectoral labor ratio:

$$\frac{N_2}{N_1} = \frac{C_2}{C_1} \cdot \frac{\frac{C_1}{N_1}}{\frac{C_2}{N_2}}$$

Sector 1 Hours: Using the labor-leisure condition and all the expressions derived so far, I can derive hours in sector 1:

$$N_1 = \left[\left(1 + \frac{N_2}{N_1}\right)^{-\varphi} \cdot \frac{W \cdot (1-\phi)}{\psi} \left(\frac{C_1}{N_1}\right)^{-\sigma}\right]^{\frac{1}{\varphi+\sigma}} \cdot \left(\frac{C_2}{C_1}\right)^{\phi\varepsilon^M}$$

where $\varepsilon_M = (1-\sigma)/(\varphi+\sigma)$ is the Marshallian elasticity of labor supply.

Finding all remaining steady-state values is trivial.

E.4 Response of Wages, Prices and Productivity

Figure 40 shows the response of experience, E_t, and output-per-hour, Y_t/N_t, where Y_t is real output (output measured at baseline prices).

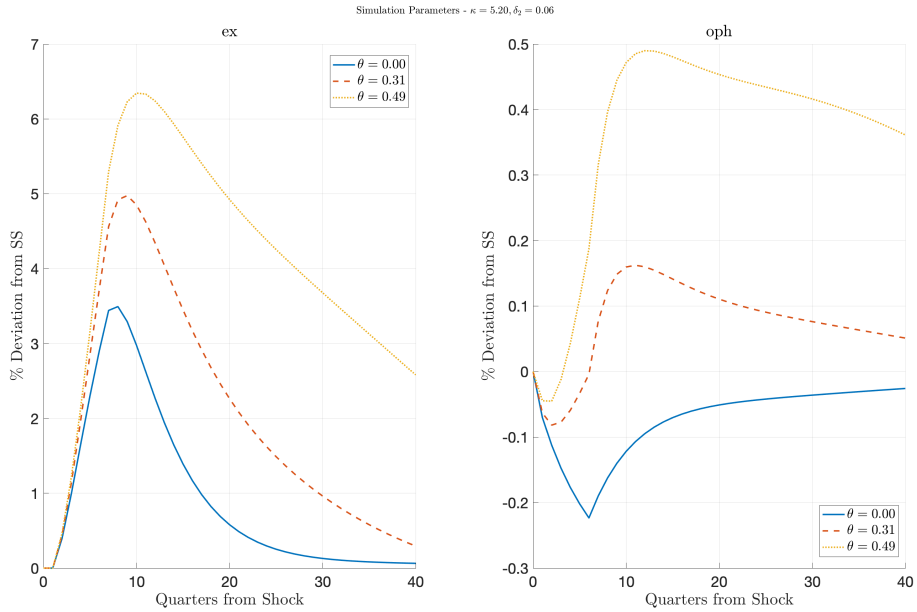


Figure 40: Experience and Output-per-Hour

Notes: The simulation is obtained with Dynare. The blue line sets $\theta = 0$ and assumes no-learning. The dashed orange line sets $\theta = E/(4 \cdot Y_2)$ and assumes learning-by-doing. The model sets $\kappa = 5.2$ (investment adjustment costs) and $\delta_2 = 2 \cdot \delta_1$ (capital utilization). Output-per-Hour is obtained diving real GDP by total hours.

The left panel shows that experience starts increasing from period 2, as a result of increased production, experience keeps increasing and stays above steady-state level as long as $Y_{2,t} > Y_2$. It then decays geometrically at rate δ_E. The right panel shows the response of output-per-hour, which increases slowly as experience builds-up.

Figure 41 shows the dynamics of several prices and wages.

Firstly, the bottom-right figure shows the dynamics of P_t, the price of good 2 relative to the price of good 1. In the case of no-learning, the price increases as sector 1 becomes more productive than sector 2 (i.e. recall that $P_t = \text{MPN}_{1,t}/\text{MPN}_{2,t}$), since labor reallocation increases $\text{MPN}_{1,t}$ and decreases $\text{MPN}_{2,t}$. When there is learning in the model, the effect of experience overcomes the one of sectoral reallocation, making $\text{MPN}_{2,t}$ increases more than $\text{MPN}_{1,t}$ does. Therefore, the price falls.

