
Monograph:
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Appendices: The UK's Finance Curse: Costs and Processes

The report for which these appendices are an accompaniment, provides an initial estimate of UK negative sum macroeconomic costs, arising from a phenomenon referred to in Nick Shaxson's new book as the finance curse[1]. To calculate the total price tag we add together two separate components that shrink the potential overall size of the UK economy. The first component is misallocation costs with calculations derived from the 'too much finance' literature. The second component is a figure for the total cost of the 2008 crisis in terms of lost UK output. The headline figure of £4.5 trillion is made up of £2.7 trillion misallocation costs between 1995 and 2015 and a £1.8 trillion cost of crisis figure.

Misallocation costs, refer to the effect where past a certain threshold finance slows the growth capacity of an economy, imposing costs on the economy by reallocating factors of production away from their most efficient uses and crowding out other sectors. We use regressions from the peer reviewed 'too much finance' literature to estimate these costs by applying them to the UK. Further research is required into the different elements of misallocation in terms of relative size, and how these processes occur in practice. Misallocation involves both intentional and unintentional processes and can involve: conscious decisions to lend to high collateral, low productivity projects such as property and other financial assets at the expense of high productivity, research and development intensive projects that do most to enhance long-term growth; financial firms and funds taking positions in and demanding short term returns from other companies damaging overall productivity and investment levels; high rewards attracting financial and human capital (brain drain) that might more profitably be deployed elsewhere; exchange rate and price inflation that make it more difficult for alternative tradable sectors to compete (Dutch disease); high, unserviceable debt burdens for households and businesses that shrink demand and productivity.

We also arrive at a calculation of the cost of the crisis of 2008 in terms of total lost UK output. Large complex financial sectors can be volatile, generating high levels of systemic risk and large financial cycles resulting in crises and recessions that are deeper and go beyond usual business cycles. Consequently, countries suffering from excess financial dependence can be particularly vulnerable to such crises. As we explain in footnote 5 in the report, while we accept fiscal consolidation amplified the loss in output and was a political choice in the UK, we treat this as part of the UK's crisis trajectory, because the finance curse concept expects financial dependence to spill over to shape social and political arenas. Together, these two factors make a calculation of a total lost output price tag for the UK as a result of the 2008 crisis, entirely appropriate.

P.7 of the report contains an explanation of why adding these two component parts together is unlikely to involve double counting.

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[1] Shaxson, N (2018) *The Finance Curse: How Global Finance is Making us all Poorer,* Bodley Head.

In Overcharged, a series of similar estimates were calculated for the United States, but a third category of excess rent was added to the other two categories. We calculate excess rent for the UK too. We omit it from the headline figure in anticipation of an argument that all UK financial rent is earned from abroad because of the fees and commissions, the City of London's global position enables it to extract. We know this is not the exact empirical pattern, but unlike the other two costs that are negative sum, excess rent is a zero sum redistributive cost, from one social group to another. Consequently, we present the headline figure as negative sum macroeconomic costs caused by finance curse symptoms in the UK, - misallocation + cost of crisis.

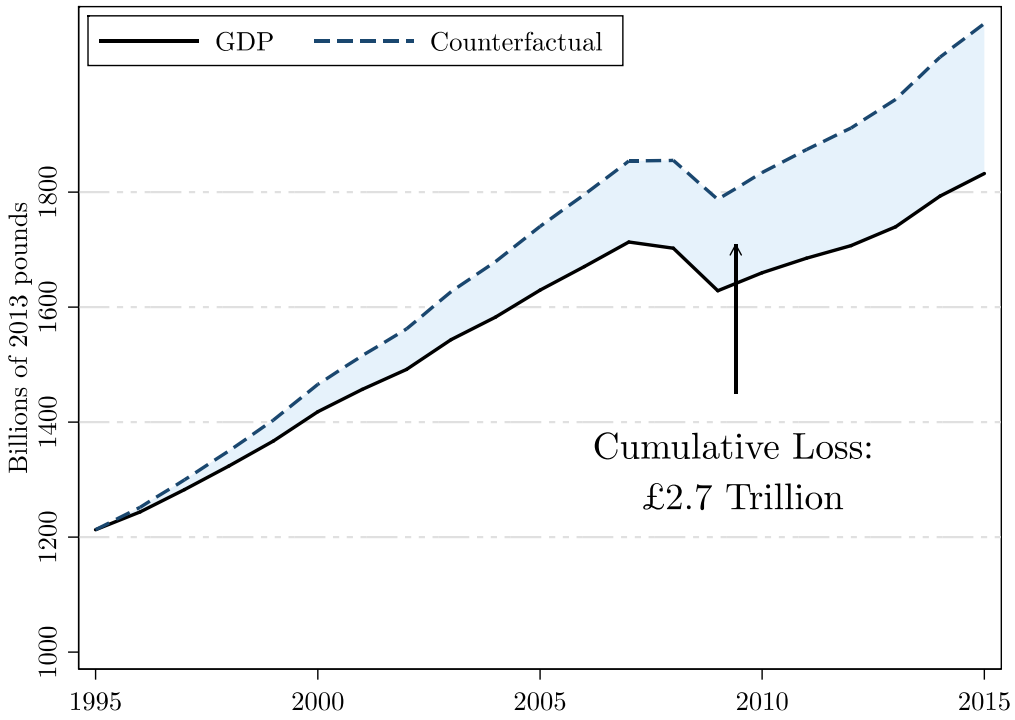
Putting a monetary price tag on the macroeconomic costs generated by an oversized financial sector through lost growth will always require making assumptions and, at times, relying on judgement. That is why, throughout the analysis we have drawn on a wide range of academic research and data sources to make our case. Some estimates require making stronger assumptions than others. For these cases our guiding principle has been to use conservative assumptions and to err on the side of caution. The rest of this note presents three appendices that explains in more detail how the calculations for each of these three components were arrived at. It is designed to be read in conjunction with the full report and replicates some elements of it. We would emphasise that the overall figure is an initial first estimation.

