Federal Stimulus Spending Accounted for a Quarter Million Texas Jobs

Texans for Public Justice
April 2012

Federal Stimulus Saved or Created 264,459 Texas Jobs by End of 2010: Two Percent of State's Total Employment

Texans for Public Justice
609 W. 18th St., Suite E
Austin, TX 78701
PH: (512) 472-9770
tpj@tpj.org
http://www.tpj.org

Federal Stimulus Saved or Created 264,459 Texas Jobs by End of 2010— Two Percent of State's Total Employment

I. Summary

Texas Governor Rick Perry had mixed results in taking credit for the so-called "Texas miracle" economy in his recent gubernatorial and presidential campaigns. A new economic study commissioned by Texans for Public Justice finds that by the end of 2010 the federal American Recovery and Reinvestment Act of 2009 saved or created at least 264,459 Texas jobs, equivalent to 2 percent of Texas' total employment at that time. Without $7.7 billion in federal stimulus funds, Texas employment would have taken a dive, the study finds, imposing far more pain on hundreds of thousands of Texas families.

II. Introduction

A divided Congress passed the American Recovery and Reinvestment Act in February 2009 at the urging of new President Barack Obama.[1] This $840 billion government stimulus sought to reverse a free-falling economy that drowned American workers in pink slips.[2] Liberal economists argued that the stimulus was unequal to the severity of the crisis.[3] Nonetheless, a recent book on the Recovery Act reports that the U.S. spent more inflation-adjusted dollars on the stimulus than it did on the Louisiana Purchase, FDR's Works Progress Administration, the Manhattan Project, the moon race, seven years of Iraq War or the $170 billion Bush stimulus in 2008.[4] Conservative politicians warned that the stimulus would unleash perverse incentives and runaway inflation. They exclusively prescribed cutting taxes and government spending (even as investors craved certain government economic interventions).[5] Three years later, investors are effectively paying the U.S. government to let them lend it money.[6] And who in their right mind would trade the stimulated U.S. economy for the austerity-drained economies of Europe?[7]

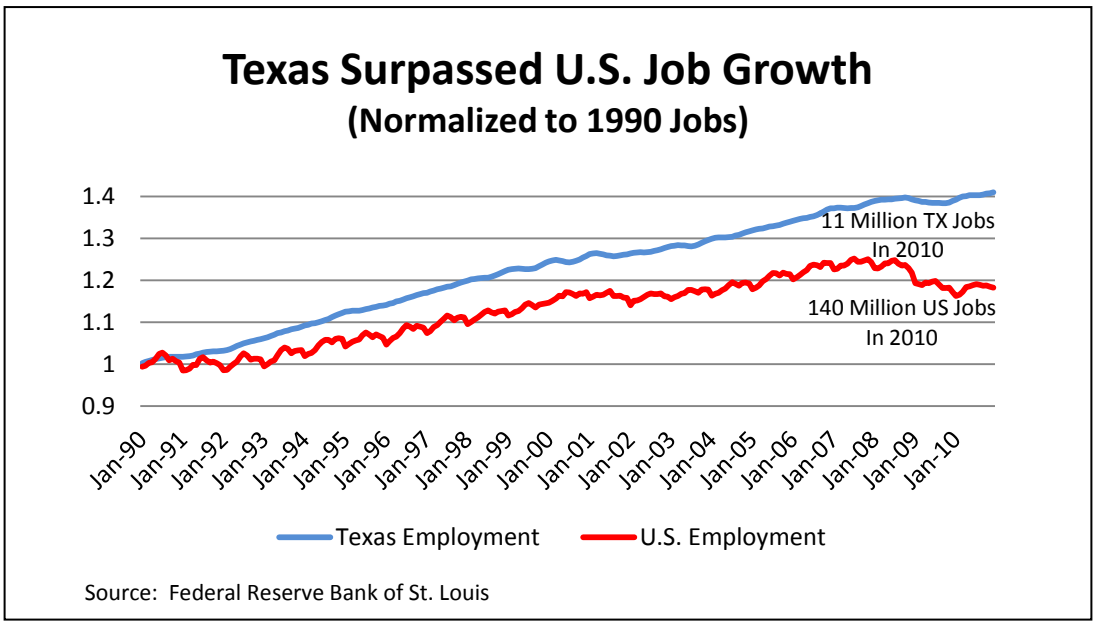
Employment in rapid-growth Texas significantly outpaced the nation as a whole over the past 20 years. Yet Texas jobs peaked in late 2008 and then turned south. The leaders of this cash-strapped state showed no interest in engineering a stimulus of their own. In fact, Governor Rick Perry won his 2010 reelection by campaigning against a federal government that was investing billions of dollars in Texas. Using the same message in his presidential campaign a year later, Perry self-destructed—often on live television. CNN's Wolf Blitzer asked Perry in a September 2011 debate if he supported a slew of Obama-proposed tax cuts and tax credits. "And he's going to pay for them all with raising your taxes," Perry replied. "That is the issue. He had $800 billion worth of stimulus in the first round of stimulus. It created zero jobs, $400-plus billion dollars in this package. And I can do the math on that one. Half of zero jobs is going to be zero jobs."[8]

Saying the $840 billion stimulus "created zero jobs" is less dishonest than, say, claiming that every American worker owes his or her paycheck to the federal stimulus.[9] Still, the PolitiFact project of the *Tampa Bay Times* rated Perry's zero-jobs claim a "pants-on-fire" lie. PolitiFact cited figures from Obama's Council of Economic Advisers, the Congressional Budget Office and three private economic studies that credited the stimulus with producing from 1.3 million to 3.6 million American jobs.[10] If the Recovery Act did create upwards of "zero jobs," could some of the workers participating in the so-called "Texas miracle" economy owe their paychecks to Obama's stimulus package? That is the question tackled here.

Not all Recovery Act funds targeted direct job creation. Tracking allocations of the first $747 billion in stimulus funds, the Obama administration reported that:

- 40 percent went to tax benefits (led by individual tax credits);
- 30 percent to contracts, grants and loans (led by education and transportation spending); and
- 30 percent went to entitlements (led by Medicaid, Medicare and unemployment insurance).

