Inflation and the Redistribution of Nominal Wealth: Technical Appendix*

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1 Overview

This appendix describes a data set of U.S. nominal positions assembled for our paper "Inflation and the Redistribution of Nominal Wealth." We construct expected future nominal payment streams for different sectors of the U.S. economy, as well as age and wealth groups of households. Our sectoral data is based on the Flow of Funds Accounts from 1952 to 2004. For groups of households, we rely on the 1989 and 2001 Survey of Consumer Finances. We explicitly trace out indirect nominal positions held through equity or investment intermediaries. We also use the payment stream data to compute the market value of nominal positions under different scenarios for inflation expectations.

The appendix is organized as follows. Section 2 lists the data sources we use. Section 3 introduces our sector definitions and explains how and why they differ from those of the FFA. Section 4 discusses the classification of assets into nominal, real, investment intermediary shares, and equity. Section 5 explains how we construct payment streams for bonds and mortgages. Section 6 reviews the construction of household-level nominal positions. Finally, Section 7 discusses the reconciliation of aggregates derived from FFA and SCF data.

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2 Data Sources

Our main data source for sectoral positions is the *Flow of Funds Accounts of the United States* (FFA). We use quarterly FFA data from 1952:1 to 2004:4. For household positions, we rely on the 1989 and 2001 editions of the *Survey of Consumer Finances* (SCF). Both data sets are available from the Board of Governors of the Federal Reserve System. As additional sources on positions, we use various issues of the *Life Insurers' Factbook*, published annually by the American Council of Life Insurers (ACLI), the *International Investment Position*, published by the Bureau of Economic Analysis, and the U.S. Treasury database from CRSP. For market interest rates, we rely on the monthly release *Selected Interest Rates* from the Federal Reserve Board. Our measure of inflation is the *Consumer Price Index for All Urban Consumers*, available from the Bureau of Labor Statistics. For the zero coupon yield curve, we use the McCulloch-Kwan data set described in McCulloch (1990), which is available for 1946-1991, and zero coupon yields provided by the Federal Reserve Board for the years 1992-2004. Information on interest, maturity and contract form for mortgages is from the *Monthly Interest Survey* provided by the Federal Housing Finance Board.

3 Consolidation of Sectors

Table 1 is a list of sectors and classes of financial institutions for which the FFA supplies aggregate data. We calculate direct and indirect net nominal positions for four *end-user* sectors: households, the government, the rest of the world, and nonprofit organizations. The calculation uses direct nominal positions of all sectors and institutions. Among institutions, the key distinction is between those that have shares as the only class of liabilities and those that have several classes. We call the former group *investment intermediaries*.

Investment Intermediaries

The most important investment intermediaries are mutual funds (MF), money market mutual funds (MMMF), and private defined contribution (DC) pension plans.[1] The single

[1] A breakdown of private pension assets into DC and defined benefit (DB) pension plans is available only since 1984. Before that time, we postulate that a constant share equal to the 1984 share was DC.

class of liabilities of these institutions is fund shares. We assign nominal positions of investment intermediaries directly to their shareholders. For MMMFs and MFs, these shareholders include other intermediaries, in particular DC plans and trusts. Cross-holdings between MMMFs and MFs, however, are negligible. We therefore proceed sequentially: we first reassign mutual fund nominal assets to other intermediaries as well as all end users, and then in a second step reassign pension and trust assets to households.

In recent years, life insurance companies have increasingly offered investment risk pass-through products such as variable annuities, in addition to their more traditional nominal liabilities. Life insurers are required by law to keep a *separate account* for assets that back pass-through claims. We treat this separate account as an investment intermediary—gains and losses accrue to pension reserve holders at life insurance companies, rather than to the owners of these companies. Since the FFA does not distinguish between life insurers' separate and general accounts, we use data on the account composition from the Life Insurers Fact Book for the 1990s.