Appendix 1: Misallocation Growth Costs: Real GDP Counterfactual and Too Much Finance

The misallocation of workers and other factors of production towards finance can have long-run negative effects on the growth rate of GDP. We place a price tag on these negative growth costs for the UK by building on a growing academic literature on the dynamic costs of "too much finance." The too much finance literature Arcaand et al. (2015) and Cecchetti and Kharroubi (2012, 2015) shows that credit is beneficial for economic growth in moderate amounts, but appears to become a drag on growth beyond a certain threshold. Studies tend to estimate this threshold at somewhere in the range of 90 to 100 percent of GDP. The average amount of credit to the private sector in the UK between 1995 and 2015 was 160 percent of GDP, which is well into the region that would be expected to lower growth.

These estimates of the link between growth and credit to the private sector can be used to construct a counterfactual series for the path of GDP assuming credit to the private sector was at its "optimal", growth maximizing level. Specifically, we ask: how much higher would real output have been if the financial sector was not too large? It is worth noting that, unlike static efficiency losses, dynamic inefficiencies that affect the growth rate of GDP imply a permanently lower level of output. This means that even small detrimental effects on annual growth rates can be amplified over time and amount to large cumulative output losses. Indeed, the cumulative price tag for the years 1995-2015 are in excess of £2.7 trillion or roughly 1.5 times annual output as shown in figure 1.

Figure 1.



We arbitrarily treat 1995 as the benchmark year and compare the trajectory of actual GDP to its counterfactual level without the negative effects of excessive finance. Naturally, choosing an earlier benchmark year would magnify the estimated cumulative costs. The gap between real GDP and its counterfactual is the output cost from too much finance. As can be seen, the dynamic growth costs are quite large and suggest that GDP would have been around 14 percent higher with a leaner financial system.

In order to calculate the cumulative impacts of foregone GDP resulting from an inefficiently large financial system, we build on Arcand et al (2012) and Cecchetti and Kharroubi (2012), who investigate the relationship between the size of the financial sector and economic growth. Both studies estimate regressions of the following form:

$$g = \beta_1 C + \beta_2 C^2 + e$$

where g is the real growth rate of GDP per capita and C is the ratio of private credit to GDP and thus stands for the size of the financial sector. The key result in both of these papers is that the coefficient β_1 is positive, indicating that an increase in finance is associated with faster growth, but that the coefficient β_2 is negative, indicating that finance becomes detrimental to growth after a certain point. In other words, there is such a thing as "too much finance."

To approximate the negative growth effect from having too much finance, we start by calculating the maximum growth rate that could be obtained, holding all else constant, were the financial sector at its optimal size. This maximum growth rate can be obtained by plugging in the growth maximizing credit to GDP ratio, $C_{max} = -\beta_1/2\beta_2$, in the regression equation. We can then calculate the cost to growth from having an inefficiently large financial system as the difference between the growth maximum and the average growth rate that results from the observed size of the financial sector between 1995-2015.