Job creation nonetheless was a key goal of the program, which required stimulus-fund recipients to report how many jobs they created or retained with these federal funds. According to federal data, the Recovery Act directly created or preserved 243,814 Texas jobs by the end of 2010 (the most recent data available when this study began).[11] This number is equivalent to two percent of the total Texas workforce, which then boasted 11.2 million workers according to the Texas Workforce Commission.



Unfortunately, problems plague Recovery Act job data. Some of these problems undercount jobs, while others overstate them. The Recovery Act systematically undercounts jobs, for example, by just reporting *direct* job creation and retention (ignoring so-called Keynesian multiplier effects). The army of Texans who took home stimulus paychecks did not stuff all of that money under their mattresses. They spent it on basic living expenses and the occasional luxury, thereby indirectly preserving and creating thousands of other jobs that would not have survived or existed without the stimulus.

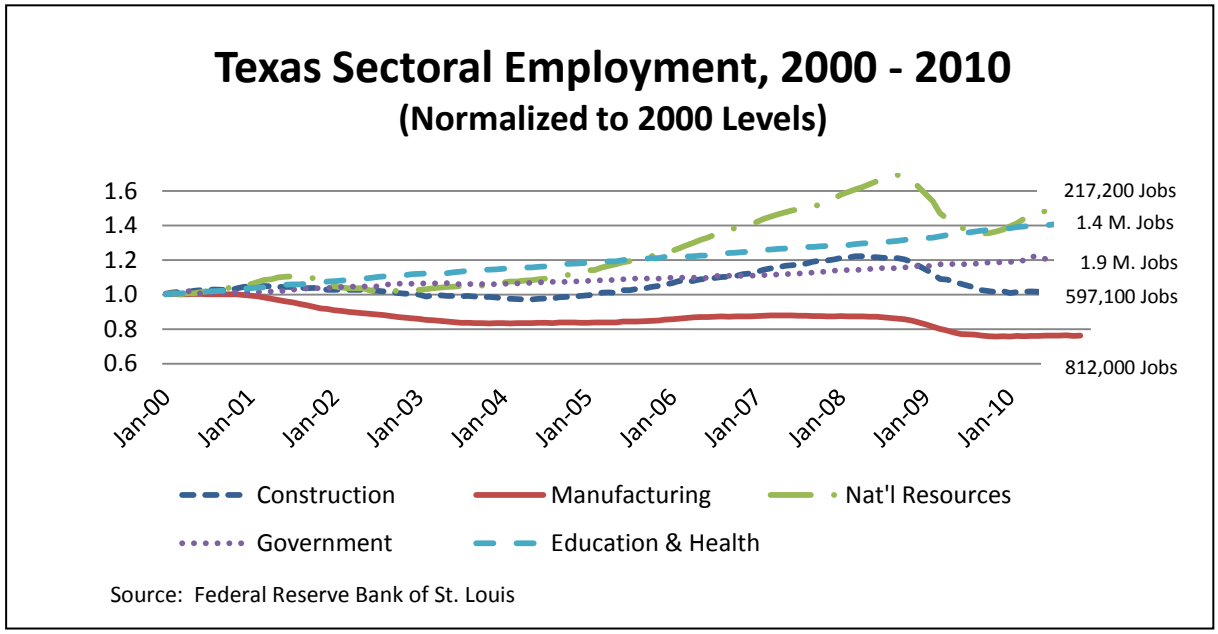
Other data flaws overstate Recovery Act jobs. Consider, for example, the $7.2 billion that the Recovery Act invested in the nation's high-speed Internet network. The government pumped some of this money into sparsely populated areas that commercial Internet vendors have spurned as unprofitable. Yet the industry also complained that part of these federal expenditures intruded into areas that commercial vendors already serviced at a fair price.[12] In some cases, then, stimulus-funded workers undoubtedly pushed non-stimulus workers out of their jobs. Recovery Act data do not account for stimulus-induced layoffs.

Recovery Act data also do not distinguish between temporary and long-term employment. This is significant because the government plowed 71 percent of Texas' stimulus awards into three key sectors: Education, Infrastructure and Transportation. Many Infrastructure and Transportation jobs are measured in months rather than years. And too many education jobs also turned out to be short-lived. After the Recovery Act put a $6 billion band-aid on Texas schools, Texas lawmakers slashed education spending in 2011. Texas schools then laid-off an estimated 32,000 education workers (including 12,000 teachers); Texas schools face another $2 billion cut in state funds in September 2012.[13] Due to data failings that both understate *and* overstate stimulus jobs, economic models offer the best way to estimate the impact of the Recovery Act on Texas' job market.

