FISCAL STIMULUS AND CONSUMER DEBT[*]

by

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July 7, 2017

Abstract

In the aftermath of the consumer debt–induced recession, policymakers have questioned whether fiscal stimulus is effective during periods of high consumer indebtedness. This study empirically investigates this question. Using detailed data on Department of Defense spending for the 2007–2009 period, we document that the open-economy relative fiscal multiplier is higher in geographies with higher consumer debt. The results suggest that, in the short term (2007-2009), fiscal policy can mitigate the adverse effect of consumer (over)leverage on real economic output during a recession. We then exploit detailed microdata to evaluate whether aggregate demand and aggregate supply economic mechanisms contribute to the debt-dependent multiplier.

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1. Introduction

The Great Recession illustrates the importance of consumer balance sheets during an economic downturn. A number of academic studies document that accumulation of debt by consumers set the stage for the 2007 crisis (see, e.g., Mian and Sufi, 2011). Debt overhang also slowed the economic recovery (Mian, Rao, and Sufi, 2013; Mian and Sufi, 2015). In such an environment, both fiscal and monetary authorities face the challenge of designing a proper policy response, particularly because high consumer debt balances are frequently invoked to question the efficacy of expansionary fiscal policy. After all, Ricardian equivalence (Barro, 1974) implies that government spending only increases the effective debt burden of already overlevered consumers. "You cannot solve a problem created by debt by running up even more debt, say the critics," (Eggertsson and Krugman, 2012).

In this paper, we empirically investigate whether expansionary fiscal stimulus is effective during a consumer-debt-overhang-induced recession. Using new transaction-level data on Department of Defense (DOD) spending, we document that during the 2007–2009 recessionary period the open-economy relative fiscal multiplier is higher in geographies with higher pre-recession consumer indebtedness. We then present evidence suggesting that both aggregate demand and aggregate supply economic mechanisms likely contribute to the debt-dependent multiplier we document.

Academic literature has long acknowledged the adverse effects of debt in a recession (Fisher, 1933; Minsky, 1988). Indeed the 2007 crisis is not the only economic downturn accompanied by high consumer indebtedness (see, e.g., Mian, Sufi and Verner, 2017, and Schularick and Taylor, 2012). However, only since the 2007 crisis has the theoretical literature explored optimal policy in a setting where the distribution of debt across heterogeneous households

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can affect aggregate output (e.g., Eggertsson and Krugman, 2012; Guerreri and Lorenzoni, 2010). The *empirical* studies investigating this question are even more scarce. This paper attempts to fill the void by documenting how the geographic heterogeneity in pre-recession consumer leverage affects the open-economy relative fiscal multiplier (henceforth referred to as fiscal multiplier or DOD spending multiplier).[1]

To explore the heterogeneity in the open-economy relative fiscal multiplier, we utilize new detailed data on DOD spending available from 2000 to 2014. This publicly available data includes information about contract-level DOD spending, from $25 disbursements to almost $32 billion military procurements. We observe the start and end date of the contracts, the primary contractor locations, and the ZIP codes in which the majority of the work is performed. We validate these DOD spending data by replicating the empirical experiment of Nakamura and Steinsson (2014), who use state-level DOD spending data and a Bartik-style instrument to estimate a state-level open-economy fiscal multiplier of about 1.4.[2] While our sample period is much shorter, we find a state-level GDP multiplier of a similar magnitude. The state-level granularity, however, is too coarse to explore the effects of consumer leverage on economic growth.

One of the contributions of this study is to estimate the DOD spending multiplier at lower levels of geographic granularity (county and Core Based Statistical Areas [CBSAs] as opposed to state), which allows for a detailed investigation of heterogeneity in fiscal multipliers that was not possible in prior studies based on state-level analysis. Our estimated fiscal multipliers at different levels of geographic granularity are uniformly positive, statistically significant, and increase with

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[1] The relative open-economy multiplier is especially relevant in our context since we are interested in whether government spending is relatively more effective when consumer debt is relatively high.

[2] Our estimates are in line with broad literature exploring the regional fiscal spending multipliers (e.g., Chodrow-Reich et al., 2012; Wilson, 2012; Nakamura and Steinsson, 2014; Suárez Serrato and Wingender, 2016). See Chodrow-Reich (2017) for a review of this literature.

the size of the geographic unit: the county-level multiplier is about 0.06 and the CBSA-level multiplier reaches 0.63. This is consistent with the notion that the effect of local DOD spending often dissipates beyond counties or CBSAs where government contractors reside. In the rest of the paper, we adopt the CBSA-level analysis since CBSAs are big enough to capture meaningful variation in DOD spending, yet not too big to lose meaningful variation in consumer leverage.

Armed with the validated DOD spending data, we turn to the core question of the paper and document that the local 2007-2009 fiscal multiplier increases with local pre-recession consumer leverage. Specifically, we combine the empirical approaches of Mian and Sufi (2015) and Nakamura and Steinsson (2014) and implement an instrumental variable analysis that evaluates how pre-recession consumer debt-to-income ratios and the change in DOD spending from 2007 to 2009 affect economic output over this period.

The results suggest that the DOD spending multipliers are higher in CBSAs with higher pre-recession consumer debt-to-income ratios. The marginal effect is economically significant: the difference in the multiplier between the 75th and 25th percentiles of the consumer-leverage distribution is about the same as the average CBSA fiscal multiplier. At least in a medium run, expansionary fiscal stimulus can mitigate the adverse effects of consumer debt overhang on economic growth: one percentage point increase in government spending relative to local income offsets the adverse effects of consumer indebtedness by about 16%.

While it is important to know whether fiscal stimulus is effective during a consumer-debt-overhang-induced recession, it is no less important to understand what economic mechanisms contribute to the heterogeneity in the fiscal multiplier. Existing economic literature offers a number of channels through which government spending can affect real output. In these theories, the

efficacy of fiscal stimulus depends on its net effect on aggregate demand and whether aggregate supply can accommodate any increases in aggregate demand.

Changes in aggregate demand are associated with changes in investment and consumption. Private investments, for example, tend to respond to changes in interest rates associated with fiscal stimulus, as well as to changes in the expected future marginal product of capital caused by productive public investment (Baxter and King, 1993). Yet theories that rely on interest rate channels are unlikely to explain our results since monetary policy is constant across all cities in the U.S. Similarly, our focus on defense spending rules out local public investment as a cause of heterogeneous multipliers. Our evidence is also inconsistent with arguments based on Ricardian equivalence (Barro, 1974). It is unlikely that the current level of consumer leverage leads to *heterogeneous* effects on individual future taxes.

The remaining demand-side channels rely on heterogeneity in the number of credit-constrained hand-to-mouth consumers and their marginal propensity to consume (MPC), as in, for example, Galí et al. (2007) and Eggertsson and Krugman (2012). Eggertsson and Krugman (2012) present a Keynesian-style model in which agents with debt overhang are forced to delever; yet, fiscal stimulus leads to more consumption by the credit-constrained agents due to their higher MPC out of income. Similar to Galí et al. (2007), Eggertsson and Krugman (2012) argue that debtors' consumption on the margin depends on the fiscal stimulus while non-debt-constrained agents' consumption is unaffected by additional income.

To evaluate this heterogeneous MPC hypothesis, we utilize two proxies to capture household consumption: (a) individual-level consumer credit card balances, and (b) county-level

new car registrations.[3] The evidence offers support for debt-dependent MPCs. We find that the credit card balances of consumers with higher pre-recession debt-to-income ratios respond more positively to DOD spending than credit card balances of consumers with lower pre-recession debt-to-income ratios. Similarly, car registrations in higher debt-to-income geographies respond more positively to an increase in DOD spending during the crisis period than car registrations in lower debt-to-income geographies.[4] Combined with the evidence that these purchases are unlikely to be funded via an increase in car loans, as well as the lack of evidence supporting a heterogeneous response in total borrowing, the results are consistent with the economic mechanism proposed by Eggertsson and Krugman (2012).

Aggregate supply constraints can also lead to heterogeneous multipliers by counteracting the effect of increases in aggregate spending on output. Recent studies argue that differences in local economic slack may lead to differences in the extent to which local employment responds to government spending (see, e.g., Michaillat, 2012; Murphy 2017). In the presence of excess capacity, fiscal stimulus is less likely to crowd out private-sector employment and thus should be more effective in stimulating the local economy. In the context of the 2007 recession, consumer debt overhang leads to consumption slumps and associated declines in local employment (Mian and Sufi, 2015). The resulting economic slack might contribute to the efficacy of fiscal stimulus and a higher fiscal multiplier.

We empirically evaluate the validity of this aggregate supply-side channel by analyzing the growth of employment and income in the tradable sector of the economy that does not directly

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[3] A wide set of prior literature exploits credit card balances to proxy for individual consumption levels (Mian, Rao, and Sufi, 2013, Aaronson, Agarwal, and French, 2012, Agarwal, Liu, and Souleles, 2015). We augment this proxy for household consumption by evaluating new car registrations first introduced by Mian and Sufi (2011).

[4] Notably, consistent with Mian and Sufi (2011), we find that car registration declines more in geographies with more levered households than in the geographies with lower household leverage.

benefit from local household spending but is potentially affected by local labor market conditions. We find that debt-dependent multipliers are similar in magnitude to those documented in the non-tradable sector and statistically significant. Since one can argue that even the tradable sector of the economy still produces goods for local consumption, we further augment the analysis by isolating specific industries that cannot directly benefit from local individual consumption such as National Security and International Affairs sector (NAICS 9811).[5] We find that pre-crisis consumer debt does not affect employment in this sector during 2007-2009. The positive effect of DOD spending on local employment in the national security sector, however, increases with the local consumer debt-to-income ratio. The dependence of this multiplier on pre-recession consumer indebtedness cannot be explained by any individual consumption-driven economic mechanisms.

Overall, our results suggest that the benefits of fiscal stimulus – higher income and employment – are higher in geographies suffering from consumer debt overhang. Both local economic slack and the high MPCs of debt-constrained households seem to contribute to higher relative open-economy DOD spending multipliers. While we only explore the relative multiplier and do not evaluate the long term costs of fiscal stimulus (e.g., public debt and future tax burdens), our results offer an important implication: the ills of private debt can be mitigated, at least in the short run, by government spending. Fiscal policy is relatively more effective in stimulating income and employment in areas with high consumer debt-to-income ratios compared to areas with low consumer debt-to-income ratios.

This paper contributes to a number of strands of literature on fiscal policy and consumer behavior. First and foremost, we contribute to the debate about the efficacy of fiscal policy during

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[5] We cannot directly test the excess capacity channel since finding an exogenous measure of economic slack during a recession is challenging. The decline in unemployment in a given CBSA is endogenous to local real economic output and pre-recession unemployment is only weakly correlated with recession unemployment at the CBSA level.

consumer-debt-overhang-induced slumps. Inspired by the 2007 crisis, an emerging theoretical literature explores optimal policy during recessions that feature financial frictions and heterogeneous consumers (e.g., Hall, 2011; Curdia and Woodford, 2010, 2011; Guerreri and Lorenzoni, 2011; Eggertsson and Krugman, 2012). We augment this literature and offer new insights on the economic mechanisms potentially contributing to fiscal policy effectiveness in the environments analyzed by this growing theoretical literature.

Second, our evidence of a debt-dependent multiplier contributes to the empirical literature that estimates the impact of the fiscal policy on real output. We offer and validate new granular data on DOD spending that allows us to estimate relative open-economy government-spending multipliers using a short time series. Our estimated multipliers are consistent in magnitudes with those based on U.S. cross-state evidence (e.g., Nakamura and Steinsson, 2014). Effectively, our data and empirical approach allow us to estimate relative fiscal-spending multipliers that are potentially most relevant in the current economic environment.

We add to an expanding literature on state-dependent multipliers. Much of this literature employs structural vector autoregressions and national aggregate statistics to evaluate whether fiscal policy is more effective in recessions than in expansions. The most recent empirical studies include Auerbach and Gorodnichenko (2012), Bachmann and Sims (2012), Ramey and Zubairy (2013, 2014), Bernardini and Peersman (2015), and Tagkalakis (2008). We evaluate heterogeneity in multipliers via a cross-sectional U.S.-based analysis that utilizes local employment and income data. The cross-sectional nature of the analysis allows us to isolate the effect of economic slack from the zero-lower-bound-interest-rate-driven explanations for higher fiscal multipliers during recessions. The granularity of the data employed also allows us to offer additional insights into the mechanism responsible for state-dependent multipliers. Specifically, we offer evidence consistent

with the theoretical arguments behind the excess capacity channel (see, e.g., Michaillat, 2012; and Murphy, 2017).