Table: Too much finance coefficients and maximum credit threshold

	Arcand et al. (2012)	Cecchetti and Kharroubi (2012)
β_1	5.3	3.6
β_2	-2.6	-1.8
C_{max}	101.9	100

The next step is to define a counterfactual per capita growth rate:

$$g^{CF} = actual\ growth + cost$$

The counterfactual growth rate is the growth rate that would have prevailed if the financial sector were not inefficiently large. Finally, to arrive at a counterfactual measure of GDP it is necessary to extrapolate a per capita income series beginning in 1990 using the counterfactual growth rate and then multiply by the population each year. Series for GDP, GDP per capita, and total population for the United Kingdom were obtained from the UK Data Service.

Appendix 2: The 2008 Financial Crisis: Lost GDP and No-Crisis GDP Counterfactual

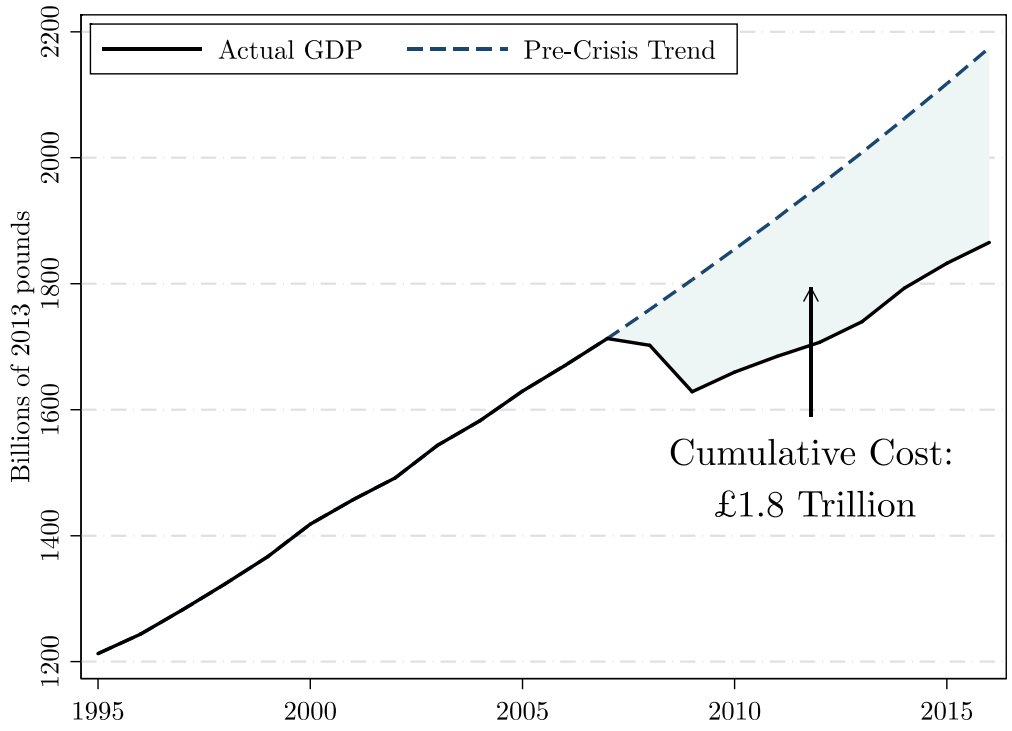
Any estimate of the social costs of the financial sector would be incomplete without taking into account the effects of the 2008-9 global financial crisis. The simplest way to assess the costs associated with the crisis is to measure its impact on national output. It is well known that countries hit hard by the global financial crisis suffered potentially permanent losses in output, with GDP lagging well below its pre-crisis trend. This is certainly the case for the UK.

To put a price tag on the amount of lost output due to the crisis, we compare the path of real GDP to a simple no-crisis counterfactual where the UK continued to grow at its pre-crisis trend. **Specifically, we consider the pre-crisis trend as the average growth rate for the period 1980-2007, which amounted to around 2.8 percent annually.** Note that this period contains at least two major recessions that we allow for. If we were to use just the 1995-2007 period, the average growth rate moves to 3 percent annually, which would make our total estimates higher still. We have opted for the more conservative estimates. It is also worth noting that the period 1950-2007 involves a 2.6 percent annual growth rate, so our counterfactual pathway is in line with the overall post war trend. This trend growth rate **1980-2007** can

then be used to construct a simple no-crisis counterfactual where the UK economy would have continued to grow at 2.8 percent per year after 2007.

The solid black line in figure 2 depicts actual real GDP while the dashed blue line shows the pre-crisis trend. As can be seen in the figure, had GDP continued to expand at its pre-crisis trend it would have reached around £2.1 trillion by the year 2015. We calculate the cumulative net present value of the output loss, amounting to roughly £1.8 trillion, or approximately 100 percent of 2015 output, which is within the range suggested by Bank of England officials (Haldane, 2010).

