**THE “CROWD OUT” PROBLEM IN STRUCTURAL MODELS OF THE MACROECONOMY**

 John J. Heim, Ph.D.

Rensselaer Polytechnic Institute and

Visiting Professor, State University of New York at Albany

**ABSTRACT:**  This paper tests the hypothesis that private spending (and borrowing) declines in periods of government deficit growth, due to a “crowd out” effect offsetting government stimulus efforts. The tests use Keynesian structural models of the U. S. economy 1960-2010, into which variables measuring the effects of the government deficit on private borrowing and spending are inserted. Results indicate crowd out completely or almost completely offsets deficit - driven stimulus efforts, even controlling for the state of the economy in which they occur. Extensive tests for endogeneity, stationarity, heteroskedasticity and robustness were undertaken. All testing was done in 1st differences, eliminating nonstationarity and reducing multicollinearity problems by approximately half. Models explained 90 -95% of the yearly changes of consumption and Investment during the 50 year period. Results were robust for tests of different time periods, different structural models, different regression techniques (OLS, strong and weak instrument 2SLS), and different strong 2SLS instruments. Consistency of crowd out effects on borrowing and spending was found. This was important because reduced private borrowing is the mechanism through which crowd out is theorized to affect spending.

**THE “CROWD OUT” PROBLEM IN STRUCTURAL MODELS OF THE MACROECONOMY**

**STIMULUS MODELS USUALLY KEYNESIAN:**

* **STRUCTURAL**
* **DEMAND DRIVEN**
* **SHORT RUN**

**SIMPLE “KEYNESIAN CROSS” MODEL OF NATIONAL INCOME DETERMINATION: (NO CROWD OUT)**

**National Income Identity Y = C+ I + G + (X-M)**

**Consumption function C = β(Y-T)**

**Standard KC Model Y =** $\left(\frac{1}{1-β}\right)$ **( - βT + I + G + (X-M) )**

**Of Stimulus Mechanics**

**Simple IS Curve: Y =** $\left(\frac{1}{1-β}\right)$ **( - βT - θr + γ ACC + G + (X-M) )**

**THE PROBLEM:**

* **VIRTUALLY IMPOSSIBLE TO FIND ECONOMETRIC EVIDENCE OF A NEGATIVE SIGN ON THE TAX VARIABLE**
* **(OR A POSITIVE SIGN ON GOVERNMENT SPENDING IN MOST MODELS)**

**Table 2.1**

**Tests of Keynesian Models For the Stimulus Effects of Tax Cuts**

**Model Tax coefficient (t-stat) .**

***Keynesian Cross:***

***Y* =** $f \left(T, G, Investment, X-M\right)$ **+.17 (2.2)\*\***

***Simple IS Curve Model:***

***Y* =** $f \left(T, G, ACC, Int. Rate, X-M\right)$ **+.79 (6.6)\*\*\***

***Sophisticated IS Model:***

***Y* =** $f$ ***(T, G, ACC, Interest Rates, Wealth, Tobin’s q,***

***Exchange Rates, Pop. Growth, Money Supply***

***Growth ,Consumer Confidence, Depreciation,***

***Profits, X) + .59 (2.8)\*\*\****

 **.**

* **\*\* Significant 5% level, \*\*\* Significant 1% level. Strong instrument 2SLS, Hausman:
 Wald, Sargan, Durban-Watson tests; Newey - West errors, Data in first differences.**

**POSITIVE SIGN ROBUST FOR VARIOUS PERIODS SAMPLED**

**1960-2010 1960-2000**

**1970-2010 1970-2000**

**GOVERNMENT SPENDING COEFFICIENT SIGNS:**

**(+) SIMPLE MODELS**

**(-) SOPHISTICATED MODELS**

**DOES THIS MEAN STIMULUS PROGRAMS DON’T WORK?**

* + - * **MAY NOT, BECAUSE OF CROWD OUT**

**HOW DOES CROWD OUT WORK?**

**KEYNESIAN CROSS MODEL (WITH CROWD OUT)**

**Consumption Function C = β (Y-T) + λ (T-G)**

 **Ʌ**

 **|**

 **|**

 **(CROWD OUT FACTOR: GOV’T DEFICIT)**

**Statement OF Y =** $\left(\frac{1}{1-β}\right)$ **( (-β+ λ) T + (1- λ) G + I + (X-M)**$)$

**Stimulus Mechanics Ʌ Ʌ**

**| |**

 **| |**

 **| |**

 **(Stimulus Effect, Net Of Crowd Out)**

**SIMPLE “IS” CURVE MODEL (WITH CROWD OUT)**

**Consumption Function C = β (Y-T) + λ1 (T-G)**

**Investment Function I = - θ(r)+ γ(ACC) + λ2 (T-G)**

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**(CROWD OUT FACTORS)**

**Statement of Stimulus Y =**$\left( \frac{1}{1-β} \right)$**((-β+ λ1+ λ2)T + (1- λ1- λ2) G + γ ACC - θr +(X-M))**

**Mechanics Ʌ Ʌ**

 **| |**

**(Net Stimulus Effects Of -ΔT, +ΔG)**

**More Sophisticated IS Models: C, I equations Include
 additional determinants**

**PREVIOUS RESEARCH**

**POPULAR PRESS**

* **Rising sovereign debt “could crowd out private sector credit growth”**

**(Chan, *NY Times*, 2/7/10)**

* **“Government bond buying by banks is…crowding out, reducing
the supply of consumer and corporate lending”**

**(Barley, *WSJ* 2/24/10)**

* **Crowd Out Relatively Unimportant in Recessions; Stimulus dominates Crowd Out,**
* **Stimulus Works, If Big Enough; Obama Stimulus Too Small**
* **Crowd Out Not A Problem In Recessions**

**(Krugman, *NY* *Times*, 9/28/09)**

**PROFESSIONAL LITERATURE**

**Spencer and Yohe, (1970)**

* **Literature Review: Dominant View: Deficits Cause Crowd Out**

**Ben Friedman (1978)**

* **Elasticity Of Substitution Between Bonds And Stocks Is Key: When Interest Rates Rise (Due To Gov’t. Borrowing), May Bring Crowd Out (Or Crowd In); Indeterminate Theoretically**
* **His Empirical results ambiguous.**

**Gale and Orszag (2004)**

**Model Tested:**

**C =** $f$ **(NNP, NNP-1, Deficit Var.(TT ,or TF, TS&L, GG&S, GTR, Gi,), Gov’t Debt, Tax Rates, Wealth)**

**Findings:**

* **Total Tax Cuts Have Net Stimulus Effects On Consumption 1956-2002, (But Not For 1956-92)**
* **Federal Tax Cuts Have Positive Stimulus , (1956-2002)**
* **S& L Tax Cuts Have Negative Stimulus, “**
* **Gov’t Spending On Transfers (Only) Had Pos. Stimulus, “**
* **Tax rate cuts for labor (but not capital) stimulate consumption “**