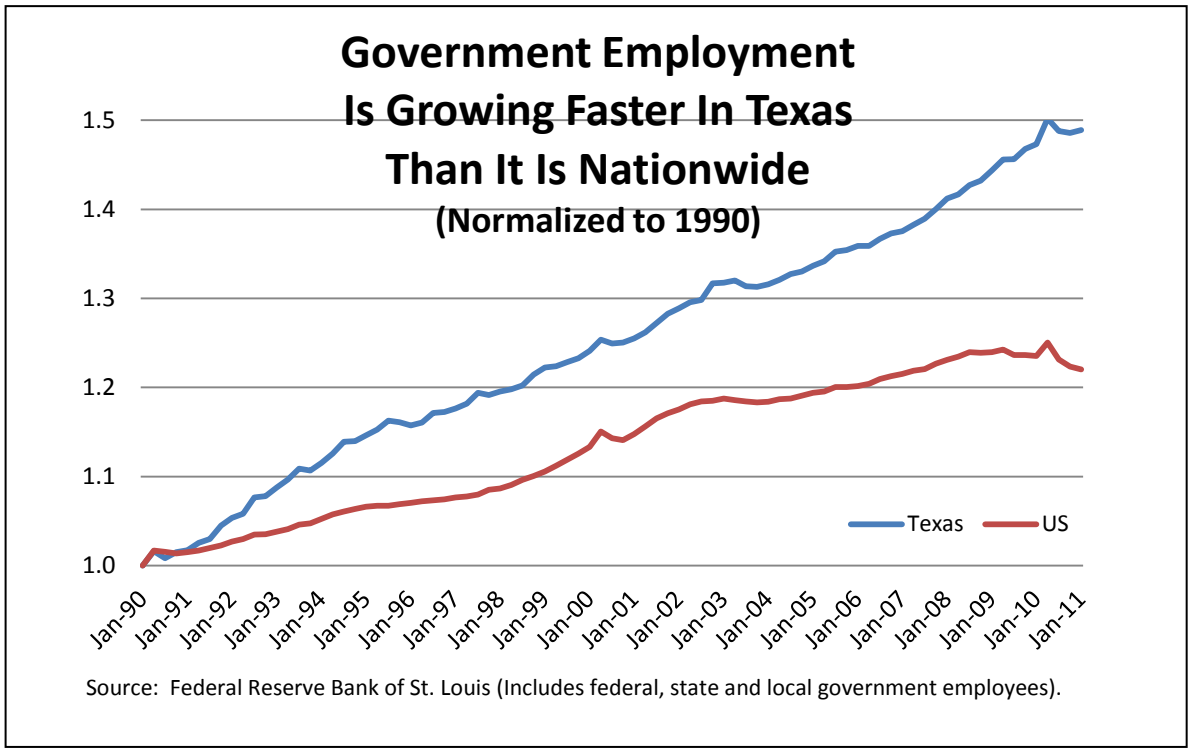
III. The Texas Job Market

Before introducing economic models that gauge the Recovery Act's impact on Texas employment it is useful to review the basic dynamics of the Texas job market. Most data in this section cover through the end of 2010—the same period analyzed by the economic models discussed in the next section.

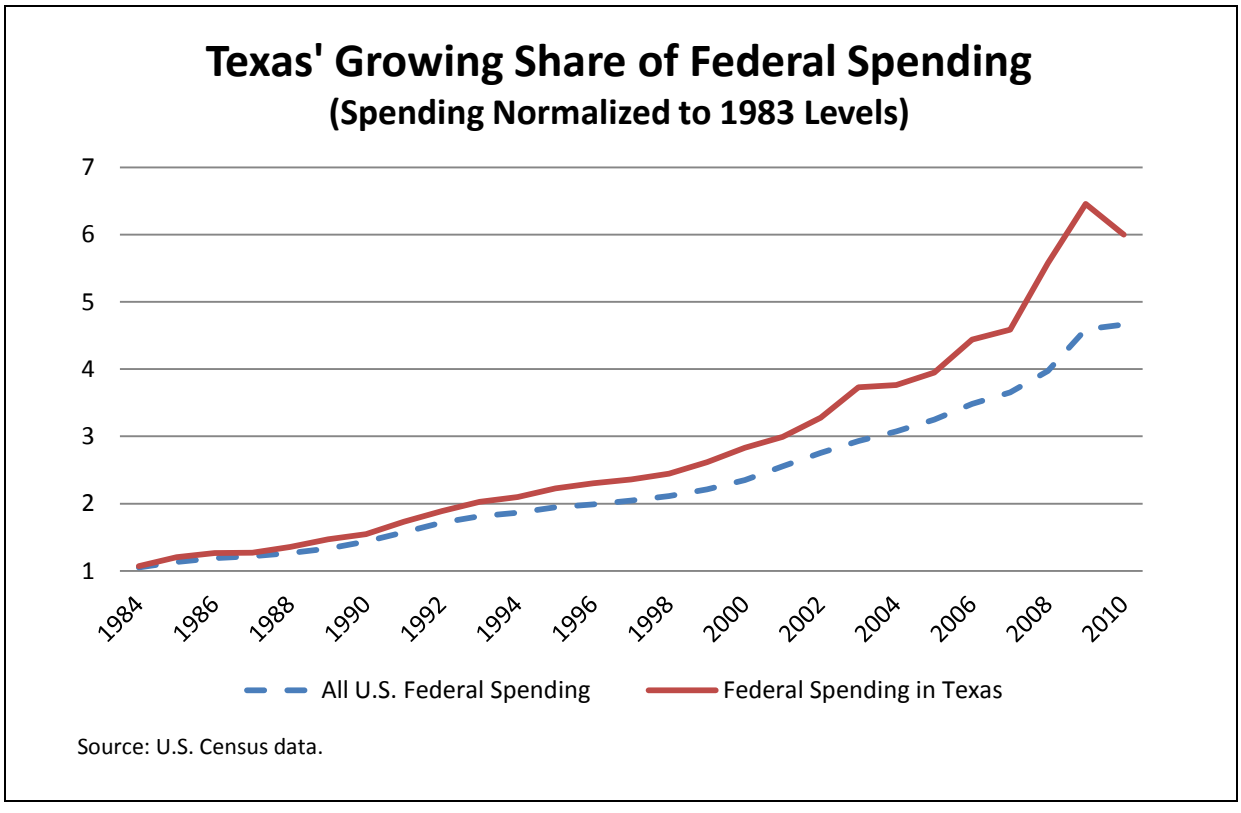
The accompanying graph shows Texas employment in key economic sectors over the past decade. Texas, which boasted more than 1 million manufacturing jobs in 2000, has bled away a quarter million of those jobs. Texas Construction jobs boomed during the bubble only to crater in the bust to levels seen 10 years ago. Despite wild gyrations, Texas' oil-and-gas jobs in the Natural Resources sector grew the most over the past decade, helping to insulate this state from the global recession's worst shocks. Nonetheless, even when oil prices peaked in 2008, the Natural Resources sector employed just over 238,000 Texans. Left at the core of Texas' job market are the only two steady-growth sectors that employ more than 1 million Texans apiece. These are the Government sector and the Education & Health sector, *both of which rely heavily on government spending*. These two sectors produced 729,000 new jobs during the preceding decade, accounting for 56 percent of the 1.3 million new jobs that Texas created in that period.



Although Texas breeds state and federal politicians who rail against government spending, the first graph on the next page shows that federal, state and local government employment has grown much faster in Texas than it has in the nation as a whole. Moreover, Texas' dependence on federal funding increases with every passing year. The second graph on the next page shows that federal spending in Texas has far outstripped the overall growth in U.S. federal spending over the past decade.

