

# Wealth Effects on World Private Financial Saving

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July 2016

## Abstract

This paper shows that about 70 percent of the variance of the yearly change in the world private financial saving rate can be explained by lagged changes in world stock and housing values for the sample period 1982–2013. A theory consistent with these results is that world asset-value changes affect world consumption and investment spending, which affects the world private financial saving rate.

## 1 Introduction

Annual data on the world private financial saving rate, denoted  $sp_t^*$ , are constructed in this paper for the 1980–2013 period, a measurement that is new to this paper. It will be seen that there is a high negative correlation between changes in  $sp_t^*$  and lagged changes in world stock and housing values. Regression results show that about 70 percent of the variance of the change in  $sp_t^*$  can be explained by lagged changes in world stock and housing values for the sample period 1982–2013. A theory consistent with these results is that asset-value changes affect consumption

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and investment spending through wealth effects, which affects the private financial saving rate.

The regression results are consistent with much of the literature on wealth effects on household expenditures. Wealth effects on household expenditures have been part of my U.S. macroeconomic model since its inception—Fair (1976). Recent estimates from the model—reported in Fair (2016)—show that a sustained increase in household wealth (financial plus housing) leads to an increase in household expenditures of about 4 to 5 percent of the wealth increase per year. In other words, about 4 to 5 cents on the dollar.

This estimate is consistent with results from other approaches. The size of the wealth effect is discussed in Ludvigson and Steindel (1999), where they conclude (p. 30) that “a dollar increase in wealth likely leads to a three-to-four-cent increase in consumption in today’s economy,” although they argue that there is considerable uncertainty regarding this estimate. Their approach is simpler and less structural than using a macroeconomic model, but the size of their estimate is similar. Starr-McCluer (1998) uses survey data to examine the wealth effect, and she concludes that her results are broadly consistent with a modest wealth effect.

Mian, Rao, and Sufi (2013) find 5 to 7 percent effects of housing wealth on consumption (p. 1723), although these effects vary considerably across zip codes. Zhou and Carroll (2012) find 5 percent effects of housing wealth on consumption (p. 18). Case, Quigley, and Shiller (2012) test for asymmetrical effects and find that the housing wealth elasticity is estimated to be larger in falling markets than in rising markets. Their estimated elasticities are 0.10 and 0.032, respectively, in falling and rising markets. The elasticity of 0.10 in falling markets translates into

roughly 4 cents on the dollar.

Finally, Chaney, Sraer, and Thesmar (2012) find significant effects of real estate prices on corporate investment through a collateral channel. They estimate about 6 cents of investment for each dollar of collateral.

The next section discusses the construction of  $sp_t^*$  and how it relates to the literature. Section 3 discusses the data collection and examines plots of the data. In Section 4 reduced form regressions are run explaining  $sp_t^*$ . Theoretical issues are discussed in Section 5.

## 2 The Construction of $sp_t^*$ and Related Literature

Country  $i$ 's current account, denoted  $S_{it}$ , is its financial saving vis á vis the rest of the world. If its current account is in surplus, there is an increase in its net foreign assets, and conversely if its current account is in deficit. The sum of the current accounts of all countries in the world is zero after converting the current accounts to a common currency. The financial saving of a country's government, denoted  $SG_{it}$ , is total government revenue minus total government expense. If a government's financial saving is positive, there is an increase in the government's net financial assets, and conversely if the government's financial saving is negative. The financial saving of a country's private sector, denoted  $SP_{it}$ , is  $S_{it} - SG_{it}$ . Because the sum of  $S_{it}$  across all countries is zero after converting to a common currency, the sum of  $SP_{it}$  is equal to minus the sum of  $SG_{it}$  after converting each to a common currency. If the sum of  $SP_{it}$  after converting to a common currency is positive, this means there is a net flow of funds from the world's private sector

to the world's government sector, and conversely if the sum is negative.  $sp_t^*$  is the sum of  $SP_{it}$  divided by world GDP, where all variables are converted to U.S. dollars.

This paper is concerned with *financial* saving—flows of funds among sectors and countries. Financial saving does not distinguish between consumption and investment expenditures. The financial saving of a sector or country is total revenue minus total expenditures, including expenditures that are classified in the national income and product accounts as investment expenditures.<sup>1</sup> Consider the GDP definition for a country,  $Y_{it} = C_{it} + I_{it} + G_{it} + EX_{it} - IM_{it}$ , where  $Y_{it}$  is GDP,  $C_{it}$  is consumption,  $I_{it}$  is investment,  $G_{it}$  is government spending,  $EX_{it}$  is the level of exports, and  $IM_{it}$  is the level of imports.  $S_{it}$  as used in this paper is  $Y_{it} - C_{it} - I_{it} - G_{it}$ , namely the country's current account,  $EX_{it} - IM_{it}$ . A country's saving, on the other hand, which will be denoted  $SAV_{it}$ , is  $Y_{it} - C_{it} - G_{it}$ , so  $S_{it} = SAV_{it} - I_{it}$ . In this paper  $SAV_{it}$  will be called “saving,” and  $S_{it}$ ,  $SP_{it}$ , and  $SG_{it}$  will be called “financial saving.”

Much of the literature on saving behavior is concerned with  $SAV_{it}$ . It is important to realize that a country's current account,  $S_{it}$ , can be large relative to its GDP even though it has a low saving rate (because  $I_{it}$  is small). If one is talking about which countries are financing, say, a large U.S. current account deficit, it is not necessarily countries with high saving rates. By definition all current account deficits are financed by current account surpluses (because the sum of  $S_{it}$  across countries is zero), but this in itself says nothing about which countries have high

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<sup>1</sup>The difference between consumption and investment expenditures in national income and product accounts is, of course, somewhat arbitrary. For example, consumer durable expenditures and clothing expenditures have an investment component to them, as do educational expenditures.

saving rates and which have low saving rates.

It is useful to see how this paper relates to the literature on saving gluts. Bernanke (2005) in a well known speech discussed the possibility of a global saving glut in the early 2000s, and econometric studies—for example, Chinn and Ito (2007) and Gruber and Kamin (2007)—examining this theory followed. In the econometric work current account balances for a number of countries are regressed on a variety of variables. To the extent that the right hand side variables are exogenous, these regressions can be considered reduced form regressions. An issue with this work, however, is that there cannot be a global saving glut regarding current account balances, since they sum to zero across countries, a fact this paper uses in the construction of  $sp_t^*$ . It is thus not clear what to make of the regression results regarding a possible global saving glut. Bernanke’s speech is in fact not really concerned with a global saving glut, but with the large U.S. current account deficit. He discusses a number of possible reasons for the large U.S. deficit and for the surpluses of some other countries. None of this discussion requires the concept of a global saving glut.

Obstfeld (2010) focuses on current account deficits and surpluses leading up to the world economic slowdown in 2008-2009—what he calls “current account imbalances.” He discusses possible connections between the imbalances and the U.S. financial crisis, and he argues that there is no simple cause and effect story. Again, this paper is not concerned with current account imbalances, which sum to zero across all countries. Instead, the world is divided into two sectors—private and government—and the financial saving of the world’s private sector is examined, not the financial flows among countries.