**Methodology**

* **Not Structural, Not VAR, Not DSGE. OLS, 1st Differences Used**

**Specification/Estimation Issues:**

* **What’s the theory? Anything left out necessary to control for?**
* **Simultaneity of C and NNP? OLS Results likely biased.**
* **Model Specification May Predetermine Result:
Replace NNP With Disposable Income, 1960-2000, Yields Positive Signed, Statistically Significant Tax Coefficient,**
* **Recalculate OLS Results For Transfer Payment And Federal/S&L Tax Effects For The 1960-2010, , Using Standard Structural Model . Results Change: (+) Tax, (-) Spending Effects**

**ΔCT =.56Δ(Y-TT) +.64Δ(TF ) +.53Δ(TS&L) -.27Δ(GTrans) - .39Δ(GOther) -10.60ΔPR +.42 ΔDJ-2 +3.60 ΔXRAV**

 **(t =) (13.0) (7.6) (1.9) (-2.2) (-4.1) (-4.4) (5.1) (2.6)**

**-366.99ΔPOP16 +.011ΔPOP +.78ΔICC-1 +45.26ΔM2AV  + .11ΔCB + 19.69 ΔUNEM-0 R2=95.7%**

**(-1.7) (3.0) (2.6) (5.9) (3.1) (2.8) D.W.=1.8**

**Conclude:**

* **Orszag & Gale’s Findings Sensitive To Model Specified, Time period Tested**

**Montford and Uhlig (2008):**

**Findings**

* **Increased Gov’t Spending Reduces Investment. (Crowd Out)**
* **Decreased Taxes Increase Investment. (Stimulus Theory)**
* **No Theory Proposed To Reconcile Results,
(Consistent With RBC w/ Backward Bending Labor Supply Curve)**

**Methodology: VAR**

**Model**

* **Consumption or investment: a function of six lagged values of each of ten variables:**
* **C (or I) =** $f$ **(GDP, C, P&E & Inventory Investment, G, T, Real
 Wages, Bank Reserves, PPI index, and GDP deflator.)**

* **Data: U.S. 1955-2000, quarterly.**
* **Impulse responses to variables other than the GDP constrained to what the authors considered appropriate signs, regardless of regression results.**
* **Uhlig (2005, p.383) argued this was common practice to achieve consistency with theoretical expectations**

**Blanchard and Perrotti (2002)**

* **Model: VAR
Findings: Same As Montford And Uhlig For Investment
 Keynesian Results For, T, G Effects On GDP,**
* **Method: Difficult To Evaluate**

**Furceri and Sousa (2009)**

**Findings: As G Increases As % Of GDP, C and I Fall as a % of GDP**

**(May Result From Construction Of Hypothesis)**

**Model: VAR**

**C/GDP (or I/GDP) =** $f$ **(Fixed Effects Variable for 140 Countries, 6 Lags of G/GDP)**

**Heim (2012a, 2012b)**

**Models: Structural, 2SLS**

**Findings:**

* **Both Tax And Spending Deficits Generate Net Crowd Out Effects**
* **Crowd Out ~ Same In Recession And Non-Recession Periods.**
* **Possible Explanation: Supply Of Loanable Funds Dropped Faster Than Private Loan Demand For 1981-83 Recessionary Period (Flow of Funds Data)**

**Models:**

**CDomestic (or Imports) =** $f$ **(Disposable Income, Wealth, Prime Interest Rate, T, G, Exchange Rate, Population Size, Consumer Confidence)**

**IDomestic (or Imports) =** $f$ **(Accelerator, Tobin’s q Proxy, Prime Interest Rate, T, G, Exchange Rate, Profits, Depreciation Allowances, Capacity Utilization Levels, )**

**Annual Data 1960-2000**

**Methods**

* **Effects On GDP Estimated 2 Ways (IS Curve Method):**
	+ - **Inferred from C, I regressions**
		- **Actual IS curve regression coefficients**

**DSGE (Euler Equation Models)**

**Gale and Orszag (2004). Model melds Real Business Cycle and “Rule of Thumb” new Keynesian consumers into one model:**

 **Model**

**C =** $f$ **(YGross, Deficit Var.(TF, TS&L, GG&S, ), Gov’t Debt, Wealth, Tax**

 **Rates)**

**Findings**

* **Gross Income, Federal Tax Levels, And Wealth Levels Were Significant Stimulus Factors (5% Level)**

**Methodology:**

* **(Discussed earlier): everything endogenous, replaced by lagged values, OLS. Results not replicable using structural models)**

**Non-DSGE Tests of Consumption: DSGE Implications:**

**Kuznets (1948):**

* **Current Consumption = 70% Of Current Year Only National Income, 1869-1929, Low S.D.**
* **70% *Precisely* Replicable For The 1960-90 Period (Heim 2008a)**
* **Reasonably Replicable For 1960-2010 (76.6%) ( “ “ )**

**Heim (2008b)**

**Compared Explanatory Power of Consumption Models**

* **Average Income (Life Cycle/Permanent Income Hypothesis),**
* **Current Income Only (Keynesian)**

**Findings:**

* **Keynesian Models Explained Substantially More Variance (68%) In Consumer Spending. Average income explained about ½ As Much**
* **Current Income Explained 68% Of Variance, Crowd Out 14%, Wealth 5%, Interest Rates (2%), And Exchange Rates (1%).
 (Stepwise Regression- 1st In Method)**

**KEYNESIAN MODEL**

**C =** $f$ **(YDisposable, Deficit (TTotal, GTotal) Wealth, Prime Interest Rate,**

 **Exchange Rates)**

**LIFE CYCLE/ PERMANENT INCOME MODELS**

**Adaptive Expectations Version: Same Model as Above , except current income replaced by average income for past 4 years**

**Rational Expectations Version: : Same Model as Above , except current income replaced by actual average income for next 4 years (or next 4 and past 4 years to combine adaptive with rational expectations)**

**METHODOLOGY**

**DATA: U.S. 1960 - 2010 *Economic Report Of The President* 2011**

***Flow Of Funds Accounts* 2011**

**Spending And Borrowing Models – Same Determinants Assumed**

**“Standard Models” Used: Test All Variables Commonly Cited As**

 **Determinants of Consumption Or Investment**

**Lags:, Chose The Lags Most Systematically Related To The Dependent Variable, If Theory Says Variable Should Be Included**

