# The Financial Crisis and the Measurement of Financial Sector Activity

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13. November 2010

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Abstract

The widespread expectation, forcefully posed by Reinhart and Rogoff (2009), that growth in the U.S. and the rest of the industrialized world will be subpar for a prolonged period following the financial crisis, raises issues for the measurement of the financial sector's activity. According to the U.S. NIPA, finance and insurance accounts for roughly 8 percent of GDP, much of which consists of routine processing of transactions and maintenance of accounts. As noted in Steindel (2009), by normal growth accounting reasoning, even a marked contraction in the sector's activity would not seem likely to be capable by itself to have a major prolonged negative impact on growth. One possible alternate way to account for the activity of the sector, building on the work of Corrado, Hulten, and Sichel (2005, 2009), is that the very high levels of employee compensation in finance partly reflect investments in market knowledge, a form of intangible capital. The increased growth in such market knowledge in the years leading up to the crisis may have helped to support growth in the economy outside of finance, while its diminution in the current environment (if not offset by increased growth of comparable knowledge elsewhere) could work to hold down growth. Altering the treatment of finance in the accounts in this fashion helps to bridge, if not fully close, the gap between the absolute size of the sector as gauged in the standard way and its generally acknowledged large and persistent effect on aggregate activity.

Thanks to Carol Corrado and Daniel Sichel for comments, and Josiah Bethard for assistance. This paper was written when the author was employed by the Federal Reserve Bank of New York, and the views expressed here are those of the author only and not necessarily those of the State of New Jersey, the Federal Reserve Bank of New York, or the Federal Reserve System.

The financial crisis has spurred interest in examining the interaction of the financial sector and the real economy. Much of this recent work has focused on how shocks, such as unexpectedly low payoffs on investments, are transmitted through the economy, and the options stabilization policy may have to offset such effects (e.g. Woodford and Curdia, 2010). In general, this line of research augments New Keynesian models with the addition of financial intermediary sectors that channel funds from savers to entrepreneurs who produce final output. Decompositions of this type add a variety of interest rates to the models. The relative movements in these rates may be informative about the macroeconomic outlook and could potentially be an input to stabilization policy, for instance by setting criteria for government purchases of private securities as an adjunct to the Central Bank's targeting the overnight risk-free interest rate.

It is not clear, though, that financial sectors modeled in such ways provide much insight into the longer- term evolution of the economy in response to a financial crisis, given that the underlying models were developed primarily to understand business cycle dynamics. Reinhart and Rogoff (2009) (as well as Reinhart and Reinhart, 2010) document that nations that have experienced significant financial crises have typically seen prolonged periods of subpar output and employment growth. Of course, this record may reflect demand-side effects—it may just be the case that a large shock to aggregate demand from a financial crisis is only partly offset by forces such as expansionary monetary and fiscal policies.[1] However, it is possible that major financial contractions directly depress aggregate activity for a long time, either because the financial sector itself is of sufficient magnitude so that a slump there will weigh down national totals (assuming that the process of re-allocating resources from finance to growth sectors is cumbersome), or because finance provides substantial volumes of critical products to other

[1] Also, a long and deep recession may depress potential (and actual) output by suppressing the growth of physical and human capital.

sectors, and a blockage in this flow leads to a significant and prolonged impairment in efficiency throughout the economy.

This paper will examine the potential that a contraction in U.S. finance has to impinge aggregate output, looking at both the direct effects of a diminution in the size of the sector, and at potential spillovers to the rest of the economy. Steindel (2090) found that in the data used in the National Income and Product Accounts, substantial, sustained contractions in both finance and real estate do not appear to, by themselves, be capable of accounting for very large and prolonged slowdowns in activity. This paper re-examines those findings in the wake of updated data. Furthermore, taking into account the work of Corrado, Hulten, and Sichel (2005, 2009) on the role of intangible investments in U.S. economic growth, a modified estimate of financial sector activity is discussed. This measure assumes that the unusually large compensation received by workers in the financial sector (documented by Phillipon and Reshef, 2009) may be a proxy for investment in market knowledge. The resulting augmentation of financial investment appears capable of accounting for a meaningful proportion—on the order of one-third—of the brisk trend growth rate of multifactor productivity (MFP) in the sector in the last generation. This allows for a more systematic estimation of the potential direct aggregate impact of a contraction in finance.

## The Financial Sector in the Aggregate Data

Finance and Insurance in the National Accounts encompasses four major industry groups: 1. Financial intermediaries ("Federal Reserve Banks, credit intermediation, and related activities"). 2. Securities dealers ("Securities, commodity contracts, and investments"). 3. Insurance ("Insurance carriers and related activities"). 4. Financial advisors and money management ("Funds, trusts, and other financial vehicles").[2] The sector can be seen as adding value to current production by payments

[2] These are the major sectors and names in the NAICS. The SIC classification was broadly similar.

processing, safekeeping, risk-bearing, and advising investors and borrowers. The sector is assumed to provide final services to household investors and foreign customers; businesses and governments are purchasers of intermediate services.

A large part of the services provided to households are "imputed"--households earn below market returns on large portions of the funds held on deposit at institutions such as commercial banks, and the presumption in national accounting is that they are earning and consuming implicit services in return for the sacrifice of income.[3] Borrowers are also assumed to be receiving imputed services when they pay above-market rates for their funding. The receipt of such imputed services by nonfinancial businesses reduces the output of the nonfinancial business sector by the amount that financial output is increased, and overall GDP is unaffected. The consumption of imputed services by depositors is a component of GDP (Fixler, Reinsdorf, and Smith, 2003).

The precise computation of these imputed services is an unsettled matter (Triplett and Bosworth, 2004). In the U.S. accounts, the assumption is that the entire explicit interest margin of depository institutions is paid out as imputed interest. The "reference rate," measured as the yield on the industry's U.S. Treasury debt portfolio, determines the split between imputed interest paid to depositors and that paid to borrowers. The difference between the actual interest paid to depositors and the amount they would have earned if their deposits had accrued at the reference rate is defined to be imputed interest paid to depositors. The difference between interest paid by borrowers and the amount they would have paid if they borrowed at the reference rate provides the estimate of imputed interest paid to borrowers, which is assumed to reflect services provided to borrowers in return for their paying above-Treasury rates on the loans.