There is an interesting literature showing that after taking into account capital gains and losses on net foreign assets, the change in a country's net foreign assets can be quite different from the country's current account—see, for example, Gourinchas and Rey (2007) and Obstfeld (2010). The financial flow data used in this paper do not include capital gains and losses, so these valuation issues are not taken into account.

There is finally a literature explaining the private saving of various countries, both across time and across countries—see, for example, Maason, Bayoumi, and Samiei (1998) and Loayza, Schmidt-Hebbel, and Servén (2000). This latter reference provides a good summary of previous work. In this literature the private saving rate is regressed on a number of variables, generally using panel data sets. Again, if the right hand side variables are exogenous, these regressions can be considered reduced form regressions. Government saving is usually one of the right hand side variables, which seems problematic. If, say, there is a negative shock to consumption, thus increasing private saving, this is likely to lead to a fall in output and income, which will lead to a fall in tax revenue and possibly an increase in some kinds of government spending. Government saving will thus fall. Government saving is an endogenous variable, and it is not clear that it should be on the right hand side of an equation explaining private saving. At any rate, this is not an issue in this paper. Total private financial saving in the world is equal to the negative of total government financial saving in the world, and the latter is certainly not an exogenous variable explaining the former.

### 3 Data Collection and Values of the Variables

#### Data Collection for $sp_t^*$

All of the data used in the construction of  $sp_t^*$  were taken from the IMF International Financial Statistics (IFS). Only annual data were used. The construction is discussed in the Appendix and summarized in Table A.2. For each country, current account data, government financial saving data, GDP data, and data on its exchange rate relative to the U.S. dollar were collected and used. Data began earlier for some countries than others. For 38 countries (group 1) the beginning year is 1980. For 18 others (group 2) the beginning year is 1990, and for 36 others (group 3) the beginning year is 2000. The last year is 2013 for all countries. The three groups are listed in Table A.1.

Also constructed in this study is a variable, denoted  $s_t^*$ , which is the sum of the current accounts across all countries divided by the sum of their GDP's. With no measurement error, this variable should be zero, which is examined next.

#### Tables and Plots of $sp_t^*$

Table 1 presents values of  $sp_t^*$  and  $s_t^*$  three sets of countries. Observations begin in 1980 for the first set (group 1), 1990 for the second set (groups 1 and 2), and 2000 for the third set (groups 1, 2, and 3). It is important to note that the summation for the first set is always over only countries in that set—countries are not added as observations become available for them. The values for  $sp_t^*$  and  $s_t^*$  for, say, 1990 for the first set are thus different than those for the second set because the summation is different.

**Table 1**  
**Values of  $sp_t^*$  and  $s_t^*$**

Year	$sp_t^*$			$s_t^*$		
	1	2	3	1	2	3
1980	0.0279			-0.0026		
1981	0.0354			-0.0001		
1982	0.0405			-0.0053		
1983	0.0480			-0.0052		
1984	0.0399			-0.0074		
1985	0.0382			-0.0081		
1986	0.0391			-0.0027		
1987	0.0306			-0.0029		
1988	0.0258			-0.0015		
1989	0.0236			-0.0037		
1990	0.0257	0.0264		-0.0052	-0.0064	
1991	0.0288	0.0294		-0.0047	-0.0057	
1992	0.0342	0.0346		-0.0023	-0.0035	
1993	0.0360	0.0363		0.0002	-0.0012	
1994	0.0278	0.0285		-0.0014	-0.0020	
1995	0.0262	0.0269		0.0002	-0.0003	
1996	0.0215	0.0215		-0.0005	-0.0006	
1997	0.0148	0.0141		0.0031	0.0024	
1998	0.0069	0.0063		-0.0001	-0.0010	
1999	-0.0028	-0.0028		-0.0056	-0.0055	
2000	-0.0138	-0.0126	-0.0092	-0.0108	-0.0096	-0.0065
2001	0.0012	0.0026	0.0042	-0.0098	-0.0083	-0.0062
2002	0.0193	0.0199	0.0194	-0.0089	-0.0074	-0.0054
2003	0.0276	0.0276	0.0275	-0.0071	-0.0054	-0.0030
2004	0.0260	0.0250	0.0246	-0.0040	-0.0028	0.0000
2005	0.0166	0.0156	0.0163	-0.0061	-0.0052	-0.0009
2006	0.0057	0.0050	0.0046	-0.0045	-0.0038	0.0005
2007	0.0095	0.0081	0.0042	0.0007	0.0006	0.0019
2008	0.0262	0.0240	0.0180	-0.0007	-0.0016	0.0005
2009	0.0706	0.0666	0.0637	0.0033	0.0018	0.0030
2010	0.0670	0.0628	0.0599	0.0042	0.0024	0.0040
2011	0.0554	0.0522	0.0473	0.0029	0.0016	0.0032
2012	0.0515	0.0479	0.0437	0.0046	0.0023	0.0033
2013	0.0421	0.0401	0.0380	0.0061	0.0049	0.0052
Mean of absolute values				0.0040	0.0036	0.0031

$sp_t^*$  is the world private financial saving rate.

$s_t^*$  is the world total financial saving rate, which should be zero.

1 = group 1 (38 countries). See Table A.1.

2 = groups 1 and 2 (56 countries). See Table A.1.

3 = groups 1, 2, and 3 (92 countries). See Table A.1.