**2SLS: To Address Simultaneity Bias**

**Tests: Hausman Endogeneity: What To Instrument**

**Wald: Weak Instrument Test**

**Sargan Endogeneity: Do Instruments Remove It?**

**Method For Defining Instrument Components: Steps**

1. **All Exogenous & Lagged Variables In Both Equations Used As Initial Components (Griffiths, Hill, Lim 2011), (Pindyck & Rubinfeld, 1991).**
2. **Only Six Assumed Endogenous (GDP, T, G, UNEM, PR, ACC)**
3. **Hausman Tests On These 6 Suspected Endogenous, Using All Others As Hausman 1st Stage Regressors,**
4. **Hausman Tests On All Others, Using All Others Except The One Being Tested As 1st Stage Regressors**
5. **All Variables Found Exogenous/Lagged Regressed On Each Endogenous To Obtain Instrument.**
6. **For Weak Instruments, Add Lagged Versions Of The Endogenous Or Other Variables Used Originally. Continue Until Either F Statistic Was F>= 10, Or At Least One Regressors Had t >= 3.3. (Wald Test)**
7. **To Ensure Strong Instrument Not Endogenous, Sargan Test Used. Residuals From The Structural Model (With Instruments) Regressed Against Instrument Components Chi Square Used As Test Criteria. If (N)(R2) < Χ2(.95,D F) Conclude Endogeneity Eliminated Hausman, Wald And Sargan Tests Used For Every Model Tested.**

**Data Tested In First Differences To Address Nonstationarity , Serial Correlation Issues.**

* **All Passed Augmented Dickey-Fuller Unit Root Tests, Except 3.**
* **The 3 Proved Cointegrated With Spending And Borrowing Dependent Variables (The Dow Jones Average, Population Size And Population Young/Old Ratio Variables)**
* **1st Differences Also Reduced Multicollinearity Levels By~ ½, Stabilizing Coefficients**

**Durbin Watson Tests: Evaluate Serial Correlation. Most Appropriate Test For Small Samples, (Hill, Griffiths & Lim, 2011, P. 355)**

**Newey West Standard Errors (Heteroskedasticity)**

**IS Curve Method**: **Estimate Net Stimulus/Crowd Out Effects On GDP**

**MODELS TESTED: 24 CONSUMPTION & 24 INVESTMENT**

**OF THE 24 IN EACH GROUP**

* **16 SPENDING MODELS: 8 USE 1-VARIABLE DEFICIT,
 8 USE 2-VARIABLE DEFICIT**
* **OF EACH GROUP OF 8, 4 WITH BORROWING DETERMINANT, 4 WITHOUT,**
* **EACH OF THE GROUP OF 4 USE DIFFERENT BUSINESS CYCLE CONTROLS**
* **8 BORROWING MODELS:**
* **4 HAVE 1-VARIABLE DEFICIT, 4 HAVE 2-VARIABLE)**
* **EACH OF THE 4 USE DIFFERENT BUSINESS CYCLE CONTROLS**
* **EACH OF THE 48 TESTED 3 WAYS**
* **OLS**
* **2SLS (STRONG INSTRUMENT),**
* **2SLS (WEAK INSTRUMENT, IF ENCOUNTERED)**
* **TO ENSURE ROBUSTNESS, RESULTS COMPARED FOR 4 VARYING SAMPLE PERIODS (8 MODELS)**
* **1960-2000**
* **1960-2010**
* **1970-2000**
* **1970-2010**

**TYPICAL MODEL RESULTS (2SLS STRONG INSTRUMENT)**

**TESTED: DETERMINANTS OF CONSUMPTION (CT), INVESTMENT (IT)**

**Consumption Investment**

**Disposable Income (Y-T) Samuelson’s Accelerator (ACC)**

**Crowd Out Crowd Out**

* **Taxes (TT) ● Taxes (TT)**
* **Gov’t. Spending (GT&I) ● Gov’t. Spending (GT&I)**

**Wealth (DJ) Depreciation Allowances (DEP)**

**Interest rates (PR) Interest Rates (r)**

**Exchange Rates (XR) Tobin’s q (DJ as Proxy)**

**Consumer Confidence (CCI) Profits (PROF)**

**Population Size (POP) Exchange Rates (XR)**

**Pop. Age Composition (POP16) Population Size(POP)**

**Money Supply (M2, M1) Money Supply (M2, M1)**

**Business Cycle Controls Business Cycle Controls**

* **Unem. Rate (UNEM) Business Borrowing (IB)**
* **GDP0, GDP-3**

**Consumer Borrowing (CB)**

**CONSUMPTION SPENDING**

ΔCT =.50Δ(Y-TT) **+.55Δ(T**T**) -.26Δ(G**T&I**)** -11.81ΔPR +.42 ΔDJ-2 +3.42 ΔXRAV  -336.65ΔPOP16 +.012ΔPOP +.36ΔICC-1 +40.86ΔM2AV

 (t =) (11.4) **(11.4) (-3.7)**  (-5.1) (5.3) (2.3) (-1.3) (2.6) (1.3) (3.8)

+ **.12 ΔCB2** +.04 ΔGDPReal(-3) **R2=94.9%** D.W. = 1.8 MSE = 25.45 (Eq. 7.1)

 **(3.1)** (1.1)



**CONSUMER BORROWING**

ΔCB =.34Δ(Y-TT)**+.61Δ(TT) -.55Δ(GT&I)** -22.89ΔPR-1.62 ΔDJ-1 +24.06ΔXRAV +102.23ΔPOP16 +.005ΔPOP +.12ΔICC-1 -30.82ΔM2AV

 (t =) (1.3) **(1.8) (-1.7)**  (-3.7) (-3.4) (2.8) (0.1) (0.3) (0.1) (-0.9)

- .20 Δ(M2-M1)Real -18.54 ΔUNEM R2=58.7% D.W.=2.1 MSE=103.40 (Eq. 7.5.Alt.)

 (-1.7) (-0.6)

**INVESTMENT SPENDING**

ΔIT = +.33Δ(ACC)**+.22Δ(T**T**) -.53Δ(G**T&I**)** + .81ΔDEP +2.39ΔCAP-1 -2.29ΔPR-2 + .10ΔDJ-0 +.13ΔPROF-0+5.87ΔXRAV +.013ΔPOP

 (t =) (4.9) **(2.0) (-3.4)**  (3.0)) (1.0) (-0.9) (0.4) (1.9) (2.4) (2.8)

+ **.05 Δ(BOR-1)** – 12.40 ΔUNEM R2=93.1% D.W.=2.0 MSE=33.05 (Eq. 8.2.Alt.b)

 **(0.9)** (-1.5)

USING STEPWISE REGRESSION: VARIANCE EXPLAINED: (From Eq. 8.3.Alt.a.2 – No bus.cycle var.))

