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How 401(k) Plans Make Recessions Worse

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THE GREAT RECESSION AND AUTOMATIC STABILIZERS

The Great 2008-2009 Recession, the worst recession since the Great Depression in 1933, reduced national wealth by 10% -- $15 trillion in 2008. [1] The gap between actual real Gross Domestic Product and potential output fell precipitously in 2009 by $504 billion. And, because of the decline in household and business spending, millions of workers lost their jobs. Between December of 2007 and December 2009 employment fell by 5.7 percent – a loss of 8.3 million jobs – and the unemployment rate peaked at 10 percent. Older workers did relatively worse than they had fared in previous recessions. The rate of long term unemployed among older workers has never been higher ((Johnson 2009, Saad-Lessler and Ghilarducci 2013). Because of job, income, and wealth losses consumers spent dramatically less in every major expenditure category, except for healthcare[2], from 2007 to 2010, and almost 39% of households experienced job loss, an underwater mortgage, and other significant declines in wealth (Hurd and Rohwedder, 2010). To help mitigate the effects of the recession the federal government launched a spending program of $700 billion for a number of substantial, one time, stimulus programs.[3] Meanwhile, built-in automatic stabilizers 'did their thing' by injecting billions of dollars into the spending stream of the economy. Traditional automatic stabilizers such as Unemployment Insurance, TANF, SNAP, and, the program with the largest effect -- the progressive tax system (the average marginal tax rates shrinks as more people fall into the lower brackets) – helped the Great Recession avoid becoming a colossal Depression.

Overlooked in this retelling is the role of nontraditional automatic stabilizers: Social Security, Disability Insurance, and Medicare. People use these programs in recessions as income and life style support and the taxes used to finance these programs reduce spending in expansions (Thompson and Smeeding 2013).

This study looks past the decline in housing values, the success of traditional automatic stabilizers and stimulus spending as explanations of the dynamics of the recession. Annuity based retirement accounts backed by government programs also helped the economy, while financially-based retirement programs like 401(k) type programs, hurt the economy.

The Great Recession reduced the value of some retirement assets and not others. Over half of households own IRAs, 401(k), and 401(k) type accounts and the values of these accounts fell an average of by 14% in 2008, with wealthy households losing the most (Vanderhei 2009). Middle class and lower income households, whose current and future retirement income wealth derives primarily from Social Security, disability insurance, defined benefit pension plans and Medicare lost almost nothing in the 2008-2009 recession (Smeeding and Thompson, 2013, Gustman, Steinmeir, Tabatabai 2011).

According to Gustman, Steinmeir, Tabatabai (2011) "those in the middle class in terms the wealth distribution experienced a 4.3 percent drop in wealth; there was essentially no drop in total wealth for households in the lowest wealth quartile because Social Security wealth (which was unaffected by the recession) makes up a much larger share of total wealth for poorer households." Federal Reserve economists Peterman and Sommer (2014) found that Social Security reduced the exposure of households to the wealth shock of the Great Recession.

The micro economy of worker and retiree households experienced the Great Recession very differently depending on how much of their retirement income and expected retirement income came from a promised stream of income from Social Security and traditional pensions and how much of their retirement wealth relied on financial-market based assets.

The macro economy also benefited from government-based retirement assets and suffered, like households suffered, from having retirement income depend on financial assets: 401(k) plans whose value depended on flows, dividends and capital gains from stocks, bonds, and other financial assets. In short, the existence of 401(k) plans and other financial market based retirement wealth - whose values fluctuate with the business cycle -- made the last recession deeper and caused more unemployment than would have happened otherwise if 401(k)s did not exist.

This chapter determines how much the macroeconomy was destabilized by 401(k) plans and how many jobs were lost because of this destabilizing effect using modern assumptions and parameters from Okun's law. Okun's law stipulates that a 1% increase in the difference between what the economy is and what it could be (the gap between actual and potential GDP) causes the unemployment rate to drop by 0.45 percentage points (Ball, Leigh and Loungani, 2013). We know from analyzing data for over 20 years that Social Security, Unemployment Insurance, Disability Insurance, Medicare and Federal taxes reduce the effect of a change in the output gap on unemployment, by injecting more net household spending in recessions and dampening spending in expansions. This is a stabilizing effect. 401(k) plans and other financially based retirement accounts have a destabilizing effect; the reductions in wealth and income in recessions cause less spending and more labor market activity than would otherwise be (measuring the labor supply effects of the programs are outside the scope of the paper.)