Rest of the World

Our rest of the world (ROW) sector combines the FFA's ROW sector as well as two classes of foreign financial institutions. First, for foreign banking offices in the U.S., the FFA provides a detailed table of positions. Second, funding corporations set up by foreign institutions to issue commercial paper in the U.S. are part of the FFA's funding corporations sector, where they are lumped together with nonbank financial holding companies and custodial accounts for reinvested collateral associated with securities-lending operations. The commercial paper issued by foreign-controlled funding corporations is either used either to finance foreign banking offices, or to raise funds that are then transferred to the foreign parent. We thus construct a *foreign funding corporations* sector. Its assets are equal to miscellaneous claims on foreign banking offices minus foreign direct investment in funding corporations and its liabilities are equal to sufficient commercial paper to balance the books.

Business

Our business sector comprises all FFA sectors and groups of institutions not already mentioned. From the point of view of the end-user and, in particular, household positions, it

Sector	Table	Number
Households	Households and nonprofit organizations	B.100
Government	Consolidated federal, state, and local	L.106c
	Government employee retirement funds	L.120
	Monetary authority	L.108
Rest of the World	Rest of the world	L.107
	Foreign banking offices in U.S.	L.111
	Foreign funding corporations	L131
Investment Intermediaries	Money market mutual funds	L.121
	Mutual funds	L.122
	Private pension funds	L.118
	Federal government retirement funds	L.120
	Life insurance companies (separate account)	L.117
Nonfinancial Business	Nonfarm nonfinancial corporate business	B.102
	Nonfarm noncorporate business	B.103
	Farm business	L.104
Financial business	U.S.-chartered commercial banks	L.109
	Saving institutions	L.114
	Credit unions	L.115
	Life insurance companies (general account)	L.117
	Other insurance companies	L.116
	Closed-end and exchange traded funds	L.123
	Government-sponsored enterprises	L.124
	Federally related mortgage pools	L.125
	Issuers of asset-backed securities	L.126
	Finance companies	L.127
	Mortgage companies	L.128
	Real estate investment trusts	L.129
	Security brokers and dealers	L.130
	Funding corporations (except foreign)	L.131

Table 1: Tables in the Flow of Funds Accounts

is not important whether an institution is a corporation or not. The nonfinancial business sector thus contains the FFA nonfarm, noncorporate business, farm business, as well as nonfinancial corporate sectors. The distinction between nonfinancial and financial sectors is also immaterial for the end-user calculations, because we cannot distinguish between holdings of financial and nonfinancial equity. However, it is sometimes useful to distinguish financial and nonfinancial business when interpreting aggregate redistribution effects caused by indirect nominal positions. The financial business sector contains U.S. commercial banks, other (non-life) insurance companies, closed-end and exchange-traded funds, brokers and dealers, savings institutions, credit unions, the government-sponsored enterprises, finance companies, mortgage companies, and REITs. In addition, it contains the general account business of life insurers, and funding corporations that are not foreign-controlled.

We also assign assets and liabilities of federally related mortgage pools to the financial sector. We assume that mortgage pools are financed entirely by pass-through mortgage-backed securities. The assumption of full pass-through implies that shareholders of the financial sector take neither gains or losses on pool mortgages from inflation—any changes in the value of pool mortgages are borne by holders of the mortgage-backed securities. The point of our convention—counting mortgage-backed securities as bonds issued by the financial sector and treating already securitized mortgages akin to non-securitized mortgages held by the financial sector—is to highlight the role of securitization and facilitate our discussion of the distribution of losses.

4 Classification of Assets

We classify balance sheet items into "nominal," "real," "investment intermediary shares," and "equity." We assume that loans and fixed income securities are nominal, unless the Flow of Funds Guide provides information to the contrary. Securities denominated in foreign currency are classified as real. Domestic corporate equity, and ownership of non-corporate business is classified as equity. In what follows, we comment briefly on five sets of claims where classification is not obvious: defined benefit pension assets, asset backed securities, foreign equity positions, foreign deposits, and the FFA's "miscellaneous financial assets and liabilities."

Pensions

We deviate from the FFA in our treatment of defined benefit (DB) pension assets. In the FFA, pension plan holdings are included on the asset side of household balance sheets. With this convention, nominal assets in DB pension plans would contribute to households' nominal position. This would imply that households themselves bear all losses that the pension fund incurs from inflation. In contrast, we view defined-benefit plans as a real tax-transfer system, together with an endowment, the returns on which can be spent on transfers. The plan sponsor (i.e., a firm or a part of the government) is responsible for delivering a real flow of transfer payments. This view seems reasonable given that most plans specify benefits in terms of a replacement rate for wages at retirement. Since wages increase with inflation, future benefits are effectively indexed, at least over the medium run that is of interest to us. In many cases, this is reinforced by explicit inflation protection of payments after retirement.