* 1ST IN Method: 64% Explained by (T,G); 2nd In: ACC (17.2%) 3rd In: DEP (4.4%); 4th In:PR-2
 (2.5%); 5th In: XRAV (1.6%);6th In: IB(-1) (0.8%);7th In: POP (0.03%);8th In: CAP-1
 (0.01%);9th In: PROF (-0.01%);10th In: DJ (-0.07%);

(If ACC entered first, explains 44% of variance; If( T,G) entered second, adds 37%)
* 1st Out Method: 1st Out: (9.8% Explained by ACC), 2nd Out: CapUtil-1 (4.9%); 3rd Out: PROF
 (2.7%); 4th Out:T,G: (6.7%); 5th Out:I B(-1): (6.9%); 6th Out:DJ: (42.3%); 7th
 Out:PR-2(13.9%); 8th Out:DEP: (2.1%); 9th Out:XR and 10th Out:POP: (-
 0.0%)



**BUSINESS BORROWING**

ΔIB = -.08Δ(ACC**)+1.21Δ(TT) -1.02Δ(GT&I)** –3.11ΔDEP-17.20ΔCAP-1-14.79ΔPR-2 -1.85ΔDJ-1+1.38ΔPROF-2+23.07ΔXRAV +.04ΔPOP

 (t =) (-0.3)  **(2.4) (-4.1)**  (-1.7) (-2.2) (-1.9) (-2.6) (3.8) (2.9) (2.6)

- .01 Δ(M2-M1)Real + 45.69 ΔUNEM R2=59.2% D.W.=1.9 MSE=120.40 (Eq. 8.5.Alt)

 (-0.0) (1.4)

**FINDINGS IN DETAIL:**

**CONSUMER SPENDING MODELS**

**Table 5.7**

**SUMMARY OF ALL CONSUMPTION OLS AND 2SLS SPENDING AND BORROWING RESULTS**

**(1 VARIABLE DEFICIT EFFECTS)**

 .

A.) 2SLS Spending Model Findings Summarized: OLS Spending Findings Summarized

 Δ(TT-GT&I) Δ(BOR) Bus. Cycle Δ(TT-GT&I) Δ(BOR)

Model# β (t-stat.) β (t-stat.) Control Model# β (t-stat.) β (t-stat.)

5.13 .38 ( 2.6) **.11 (1.9)** GDP Real(0) 5.1 .25( 3.4) .11(3.4)

5.13.a .37 ( 2.9) .12 (3.0)

\*5.14&14.a .04 ( 0.2) “ 5.2 .26( 3.3)

5.14/14a.Alt. .22 ( 2.4)

\*5.15 .49 ( 8.1) .10 (1.2) GDP Real(-3) 5.3 .47( 8.7) .13(3.0)

5.15.Alt .47 ( 8.5) .13 (1.9)

5.15.a .47 ( 8.3) .13 (2.5)

 “ 5.4,16,16a 53( 7.4)

5.17 .48 ( 4.5) **.12 (2.1)** % Unemployed 5.5 .54(11.1) .13(3.4)

\*5.17.a .57 (10.2) .12 (2.4)

5.17.a.Alt .57 (10.9) .12 (2.5)

5.17.a.Alt2 .61 ( 3.8) .12 (2.9)

5.18 .48 ( 3.3) “ 5.6 .60( 7.3)

5.18.a .46 ( 3.6)

5.19 .49 ( 8.9) .12 (2.2) None 5.7 .48( 9.8) .12(3.1)

5.19.a .53 ( 8.1) .12 (2.1)

5.20 .54 ( 7.5) “ 5.8 .54( 7.5) .

Average (All): .45 ( 6.0) .12 (2.2) Average: .46( 7.4) .12 (3.2)

Av.(Str.Inst.Only).47( 5.9) .12 (2.4)

\*Weak Instruments

**Table 7.1**

**2SLS CONSUMER SPENDING FINDINGS SUMMARIZED, COMPARED TO OLS**

**(TWO VARIABLE DEFICIT EFFECTS)**

 .

 Δ(TT) Δ (GT&I) Δ(BOR) Bus. Cycle

Model# β (t-stat.) β (t-stat.) β (t-stat.) Control Method.

7.1 .55 (11.4) -.26 (-3.7) .12 (3.1) GDP Real(-3) OLS Only (No Endog.)

7.2 .63 (12.2) -.31 (-4.5) .12 (3.6) Unem. Rate OLS Only

7.2.a .63 (14.4) -.28 (-3.7) .13 (2.6) “ “ 2SLS (Weak Inst.)

7.2.(Alt.) .64 (12.0) -.28 (-3.9) .11 (3.9) “ “ 2SLS (Strong Inst.)

7.2.(Alt.a) .71 ( 7.9) -.28 (-3.1) NA 2SLS

7.3 .55 (12.5) -.25 (-3.4) .11 (3.4) (None) OLS Only (No Endog.)

Average; .60 (12.5) -.28 (-3.8) .12 (3.3)

Av.(All except .59 (12.0) -.28 (-3.8) .12 (3.5)

 weak inst.)

 .

**CONSUMER BORROWING MODELS:**

**TABLE 5.7 (CON’D-PART B)**

**(1 VARIABLE DEFICIT BORROWING MODELS)**

B). 2SLS Borrowing Model Findings Summarized: OLS Spending Findings Summarized

 Δ(TT-GT&I) Bus. Cycle Δ(TT-GT&I)

Model# β (t-stat.) Control . Model# β (t-stat.)

5.21 .64 (0.5) GDP Real(0) 10.1.A.9 .54(2.3)

5.21.Alt 1.55 (1.5)

5.22 .62 (3.2) “ GDP Real(-1) 10.1.A.10 .64(2.6)

5.22.Alt .59 (2.3)

5.22.Alt2 .61 (2.6)

5.23 .51 (1.6) % Unem 10.1.A.11 .59(2.0)

5.23.Alt .61 (2.1)

5.23.Alt2 .96 (2.3)

5.24 .63 (3.2) None 10.1.A.12 .66(2.7)

5.24.Alt .61 (2.4) OLS Av: .61(2.4)

2SLS Av (All): .73 (2.2) [ .64 (2.3) without 21.Alt.]

2SLS Av (Str.)) .82 (2.2) [ .67 (2.3) “ “ ]

 .

**Table 7.2**

**2SLS CONSUMER BORROWING FINDINGS SUMMARIZED, COMPARED TO OLS**

**(TWO VARIABLE DEFICIT EFFECTS)**

 .