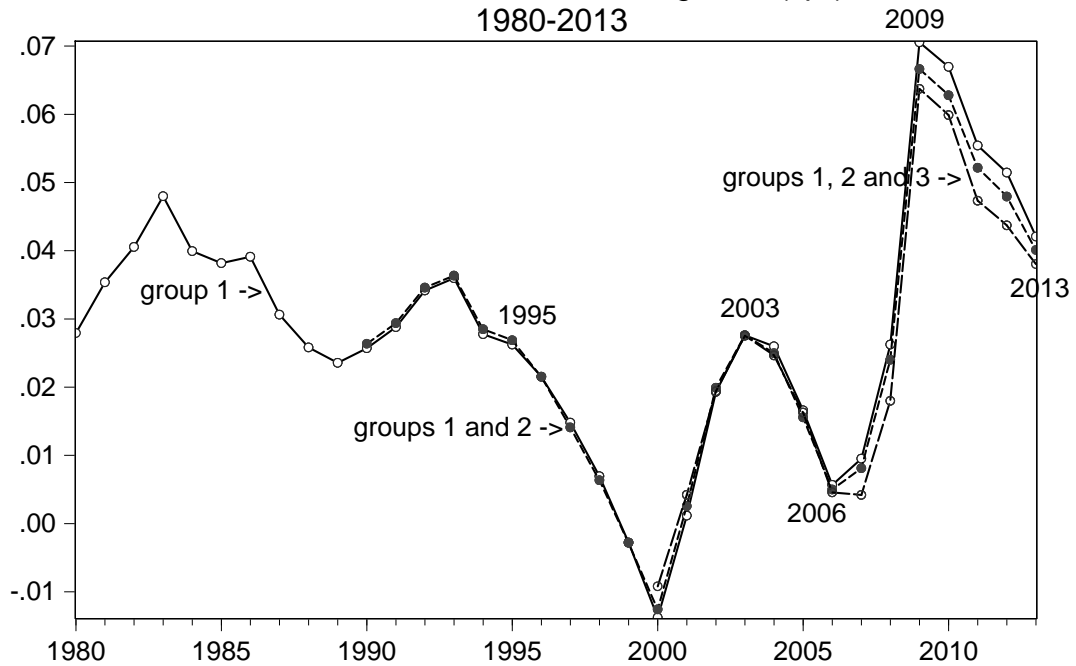


As noted above, the values for  $s_t^*$  should all be zero. As a check on the data, consider in Table 1 how close the values of  $s_t^*$  are to zero. The values range from  $-0.0108$  for 2000 for set 1 to  $0.0061$  for 2013 for set 1. The means of the absolute values for the three sets are  $0.0040$ ,  $0.0036$ , and  $0.0031$ , respectively. From the IMF World Economic Outlook Database (October 2014 used here) one can get annual data on the world current account balance and on world GDP (in U.S. dollars). For the 1980–2013 period the ratio of the world current account balance to world GDP ranges from  $-0.0090$  to  $0.0055$ , and the mean of the absolute values is  $0.0041$ . This mean compares to the mean of  $0.0040$  for set 1 in Table 1. The values in Table 1 are thus of the same magnitude as the IMF values, which suggests that most of the world that matters for this purpose is being captured.

Figure 1 plots the three sets of values of  $sp_t^*$  in Table 1. The plots show that the values since 2000 have a similar pattern for the three sets and that the values since 1990 have a similar pattern for the two sets. The results are thus not sensitive to the addition of more countries. The figure shows that there was a modest rise in the saving rate between 1980 and 1983, a modest fall to 1989, a modest rise to 1994, a large fall until 2000, a large rise to 2003, a fall to 2006, a remarkable rise to 2009, and then a fall to 2013, the end of the data. It will be seen below that these fluctuations are highly correlated with changes in world asset values.

As discussed in the Appendix, the world government financial saving rate, denoted  $sg_t^*$ , is  $s_t^* - sp_t^*$ . Since  $s_t^*$  is approximately zero,  $sg_t^*$  is approximately  $-sp_t^*$ . Given this, another way of looking at, say, the large positive value of  $sp_t^*$  in 2009 is that governments were on average running large deficits.  $sp_t^*$  for set 3 (all 92 countries) was  $0.0637$  in 2009, and so the deficit of the world's government

Figure 1  
World Private Financial Saving Rate (sp\*)  
1980-2013



sector was approximately 6.37 percent of world GDP . One might say there was a world-wide government deficit problem in 2009, which is the same as saying there was a problem of a large world-wide private financial saving rate.

### Data Collection for World Asset Values

A global stock index from MSCI, denoted  $MSCI_t$ , is available back to 1980. Another global stock index, from Standard & Poors, denoted  $SP1200_t$ , is available back to 1989. Observations on the last business day of each year were collected for each of these two variables. Each of these variables was normalized by world trend GDP . Let  $Y_t^*$  denote the sum of  $Y_{it}$  over the group 1 countries.  $\log Y_t^*$

was regressed on a constant and time trend for the 1980–2013 period, and the exponential of each predicted value from this regression, denoted  $\hat{Y}_t^*$ , was used for the trend value. Let

$$MSCI_t^* = MSCI_t / \hat{Y}_t^*$$

$$SP1200_t^* = SP1200_t / \hat{Y}_t^*$$

These are the two global stock indices used below. Values of  $SP1200_t^*$  are only available back to 1989, and this variable was spliced to  $MSCI_t^*$  for the years 1980–1988. The spliced variable will be denoted  $SP1200_t^{**}$ .

For comparison purposes data on the Standard & Poors 500 U.S. stock index, denoted  $SP500_t$ , were also collected, again observations for the last business day of the year. It was normalized by U.S. trend GDP.  $\log Y_{US,t}$  was regressed on a constant and time trend for the 1980–2013 period, and the exponential of each predicted value from this regression, denoted  $\hat{Y}_{US,t}$ , was used for the U.S. trend value. Let

$$SP500_t^* = SP500_t / \hat{Y}_{US,t}$$

Observations on this variable are available for the entire 1980–2013 period.

Regarding world housing prices, one can get from the Bank of International Settlements (BIS) indices of residential property prices by country. Data back to 1970 are available for 20 countries.<sup>2</sup> An overall index of these indices for the 20 countries was computed using as weights the country's GDP in 2005 in dollars. This index will be denoted  $BIS_t$ . Data beginning in 1980 were used here. An

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<sup>2</sup>The 20 countries are Australia, Belgium, Canada, Switzerland, Germany, Denmark, Spain, Finland, France, the United Kingdom, Ireland, Italy, Japan, Korea, the Netherlands, Norway, New Zealand, Sweden, the United States, and South Africa.

important feature of  $BIS_t$  is that it is a property price variable, not a housing wealth variable. It is obviously highly correlated with housing wealth, but it is not wealth.

A housing wealth variable is available for the United States, which will be denoted  $USHOUSE_t$ . It is the nominal market value of the stock of housing from the U.S. Flow of Funds accounts (for the fourth quarter of the year) divided by trend U.S. GDP above,  $Y_{US,t}^{\hat{\$}}$ .

It will be useful to examine plots of some of these variables. Figure 2 plots  $MSCI_t^*$  and  $SP1200_t^*$  for the common 1989–2013 period. It is obvious that these two variables are highly correlated. They are essentially measuring the same thing.

Figure 3 plots  $MSCI_t^*$  and  $SP500_t^*$  for the 1980–2013 period. Remember that  $SP500_t^*$  is for the United States only. These two variables are highly correlated from 1997 on. From 1985 through 1996,  $MSCI_t^*$  is noticeably larger. Stock markets were stronger outside of the United States during this period.

Figure 4 plots  $BIS_t$  and  $USHOUSE_t$  for the 1980–2013 period. Both variables show sharp increases between 1997 and 2006. However, the huge fall in  $USHOUSE$  between 2006 and 2011 is not reflected in  $BIS$ . There is a fall, but it is modest. Remember that  $BIS$  is a property price variable, not a wealth variable. Both variables are used in the regression analysis below.