With this assumption, gains and losses from inflation incurred by the pension funds accrue to the plan sponsor. For a private plan, a shortfall in the endowment due to inflation thus directly hurts the shareholders of sponsoring firm. Similarly, for a government-sponsored plan, the shortfall resembles an increase in net government debt. To capture these redistributions, we make three adjustments to the positions derived from FFA balance sheets. First, we add nominal assets in private DB pension funds to the net nominal position of businesses. Second, we reduce net government debt by nominal assets in DB funds for government employees. Finally, we subtract all pension claims from the asset side of the households' balance sheet.

Asset-Backed Securities

As mentioned in the above discussion of the business sector, we assume that all claims on federally related mortgage pools recorded by the FFA are pass-through mortgage-backed securities. Unfortunately, the FFA do not publish aggregate holdings for securities backed by mortgages in federally related pools. Instead, these securities are subsumed under what the FFA call "government agency bonds." The latter category also contains bonds issued by the government-sponsored enterprises as well as a small amount of bonds issued by various budget agencies. To allocate federally related pool securities to their holders, we assume that a dollar held in the FFA's agency bonds is split between pool securities and other agency bonds proportionately to outstanding quantities.

For the government-sponsored enterprises (GSE), the FFA provide a balance sheet, where the major class of liabilities is agency bonds. Since the GSEs also issue equity, we do not treat their liabilities as pass-through, but instead as corporate bonds. We proceed similarly for other (that is, not federally related) issuers of asset-backed securities. For this sector, the FFA lists assets and liabilities, where the latter consist of both commercial paper and corporate bonds. Since there is no information on what type of loan backs which liability, we follow the classification of the FFA. To the extent that asset-backed commercial paper is backed by short term loans such as credit card or trade receivables, this approach effectively treats asset-backed paper as a pass-through security: all short term securities are priced the same way in our setup.

Foreign Equity Positions

The FFA ROW table lists foreigners' portfolio equity positions in the U.S.. Unfortunately, the FFA does not measure the equity component of foreign direct investment, which is incorrectly attributed to households.[2] To correct household and ROW positions, we construct an estimate of the equity component of FDI using data from from the BEA's International Investment Position. Since 1982, the BEA supplies series for the outstanding market value of FDI, as well flows of FDI split up into net equity purchases, retained earnings and net intercompany loans (reported at book value).

The average share of debt in FDI flows over 1981-2004 was 26.5%. We assume that intercompany debt is valued at par, that the share of debt in the market value of FDI before 1981 was 26.5%, and that the market-to-book value of FDI was constant before 1981 at its 1981 value. Under these assumptions, the debt component of FDI before 1981 was a constant share of the book value of FDI in the FFA. For the period after 1981, our estimate of the debt component cumulates the BEA (book value) debt flow series, with the 1981 number as an initial condition. We subtract the debt component from the total market value of FDI to obtain our estimate of the equity component of FDI. The latter estimate is added to equity holdings of the rest of the world reported in the FFA and subtracted from equity holdings of households reported in the FFA. Finally, we subtract FDI in foreign banks and funding corporations, since we consolidate these sectors with the rest of the world sector of the FFA.

[2]While FDI does appear as an instrument in the FFA, the numbers recorded there are at current cost, and are therefore not directly comparable to the equity numbers, which are at market value.

The debt component of FDI consists of intercompany loans, typically between a parent company and its U.S. affiliate. While these loans may be denominated in dollars, we suspect that the loans effectively have state-contingent payoffs and should not be treated as non-contingent nominal debt. We therefore classify these loans as real. In addition, we do not have comprehensive data on dollar denominated claims of foreign corporations. For simplicity, we thus treat foreign equity and foreign direct investment by U.S. investors abroad as entirely real, hence ignoring indirect net nominal positions of U.S. investors through dollar-denominated claims issued by foreign corporations. For our benchmark year 1989 (and more generally all years except the late 1990s), foreign equity holdings are in any case relatively small.