Finally, a growing literature empirically evaluates consumer behavior in response to various forms of stimulus: tax rebates (e.g., Kaplan and Violante 2014; Misra and Surico 2014; Shapiro and Slemrod 2003; Aaronson, Agarwal, and French, 2012; Parker, et al, 2013; Agarwal and Qian 2014; Agarwal, Liu, and Souleles, 2015; Cloyne and Surico 2017), reductions in mortgage interest rates (Keys, Piskorski, Seru, and Yao, 2014), and government refinancing guarantees (Agarwal, et al, 2015; Agarwal, et al, 2016). Many of these studies document that, in response to increases in their discretionary income, consumers increase their durable and nondurable purchases and finance this consumption in part by an increase in debt. We augment this literature by documenting debt-dependent MPCs: highly levered households tend to consume more in response to increases in DOD spending as compared to less levered households.

2. Data and Sample Selection

1.1. Government-Spending Data

The core objective of this paper is to evaluate heterogeneity in the effect of government spending on the real economy across geographic regions with varied consumer leverage. Government spending data is crucial to evaluate this question. In this paper, we use the new database of DOD contracts available at USAspending.gov. This official government website contains detailed information on DOD contracts signed since 2000. The data are based on DD-350 and DD-1057 military procurement forms.[6] It covers purchases and obligated funds from $25 to multi-million dollar contracts.

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[6] Prior research has shown that DD-350 and DD-1057 spending covers in excess of 96% of total DOD spending and accounts for almost all of the time-series variation in DOD spending at the state-year level (Nakamura and Steinsson, 2014).

Each observation in the dataset corresponds to a unique individual contract between the DOD and a prime contractor. We observe the total contract amount (obligated funds) and the duration of the contract: from a minimum of one day in cases of outright purchase of readymade goods or services to more than a decade in cases of large military contracts (the latter of which account for less than 0.2% of contracts). Furthermore, we observe the location, industry, and tax characteristics of the prime contractor and, in most cases, information on the location(s) (ZIP codes) wherein the majority of the work was actually performed. Finally, the database offers information on amounts that were de-obligated and terminated contracts, and the date of such de-obligation/termination.

The DOD spending data is uniquely suited to evaluate our core question. DOD spending is the third-largest source of government spending (18% of the U.S. budget) after Social Security (25%) and Medicare/Medicaid (24%), and thus constitutes a significant force of fiscal stimulus during a recession. More importantly, DOD spending constitutes more than half of discretionary government spending. Not surprisingly, a number of studies in prior literature have exploited aggregate DOD spending in evaluating the effect of fiscal policy on economic growth (Hall, 2009; Barro and Redlick, 2010; Fisher and Peters, 2010; Ramey 2011; and Auerbach and Gorodnichenko, 2012).

We first build DOD spending variables based on DOD obligations—the total amount of new contracts signed—disregarding the maturity of the contracts and the timing of actual DOD disbursements.[7] We isolate the location of the primary DOD contractor/supplier (county, CBSA,

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[7] Influential studies of fiscal stimulus focus on current fiscal outlays (e.g., Blanchard and Perotti, 2002; Auerbach and Gorodnichenko, 2012), although others note that current outlays ignore anticipation effects. In particular, Ramey (2011) argues that the present discounted value of spending, rather than current outlays, is the relevant measure of stimulus from the perspective of the neoclassical model. It is not clear a priori which measure is most relevant for household behavior. In the presence of heterogeneous workers and imperfect information, the anticipation effects associated with long-term spending commitments can be muted relative to the effects of perceptions of permanent income associated with current outlays (Murphy, 2015), consistent with our finding that current outlays have larger effects than new obligations.

and state) and the timing of the contract. While we always observe the ZIP code of the primary contractor, the ZIP code in which the majority of the work was performed is available only for about 70% of contracts. If this information is missing, we use the location of the company as the location in which the work was performed. The location of the company matches the location in which the work was performed in more than 60% of the contracts for which we observe both locations. We also subtract de-obligations—a DOD contract with a negative contract amount. We build the measure of DOD obligations at different levels of geographic granularity by mapping the ZIP codes into county, CBSA, or state.

Since some of the hypotheses of the paper link fiscal spending and consumer behavior, we augment DOD obligations measurements with a proxy for actual DOD spending (disbursements). Arguably, in the presence of credit constraints, only actual government disbursements can affect consumption and/or the loan-repayment behavior of individual households. To build the spending proxy, we allocate the obligated amount of the contract equally across all months of the contract duration and then aggregate the monthly data into geographic spending estimates over considered periods of time. Since the vast majority of de-obligated contracts represent a terminated contract with no fund outlays, we remove de-obligations and matching original obligations that each de-obligation negates. Specifically, we match de-obligations with prior obligation contracts that have the same contractor ID, the same primary contractor ZIP code, and a dollar amount of the original contract within 0.5% of the de-obligated amount. In the case of a match, we consider both contracts null and void. This restriction removes 4.7% of contracts from the sample. We account for the

remaining de-obligations as immediate negative outlays of funds.[8] For simplicity, through the rest of the paper, we refer to both DOD obligations and DOD spending as government spending.

2.1. Real Economic Data

To build various measures of real economic growth, we exploit two datasets. First, we obtain annual GDP data for 372 CBSAs from the Bureau of Economic Analysis (BEA). Second, we expand our analysis to income and employment data from the Quarterly Census of Employment and Wages (QCEW) dataset provided by the Bureau of Labor Statistics. The traditional fiscal multiplier literature focuses on GDP, yet the limited number of CBSAs covered in the data, as well as the inability to capture fine geography and industry variation in GDP, significantly limits our ability to conduct the analysis using GDP alone. In contrast, BLS data allow us to build two core dependent variables—growth in income and growth in employment—across counties, states, and a much larger set of CBSAs, as well as across different industries. We exploit this feature of the data in our robustness tests.

Alongside the aggregate economic indicators within a given geography, we conduct the analysis by sector of the economy. Specifically, we evaluate how tradable and nontradable sectors react to consumer indebtedness and fiscal stimulus. To do so, we separate industries into two respective categories following Mian and Sufi (2012): non-tradable sector is formed from the retail

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[8] Ideally, we would like to isolate the actual amount spent for even partially completed contracts. One can argue that we can do so by allocating the difference between the original contract amount and the de-obligated amount over the period of time between the original contract date and the de-obligation date. Such an approach, however, is difficult to implement for two reasons. First, the data start in 2000, which prevents us from effectively filtering out de-obligations that are close to the sample start date. Second, despite the presence of unique contractor IDs, it is impossible to identify prior contracts that were de-obligated if the de-obligation amount is well below the original contract amount. We have conducted multiple empirical experiments in an attempt to account for de-obligations in full. While none of the approaches we implemented even closely achieves this goal, each produced similar core results of interest, leading us to conclude that not fully excluding de-obligations does not bias our analysis. Indeed, the fact that we use an instrument for DOD outlays and obligations helps mitigate any concerns regarding contract-level measurement error.

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and restaurant industries; "strict nontradables" sector further excludes auto dealers and home furniture stores.

2.2. Measure of Consumer Indebtedness

The core independent variable of interest in this study is consumer indebtedness. To capture the leverage of individual consumers, we utilize the 2006 (and for robustness, 2007) consumer debt-to-income ratios published by Mian, Rao, and Sufi (2012) at the county level. When appropriate, we aggregate this measure to larger economic geographies (CBSA or state) using population-weighted averages.

Using pre-recession leverage offers a number of advantages in our setting. First, considering consumer leverage pre-recession mitigates traditional reverse-causality concerns. It is highly unlikely that the depth of the economic downturn in the 2008–2009 period can affect pre-determined consumer leverage in 2006 (2007). Second, pre-crisis leverage is measurable at the start of the recession, making it an actionable measure for fiscal policymakers.

Pre-crisis consumer leverage, however, does not fully capture consumer credit constraints and de-leveraging pressures during the crisis. The decline in housing prices drastically affected consumers' credit constraints and forced households to delever. The household net-worth shock introduced by Mian, Rao, and Sufi (2013) better captures these effects yet suffers from two shortcomings. First, it is endogenous to local economic growth. Recent literature questions whether the Saiz elasticity is a valid instrument for housing price changes (Davidoff, 2015). Second, it is difficult to measure pre-crisis, and thus is impossible to use in designing fiscal policy.

We argue that simple pre-recession consumer-leverage ratios offer a robust and ex ante measurable way to account for the extent of consumer debt overhang during a recession.[9]

2.3. Validating Government-Spending Data

Before we proceed with our analysis of the core question of the paper, we offer validation of the new data on DOD spending. Specifically, in this subsection, we report a baseline analysis of the open-economy fiscal multiplier using our new data and then compare the results to previous findings documented in the literature. In our validation analysis, we adopt the empirical approach of Nakamura and Steinsson (2014) and implement two types of instrumental variable regressions. First, we implement a cross-sectional analysis of the effects of government spending on real economic output focused on the 2008–2009 recession.

$$\frac{Y_i^{Post} - Y_i^{Pre}}{Y_i^{Pre}} = \alpha + \beta_Y \frac{G_i^{Post} - G_i^{Pre}}{Y_i^{Pre}} + Controls_i + \epsilon_i, \tag{1}$$

where Y_i^{Post} is 2009 income (employment or GDP) in the geography i, and Y_i^{Pre} is 2007 income (employment or GDP) in the geography i. Given that government spending in both 2008 and 2009 affected the local real economy in 2009, we consider growth in government spending over the 2008–2009 period by evaluating the increase in government spending from the 2006–2007 period (G_i^{Pre}) to the 2008–2009 period (G_i^{Post}).[10]

Second, to evaluate the robustness of the documented multipliers, we implement panel regression specifications similar to the one reported by Nakamura and Steinson (2014):

$$\frac{Y_i^t - Y_i^{t-2}}{Y_i^{t-2}} = \alpha + \beta_Y \frac{G_i^t - G_i^{t-2}}{Y_i^{t-2}} + \alpha_i + \gamma_t + \epsilon_i \tag{2}$$

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[9] Mian, Rao, and Sufi (2013) report that their results are robust to using simple pre-recession consumer leverage as a measure of household net-worth shock and associated credit constraint.

[10] We conducted a battery of robustness tests and find our results robust to various definition of the recession period and DOD spending horizons. The results are available upon request.

In this analysis, we evaluate the relationship between 2-year-changes in real economic output and similarly timed changes in government spending. The sample covers annual data from 2002 to 2013. The panel-level analysis allows us to include geography and time-fixed effects. We normalize both the dependent variable (difference in real economic output) and the core variable of interest (difference in government spending) by the same beginning of the period measure of economic output. Specifically, we normalize the change in government spending by total income (in cases of income or employment regression specifications) or total GDP (in GDP specifications). The coefficients β_{Income}, β_{Empl}, and β_{GDP} capture the government-spending multiplier for different real economic variables of interest.

To accommodate differences in industry structure across geographies, we control for the beginning of the period share of 19 different industries in local employment as reported by the Bureau of Labor Statistics. Following Mian and Sufi (2015), we also control for the percentage of white people in the local population, median household income, the percentage of owner-occupied housing units, the percentage of the population that has earned less than a high school diploma, the percentage of the population that has not earned more than a high school diploma, the unemployment rate, a dummy for urban areas, and the poverty rate at the respective geographic level. Consistent with prior work we do not control for housing price level or appreciation over the pre-crisis period as, non-surprisingly, this measure closely tracks consumer indebtedness and thus captures similar economic fundamentals to the local debt-to-income ratio.

As emphasized in prior literature, government contracts are notoriously political and hence potentially endogenous to local economic conditions. Politicians from more recession-prone or deeper-recession geographies might lobby for larger DOD allocation for their constituencies. To

address this endogeneity problem, we use the standard Bartik-style instrument approach proposed in Nakamura and Steinsson (2014):

$$\Delta G_i^{Instrument} = Average\left(\frac{G_{it}}{G_t}\right) * \frac{G_i^{Post} - G_i^{Pre}}{Y_i^{Pre}} \tag{3}$$

The instrument is the predicted change in government spending based on a location's average annual 2002–2014 share of national defense spending (G_{it}/G_t) and the total aggregate change in national defense spending ($G^{Post} - G^{Pre}$) over a respective period of time (two-year changes in case of the panel-level analysis).[11] The instrument relies on the aggregate variation in defense spending while eliminating the ability of the appropriation process to reallocate DOD spending in response to local economic conditions. The identifying assumption is that the buildup and drawdown of national defense spending associated with wars in Iraq and Afghanistan is not a response to economic conditions in any particular city. Note that the instrument changes with each specification depending on (a) the normalization variable (income or GDP), and (b) whether the specification utilizes a DOD-obligations-based measure of government spending or a DOD-spending-based measure.