 Δ(TT) Δ (GT&I) Bus. Cycle

Model# β (t-stat.) β (t-stat.) Control Method .

7.4 .68 (2.4) - .48 (-2.3) GDP Real(-3) OLS

7.4.a .83 (3.1) + .11 ( 0.1) “ “ 2SLS (Weak Inst.)

7.4.Alt .61 (2.2) - .57 (-1.9) “ “ 2SLS (Strong Inst.)

7.4.Alt2 .64 (2.2) -1.05 (-1.7) “ “ 2SLS (Strong Inst.)

7.5 .62 (1.8) - .49 (-2.0) Unem. Rate OLS

7.5.a .79 (2.3) + .12 ( 0.2) “ “ 2SLS (Weak Inst.)

7.5.Alt .61 (1.8) - .55 (-1.7) “ “ 2SLS (Strong Inst.)

7.5.Alt2 .72 (1.8) -1.79 (-1.5) “ “ 2SLS (Strong Inst.)

7.6.a .84 (3.6) + .11 ( 0.2) “ 2SLS (Weak Inst.)

7.6.Alt .68 (2.5) - .59 (-1.9) “ 2SLS (Strong Inst.)

7.6.Alt2 .64 (2.3) -1.17 (-1.6) “ “ 2SLS (Strong Inst.)

Average(All) .70 (2.4) - .58 (-1.3) (All)

Av. (OLS) .66 (2.2) - .50 (-2.2) (OLS only)

Av. (2SLS) .65 (2.1) - .57 (-1.8) (Strong Instrument only)

 .

**ROBUSTNESS OVER TIME OF CONSUMPTION FINDINGS:**

**Table 5.8**

**ROBUSTNESS OF CONSUMPTION MODELS WITH RESPECT TO TIME PERIOD SAMPLED**

  **.**

1. **(3 Period - Lagged Real GDP Rate Business Cycle Control)**

**Spending Model 5.15 Borrowing Model 5.22**

**Sample Deficit Variable Sample Deficit Variable**

**Period β (t-stat.) Period β (t-stat.)**

**1960-2010 .49 (8.1) 1960-2010 .62 (3.2)**

**1970-2010 .47 (8.1) 1970-2010 .62 (2.8)**

**1960-2000 .37 (5.4) 1960-2000 .65 (1.8)**

**1970-2000 .36 (5.1) 1970-2000 .75 (2.3)**

1. **(No Business Cycle Control)**

**Spending Model 5.19 Borrowing Model 5.24**

**Sample Deficit Variable Sample Deficit Variable**

**Period β (t-stat.) Period β (t-stat.)**

**1960-2010 .49 (8.9) 1960-2010 .63 (3.2)**

**1970-2010 .47 (9.0) 1970-2010 .63 (2.8)**

**1960-2000 .37 (6.6) 1960-2000 .85 (2.8)**

**1970-2000 .33 (5.7) 1970-2000 .64 (4.2)**

 **.**

**SUMARY OF CONSUMER SPENDING AND BORROWING FINDINGS**

* **Crowd Out is Real: Consumer Spending & Borrowing Negatively Related To Deficit , Even Controlling For Business Cycle Effects**
* **Result Holds For Both Tax Cut And Spending Deficits**
* **Crowd Out Effect Generally The Same With Or W/O Business Cycle Controls, Matching Previous Explicit Measurements Of Effects In Recessions And Non-Recession Periods. (Heim 2012a&b)**
* **Crowd Out Effects On Consumer Spending Of Tax Cut Deficits Twice As Large As Government Spending Deficits ($0.59 Vs. $0.28 Per Dollar Of Deficit).**
* **This May Be Because The Test Results Above Implies The MPS Is About $0.50 Per Dollar Of Deficit), Whereas Most Or All Of The Dollar Increase In Government Spending Is Spent**
* **For The OLS And Strong Instrument 2SLS Models, $1.00 Increase In Deficits Associated With $0.54 - $0.65 Decline In Consumer Borrowing (and Spending)**
* **Access To Borrowing Significantly Increases Total Consumer Spending, Adding About 12% To Explained Variance**
* **Remarkably Similar Crowd Out Results In Spending Models For OLS, Weak, And Strong 2SLS Methods**
* **Remarkably Similar Crowd Out Results In Borrowing Models For OLS And Strong 2SLS Models. Even With Weak Instruments, Same For Tax Cuts, But Varied For Spending Deficits.**
* **Generally Robust To**
* **Method (OLS, 2SLS Strong, Usually 2SLS Weak),**
* **Time Period Sampled,**
* **Business Cycle Effects,**
* **Alternative Endogeneity Method**
* **Different (Strong) Instruments**
* **Moderate Changes In Model Specification**
* **1 Vs. 2 Var. Deficit,**
* **Business Cycle Control,**
* **Lags For DJ And PROF Variables)**

**DETAILED RESULTS: INVESTMENT**

**Table 6.7**

**SUMMARY OF ALL INVESTMENT OLS AND 2SLS SPENDING AND BORROWING FINDINGS**

 .

**Spending Models (1 Variable Deficit):**

 .

2SLS Deficit Var. Bor. Var. OLS Deficit Var. Bor. Var.

Spending Δ(TT-GT&I) Δ(IB) Bus. Cycle Spending Δ(TT-GT&I) Δ(IB)

Model# β (t-stat.) β (t-stat.) Control . Model# β (t-stat.) β (t-stat.)

6.13 .30 (4.6) .09 (1.9) GDP Real(0) 6.1 .27 (4.5) .11 (2.5)

6.13.Alt .31 (4.5) .09 (1.9) “ 6.1.a .27 (3.4) .13 (2.4)

6.13.Alt.a2 .31 (3.9) .14 (2.2)

6.14 .33 (7.1) “ 6.2 .33 (7.0)

6.14. Alt .36 (6.8) “

6.15 .37 (5.3) .12 (2.2) GDP Real(-3) 6.3 .34 (5.2) .10 (1.8)

6.15. Alt .37 (5.1) .10 (2.1) “ 6.4 .38 (6.3)

6.15.Alt.a .33 (4.0) .14 (1.9) 6.3.a .34 (4.1) .14 (2.3)

6.15.Alt.a2 .37 (3.1) .16 (1.5)

6.16 .39 (6.9) “

6.16. Alt .42 (6.8) “

6.17 .28 (3.9) .07 (1.3) Unem. Rate 6.5 .29 (4.0) .08 (1.5)

6.17. Alt .30 (3.9) .08 (1.5) “ 6.6 .32 (5.6)

6.17.Alt.a .30 (3.1) .09 (1.3) 6.5.a .28 (2.8) .11 (1.7)

6.17.Alt.a2 .34 (4.2) .22 (1.5)