[3] Households are also credited with imputed income and consumption from funds left as insurance reserves and from mutual fund holdings, though the computation of these differ from those credited for deposits at intermediaries.

Clearly, the computation of these imputed interest flows is rather arbitrary. One particular issue is the use of the rate of return on banks' holdings of Treasuries as the reference rate to calculate imputed interest paid to borrowers. Obviously, few if any private borrowers can obtain financing at the Treasury rate. Arguably, at the margin, borrowers can be seen as deciding between liquidating funds earning the reference rate and paying higher market rates. Thus the spread between borrowing rates and the reference rate can be said to reflect the implicit costs of services provided by banks to borrowers (Fixler, Reinsdorf, and Smith, 2003). Others have argued that a higher interest rate, taking into account the inherent risk in lending to private parties, should be used as the reference rate to compute imputed interest paid to borrowers (Wang, Basu, and Fernald, 2009; Basu, Inklaar, and Wang, 2010). If such a procedure were adopted the dollar value of imputed interest paid to business borrowers by the financial sector would be reduced, as would be reported financial output. A slightly contrasting view arises from the observation that the payment of imputed interest is assumed to cease when a loan is sold by a depository to a nondepository—for instance, when a loan is purchased for securitization (Ashcraft and Steindel, 2008). Because, from the borrower's viewpoint, nothing substantive has changed in the servicing of the loan, the disappearance of its imputed interest flow appears hard to justify. Recognition that imputed interest continues to flow to such borrowers would have the effect of increasing the dollar value of imputed interest paid to borrowers and would shift the composition of industry output toward financial firms.[4]

These issues connected to the computation of imputed interest paid to borrowers bear on the calculation of current-dollar financial output. A whole host of other questions relate to the computation of the real output of the sector, given the immense difficulties defining standardized transactions. For instance, even a very simple transaction, such as the purchase and sale of corporate stock, raises some

[4] Any explicit fees the purchaser of the loan pays to the originator will be reflected in measured financial sector output.

complexity in determining the real activity involved. Is the unit of transaction a single sale of a block of shares, or the sale of one share? It certainly seems as if the sale of 10 shares in one block involves no more physical services than a sale of 1 share (especially if the nominal values of the transactions were equal and involved the same ownership stake in a firm); however, the sale of multiple shares may also involve transactions with multiple buyers. Such conundrums could multiply exponentially when one attempts to deflate the expenses involved with the creation of securitization structures or those associated with M&A activity. We are left with the issue that there are serious concerns associated with the computation of current-dollar financial sector output, and likely even greater ones involving the calculation of real output. Many would have associated more intensive use of financial services in recent years with efficiency gains in user industries and across the economy as a whole (Kohn, 2008), given the subsequent contraction one might argue that either the measures of past usage and the efficiency gains were overstated, or that lessened use in the future will weigh down growth.

Turning from the conceptual issues to the published numbers, Table 1 shows the breakdown of financial sector gross revenues in 2008 based on the categories value-added, services purchased by final users, and intermediate services provided to other industries Over half the revenues of the financial sector were intermediate services provided to other industries (these include sales to other industries within the sector). The bulk of the final sales of the sector are services (including interest paid to depositors) provided to households.

The numbers shown do not incorporate the July 30, 2010 revision of the National Income and Product Accounts (NIPA). The revised figures show somewhat higher 2008 household purchases of financial services than was earlier reported. Revisions of the numbers on the sector's value-added and gross revenues have not yet been released. However, there was a very substantial downward revision in domestic financial sector profits for 2008 (from $271.6 billion to $128.0 billion), as well as a comparable cut in the estimate of national income for the broader finance, insurance, and real estate sector. These suggest that there will be a reduction in the estimate of the finance and insurance sector's value added, equal to perhaps one percentage point of GDP.

**Table 1**

**2008 Value-Added and Gross Output of Finance and Insurance**

| | Billions of Dollars | Percent of GDP |
|---|---|---|
| **Value-Added** | **1200.0** | **8.3** |
| **Gross Output** | **2169.3** | |
| **Sales to Final Users** | **861.6** | **6.0** |
| **Consumption** | **832.0** | **5.8** |
| Imputed Interest | 271.4 | 1.9 |
| Insurance services[5] | 252.7 | 1.7 |
| **Intermediate services sold** | **1207.7** | |
| Sales within the sector | 487.9 | |
| Intermediate services sold to nonfinancial sectors | 720.8 | |

Data on sales to final users, the consumption aggregate and intermediate sales within the sector come from the BEA annual input-output table on industry make/use.

The likelihood of this downward revision to financial value-added would seem to support arguments that U.S. output has been overstated due to overestimates of the contribution of finance—estimates of overall U.S. GDP, both nominal and real, for 2008 were also reduced. However, it appears that any downward revision to value-added produced by finance and insurance will reflect some

[5] Essentially life and medical insurance premiums less benefits received.

combination of reduced estimates of intermediate services sold to other sectors, or larger estimates of purchases from other sectors (there were no consequential revisions to the numbers on household consumption of financial services). Other things equal, revisions of this type would increase estimates of value-added outside of finance, offsetting the reduction in financial value-added (indeed, estimates of 2008 corporate profits outside of domestic finance have been boosted).

In any event, the value-added and final sales data do not by themselves suggest that finance and insurance looms as a remarkably large sector. Moreover, as we see, these numbers are notably boosted by imputations. The significant volume of imputations assigned to financial activity allows for clearer understanding of the large figures for profits in the sector. Most importantly, if finance was not assumed to be providing services to depositors (and insurance policy holders and mutual fund customers) equal to its spread income, the NIPA data would show that much of its profits would be offset by much lower figures for net interest paid, leaving the sector smaller and, probably, more stable. Economic cycles are generally accompanied by large swings in the balance sheet of the financial sector, and the current treatment allows for these swings (which are generally accompanied by shifts in spread income) to appear in the aggregate data.