Table 1 presents summary statistics of our core variables of interest. Specifically, we report the growth in various characteristics between the 2006–2007 and 2008–2009 periods using CBSA-level aggregates. We find that over this period, consumer income declined on average by 0.91%. We observe significant heterogeneity, with some CBSAs experiencing declines in aggregate wages as high as 26%, and some growing at a 31% rate. The average *change* in defense spending as a fraction of pre-recession income is 1.1% with a standard deviation of 5%. On average, the *level* of defense spending is 2.7% of CBSA income, with a standard deviation of 6.5%. The heterogeneity

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[11] We obtain qualitatively and quantitatively similar results if we exploit the average geography share of DOD spending using only pre-recession years (2000–2007) or DOD spending allocation shares as of 2006.

indicates that while for some CBSAs, DOD spending negligibly contributes to the local economy, the other CBSAs rather heavily depend on DOD spending.

Table 2 presents the first set of results of the county, CBSA, and state-level analyses that validate our data and empirical approach. Panel A reports cross-sectional IV analysis of the effect of DOD obligations and DOD spending on wage-based income growth from 2007 to 2009. Panel B reports the results of a similar IV regression based on a panel of 2002-2013 annual sample. Both analyses incorporate a wide set of controls for pre-recession local industry structure and local economic conditions. From the first-stage regression, we only report the core coefficient of interest as well as the Kleibergen-Paap LM test for weak instruments. Both statistics suggest that most regression specifications are well identified.

Table 2 offers a number of important findings. First, we observe that the multiplier coefficients are increasing with the size of the explored geographic unit. The county-level multiplier is very statistically positive but economically small (0.04 to 0.09); CBSA-level estimates are considerably larger (0.24 – 0.36); and state-level multiplier estimates exceed one. This can be attributed to the fact that our data report only contracts with prime vendors and do not capture the ability of said vendors to subcontract or hire employees across county or CBSA lines. With smaller, less-populous geographies, the government spending dissipates into other (potentially neighboring) geographic areas, thus diluting the magnitude of our estimates. Only 41% of the contracts are implemented in the ZIP code where the primary contractor is located. In contrast, 74% of the contracts are implemented within the same state. Consistently, the multipliers increase with the size of the geographical unit. [12]

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[12] One can argue that with migration and trade in intermediate goods, county-level open economies should exhibit higher multipliers than state-level relatively more closed economies: it is easier for smaller regions to pull resources from surrounding areas, thus permitting larger output responses to fiscal stimulus. This argument, however, relies on government spending being confined within

Second, the documented DOD spending multiplier exhibits higher magnitudes during the 2007–2009 recession (Panel A) compared to the average effect across the 2002–2013 period (Panel B). This is consistent with fiscal stimulus having a larger effect during a recessionary period compared to periods of economic growth (see, e.g., Auerbach and Gorodnichenko, 2012; Bachmann and Sims, 2012).

Third, irrespective of the geographic unit considered and/or the level of analysis, the multiplier estimates based on DOD obligations and DOD spending are of similar magnitudes. Finally, the state-level estimates of open-economy multipliers are close in economic magnitude to those reported by recent studies of state-level government-spending multipliers although they, admittedly, lack high statistical power.

The objective of this study is to evaluate the heterogeneity in the government-spending multiplier across localities with varying levels of local consumer indebtedness. It presents an empirical challenge. On the one hand, the county level analysis offers the best way to capture heterogeneity in consumer debt but prevents us from capturing an economically meaningful government-spending multiplier. On the other hand, the state-level analysis captures a meaningful open-economy relative government-spending multiplier, but is too coarse to capture meaningful variation in consumer indebtedness. The CBSA level offers a balanced approach. In the rest of the paper we offer a CBSA level analysis. In interpreting the results it is important to note that the local income state-level estimates of above 1 correspond to CBSA-level multiplier estimates of 0.37.

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the borders of a given local economy. In our setting, the measurable DOD spending can dissipate outside of the geographic region and this dissipation increases as the region size decreases. Consequently, we observe higher dissipation of funds and lower open economy multiplies as the level of data aggregation declines.

With this observation in mind, we further validate our data and empirical approach by conducting a wide array of robustness tests at the CBSA level. Table 3 reports IV analysis using cross-sectional and panel data and various measures of local economic output: income growth, employment growth, and GDP growth. It shows that the government-spending multiplier for employment is 0.23 and below the income-based multiplier of 0.36, which further adds to the validity of our data and approach. Government spending affects both the level of wage income and the level of employment. While total local wage income captures both, the employment level only captures one dimension of this equation. Consistently, the GDP multiplier is significantly larger, varying from 0.54 to 1.2. It is not precisely estimated, likely due to the small number of CBSAs for which the GDP growth estimates are available.

Combined, Table 2 and Table 3 establish baseline estimates of open-economy multipliers at the CBSA level and confirm the validity of the new data on government spending in the context of evaluating the effect of fiscal stimulus on local economic output.

3. Consumer Indebtedness and the Government-Spending Multiplier

3.1. CBSA-level Analysis and Results

Armed with validated data, we turn to the core question of this study and investigate whether government spending *becomes (in)effective* when consumers are forced to delever. To evaluate this question, we alter the baseline specification (1) by incorporating the effect of pre-recession consumer debt and allowing for a consumer-debt-dependent government-spending multiplier:

$$\frac{Y_i^{Post}-Y_i^{Pre}}{Y_i^{Pre}} = \alpha + \beta_1 \frac{G_i^{Post}-G_i^{Pre}}{Y_i^{Pre}} + \gamma DTI_i^{06} + \beta_2 \frac{G_i^{Post}-G_i^{Pre}}{Y_i^{Pre}} \times DTI_i^{06} + Controls_i + \epsilon_i, \quad \textbf{(4)}$$

where DTI_i^{06} is the debt-to-income ratio in CBSA i in 2006.[13] Notably, DTI_i^{06} is predetermined and exogenous to the change in economic growth during the recessionary period. β_2 is a core coefficient of interest. A positive coefficient estimate ($\beta_2 > 0$) would indicate that expansionary fiscal policy is more effective in geographies suffering from consumer debt overhang. $\beta_2 < 0$ would suggest that fiscal policy is less effective in areas with high consumer debt.

Given the potentially endogenous nature of government spending, we instrument both the direct effect of government spending as well as the interaction between the change in government spending and the debt-to-income ratio. Specifically, we employ two instruments: a Bartik-style instrument described in equation (3) as well as its interaction with the 2006 debt-to-income ratio. Similar to Table 3, we control for local industry structure pre-recession and a wide set of pre-recession CBSA-level economic conditions.

Table 4 reports the results of this IV analysis for different measures of real economic output. The results suggest that government spending creates relatively more economic growth in areas with higher consumer leverage. We document a statistically significant and positive coefficient β_2 irrespective of the real economic variable considered: employment, income, or GDP. More importantly, the effect is also economically significant. In case of income growth, one standard deviation increase in the debt-to-income ratio (0.597) is associated with a marginal effect on the DOD spending multiplier of 0.608 * 0.597 = 0.354, or about the average CBSA fiscal income multiplier (0.37).

One can also look at the economic significance from a perspective of DOD spending being able to mitigate the adverse effects of consumer debt overhang. The direct effect of consumer

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[13] The results are nearly identical using the average debt-to-income ratio between 2006 and 2007.

leverage is negative, very economically significant, and estimated rather precisely.[14] In the case of income multipliers, our results suggests that a1% (relative to local income) increase in government spending reduces the direct effect of consumer leverage by 0.006, or about 16% of (-0.033) the DTI coefficient.

Table 5 summarizes the economic significance of the estimates documented in Table 4 by presenting the implied magnitudes of the government-spending multiplier for different levels of consumer debt and different measures of economic activity. The local income multiplier ranges from 0.22 at the 25th percentile of the debt distribution, to 0.60 (almost twice as large as the average) at the 75th percentile.

3.2. Multiplier during Periods of Economic Expansion

In this section, we augment our analysis by evaluating whether the government-spending multiplier also varies with consumer leverage during periods of economic expansion when credit constraints are unlikely to be binding. Most of the theories about the effects of consumer leverage on economic growth in a recessionary environment (e.g., Eggertsson and Krugman, 2012) are based on the assumption that an economic decline makes a significant share of consumers credit constrained. In contrast, during periods of positive economic growth, leverage is not binding and deleveraging is not forced by the market. In fact, during periods of expansion, higher consumer leverage is likely to positively contribute to economic growth as agents borrow against their future (expectedly higher) wages to finance their current consumption. In such an environment, individual consumption and employment are not constrained by the level of indebtedness. As such, finding a positive correlation between household leverage and the government-spending multiplier

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[14] These results are qualitatively and quantitatively consistent with Mian and Sufi (2015), who document that weakness in consumer balance sheets contributed to local economic slumps.

during an expansionary period would suggest a spurious relationship that cannot be attributed to binding consumer credit constraints.

To evaluate this hypothesis, we implement a cross-sectional analysis following regression equation (4) during the period of positive economic growth between 2002 and 2005. Specifically, we use 2002 economic indicators as measures of "pre-boom" activity and 2004–2005 indicators as measures of "boom" activity. For consistency with our prior analysis, we conduct the analysis at the CBSA level and utilize the 2002 consumer debt-to-income ratio.

Table 6 presents the results. The average fiscal multiplier in the 2002–2005 period is nearly identical to the multiplier during the recession period for income and employment. The coefficients for GDP are larger than those reported in Table 4, above one, and precisely estimated. The coefficients on consumer leverage are positive and significant, consistent with debt stimulating economic growth during expansionary periods (see, e.g., Loutskina and Strahan, 2015). Yet, we do not observe that consumer leverage affects the government-spending multiplier. If anything, high debt is associated with lower fiscal multipliers (although the estimates lack statistical significance), which may reflect the fact that the abundance of consumer debt and the associated increase in leverage reduces the importance of government spending in stimulating a local economy. Overall, the results presented in Table 6 suggest that the debt-dependent multiplier we document is an attribute of a recessionary environment when credit constraints are binding.

3.3. Robustness: DOD Spending and Local Economic Conditions

One can argue that local economic and demographic conditions distinct from credit constraint might drive our results. Two separate arguments could be made.

First, if the local characteristics are correlated with DOD spending allocations and generate a heterogeneous response of income or employment to pre-recession DTI, it might explain our

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core coefficient of interest. For example, it is possible that the government systematically allocates a higher share of the DOD budget to poorer and more diverse geographies and residents of such geographies face particularly strong borrowing constraints during 2008-2009, leading to a deeper local recession and biasing our coefficient of interest downward.

Indeed, we do find that DOD spending in general and our instrument in particular are negatively correlated with local income levels, housing prices, and percentage of college educated and white population. We then conduct robustness tests where we explicitly control not only for the CBSA level characteristics, but also for their interactions with DTI in 2006. Table A1 reports the results. After we control for an exhaustive set of cross effects between the control variables and pre-recession DTI, we still observe that the relative fiscal multipliers are higher in the geographies with higher pre-recession consumer leverage ratios. If anything, the coefficients of interest slightly increase in economic magnitude, confirming the downward bias of the original estimates.[15].

Second, one can argue that DTI might be capturing local consumer characteristics alongside credit constraints. In this case, our results might be attributed to DOD spending multipliers varying with other local economic and geographic characteristics distinct from leverage. Ideally, to address this concern, we would like to control for DOD spending growth interacted with all local economic covariates. Implementing such analysis is not feasible as we would need to instrument over thirty independent variables (interaction terms and direct effect of the DOD spending growth) which our sample size does not allow. Therefore, we implement a set of robustness tests where we add the interactions between DOD spending growth and control

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[15] In this analysis, the number of explanatory variables exceeds the number of states making clustering the standard errors by state not feasible. Consequently, we report robust standard errors.

variables one at a time. Table A2 offers a summary of the results from 32 regressions for each of the six specifications we implemented throughout the paper.