The top-left figure shows the product wage of sector 1, which is identical to the nominal wage W_t in the model, given that the price of good 1 is the numeraire of the economy. The bottom-left panel shows the response of the rental rate of

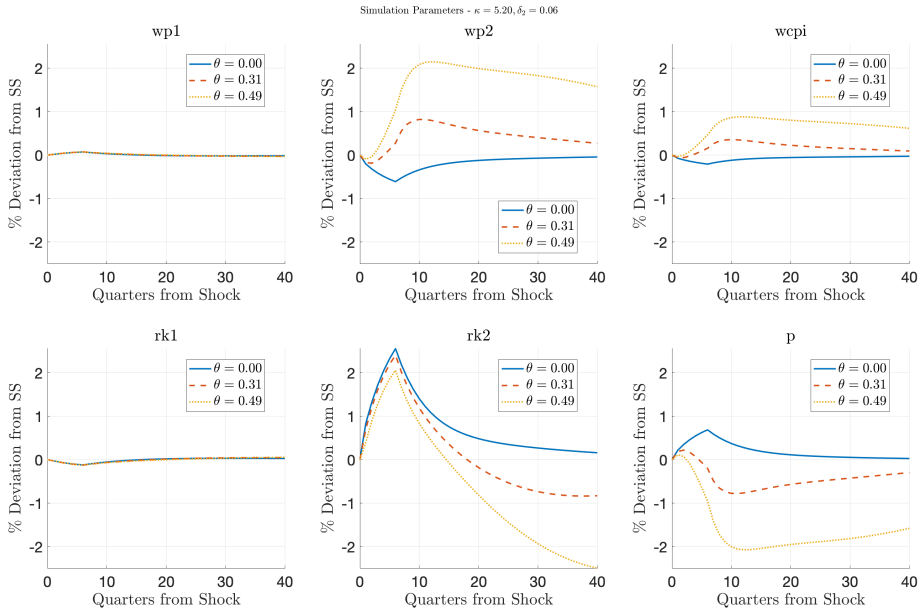


Figure 41: Prices and Wages

Notes: The simulation is obtained with Dynare. The blue line sets $\theta = 0$ and assumes no-learning. The dashed orange line sets $\theta = E/(4 \cdot Y_2)$ and assumes learning-by-doing. The model sets $\kappa = 5.2$ (investment adjustment costs) and $\delta_2 = 2 \cdot \delta_1$ (capital utilization).

capital of sector 1, which coincides with the marginal product of capital of sector 1. Given that sector 1 is not much affected by the build-up, the magnitude of their response is very limited compared to the dynamics of sector 2 and the aggregate one.

The top-middle panel shows the product wage of sector 2, obtained as W_t/P_t. Notice that the product wage increases when there is learning and falls when there is not learning, a result driven by the dynamics of relative prices (bottom-right figure). The bottom-middle panel shows the rental rate of capital of sector 2 (recall that $r^k_{2,t} = P_t \cdot \text{MPK}_{2,t}/u_{2,t}$). The rental rate initially increases, boosted by extra hours worked in sector 2, as well as extra TFP coming from learning-by-doing. As hours fall and experience achieves its peak, the fall in the price drives down the rental rate of capital.

Finally, the top-right panel shows the response of the consumption wage, which is constructed as the ratio between the nominal wage W_t and the CPI. I construct

the CPI as follows:

$$\begin{aligned}
\mathrm{CPI}_t &= \frac{C_1}{C} \cdot 1 + \frac{P \cdot C_2}{C} \cdot P_t \\
&= \frac{C_1}{C_1 \ \left(1 + \frac{P \cdot C_2}{C_1}\right)} + \frac{P \cdot C_2}{C_1 \ \left(1 + \frac{P \cdot C_2}{C_1}\right)} \cdot P_t \\
&= \frac{1}{1 + \frac{\phi}{1-\phi}} + \frac{\frac{\phi}{1-\phi}}{1 + \frac{\phi}{1-\phi}} \cdot P_t \\
&= (1 - \phi) + \phi \cdot P_t.
\end{aligned}$$

Therefore, the consumption wage is:

$$W_t^{\mathrm{CPI}} = \frac{W_t}{(1 - \phi) + \phi \cdot P_t}.$$

The consumption wage increases in a way similar to the one of the product wage of sector 2, driven up by the fall in the relative price.

F SCB's Meaningful Extracts in the Vietnam War Period

Sep65 (On Government Activity) "*Activity is also being bolstered by rising government orders and expenditures, especially for defense, which are likely to grow larger in the near future.*"
(On consumer expenditures) "*Consumer demand continues to advance with the rise in income [...] The wage increase in the steel industry and a rise in military pay will also add to the flow of income in September*". It is important to notice that the SCB also mentions the lump-sum transfer for increased social security benefits in September (even if this was financed with tax increase according to R&R.