It is hard to trace in the reported numbers some of the mechanisms through which the financial sector may be of critical importance for the business cycle and longer-term growth, in particular. As noted, the bulk of the final financial services purchased are fairly commonplace products used by the household sector, the demand for which is likely slowly-evolving with longer-term trends. Income earned by the sector from sales of intermediate services could very well be held down in the aftermath of a financial crisis; in other words, industries outside of finance may use fewer financial services, and it is possible that reduced use of these intermediate inputs could hold back activity throughout the economy.[6] If gross revenues of the financial sector loom large for the economy as a whole this mechanism could go a good way to understand why financial crises are associated with significant retrenchments in aggregate activity.

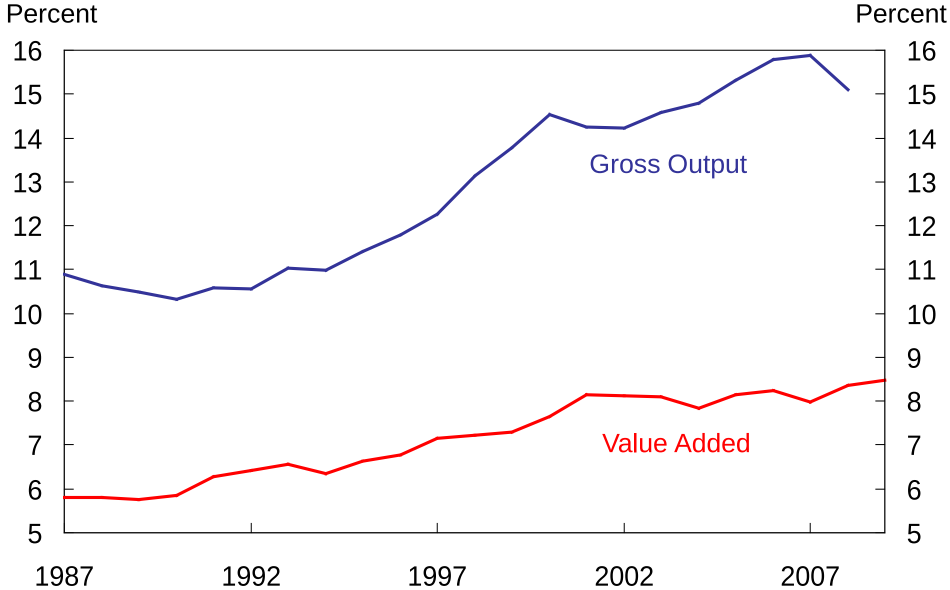
The numbers reported by BEA show that, all in all, sales of financial services—both final and intermediate—amounted to only a bit more than 8% of aggregate gross revenues in 2008, even after years of steady growth in this share, while the ratio of financial gross revenues (BEA's term is gross output) to GDP was approximately 15% (Chart 1). This latter ratio is of particular importance, since one way to examine how a financial sector contraction could impact longer term growth is to look at how the sector's contribution to MFP growth might diminish, and the contribution of a single sector's MFP growth to that of the economy at large is proportional to the ratio of its nominal gross revenues to nominal GDP (Schreyer, 2001). Thus, using the BEA numbers, it would require a roughly 6 percentage point reduction in the growth of MFP in finance to reduce the growth of aggregate MFP by 1 point.[7]

[6] This is a "supply-side" effect of a financial contraction, stemming from higher costs or less efficient provision of financial services leading to suboptimal usage. This is opposed to the "demand-side" effects stemming from forces such as loss of access to financial services stemming from declines in wealth among users of financial products. Estimates of the loss of output from a financial contraction that concentrate of movements in the industry's value-added, such as those shown in Berrera, Estaveo, and Keim (2009), appear to incorporate both sets of effects.

[7] One might maintain that indirect "spillovers" from a financial contraction to other sectors would amplify its effect, meaning that not such a drastic financial contraction would be required to generate a 1 percentage point reduction in aggregate MFP growth. However, the spillovers in question would be from technical progress in finance to that in other sectors, which is hard to understand. Other arguments have been advanced that the aggregate impact of financial shocks is amplified through accelerator mechanisms; current work in macroeconomics is extensively devoted to examining such accelerators. These mechanisms, though, are essentially those that propagate cyclical disturbances through spillovers to demand. In model calibrations these effects can be long-lasting, but such results come in part from attempts to match a model to the historic aggregate record.

Chart 1

Finance and Insurance Value Added and Gross Output as a Share of GDP




Source: U.S. Bureau of Economic Analysis

The BEA gross revenue figures reported may overstate the importance of finance and insurance sector, since they do not net out sales between industries in the three-digit sectors included. The comparable figures available from BLS show substantially lower financial and insurance revenues; using the BLS figures a much larger reduction (up to 10 percentage points) in MFP growth in finance and insurance would be required to reduced the growth of aggregate MFP by 1 percentage point. We now turn to the BLS data to examine recent MFP trends in the financial sector.

Harper, Khandrika, Kinoshita, and Rosenthal (HKKR, 2010) report estimates that MFP in securities grew at a compound rate of 7.2% from 1987 to 2006 (Table 2). This was far and away the highest pace for the 42 nonmanufacturing sectors they examined. While MFP growth in the securities sector cooled off slightly after 2000, it still averaged a hefty 6.3% from 2000 to 2006.

HKKR find that MFP growth in other components of finance and insurance was noticeably less than in securities, with their longer-term averages slightly negative. Still, there was a noticeable stepup after 2000 in two of the other three areas, with that for banking rising from -2.1% for 1987-2000 to 3.1% for 2000-2006, and that for trusts moving up from -1.0% to 0.0%. Countering a portion of these increases was a slowing in MFP growth in insurance.

HKKR calculate that the broad finance and insurance sector contributed .31 percentage points to average aggregate MFP growth of 1.50% in 2000-20006. This was a bit smaller than the contribution of retail and wholesale trade; however, the trade contribution changed little after 2000 while that from finance and insurance moved up from an average of .19 percentage point in 1987-2000.