During a recession the output gap increases the unemployment rate; but without all the traditional and untraditional automatic stabilizers the unemployment rate would have been higher. The bundled positive effect of the 6 programs (OASI, DI, Medicare, 401(k) plans, income taxes, and unemployment insurance) on reducing unemployment is larger when the effect of 401(k) plans is eliminated.

Table 1
Estimated Unemployment Rate if Specific Business-Cycle Related Programs Were Not Embedded In The Economy, using complete data including post recession years

Year	Unemployment rate change	Estimated Unemployment rate change, with OASI, 401K, DI, UI, Medicare, Taxes	Unemployment rate change, with OASI,DI, UI, Medicare, Taxes but not 401(k) affecting spending	Unemployment rate change, with UI, Taxes	National unemployment rate
2006	-0.0033	-0.0032	-0.0031	-0.0031	4.608
2007	-0.0022	-0.0022	-0.0021	-0.0022	4.617
2008	0.0047	0.0046	0.0044	0.0045	5.800
2009	0.0157	0.0155	0.0149	0.0151	9.283
2010	-0.0068	-0.0067	-0.0064	-0.0065	9.625
2011	-0.0022	-0.0021	-0.0021	-0.0021	8.933
2012	-0.0050	-0.0049	-0.0047	-0.0048	8.075
2013	-0.0007	-0.0007	-0.0007	-0.0007	7.350

For example, during the recession in 2009, the 6 programs together reduced the effects that declining GDP had on unemployment from .0157 to .0155 (line 4 Column 3, Table 1)); but, without 401(k) plans, the job losses due to shrinking output would have been an even smaller .0149 (line 4 Column 4, Table 1). In other words, without 401(k) plans the mitigation effect of traditional automatic stabilizer programs -- progressive income taxes and unemployment insurance – and nontraditional old age programs – Social Security (Old Age and Survivor Insurance (OASI), Disability Insurance (DI), and Medicare -- would have been bigger. The programs together dampened the effect of a rising output gap from .0157 to.0155, a savings of over 23,000 jobs (Line 4, column 4, Table 2), while without 401(k) plans 864 jobs would have been saved. This is a low number because many other factors besides 401(k) wealth determined labor force participation and employer willingness to keep workers with 401(k) plans. Also, in 2008 most American workers had small account balances since 401(k)s are skewed toward the top tenth of the income distribution.

	National unemployment rate	Number of people in LF	The effect of all 6 AS programs	The effect of all 5 programs excluding 401(k)	Difference due to 401(k) program
2006	4.61	151,428,000	(4872)	(4696)	176
2007	4.62	153,124,000	(3388)	(3266)	122
2008	5.8	154,287,000	7106	6849	(257)
2009	9.28	154,142,000	23904	23041	(864)
2010	9.63	153,889,000	(10255)	(9884)	371
2011	8.93	153,617,000	(3278)	(3159)	118
2012	8.08	154,975,000	(7599)	(7325)	275
2013	7.35	155,389,000	(1072)	(1033)	39

Table 2
Number Of People Unemployed Or Employed Due To Programs, using complete data including post recession years

SOCIAL SECURITY, 401(K) PLANS AND AGGREGATE DEMAND

Most U.S. workers and employers are required to participate in the Social Security system. Only approximately 50% of workers have employers who voluntary

supplement Social Security retirement plans that come in two types: defined benefit (DB) and 401(k) type plan – a defined contribution (DC) plan. Most workers with DB plans also have a DC plan. Most workers with DC plans do not have a DB plans.

One reason why Social Security works as an automatic stabilizer is because it is big. Social Security is a universal defined benefit plan (93 percent of workers participate in Social Security; most others are state and local public employees who have similarly structured plans.) All Social Security benefits are paid out as an annuity. The monthly pension amount is based on years of credited service and a career average salary indexed for inflation. In contrast, DC plans are individual retirement accounts where workers (and often employers) voluntarily contribute to the plan and the balance of the fund depends on total contributions, investment performance, and fees. The investment vehicle in 401(k) plans is chosen by the employer, though the portfolio mix is chosen by the employee (most of the assets in Individual Retirement Accounts (IRAs) come from 401(k) plans.)