Foreign Deposits

The magnitude of U.S. private deposits abroad has been increasing in the late 1990s and has been around 6% of GDP since 2001. According to BEA data, Eurodollar deposits are a significant share of this total, which suggests that they should be partly counted towards U.S. nominal assets. Unfortunately, the FFA has only scant information on U.S. private deposits abroad. In particular, while these deposits are recorded as a liability of the rest of the world, the FFA does not identify most of the depositors. In 2001, about 90% of all deposits abroad were booked as a 'discrepancy' item, that is, the counterparty to the rest of the world could not be provided. We only know that about 10% are held by money market mutual funds, and that households directly hold a negligible share. The FFA also does not identify the share of U.S. deposits abroad that is denominated in dollars. Our baseline scenario proceeds under the assumption that all unidentified private deposits abroad are denominated in dollars and are held by financial corporations.

As a sensitivity check, we have also recomputed positions under the assumption that all foreign deposits are denominated in foreign currency. In the late 1990s, this convention increases the short-term nominal position of the rest of the world (by up to 6%), while decreasing that of the domestic financial system. In terms of redistribution, the new convention reduces the loss of the foreign sector in the baseline experiment by 2.3 percentage points. In the *Indexing ASAP* case, short term deposits are barely affected and the loss remains essentially unchanged. The qualitative facts about positions and redistribution in the 1990s are therefore not altered by the alternative convention.

Unidentified Miscellaneous Items

In the FFA, unidentified miscellaneous assets and liabilities are residuals that result from subtracting all identifiable categories from total assets and liabilities reported for a given sector. The only sector where unidentified miscellaneous items are substantial is nonfinancial corporate business: in the late 1990s, they account for up to 20% of total assets and liabilities. To get an idea of what is going on, we have examined balance sheets in Compustat, which are available in more disaggregated form than those in the FFA. The Compustat numbers suggest that a large share of unidentified items are accounting items that do not represent claims on another party. For example, goodwill acquired through takeovers or mergers made up 9% of total assets of Compustat Industrial firms in 2000. The revaluation of pure accounting items like goodwill does not lead to redistribution from one party to another, even if the item is nominal.[3] We therefore omit all unidentified miscellaneous assets and liabilities from our calculations.

5 Valuation

We now describe how we estimate the streams of payments for various types of bonds and loans.

5.1 Market Value of Bonds

To construct payment streams for bonds, we need reasonable approximations of the maturity and coupon rate distributions for all outstanding bonds at a point in time, in particular for our benchmark years 1989 and 2001. For Treasury securities, this information can be taken directly from the monthly U.S. Treasury database of CRSP, which records coupon rates, maturities and amounts outstanding for every Treasury issue and every end-of-month trading date since 1952. For Treasury bonds and notes, the CRSP database contains separate series for total issues and issues held by the public; we use the latter for our calculations. For agency, municipal and corporate bonds, we construct quarterly series of estimated payment streams using FFA data, as described below.

[3]Redistribution through the revaluation of goodwill is an issue only if there are nominal rigidities in the tax system, which we are leaving out of this step of our analysis.

Short Term Instruments

We use the CRSP data to distinguish bills (discount bonds with maturities of one year or less) from other Treasury securities, a distinction that is not made in the FFA. We thus split outstanding Treasury securities in the FFA into short and long categories, with the ratio derived from the CRSP data. To determine holdings of the two types of Treasury securities, we assume that households do not hold any Treasury bills directly. This assumption is natural since bills tend to be bought and sold in large amounts by institutional investors (see, for example, Stigum 1990). For all other sectors, we allocate those bonds and notes not held directly by households as well as all outstanding bills proportionately.

For corporate debt, the FFA do identify short term commercial paper separately from long term corporate bonds. It also identifies a host of other short term liquid assets: checkable deposits, time and savings deposits, open market paper, various types of payables (trade payables, taxes payable etc.), various types of receivables (trade receivables, pension contribution receivables, insurance receivables etc.), as well as security repurchase agreements. We value all of these assets at par.

