Can Debt Be Cured with More Debt?

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July 2016

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Disclosure

The views expressed are those of the authors and do not necessarily reflect the official positions of the Federal Reserve Bank of Cleveland or the Federal Reserve System.

The Role of Consumption

- What is the role of individual consumption in economic growth?
- How does access to credit affect consumption? How about economic growth?
- Is there limit to positive effect?
- What happens with consumption when consumers are overlevered?

Motivation

- Consumer debt overhang contributed to the depth of the 2008 recession and slowed the economic recovery
  - Mian, Rao, and Su (2013), Mian and Su (2015)

- Big Debate:
  - Can fiscal policy be effective when consumers are forced to delever?
  - Can it mitigate the adverse consequences of consumer debt overhang?

Can fiscal policy be effective?

- A long literature proposes theories of fiscal stimulus
- Few theories that factor in consumer heterogeneity
  - e.g., Gali et al (2007), Murphy (2015)
- Fewer theoretically evaluate the impact of consumer leverage on the efficacy of fiscal stimulus
  - Eggertsson an Krugman (2013)
- There is no empirical evidence that fiscal stimulus is effective during periods of consumer debt overhang.

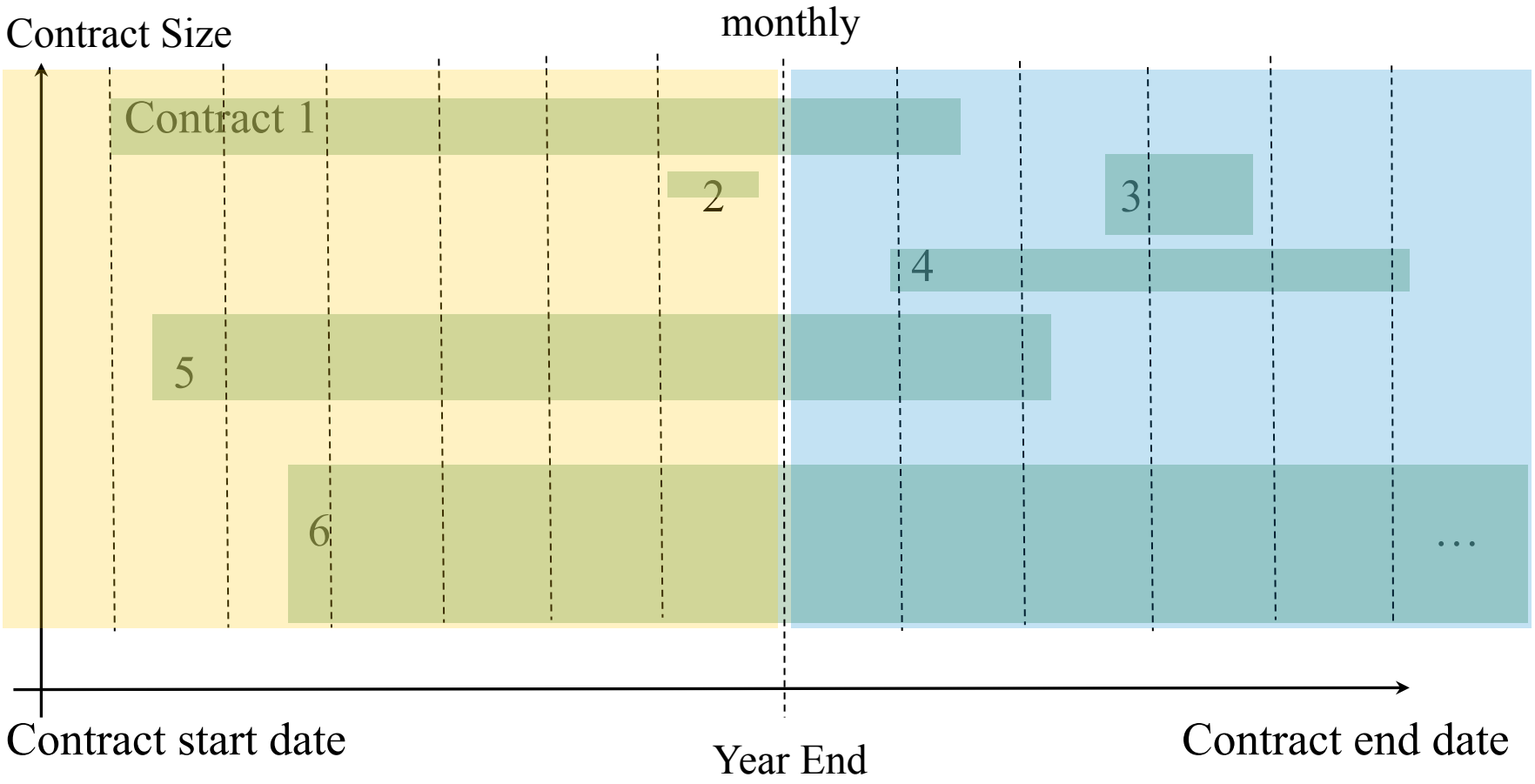
This paper…

- Empirically evaluates if government spending multiplier varies with local consumer leverage during Great Recession
  - Exploits a new detailed dataset on Department of Defense spending.
  - Establishes that the fiscal multiplier in a recession is higher in geographies with higher pre-recession consumer indebtedness.
- Evaluates the validity of mechanisms that can account for the debt-dependent fiscal multiplier
  - Relaxation of credit constraints
  - Heterogeneity in MPC
  - Excess capacity channels

New Government Spending Data

- Department of Defense contract-level data
  - every contract since 2000
    - date contract signed, length of contract, and amount of contract
    - zip code of prime contractor
    - zip code where majority of work is performed
- Third largest spending line after Medicare, Social Security