Traditional and Non-Traditional Automatic Stabilization.

Automatic stabilizers are government or private market programs that are (1) permanently installed, (2) well-defined in their main provisions and purposes, and (3) reliably linked to cyclically sensitive criteria so that the programs' effects operate quickly without government decisions (Egle 1952: 46; Auerbach, A. and Feenberg, D. 2000). Automatic stabilizers should produce budget deficits during slumps and surpluses during upswings, expanding the economy's stock of cash in slumps and reducing the cash stocks in expansions and lowering the public's demand for cash during slumps while raising the demand of cash during expansions (Hart 1954: 462). In fact, an automatic stabilizer is effective because it begins its compensatory effect without waiting for new policy decisions or the recognition of changes in the cycle.

Fortunately, developed nations had automatic stabilizers in place during the recession, which quickly boosted household consumption when workers lost their jobs, wages stagnated, and other sources of income dried up. The surprising and aggressive nature of the downturn prompted many critics of government policy to reconsider the fiscal role of government and social insurance (Rajan 2010:100). [4]

The Three Channels by which Retirement Plans Act as Automatic Stabilizers

When an economy goes into a contraction, income from work and income and asset values from accounts tied to the financial markets either fall or the increases become smaller. These income effects induce workers to reduce spending and delay retiring and retirees are induced to hop back into the labor market. These wealth, income, and labor effects make recessions worse.

If an economy depends on financialized retirement accounts -- accounts whose value depend directly and immediately on financial markets –the values of the accounts are pro cyclical: they increase when the economy is expanding and decrease when the economy is contracting. This means that households with financial market based retirement accounts are less likely to spend and more likely to work, or seek work, in recessions, causing unemployment to rise and making recessions worse. Thus, the retirement income security system affects the macro economy through three channels: income, wealth, and labor market channels.

The first channel is the income effect. The level and change in retirement income affects household consumption immediately and directly through the income effect. The second channel is the wealth effect. Changes in the level of retirement wealth can cause a family to feel wealthy or poor, which affects their immediate spending and saving decisions. The third channel is how the level and changes in retirement income and anticipated retirement income affects household labor market decisions. For example, in recessions workers and retirees who depend on retirement income that is based on the financial markets are likely to experience retirement wealth losses. The retirement income and wealth loss means older workers are less likely to voluntarily retire and retirees are more likely to go back to work or seek work during recessions precisely when employers do not need workers. In expansions the reverse happens with equally perverse results. Workers feel wealthy as their 401(k) balances increase so they may retire earlier than they planned and spend more on houses and consumer items than they otherwise would helping to fuel inflation and a labor shortage.

Whereas financial based retirement plans destabilize the macro economy, guaranteed retirement accounts -- whose values are immune to financial market

fluctuations --- have the opposite, stabilizing, effect over the business cycle. Social Security and annuities from DB plans do not affect spending and job creation by causing workers and retirees to slow down spending and increase work effort in recessions. DB and Social Security income is stable over the business cycle because the values of these accounts for retirees are not tied to the financial system. An economy might be in recession but, falling asset values do not reduce retirement wealth, income, and consumption and workers with DB plans retire or stay retired (Hermes 2006; Maestas 2004). Therefore, a retirement income security system that depended on more, rather than less, secure retirement wealth and income –retirement income that smoothes out income over the business cycle – would help stabilize the macro economy.

Ghilarducci, Saad-Lessler, and Fisher (2012) showed that Social Security, DB plans and 401(k) flows changed over the business cycle. When recessions hit the Social Security system took in less contributions and paid out more benefits, which kept consumption relatively stable over the business cycle. Social Security is counter-cyclical and helps stabilize the economy during a recession.

In contrast, net flows from 401(k) plans were positive over the business cycle and continue to be four years after the recession. As stock market prices increase wealth increases and workers consume more bidding up prices and retiring earlier -- worsening an already tight labor market. Conversely, when asset prices in 401(k) retirement accounts fell, older workers stayed longer in the labor market (Norris 2014). Workers and retirees relying on financial-market based retirement accounts saved more as they experienced a decrease in their wealth balances (Pounder 2009, Peterman and Sommer 2014.)