Overall, our core results are robust to inclusion of additional (instrumented) cross-effects. In all specifications the core coefficient of interest (the interaction term between DTI and DOD spending growth) are positive and similar in economic magnitudes to those documented in Table 4. Only the inclusion of the interaction between DOD spending and log of local household income attenuates the economic magnitudes of the coefficient of interest in two out of six specifications. However, the cross-effect between local income and DOD spending is not consistently economically or statistically significant. The sign of the estimated effect of the local income interaction also varies across specifications. Finally, the inclusion of the interaction terms does not lead to a systematic deterioration of statistical significance of the coefficients of interest. Combined this evidence suggests that the debt-dependent DOD-multiplier we document is unlikely to be driven by the local economic or demographic characteristics distinct from consumer leverage.

4. What Contributes to Heterogeneity in the Government-Spending Multiplier?

While it is important to know whether fiscal stimulus is effective during consumer-debt-overhang induced recessions, it is no less important to understand what economic mechanisms contribute to the heterogeneity in the fiscal multiplier we document. Existing economic literature offers a number of channels through which government spending can affect real output. In these theories, the efficacy of fiscal stimulus depends on its net effect on aggregate demand and whether aggregate supply can accommodate the increase in aggregate demand. In this section, we present a discussion and empirical evaluations of aggregate supply and aggregate demand economic mechanisms that can lead to a state dependent DOD spending multiplier.

4.1. Aggregate Demand Economic Mechanisms

Changes in *aggregate demand* in response to fiscal stimulus are associated with changes in investment and/or consumption. Private investments, for example, tend to respond to changes in interest rates associated with fiscal stimulus (see, e.g., Murphy and Walsh, 2016, for a review), as well as to changes in the expected future marginal product of capital caused by productive public investment (Baxter and King, 2003).

Fiscal stimulus also can affect consumption. Some theories argue that it can *decrease* consumption through expectations of higher future taxes (the Ricardian equivalence channel discussed in Barro, 1974) and increases in real interest rates (Baxter and King, 1993). Others point to *increases* in consumption through increases in expected income (Murphy, 2015; Rendahl, 2015), presence of credit-constrained hand-to-mouth consumers (e.g., Galí et al., 2007; Eggertsson and Krugman, 2012), or declines in the real interest rate (e.g., Eggertsson, 2010; Christiano, Eichenbaum, and Rebelo, 2011).

How do these theories inform the mechanisms that might be responsible for the debt-dependent multipliers we document? Theories that rely on interest-rate channels are unlikely to explain the evidence presented in Table 4 since monetary policy is constant across cities in the U.S. Similarly, our focus on defense spending rules out local public investment as a cause of heterogeneous multipliers. Our evidence is also inconsistent with arguments based on Ricardian equivalence. It is unlikely that the current level of consumer leverage leads to a heterogeneous effect on individual future taxes within the U.S. The remaining demand-side channels rely on heterogeneity in the number of credit-constrained consumers.

Eggertsson and Krugman (2012) present a Keynesian-style model that demonstrates the efficacy of expansionary fiscal policy in a debt-overhang-driven recession. In their model, all

consumers are forced to delever as they face a discrete shift in credit constraints. Yet, consumption of credit-constrained consumers responds more to government stimulus since spending by these consumers depends on the margin on current income and not on expected future income. In contrast, households that are not credit constrained exhibit consumption patterns that do not depend on the margin on local fiscal stimulus. Similarly, Galí et al. (2007) present a model with hand-to-mouth consumers that dedicate all newly found income to consumption. Both studies imply that debt-dependent-MPCs should generate higher consumption responses to fiscal stimulus and, by extension, higher government-spending multipliers in areas with higher consumer leverage compared to those with relatively low consumer leverage.

Empirical literature offers little evidence of debt-dependent MPCs in response to government spending. It is well documented that households increase consumption after both permanent (Aaronson, Agarwal, and French, 2012) and transient (Agarwal, Liu, and Souleles, 2015) increases in wages. These studies also show that the effects are more pronounced for individuals with high credit card utilization rates (ratio of credit card balances to credit card limits), suggesting that consumers who face liquidity constraints (and potentially a credit constraints) increase consumption more in response to an income shock. We advance this line of inquiry by directly exploring the link between consumption and indebtedness during a recession.

To evaluate the validity of the MPC-driven economic rationale for the debt-dependent multiplier, we turn to microdata on individual purchasing and borrowing behavior exploited in the prior literature as proxies for consumption: (a) individual credit card balances (see, e.g., Aaronson, Agarwal, and French, 2012; and Agarwal, Liu, and Souleles, 2015); and (b) auto purchases (Mian, Rao, and Sufi, 2013).

Credit Card Balances

First, we analyze the dynamic response to DOD spending of individual credit card balances provided by two credit bureaus: (i) the anonymized TransUnion panel data provided by the Federal Reserve Bank of Cleveland; and (ii) Equifax, provided by the Federal Reserve Bank of New York's Consumer Credit Panel. The data from these two major credit bureaus in the United States complement each other and offers opportunity to evaluate robustness of the results.

The *TransUnion* data cover a random sample of about 10 million individuals residing in the U.S. and are reported as of February of each year. The data offer a rich set of characteristics of consumers' financial behavior, including total consumer debt balances, credit card balances, foreclosures and delinquencies, etc. It also offers us consumer characteristics including a credit score and a ZIP code of an individual's residence. About 67% of the individuals in the TransUnion sample have credit cards and 78% of those exhibit positive credit card balances. As reported by the Survey of Consumer Finances, for individuals with credit card accounts, about 67% of their consumption is done via credit card accounts.

The TransUnion panel is uniquely suited to evaluate our core question of interest since it reports *individual* consumer income modeled by TransUnion using a proprietary model. To our knowledge, no other dataset offers actual or estimated consumer income for a representative and geographically diverse set of individual consumers. To check the accuracy of the income measure from TransUnion, we, first, aggregated individual-level data to the county level and correlated the resulting measure with county-level income reported by the BEA. The correlation coefficient is 68% and offers considerable confidence in the TransUnion estimates.[16] Second, we aggregate the

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[16] Note that all credit bureaus report information only about individuals who have a social security number and a credit history, so the aggregate income of TransUnion consumers and that reported by and to the BEA are expected to differ.

data at the ZIP code level and observe 86% correlation of TransUnion imputed income and IRS ZIP code level income data.

Using the individual total debt balances and individual income, we then build one of the core variables of interest in this study—debt-to-income ratio—at the consumer-level k. Specifically, we use these characteristics to build DTI_k^{TU} as of February 2007.

Given the arguably imprecise nature of the individual-consumer imputed income offered by TransUnion, we supplement the analysis by considering Equifax data. It lacks the information about an individual consumer's income, but still offers a wide range of consumer credit-related information for a random 5% sample of individuals who have a social security number and a credit report. To supplement this data, we follow Mian and Sufi (2009) and use IRS income data at the smallest geographic unit available—namely, ZIP code. We combine consumer-specific debt and average IRS income in the ZIP code in which the consumer resides to build individual consumer debt-to-income ratio, DTI_k^{Eq}, as of the end of 2006.

This approach admittedly is not free from criticism. One can argue that measuring individual consumer debt-to-income ratios using ZIP code-level income is problematic, because a number of ZIP code residents might not be filing an IRS tax return for a variety of reasons. As such, the IRS average income for a particular ZIP code might exhibit downward bias relative to the true average income in a given geography. We believe, though, that consistency in the results across the different credit bureaus' data reported in Tables 8 through 10 should offer some comfort.

To evaluate whether individuals with higher pre-recession DTI exhibit higher MPCs, we implement the following regression analysis:

$$Growth\ in\ Credit\ Card\ Balances_k = \ \beta_1\ DTI_k + \beta_2 DTI_k^* \times \Delta DOD\ Spending_j + \qquad \textbf{(5)}$$

$$CBSA_j + \ County\ Controls + \ \varepsilon_i$$

For compatibility between TransUnion-based and Equifax-based results and results presented in Tables 3−5 of this paper, we consider growth in credit card debt from Q4 of 2007 to Q4 of 2009. Specifically, growth in total credit card balances for an individual k is measured from the end of 2007 to the end of 2009 in case of Equifax, and from February 2008 to February 2010 in case of TransUnion.[17] DTI_k is measured as of the end of 2006 (February 2007) in case of Equifax (TransUnion). To be consistent with prior analysis, we exploit CBSA-level changes in government spending. For robustness, we evaluate two different measures of growth in consumer debt balances: (a) the log growth that discards information about consumers who have zero total debt and (b) the dollar change in respective debt variables normalized by individual consumer income in February 2008. CBSA fixed effects control for a wide set of local economic conditions during the recession including the direct effect of government spending.

While CBSA fixed effects and the fact that government spending is exogenous to individual household financial decisions mitigate potential endogeneity concerns, it is still possible that, for example, a negative correlation between government spending and local income might create unobserved variable bias and push our coefficients of interest β_2 downward. To eliminate this potential bias, we (a) instrument the interaction term in this regression using an interaction between our Bartik-style instrument and individual debt-to-income ratios and (b) demean the individual DTI within a CBSA before interacting it with government spending, DTI_i^* (see Balli and Sørensen, 2013).

Finally, similar to our prior analysis, we control for pre-recession local industry structure and a wide set of pre-recession CBSA-level economic conditions. In addition, we control for

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[17] While we would like to narrow the window and restrict our analysis to the period after the onset of the crisis in the third quarter of 2007 to the last quarter of 2009, the nature of the data does not offer us this flexibility.

individual-level income (ZIP code-level income) measured as of February 2007 (end of 2006) when using TransUnion (Equifax) data as a control variable. We winsorize the credit bureau data at a 1% level to eliminate the extreme observations, which are likely erroneous, though we find that this restriction only minimally affects our results. Notably, we do not control in this regression for individual credit score, number of credit accounts, or credit utilization. These consumer characteristics either directly depend on debt-to-income ratio or directly contribute to higher consumer leverage and thus are capturing similar economic fundamentals but less precisely.

Table 8 reports the results of the analysis. The instrumental variable regression specifications uniformly suggest that in response to DOD spending, consumers with higher levels of pre-recession leverage increase their credit-card-funded consumption more than households with lower levels of leverage. The magnitude of the coefficients of the interaction term with the change in DOD spending is significantly larger than the direct negative effect of pre-recession consumer leverage. Column (2) suggests that a one-standard-deviation increase in government spending (5%) mitigates the adverse effect of leverage on individual consumption by about half ($0.18 * 5\% = 0.01$, or about half of the direct DTI coefficient of 0.02). Notably, the OLS coefficient of the cross effect of DOD spending and DTI is indeed downward biased, as it potentially captures the adverse effect of declines in local income.

These results are robust to a wide set of regression specifications, data sources used, and approaches to evaluate the credit card balances. Specifically, we implemented the following robustness checks and found qualitatively similar results with varying levels of statistical significance. First, we conducted the analysis for various subsets of consumers in an attempt to isolate individuals who are most likely to channel the majority of their consumption through credit

card accounts: (a) only for individuals with at least one credit card account; and (b) only individuals who have positive credit card account balances in all reporting periods considered in our analysis.

Second, rather than considering change in credit card balances from the end of 2006 to the end of 2009, we evaluated the change in average (quarterly) credit card balances from the 2005–2006 pre-recession period to the recession period of 2007–2009. This allows us to capture the cumulative change in consumption over the recession period. All the robustness tests offer results consistent with those reported in Table 8.

To further examine whether credit constraints are responsible for the debt-dependent MPC, we conduct the analysis presented in Table 8 for sub-groups of individuals in different credit score categories from potentially the most-credit-constrained sub-prime borrowers to the least-credit-constrained prime borrowers.

Table 9 reports the results of the seemingly unrelated IV regression, exploring whether our core coefficients of interest vary with individuals' pre-recession credit scores. Deep Subprime, Subprime, Near Prime, Prime, and Super-Prime categories correspond to TransUnion credit scores within the following respective ranges: [501,600], [601,700], [701,800], [801,900], [901,990].[18] Consistent with the idea that DOD spending relaxes credit constraints, we observe that DOD spending has the largest effects on high-debt-to-income consumers if they are also in the Deep Subprime credit score category—that is, the most credit-constrained group. We observe the effect dissipating as we move to Subprime and Near Prime categories and it is virtually nonexistent economically or statistically in top credit score categories. The results add further validity to an

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argument that DOD spending facilitates consumption of more credit constrained individuals to a higher extent than that of less credit constrained individuals.