6.18 .31 (5.5) “

6.18. Alt .34 (5.1) “

6.19 .33 (4.9) .09 (1.6) None 6.7 .33 (5.0) .09 (1.8)

6.19. Alt. .33 (4.9) .09 (1.7) “ 6.8 .39 (6.7)

6.19.Alt.a .26 (3.1) .13 (1.8) 6.7.a .32 (4.1) .13 (2.1)

6.19.Alt.a2 .33 (4.3) .22 (1.6)

6.20 .37 (6.6) “

6.20. Alt .38 (6.6) “ . . .

Average .34 (5.6) .09 (1.8) 2SLS weak instr. Average .33 (5.5) .10 (1.9) - OLS

Average .35 (5.5) .09 (1.8) 2SLS str. instr.(Alt) (w/o “a”)

Average .30 (3.4) .12 (1.7) 2SLS str.Instr (Alt.a) Average .30 (3.6) .13 (2.1) (”a” only)

Average .34 (3.9) .19 (1.7) 2SLS str.Instr (Alt.a2)

 .

**t = 1.8 = 7% sig. level; 1.6 = 11% level; 1.5 = 15% level**

**Table 8.1**

**2SLS INVESTMENT SPENDING FINDINGS SUMMARIZED, COMPARED TO OLS**

**(TWO VARIABLE DEFICIT EFFECTS)**

 .

2 – Variable OLS and 2SLS Investment Spending Model Findings Summarized:

 Δ(TT) Δ (GT&I) Δ (BOR) Bus. Cycle

Model# β (t-stat.) β (t-stat.) β (t-stat.) Control Method .

8.1 .31 (4.2) -**.46 (-4.3)** .08 ( 1.5) GDP Real(-3) OLS

8.1.a .30 (3.3) -**.43 (-3.7)** .13 ( 2.2) GDP Real(-3) OLS

8.1.Alt .31 (4.6) -.77 (-6.3) -.08 (-0.9) “ “ 2SLS (Strong Inst.Alt)

8.1.Alt.a .26 (3.3) -.54 (-3.6) .08 (1.4) “ “ 2SLS (Str.Inst. Alt.a)

8.1.Alt.a2 .26 (3.5) -.48 (-3.5) .17 (2.7) “ “ 2SLS (Str.Inst. Alt.a2)

8.2 .24 (2.8) -.41 **(-4.0)** .06 ( 1.1) Unem. Rate OLS

8.2a .21 (1.9) -.38 **(-3.1)** .08 ( 1.5) Unem. Rate OLS

8.2.Alt .27 (3.6) -.63 (-5.5) -.06 (-0.8) “ “ 2SLS (Strong Inst.)

8.2.Alt.a .16 (1.7) -.45 (-2.8) +.06 (0.9) “ “ 2SLS (Str.Inst. Alt.a)

8.2.Alt.b .25 (3.2) -.59 (-8.4) NA 2SLS(Str.Inst. Alt.b)

8.2.Alt.b2 .21 (2.5) -.40 (-3.1) .16 (1.7) “ “ 2SLS (Str.Inst. Alt.b2)

8.3 .30 (3.8) -**.43 (-4.1)** .08 ( 1.5) None OLS

8.3.a .29 (3.1) -**.40 (-3.6)** .11 ( 1.9) None OLS

8.3.Alt .32 (4.7) -.66 (-5.1) -.01 (-0.2) “ 2SLS (Strong Inst.)

8.3.Alt.a .21 (2.4) -.45 (-3.2) .09 ( 1.5) “ “ 2SLS (Str.Inst. Alt.a)

8.3.Alt.a2 .25 (3.4) -.40 (-4.1) .18 (1.4) “ “ 2SLS (Str.Inst. Alt.a2)

Average (All) .29 (4.0) -.56 (-4.9) .07 ( 0.4) (w/ DJ-2, PROF-2 models only)

Av.(OLS Only) .28 (3.6) -.43 (-4.1) .07 ( 1.4) (w/ DJ-2, PROF-2 models only)

Av.(OLS Only) .27 (2.8) -.40 (-3.5) .11 ( 1.9) (w/ DJ0, PROF0 models only)

Av.(2SLS Only) .30 (4.3) -.69 (-5.6) -.05 (-0.6) (w/ DJ-2, PROF-2 models only)

Av.(2SLS Only) .23 (2.9) -.47 (-4.1) +.12 (1.6) (w/ DJ0, PROF0 models only(Alta+b)

 .

**BUSINESS BORROWING**

**Table 6.7 (Part B)**

**BORROWING MODELS:**

**(ONE VARIABLE DEFICIT)**

2SLS Δ(TT-GT&I) Bus. Cycle 2SLS OLS Δ(TT-GT&I)

Model# β (t-stat.) Control . Method Model# β (t-stat.) .

6.21 .98 (4.5) GDP Real(0) Strong Instr. 6.9 .98 (3.6)

6.22 .94 (4.3) GDP Real(-3)  “ “ 6.10 .87 (3.1)

6.23 .94 (4.3) Unem. Rate “ “ 6.11 1.07 (3.2)

6.23.a 1.11 (3.3) “ “ “

6.24 .97 (4.7) None “ “ 6.12 .92 (3.6)

Average .96 (4.5) Averaqe .96 (3.4)

 .

**Table 8.2**

**2SLS BUSINESS BORROWING CONCLUSIONS SUMMARIZED, COMPARED TO OLS**

**(TWO VARIABLE DEFICIT EFFECTS)**

 .

2 – Variable OLS and 2SLS Business Borrowing Model Findings Summarized:

 Δ(TT) Δ (GT&I) Bus. Cycle

Model# β (t-stat.) β (t-stat.) Control Method .

8.4 .87 (2.4) -**.88 (-3.6)** GDP Real(-3) OLS

8.4.Alt .96 (2.5) -.89 (-3.6) “ “ 2SLS (Strong Inst.)

8.4.a ..50 (1.9) -.72 (-2.4) “ OLS (PROF0 used)

8.5 1.09 (2.5) -1**.03 (-4.4)** Unem. Rate OLS

8.5.Alt 1.21 (2.4) -1.02 (-4.1) “ “ 2SLS (Strong Inst.)

8.5.a .70 (2.1) - .91 (-3.4) “ OLS (PROF0 used)

8.6 .90 (2.5) -**.95 (-4.4)** None OLS

8.6.Alt .99 (2.6) -.93 (-4.4) “ 2SLS (Strong Inst.)

8.6.a .54 (2.2) .-.85 (-3.4) “ OLS (PROF0 used)

 .