Figure 2  
 MSCI\* and SP1200\*: 1989-2013

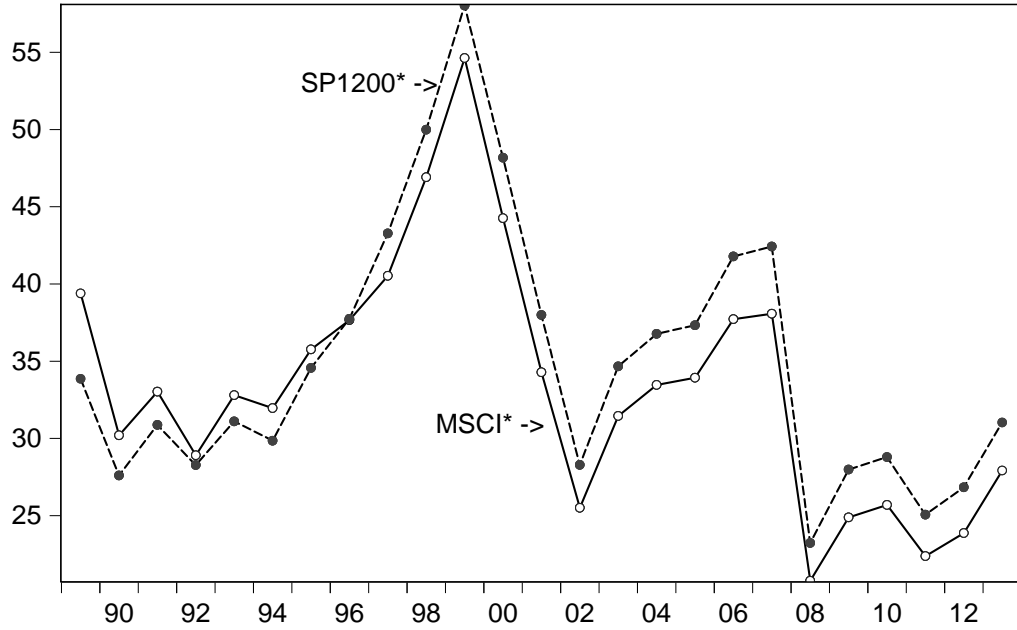


Figure 3  
 MSCI\* and SP500\*: 1980-2013

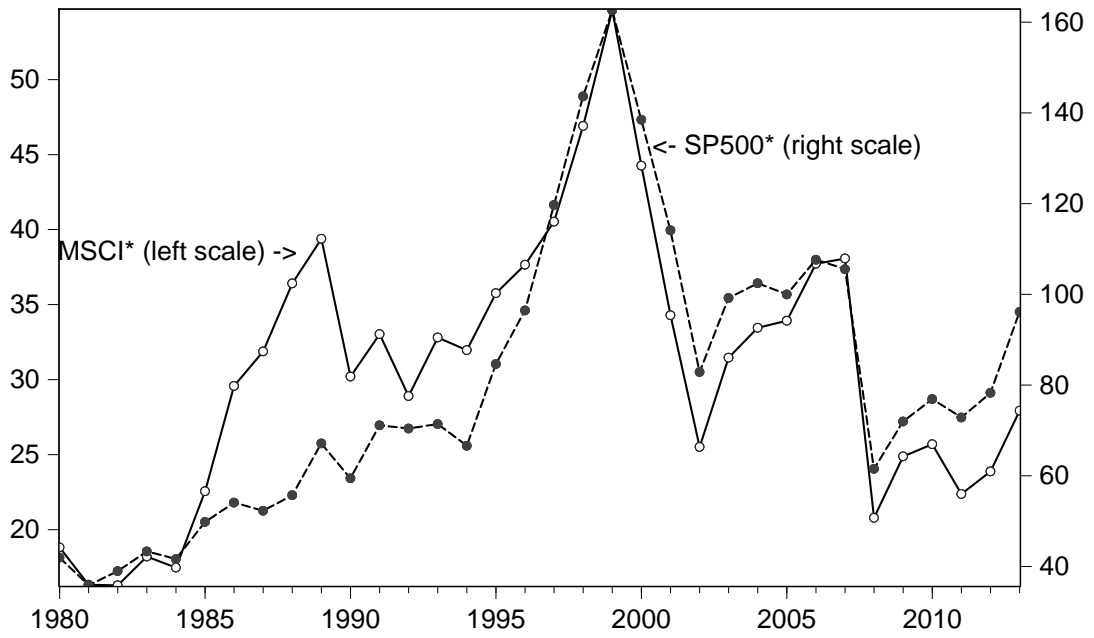
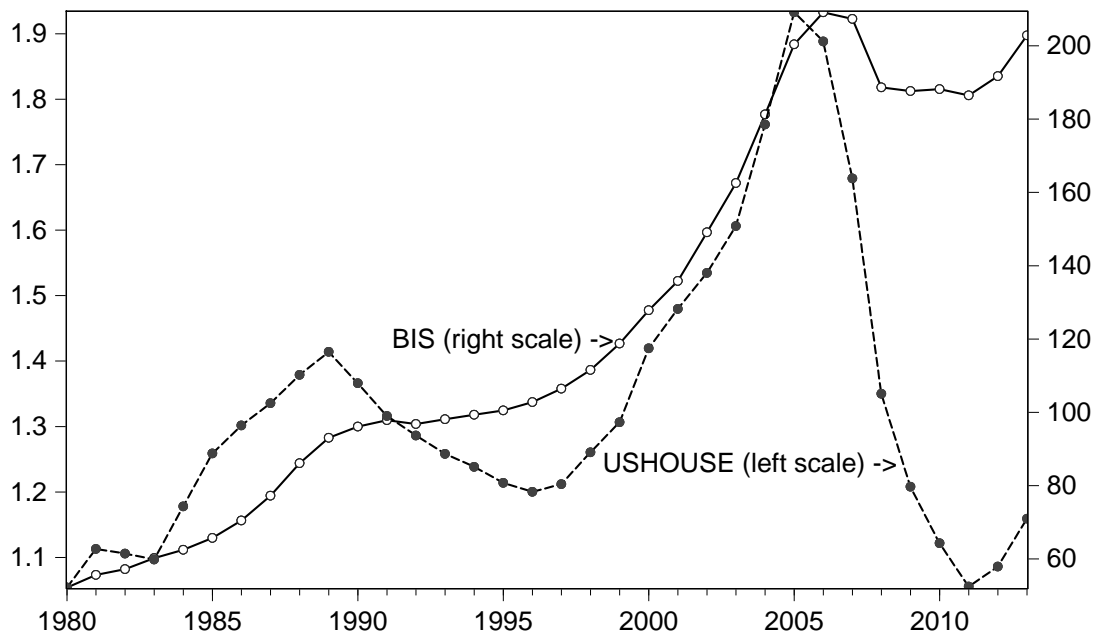


Figure 4  
USHOUSE and BIS: 1980-2013



### Plots of $sp_t^*$ and Asset Variables

Figure 5 plots  $sp_t^*$  and  $MSCI_t^*$  lagged one year, i.e.,  $MSCI_{t-1}^*$ . The negative correlation is remarkable. The figure indicates why the regression results below are so strong. Finally, Figure 6 plots  $sp_t^*$  and  $USHOUSE_t$  lagged one year. Comparing Figures 5 and 6, the large increases in housing values did not begin until the late 1990s, whereas the large increases in stock values began in the mid 1990s. Also, housing values did not fall in the early 2000s, contrary to stock values.