Oct65 (On wage increases) "*The wage increase in the steel industry and a rise in military pay will also add to the flow of income in September*".
(On Car sales) "*Another influence that may have contributed to the recent high rate of new car sales has been the growing awareness by consumers and businessmen of the buoyant effects of the Vietnam developments on prospective economic activity*".

Nov65 (On long-term interest rates): "*However, expectations also played a substantial role, particularly in the summer rise in long-term rates. After the enlargement of U.S. military participation in Vietnam during the summer, there were widespread expectations that credit demands —already large because of the business expansion— would rise even more*".

Dec65 (On defense orders and the overheating of defense production) "*Because of the fighting in Vietnam, order backlogs for defense products — aircraft and parts, ordnance, and communication equipment have grown considerably this year, and the rise has outstripped the increase in defense shipments. Typically there is a long lag between order placements and delivery of major procurement items. At the end of the third quarter, the ratio of backlogs to shipments stood at more than 10, as compared with 9 a year earlier. As chart 3 makes clear, this ratio has been moving irregularly higher since early 1962*".
(On Procurement accounting) "*It is also quite apparent that the ratios in recent years are far below those that prevailed in the midfifties. Part of the difference is due to changes in procurement policies of the Department of Defense. Formerly, contract awards for major procurement items like aircraft were generally made on a lump-sum basis covering in a single award the entire cost of the contract, regardless of the length of time required to com-*

plete it. Frequently, individual contracts were so large that their completion required several years; the new orders reported by respondent firms reflected large awards of this type. More recently, however, contract awards have been placed only for that part of a total contract expected to be completed within a year; only this portion is now reported as a new order."
(On New Durable Orders) "*Continued advances in business investment and in consumer expenditures for household durables throughout 1965 and sharply increasing defense programs have been reflected in a rising flow of new orders for durable goods*".
(On the need to expand capital) "*The rise in the unfilled order-sales ratio in September and October was rather sharp. In part, it was attributable to industries producing defense products, but it appeared also in machinery and equipment industries. The most recent increases probably indicate somewhat more pressure on the capabilities of durable goods industries and are consistent with the finding, reported below in the review of plant and equipment expenditures, that a rising percentage of durable goods companies consider their present production facilities inadequate to satisfy current and near-term sales requirements.*".

Jan66 (On the rise in Output) "*The most recent increases probably indicate somewhat more pressure on the capabilities of durable goods industries and are consistent with the finding, reported below in the review*".
(On the increase in federal Outlays) "*In the second half of 1965, defense spending was accelerated under the impetus of the increasing American commitment in Vietnam. Outlays for payrolls, ammunition, fuel, and supplies moved up rapidly. Military strength rose nearly 100,000 in the second half of the year. In addition, total military compensation was increased appreciably by a general pay raise for military personnel and by an extension of combat pay eligibility*". They were also saying that in the first half of 1965, federal purchases were driven up by non-defense purchases, particularly for the space race (NASA).
(On the lag between outlays and orders) "*Expenditures for major hard goods categories—missiles, aircraft, and ships—did not show similar increases, because the Vietnam conflict has been fought mostly from stocks on hand. However, new orders for defense products have been advancing sharply in recent months.*"
(On Consumers' Expectations) "*Perhaps the outstanding development in 1965 was the change in the economic climate that emerged around the end of the year. It reflected the buoyant state of demand, the prospective large increases in spending, particularly for defense, and the growing pinch on resources.*"

(On taxes) Total tax receipts increase in 1965, this is despite a small excise tax cut and a lump-sum transfer in September. Expected increase in social security contributions: "*A much larger increase—over $6 billion—is expected this year, primarily because of the 1965 Social Security Amendments. About $5 billion of this rise will result from the increase in the combined (employee-employer) tax rate from 7.25 to 8.4 percent and from the advance from $4,800 to $6,600 in maximum earnings subject to tax.*"
(On Prices and Wages) The Survey says that plant utilization was much higher than in the past year. Moreover: "*In some industries shortages of qualified workers, chiefly late in the year, were responsible for rising unit labor costs; in others, the utilization of marginal plant facilities pushed up production costs. In the closing months of the year, the escalating military conflict in Vietnam may have given rise to speculative price increases*".
(On Why the economy was so strong in 1964 and 1965) "*The 1964 reduction in personal and corporate income taxes continued to stimulate personal consumption expenditures and business spending on new plant and equipment, and the cut in corporate taxes at the beginning of 1965 provided a further stimulus to business investment. The reduction in excise taxes around midyear lowered prices on a wide variety of consumer goods and provided an additional fillip to consumer spending. Personal income was directly increased by the rise in Social Security benefits. Some of the rise in employment, notably among teenagers, was a reflection of special Government programs associated with the war on poverty*".