Darby and Melitz (2009) found for countries in the Organization for Economic Cooperation and Development (OECD) that retirement programs act like non-traditional automatic stabilizers; they estimate that a $1 increase in actual output relative to "full employment" (potential) output leads to 13.5 cents less social spending, with retirement income programs like the U.S. Social Security system, on average, contributing a third to that social spending. We added to Darby and Melitz by distinguishing between types of retirement programs – DC and DB types. We found that 4 years later the counter-cyclical

effect of Social Security is even stronger and the destabilizing effect of 401(k) plans are worse.

METHODOLOGY AND DATA

We use Darby and Melitz' (2008) specifications and identify the inflows and outflows from each program in terms of levels and shares of Gross Domestic Product (GDP). The "shares" analysis describes how absolute changes in expenditures or benefits (outflows) and taxes or contributions (inflows) trend over time, as a percentage of GDP.

The output gap is the ratio of realized to potential GDP for the analysis in shares, and the difference between realized GDP and potential GDP for the analysis in levels. Potential GDP is estimated as the trend component of actual GDP after applying a Hodrick-Prescott filter (Hodrick and Prescott 1997), a widely used technique to disaggregate short-term fluctuations and longer cycles.

When the elasticity coefficient of the output gap is positive, then an increase in the output gap leads to an increase in the level and GDP share of program flows. The first equation, below, defines the change in the size of different programs (measured by net flows as shares of the U.S. economy) as dependent on changes in the output gap and other controls. The second equation defines changes in the absolute level of net flows of a program as reliant on changes in the absolute size of the output gap and other factors.

In order to control for omitted variable bias, we control for changes in the age profile of the population by adding to the equation the fraction of the population between 25 and 54 years of age and the fraction of the population aged 65 or over (W_i).

$$(1) \Delta\left(\frac{x_{it}}{Y_t^{Nominal}}\right) = \alpha + \beta_i \Delta\left(\frac{Y_t^{Real}}{Y_t^{Potential}}\right) + \gamma_i Z_{it} + \lambda_i W_t + \varepsilon_{it}$$

$$(2) \ \Delta x_{it} = \alpha_i + \beta_i \Delta(Y_t^{Real} - Y_t^{Potential}) + \gamma_i Z_{it} + \lambda_i W_t + \varepsilon_{it}$$

Hereby *i* denotes the inflow/outflow component of each plan, *t* denotes time, *x* is the specific program, *Y* is GDP, and Z includes the lag of the dependent variable, both in levels and in differences.

The coefficient of interest in both sets of specifications is β. In the shares equation, β is the percentage point change in the GDP share of inflows/outflows for every 1 percentage point increase in the difference between realized and potential output. Therefore, if β is positive, the relevant program's share of inflows and outflows (measured as a share of GDP) increases with GDP growth. Alternatively, if β is negative, the program's GDP share of inflows/outflows shrinks as output grows. In the levels analysis, the β coefficient describes what happens to the relevant program's level of inflows/outflows when output increases by $1.

Outflows from the programs add income and cause an income effect in the economy, whereas inflows into the programs reduce income. The net effect on the economy is the impact on outflows minus inflows. If the net impact of the program is positive, an increase in the output gap leads to a net increase in income to households. This implies a positive feedback into the economy when it is already growing. As a result, we are left with amplified and destabilizing cyclical economic swings.

On the other hand, if the net impact of the program is negative, an increase in the output gap results in the relevant program reducing household income. This counteracts and reduces the effect of the output gap and then we consider the program to be an automatic stabilizer. Results yield the automatic stabilization properties of the various retirement institutions and the government programs. The size of the stabilization effect of government programs provides a benchmark to compare the economically significant impacts of 401(k) plans and the Social Security system. Endogeneity in these AS regressions is a problem because changes in the output gap lead to changes in automatic stabilizer program levels and shares (that is the very purpose of AS programs) and those very changes feedback to affect the output gap (the OLS estimation would yield a biased β coefficient). Indeed the Wu-Hausman test of endogeneity test indicates that there is endogeneity present. Therefore we use instrumental variables in a two stage least squares (2SLS) estimation. The instrumental variables are real gross business investment and the change in exports. These two variables affect output but are not affected by automatic stabilizer programs.[5]