Coupon Bonds

For bonds other than Treasury bonds, we need to make assumptions about maturity. For long term corporate bonds, we assume that all new issues have a maturity of 10 years. This number is chosen to be somewhat smaller than the maturity of a typical corporate bond (15 years for privately placed bonds and 18 years for publicly traded bonds, according to Barclay and Smith 1999), in order to accommodate the fact that many corporate bonds are callable. While a more careful modeling of callability may be desirable for other applications, we have found that changing these numbers within a reasonable range do not much affect our redistribution results. We also assume a maturity of 10 years for agency bonds. Finally, for municipal bonds, which are traditionally long term, we assume that every new issue has a maturity of 20 years.

We use our assumptions on maturity and the series of outstanding face values from the FFA to construct a time series for new bond issues. To do so, we need to impose initial conditions. We assume that the initial year 1952 was a steady state, in which the outstanding quantities and the maturity structure was being replicated every year for each class of bonds. Starting from the initial distributions of bond vintages, it is then straightforward to recursively calculate series of new issues, every year retiring old bonds and inferring new issues from the change in outstanding face values. With this procedure, initial conditions strongly affect the results in the early years of the sample, and hence may induce some error there. However, their effect diminishes over time. As we move towards 1989, the first benchmark year for our detailed calculations, the results are mostly driven by observables.

The next step is to determine the series of future coupon payments for every vintage of bonds. We assume that bonds with maturity longer than one year are issued at par and take the coupon rates to be the appropriate Treasury constant maturity yields prevailing in the issue year. We use Treasury rates – that are essentially free of default risk – for corporate bonds because our valuation framework assumes certain payment streams. While corporate bonds typically promise higher rates than Treasury bonds, they not always pay off those rates in default. Assuming risk neutral pricing, our approach exactly corrects for default risk. For simplicity, we also use Treasury rates for municipal bonds, although actual municipal bond rates tend to be slightly lower, since interest on those bonds is not subject to Federal income tax. This discrepancy is not important for our results.

5.2 Market Value of Mortgages

To estimate payments on mortgages, we use data on mortgage rates, average maturity, the share of adjustable rate loans in new contracts (from the Federal Housing Finance Board, FHFB), as well as the series of outstanding face value for all mortgages (from the FFA). Unfortunately, data on the adjustable rate share in new mortgages are available only starting in 1982. As shown in Figure 1, these data show a high share of adjustable rate immediately after the high inflation experience of the late 1970s and early 1980s, and a steadily decreasing share thereafter. We assume that the share of adjustable rate mortgages was constant before 1982, and we select it such that the share of adjustable rate mortgages implied by our FFA calculations matches the share observed in the 1989 SCF, as illustrated in Figure 1. The result is a 6% share before 1982; this squares well with anecdotal evidence that adjustable rate mortgages came into widespread use only after the period of high interest rate volatility in the late 1970s.

In our calculations, we take the maturity of all new contracts in a given year to be equal to the average maturity reported by the FHFB.[4] We assume that fixed and adjustable rate

[4]For the years 1952–63, where FHFB data are not yet available, we substitute the 20-year constant matu-