Av.(All ex. “a”) 1.00 (2.5) -.95 (-4.1)

Av.(Str.Ins.only) 1.05 (2.5) -.95 (-4.0)

Av. (“a” only) .61 (2.1) -.83 (-3.1)

 .

 .

**ROBUSTNESS OVER TIME OF INVESTMENT FINDINGS:**

**Table 6.8**

**ROBUSTNESS OF INVESTMENT MODELS WITH RESPECT TO PERIOD SAMPLED**

 **.**

 **Investment Investment**

**2SLS Spending Model 6.15Alt., 17Alt. 2SLS Borrowing Model 6.22-23.**

**(Current Year Unemployment or GDP-3 (Current Year Unemployment or GDP-3**

**Used as Business Cycle Control) Used as Business Cycle Control)**

 **Using Unem.: Using GDP-3 Using Unem.: Using GDP-3**

**Sample Deficit Var. Deficit Var. Sample Deficit Var. Deficit Var.**

**Period β (t-stat.) β (t-stat.) Period β (t-stat.) β (t-stat.)**

**1960-2010 .30 (3.9) .37 (5.1) 1960-2010 1.12 (4.5) .94 (4.3)**

**1970-2010 .31 (3.7) .40 (5.6) 1970-2010 1.34 (4.3) 1.00 (3.9)**

**1960-2000 .32 (3.9) .38 (5.0) 1960-2000 .80 (2.6) .60 (2.4)**

**1970-2000 .37 (3.8) .45 (6.6) 1970-2000 1.18 (2.6) .71 (2.1)**

 **Investment Investment**

**2SLS Spending Model 6.13Alt, 19Alt. OLS Borrowing Model 6. 21, 24.**

**(Current Year GDP Or No Control (Current Year GDP Or No Control**

**Used as Business Cycle Control) Used as Business Cycle Control)**

 **Using GDP0: No ControlUsing GDP0: No Control**

**Sample Deficit Var. Deficit Var. Sample Deficit Var. Deficit Var.**

**Period β (t-stat.) β (t-stat.) Period β (t-stat.) β (t-stat.)**

**1960-2010 .30 (4.4) .33 (4.9) 1960-2010 .98 (4.5) .97(4.7)**

**1970-2010 .33 (4.5) .36 (5.1) 1970-2010 1.11 (4.1) 1.06(4.3)**

**1960-2000 .31 (4.8) .36 (5.1) 1960-2000 .69 (2.8) .63(2.6)**

**1970-2000 .37 (5.4) .43 (6.5) 1970-2000 .94 (2.9) .79(2.4)**

**SUMMARY OF INVESTMENT FINDINGS**

* **Investment Spending Or Borrowing And Deficits Negatively Related, Even Controlling For Business Cycle**
* **Remarkably Similar Results For OLS, 2SLS (Strong) And 2SLS (Weak) Techniques**
* **Borrowing As A Determinant Of Investment Spending, ONLY Marginally Significant.**

**(May Be For Technical Not Substantive Reasons: High Collinearity Often Reduces Significance (Business Borrowing And Deficits r = -.78 )**

* **Summary: Results Robust To**
* **Technique,**
* **Business Cycle Effects,**
* **Whether Or Not A Borrowing Variable Used,**
* **Time Period Sampled**

**ADDITIONAL INVESTMENT RESULTS - 2 VARIABLE DEFICIT MODELS**

**SUMMARY OF FINDINGS**

* **Spending Deficits Have Twice The Crowd Out Effect Of Tax Cut Deficits; OLS Models Show About The Same Effect. (Was the Opposite For Consumption)**
* **Business Borrowing Declines Dollar For Dollar With Increases In Deficit**

**OTHER CONCLUSIONS, ISSUES**

* **Argument That The Negative Relationship Between Private C & I Spending And Deficit Growth Cause By Recessions, Not Crowd Out (Krugman), Not Supported**
* **Larger Reductions In Borrowing Than Spending Associated With Deficits. (Consumer Savings / Retained Earnings May Fill The Gap)**
* **Decline In Private Borrowing Exceeds The Size Of The Deficit; Not Clear Why**
* **Borrowing Models Only Explain About 60% Of The Variance. Variables *In* The Model, like Crowd Out, May Be Picking Up Left Out Variables Effects.**
* **Confounding Supply And Demand Effects In One Equation**
* **Borrowing Data For Businesses For Everything, Not Just Investment.**
* **Most Likely: Stimulus Income Does Not Increase Spending; Just Reduces Need To Borrow To Finance Part Of It.**
* ***By Comparison, Combined Consumer And Investment Spending Declines Match Deficit Increases***

**EFFECTS OF STIMULUS PROGRAMS ON GDP, NET OF CROWD OUT EFFECTS**

**Two Methods For Estimating:**

**Method #1: Uses Marginal Effect Estimates for T, G, and Borrowing
 Variable. (Positive Effect of tax cut on Pool of Savings
 Factored in)**