Data on flows

We used data on inflows and outflows for Social Security -- the Old Age and Survivors Insurance (OASI)--, 401(k) retirement accounts, disability insurance (DI), unemployment insurance (UI), Medicare and federal income tax collections. Data for OASI, DI and Medicare comes from the Social Security Administration; the U.S. Department of Labor reports unemployment insurance benefits. Information on 401(k) plans is available from the Department of Labor's Form 5500 data, and information on federal income taxes, nominal and real GDP, as well as real gross business investment, comes from the Bureau of Economic Analysis (BEA). Finally, we calculate the proportion of the population between the ages of 25-54 and the fraction aged 65 or over using data from the US Current Population Survey (CPS). All data is annual and national, with the data range starting in 1971 and ending in 2012 for OASI, DI, Medicare and taxes. The data range for 401(k) plans is 1984-2011and the data range for unemployment insurance is 1972-2012. The references section below presents detailed information on these sources. We use annual data because this is what is available for 401(K) plans and OASI. We are not aware of the availability of quarterly data for these programs.

In the period ending in 2012, federal income taxes constituted the largest source of inflows into the government's coffers, with tax collections making up an average of 8% of GDP over all time periods. The second largest inflow source was Social Security, at about 4% of GDP, followed by Medicare at 2%. 401(k) plan inflows make up about 1% of GDP, while disability insurance inflows weigh in at 0.6%, and unemployment insurance inflows represent diminutive 3 tenths of one percent of GDP. Given the size of inflows from these programs, we expect Medicare, Social Security and 401(k) plans to have a significant impact on the macroeconomy, but size is not all that matters. Sensitivity to the business cycle also matters. Though Medicare is large we don't expect the demand for Medicare services to be as sensitive to the business cycle as Social security benefit receipts are. But Medicare taxes are tied to payroll -- 2.9% of payroll – so Medicare premiums are sensitive to the business cycle, as are FICA taxes at 12.4% of payroll. Please see Table 3 for the relative size of the six programs in the economy.

Table 3	
Average Shares of Traditional and Not Traditional Stabilizers from 1971 – 2012 and 1984-2011	
RETIREMENT PROGRAMS THAT VARY OVER THE BUSINESS CYCLE	
Social Security (FICA) taxes share of GDP	3.90%
401(k) contributions share of GDP	1.30%
Disability insurance inflow share	0.60%
Medicare inflow share	1.20%
TRADITIONAL AUTOMATIC STABILIZERS	
Unemployment insurance inflow share	0.30%
Federal income tax collections share	7.80%

RESULTS: SOCIAL SECURITY STABILIZES: 401(k) DESATBILIZES

The results show that before the Great Recession every 1 percentage point increase in the GDP output gap resulted in net flows from Social Security, unemployment insurance, disability, Medicare and taxes decreasing by 0.34 percentage points. On the other hand, net flows from 401(k) plans increased by 0.05 percentage points. In other words, Social Security, unemployment insurance, disability, Medicare and federal personal income taxes acted as automatic stabilizers, while 401(k) plans had a destabilizing effect.

After the 2009 recession, automatic stabilizer effects of the government programs became stronger, with every 1 percentage point increase in the GDP output gap resulting in reduced net flows from the stabilizing programs by 0.43 percentage points. But the destabilizing effects of 401k plans were reduced, with net flows from 401(k) plans increasing by 0.02 percentage points for every 1 percentage point increase in the output gap. (See Table 4)

Examining the impact of the programs in terms of levels, in the data pre-2008, for every $1 increase in real GDP, net flows from the various government programs shrank by 45 cents, which tempered the expansion. These stabilizing effects were weakened by the effect of net flows from 401(k) plans, which increased by 5 cents. In other words, 401(k) plans reduced the automatic stabilization impact of government programs by 11 to 15% (11% in levels, 15% in shares) before the recession.

Using years after the recession, the effects of a $1 increase in real GDP were a 61 cent reduction in net flows from government programs, while net flows from 401k plans grew by 3 cents. In other words, 401(k) plans tempered the automatic stabilization impact of government programs by 5% in levels and 5% in shares. The results are in Table 4 below.