The lower portion of Table 2 recalculates the HKKR estimates for the finance and insurance sector using the revised data available on the BLS website (http://www.bls.gov/mfp/mprdload.htm). The new numbers show an approximately .1 percentage point reduction in the growth contribution from the sector for the years 2000-2006 from that reported by HKKR. Nevertheless, the new numbers still suggest that the finance and insurance sector made a major contribution to MFP growth in the first half of the last decade, with an absolute rate of growth of nearly 2 percent a year in that period.

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**Table 2**
**Multifactor Productivity Growth and Contributions**

| | 1987-2006 | 1987-2000 | 2000-2006 | 2007 |
|---|---|---|---|---|
| *Derived from Harper, Khandrika, Kinoshita, And Rosenthal (2010)* | | | | |
| Growth (compound annual rate) | | | | |
| Private Business | 1.04 | 0.83 | 1.50 | |
| Finance and Insurance | | | | |
| Banking | -.03 | -2.1 | 3.7 | |
| Securities | 7.2 | 7.7 | 6.3 | |
| Insurance | -.6 | .4 | -2.5 | |
| Trusts | -.7 | -1.0 | .0 | |

| | | | | |
|---|---|---|---|---|
| <u>Average Growth Contributions</u> | | | | |
| Finance and Insurance | .17 | .10 | .31 | |
| Banking | -.01 | -.10 | .18 | |
| Securities | .21 | .20 | .21 | |
| Insurance | -.02 | .01 | -.08 | |
| Trusts | -.01 | -.01 | .00 | |
| *Based on Revised Industry MFP data* | | | | |
| <u>Growth (compound annual rate)</u> | | | | |
| Finance and Insurance | 1.2 | .9 | 2.0 | -1.0 |
| Banking | -.8 | -2.0 | 2.1 | -4.7 |
| Securities | 7.6 | 8.3 | 6.0 | 1.1 |
| Insurance | -.2 | .2 | -.9 | 2.6 |
| Trusts | -1.0 | -.6 | 1.9 | -1.6 |
| <u>Average Growth Contributions</u> | | | | |
| Finance and Insurance | .12 | .09 | .20 | -.11 |
| Banking | -.02 | -.07 | .09 | -.20 |
| Securities | .15 | .15 | .15 | .03 |
| Insurance | .0 | .0 | -.01 | .08 |
| Trusts | -.01 | -.01 | - .02 | -.02 |

If MFP growth in finance and insurance was to go into reverse and decline at the same rate as its growth rate from 2000-2006, the effect, using the HKKR estimates, would be that the sector would swing from contributing about one-third of one percentage point to annual aggregate MFP growth to holding down aggregate MFP growth by that amount. Such a downshift—amounting to two-thirds of one percent -- would be at least reminiscent of the growth costs of financial crises documented in Reinhart and Rogoff and Reinhart and Reinhart (Reinhart and Reinhart estimate that annual real GDP growth rates in large nations have fallen about one percentage point for the decade following a financial crisis). The revised numbers suggest that reversing the sign of the 2000-2006 growth in MFP in finance and insurance could be associated with aggregate MFP growth slowing close to one-half percentage point relative to its 2000-2006 trend

A major problem with pro-forma computations of this type is that one should have some insight into the forces that might be associated with such swings in MFP growth in a sector. Clearly, at least in the securities component, the MFP growth trend has been extraordinary: the HKKR estimate is that the level of MFP in the securities industry increased four-fold in the twenty years after 1987—a period shorter than the careers of some professional athletes.[8]

The other major sectors that have stood out as making major positive contributions to aggregate MFP growth in the last generation are trade (wholesale and retail) and, in manufacturing, computers and electronics.[9] In these sectors, there are reasonably well-accepted explanations for the surges (Oliner, Sichel, and Stiroh, 2008). Essentially, advances in information technology (both in the production and use of the hardware and software tools), and, especially in trade, fundamental organizational changes allowing exploitation of the economies of scale achievable by the technology, can be seen as underlying the rapid growth in MFP. Looking into the specifics of these industries, analysis of the effects of spending on intangible assets, such as R&D, training, staff reorganization, advertising and other branding expenses, could provide a fuller understanding of their MFP movements.

Of course, similar forces have likely been at work in finance and insurance. However, in technology manufacturing and in trade, it is plausible to assume that, over time, the impetus to MFP growth will fade without further rapid advances in technology. It appears to be more difficult to sketch a scenario in which MFP would decline, without anticipating that some other forces would be at work. Similarly, it would be hard to understand a projection in which MFP in finance and insurance would retrogress for a sustained period without getting a handle on the forces that have propelled its long-term surge and assessing the likelihood of their reversal.

[8] Roger Clemens' major league career spanned 1984-2007 and Greg Maddux's 1986-2008. Julio Franco's first major-league game was in 1982 and his last was in 2007, but he did not play in the major leagues in 1995 and 1998.

[9] HKKR note that accelerated MFP in broadcasting also contributed to the pickup in aggregate MFP growth after 2000.