One can argue that Tables 8 and 9 effectively suggest that incremental government spending entices households to *borrow* to finance additional consumption on average. In this case our evidence may be a manifestation of relaxation of borrowing in addition to hand-to-mouth consumption. Notably, we are indifferent between the two explanations because any additional dollar of debt *is* financing consumption. Yet, to explore the relaxation-of-borrowing-constraints hypothesis, we evaluate aggregate consumer indebtedness and its response to DOD spending.

Table 10 reports the analysis of individual total consumer indebtedness and its response to DOD spending following regression specification (5), where instead of growth in credit card balances we evaluate the growth in total outstanding debt balances. Irrespective of the credit bureau data we use, we find no evidence consistent with government spending relaxing the borrowing constraints of high-leverage households more than that of low-leverage households.

We also explore the effect of DOD spending on households' ability to continue servicing debt obligations. Specifically, in column (3) of Table 10, we evaluate the effect of debt-to-income ratios and DOD spending on consumers' propensity to be delinquent on any of their debt obligations. The dependent variable in column (3) is a dummy that equals to one if an individual had at least one 90 days or more past due account in the past 24 months as of February 2010. The results suggest that DOD spending helps highly leveraged consumers to avoid delinquency more than consumers with lower leverage, and thus is likely to indirectly contribute to the local economic growth of geographies with more-leveraged consumers.

Overall, the analysis of individual credit card and aggregate debt accounts suggests that in response to DOD spending, highly leveraged individuals tend to consume more and continue to service their debt balances better.

Auto Registrations

To evaluate robustness of our results we augment the analysis of credit card balances with a specification that utilizes ZIP code-level auto registration data from R.L. Polk (see, e.g., Mian, Rao, and Sufi, 2013). These data are collected from new automobile registrations and provide information on the total number of new automobiles purchased in a given geography every year. The auto registration data offer a number of advantages to explore the heterogeneous-MPC hypothesis as a driving factor of the debt-dependent multiplier. First and foremost, it captures actual consumption by households at a fairly granular ZIP code level. The address in the data is derived from registrations, so the ZIP code represents the ZIP code of a person who purchased the automobile, not that of the dealership. Second, we can combine the auto registrations with the credit bureau data to evaluate whether the new consumption was funded by debt by exploring the car loan balances.

Table 11 reports the results of the following two regressions:

$$Log\ Growth\ in\ Auto\ Registrations_z = \beta_1^{AR}\ DTI_z + \beta_2^{AR} DTI_z^* \times \Delta DOD\ Spending_j + \textbf{(6a)}$$

$$CBSA_j +\ County\ Controls +\ \varepsilon_i$$

and

$$Log\ Growth\ in\ Car\ Loans_k = \beta_1^{AL}\ DTI_k + \beta_2^{AL} DTI_k^* \times \Delta DOD\ Spending_j + \qquad \textbf{(6b)}$$

$$CBSA_j +\ County\ Controls +\ \varepsilon_i$$

where both growth in auto registrations (AR) at the ZIP code level and growth in auto loans (AL) at the individual level are measured from the end of 2007 to the end of 2009. We maintain the same set of controls as in previous empirical tests. Following Eggertsson and Krugman (2012), we should expect a higher consumption response in auto-registrations from debt-constrained households in response to government spending ($\beta_2^{AR} > 0$). If this increase in consumption is funded by an increase in auto loans then we would expect $\beta_2^{AL} > 0$.[19]

The results presented in Table 11 indicate that ZIP codes characterized by highly levered consumers tend to experience larger increase in auto registrations in response to DOD spending compared to less levered consumers. This increase in consumption is unlikely to be funded with debt. Combined, Tables 8 through 11 offer strong evidence of debt-dependent MPCs and as such offers a valid aggregate demand economic mechanism underlying the debt-dependent DOD spending multiplier.

4.2. Aggregate Supply Economic Mechanisms

Aggregate supply constraints, however, can counteract the effect of increases in aggregate spending. In the simplest one-period Ricardian endowment economy, consumption declines one-for-one with government purchases regardless of the presence of hand-to-mouth consumers. In contrast, recent theoretical work argues that demand stimulus might be more effective during periods of high unemployment (e.g., Michaillat, 2012; Murphy, 2017).

In Michaillat (2012), an increase in government-sector employment increases labor-market tightness and crowds out private employment, thus diminishing the impact of government

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[19] Ideally, we would like to evaluate both the car purchases and auto loans at the same level of granularity and in similar units for compatibility of the coefficients. However, the car purchases are not available at the individual level. More importantly, these data are not measured in dollars undermining direct compatibility of coefficients. Consequently, we abstain from aggregating the 5% random TransUnion sample to the ZIP-code level. Instead, in our analysis we exploit the high granularity of the individual credit bureau data.

spending on economic output. Yet, during the periods of high slack (high unemployment) in a local economy, the new government-spending-driven jobs have little influence on labor-market tightness, leading to weak crowding out of the private sector. Consistently, prior empirical literature documents that fiscal multipliers are higher in times of high unemployment (e.g., Auerbach and Gorodnichenko, 2012).[20]

The prior literature also leads us to expect higher economic slack in geographies with higher consumer indebtedness. After all, higher consumer debt in combination with housing price declines contributed to household-net-worth shocks and the local employment slump (Mian and Sufi, 2014) via depressed household consumption (Mian, Rao, and Sufi, 2013). Combined, these two streams of literature suggest that we might observe a debt-dependent DOD spending multiplier due to higher economic slack in 2008-2009 associated with higher pre-recession consumer indebtedness.

Implementing direct empirical analysis of the slack channel is challenging. Excess capacity in general is difficult to estimate, and unemployment in particular is endogenous to both local economic conditions and fiscal stimulus. We approach evaluating the validity of this economic mechanism indirectly by looking at the real output in sectors of the economy that do not benefit from household consumption but depend on local labor-market tightness.

First, we examine multipliers for broad sectors that are more/less individual-consumption dependent: tradable sectors, nontradable and strict nontradable sectors, as well as construction and other (unclassified) sectors of the economy.[21] If only consumption-based mechanisms contribute to the debt-dependent multiplier, then we should only observe debt-dependent multipliers in

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[20] Some recent work suggests that fiscal multipliers are not higher during recessions (Ramey and Zubairy 2014). Therefore, the literature has yet to reach a consensus on whether fiscal multipliers are state-dependent.

[21] Mian and Sufi (2015) isolate the consumption-driven mechanisms behind the adverse effect of consumer debt on real economic growth by focusing on the nontradable sector. Their test primarily relies on local consumer expenditure almost by definition.

nontradable sectors of the economy. Similar evidence in the tradable sectors would suggest additional, potentially supply-side, mechanisms at work.

Table 12 presents the result of the analysis across different sectors following regression equation (4). To make the sector multipliers comparable, we normalize both DOD obligations/spending and growth in sectors' income and employment by total CBSA-level income in 2006 (i.e., total CBSA income, not sector-specific income). Correspondingly, the sector driven multipliers we document are of smaller magnitudes than those reported in Tables 2 through 5.

Table 12 suggests that the multiplier increases with consumer leverage not only in industries affected by local consumer spending such as construction and (strict) nontradables, but also in sectors that do not directly benefit from local household spending. The debt-dependent multipliers in tradable sectors are also significantly above zero and similar in magnitude to those in nontradable sector. The largest cross-effect coefficient is documented for 'other' industries that are difficult to classify into tradables, nontradables, or construction. The evidence suggests that economic mechanisms other than pure consumer spending may be at work.

Second, to further validate the aggregate supply mechanism, we isolate industries that benefit from supply-side channels but are not subject to effects of consumption-based explanations. Isolating such industries is challenging since most industries ultimately produce consumer goods. Admittedly, we found only one industry that fits these requirements—National Security and International Affairs sector (NAICS 9811). This sector is unique as it cannot directly benefit from increases in household consumption but can benefit from local economic slack. Any debt-driven heterogeneity in the government-spending multiplier in this sector is unlikely to be explained by the individual consumption behavior.

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Table 13 reports the results. Consistent with the notion that household consumption does not directly affect employment and wages in this industry, we find that high pre-recession consumer leverage does not have economically or statistically significant effects on this sector of the economy during the recession. Yet, we observe economically and statistically significant debt-dependent fiscal-spending multipliers in this sector. This evidence cannot be explained by any consumption-driven economic channel and is consistent with the slack channel.

To summarize, while Tables 12 and 13 do not offer direct evidence in support of the slack channel, they do provide a strong indication that supply-side frictions such as local slack contribute to the debt-dependent multiplier. Along with our evidence from consumer microdata, these tables imply that both aggregate demand and aggregate supply channels contributed to the debt-dependent multipliers during the recession.

5.   Concluding Remarks

The ability of government spending to mitigate recessions has always been a hotly debated topic among academics, practitioners, and policymakers. The 2007 crisis brings new arguments to the table as it acutely highlights the role consumer indebtedness plays in a recession. The dramatic rise in U.S. household leverage from about a 1.2 debt-to-income ratio in late 1990 to about 1.65 in 2006 (Mian and Sufi, 2011) not only set the stage for the Great Recession but also contributed to a decline in aggregate consumption and, ultimately, slowed down the economic recovery.

Consumers' high debt and need to delever are frequently invoked to argue that expansionary fiscal policy might be ineffective during consumer-debt-overhang-induced slumps. At the same time, the proponents of demand stimulus argue that "the purpose of fiscal expansion is to sustain output and employment while private balance sheets are repaired, and the government can pay down its own debt after the deleveraging period comes to an end" (Eggertsson and

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Krugman, 2013). While some theoretical literature sheds light on this debate, ours is among a few papers to offer an empirical examination of this question.

We utilize new detailed data on DOD spending to evaluate whether government spending post-recession stimulates local economic growth differently across geographies with varying levels of pre-recession consumer indebtedness. We find that consumer debt is an important determinant of the fiscal multiplier during the Great Recession: during the 2007–2009 period, the DOD spending multiplier is higher in CBSAs with higher pre-recession consumer debt-to-income ratios than in CBSAs with lower pre-recession consumer debt-to-income ratios. The evidence suggests that, in the short run (two years are considered in this study), expansionary fiscal stimulus has the capacity to mitigate the adverse effects of consumer leverage on local employment and income.

While our core objective is to evaluate the heterogeneity in the DOD spending multiplier, we augment these results by offering evidence that sheds lights on economic mechanisms contributing to the debt-dependent fiscal multiplier. Specifically, we present evidence consistent with both aggregate demand and aggregate supply-side mechanisms. On the aggregate demand side, we find evidence supporting heterogeneous MPC-based explanations. Our results show that in response to increase in DOD spending, households with high debt-to-income ratios tend to increase consumption more relative to households with low debt-to-income ratios.

We also find evidence consistent with aggregate supply-side frictions, such as local market slack or excess capacity, contributing to heterogeneity in government-spending multipliers. Higher consumer indebtedness depresses household consumption and contributes to local unemployment. Yet, it creates a more fruitful environment for fiscal stimulus because it leads to local excess

capacity. In the presence of local economic slack, government spending is unlikely to crowd out the private sector, which in turn leads to higher government-spending multipliers.

Overall, our results not only contribute to the debate about the efficacy of expansionary fiscal policy, but also add to our understanding of the economic mechanisms through which government spending operates. While we are unable to quantify the relative importance of these demand-side and supply-side mechanisms, our evidence points to the importance of both channels and calls for future research in this area.

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Table 1
Summary Statistics

This table reports summary statistics for core variables of interest used in this study. Panel A sumarizes the percentage growth in core economic variables of interst from 2007 to 2009: income, employment, and GDP. Panel B reports the change in DOD spending over the same period as a fraction of 2007 income. It also reports the summary statistics for the instrumental variables we employ. Finally, Panel C reports the average dollar volume of DOD spending at the CBSA-year level. The data covers 828 CBSAs.