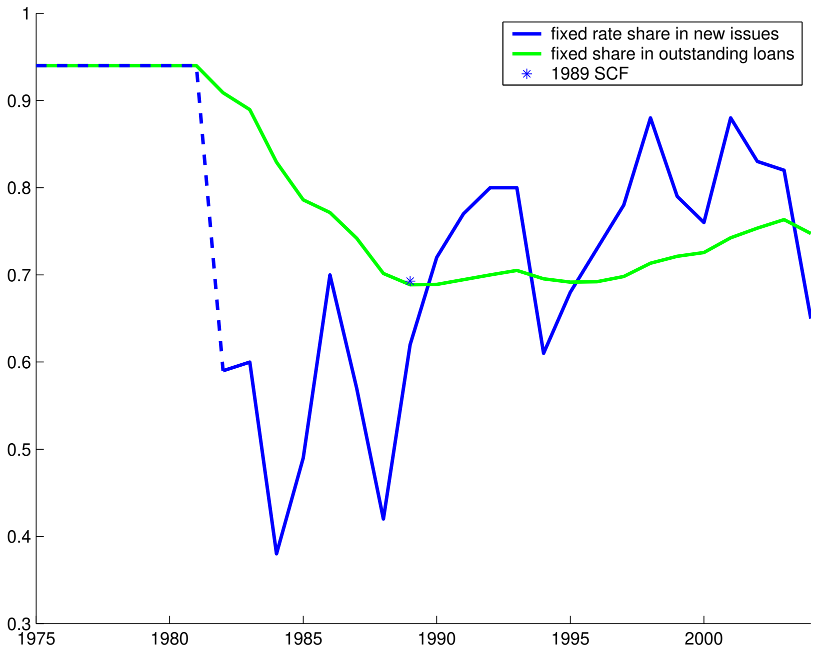

Figure 1: Share of Fixed Rate Mortgages

mortgages are amortized according to the same scheme. At any point in time, every vintage of mortgages is associated with its own current interest rate. When a vintage is created, its current rate is the mortgage rate on new issues from the FHFB. We assume that a vintage is refinanced whenever the market rate on new mortgages drops below the current rate of the vintage, and that refinancing does not change the maturity of the vintage. To determine amortization on outstanding vintages in a given year, we calculate annual mortgage payments for every outstanding vintage using its current rate and remaining maturity. For the given year, amortization is determined as if the current interest rate were in place until maturity. The amortization scheme thus changes with every refinancing.

We check whether our assumptions on refinancing produce sensible results by comparing the distributions of interest rates across vintages with the interest rates reported by the SCF for 1989. Table 2 lists mean interest rates and years since the last refinancing for our middle class cohorts, who are the most important mortgage borrowers. There is some evidence of lower rates on old fixed rate mortgages that were locked in before the high interest period in the early 1980s, as well as on very young mortgages. Nevertheless, all rates are within two percentage points of each other. Our FFA calculation imply a current

rity Treasury bond rate.

rate of 10.1% for the 1989 vintage, 9.3% for the 1979–1988 vintages (this the 1987 rate, obtained by refinancing), and slightly lower rates for vintages 1978 and older. While this might understate the rates paid by younger cohorts (probably because we do not take refinancing costs into account), we conclude that our rule does not induce significant bias in valuation.

Age	≤35	36–45	46–55	56–65	66–75
	Fixed rate mortgage holders				
Year last refinanced	1985	1981	1978	1977	1975
Interest rate	10.2	9.8	8.9	9.1	8.7
	Adjustable rate mortgage holders				
Year last refinanced	1987	1985	1983	1985	1977
Original interest rate	10.1	10.6	9.9	10.0	10.5
Current interest rate	8.8	9.3	8.5	9.1	8.7
% all par values	31	28	26	19	10
% with 1 yr adj. interval	87	78	52	82	87

Table 2: Cohort means of interest rates and year of last refinancing as well as within-cohort share of adjustable rate mortgages in total outstanding par values and within-cohort share of adjustable rate mortgages with a one-year adjustment interval, middle class cohorts, 1989 SCF.

To construct series of outstanding face values and new issues for both types of mortgages, we again need to impose initial conditions. As for bonds, we assume that 1952 was a 'steady state,' where the outstanding mortgage debt was being replicated, with the same maturity for all new issues, the same mortgage rate, and the same share of adjustable rate contracts. Starting from this initial distribution, we recursively calculate time series for outstanding fixed and floating rate mortgage debt, for each year amortizing all old vintages of mortgages and inferring the quantity of new contracts from the change in total face value. Given series of new fixed rate contracts and mortgage rates, we then calculate, for every year *and every vintage*, the stream of payments yet to be made on the mortgage. The nominal yield curve can again be used to compute the market value of these payments. Since we are assuming that rates are set to keep the market value of adjustable rate mortgages always at par value, the adjustment factor per dollar of face value is simply the sum of the market value of fixed rate loans and the face value of adjustable rate loans, divided by the face value of all mortgages.

6 Nominal Positions by Household Group

We obtain data on the cross section of portfolio holdings from the 1989 and 2001 editions of the Survey of Consumer Finances (SCF). The observation unit in the SCF is a household. In our benchmark year 1989, the survey covers 3143 households, and weights are provided to produce U.S. aggregates. In all our calculations, we use the weights provided by the SCF to weight observations within an SCF implicate, and we average across the five implicates.