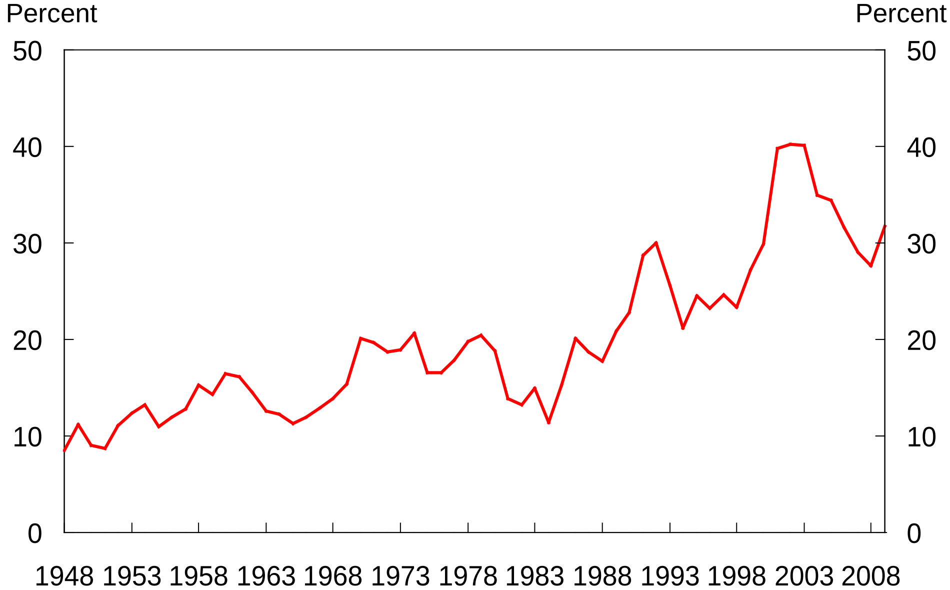
Intangible Investment and MFP Growth in Finance and Insurance

One approach to the issue of understanding some of the factors behind rapid growth in financial MFP might come from rethinking how the inputs to activity of the financial sector are measured. Basically, finance is currently viewed as combining conventionally-measured capital and labor inputs (as well as intermediate products purchased from other sectors) to produce its services and earn its income. Measured in this fashion, it is hard to understand some of the extraordinary returns earned by factors of production in finance. Many observers have noted the high return to capital in the sector, signaling out the very high share of corporate profits accruing to finance (Chart 2). [10] Looking a bit more broadly, in 2006, the peak year for financial profits, capital-type income in the sector (profits, net interest, and proprietors' income) was about $450 billion. The estimated current-dollar replacement cost of all physical capital owned by the sector was $1103 billion at the start of that year; thus capital income amounted to a remarkable 40.7% of the start of year value of physical capital. Capital income in all private domestic industries in that year equaled 10.8% of the start of year value of all fixed reproducible assets. The substantial gap between finance and other sectors has persisted for some time, and may be difficult to relate solely to the riskiness of finance (Chart 3). On the labor side, Philippon and Reshef (2010) have noted that compensation per worker in finance in 2006 was approximately 30% to 50% greater than the compensation received by workers of comparable education and technical skills in other industries. This differential was not evident in the early 1980s.

[10] As mentioned, the 2010 NIPA revisions sharply reduced recent estimates of financial sector profits. Still, even after these reductions, pre-tax operating profits in finance during the trough year of 2008 amounted to 15% or all domestic corporate earnings.

## Chart 2

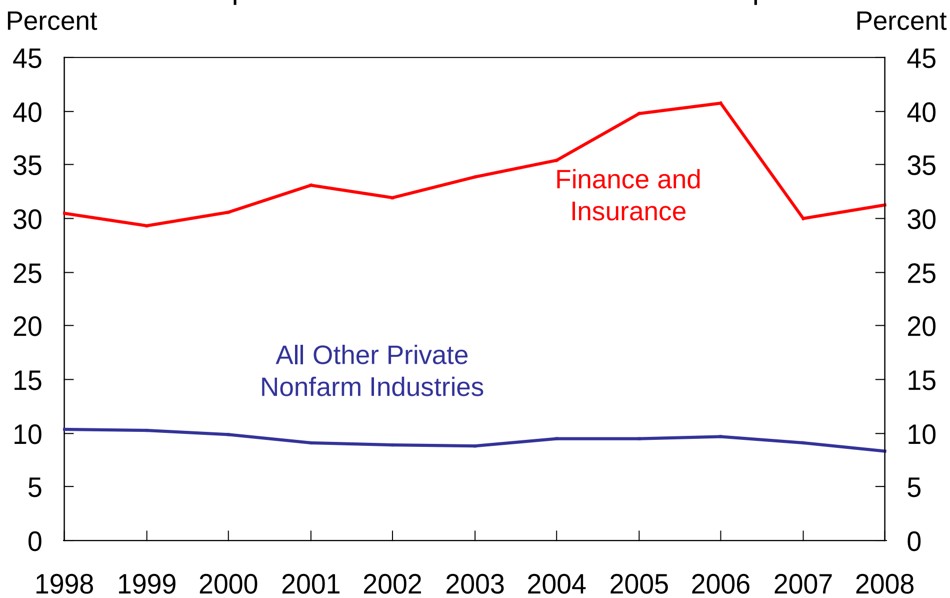
Financial Profits as Share of Domestic Total




Source: U.S. Bureau of Economic Analysis

## Chart 3

Domestic Capital Income Relative to Start of Year Capital Stock




Source: Bureau of Economic Analysis and Author's Calculations

Phillppon and Reshef assigned this unexplained compensation differential in finance to "rents." Comparably, HKKR could only conclude that the surge in MFP in the securities sector "could be reflective of an overheated financial market." Given the very large size and persistence of these differentials it seems reasonable to assume that some ongoing special factors must help to explain the high rates of return to capital and labor. If so, and if it seems plausible that such factors could diminish in the future, a large diminution in the sector's MFP (as would be conventionally measured) would be easier to understand.

Attempts to understand movements in national output trends that cannot be readily explained by shifts in capital and labor inputs—swings in aggregate MFP—often focus on examination of the inputs of intangible assets. Corrado, Hulten, and Sichel (2005, 2009) have done a comprehensive assessment of the possible aggregate importance of accounting for intangible investments in R&D, brand enhancement (items such as advertising) and the like, in a similar matter as tangible investment, rather than as intermediate expenditures. In this alternative treatment, the capital stock is expanded by the addition of a large amount of (fairly rapidly depreciating) items, and GDP is swelled by investment in them. Their finding is what is reported as acceleration in national MFP can be partly explained as the result of rapid growth of the productive inputs from these intangible capital types. Their bottom line result is that the published .94 percentage point increase in aggregate MFP growth from 1973-1995 to 1995-2003 is reduced to .67 percentage point when spending on these intangible items is accounted for as investment, rather than as outlays for intermediate product.