- Accounts for over half of discretionary spending.
- Long history of using DOD spending to estimate fiscal multiplier

Annualized Government Spending



Annualized Spending

- Geographic distribution
  - Based on ZIP of location where work was performed
  - 75% of the contracts offer the ZIP code of the prime contractor and ZIP code where work was performed
  - 41% of contracts are done in the same ZIP
  - 76% of contracts are done in the same state

- De-obligations
  - De-obligated contracts are excluded (4.7% of the sample)
  - Other de-obligations are considered as negative spending

Other data

- Income Data
  - Local employment and wages from BLS
- GDP Data
  - CBSA level from BEA
- Debt Data
  - Local measures of pre-recession debt-to-income ratios from Mian, Rao, and Sufi (QJE 2013)
  - County-level measures are aggregated to CBSA-level measures using population weights

Baseline Empirical Specification

$$Y_{i,Post} - Y_{i,Pre} / Y_{i,Pre} = \alpha + \beta_Y G_{i,Post} - G_{i,Pre} / Y_{i,Pre} + Controls_i + \epsilon_i,$$

- $Y_{i,Post}$ measure of real economic output in 2008/09 period
- $Y_{i,Pre}$ measure of real economic output in 2006/07 period
- Normalize change in DOD spending by real economic output pre-recession
  - Income for income and employment analysis
  - GDP for GDP analysis

- Use Bartik-type instrument for ΔG using pre-recession DOD spending shares

T2: The Effect of Government Spending on Local Economic Growth

	County	CBSA				State
	Total Income Growth (1)	Total Income Growth (2)	Employ-ment Growth (3)	Total Income Growth (5)	Total Income Growth (6)	Total Income Growth (7)
Panel A: Cross-Sectional Regressions						
Change in Government Spending$_{07 \text{ to } 09}$ Normalized by Local Income$_{06/07}$	0.08*** (17.38)	0.37*** (3.86)	0.23*** (3.60)	0.53*** (2.75)		0.852 (1.14)
Change in Government Obligations$_{07 \text{ to } 09}$ Normalized by Local Income$_{06/07}$					0.366*** (2.86)	
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	2,412	828	828	372	828	51
R2	0.18	0.45	0.40	0.55	0.40	0.83
First stage regression coefficient	3.71***	2.26***	2.26***	1.64***	2.12***	0.47**
Kleibergen-Paap ML Test	1.41	13.25***	13.25***	8.05**	8.82***	7.97***