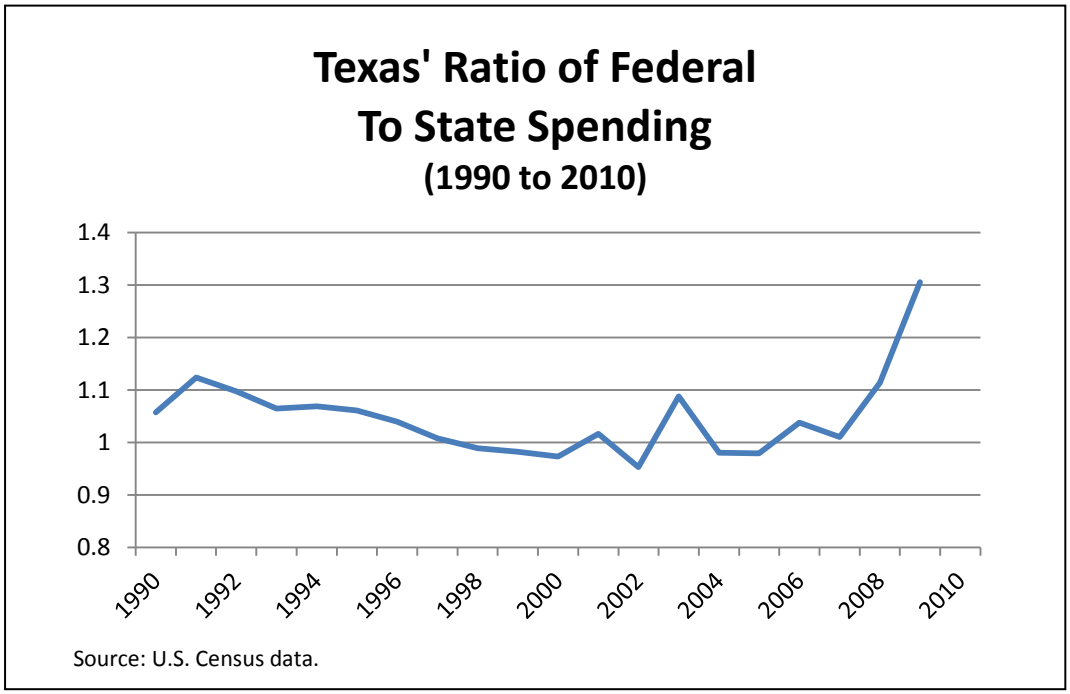


Source: Federal Reserve Bank of St. Louis (Includes federal, state and local government employees).



Source: U.S. Census data.

The graph below compares the ratio of federal to state spending in Texas over the past decade, revealing that the federal government's share of this government spending skyrocketed during the recent crisis. This prompted a lively debate over whether or not the Texas Legislature took advantage of the federal stimulus to slash state spending on education and other human services.[14]

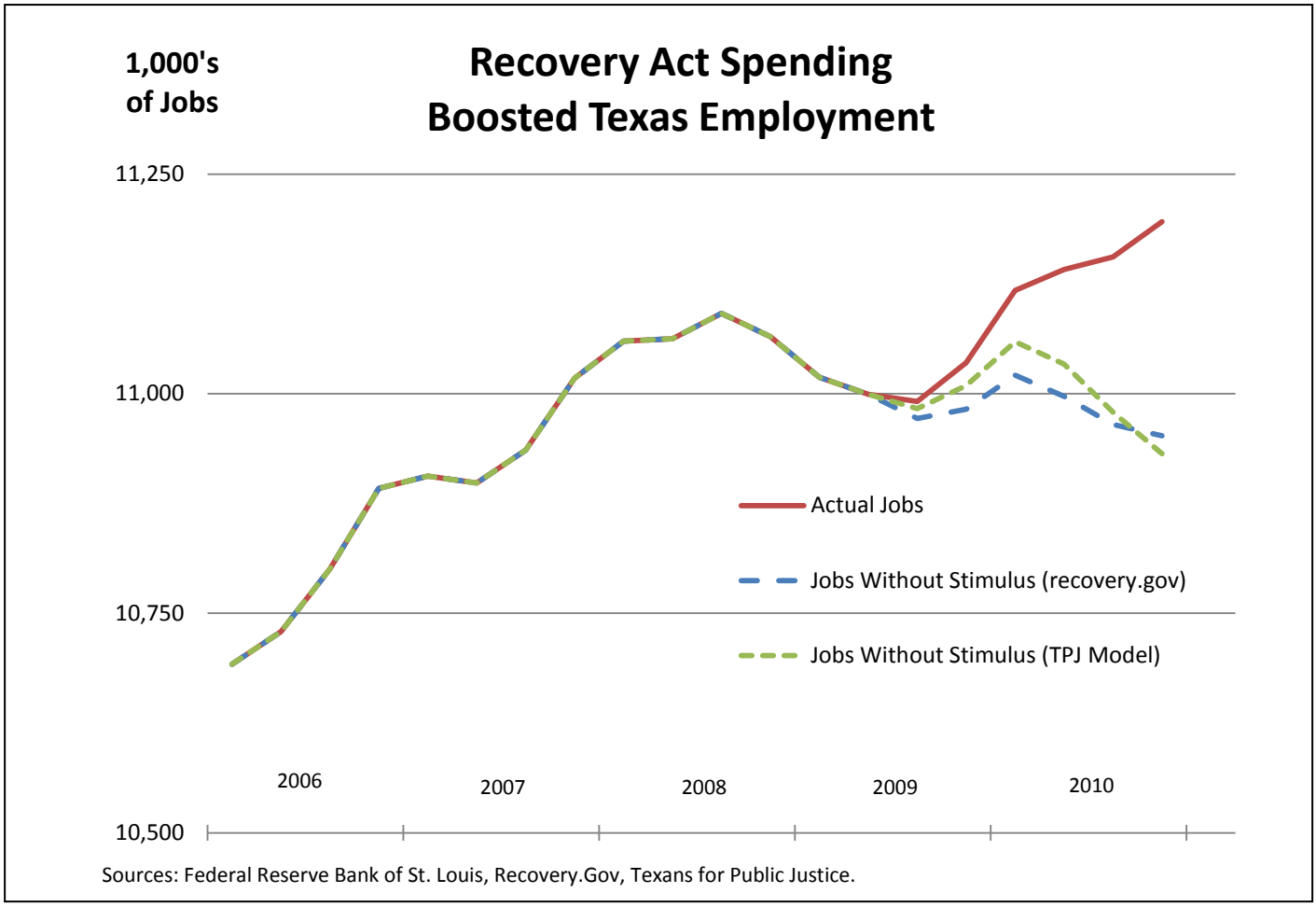


Despite being led by conservative leaders who crack the whip on social spending, Texas relies heavily on federal, state and local government jobs. This dependence on the public sector predated the Recovery Act. Anyone who discounts the huge role of governmental spending in Texas' economy has abandoned the real world for an Ayn Rand—or Rand Paul—fantasyland.