	N	Mean	StDev	p25	p50	p75
Panel A: CBSA-level 2007 to 2009 growth						
Personal Income Growth	828	-0.91%	6.12%	-4.52%	-0.65%	2.63%
Personal Income Growth, Nontradables	828	0.19%	0.71%	-0.17%	0.14%	0.56%
Personal Income Growth, Tradables	828	-0.32%	2.41%	-0.62%	-0.06%	0.20%
Personal Income Growth, Construction	828	-0.46%	1.70%	-1.09%	-0.38%	0.35%
Personal Income Growth, All Other Sectors	828	2.10%	3.02%	0.44%	1.82%	3.54%
Employment Growth	828	-4.96%	4.30%	-7.24%	-4.70%	-2.50%
Personal Employment Growth, Nontradables	828	-0.23%	1.15%	-0.81%	-0.29%	0.30%
Personal Employment Growth, Tradables	828	-0.42%	1.60%	-0.63%	-0.15%	0.06%
Personal Employment Growth, Construction	828	-0.90%	1.34%	-1.34%	-0.76%	-0.17%
Personal Employment Growth, All Other Sectors	828	0.19%	2.27%	-1.00%	0.12%	1.32%
GDP Growth	372	0.67%	6.67%	-3.03%	1.23%	4.65%
Panel B: CBSA-level as fraction of CBSA pre-recession income						
CBSA DOD spending	828	2.65%	6.48%	0.15%	0.59%	2.23%
Change in DOD Spending 2007 to 2009	828	1.12%	4.95%	-0.07%	0.07%	0.60%
Instrument for Change in DOD Spending 2007 to 2009	828	0.61%	1.43%	0.05%	0.14%	0.48%
Change in DOD Obligations 2007 to 2009	828	1.01%	6.13%	-0.09%	0.04%	0.54%
Instrument for Change in DOD Obligations 2007 to 2009	828	0.44%	1.05%	0.03%	0.10%	0.35%
Debt to Income 2006	824	1.602	0.597	1.195	1.443	1.834
Panel C: CBSA-year level						
DOD Spending, 2006-2009 ($millions)	3,312	2.900	1.450	1.172	7.49	58.6
DOD Obligations, 2006-2009 ($millions)	3,312	3.060	1.500	1.115	7.62	62.3

Table 2
The Effect of Government Spending on Local Economic Growth

This table presents the results of the IV analysis evaluating the effect of DOD spending on local economic growth. Panel A presents the cross-sectional analysis following regression equation (1). The dependent variable is growth in local income between 2007 and 2009. The core variable of interest is change in DOD spending in a locality from 2006/07 to 2008/09 normalized by local income in 2006. Panel B presents the results of panel regression analysis following regression equation (2) and the sample covers from 2002 to 2013. In both panels DOD spending and DOD obligations are instrumented using the Bartik instrument. In all specifications we control for labor shares of 19 (2-digit NAIC) industries. County and CBSA specifications also include controls for median household income, pre-recession percentage of white population, percentage of owner-occupied housing units, percentages of the population with/less than high school diploma, unemployment rate, poverty rate, and dummy for urban areas. The core coefficient of interest from the first stage regression as well as the Kleibergen-Paap test for weak instrument are reported at the bottom of each regression specification for brevity. Standard errors are clustered by state in Panel A and by respective geographic unit in Panel B. Absolute values of t-statistics are reported in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

	County		CBSA		State	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Cross-Sectional Regressions						
Change in Government Spending$_{07 \text{ to } 09}$	0.090***		0.365***		1.613	
Normalized by Local Income$_{06/07}$	(12.43)		(3.86)		(1.55)	
Change in Government Obligations$_{07 \text{ to } 09}$		0.084***		0.353***		1.282
Normalized by Local Income$_{06/07}$		(9.69)		(2.86)		(1.78)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	1743	2410	828	828	51	51
R2	0.35	0.18	0.45	0.40	0.86	0.89
First stage regression coefficient	3.73***	5.74***	2.12***	2.12***	0.793***	0.793***
Kleibergen-Paap LM Test	1.47	1.34	13.25***	8.82***	5.86**	5.63**
Panel B: Panel Regressions						
Change in Government Spending$_t$	0.048***		0.248***		1.50	
Normalized by Local Income$_{t-2}$	(3.85)		(3.74)		(1.25)	
Change in Government Obligations$_t$		0.035***		0.112***		1.13
Normalized by Local Income$_{t-2}$		(4.42)		(4.26)		(0.64)
CBSA and Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	17,430	22,578	8,280	8,280	510	510
R2	0.72	0.67	0.77	0.78	0.92	0.92
First stage regression coefficient	1.84***	1.83***	1.39***	1.53***	0.67**	0.83***
Kleibergen-Paap LM Test	1.79	1.77	10.62***	15.82***	3.63*	5.23**

Table 3
The Effect of Government Spending on CBSA Economic Growth

This table reports the results of the IV analysis evaluating the effect of DOD spending on local economic growth at the CBSA level. Panel A presents the cross-sectional analysis following regression equation (1). The dependent variables are growth in local income, employment, or GDP between 2007 and 2009. The core variable of interest is the change in DOD spending in a locality from 2006/07 to 2008/09 normalized by 2006 local income. Panel B presents the results of panel regression analysis following regression equation (2) and the sample covers from 2002 to 2013. In both panels DOD spending and DOD obligations are instrumented using a Bartik instrument. In all specifications we control for labor shares of 19 (2-digit NAIC) industries, median household income, pre-recession percentage of white population, percentage of owner-occupied housing units, percentages of the population with/less than high school diploma, unemployment rate, poverty rate, and dummy for urban areas. The Kleibergen-Paap LM test statistics for weak instruments are reported at the bottom of each column. Standard errors are clustered by state in Panel A and by CBSA in Panel B. Absolute values of t-statistics are reported in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

	DOD Spending			DOD Obligations		
	Total Income Growth (1)	Total Empl. Growth (2)	Total GDP Growth (3)	Total Income Growth (4)	Total Empl. Growth (5)	Total GDP Growth (6)
Panel A: Cross-Sectional Regressions						
Change in DOD Spending/Obligations$_{07\ to\ 09}$	0.365***	0.234***		0.353***	0.228***	
Normalized by Local Income$_{06/07}$	(3.86)	(3.60)		(0.004)	(0.004)	
Change in DOD Spending/Obligations$_{07\ to\ 09}$			0.777			0.539
Normalized by Local GDP$_{06/07}$			(1.31)			(0.342)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	828	828	372	828	828	372
R2	0.45	0.40	0.44	0.40	0.37	0.41
Kleibergen-Paap LM Test	13.25***	13.25***	5.60***	9.10***	9.10***	2.32
Panel B: Panel Regressions						
Change in DOD Spending/Obligations$_t$	0.248***	0.163***		0.112***	0.074***	
Normalized by Local Income$_{t-2}$	(0.066)	(0.043)		(0.026)	(0.018)	
Change in DOD Spending/Obligations$_t$			1.292			0.491**
Normalized by Local GDP$_{t-2}$			(0.761)			(0.150)
CBSA and Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	8,280	8,280	3,720	8,280	8,280	3,720
R2	0.77	0.52	0.44	0.78	0.52	0.50
Kleibergen-Paap LM Test	10.62***	10.62***	5.42**	15.82***	15.82***	11.66***

Table 4
Government Spending, Consumer Leverage, and Economic Growth

This table reports the results of CBSA-level cross-sectional IV analysis of income growth, employment growth, and GDP growth between 2007 and 2009. Panel A reports results based on DOD spending, and Panel B reports results based on DOD obligations. Both change in DOD spending (normalized by pre-recession income or GDP) as well as the interaction term between change in DOD spending and CBSA-level consumers' debt-to-income ratio are instrumented using the Bartik instrument and its interaction with debt-to-income ratio. In all specifications we control for labor shares of 19 (2-digit NAIC) industries, median household income, pre-recession percentage of white population, percentage of owner-occupied housing units, percentages of the population with/less than high school diploma, unemployment rate, poverty rate, and dummy for urban areas. The Kleibergen-Paap LM test statistics for weak instruments are reported at the bottom of each column. Standard errors are clustered by state. Absolute values of t-statistics are reported in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

	Total Income Growth				Employment Growth				GDP Growth			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: DOD Spending												
Change in DOD Spending$_{07\ to\ 09}$	0.365***		0.370***	-0.507*	0.234***		0.239***	-0.252	0.777		0.740	-2.857**
	(3.86)		(3.86)	(1.66)	(3.60)		(3.64)	(1.16)	(1.31)		(1.31)	(2.48)
Debt to Income$_{2006}$		-0.033***	-0.031***	-0.038***		-0.028***	-0.027***	-0.031***		-0.023**	-0.023**	-0.036***
		(6.22)	(5.79)	(6.50)		(5.72)	(5.65)	(5.65)		(2.08)	(2.00)	(3.41)
Change in DOD Spending$_{07\ to\ 09}$ * Debt to Income$_{2006}$				0.608**				0.340**				2.536***
				(2.36)				(2.01)				(2.89)
CBSA Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	828	824	824	824	828	824	824	824	372	372	372	372
R2	0.45	0.48	0.47	0.47	0.40	0.45	0.43	0.44	0.44	0.45	0.45	0.44
Kleibergen-Paap LM Test	13.25***	n/a	13.21***	8.73***	13.25***	n/a	13.21***	8.73***	5.60***	n/a	5.54***	8.02***
Panel B: DOD Obligations												
Change in DOD Obligations$_{07\ to\ 09}$	0.353***		0.357***	-1.037*	0.228***		0.232***	-0.576	0.539		0.508	-5.006**
	(2.91)		(2.89)	(1.72)	(2.91)		(2.91)	(1.55)	(0.95)		(0.94)	(2.26)
Debt to Income$_{2006}$		-0.033***	-0.030***	-0.039***		-0.028***	-0.026***	-0.032***		-0.023**	-0.023*	-0.035***
		(6.22)	(5.43)	(5.83)		(5.72)	(5.56)	(5.33)		(2.08)	(1.93)	(2.75)
Change in DOD Obligations$_{07\ to\ 09}$ * Debt to Income$_{2006}$				1.025**				0.595*				4.346**
				(1.98)				(1.90)				(2.12)
CBSA Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	828	824	824	824	828	824	824	824	372	372	372	372
R2	0.40	0.48	0.42	0.36	0.37	0.45	0.40	0.37	0.41	0.44	0.42	0.32
Kleibergen-Paap LM Test	9.10***	n/a	9.06***	5.36**	9.10***	n/a	9.06***	5.36**	2.32	n/a	2.31	3.76**

Table 5
Marginal Effects of Consumer Leverage on Government Spending Multiplier

This table reports the relative DOD spending multipliers of income, employment, and GDP at different levels of the pre-recession debt-to-income distribution. Column (1) shows the average multipliers across CBSAs. Columns (2) through (4) show the multipliers at different levels of the debt distribution along with the multiplier as a percentage of the average multiplier displayed in column (1). Column (5) shows the difference in the multiplier when comparing different points in the distribution of debt-to-income across CBSAs. All reported numbers are based on estimates documented in Table 4.

| | | Debt to income ratio | | | |
| | Aggregate Multiplier | 1.19 *p25* | 1.44 *p50* | 1.83 *p75* | *p75-p25* |
	(1)	(2)	(3)	(4)	(5)
Income	0.365	0.222	0.370	0.600	0.378
		60.8%	101.3%	164.3%	103.5%
Employment	0.234	0.155	0.240	0.372	0.218
		66.1%	102.4%	159.1%	93.0%
GDP	0.777	0.202	0.745	1.591	1.389
		26.0%	95.9%	204.8%	178.7%

Table 6
Government Spending and Consumer Leverage During 2003-2005

This table reports the results of CBSA-level cross-sectional IV analysis of income growth, employment growth, and GDP growth between 2003 and 2005. Panel A reports results based on DOD spending, and Panel B reports results based on DOD obligations. Both the change in DOD spending (normalized by pre-recession income or GDP) as well as the interaction term between change in DOD spending and CBSA-level consumers' debt-to-income ratio are instrumented using the Bartik instrument and its interaction with debt-to-income ratio. In all specifications we control for labor shares of 19 (2-digit NAIC) industries, median household income, pre-recession percentage of white population, percentage of owner-occupied housing units, percentages of the population with/less than high school diploma, unemployment rate, poverty rate, and dummy for urban areas. The Kleibergen-Paap LM test statistics for weak instruments are reported at the bottom of each column. Standard errors are clustered by state. Absolute values of t-statistics are reported in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