Figure 5  
 sp\* and MSCI\* lagged once: 1981-2013

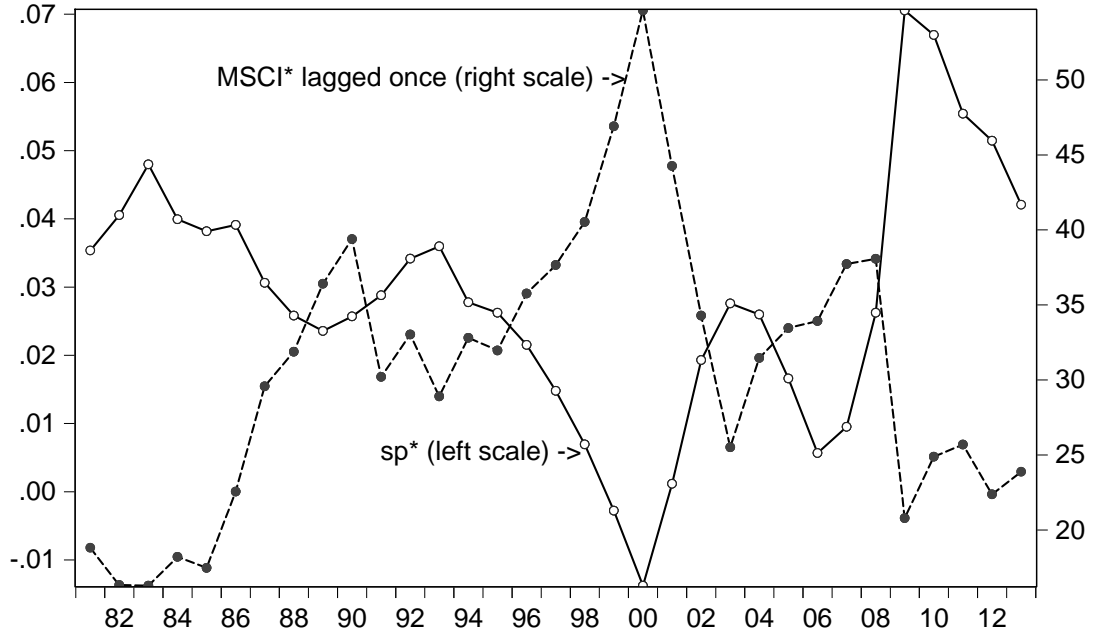
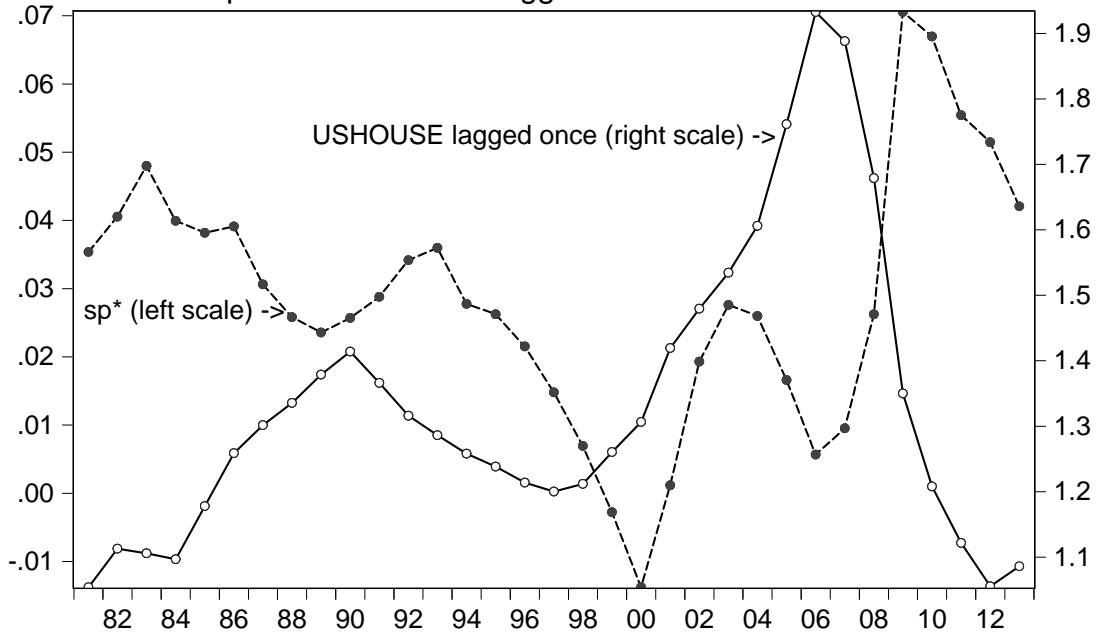


Figure 6  
 sp\* and USHOUSE lagged once: 1981-2013



## 4 Reduced Form Regressions Explaining $sp_t^*$

In Table 2 the change in  $sp_t^*$  is regressed on one-year lagged changes in asset values. Before discussing these results, how should these regressions be interpreted? Consider  $sp_t^*$  as an endogenous variable in a large world simultaneous equations structural model, with many endogenous, lagged endogenous, and exogenous variables, where some of the explanatory variables are lagged asset values. (Remember from the discussion in the Introduction that there are likely to be wealth effects on household expenditures.) Now solve for the reduced form equation for  $sp_t^*$ , where  $sp_t^*$  is then a function of lagged endogenous variables and exogenous variables. Take the first difference of this equation, where the change in  $sp_t^*$  is then a function of the changes in lagged endogenous variables and exogenous variables. If lagged asset values are explanatory variables in the overall model, then the changes in lagged asset values will be in the reduced form equation. Let  $\Delta A_{t-1}$  denote the change in some lagged asset value. If  $\Delta A_{t-1}$  is uncorrelated with all the variables in the reduced form equation, an OLS regression of  $\Delta sp_t^*$  on a constant and  $\Delta A_{t-1}$  will result in a consistent estimate of the coefficient of  $\Delta A_{t-1}$ .<sup>3</sup>

How good is the assumption that  $\Delta A_{t-1}$  is uncorrelated with all the variables in the reduced form equation, where  $A$  is a world stock index or a housing index? The assumption is valid if the change in  $A$  is simply a random walk with drift, which is supported by much of the finance literature. Results reported in footnote 11 in Fair (2016) are consistent with this assumption. No significant effects could

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<sup>3</sup>This is assuming linearity. For a nonlinear structural model, it may not be possible to solve for the reduced form equation analytically. In this case estimating a linear reduced form equation is only an approximation.



**Table 2**  
**Regression Results**  
 $\Delta sp_t^*$  is the left-hand-side variable.

	(1)	(2)	(3)	(4)	(5)
constant	0.00045 (0.38)	0.00059 (0.52)	0.00082 (0.70)	0.00244 (1.70)	0.00045 (0.26)
$\Delta MSCI_{t-1}^*$	-0.00131 (-5.96)				
$\Delta SP1200_{t-1}^{**}$		-0.00131 (-6.58)		-0.00134 (-6.33)	-0.00132 (-6.44)
$\Delta SP500_{t-1}^*$			-0.00050 (-6.16)		
$\Delta USHOUSE_{t-1}$	-0.03763 (-2.91)	-0.03665 (-3.01)	-0.04323 (-3.48)		-0.03660 (-2.95)
$\Delta BIS_{t-1}$				-0.00043 (-2.30)	
$\% \Delta WORLDY_{t-1}$					0.0000221 (0.10)
SE	0.00674	0.00636	0.00661	0.00670	0.00647
R <sup>2</sup>	0.675	0.710	0.687	0.678	0.710
DW	1.52	1.42	1.71	1.34	1.43

Estimation period: 1982–2013, 32 observations.