If we apply the Corrado, Hulten, and Sichel methodology to finance the results would likely be fairly lackluster, taking into account the most obvious types of intangible capital. For instance, as reported in Wolfe (2010), less than 2% of aggregate commercial R&D spending in the U.S. in 2005 was incurred by firms in the finance and insurance sector ($3 billion out of a total of $226.2 billion, or .5% of sales, compared to an economy-wide average of 3.7%). Can there be other types of intangible capital more germane to financial activity?

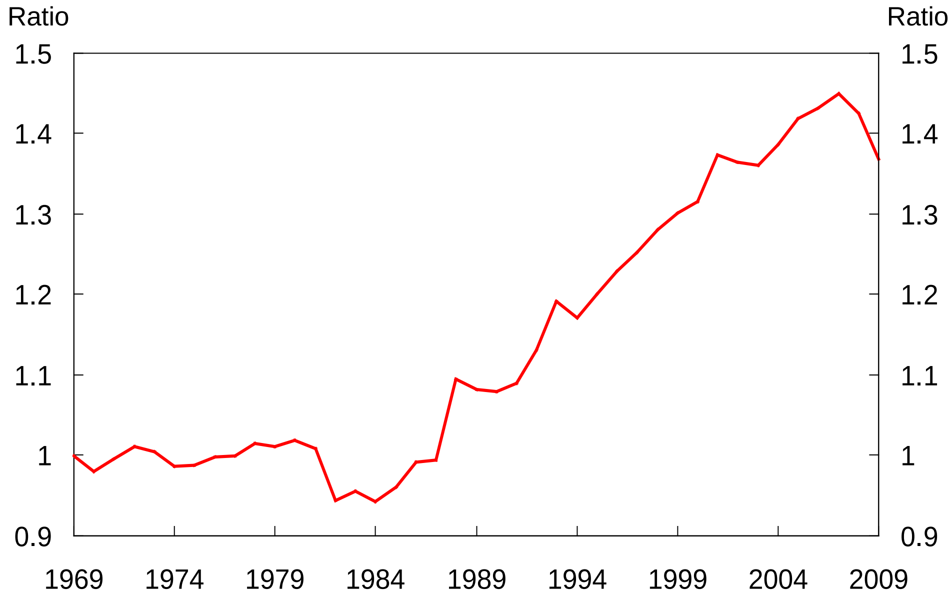
An obvious example would appear to be the information financial firms have about their customers and markets. Clearly, a successful firm would have very specialized knowledge about the evaluation of credit and the various institutional and regulatory structures associated with financial transactions in different markets and jurisdictions. Of course, firms in other industries need some knowledge of this type—a fisherman has to know what species are most desired, assess where the schools are gathered, and when and where the buyers can be found—but arguably information on market structure is of peculiar importance for finance, especially given the extraordinary expansion in the complexity, size, and number of markets and instruments over the last generation. Such information would be highly proprietary, and one would not expect it to be reflected clearly in items such as spending on formal R&D or even technology capital.

A plausible proxy for capital spending by financial firms on market knowledge may lie in the compensation numbers. Potentially, some fraction of the compensation paid by financial firms reflects payments for the specialized market knowledge of the workers in the industry; such knowledge may not be easily connected to either their formal skills (as measured by factors such as their educational achievement) or even their years of experience. As a first pass, it will be assumed that increases in aggregate compensation in finance and insurance that are associated with increases in the compensation per full-time equivalent employee in finance relative to workers in "professional, scientific and technical services" reflects increased spending on market knowledge. The professional, scientific, and technical services sector encompasses legal services, computer services, and miscellaneous professional, scientific, and technical services (industries such as accounting, advertising, and consulting), and the presumption is that the formal technical qualifications of workers in these industries are comparable to those in finance.  Unfortunately, the NAICS numbers on professional, scientific, and technical services are only available for the years 1998-2008; for 1987 to 1998 a reasonable benchmark SIC sector consists of legal and other services, while prior to 1987 the benchmark comprises legal and other professional services.

Chart 4 shows movements in the ratio of financial compensation per full time equivalent (FTE) worker to those of the benchmark series, with the 1969 value of the ratio set equal to one.  The sharp increase in relative compensation in finance starting in the late-1980s is quite evident and appears comparable to the excess wage series computed by Philippon and Reshef (as shown in their Figure 11).

**Chart 4**

Relative Compensation per Full-time Equivalent Employee in Finance and Insurance




Source:  Bureau of Economic Analysis and Author's Calculations

1969 = 1; benchmark prior to 1998 is legal and other services, while from 1998 on it is professional, scientific and professional services.

The hypothesis  is that spending by financial firms on traditional labor services can be approximated by outlays sufficient to maintain the ratio of their compensation per FTE to that of professional, scientific, and professional services equal to mid-1980s levels—in other words, presumably the labor component of compensation per worker reflecting payments for standard labor services has increased at the same rate in finance and insurance as in other industries hiring labor of comparable technical and professional skills.[11] All compensation spending in excess of this mark will be viewed as outlays by finance in an intangible asset, market knowledge capital. It will be further assumed, in line with the assumptions made by Corrado, Hulten, and Sichel, that this investment is valued at the same price as that for all nonfarm business, and that such investment depreciates at a 50% annual rate. It will also be assumed that the aggregate stock of this capital was zero at the end of 1987.[12]