IV. Recovery Act Jobs in Texas

Given the Recovery Act data problems discussed earlier, economic models are likely to provide more accurate estimates of how many jobs the Recovery Act created or preserved in Texas. Economists often use "fiscal multipliers" to estimate the likely impacts of tax breaks or government spending. Such multipliers also can be used to estimate the number of jobs produced for every $1 million in stimulus expenditures. Liberal Keynesian economists argue that government spending can be a major stimulator of employment. Conservative neoclassical economists counter that this impact is modest or even negative because government spending produces economic distortions associated with increased taxes, debt and inflation.

This paper, which will not settle that debate, uses a Keynesian model, albeit a relatively conservative one.[15] Texans for Public Justice contracted with graduate students in public policy and economics at the University of Texas at Austin to test a variety of economic models. The U.T. team headed by Mazdak Mohtasham, a 2011 recipient of a master's degree in economics, analyzed $7.7 billion in federal stimulus funds spent in Texas from the third quarter of 2009 through the end of 2010.[16] They tested eight different models that estimated that the Recovery Act had created or preserved anywhere from a low of 161,360 jobs up to a high of 424,453 jobs in Texas by the end of 2010 (see the technical appendix for details). The model offering the best statistical fit with the underlying data found that the Recovery Act created or preserved at least 264,459 Texas jobs by the end of 2010.



By comparison, federal government data report that the Recovery Act *directly* created or preserved 243,814 Texas jobs in that same period. Texas *added* a net total of 190,320 jobs during this same period, according to Texas Workforce Commission data. The accompanying table plots actual Texas employment figures alongside what employment levels would have been without federal stimulus spending. Clearly the global recession would have imposed far more pain on the state of Texas and its families without $7.7 billion in Recovery Act expenditures that created or preserved at least 264,459 Texas jobs.

Washington-based Good Jobs First provided funding for this study.

V. Technical Appendix:
Gauging the American Recovery & Reinvestment Act's Stimulus of the Texas Job Market

Few studies have examined the impact of the 2009 American Recovery and Reinvestment Act on job creation and retention. This study gauges the Recovery Act's impact on the Texas job market. The first section introduces models that measure the impact of federal stimulus spending on Texas employment. While other studies have used similar methods to analyze countries, we are not aware of any previous applications of this approach to a state economy. Section V(b) introduces a new panel dataset to test the models. Section V(c) concludes that the Recovery Act saved or created at least 264,459 Texas jobs by the end of 2010.

V(a). Texas Employment Multipliers

Economists use "fiscal multipliers" to study the impact of government tax breaks or government spending on economic output or employment. Here we review multiplier models used to predict the number of jobs created for each additional $1 million in government expenditures.

Economists disagree over these multipliers. Conservative economists argue that government interference distorts economic fundamentals, though some conservatives recognize that government spending produces jobs [Baxter, King (1993)].[17] Neoclassicists argue that the impacts of government spending on employment are negative, modest, or temporary. In contrast, liberal economists emphasize the benefits of government spending through "Keynesian multipliers." They argue that public spending boosts employment, which spurs household spending, prompting additional hiring. Employment multipliers depend on the so-called "marginal propensity to consume" (the amount household consumption increases for each new $1 in revenue received).

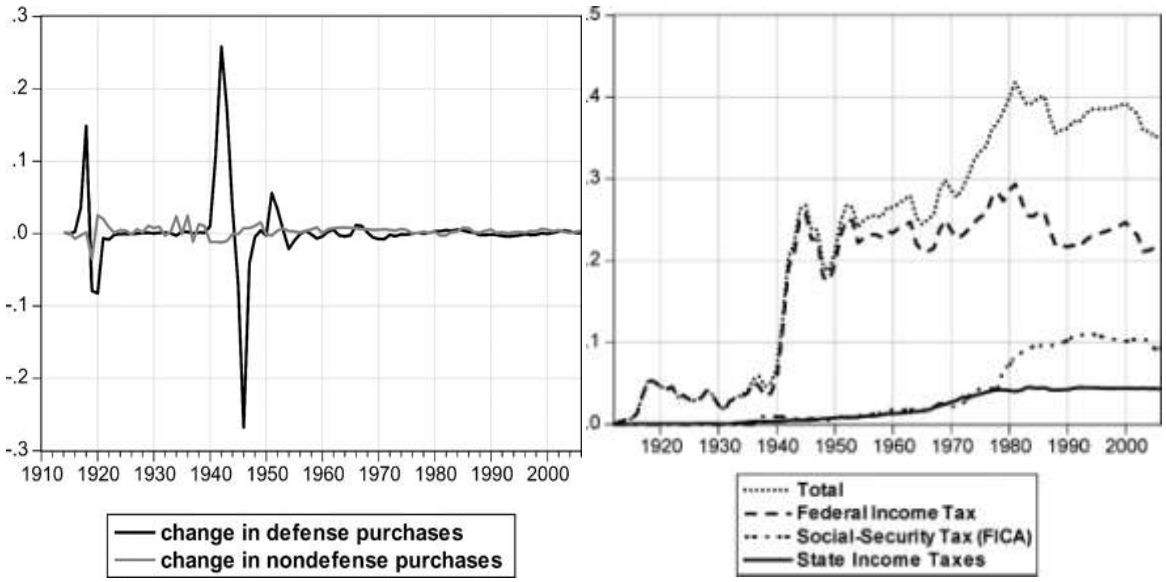
It is difficult to isolate the effects of government spending on employment because government spending is an endogenous variable (in other words, government spending and employment are both interrelated parts of one and the same economic system). One solution to this problem is to base the employment multiplier on *military* spending. While government spending as a whole may be shaped by endogenous economic events, few people would argue that the economy caused the U.S. wars in Korea, Vietnam, Afghanistan and Iraq. Table 1 summarizes economic studies that have used military expenditures to generate government-spending multipliers.