OLS estimates.

t-statistics are in parentheses.

Range of  $sp_t^*$  is -0.0138 to 0.0706.

$MSCI^*$  = MSCI global stock index normalized by world trend GDP.

$SP1200^{**}$  = global stock index from Standard & Poors normalized by world trend GDP, spliced to  $MSCI^*$  for 1980–1988.

$SP500^*$  = U.S. stock index from Standard & Poors normalized by U.S. trend GDP.

$BIS$  = BIS world residential property price index.

$USHOUSE$  = U.S. nominal market value of housing normalized by U.S. trend GDP.

$WORLDY$  = world GDP.

be found of various lagged macroeconomic variables on the changes in U.S. stock and housing values. The results in Table 2 will thus be interpreted as producing consistent coefficient estimates, subject to the nonlinear issue discussed in the previous footnote.

The measurement error in  $sp_t^*$  is probably small, since the values of  $s_t^*$  in Table 1 are fairly small, although there is, of course, some measurement error. Measurement error in  $\Delta sp_t^*$  in Table 2 will increase the estimated standard errors, but it will not lead to bias in the coefficient estimates if the error is uncorrelated with the right hand side variables.

Equations (1), (2), and (3) in Table 2 use the U.S. housing wealth variable, *USHOUSE*, plus different stock variables: *MSCI\**, *SP1200\*\**, and *SP500\**, respectively. Remember that *SP1200\*\** is spliced from 1988 back using *MSCI\**. The  $R^2$ 's are remarkably high—0.675, 0.710, and 0.687 respectively, consistent with the plots in Figures 5 and 6. The largest  $R^2$  is for *SP1200\*\**, but they are all close. Remember that *SP500\** is for the United States only. Given the high correlation between *SP500\** and world stock values, especially since 1997, using *SP500\** in place of the world indices yields roughly the same results. The U.S. housing wealth variable has a consistent coefficient estimate in all three regressions, and its coefficient estimate is little affected by which stock variable is used.

Equation (4) is equation (2) with *BIS* replacing *USHOUSE*. The coefficient estimate of  $\Delta BIS_{t-1}$  is negative as expected and significant, although the fit of the equation is not as good as when *USHOUSE* is used. It would appear that *USHOUSE* is capturing world housing wealth effects better than is *BIS*.

Equation (5) is equation (2) with the lagged percentage change in world GDP,

denoted  $\% \Delta \text{WORLDY}_{t-1}$ , added. This variable is not significant and adds nothing to the explanatory power of the equation. It is not a good proxy for the other explanatory variables in the reduced form equation.

Other robustness checks were also made. The percentage change in world GDP lagged twice was added, and it was not significant. Nor were the change in asset variables lagged twice. The change in *USHOUSE* lagged twice was significant in equations (1) and (2), but the coefficient estimates were of the wrong sign.

Finally, it is interesting to note that the huge increase in  $sp_t^*$  in 2009 is an informative example of what the regression results are picking up. Consider Figures 5 and 6. In 2008 (remember that the asset values are lagged once in the figures) both stock values and housing values fell dramatically. This is contrary to a number of other years in which they moved in opposite directions. The regression results are picking up the fact that these two falls preceded the huge increase in  $sp_t^*$  in 2009—an increase larger than any of the other increases in the sample period.

## 5 Theories

As noted in the Introduction, the regression results in Table 2 are consistent with the existence of estimated wealth effects in the literature. What is remarkable is how much of the variance of the change in  $sp_t^*$  can be explained by the lagged change in two asset variables.

A theory consistent with the results in Table 2 is that world asset changes like stock changes affect world consumption through wealth effects and affect world investment through cost of capital effects. The simple life cycle model, for

example, says that an unanticipated increase in wealth leads, other things being equal, to an increase in consumption. This theory relies on asset-price changes being exogenous to the households' and firms' decision making processes: asset prices change for some reason independent of these processes, and after the asset-price changes, households and firms respond.

As noted in Section 4, there are other variables in the reduced form equation for  $sp_t^*$  aside from the variables in Table 2. These are likely to include current exogenous fiscal-policy variables and various lagged endogenous variables. If, for example, the monetary policy rule for a country has the lagged value of the country's unemployment rate as an explanatory variable, the lagged value of the unemployment rate will be in the reduced form equation for  $sp_t^*$ . Given the above theory, the best explanation of  $sp_t^*$  is likely to come not from estimating a reduced form equation but from estimating a multicountry structural model with lagged asset values in the consumption and investment equations and then solving for  $sp_t^*$ .

Another possible theory is one in which there is an exogenous change in households' and firms' expectations of some future variable, like future productivity, and this leads them to both bid asset prices up or down and to change consumption and investment. If productivity is expected to be higher in the future than originally thought, this would lead households to bid asset prices up and increase consumption at the same time. Lantz and Sarte (2001) have a general equilibrium model in which this effect is at work. In this theory asset-price changes do not cause consumption and investment changes, since all three are determined by changes in expectations. In this case it does not make sense, for example, to talk about the marginal propensity to consume out of wealth.

Under this second theory the regressions in Table 2 are not causal. They are simply picking up correlations between changes in  $sp_t^*$  and changes in lagged asset values. What can be said is the following: Say there are two forces, like expectation changes. Say that one force affects both asset values and private spending and the other affects only spending. The effects of the second force go into the error term in the regressions, since the second force affects the left hand side variable but not the right hand side variables. The regressions will be picking up the effects of the first force, but not the second. The high correlations in Table 2 thus suggest that this first force is quite important.

If asset-price changes (or forces like changes in productivity expectations that drive asset-price changes) are essentially unpredictable, then the present results suggest that much of the change in  $sp_t^*$  is unpredictable. In a complete structural model some of the change in  $sp_t^*$  would be predictable because it would depend on various exogenous and lagged endogenous variables, including various exogenous fiscal-policy variables. The main message here is that so much of the change in  $sp_t^*$  seems to be driven by (unpredictable) changes in asset prices.

If the forces behind asset-price changes are largely unpredictable, this does not necessarily mean that policy makers have no ability to affect these changes. Take the huge boom in U.S. stock prices between 1995 and 2000. Many people thought at the time that this boom was a stock market bubble, but this did not appear to be the Fed's view. Alan Greenspan talked about a new age of productivity, and the Fed lowered interest rates during certain bad times in the stock market.<sup>4</sup>

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<sup>4</sup>Perhaps the most dramatic Fed action in this period was the surprise lowering of the federal funds rate on October 15, 1998. The U.S. stock market was down from its highs in late September, and the Fed cited unsettled conditions in financial markets as one of the reasons for the decrease.

The view among many was that there was a “Greenspan put” regarding stock prices. It is possible that the Fed could have curtailed this boom by raising (or not lowering) interest rates and margin requirements. Policy actions like these are themselves unpredictable, and thus changes in stock prices and housing prices can be unpredictable even though they are influenced by (unpredictable) policy actions.