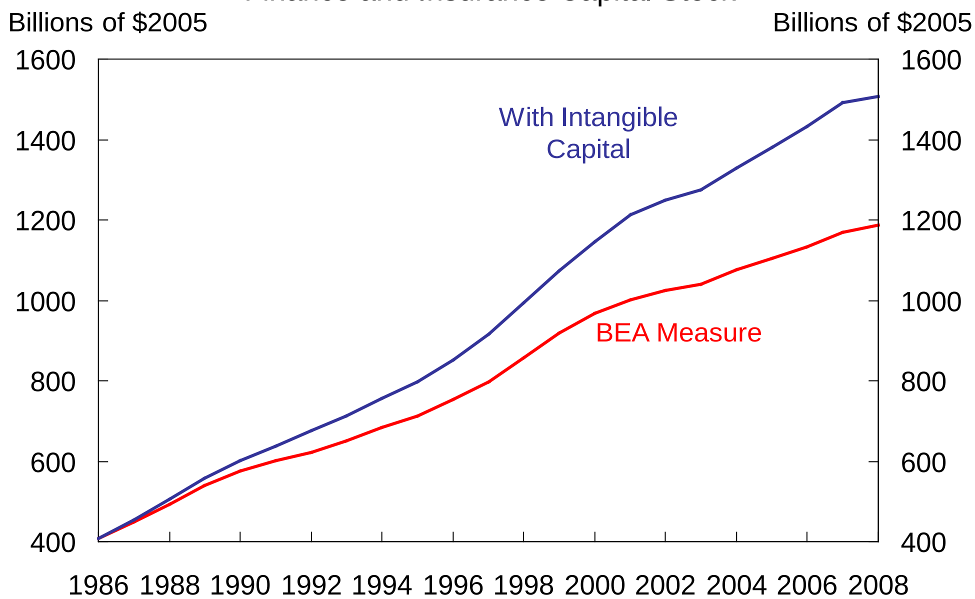
Chart 5 shows the effects of this computation for the growth of the capital stock of the financial sector. With the assignment of "excess" compensation as a type of investment, and the assumptions on depreciation, the augmented finance and insurance capital stock increases by roughly 3 ¼ times from 1987 to 2008, compared to the officially reported increase of about 2 ½ times.[13] The compound annual growth rate of the augmented capital stock is 5.8%, compared to the official figure of 4.7%. Thus, viewing excess compensation as investment results in a fairly noticeably augmentation to the growth of the finance and insurance capital stock.

[11] There is a noticeable difference in the 1998-2000 overlap period between the NAICS numbers on compensation per full time equivalent worker in professional and other services and the SIC numbers on compensation per worker in legal and other services, with the levels of the SIC levels being substantially higher.

[12] The computation adjusts for the difference in numbers of full time equivalent workers in finance and insurance between the SIC and NAICS measures in 1998-2000. The NAICS numbers are about 94.5% the magnitude of the SIC figures in the overlap years, and only this proportion of the SIC figures on aggregate compensation in finance and insurance in 1985-1997 is used in the computation.

[13] For the purposes of the aggregation it is assumed that the deflator for the end of year values for the new capital type is the average of the deflator for nonfarm business output for the current and next year.

Chart 5
Finance and Insurance Capital Stock




Source: Bureau of Economic Analysis and Author's Calculations

The assignment of excess compensation in finance to spending on intangible knowledge capital would have a further number of further significant implications for the accounting of activity in the sector:

1. Estimates of profits in the sector would be boosted, because the excess compensation would no longer be charged as an immediate expense. The boost to profits would, though, be muted by a depreciation charge on the new type of capital.
2. The production of the new type of capital would need to be accounted for. A plausible way to do this would be to assume that the new capital is the product of labor in a new "industry." This industry could plausibly be part of the broader finance and insurance sector (this treatment is analogous to BEA's "own-account" construction series—structures built by households and staffs of nonconstruction firms and governments).

As the result of such adjustments, the finance and insurance sector would represent a larger fraction of GDP and aggregate gross revenues for the period since 1987, and at least for part of that time, would be reported to grow faster than is currently the case. There would also be a small upward adjustment to overall GDP. Table 3 illustrates the impact of the addition of this investment series upon the growth of real value-added for finance and insurance, upon the growth of real gross output (both the BEA and BLS measures), and upon real GDP. It is clear that the impact on real GDP growth is minimal, but there is a modest upward effect upon the various measures of financial sector growth.

**Table 3**

**1987-2006 Growth of GDP and Financial Gross Output Before and After Recomputation**

(Chained $2005, Compound Annual Rate)

| | |
|---|---|
| GDP | |
| Before | 3.1% |
| After | 3.1% |
| Finance and Insurance Value-Added | |
| Before | 4.0% |
| After | 4.4% |
| Finance and Insurance Gross Output: BEA Estimate | |
| Before | 4.6% |
| After | 4.8% |
| Finance and Insurance Gross Output: BLS Estimate | |
| Before | 3.7% |
| After | 4.1% |

The key point, though, is not the impact of the reclassified compensation on GDP or on measures of financial activity. As noted above, the major point of interest is to see how the reclassification may affect MFP growth in finance and ultimately that in the economy at large. The difference between the new and altered estimates of MFP growth in the sector would be charged to the reclassification of a portion of compensation. One may make more or less defensible suppositions as to the future evolution of financial sector compensation; in turn these will affect the growth trajectory of the market knowledge capital variable and will thus influence the growth of *observed* MFP in the sector as well as that for the economy as a whole.

The main elements needed for the impact of accounting for this new type of capital on sectoral MFP growth are the already computed alternate growth rates of real gross revenues in finance and insurance (for this exercise, the numbers on the new type of capital spending are added to these the BLS estimates), the already computed estimate of the growth rate of real intangible capital, and the user cost of that intangible capital. It will be assumed, for simplicity, that the user cost on the new type of intangible capital will be based on applying a fixed 54% rate of return to the nominal start of year stock of that capital (the rate of return would likely be expected to be in excess of 50% given the depreciation assumption).[14] With the assignment of user costs to the new capital (equal, at its peak, to approximately 10% of the gross revenues of the sector), the growth contributions from already accounted for labor, capital, and intermediate inputs will be pared (since their income shares will be reduced).

Table 4 shows the results of the recomputation of finance and insurance MFP growth made by including the new input. The essential point is that there are noticeable reductions. The new estimate for average MFP growth in finance and insurance from 1987 to 2000 is .5%, compared to the .9%

[14] This is clearly a highly arbitrary assumption, in part because it does not assume equilibration of rates of return across investment types. This simplification is likely adequate for the purpose of illustrating the potential effect on finance and insurance MFP of capitalizing "excess" compensation.

computed from the official BLS data. For 2000-20006, the new estimate is growth averaging 1.5% a year, compared to 2.0%. For the entire period from 1987 to 2006 the new estimate is .8%, compared to 1.2%. In other words, by these computations something around one-third or more of reported MFP growth in finance and insurance over the last generation could reflect a lack of accounting for the creation of intangible capital suggested by the very high relative compensation of the sector.