Studies Basing Government-Spending Multipliers on Military Expenditures

Study	Description	Method	Result
Davis, Loungani, Mahidhara (1997)	Heterogeneity on military spending between states and jobs created in each state considering the impact of oil prices.	Panel VAR	Job-creation costs $34,000 to $400,000, depending on the job data source and allowances for spillovers.
Barro (1981), Hall (1986), Hall (2009), Barro-Redlick (2011)	Military spending as an instrument for government spending.	OLS Method	Output multiplier between 0.6-1
Rotemberg-Woodford (1992)	Regress military spending on its lag and military employment, then use these shocks as exogenous spending.	2SLS	Output multiplier 1.2

The graphs below illustrate findings from the 2011 Barro-Redlick study, which found that wars prompt major swings in government spending. That study also analyzed average marginal income tax rates in the United States, which tend to peak during wars. Marginal income tax rates have substitution effects that influence the timing of consumption and investment. Multipliers that ignore these tax rates tend to overstate the number of jobs created by government spending.

Barro-Redlick (2011) Military Spending and Calculated Marginal Tax



Barro-Redlick (2011) introduces the following OLS equation:

$$\frac{y_t - y_{t-1}}{y_{t-1}} = \beta_0 + \beta_1 \frac{g_t - g_{t-1}}{y_{t-1}} + \beta_2(\tau_{t-1} - \tau_{t-2}) + other\ variables$$

Where y_t is per capita real GDP, g_t is per capita real government purchases, and τ_t is a tax rate for year t, therefore, β_1 can be interpreted as the output multiplier. This study found that $\beta_1 = 0.77\ (s.e. = 0.28)$, which is significantly greater than zero but less than one. This means that growth in government spending increased output growth by 77%. In contrast, β_2 is expected to be negative because an increase in the marginal tax rate adversely affects labor supply and output growth. The authors found that $\beta_2 = -0.58\ (s.e. = 0.21)$, which is significantly smaller than zero and consistent with theory. Their paper also found that the output multiplier is larger when unemployment is higher. In other words, the fiscal multiplier is dynamic and depends on the overall state of the economy.

Although this appears to be the best-available method, it does not resolve everything. Barro-Redlick mention that, due to the lack of reliable data, their method does not control for substitution effects and income effects. Moreover, relying on war-time spending data could introduce additional problems. Are patriotic households motivated to work harder in wartime? Does wartime expansion of defense industries materially skew results? These caveats apply to employment multipliers based on military spending. Moreover, some government medical expenditures "crowd out" or replace private spending on health care, just as some federal expenditures "crowd out" or replace state or local government expenditures. If a federally funded job replaces what had been a state-funded job then there is no net increase in employment.

Structural VAR models are popular tools of regression analysis because of their neutrality to theories and background modeling. These models let aggregate data freely determine which theories best describe the real world economy. They have been widely used to investigate the dynamic effects of technology shocks,

monetary policy shocks and surges in government spending. Blanchard and Perotti (2002) proposed this seminal structural VAR identification model:

$$z_t = B(L,q)z_{t-1} + u_t$$

Where z_t could be any vector of aggregate variables. In their paper z_t is $[T_t, G_t, Y_t]$, a 3x1 vector of log total tax revenue, log of government spending, and log of GDP. They studied the aggregate national output multiplier. In contrast, this study estimates the state employment multiplier. Therefore, we define $z_t = [T_t, S_t, E_t]$ where T_t is the federal tax revenue in the state, S_t is Federal spending, and finally, E_t is the variable of interest, employment level. Here S_t stands for federal spending, and not state spending, because federal spending has different dynamic effects on employment than does state spending. Federal expenditures are funded by national taxes rather than by future state taxes. Therefore:

$$u_t^T = a_1\epsilon_t^S + a_2 u_t^E + \epsilon_t^T$$
$$u_t^S = b_1\epsilon_t^T + b_2 u_t^E + \epsilon_t^S$$
$$u_t^E = c_1 u_t^T + c_2 u_t^S + \epsilon_t^E$$

Here, $\epsilon_t = [\epsilon_t^T, \epsilon_t^G, \epsilon_t^E]$ are mutually uncorrelated structural shocks. This equation determines that the structural shocks in federal government spending and reduced form shocks in employment influence tax revenue. Whereas, the reduced form shocks to unemployment are affected by both reduced shocks in federal tax revenues and government spending. As a result, it is more robust to use reduced form shocks for tax revenues in the third regression. Blanchard and Perotti (2002) proposed three steps:

1. The first step is based on the *institutional knowledge* to pin down a_2, b_2. These parameters determine the response of T_t, S_t to unexpected shocks to employment. It is reasonable to assume that current government spending is not affected by current unexpected shocks to employment, since government spending typically is decided before the unexpected employment shock. The choice of a_2 depends on the elasticity of federal tax revenues to unexpected employment shocks. We assume $a_2 = 2$
2. The next step is to build $\hat{u}_t^I = u_t^I - a_2 u_t^E$ and $\hat{u}_t^S = u_t^S - b_2 u_t^E$ which are no longer correlated with the structural error term in employment. They are therefore applicable instruments to estimate c_1 and c_2 in the last regression.
3. They propose different scenarios to identify a_1 and b_1. We will use standard VAR identification to pin down these parameters.

Currently it appears to be impossible to apply this method to the state of Texas. We do not have a theoretical way to address simultaneous state and federal spending. Nor could we get access to federal tax revenues for the state. For these reasons we will use available U.S. data as our benchmark model, following the findings of Monacelli, Trigari, and Perotti (2010). They found that, "An increase in government spending of 1 percent of GDP generates output and unemployment multipliers respectively of about 1.2 per cent (at one year) and 0.6 percentage points (at the peak)." Following that study we use an employment multiplier of close to 0.6 as our benchmark model for our structural VAR model.