	Total Income Growth				*Employment Growth*				*GDP Growth*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: DOD Spending												
Change in DOD Spending$_{02/03\ to\ 04/05}$	0.419**		0.308**	2.089	0.232*		0.233*	1.782	1.789***		1.821***	0.155
	(2.14)		(1.98)	(1.32)	(1.75)		(1.72)	(1.37)	(2.75)		(2.80)	(0.05)
Debt to Income$_{2002}$		0.036**	0.036**	0.044**		0.039***	0.039***	0.046***		0.028	0.029	0.026
		(2.35)	(2.34)	(2.38)		(3.34)	(3.33)	(3.31)		(1.22)	(1.29)	(1.19)
Change in DOD Spending$_{02/03\ to\ 04/05}$ * Debt to Income$_{2002}$				-1.257				-1.165				1.255
				(1.12)				(1.27)				(0.52)
CBSA Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	828	824	824	824	828	824	824	824	372	372	372	372
R2	0.20	0.24	0.23	0.18	0.15	0.20	0.19	0.15	0.42	0.44	0.42	0.43
Kleibergen-Paap LM Test	6.47**	n/a	6.18**	9.69***	6.47**	n/a	6.18**	9.69***	6.47**	n/a	6.18**	9.69***
Panel B: DOD Obligations												
Change in DOD Obligations$_{02/03\ to\ 04/05}$	0.512		0.327	8.272	0.283		0.285	6.279	5.008		5.083	7.147
	(1.61)		(1.63)	(1.13)	(1.41)		(1.39)	(1.15)	(1.57)		(1.60)	(0.31)
Debt to Income$_{2002}$		0.036**	0.034**	0.051**		0.039***	0.037***	0.051***		0.028	0.022	0.025
		(2.35)	(2.20)	(2.14)		(3.34)	(3.14)	(2.83)		(1.22)	(0.93)	(0.71)
Change in DOD Obligations$_{02/03\ to\ 04/05}$ * Debt to Income$_{2002}$				-5.576				-4.307				-1.529
				(1.10)				(1.13)				(0.10)
CBSA Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	828	824	824	824	828	824	824	824	372	372	372	372
R2	0.15	0.24	0.21	0.20	0.13	0.20	0.16	0.15	0.15	0.44	0.14	0.10
Kleibergen-Paap LM Test	3.18*	n/a	3.63*	2.12	3.18*	n/a	3.63*	2.12	3.24*	n/a	3.27*	0.48

Table 7

Summary Statistics for Individual Consumer Data

This table reports summary statistics for the individual-level data from TransUnion and Equifax. The credit categories are based on consumers' credit scores in TransUnion data. Deep Subprime, Subprime, Near Prime, Prime, and Super Prime are based on borrowers' credit scores measured in February 2007 in the following ranges: [501,600), [601,700), [701,800), [801,900), [901,990], respectively.

	Mean	St.Dev
TransUnion:		
Total Debt Growth (2009-2007).	0.050	1.629
Change in Debt (2007-2009)/Income2007.	0.091	1.367
Credit Card Growth (2009-2007).	-0.127	1.448
Deep Subprime x Credit Card Growth (2009-2007)	-0.102	1.348
Subprime x Credit Card Growth (2009-2007)	-0.153	1.382
Near prime x Credit Card Growth (2009-2007)	-0.107	1.465
Prime x Credit Card Growth (2009-2007)	-0.148	1.469
Super Prime x Credit Card Growth (2009-2007)	-0.161	1.462
Debt-to-Income ratio, 2006	1.239	1.437
Deep Subprime x Debt-to-Income ratio, 2006	0.914	1.353
Subprime x Debt-to-Income ratio, 2006	1.202	1.45
Near prime x Debt-to-Income ratio, 2006	1.461	1.512
Prime x Debt-to-Income ratio, 2006	1.265	1.403
Super Prime x Debt-to-Income ratio, 2006	1.202	1.325
Equifax:		
Total Debt Growth (2009-2007).	0.094	1.657
Change in Debt (2007-2009)/Income2007.	0.103	1.411
Credit Card growth (2009-2007).	-0.024	1.322

Table 8
Government Spending and Consumer Credit Card Balances During Recession

This table reports the results of the OLS and IV regression analysis following the regression equation (5) of the paper. The dependent variable is either log growth of credit card balances between 2007 and 2009 or the dollar change in credit card balances between 2007 and 2009 normalized by pre-recession consumer income. Panel A reports results based on DOD spending, and Panel B reports results based on DOD obligations. The interaction term between DOD spending (obligations) and debt-to-income ratio is instrumented using the respective Bartik instrument's interaction with individual debt-to-income ratio. In case of TransUnion we construct debt-to-income measures using individual-level income and individual total debt as of February 2007. In case of Equifax we use average IRS ZIP code-level income and ZIP code average of the individual total debt as of 2006. In all regressions we control for log consumer income in 2006, CBSA fixed effects, labor shares of 19 (2-digit NAIC) industries, median household income, pre-recession percentage of white population, percentage of owner-occupied housing units, percentages of the population with/less than high school diploma, unemployment rate, poverty rate, and dummy for urban areas. The Kleibergen-Paap LM test statistics for weak instruments are reported at the bottom of each column. Absolute values of t-statistics are reported in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

	TransUnion			Equifax		
			Growth in CC Balances			Growth in CC Balances
	Log Growth in CC Balances	Log Growth in CC Balances	Normalized by Income	Log Growth in CC Balances	Log Growth in CC Balances	Normalized by Income
	OLS	IV	IV	OLS	IV	IV
Panel A: DOD Spending						
Debt to Income $_{2006}$	-0.02***	-0.020***	-0.005***	-0.01***	-0.007***	-0.001***
	(15.87)	(16.90)	(23.73)	(7.32)	(7.68)	(6.07)
Change in DOD Spending$_{07\ to\ 09}$ *	-0.04	0.181**	0.045***	-0.012	0.113**	0.028***
Debt to Income$_{2006}$	(1.05)	(2.21)	(3.28)	(0.81)	(2.37)	(3.01)
Controls and CBSA Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Kleibergen-Paap LM Test	--	27.990***	28.485***	--	29.563***	30.340***
No. obs.	3,895,839	3,895,839	6,689,130	5,126,571	5,126,571	9,782,132
Panel B: DOD Obligations						
Debt to Income $_{2006}$	-0.02***	-0.020***	-0.005***	-0.01***	-0.007***	-0.001***
	(17.10)	(17.03)	(23.09)	(6.83)	(7.62)	(5.86)
Change in DOD Obligations$_{07\ to\ 09}$ *	-0.003	0.181*	0.046**	-0.03	0.109**	0.027***
Debt to Income$_{2006}$	(0.16)	(1.95)	(2.36)	(1.02)	(2.07)	(2.64)
Controls and CBSA Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Kleibergen-Paap LM Test	--	7.984***	7.966***	--	11.886***	11.877***
No. obs.	3,895,839	3,895,839	6,689,130	5,126,571	5,126,571	9,782,132

Table 9

The Effect of Government Spending on Consumer Balances by Credit Rating

This table evaluates the heterogeneity in DOD spending effect on individual debt balances between 2007 and 2009. Each panel represents a single IV regression. The coefficients are presented in horizontal rows for ease of comparison of the effects of DOD spending and pre-recession debt on debt balances of different consumer groups. Panel A reports results that utilize data on DOD spending and Panel B, DOD obligations. Individual data are from the TransUnion Panel. In Panel A, columns represent consumers' credit categories, which are interacted with each of the independent variables of interest. The credit categories are based on consumers' credit scores in February 2007. Deep Subprime, Subprime, Near Prime, Prime, and Super Prime correspond to credit scores within the following respective ranges: [501,600), [601,700), [701,800), [801,900), [901,990], respectively. In all specifications we control for labor shares of 19 (2-digit NAIC) industries, median household income, pre-recession percentage of white population, percentage of owner-occupied housing units, percentages of the population with/less than high school diploma, unemployment rate, poverty rate, and dummy for urban areas. The Kleibergen-Paap LM test statistics for weak instruments are reported at the bottom of each panel. Standard errors are clustered by county. Absolute values of t-statistics are reported in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

	Deep Subprime	Subprime	Near Prime	Prime	Super Prime
	Dependent Variable: $\log(\text{Credit card balances}_{Feb\ 2010}/\text{Credit card balances}_{Feb\ 2008})$				
Panel A: DOD Spending					
Debt to Income$_{Feb\ 2007}$	-0.069***	-0.061***	-0.024***	-0.001	0.003*
	(22.67)	(34.91)	(20.76)	(1.26)	(1.94)
Change in DOD Spending$_{07\ to\ 09}$ *	0.674***	0.138	0.159*	-0.061	0.027
Debt to Income$_{Feb\ 2007}$	(2.66)	(1.25)	(1.85)	(0.65)	(0.21)

Adj. R-sq: 1.4%. Obs: 3,700,662. Kleibergen-Paap LM Test: 27.604***
Controls: CBSA fixed effects, log of individual income, county industry structure and economic conditions.

	Deep Subprime	Subprime	Near Prime	Prime	Super Prime
Panel B: DOD Obligations					
Debt to Income$_{Feb\ 2007}$	-0.067***	-0.061***	-0.024***	-0.001	0.003**
	(23.85)	(36.54)	(22.00)	(1.55)	(2.00)
Change in DOD Obligations$_{07\ to\ 09}$ *	0.744**	0.143	0.165*	-0.05	0.03
Debt to Income$_{Feb\ 2007}$	(2.13)	(1.51)	(1.84)	(0.50)	(0.19)

Adj. R-sq: 1.3%. Obs: 3,700,662. Kleibergen-Paap LM Test: 7.312***
Controls: CBSA fixed effects, log of individual income, county industry structure and economic conditions.

Table 10

Government Spending and Consumer Debt During 2008 Recession

This table reports the results of the individual-level IV analysis following equation (5) of the paper. Panel A reports results that utilize data on DOD spending and Panel B, DOD obligations. The interaction term between DOD spending (obligations) and debt-to-income ratio is instrumented using the respective Bartik instrument's interaction with individual debt-to-income ratio. In column (1), the dependent variable is log growth in individual consumer total debt balances between the end of 2007 and the end of 2009. In column (2), the dependent variable is dollar change in individual consumer debt balance normalized by the pre-recession consumer income. In column (3), the dependent variable is a dummy variable that equals to one if an individual had at least one account past due 90 days or more in the past 24 months as of February 2010, as reported by TransUnion. In all regressions we control for log consumer income in 2006 (February 2007) from TransUnion, CBSA fixed effects, county level labor shares of 19 (2-digit NAIC) industries, median household income, pre-recession percentage of white population, percentage of owner-occupied housing units, percentages of the population with/less than high school diploma, unemployment rate, poverty rate, and dummy for urban areas. The Kleibergen-Paap LM test statistics for weak instruments are reported at the bottom of each column. Absolute values of t-statistics are reported in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

	Log Growth in Total Debt (1)	Growth in Total Debt Normalized by Income (2)	Derogatory Events (3)
Panel A: DOD Spending			
Debt to Income $_{2006}$	-0.101***	-0.138***	0.018***
	(75.79)	(72.28)	(17.53)
Change in DOD Spending$_{07 \text{ to } 09}$ *	-0.027	0.045	-0.129**
Debt-to-Income$_{06}$	(0.35)	(0.46)	(2.21)
Controls: CBSA fixed effects, log of individual income, county industry structure and economic conditions.			
Kleibergen-Paap LM Test	28.080***	28.485***	28.659***
No. obs.	5,917,526	6,689,130	6,957,277
Panel B: DOD Obligations			
Debt to Income $_{2006}$	-0.101***	-0.138***	0.018***
	(78.91)	(75.65)	(17.92)
Change in DOD Obligations$_{07 \text{ to } 09}$ *	-0.026	0.051	-0.139*
Debt-to-Income$_{06}$	(0.33)	(0.51)	(1.84)
Controls: CBSA fixed effects, log of individual income, county industry structure and economic conditions.			
Kleibergen-Paap LM Test	7.935***	7.966***	8.036***
No. obs.	5,917,526	6,689,130	6,957,277

Table 11
Government Spending and Consumer Auto Consumption

This table reports the results of the cross-sectional IV regression analysis of car registrations and car loans following regression equation (5). In column (1) the dependent variable is ZIP code-level log growth in new auto registrations between 2007 and 2009. Here we utilize debt-to-income ratio from TransUnion aggregated to the ZIP code-level. In column (2) the dependent variable is log growth in individual-level auto loan balances between 2007 and 2009 as reported by TransUnion. Here the debt-to-income ratio is computed at the individual level using TransUnion data. Panel A reports results based on DOD spending and Panel B reports results based on DOD obligations. In all regressions we control for log consumer income in 2006 and CBSA fixed effects. In all specifications we control for labor shares of 19 (2-digit NAIC) industries, median household income, pre-recession percentage of white population, percentage of owner-occupied housing units, percentages of the population with/less than high school diploma, unemployment rate, poverty rate, and dummy for urban areas. The Kleibergen-Paap LM test statistics for weak instruments are reported at the bottom of each column. Standard errors are clustered by county. Absolute values of t-statistics are reported in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