**Method #2: Direct Estimate Of IS Curve Coefficients (Same Models**

 **But w/o borrowing, business cycle variables, or effect of**

 **Tax cut on saving pool added in)**

**Summary of Results:**

**Changes in GDP Per Dollar of Deficit Spending**

 **Increase In**

 **Tax Cut Gov’t. Spending**

**Method #1: $ -0.47 $ - 0.35\***

 **Method #2: $ -0.65 $ +0.24\***

 **\*Not Sig. Different from 0**

**Detail Of Key Data & Methods Used**

**Data: Effects of Deficits on Spending –Method 1**

**ΔCT = .55 ΔTT  - .26 ΔGT&I + .12 ΔCB2 MPC=.50 (Eq. 7.1)**

**ΔIT = .22 ΔTT - .53 ΔGT&I + .05 ΔIB2(-1) ACC=.33(Eq.8.2.Alt.B)**

**Total .77 ΔTT  -.79 ΔGT&I + .17 Borr.**

**Data: Effects of Deficits on Borrowing –Used In Method 1**

**ΔC = .61 ΔTT  - .55 ΔGT&I (Eq. 7.5.Alt)**

**ΔI = 1.21 ΔTT - 1.02 ΔGT&I (Eq. 8.5.Alt)**

**Total 1.82 ΔTT - 1.57 ΔGT&I**

**Effect of GDP Growth On Unemployment;**

**Long Run: ΔUnem. Rate = 1.359 - .56.69 Δ(GDP^.17) R2 = .75**

 **(t=) (11.8) (-13.0) DW = 2.0**

 **MSE=0.5%**

**Short Run: ΔUnem. Rate = 1.03 - .0048 Δ(GDP) R2 = .55**

 **(t=) (6.8) (-6.5) DW =1.5**

**MSE=0.7%**

**Tax Cut Deficits (Method #1- Based On Marginal Borrowing Effect &**

 **Marginal Crowd Out Variable Effect):**

**Δ(C&I Spending) = Δ (tax cut deficit’s effect on consumption and**

**investment)**

 **= $ -0.55 consumption effect -$0.22 investment effect) Δ TT**

 **= $- 0.77 decline in private spending per dollar of tax cut**

 **deficit.**

 **$ -0.31 additional decline due to reduced borrowing**

 **($0.17x ($$1.82))**

 **$+0.50 stimulus effect (MPC)**

 **$+0.50 Addition To Loanable Funds From tax Cut MPS**

 **$-0.08 net negative effect on GDP of a tax cut - induced**

 **deficit**

 **X 5.88 multiplier / accelerator effects 1/(1-.50-.33)**

 **$-0.47 Total decrease in GDP associated with a $1.00 tax**

 **cut stimulus**

**Government Spending Deficits (Method #1):**

**Δ(C&I Spending) = Δ (spending deficit’s effect on consumption and**

 **investment)**

 **= $ -0.26 consumption + $-0.53 investment effect**

 **x (Δ GT&I)**

 **= $ -0.79 decline in private spending per dollar of**

 **increased deficit spending.**

 **$ -0.27 additional decline due to reduced borrowing**

 **($0.17x ($1.57))**

 **$+ 1.00 stimulus effect (Coef. On G in IS function)**

 **$-0.06 net initial effect on GDP of a tax cut deficit**

 **x5.88 multiplier / accelerator effects 1/(1-.50-.33) $-0.35 Total increase in GDP associated with a**

**$1.00 deficit-inducing increase in**

**government spending**

**Method #2: Statistically Estimated Full IS Curve**

**(2SLS,Hausman, Wald & Sargan Tests; No Borrowing Variable Or Business Cycle Variable; AR 1, 2, 3 Corrections Used)**

**ΔY = .65ΔTT + .24ΔGT&I +… Etc R2 – 84.3%; (Eq. 9.1.1)**

 **(3.2) (0.6) DW = 2.0**

* **Indicates Tax Cuts Have A Substantial Negative Effect On GDP
( Crowd Out Significantly Overwhelms Stimulus Effects,**
* **Spending – Induced Deficits Have Smaller Positive Impact O**n **GDP
( Stimulus Exceed Crowd Effects On Average, But Effect Not Significantly Different From Zero)**

**CONCLUDE:**

**The Negative Net Effects Of Tax Cut Deficits For Method #1 (.47) Close To Those Obtained For Method #2 (.65); Both Highly Statistically Significant.**

**The Results For Spending Deficits Using Method #1 (-.35) Were More At Variance With Method #2 Results ( +.24), But Both Estimates Statistically, Were Insignificantly Different From Zero.**

**STIMULUS STRATEGIES:**

1. **OBAMA STIMULUS PROGRAM:
 ($830 BILLION, ½ SPENDING, ½TAX CUTS).**
* **Effect On GDP (Method #2):**

 **ΔGDP = $-170B = (-.65) ($415B) + .24 ($415B)**

 **i.e., -0.20 = Δ GDP/ Δ Deficit**

* + **Effect On Unemployment (at 2010 GDP levels):**

 **ΔUnem. Rate = - 56.69($13,078.7B.17 - $13,248.7B.17)**

**= - 56.69(-.011)
 = +0.62% (for one year)**

* + - * **Full Implementation 2010: Unem. Rate Rises from 9.6% to 10.2% (for 1 year)**
			* **2 Year Implementation: Unem. Rate Rises to 9.9% (for 2 years)**
			* **Similarly, an $830B reduction in the deficit would only increase the GDP $170B, reducing the unemployment rate only 0.62%**

**2. RESTORE PRE- 2008 RECESSION UNEMPLOYMENT**

 **LEVELS: REDUCE UNEM. RATE TO FROM 9.6% TO 4.6%
 (2006 & 2007 RATE)**

**May Be Impossible Manipulating The Deficit : The Estimates Above Suggest**

* **Large Deficits Marginally Reduce GDP, Marginally Increase Unemployment , Which Implies**
* **Large Deficit Reductions Would Only Marginally Increase GDP, Marginally Lower Unemployment**
* **Conclude: Manipulating The Deficit In Either Direction Would Not Seem To Be A Successful Strategy For Increasing GDP Or Reducing Unemployment in The Short Run**
* **However, In The Solow Long Run, Increases In Saving, Including Public Saving, Through Deficit Reduction, Increase Investment And GDP Growth (Though Not Necessarily The Unemployment Rate If The GDP Growth Is Coming From Increased Productivity).**

**3) NO STIMULUS PROGRAM**

* **IS/LM/Phillips Curve Theory: Unemployment Pressures Lower Prices And Wages, Shifting LM curve to Right, Restoring Full Employment (Blinder, Mankiw)**
* **Real Business Cycle Theory/ New Keynesian Theory: Long term full employment equilibriums via micro foundations effects (intertemporal utility and profit maximization)**

**DYNAMIC EFFECTS:**

**We can estimate the dynamic effects of a one-time deficit driven change in the GDP from the standard Keynesian IS curve formulation:**

**ΔY = ΔC +ΔI + ΔG + Δ(X-M)**

**With some simplifying assumptions,(e.g.**

1. **that government spending and taxes after the initial stimulus return to their earlier levels after a specified period of periods, and**
2. **.to deal with the “Everything is a function of everything else” issue, variables whose current values are in part driven by current or past values of the GDP are specified using only their initial exogenous part, augmented by the effect of the current or lagged values of the GDP appropriate for that variable. For example, If our GDP determination model was

 Y = .50 (Y-T) + .30 ACC + G + (X-M) +.10 DJ where (DJ - .20 Y) = DJEXOG

we can easily show that

Y = [1/(1-.50-.30-.02)] [-.50T -.30Y-1 + .10 DJEXOG + G + (X-M) ]

i.e., the “everything is a function of everything else” problem reduces to simply a change in multiplier effect when one uses the exogenous portion of variables so affected. We would then iterate through the model as many times as necessary to clear the original change in Y’s effects out of any lags through which it affects other variables, and hence the GDP in future years.**

**Lagged effects of changes in other variables are handled by direct entry of the lagged value in the equation, or the lagged value of GDP affecting the variable as XEXOG + βY-t**

**That said, this paper’s analysis has been done in comparative statics. While it would be desirable to know the dynamic path the change in GDP takes over time, it is beyond the scope of this paper**

**ALTERNATIVE METHODS FOR FINANCING DEFICITS**

* **Increase MS (?)**
* **Foreign Borrowing (That Does Not Reduce Loanable Funds
 Available Domestically For C And I)**

**- END -**