Feb66 (On the need of tax increase and spending cuts) "*The outlook in early 1966 is for rising defense outlays, strong investment demand, and continued buoyancy of consumer spending. Since the increase in military spending occurs at a time of high employment and high rates of capacity utilization, the budget calls for several measures designed to moderate the growth in the private sector. New tax proposals—such as the speedup in collections of corporate and individual income taxes and the temporary restoration of certain excise taxes—will boost revenues sharply in the period immediately ahead. On the expenditure side, the expansion of important new civilian programs has been slowed down, and older, lower priority activities have been reduced or eliminated. [...] On the other hand, an end to the Vietnam conflict could provide the opportunity for tax reduction or increased expenditures on many high priority Federal civilian programs now limited by defense needs.*"
(On the lag in NIPA) "*In the defense area, it is expected that cash outlays will rise more rapidly than NIPA purchases in fiscal 1966 and 1967. Purchases of military hard goods in the NIPA budget are based on deliveries, which in a period of rapidly rising expenditures tend to lag considerably behind cash*

payments made for work in progress." In turn, outlays lag behind orders.

Mar66 (On the fiscal stimulus) "*February was still another month of strongly rising business activity as aggregate demand surged higher, mainly under the influence of increasing defense outlays and business expenditures for new plant and equipment.*"
(On Plant and Equipment Investment) "All major industries are programming further sizable increases in expenditures on new plant and equipment in 1966. Expenditures of durable goods producers are expected to reach $13 billion this year, 18 percent above last year's $11.4 billion. The rise is expected to accelerate in the second half. The expected 1966 increases are particularly large for electrical machinery (31 percent), nonelectrical machinery (24 percent), and nonautomotive transportation equipment (46 percent). These industries, which are the major suppliers of capital goods and defense goods, also anticipate the largest relative increases in 1966 sales over 1965".
() " *...given the rising requirements of Vietnam and a tightening supply of skilled labor and other resources, there is the question as to whether further increases in aggregate demand will necessitate new tax measures*".

Apr66 (On the state of the economy and defense program) "*The March gains rounded out another large quarterly increase in GNP and a still greater rise in final sales, paced by a substantial advance in personal consumption expenditures and sizable increases in fixed investment and defense expenditures. Because of the growing pinch on available resources, the President late in March asked businessmen to reexamine their plant and equipment programs with a view to cutting them down or stretching them out, as one way of reducing aggregate demand and inflationary pressure*".

May66 (On the state of demand and the defense stimulus) "*According to advance figures, retail sales appear to have eased, mainly because of lower automobile sales. [...] This is not to suggest that aggregate demand is flagging. On the contrary, it is still increasing vigorously, chiefly under the stimulus of rising defense expenditures and capital outlays, and continues to press on plant and equipment capacity and labor resources.*"

Jun66 (On Procurement Purchases)"*Nearly half of the large rise in expenditures occurred in national defense purchases as military procurement for Vietnam jumped sharply during the quarter.*"
(On the demand side) "*On the demand side, it appears that activity this spring has advanced mainly under the stimulus of rising plant and equipment expenditures and defense outlays'.*"
(On Consumer behavior) "*However, consumer demand, after two quarters*

of extraordinary increase, has lost some of its buoyancy. According to the advance report for May, retail sales declined (seasonally adjusted) for the second straight month, chiefly because of lower sales of durable goods.". The Survey, suggests that it was mainly automobile's demand to slow down, suggesting that the cuprit could have been a rise in prices.
(On Business Investments in new plants and equipment) "*Under the stimulus of strong demand for capital goods and defense products, the nonelectrical machinery an non-automotive transportation equipment industries are scheduling the largest year-to-year increases in investment outlays of any industry*".
(On Industry Expectations) "*Industries that supply capital goods and defense products expect continuing substantial increases in shipments, but the motor vehicles industry anticipates some easing from the high first quarter rate*".

Jul66 (On the state of the economy) "*It is clear that although economic activity is moving ahead at a good pace, it is not increasing at the exceptionally rapid rate of last fall and winter. The rise in output attributable to the increases in defense and capital goods demand is being offset to some extent by a weakness in homebuilding and by the decrease in auto production that has followed the earlier setback in sales*".

Sep66 (State of the Economy) "*It seemed fairly certain that GNP would show a greater rise in the third quarter than in the second, as defense purchases and business outlays for new plant and equipment continued to rise and as consumer demand moved ahead at a faster rate than in the spring*".
(President's Proposal) "*The president's proposals on September 8 to slow down the growth in business fixed investment and government outlays in order to reduce inflationary pressures and alleviate the burden on monetary policy were made in a setting of strongly rising output and demand and continued pressure on productive resources*". The President wanted lower interest rates.