T2: The Effect of Government Spending on Local Economic Growth

	County		CBSA			State
	Total Income Growth (1)	Total Income Growth (2)	Employ-ment Growth (3)	Total Income Growth (5)	Total Income Growth (6)	Total Income Growth (7)
Panel B: Panel Regressions						
Change in Government Spending$_t$	0.05***	0.21***	0.13***	0.34***		1.17
Normalized by Local Income t-1	(4.62)	(3.86)	-3.69	(2.24)		(1.18)
Change in Government Obligations$_t$					0.02	
Normalized by Local Income $_{t-1}$					(1.43)	
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
CBSA and Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	19,173	9,108	9,108	4,092	4,092	561
R2	0.82	0.87	0.43	0.92	0.86	0.54
First stage regression coefficient	1.65***	1.31***	0.94***	1.03***	1.18***	0.79**
Kleibergen-Paap ML Test	1.94	10.35***	10.35***	4.46**	8.73***	3.89**

Debt-Dependent Fiscal Multiplier

$$\Delta Y = \alpha + \beta_1 \Delta G + \gamma DTI_{i,06} + \beta_2 \Delta G \times DTI_{i,06} + Controls_i + \epsilon_i,$$

- $DTI_{i,06}$: debt-to-income ratio in geography i in 2006.
  - Exogenous (Davidoff, 2015);
  - Observable prior to recession.

- Fiscal Multiplier:

$$\beta_1 + \beta_2 \ DTI_{i,06}$$

T3: The Effect of Leverage on the Fiscal Multiplier

	Panel A: Total Income Growth			
	(1)	(2)	(3)	(4)
Change in Government Spending$_{07\ to\ 09}$	0.36***		0.37***	-0.48
	(3.90)		(3.94)	(1.62)
Debt to Income$_{2006}$		-0.03***	-0.03***	-0.04***
		(5.93)	(5.59)	(6.20)
Change in Government Spending$_{07\ to\ 09}$ * Debt to Income$_{2006}$				0.59**
				(2.37)
CBSA Control Variables	Yes	Yes	Yes	Yes
Number of Observations	828	824	824	824
R2	0.45	0.48	0.47	0.47
Kleibergen-Paap ML Test	13.26***	n/a	13.23***	8.76***

T4: Economic Magnitudes

		Debt to income ratio			
	Aggregate Multiplier	1.19 *p25*	1.44 *p50*	1.83 *p75*	*p75-p25*
	(1)	(2)	(3)	(4)	(5)
Income	0.36	0.222	0.370	0.600	0.38
		61.7%	102.7%	166.6%	104.9%
Employment	0.23	0.155	0.240	0.372	0.22
		67.2%	104.2%	161.8%	94.6%
GDP	0.77	0.202	0.745	1.591	1.39
		26.3%	96.7%	206.6%	180.4%

Robustness: Economic Boom Story

	Panel A: Total Income Growth			
	(1)	(2)	(3)	(4)
Change in Government Spending$_{02/03 \text{ to } 04/05}$	0.41**		0.30*	2.12
	(2.03)		(1.88)	(1.34)
Debt to Income$_{2002}$		0.04**	0.04**	0.05**
		(2.52)	(2.54)	(2.57)
Change in Government Spending$_{02/03 \text{ to } 04/05}$ * Debt to Income$_{2002}$				-1.29
				(1.15)
CBSA Control Variables	Yes	Yes	Yes	Yes
Number of Observations	828	824	824	824
R2	0.15	0.20	0.19	0.17
Kleibergen-Paap ML Test	5.72**	n/a	5.72**	0.98

Evidence so far…

- Government spending multiplier
  - Increases in the size of geographic unit
  - Comparable in magnitude to prior literature at the state level (Naramura and Steinssons, 2014)

- Government spending multiplier higher in CBSAs with higher household leverage

- What mechanisms are responsible for the debt-dependent multiplier?

Consumption driven mechanisms

- Consumer debt overhang affect the economy through household consumption.
- Government spending mitigates the effects of consumer leverage.
- Does government spending stimulate consumption of highly indebted households more?