Another example is the lack of much regulation of the U.S. housing market during the boom in housing prices between the late 1990s and 2006. Had there been more regulation, housing prices may not have risen as much as they did. The bailout of financial institutions during the 2008–2009 recession is also a policy action that may affect stock prices.

Therefore, to the extent that the large fluctuations in  $sp^*$  are undesirable, policy actions or lack thereof may bear part of the blame.

Finally, although the discussion in this paper has focused on  $sp_t^*$ , it could, of course, have focused on the world government financial saving rate,  $sg_t^*$ , which is  $-sp_t^*$  aside from measurement error. Under the first theory discussed above, an increase in world asset values stimulates world consumption and investment and leads to a fall in  $sp_t^*$  and thus a rise in  $sg_t^*$ . The main reason for the rise in  $sg_t^*$  is the increase in tax revenue due to the more expansive world economy. Under this theory the behavioral changes caused by the increase in asset values are increases in world private consumption and investment. Governments play a passive role.  $sg_t^*$  changes because tax revenue changes. It may be that an increase in asset values leads to a decrease in discretionary government spending and/or an increase in discretionary tax rates, but this is probably quantitatively small. This

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This resulted in a huge increase in stock prices after the announcement.

paper is based on the assumption that these discretionary effects are negligible. The driving force behind the large government deficits in the world in 2009 is likely the huge fall in world equity and housing values that led to large decreases in private consumption and investment. Under the second theory the driving force is a change in expectations that led directly to large decreases in asset values, consumption, and investment. In either case the increases in the deficits were caused by the fall in tax revenue due to the fall in private spending.

## **6 Conclusion**

This paper has constructed for the first time data on the world private financial saving rate. There is a large negative correlation between changes in this rate and lagged changes in world stock and housing values. A theory consistent with this result is that there are large wealth effects on consumption and investment spending.

## Appendix: Data Collection for $sp_t^*$

Except for the stock and housing data, all the data used in this paper were taken from the IMF International Financial Statistics (IFS). Only annual data were used. The current account for each country in U.S. dollars,  $S\$_{it}$ , was taken from the Balance of Payments section. When available, variable  $129ba$ , balance on current and capital account, was used. When this variable was not available, the sum of variable  $78ald$  (current account, n.i.e.) and variable  $78bcd$  (capital account, n.i.e.) was used. Variable  $78bcd$  is minor and covers net transfers linked to the acquisition of a fixed asset and the net disposal of nonproduced, nonfinancial assets. The sum of  $78ald$  and  $78bcd$  is the balance on the financial account except for net errors and omissions. All three variables.  $129ba$ ,  $78ald$ , and  $78bcd$ , are in U.S. dollars.

Government financial saving,  $SG_{it}$ , for each country was taken from the Government Finance section. When available, variable  $anob$ , net operating balance, was used. If variable  $anob$  was not available but variable  $agob$ , gross operating balance, was,  $agob$  was used. If neither variable  $anob$  nor  $agob$  was available, variable  $ccsd$ , cash surplus/deficit, was used. If the country's fiscal year were not the same as the calendar year, the variable was converted by interpolation to the calendar year under the assumption that the value in each quarter of a fiscal year is one-fourth the value in that fiscal-year.  $SG_{it}$  is in units of the country's currency, and it was converted to U.S. dollars by dividing by the exchange rate,  $e_{it}$ :  $SG\$_{it} = SG_{it}/e_{it}$ .  $e_{it}$  is variable  $rf$  in the IFS data.

Nominal GDP for a country,  $Y_{it}$ , was taken from the National Accounts section. It was one of the following five variables:  $99b..$ ,  $99b.c$ ,  $99b.d$ ,  $99bp.$ , and  $99bac$ .



$Y_{it}$  is in units of the country's currency, and it was converted to U.S. dollars by dividing by  $e_{it}$ :  $Y^{\$}_{it} = Y_{it}/e_{it}$ .

The private financial saving of a country in U.S. dollars is taken to be:  $SP^{\$}_{it} = S^{\$}_{it} - SG^{\$}_{it}$ . The country's private financial saving rate is taken to be:  $sp_{it} = SP^{\$}_{it}/Y^{\$}_{it}$ . The country's government financial saving rate is taken to be:  $sg_{it} = SG_{it}/Y_{it}$  ( $= SG^{\$}_{it}/Y^{\$}_{it}$ ).

The data are thus constructed from only a few IFS variables, at most five per country. Data were collected for every country possible. Prior to 1980 there were many missing observations, and 1980 was taken to be the first year considered. The last year is 2013. In a few cases there were small gaps of a year or two in the  $SG_{it}$  data for a country, and in these cases values for  $SG_{it}$  were constructed by interpolating values of  $sg_{it}$  and then computing values for  $SG_{it}$  from the interpolated values for  $sg_{it}$  and the actual values for  $Y_{it}$ . Also, in a few cases values for  $sg_{it}$  at the end of the period were extrapolated using the last available value for  $sg_{it}$  and then computing  $SG_{it}$  from the extrapolated values for  $sg_{it}$  and the actual values for  $Y_{it}$ . The same procedure was followed for missing values of  $S^{\$}_{it}$ , although there were very few of these. Finally, in a few cases values of  $Y_{it}$  had to be interpolated or extrapolated.

For the 1980-2013 period there are 38 countries for which observations on  $sp_{it}$  are available for all years. These are listed in Table A.1. For the 1990-2013 period 18 more countries are added, and for the 2000-2013 period 36 more countries are added. These countries are also listed in Table A.1. In each group the countries are listed in the order they appear in the IFS data. What is of interest in this paper is the sum of  $SP^{\$}_{it}$  across all countries divided by the sum of  $Y^{\$}_{it}$ , denoted  $sp_t^*$ .

As a check on the data, it is informative to look at the sum of  $S_{it}^{\$}$  across all countries divided by the sum of  $Y_{it}^{\$}$ , denoted  $s_t^*$ . This ratio should be zero, and it is of interest to see how far away from zero it is.  $sp_t^*$  and  $s_t^*$  are examined in Section 3. The world government financial saving rate, denoted  $sg_t^*$ , is  $s_t^* - sp_t^*$ . Since (as shown in Table 1)  $s_t^*$  is approximately zero,  $sg_t^*$  is approximately  $-sp_t^*$ . Without measurement error it would be exactly  $-sp_t^*$ . Table A.2 summarizes the data collection and the construction of the variables.