Table 4
Net Impact of a Change in the Output Gap for Each Program

	BEFORE THE RECESSION		AFTER THE RECESSION	
Program	In Shares	In Levels	In Shares	In Levels
OASI	-0.03	-0.05	-0.02	-0.07
401(k)	0.05	0.05	0.02	0.03
UI	-0.06	-0.06	-0.07	-0.07
DI	-0.01	0	-0.01	-0.01
Medicare	-0.03	0	-0.01	-0.01
Federal Income Tax Collections	-0.21	-0.34	-0.32	-0.45
Estimates for Before the Recession are based on coefficient from pre-2008 data only. Estimates for After the Recession are based on coefficients from complete data sample, including post 2007 data. Detailed coefficients for both time periods are in the Appendix tables 4a-4d				

Are the Results the Same in an Expansion?

As in Ghilarducci, Saad-Lessler, and Fisher (2012) we explore whether the impact of the change in the output gap is symmetrical. In other words, is the impact of the change in the output gap the same when GDP is increasing relative to full employment or decreasing in relationship to it? We do this by creating a dummy variable that takes on a value of 1 when the economy is in recession and zero otherwise. We interact this dummy variable with the change in the output gap and add the interaction term to the specification. When the output gap is positive (indicating an expansion), the impact of an increase in the output gap is the coefficient on the change in the output gap. When the output gap is negative (indicating a recession), the impact of an increase in the output gap is the coefficient on the change in the output gap plus the coefficient on the interaction term.

Using all data years in our sample, we find significant asymmetrical effects of a change in the output gap for disability inflows and tax collections when measured in shares.

Table 5:
Asymmetric effects of a change in the output gap, in shares

Program Flows	Impact in an expansion	Impact in a recession
Disability inflows	0.04	-0.05
Federal Tax Collections	0.56	-0.47

In other words, the disability program and the federal income tax system have a much greater stabilizing impact in recessions compared to expansions perhaps because disability applications are highly sensitive to lower prospects of jobs or layoffs occur more severely for older and marginally disabled workers.

CONCLUSIONS

Making retirement plans depend on financial markets by expanding 401(k) plans worsens recessions and exacerbates expansions. We find that 401(k) plans reduce the automatic stabilization impact of government programs by 11 to 15%. Including the period after Great Recession, 401(k) plans reduce the automatic stabilization impact of government programs by 5%. These results highlight a significant problem with 401(k) retirement plans, and in fact any retirement plan dependent on financial markets.

The Social Security system (and to a lesser extent DI and Medicare), along with progressive income taxes and unemployment insurance, acted like automatic stabilizers increasing spending more than would have occurred and lessening the increase in unemployment than would have otherwise occurred. At the same time, 401(k) plans exacerbated the decline in spending caused by the fall in output making recessions worse. Five state legislatures have passed bills to create or study the creation of retirement savings vehicles for workers in their states that are funded with regular employee contributions and that pay out a stream of income in the form of an annuity (Bradford 2014, GAO Government Accountability Office 2009.)

Five other states are considering legislation. California passed the Secure Choice Pension Plan in 2012 in an effort to secure retirement income for California workers. These efforts to create secure retirement accounts for all workers could have major unintended positive effects on the macro economy. Secure choice pensions plans would help protect state economies from reduced state spending when recessions hit ; this would avoid forcing layoffs and cuts in social services just when they are needed the most.

APPENDIX

Appendix Table 4a
Estimated impact of a change in the output gap on changes in the GDP *shares* of program outflows/inflows, using Pre-Recession data only

	Coefficient		Ho p-value	H2 p-value	R^2	F-value
OASI inflows	-0.030	**	0.003	0.583	0.5713	9.85963
OASI outflows	-0.062	**	0.001	0.398	0.5151	10.1956
401(k) inflows	0.017	**	0.195			
401(k) outflows	0.069	**	0.004	0.139	0.4478	15.5133
DB inflows	-0.022		0.438			
DB outflows	-0.008	**	0.808			
Unemployment insurance inflows	0.010	**	0.523			
Unemployment insurance outflows	-0.053	**	0.005	0.496	0.5591	11.3406
Disability insurance inflows	-0.004		0.949			
Disability insurance outflows	-0.012	**	0.000	0.813	0.5683	10.1078
Medicare inflows	0.002		0.654			
Medicare outflows	-0.031	**	0.073	0.176	0.6355	12.181
Federal income tax collections	0.205	**	0.000	0.024	0.5659	10.2016