  - Relaxation of credit constraints
  - Higher marginal propensity to consume

Individual Level Data from Credit Bureaus

- TransUnion
  - Wide set of consumer specific financial dimensions
  - Credit score data
  - Individual consumer income → individual DTI
    - Estimated using proprietary model
  - Less than 3% of the population

- Equifax
  - No consumer specific income measure
    - ZIP code IRS average income
  - Solid robustness check
  - 5% random draw from the US population

T8: Relaxation of credit constraints?

Panel A: TransUnion

	$log(Debt_{Feb\ 2010}/Debt_{Feb\ 2008})$		
Debt to Income $_{Feb\ 2007}$	-0.10***	-0.10***	-0.10***
	(84.34)	(80.22)	(79.53)
Change in Government Spending$_{07\ to\ 09}$ *	-0.10***	-0.11***	-0.11***
Ind. Debt to Income$_{Feb\ 2008}$	(3.13)	(3.06)	(3.03)
Controls for local industry structure	No	Yes	Yes
Controls for county economic conditions	No	No	Yes
CBSA fixed effects and log(Income$_{i,\ Feb\ 2007}$)	Yes	Yes	Yes
Adj. R sq.	1.3%	1.4%	1.4%
No. obs.	5,918,116	5,918,114	5,917,526

T8: Relaxation of credit constraints?

Panel B: Equifax			
	$log(Debt_{2009}/Debt_{2007})$		
Ind. Debt to Avg ZIP Income$_{2006}$	-0.07***	-0.07***	-0.07***
	(52.01)	(51.45)	(51.45)
Change in Government Spending$_{07\ to\ 09}$ *	-0.11***	-0.11***	-0.11***
Ind. Debt to Avg ZIP Income$_{2007}$	(3.01)	(2.97)	(2.99)
Controls for local industry structure	No	Yes	Yes
Controls for county economic conditions	No	No	Yes
CBSA fixed effects and log(ZIP Income$_{2006}$)	Yes	Yes	Yes
Adj. R sq.	1.1%	1.2%	1.2%
No. obs.	7,137,767	7,137,614	7,137,614

Consumption data

- County-level data
  - Auto purchases
  - Moody's consumption data
    - Retail sales
    - Durable purchases
    - Non-durable purchases
- Individual-level data
  - Credit card balances
  - Auto loans
  - Other retail loans

T : Higher MPC?

	Auto Registrations Growth $_{07 \text{ to } 09}$		Total Retail Sales Growth $_{07 \text{ to } 09}$		Nondurable Consumption Growth $_{07 \text{ to } 09}$		Durable Consumption Growth $_{07 \text{ to } 09}$	
County Debt to Income$_{2006}$	-0.133***	0.037	-0.03***	0.01	-0.02***	0.02	-0.06***	-0.014
	(4.17)	(0.36)	(6.87)	(0.20)	(4.73)	(0.67)	(7.38)	(0.40)
CBSA Change in Government Spending$_{07 \text{ to } 09}$	0.205	-	0.092	-	0.119	-	0.187	-
	(0.28)		(0.69)		(1.27)		(0.72)	
CBSA Change in Government Spending$_{07 \text{ to } 09}$ * County Debt to Income$_{2006}$	0.01	-2.06	-0.04	-0.18	-0.03	0.25	-0.11	-1.08*
	(0.01)	(0.77)	(0.41)	(0.59)	(0.43)	(0.80)	(0.63)	(1.77)
Controls for local industry structure	No	Yes	No	Yes	No	Yes	No	Yes
Controls for county economic conditions	No	Yes	No	Yes	No	Yes	No	Yes
CBSA fixed effects	No	Yes	No	Yes	No	Yes	No	Yes
Adj. R sq.	7%	6%	9%	4%	7%	1%	10%	4%
No. obs.	1,503	1,503	1,484	1,484	1,484	1,484	1,484	1,484