**Table 4**

**Finance and Insurance MFP Growth Before and After Recomputation**

(Compound Annual Rate)

| | 1987-2006 | 1987-2000 | 2000-2006 | 2007 |
|---|---|---|---|---|
| Before | 1.2 | .9 | 2.0 | -1.0 |
| After | .8 | .5 | 1.5 | -1.4 |

This recomputation of MFP growth in finance and insurance might allow for a clearer understanding of recent and perspective movements in the published series, and, other things equal, the contribution of finance and insurance to aggregate MFP movements. One possibility is to view the 0.5% trend from 1987 to 2000 in the transformed series as a plausible estimate of "true" MFP growth in the sector.[15] Under this assumption, the rapid reported 2% trend in finance and insurance MFP from 2000 to 2006 may be parsed into three components:

1. "Underlying" MFP growth of .5% a year.

[15] This estimate itself would likely be trimmed somewhat if one recognized the growth contributions of the types of intangible investments discussed by Corrado, Hulten, and Sichel. However, some fraction of these are, in principle, already recognized as intermediate purchased service inputs to the industry's output in BLS's KLEMS system, so any increment would stem from the contributions of past expenditures. Given the high depreciation rate assumptions for these types of investment the increment to input growth would probably be rather limited.

2. A .5% contribution from the growth of market knowledge capital proxied by the high dollar volume and growth of “excess” compensation in the sector.
3. A residual of 1% that may reflect rents stemming from the rapid growth in activity in the sector in this period.

Intangible Investment and Possible Future Growth Contributions of Finance

If we look to the future, it is certainly plausible to suppose, at one extreme, that both the second and third components noted above could turn negative if financial sector expansion slows, and the compensation bill falls back to being more characteristic of sectors employing workers of comparable skills (through some combination of pared growth or declines in relative compensation per worker, and slower growth of or reductions in employment). Given a “baseline” for MFP growth in the sector of .5% per year, a period of negative reported MFP growth for finance and insurance may be plausible. In turn, a swing from 2% a year reported MFP growth for finance and insurance to a negative value would imply downward pressure on aggregate MFP of at least one-quarter percentage point a year. To reiterate, if there is an unwinding of high compensation in the sector, and that high compensation truly is a proxy for investment in a productive form of intangible capital, the downward push on published MFP would stem in part from declines in that type of capital.

The ultimate extent of the downward pressure on aggregate MFP from an unwinding of high compensation in finance and real estate would be uncertain. In 2008 the computed user cost of this intangible capital stock equaled about 1 ¼% of GDP. Thus, the disappearance of this type of capital (in other words, relative wages in finance reverting to their mid-1980s levels) would apparently reduce the level of MFP by about this amount, which is, of course, not by itself sufficient to amount to more than either a brief sharp interruption to the growth of the aggregate series, or to a period of several years of growth under par.[16] In other words, a very prolonged drag on growth from the supply side stemming from a financial contraction might seem somewhat unlikely. However, that conclusion depends on reliance on the fairly problematic computations of the level of the stock of intangible capital and its user cost.

In addition to the mechanisms that have been discussed, another channel by which economic output may be held back (on the supply side) in the aftermath of the financial crisis is from its impact on the services received from the housing stock. The depressed levels of homebuilding in recent years have greatly reduced the growth of the housing stock, and real imputed income from owner-occupied housing is now reported in the NIPA as basically unchanged, as compared to a trend rate of growth of over 3% through the middle of the last decade. Owners imputed rental income is equal to about 7% of nominal GDP. Thus, this slowdown in imputed rent has by itself worked to put downward pressure on real GDP growth in excess of 0.2 percentage point a year.

Adding together the decline in the trend in imputed rental income, as well as the hypothesized impact of a potential slowdown in the growth contribution from intangible finance capital, produces estimates of possible downward pressures on real output growth from the supply side on the order of 0.5 percentage point a year, with roughly equal contributions from the two sources.[17] This total effect still appears to be considerably smaller—and likely shorter-lived--than the post-crisis growth slowdowns described in Reinhart and Rogoff and Reinhart and Reinhart. However, it does appear that some understanding of the roots of these slowdowns can be found by reconsideration of the sources of growth of financial activity.

[16] This fraction is about equal to the lower bound of the range of losses to potential GDP following a financial crisis estimated by Furceri and Mourougane (2009).

[17] This estimate is somewhat higher than that shown in Steindel (2009), in part reflecting a higher estimate of the drag from reduced owners' equivalent rent and in part reflecting a refined estimate of a slowdown finance and insurance. It is broadly comparable, as noted, to that reported by Furceri and Mourougane (2009)—putting their level estimates in terms of near-term growth—as well as OECD (2009)

Conclusions: Limitations and Future Work

The critical elements of this analysis have been the measurement of excess compensation paid by the financial sector, identification of that excess with investment in an intangible asset, and assessing the user costs of that assets. All of these assumptions may be questioned:

1. Professional and other business services may not be the best benchmarks to gauge financial compensation per employee.

2. Identifying excess *relative* compensation with *absolute* nominal investment in an asset is problematic. Suppose, for instance, compensation per employee were declining relative to that in the private economy at large in both finance and insurance and business and professional services, but the decline was larger in business and professional services. Would it then be reasonable to identify the increase in finance and insurance compensation *relative* to that in the benchmark as a sign of positive, purposeful, intangible investment?

3. As noted, the user cost calculation used in the exercise was quite arbitrary.

Future work in this area could address these and other issues, and refine the estimated impact on MFP. Nonetheless, the calculations present here suggest that thinking about high compensation in finance as, in part, a form of investment has the potential to improve our understanding about some of the growth of this sector.

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