Age and Wealth Groups

The SCF data allows us to add detail to the household sector by distinguishing different types of households. We first sort households into six cohorts, by age of the household head: households 35 and younger, 36–45, 46–55, 56–65, 66–75, and over 75. For each cohort, we refer to the top 10 percent of households by net worth as *rich* households. The non-rich households are then sorted by income into two additional groups, labeled the *middle class* (70 percent of the population) and the *poor* (the bottom quintile of the income distribution).[5] Table 3 presents summary statistics on the age and wealth groups. Our overall rich group is the union, over cohorts, of the rich group from every cohort, and similarly for the middle and poor households. Since younger households are on average poorer, our rich group is somewhat poorer than the top 10% of the overall U.S. wealth distribution. Nevertheless, the statistics are quite similar.

Positions

To illustrate household portfolios, we compute not only household nominal positions, but also equity and durables positions. Table 4 summarizes ownership of these broad asset classes by wealth group in a stylized balance sheet. All positions contain direct holdings as well as indirect holdings through investment intermediaries, and they are derived from household holdings at market value. We now describe how these positions—as well as the net nominal positions reported in the main paper—are determined.

[5] The fraction of households that are simultaneously in the top 10 percent of the wealth distribution and in the bottom 20 percent of the income distribution is negligible in the SCF.

Age	≤35	36–45	46–55	56–65	66–75	>75
NW (mean)	49	163	281	311	295	247
NW (90%)	120	330	544	649	556	405
Size (%)	30	21	15	14	12	8
	The Rich					
NW (mean)	347	983	1,832	1,946	2,009	1,820
	The Middle Class					
NW (mean)	20	84	141	156	139	113
	The Poor					
NW (mean)	5	25	32	30	25	27

NOTE: Moments of net worth ($000s) and cohort sizes (percent of total population) by age, 1989 SCF.

Table 3: The Rich, the Poor, and the Middle Class

We group SCF financial asset holdings into seven categories: directly held bonds, directly held equity, money market mutual funds, mutual funds, pension assets, IRAs, life insurance, as well as "various short term assets." The latter category includes checking accounts, saving accounts, and certificates of deposits. We then assume that for every dollar of directly held bonds recorded in the SCF, a household holds the well-diversified portfolio of bonds directly held by the FFA household sector. We thus multiply the individual household's bond position with the appropriate market adjustment factor for bonds. Similarly, for every dollar of claims on a particular type of investment intermediary recorded in the SCF, we assume that the households owns a share in the portfolio held by all intermediaries of that type in the FFA.

We also break down holdings in IRAs using FFA data. The FFA does not provide exact holdings in IRAs, but records assets in these accounts as direct holdings. However, there is a supplemental table that indicates at which institutions the IRAs are held. We assume that accounts held at commercial banks, savings institutions and credit unions are in the form of savings deposits. The bulk of IRA assets are at mutual funds, life insurance companies, or in "other self-directed accounts." We assume that assets at life insurers are part of life insurers' separate accounts and that other self-directed accounts have the same composition as DC pension funds. Given these assumptions and the composition of investment intermediary portfolios, we construct a portfolio of assets corresponding to the average dollar held in an IRA.

	Assets				Liabilities			
	All	Rich	Middle	Poor	All	Rich	Middle	Poor
Durables	50	39	68	69				
Equity	27	39	10	14				
Nominal	21	22	22	14				
Debt					13	7	23	16
Net Worth					87	93	67	84

NOTE: Selected balance sheet items for whole population as well as Rich, Middle and Poor households, in percent of respective group assets, 1989 SCF.

Table 4: Balance Sheet

To construct equity and durables items, we first define *business wealth* as follows. For businesses in which the household has an active interest, it contains net equity as if the business were sold today, plus loans from the household to the business, minus loans from the business to the household. For businesses in which the household does not have an active interest, business wealth contains of the market value of the interest. The fact that loans to and from the business are likely to be nominal could introduce a bias in our exercise, at least for the rich agents who hold most of the business wealth. However, loans to and from a business that is controlled by the household can be renegotiated at little cost. They are thus likely to be state-contingent and work more like equity.