T11 : Credit Card Purchases

Panel A: TransUnion

	$log(CC_{Feb\ 2010}/CC_{Feb\ 2008})$		
Debt to Income $_{Feb\ 2007}$	-0.03***	-0.02***	-0.02***
	(37.84)	(15.93)	(15.87)
Change in Government Spending$_{07\ to\ 09}$ *	-0.02	-0.04	-0.04
Ind. Debt to Income$_{Feb\ 2008}$	(0.64)	(1.01)	(1.05)
Controls for local industry structure	No	Yes	Yes
Controls for county economic conditions	No	No	Yes
CBSA fixed effects and log(Income$_{i,\ Feb\ 2007}$)	Yes	Yes	Yes
Adj. R sq.	0.1%	0.2%	0.2%
No. obs.	3,896,220	3,896,219	3,895,839

T11 : Credit Card Purchases

Panel B: Equifax

	$log(CC_{2009}/CC_{2007})$		
Ind. Debt to Avg ZIP $Income_{2006}$	-0.01***	-0.01***	-0.01***
	(6.86)	(6.83)	(6.82)
Change in Government $Spending_{07\ to\ 09}$ *	-0.03	-0.03	-0.03
Ind. Debt to Avg ZIP $Income_{2007}$	(0.96)	(0.99)	(1.01)
Controls for local industry structure	No	Yes	Yes
Controls for county economic conditions	No	No	Yes
CBSA fixed effects and log(ZIP $Income_{2006}$	Yes	Yes	Yes
Adj. R sq.	0.1%	0.1%	0.1%
No. obs.	5,126,687	5,126,571	5,126,571

Excess Capacity Channel?

- Consumer debt overhang → ↓ aggregate demand → ↑unemployment (↑ excess capacity)

- Government spending:
  - New job offerings
  - Potential crowding out of the private sector

  - Excess capacity → less crowding out → employment effect is stronger
    - Michaillat (2014), Murphy(2015)

- Empirical evaluation
  - Challenge: unemployment (slack) is endogenous
  - Solution: evaluate sectors that do not benefit from household consumption.

T11: State-Dependent Multipliers in the National Security Sector

	Panel A: Income Growth in National Security Sector			
	(1)	(2)	(3)	(4)
Change in Government Spending$_{07\ to\ 09}$	0.079***		0.079***	-0.141*
	(2.90)		(2.91)	(1.77)
Debt to Income$_{2006}$		0.001	0.001**	-0.001
		(1.46)	(2.24)	(0.97)
Change in Government Spending$_{07\ to\ 09}$ * Debt to Income$_{2006}$				0.15**
				(2.27)
CBSA Control Variables	Yes	Yes	Yes	Yes
Number of Observations	828	824	824	824
Kleibergen-Paap ML Test	13.26***	n/a	13.23***	10.44***

This Paper

- Expansionary fiscal policy is effective during consumer debt overhang induced recessions
- No evidence that fiscal policy stimulate economy via household consumption mechanism
- Natural hedge through slack channel
  - Debt overhang → ↓consumption → ↓employment
  - Higher unemployment → ↑excess capacity → ↑less crowding out from government spending

Contribution

- Fiscal policy response during the consumer leverage induced recession
  - Eggertsson and Krugman (2012), Hall, 2011; Curdia and Woodford, 2010, 2011, …
- Estimating fiscal multiplier
  - Cross-country evidence
    - Alesina and Ardagnia, 2010; Guarjardo, Leigh, and Pescatori, 2011;
  - U.S. based evidence from World War II period
    - Barro and Redlick, 2009; Hall, 2009; Ramey, 2011
  - U.S. state-level analysis
    - Nakamura and Steinsson, 2014; Shoag, 2010

Contribution

- State-dependent fiscal multipliers
  - Theoretical literature
    - e.g., Michaillat (2012) and Murphy (2015)
  - SVARs and national aggregates approaches
    - Auerbach and Gorodnichenko (2012), Bachmann and Sims (2012), Ramey and Zubairy (2014, 2015), and Tagkalakis (2008).

- Consumer response to various forms of stimulus
  - Tax rebates
    - Shapiro and Slemrod (2003), Parker, Souleles, Johnson, McClelland (2013), Agarwal and Qian 2014; Agarwal, Liu, and Souleles (2015);
  - Interest rate reductions
    - Keys, Piskorski, Seru, and Yao (2014)
  - Refinancing guarantees
    - Agarwal, Amromin, Chomsisengphet, Piskorski, Seru, and Yao (2015)