	Auto registrations	*Auto loans*
Panel A: DOD Spending		
Debt to Income $_{2006}$	-0.02**	-0.002***
	(2.08)	(3.89)
Change in DOD Spending$_{07\ to\ 09}$ *	1.72***	0.025
Debt to Income$_{2006}$	(3.84)	(0.78)
Controls and CBSA Fixed Effects	Yes	Yes
Adj. R sq.	30.6%	0.3%
Kleibergen-Paap LM Test	21.039***	28.782***
No. obs.	22,509	2,151,057
Panel B: DOD Obligations		
Debt to Income $_{2006}$	-0.02*	-0.002***
	(1.82)	(4.04)
Change in DOD Obligations$_{07\ to\ 09}$ *	1.82**	0.028
Debt to Income$_{2006}$	(2.36)	(0.81)
Controls and CBSA Fixed Effects	Yes	Yes
Adj. R sq.	30.1%	0.3%
Kleibergen-Paap LM Test	9.000***	8.604***
No. obs.	22,509	2,151,057

Table 12

Effects in Tradable and Non-tradable Sectors

This table reports the results of CBSA-level cross-sectional IV analysis of income growth (left Panel) and employment growth (right panel) across different sectors of the economy between 2007 and 2009. Panel A reports results that utilize data on DOD spending and Panel B, DOD obligations. Both DOD spending (obligations) as well as the interaction term between DOD spending (obligations) and CBSA-level consumers' debt-to-income ratio are instrumented using the Bartik instrument (defined in Section 2.2 of the paper) and its interaction with debt-to-income ratio. In all specifications we control for labor shares of 19 (2-digit NAIC) industries, median household income, pre-recession percentage of white population, percentage of owner-occupied housing units, percentages of the population with/less than high school diploma, unemployment rate, poverty rate, and dummy for urban areas. The Kleibergen-Paap LM test statistics for weak instruments is reported at the bottom of each column. Standard errors are clustered by state. Absolute values of t-statistics are reported in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

	Income Growth					*Employment Growth*				
	Strict Non-tradables	Non-Tradable	Tradables	Construction	Other	Strict Non-tradables	Non-Tradable	Tradables	Construction	Other
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A: DOD Spending										
Change in Government Spending$_{07\ to\ 09}$	-0.042**	-0.035	-0.075	-0.060	-0.177	-0.070***	-0.061*	-0.034	0.003	-0.044
	(-2.41)	(-1.39)	(-1.63)	(-1.26)	(-1.22)	(-2.74)	(-1.92)	(-1.31)	(0.13)	(-0.45)
Debt to Income$_{2006}$	-0.001	-0.002**	-0.006**	-0.016***	-0.010***	-0.000	-0.001	-0.004***	-0.011***	-0.005**
	(-0.82)	(-2.44)	(-2.21)	(-6.77)	(-3.29)	(-0.23)	(-0.89)	(-2.86)	(-6.60)	(-2.37)
Change in Government Spending$_{07\ to\ 09}$ * Debt to Income$_{2006}$	0.034**	0.032	0.068*	0.079**	0.223*	0.046**	0.043*	0.036*	0.018	0.101
	(2.41)	(1.64)	(1.89)	(2.10)	(1.75)	(2.45)	(1.80)	(1.67)	(0.87)	(1.25)
CBSA Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	824	824	824	824	824	824	824	824	824	824
R2	0.10	0.13	0.17	0.42	0.13	0.08	0.09	0.22	0.50	0.10
Kleibergen-Paap LM Test	8.73***	8.73***	8.73***	8.73***	8.76***	8.73***	8.73***	8.73***	8.73***	8.76***
Panel B: DOD Obligations										
Change in Government Obligations$_{07\ to\ 09}$	-0.062**	-0.059*	-0.118	-0.134	-0.388	-0.088***	-0.081**	-0.062	-0.026	-0.171
	(-2.51)	(-1.66)	(-1.55)	(-1.60)	(-1.42)	(-2.75)	(-1.99)	(-1.42)	(-0.66)	(-1.04)
Debt to Income$_{2006}$	-0.001	-0.002**	-0.006**	-0.016***	-0.011***	-0.000	-0.001	-0.004***	-0.011***	-0.005**
	(-0.87)	(-2.46)	(-2.20)	(-6.59)	(-3.14)	(-0.25)	(-0.91)	(-2.87)	(-6.59)	(-2.33)
Change in Government Obligations$_{07\ to\ 09}$ * Debt to Income$_{2006}$	0.051**	0.052*	0.103	0.137*	0.387	0.064**	0.062*	0.058	0.040	0.196
	(2.38)	(1.77)	(1.60)	(1.85)	(1.61)	(2.29)	(1.79)	(1.50)	(1.11)	(1.36)
CBSA Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	824	824	824	824	824	824	824	824	824	824
R2	0.09	0.12	0.16	0.39	0.06	0.08	0.09	0.21	0.50	0.06
Kleibergen-Paap LM Test	5.36**	5.36**	5.36**	5.36**	8.76***	5.36**	5.36**	5.36**	5.36**	8.76***

Table 13

State-Dependent Multipliers in the National Security Sector

This table reports the results from the CBSA-level IV regression analysis of income growth (left Panel) and employment growth (right Panel) in the National Security and International Affairs sector (NAIC 9811) between 2007 and 2009. Panel A reports results that utilize data on DOD spending and Panel B, DOD obligations. Both change in DOD spending (obligations) as well as the interaction term between change in DOD spending (obligations) and CBSA-level consumer debt-to-income ratio are instrumented using the Bartik instrument (defined in Section 2.2 of the paper) and its interaction with debt-to-income ratio. In all specifications we control for labor shares of 19 (2-digit NAIC) industries, median household income, pre-recession percentage of white population, percentage of owner-occupied housing units, percentages of the population with/less than high school diploma, unemployment rate, poverty rate, and dummy for urban areas. The Kleibergen-Paap LM test statistics for weak instruments is reported at the bottom of the table. Standard errors are clustered by state. Absolute values of t-statistics are reported in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

	Income Growth in National Security Sector				*Employment Growth in National Security Sector*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: DOD Spending								
Change in DOD Spending$_{07\ to\ 09}$	0.079***		0.079***	-0.141*	0.136**		0.136**	-0.255*
	(2.90)		(2.92)	(1.77)	(2.50)		(2.52)	(1.91)
Debt to Income$_{2006}$		0.001	0.001**	-0.001		0.002	0.002**	-0.001
		(1.56)	(2.28)	(0.99)		(1.63)	(2.31)	(0.78)
Change in DOD Spending$_{07\ to\ 09}$ * Debt to Income$_{2006}$				0.152**				0.272**
				(2.28)				(2.39)
CBSA Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	828	824	824	824	828	824	824	824
R2	0.45	0.48	0.47	0.47	0.40	0.45	0.43	0.44
Kleibergen-Paap LM Test	13.25***	n/a	13.21***	8.73***	13.25***	n/a	13.21***	8.73***
Panel B: DOD Obligations								
Change in DOD Obligations$_{07\ to\ 09}$	0.076**		0.076**	-0.266*	0.131**		0.132**	-0.476**
	(2.41)		(2.42)	(1.85)	(2.17)		(2.18)	(2.06)
Debt to Income$_{2006}$		0.001	0.001**	-0.001		0.002	0.003**	-0.001
		(1.56)	(2.03)	(1.08)		(1.63)	(2.08)	(0.96)
Change in DOD Obligations$_{07\ to\ 09}$ * Debt to Income$_{2006}$				0.252**				0.447**
				(2.06)				(2.29)
CBSA Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	828	824	824	824	828	824	824	824
R2	0.40	0.48	0.42	0.36	0.37	0.45	0.40	0.37
Kleibergen-Paap LM Test	9.10***	n/a	9.07***	5.36**	9.10***	n/a	9.07***	5.36**

APPENDIX

Table A1
Robustness: Government Spending and Local Observables

This table reports the results of CBSA-level cross-sectional IV analysis of income growth, employment growth, and GDP growth between 2007 and 2009. The empirical design mirrors analysis reported in Table 4. For robustness in this table we control for additional interactions between all CBSA level local economic observables and DTI.

Panel A reports results based on DOD spending, and Panel B reports results based on DOD obligations. Both change in DOD spending (normalized by pre-recession income or GDP) as well as the interaction term between change in DOD spending and CBSA-level consumers' debt-to-income ratio are instrumented using the Bartik instrument and its interaction with debt-to-income ratio. In all specifications we control for labor shares of 19 (2-digit NAIC) industries, median household income, pre-recession percentage of white population, percentage of owner-occupied housing units, percentages of the population with/less than high school diploma, unemployment rate, poverty rate, and dummy for urban areas. The Kleibergen-Paap LM test statistics for weak instruments are reported at the bottom of each column. Absolute values of robust t-statistics are reported in parentheses. *** p<0.01, ** p<0.05, *

	Income	Employment	GDP
Panel A: DOD Spending			
Change in DOD Spending$_{07\ to\ 09}$	-0.781	-0.584	-4.307
	(1.21)	(1.19)	(0.76)
Debt to Income$_{2006}$	-0.021	-0.033	0.112
	(0.16)	(0.35)	(0.21)
Change in DOD Spending$_{07\ to\ 09}$ *	0.901*	0.638*	4.787
Debt to Income$_{2006}$	(1.76)	(1.68)	(1.53)
CBSA Control Variables	Yes	Yes	Yes
CBSA observables * Debt to Income$_{2006}$	Yes	Yes	Yes
Number of Observations	824	824	372
R2	0.44	0.41	0.18
Kleibergen-Paap LM Test	8.06***	8.06***	1.18
Panel B: DOD Obligations			
Change in DOD Obligations$_{07\ to\ 09}$	-0.899	-0.620	-4.851*
	(1.57)	(1.55)	(1.84)
Debt to Income$_{2006}$	0.061	0.027	0.405
	(0.47)	(0.29)	(1.48)
Change in DOD Obligations$_{07\ to\ 09}$ *	0.927*	0.634*	4.295*
Debt to Income$_{2006}$	(1.92)	(1.90)	(1.75)
CBSA Control Variables	Yes	Yes	Yes
CBSA observables * Debt to Income$_{2006}$	Yes	Yes	Yes
Number of Observations	824	824	372
R2	0.42	0.41	0.34
Kleibergen-Paap LM Test	6.34***	6.34***	3.39*

Table A2
Robustness: DTI and Local Observables

This table reports the summary of the results of CBSA-level cross-sectional IV analysis of income growth, employment growth, and GDP growth between 2007 and 2009. The empirical design mirrors analysis reported in Table 4. IN each clumn we summarise the results of 32 regressions where we include additional interactions between all CBSA level local economic observables and DOD spending growth one at a time. The change in DOD spending (normalized by pre-recession income or GDP), its interaction with CBSA-level consumers' debt-to-income ratio, and its interactions with other local economic observables are instrumented using the Bartik instrument and its interaction with debt-to-income ratio as well as all other local economic observables. Each column reports (i) the average coefficients of interest across all 32 specification (ii) standard deviation of said coefficients across 32 specificaiton in square brackets; and (iii) average p-value of documented coefficients across 32 specifications in round brackets.

Panel A reports the results based on DOD spending, and Panel B reports the results based on DOD obligations. In all specifications we control for labor shares of 19 (2-digit NAIC) industries, median household income, pre-recession percentage of white population, percentage of owner-occupied housing units, percentages of the population with/less than high school diploma, unemployment rate, poverty rate, and dummy for urban areas.

	Panel A: DOD Spending			Panel B: DOD Obligations		
	Income	*Employment*	*GDP*	*Income*	*Employment*	*GDP*
Change in DOD Spending$_{07 \text{ to } 09}$	-1.31	-0.743	-1.945	-1.641	-0.948	-4.173
	[4.28]	[2.763]	[3.744]	[2.636]	[1.655]	[7.365]
	(0.263)	(0.407)	(0.151)	(0.167)	(0.216)	(0.236)
Debt to Income$_{2006}$	-0.04	-0.03	-0.03	-0.04	-0.03	-0.03
	[0.001]	[0.001]	[0.002]	[0.001]	[0.001]	[0.008]
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.085)
Change in DOD Spending$_{07 \text{ to } 09}$ *	0.61	0.34	2.42	1.08	0.62	4.44
Debt to Income$_{2006}$	[0.120]	[0.082]	[0.259]	[0.146]	[0.079]	[0.820]
	(0.062)	(0.106)	(0.009)	(0.064)	(0.073)	(0.090)
CBSA Control Variables	yes	yes	yes	yes	yes	yes
CBSA observables * Debt to Income$_{2006}$	yes	yes	yes	yes	yes	yes