We now define *equity* as the sum of business wealth and both direct and indirect holdings of public equity, while our *durables* item is the difference between all nonfinancial assets recorded by the SCF and business wealth. Combining public equity and business wealth into a single equity position avoids dealing with the different treatment of private equity in the SCF and FFA data. In the FFA, corporate equity contains closely held shares that are not publicly traded, and it is not possible to separate private and public equity. We thus use a single leverage ratio that is derived after consolidating corporate and noncorporate business. It represents the net nominal leverage ratio of the entire business sector.[6]

7 Reconciliation of FFA and SCF Positions

Our calculations for the benchmark years 1989 and 2001 require a reconciliation of sectoral positions in the FFA and aggregates for the household sector from the SCF. Antoniewicz (2000) provides a detailed analysis of discrepancies between the two data sets. She suggests a number of adjustments to the FFA numbers, after which the discrepancies for most broad asset classes are relatively small. Important exceptions are pension assets, time deposits and private equity. The SCF does not provide numbers on DB pension assets. This is natural, since survey respondents usually do not know what these assets are: they only know contributions and expected benefits. This is in line with our view of DB pensions as a tax system. Our adjustment to the FFA-based calculations described in the previous subsection thus also brings our numbers in line with the SCF. Time and savings deposits recorded by the FFA are usually higher than in the SCF, while at the same time the value of closely held shares is larger in the SCF than in the FFA. This appears to be a general issue that has no obvious explanation, although differences in terms of how assets are attributed to private business versus the respective owners may play a role.

There are two basic options for reconciling the two data sets: we can either adjust the FFA leverage ratio, or the SCF individual DNP positions. Assuming that the FFA numbers are correct implies that either SCF survey respondents misstated their positions, or that the weights designed to make the SCF representative are incorrect. In contrast, assuming that the SCF numbers are correct amounts to assuming that there are problems with the measurement of business financial assets in the FFA. Since household positions in the FFA are residuals, this indirectly leads to a mismeasurement of household positions. We adopt the second assumption here. We recalculate households' aggregate net nominal position based only on SCF assets and liabilities. We adjust the positions of other sectors to retain zero net supply of nominal claims. For most FFA instruments, it is straightforward to identify the broad sector that is the counterparty to a household position. If the counterparty cannot be uniquely identified, we assume that lending and borrowing sectors are matched proportionately.

[6]The breadth of our equity concept explains why the poor have more equity as a fraction of assets than the middle class. The middle class do have more public equity (6%, versus 2% for the poor), but they have a smaller fraction of assets invested in private businesses.

The largest adjustment is to short term nominal instruments, where the FFA records about 2 trillion more outstanding claims than the SCF. Removing these claims lowers the household sector net nominal position from 34% to 18% of GDP. Since the business sector position is simultaneously increased, shareholders' indirect debt is reduced. In particular, the NNP of the foreign sector increases from 7% to 13% of GDP. The government position increases from -41% to -33% because the FFA records more government debt than the SCF. The discrepancies are smaller for the benchmark year 2001. Household positions decline from 9.6% to 3.1%, government net debt declines from 31.5% to 27.4% and the foreign sector position increases from 17.0% to 19.5%.

Since the largest discrepancies are for short instruments, the reconciliation procedure affects the redistribution results for the *Full Surprise* scenario case more than those for the *Indexing ASAP* scenario. In particular, by lowering the total value of outstanding claims, the procedure leads to less redistribution relative to the FFA results. For the benchmark year 1989, household losses are 7.3% of GDP with SCF numbers (down from 13.2% with FFA numbers) and government gains are 13.0%, down from 16.2%. Since business debt is also lower, foreign sector losses are higher at 5.2%, up from 2.6%. Under Indexing ASAP the FFA (SCF) results reflect a household loss of 4.3% (2.2%), a government gain of 6.7% (5.2%) and a foreign sector loss of 2.5% (3.2%).

For 2001, the smaller discrepancies imply that the sectoral redistribution results are similar across the two data sets. In particular, the foreign sector loses 6.7% (7.8%) according to FFA (SCF) numbers under Full Surprise, and 4.2% (4.8%) under Indexing ASAP. Large losses for the foreign sector are implied by either dataset. Overall, the orders of magnitude and relative size of gains and losses are thus not affected by the choice of reconciliation procedure, although our choice of going with the SCF numbers might somewhat understate the redistribution effects of inflation on households.

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