Appendix Table 4b

Estimated impact of a change in the output gap on changes in the GDP *levels* of program outflows/inflows, using Pre-Recession data only

	Coefficient		Ho p-value	H2 p-value	R^2	F-value
OASI inflows	0.049	**	0.644			
OASI outflows	-0.029	*	0.019	0.236	0.79	66.402
401(k) inflows	0.054	**	0.000	0.866	0.5168	5.04646
401(k) outflows	0.100	**	0.003	0.351	0.5239	6.48358
DB inflows	-0.026		0.312			
DB outflows	0.009		0.749			
Unemployment insurance inflows	0.011	**	0.220			
Unemployment insurance outflows	-0.049	**	0.000	0.345	0.6804	20.4693
Disability insurance inflows	0.003		0.436			
Disability insurance outflows	-0.006		0.001	0.765	0.8209	60.7673
Medicare inflows	0.030		0.419			
Medicare outflows	-0.008		0.306			
Federal income tax collections	0.342	**	0.002	0.608	0.7689	49.8166

Appendix Table 4c

Estimated impact of a change in the output gap on changes in the GDP *shares* of program outflows/inflows, using complete data including Post-Recession years

	Coefficient		Ho p-value	H2 p-value	R^2	F-value
OASI inflows	-0.022	**	0.02	0.46	0.46	13.11
OASI outflows	-0.039	**				
401(k) inflows	0.048	**	0.02	0.76	0.74	29.03
401(k) outflows	0.067	**				
DB inflows	-0.020	*				
DB outflows	-0.010	**				
Unemployment insurance inflows	0.011	**				
Unemployment insurance outflows	-0.063	**	0.00	0.24	0.59	6.02
Disability insurance inflows	-0.008	*				
Disability insurance outflows	-0.012	**	0.01	0.73	0.44	16.22
Medicare inflows	-0.001					
Medicare outflows	-0.013	**				
Federal income tax collections	0.318	**	0.00	0.56	0.48	14.55

Appendix Table 4d						
Estimated impact of a change in the output gap on changes in the GDP *levels* of program outflows/inflows, using complete data including Post-Recession years						
	Coefficient		Ho p-value	H2 p-value	R^2	F-value
OASI inflows	0.037	**				
OASI outflows	-0.033	**	0.05	0.79	0.70	40.89
401(k) inflows	0.066	**	0.01	0.55	0.87	373.81
401(k) outflows	0.096	**				
DB inflows	-0.036	*	0.04	0.72	0.73	207.52
DB outflows	-0.001					
Unemployment insurance inflows	0.008	**	0.04	0.77	0.71	58.13
Unemployment insurance outflows	-0.058	**	0.00	0.47	0.79	40.53
Disability insurance inflows	-0.002					
Disability insurance outflows	-0.008	**	0.00	0.87	0.71	80.73
Medicare inflows	0.013	**				
Medicare outflows	-0.006					
Federal income tax collections	0.450	**	0.00	0.52	0.76	92.38

Data appendix

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ENDNOTES

[1] Between 2007-2010, Inflation adjusted median net worth of families in the SCF fell by 38.8%, while mean net worth dropped 14.7%. author's calculations

[2] http://www.economist.com/blogs/dailychart/2011/10/us-consumer-spending

[3] Troubled Asset Relief Program, American Recovery and Reinvestment Act (ARRA), expanded TANF, SNAP, Unemployment Insurance and the Earned Income Tax Credit, and infrastructure projects.

[4] Social transfers, in particular the rather generous systems of unemployment insurance in Europe, play[ed] a key role in the stabilization of disposable incomes and explain a large part of the difference in automatic stabilizers between Europe and the US" (Dolls, Fuest, and Peichl 2010).

[5] The validity of the instruments is verified by conducting a Sargan-Hansen over-identification test and by comparing the partial R-squared of the first stage regression. The instrument is highly correlated with the endogenous variable, and the F-value associated with the instruments, therefore these are adequate instruments. Time series data raises concern for serial correlation. Our specifications look at changes in flows on changes in independent variables but because we use differenced data, the impact of serial correlation is likely to be negligible. We calculate heteroscedasticity and auto correlation robust standard errors (HAC) using Newey-West techniques. Therefore, our estimates correct for the presence of any serial correlation and for heteroscedasticity.