Oct66 (State of the Economy and Defense stimulus) "*Business activity continued strong in September, mainly under the stimulus of rising defense outlays and business purchases of durable equipment. Personal income rose to a new peak, and retail sales, industrial production, and non-agricultural employment continued at about record August rates. Wholesale prices of industrial commodities dipped slightly in September—the first monthly decrease in 2 years—after little overall change in August.*"
(On the Vietnam Stimulus) "The war in Vietnam continues to be a major stimulus to economic activity. The $4 billion gain in military spending was the largest for any quarter since the step-up in hostilities last year. About

three-fourths of the rise in military outlays went for the purchase of equipment and supplies, while the remainder was attributable to higher personnel costs."
(On Inventories) "*Preliminary data indicate that increases in inventory investment were pronounced in business and defense equipment industries: transportation equipment —particularly aircraft— electrical and nonelectrical machinery, and fabricated metals.*"
(On Consumer Expenditure) "*The third quarter gain in disposable personal income was accompanied by a still sharper relative increase in personal consumption expenditures*".

Nov66 (On the state of the economy) "*The course of total activity continues to be dominated by rising business capital outlays and a strong expansion in defense purchases, although some crosscurrents have become more prominent since late summer. [...] The index of industrial production rose to a new record in October, with further increases in output of business and defense equipment and a sharp recovery in auto assemblies from the relatively low September level.*"
(On the new defense order wave) "*The continued buildup of the U.S. military effort gave an impetus to orders for defense products during the third quarter. [...] there can be little doubt that orders for military aircraft have risen considerably.*"
(On input-output connections) "*The slowing of residential and commercial construction activity has lowered the demand for steel and other construction materials in recent months. [...] Defense requirements for steel are undoubtedly offsetting a large part of the decline by other sectors.*"
(On Federal receipts) "*Federal receipts this year, already enlarged by higher income flows and rising effective marginal rates of taxation, were raised still more by increased social security contributions, the repeal of selected excise tax cuts, and the introduction of graduated withholding of personal income taxes.*"

Jan67 (On the Government restraints on demand) "*For the first year since the expansion started, Government Authorities adopted measures to restrain demand. Some restraint became effective at the very beginning of the year in the form of higher social security taxes—the result of legislation passed some time ago. New tax measures adopted early in the year included graduated withholding of personal income taxes, accelerated payment of corporate income taxes and the partial restoration of previously enacted cuts in excise taxes. Later in the year, tax incentives to investment in new plant and equipment were eliminated*".

(On MP response) "*But monetary policy was the major weapon employed in 1966 to hold down demand and prices. With credit demands extremely high — particularly those by business to finance rising-plant and equipment programs and working capital needs — and with monetary policy directed toward restraint, interest rates rose to their highest levels in several decades.*"
(On Government Purchases) "*Heavy defense purchases last year accounted for most of the rise in Federal outlays from 1965 to 1966 and were the dominant stimulus to rising activity in the second half of the year. [...] As in the summer months, government purchases continued to be a major stimulus to the rise in production*"
(On Personal Income) "*Another large increase in personal income accompanied the continued strong advance in economic activity in 1966. The flow of income reflected essentially the large rise in earnings from current production...*"
(On Consumption Expenditure) "*This was the largest rise in personal consumption expenditures, in both absolute and percentage terms, in the past 15 years. However, a large part of the 1966 advance in consumer expenditures reflected higher prices.*"
(On Industrial Investments) "*Within manufacturing, the largest increases in expenditures last year were in the industries producing defense* and capital goods*".
(On Inventories and Leadtime of Defense items) "*The long leadtimes for the production of defense and capital goods were important factors in the growing ratio of stocks to output during 1966...*"
(On Capital Utilization) My understanding is that the economy was operating at high regime when the Vietnam war started and businesses were making great investments in plant and equipment as well as drastically increasing hours of production workers and work-week of capital (or capital utilization).

Feb67 (On Industrial Production) "*On the other hand, industrial production in January decreased as motor vehicle and steel producers reduced output sharply, and production in non-durable goods industries declined slightly.*"

Jan67 (On National Income and Product) "*Purchases of goods and services by government —Federal, State, and local—increased about 15 percent in 1967, providing the main stimulus to the rise in economic activity. Because of the expansion of the war in Vietnam, purchases for national defense increased about one-fifth over 1966, approximately matching the large advance of the year before.*"

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