V(b). Results

This section applies the defense-spending model discussed above and uses panel data to estimate Texas' employment multiplier. Barro and Redlick incorporated marginal tax rates into their regression of the output fiscal multiplier. This study similarly takes marginal tax rates into account to gauge the employment impacts of defense-spending increases.

Models 1 through 4 in Table 2 show the results of the following equation:

$$E_t = \alpha_0 + \alpha_1 Dummy\ War_t + \alpha_2 AMT_t + \alpha_3 Defense\ Purchase_t + \epsilon_t$$

where the series of Average Marginal Tax Rate (AMT) is calculated and is reported by Barro and Redlick. The first model finds that an average of 123 jobs will be created in the United States for every $1 million in federal expenditures. As such, the Recovery Act that awarded $7.7 billion in Texas contracts by the end of 2010

produced 252,703 jobs in Texas. A similar model that ignores the marginal tax rate finds that the Recovery Act produced more than 424,000 Texas jobs over the same period.

OLS Estimates of Defense-Spending Impacts on Employment

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Dummy War			-9,782.5**	-17,841.8***			-0.1**	-0.2***
			(-2.0)	(-3.6)			(-2.105)	(-3.962)
Avg. Marg. Tax	2,594.9***		2,146.1***					
Jobs per $1 Million	123.8***	208.0***	129.6***	192.0***				
	(5.6)	(11.2)	(5.9)	(11.1)				
Log AMT					1.0***		0.8***	
					(5.8)		(4.4)	
Log Defense					0.3***	0.7***	0.3***	0.6***
Purchases					(3.0)	(9.9)	(3.5)	(9.9)
Constant	-29,628.9***	13,735.6*	-16,870.1	23,327.4***	6.2***	7.144***	6.644***	7.536***
	(-2.8)	(1.8)	(-1.4)	(3.2)	(16.9)	(16.5)	(16.7)	(18.9)
Observations	59	59	59	59	59	59	59	59
R-Squared	0.7	0.6	0.8	0.7	0.7	0.6	0.7	0.7
Job Creation	252,703	424,453	264,459	391,690	161,360	401,730	185,842	368,902

t-statistics in parentheses: *** p<0.01; ** p<0.05; * p<0.1

Researchers also ran the model with both the explanatory variable and independent variables in logarithm form, where:

$$\log(E_t) = \alpha_0 + \alpha_1 Dummy\ War_t + \alpha_2 \log(AMT_t) + \alpha_3 \log(Defense\ Purchase_t) + \epsilon_t$$

This regression is shown in Models 5 through 8 in the accompanying table. Generally, when the independent variable is in logarithm form the obtained coefficient shows its percentage effects on explanatory variables. In Model 8, for example, a 1% increase in federal spending boosts total employment by 0.6%. The Recovery Act increased federal contract spending by 5%. As a result, the aggregate employment increase under this model is 3%, equivalent to 368,902 additional employees. These employment figures would fall if this regression took average marginal tax rates into account. Importantly, all estimated coefficients are highly significant and the power of models as shown through R-squared is relatively high. Overall, the benchmark Model 3 (which includes both war dummy and marginal tax rates) provides the most accurate estimate of how federal spending affects employment.

Although multipliers provide an excellent way to quantify the Recovery Act's impact on employment, one possible criticism is that these models are better suited to national employment data than they are to Texas employment data. To assess how well the multiplier applies to state employment data, researchers created panel data covering employment levels and federal spending amounts for each Texas county going back to 2000. Eleven years worth of county-by-county data provide rich panel data with more than 2,800 observations. These time-trend data can be used to further fine tune the employment multiplier according to the following equation:

$$\log(Employment_{it}) = a_i + Year_t + \alpha lod(Federal\ Fund_{it}) + \epsilon_{it}$$

Where "i" stands for county and "t" is the year variable. The coefficient of interest is α which states what percentage employment will grow for each one percent increase in federal spending within a county. There are different ways to estimate this model. Researchers can ignore both the time variable (i.e. $Year_t$) and the dummy for each county (i.e. a_i) and run a simple OLS model. Or they can ignore the county dummy variable and run a Random Effect model— with or without the time trend. Finally, researchers can estimate the fixed effect model with a dummy for each county.

Although many recent studies use panel models to estimate different multipliers for fiscal policies, there are concerns about how to interpret the coefficients. One critique of the fixed effect model is that the coefficient

of federal funds represents the substitution between states/counties rather than the jobs created in that particular location. Furthermore, critics argue that including time trends can kill the effects of a one-time surge in federal spending. Fixed effects and random effects panel models nonetheless can provide lower-bound estimates for fiscal multipliers.

Panel Regression

Variables	OLS	F.E.	R.E.	OLS	F.E	R.E
Year	-0.051***	0.008***	-0.001			
	(-16.521)	(4.876)	(-0.366)			
Log fund	1.062***	0.040**	0.195***	1.050***	0.103**	0.187***
	(120.797)	(2.146)	(4.117)	(116.997)	(5.165)	(6.510)
Constant	90.560***	-7.768**	7.108	-	6.738**	5.157***
	(14.731)	(-2.586)	(1.433)	(-65.583)	(18.117	(9.895)
Observations	2,804	2,804	2,804	2,804	2,804	2,804
R-squared	0.908	0.149		0.900	0.103	
No. of Counties		255	255		255	255
Jobs Created/Retained	591,103	22,022	108,657	584,197	57,166	104,229

Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The Panel Regression table shows the results of panel regressions. As expected, fixed effect and random effect methods estimate that the Recovery Act had a relatively modest impact on Texas employment. As discussed, the 22,022 jobs calculated by the fixed-effect method represent substitution between counties rather than jobs created in each county. This panel indicates that if each county is treated as an open economy where the mobility of labor is restricted, then the first regression in the table above determines the high bound of the Recovery Act's impact on Texas employment: 591,103 jobs.

The following table shows that different models produce widely varying estimates of the Recovery Act's impact on Texas employment.