Figure 2: Real GDP Vs Pre-Crisis Trend



In order to calculate the pre-crisis trend growth rate, we estimate the following regression model for the period 1980-2007:

$$\ln(GDP_t) = \alpha + \beta \cdot t + e_t$$

where the estimated coefficient $\hat{\beta}$ measures the trend growth rate throughout the time-horizon. Our estimates indicate that the trend real growth rate between 1980-2007 was around 2.8 percent annually.

Next, with the trend growth rate in hand, we can calculate the no-crisis counterfactual as:

$$CF_t = \prod_{t=2007}^{2015} \left(1 + \hat{\beta}\right) \cdot GDP_{2007}$$

where GDP_{2007} denotes the level of real GDP in 2007. This expression simply states that the counterfactual real GDP is equal to the level of GDP on the eve of the crisis times the cumulative counterfactual growth between 2007 and 2015.

Appendix 3: Excess Rents: Estimation of the Finance Premium (excess compensation) and excess profits

Our estimates draw on the well know empirical work of Thomas Phillipon and Ariel Reshef. (Phillipon and Reshef, 2012), who define banker rents as the wages in finance over and above what can be explained by the remuneration to education and skill levels if they were to work in non-financial sectors of the economy.

To calculate the amount of excess compensation in the UK financial sector, we first estimate a series of Mincerian regressions using a large set of UK household surveys between 1970 and 2015. The basic idea is to estimate the following regression for each available survey year:

$$y_{i,s} = \alpha_s + \beta_s \cdot Finance_{i,s} + \boldsymbol{\gamma}_s \cdot \boldsymbol{X}_{i,s} + u_{i,s}$$

where $y_{i,s}$ denotes income earned by individual i during survey year s, $Finance_{i,s}$ is a binary variable indicating that an individual works in the financial sector, and $\boldsymbol{X}_{i,s}$ is a set of observable characteristics explaining an individual's earning potential (e.g. level of education and years of experience). The coefficient β_s measures the "finance premium," that is, the share of income earned by an individual working in finance that cannot be explained by human capital and other observable characteristics.

To put a monetary price tag on the total excess compensation financial sector employees received, we can combine our estimated finance premium with aggregate national accounts data on financial sector compensation. The aggregate excess compensation in the financial sector is simply given by:

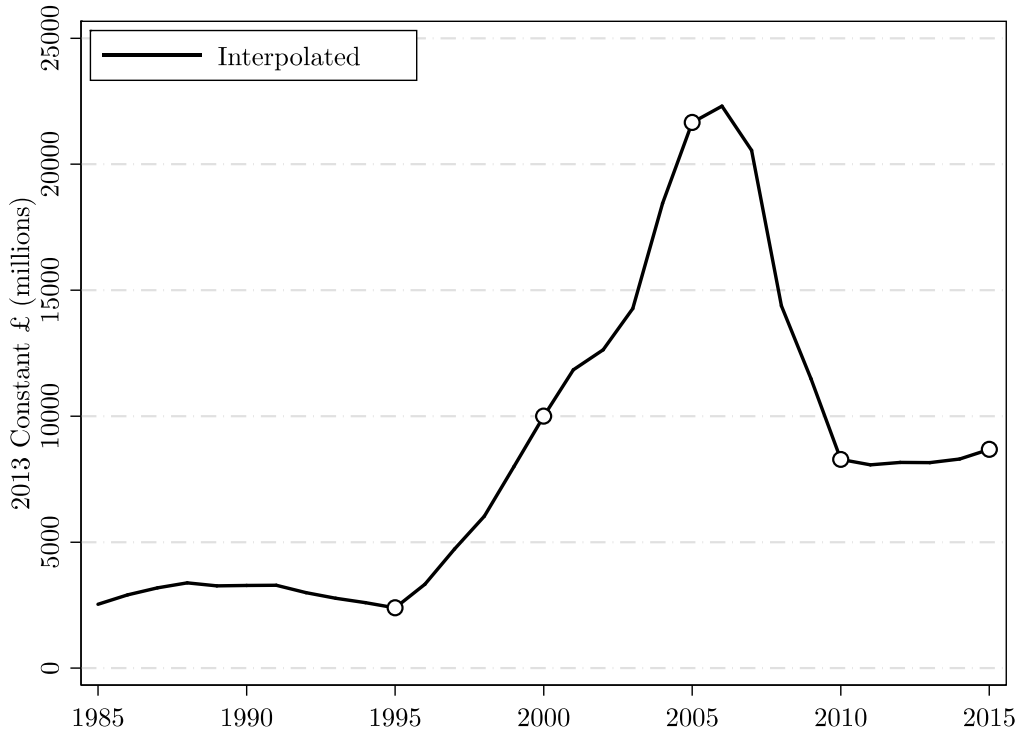
$$Excess_t = premium_t * compensation_t$$

where $compensation_t$ denotes total real financial sector compensation in year t and $premium_t$ is the estimated finance premium. In order to obtain a more complete time series, both real compensation and the finance premium are linearly interpolated to fill in missing years.