**Table A.1**  
**Countries in the Summation**

IFS code	Country
<b>Group 1: 1980–2013</b>	
1	111 UNITED STATES
2	112 UNITED KINGDOM
3	124 BELGIUM
4	132 FRANCE
5	134 GERMANY
6	136 ITALY
7	138 NETHERLANDS
8	146 SWITZERLAND
9	158 JAPAN
10	172 FINLAND
11	178 IRELAND
12	184 SPAIN
13	193 AUSTRALIA
14	199 SOUTH AFRICA
15	223 BRAZIL
16	233 COLOMBIA
17	238 COSTA RICA
18	243 DOMINICAN REPUBLIC
19	258 GUATEMALA
20	268 HONDURAS
21	273 MEXICO
22	278 NICARAGUA
23	288 PARAGUAY
24	293 PERU
25	313 BAHAMAS, THE
26	443 KUWAIT
27	456 SAUDI ARABIA
28	542 KOREA, REPUBLIC OF
29	548 MALAYSIA
30	558 NEPAL
31	576 SINGAPORE
32	616 BOTSWANA
33	664 KENYA
34	678 MALI
35	684 MAURITIUS
36	714 RWANDA
37	738 TANZANIA
38	924 CHINA,P.R.: MAINLAND

**Table A.1 (continued)**  
**Countries in the Summation**

	<b>IFS code</b>	<b>Country</b>
	<b>Group 2: 1990–2013</b>	
1	128	DENMARK
2	144	SWEDEN
3	156	CANADA
4	182	PORTUGAL
5	196	NEW ZEALAND
6	253	EL SALVADOR
7	339	BELIZE
8	436	ISRAEL
9	449	OMAN
10	524	SRI LANKA
11	534	INDIA
12	556	MALDIVES
13	564	PAKISTAN
14	618	BURUNDI
15	666	LESOTHO
16	744	TUNISIA
17	918	BULGARIA
18	944	HUNGARY

**Table A.1 (continued)**  
**Countries in the Summation**

IFS code	Country
<b>Group 3: 2000–2013</b>	
1	122 AUSTRIA
2	137 LUXEMBOURG
3	142 NORWAY
4	174 GREECE
5	176 ICELAND
6	228 CHILE
7	298 URUGUAY
8	311 ANTIGUA AND BARBUDA
9	343 JAMAICA
10	369 TRINIDAD AND TOBAGO
11	469 EGYPT
12	474 YEMEN, REPUBLIC OF
13	513 BANGLADESH
14	522 CAMBODIA
15	532 CHINA,P.R.:HONG KONG
16	536 INDONESIA
17	686 MOROCCO
18	694 NIGERIA
19	746 UGANDA
20	911 ARMENIA
21	913 BELARUS
22	915 GEORGIA
23	916 KAZAKHSTAN
24	917 KYRGYZ REPUBLIC
25	921 MOLDOVA
26	922 RUSSIAN FEDERATION
27	926 UKRAINE
28	935 CZECH REPUBLIC
29	939 ESTONIA
30	941 LATVIA
31	946 LITHUANIA
32	948 MONGOLIA
33	960 CROATIA
34	963 BOSNIA & HERZEGOVINA
35	964 POLAND
36	968 ROMANIA

**Table A.2**  
**Construction of the Variables**

Variable	Construction
Data:	
$S_{it}$	IFS 129ba or 78ald + 78bcd
$SG_{it}$	IFS anob or agob or ccsd
$e_{it}$	IFS rf
$Y_{it}$	IFS 99b.. or 99b.c or 99b.d or 99bp. or 99bac
Individual Construction:	
$SG_{it}^*$	$= SG_{it}/e_{it}$
$Y_{it}^*$	$= Y_{it}/e_{it}$
$SP_{it}^*$	$= S_{it}^* - SG_{it}^*$
$sp_{it}$	$= SP_{it}^*/Y_{it}^*$
$sg_{it}$	$= SG_{it}^*/Y_{it}^*$
World Construction:	
$s_t^*$	$= \sum_{i=1}^N S_{it}^* / \sum_{i=1}^N Y_{it}^* \approx 0$
$sp_t^*$	$= \sum_{i=1}^N SP_{it}^* / \sum_{i=1}^N Y_{it}^*$
$sg_t^*$	$= s_t^* - sp_t^* \approx -sp_t^*$

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$N$  is the number of countries.

## References

- [1] Bernanke, Ben S., 2005, “The Global Saving Glut and the U.S. Current Account Deficit,” Sandridge Lecture, Virginia Association of Economics, Richmond, Virginia, March 10.
- [2] Case, Karl E., John M. Quigley, and Robert J. Shiller, 2012, “Wealth Effects Revisited 1975–2012,” Cowles Foundation Discussion Paper No. 1884, December.
- [3] Chinn, Menzie D., and Hiro Ito, 2007, “Current Account Balances, Financial Development and Institutions: Assaying the World ’Saving Glut,”” *Journal of International Money and Finance*, 26, 546–569.
- [4] Chaney, Thomas, David Sraer, and David Thesmar, 2012, “The Collateral Channel: How Real Estate Shocks Affect Corporate Investment,” *American Economic Review*, 102, 2381–2409.
- [5] Fair, Ray C., 1976, *A Model of Macroeconomic Activity Volume II: The Empirical Model*, Cambridge: Ballinger Publishing Company.
- [6] Fair, Ray C., 2016, “Household Wealth and Macroeconomic Activity: 2008–2013,” *Journal of Money, Credit and Banking*, forthcoming.
- [7] Gourinchas, Pierre-Olivier, and Hélène Rey, 2007, “International Financial Adjustment,” *Journal of Political Economy*, 115, 665–703.
- [8] Gruber, Joseph W., and Steven B. Kamin, 2007, “Explaining the Global Pattern of Current Account Imbalances,” *Journal of International Money and Finance*, 26, 500–522.
- [9] Lantz, Carl D., and Pierre-Daniel G. Sarte, 2001, “Consumption, Savings, and the Meaning of the Wealth Effect in General Equilibrium,” *Federal Reserve Bank of Richmond Economic Quarterly*, 87/3, 53–71.
- [10] Loayza, Norman, Klaus Schmidt-Hebbel, and Luis Servén, 2000, “What Drives Private Saving Across the World,” *The Review of Economics and Statistics*, 82, 165–181.
- [11] Ludvigson, Sydney, and Charles Steindel, 1999, “How Important Is the Stock Market Effect on Consumption,” *Economic Policy Review*, Federal Reserve Bank of New York, 5, 29–51.

- [12] Maason, Paul R., Tamim Bayoumi, and Hossein Samiei, 1998, “International Evidence on the Determinants of Private Saving,” *World Bank Economic Review*, 12, 483–501.
- [13] Mian, Atif, Kamalesh Rao, and Amir Sufi, 2013, “Household Balance Sheets, Consumption, and the Economic Slump,” *The Quarterly Journal of Economics*, 128, 1687–1726.
- [14] Obstfeld, Maurice, 2010, “The Immoderate World Economy,” *Journal of International Money and Finance*, 29, 603–614.
- [15] Scatigna, Michela, Robert Szemere, and Kostas Tsatsaronis, 2014, “Residential Property Price Statistics Across the Globe,” *BIS Quarterly Review*, September, 61–76.
- [16] Starr-McCluer, Martha, 1998, “Stock Market Wealth and Consumer Spending,” Board of Governors of the Federal Reserve System.
- [17] Stock, James H., and Mark W. Watson, 2003, “Forecasting Output and Inflation: The Role of Asset Prices,” *Journal of Economic Literature*, 41, 788–829.
- [18] Zhou, Xia, and Christopher D. Carroll, 2012, “Dynamics of Wealth and Consumption: New and Improved Measures for U.S. States,” *The B.E. Journal of Macroeconomics*: Vol. 12: Iss. 2 (Advances), Article 4.