Estimates of Texas Jobs that the Recovery Act Created or Retained by the End of 2010

Method	Low Bound	High Bound	Benchmark Model
Recipients Report	-	-	243,000
SVAR	-	-	360,000
Defense Estimation	161,000	424,000	264,000
Panel Estimation	104,000	591,000	591,000

Such variability is common with fiscal multipliers. "The range within studies is almost as wide as the range across studies, and the standard errors are always large," an economist wrote in a recent review of such multipliers [Ramey (2011)]. "Thus, despite a healthy debate on methodology, most studies are giving similar answers."

The job numbers reported by Recovery Act recipients align with the results of this study. It can be said with confidence that the Recovery Act created or retained at least 264,459 Texas jobs by the end of 2010.

V(c). Links to Underlying Data

American Recovery & Reinvestment Act expenditures in Texas through the end of 2010 appear in the Excel spreadsheet: "TXStimulusExpenditures.xlsx."

The statistical Strata files for the OLS Data and the Panel Data are run by "do" commands found in the file "OLS & Panel.do."

Those commands run Strata files for:
This OLS Data: "ols.dta;" and
This Panel Data: "panel.dta."

All the files are available in a .zip archive here.

VI. Works Cited

Barro, Robert J., "Output Effects of Government Purchases," *The Journal of Political Economy*, 89 (1981), 1086-1121.

Barro, Robert J., and Charles J. Redlick, "Macroeconomic Effects from Government Purchases and Taxes," *Quarterly Journal of Economics*, 126 (February 2011), 51-102.

Baxter, Marianne, and Robert G. King, "Fiscal Policy in General Equilibrium," *American Economic Review*, 83 (1993), 315–334.

Blanchard, O. and Perotti, R. (2002), "An Empirical Characterization of the Dynamic Effects of Changes in Government Spending and Taxes on Output," *Quarterly Journal of Economics,* 117(4), 1329–1368.

Davis, Steven J., Prakash Loungani, and Ramamohan Mahidhara, "Regional Labor Fluctuations: Oil Shocks, Military Spending, and Other Driving Forces," *Board of Governors of the Federal Reserve System International Finance Discussion Paper No. 578*, March 1997.

Hall, Robert E., "The Role of Consumption in Economic Fluctuations," in *American Business Cycle: Continuity and Change*, Robert J. Gordon, ed., (Chicago: NBER and University of Chicago Press, 1986).

Hall, Robert E., "By How Much Does GDP Rise If the Government Buys More Output?" *Brookings Papers on Economic Activity,* 2 (2009), 183-231.

Ramey, Valerie A. 2011. "Can Government Purchases Stimulate the Economy?" *Journal of Economic Literature*, 49(3) (2011), 673–85.

Rotemberg, Julio, and Woodford, Michael, "Oligopolistic Pricing and the Effects of Aggregate Demand on Economic Activity," *Journal of Political Economy*, 100 (1992), 1153–1297.

VII. NOTES

[1] Just three Senate Republicans backed the bill, for example. They were Pennsylvania's Arlen Specter (who switched parties two months later) and Maine's Susan Collins and Olympia Snowe (the latter recently announced her retirement, citing the "divisiveness" of Congress).
[2] Factoring in other stimulus and recovery programs (such as unemployment-benefit extensions, the payroll tax cut and "cash for clunkers" vehicle trade-ins) the price tag balloons to $1.25 trillion. "Stimulus is Maligned But Options Were Few," *New York Times*, February 29, 2012.
[3] Most prominently, Nobel-Prize winners Paul Krugman of Princeton University and Joseph Stiglitz of Columbia University.
[4] "Money Well Spent? The Truth Behind the Trillion-Dollar Stimulus, the Biggest Economic Recovery Plan in History," Michael Grabell, PublicAffairs, 2012.
[5] The *Wall Street Journal's* lead story on April 5, 2012 reported on falling U.S. and international stock markets under the headline, "Markets Fear End of [monetary] Stimulus."
[6] "A U.S. Boon in Low-Cost Borrowing," *New York Times*, February 28, 2012.
[7] "What Ails Europe?" Paul Krugman, *New York Times*, February 26, 2012.
[8] "Rick Perry Says the 2009 Stimulus 'Created Zero Jobs,'" PolitiFact, *Tampa Bay Times*.
[9] Perry is not the only GOP politician who used the big lie about zero stimulus jobs. The PolitiFact story above also traces this claim to Florida Governor Rick Scott and Massachusetts Senator Scott Brown.
[10] "Rick Perry Says the 2009 Stimulus 'Created Zero Jobs,'" PolitiFact, *Tampa Bay Times*.
[11] This corresponded with the height of Texas' stimulus jobs, which peaked in the last quarter of 2010 at 53,152 jobs, according to www.recovery.gov.
[12] See chapter 14 of "Money Well Spent?"
[13] "Teachers Group Urges Governor To Call Special Session On School Funding," *Dallas Morning News*, February 1, 2012. "Spending Per Student Drops Sharply in Texas Public Schools," *Dallas Morning News*, February 22, 2012. "Perry Leaning Toward Run for Re-Election," *Dallas Morning News*, February 22, 2012.
[14] For a lengthy discussion of this debate, see, "Gail Collins Says Perry Used $3.2 Billion in Stimulus Money for Schools to Plug Other Holes in the Budget," *PolitiFact Texas*, March 16, 2011. If the Texas Legislature *did* use the stimulus to slash its own investments in human services it would have undermined the benefits of the stimulus, which are dictated by total federal, state and local government spending. See "States of Depression," Paul Krugman, *New York Times*, March 5, 2012.
[15] A conservative feature of the Keynesian model used here is that it takes into account the fact that increased federal spending tends to be accompanied by increases in marginal income tax rates. Those increased taxes suppress consumption and investment, reducing the employment multiplier. In addition, the model used here accounts for the fact that some federal expenditures "crowd out" or replace local government expenditures. If a federally funded job replaces what had been a state-funded job then there is no net increase in employment. Similarly, government health care spending can "crowd out" or replace private spending on health care.
[16] Texas received its first $1.8 billion in Recovery Act funding in the third quarter of 2009, according to Recovery.Gov.
[17] Through, for example, wealth effects, inter-temporal substitution, and distortions to first order conditions.