The aggregate excess compensation series is depicted in Figure 3, in 2013 constant pounds. As can be seen below, total excess compensation amounted to roughly £3 billion per year

between 1985-1995. Total excess compensation subsequently increased markedly, peaking at around £22 billion in 2005, or 1.5 percent of GDP. Excess compensation appears to have fallen since the beginning of the global financial crisis and remains at around £8 billion per year between 2010 and 2015.

Figure 3: Financial Compensation 1985-2015

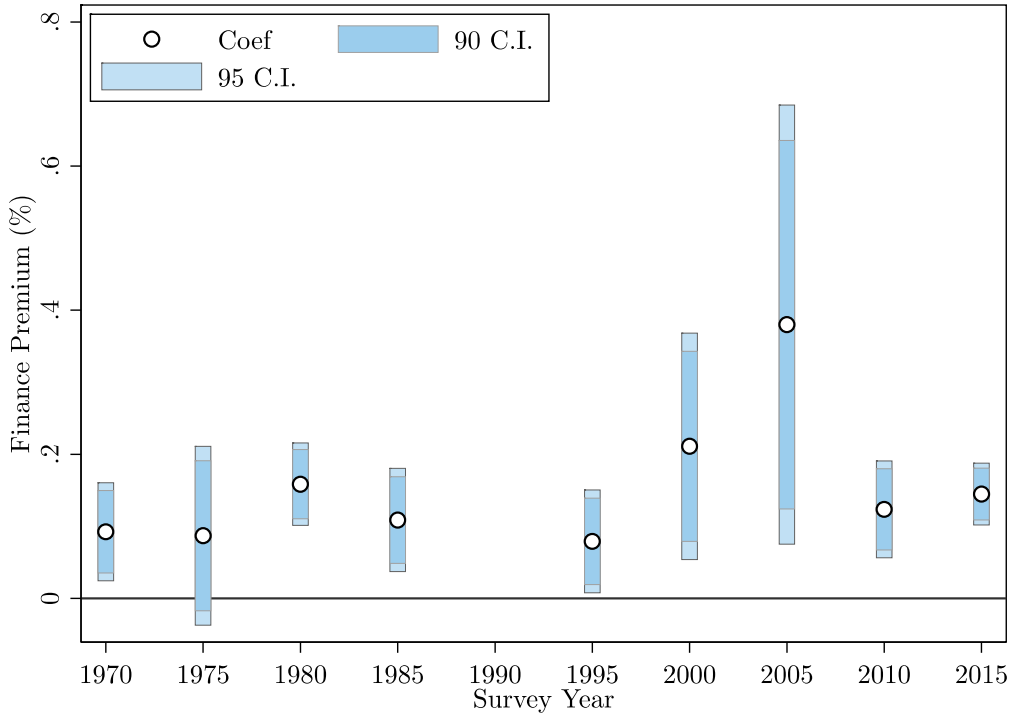


Assuming a 2 percent annual discount factor, the present value of financial sector excess compensation is £280 billion, or around 15 percent of 2015 GDP.

In order to obtain time-varying estimates of the finance premium, we used several vintages of the following UK-wide household surveys: The Family Expenditure Survey (FES), the Expenditure and Food Survey (EFS), and the Annual Population Survey (APS).

In all cases, the dependent variable is the natural logarithm of individual gross income. For years prior to 2005, we use the income of the head of the household. For years after 2005, we use the income of the "household reference person." When possible, the regressions were estimated using population sampling weights. Standard errors are clustered by geographic region.

Figure 4: The Finance Premium 1970-2015.



The information used in these calculations is summarized below, indicating the survey title and year, as well as the codes for each variable used in the estimation. Unavailable variables for a given survey year are denoted by "N/A."

Family Expenditure Survey (1970)

- *Gross Income:* P345, P353
- *Finance Indicator*: A211 = 25
- *Age*: A005
- *Gender:* A004
- *Race:* N/A
- *Education:* N/A
- *Marital Status:* A006
- *Geographic:* A096
- *Occupational Category:* A210
- *Sample Weights:* N/A

Family Expenditure Survey (1975)

- *Gross Income:* P345, P353
- *Finance Indicator*: A211 = 25
- *Occupational Category:* A210
- *Gender:* A004
- *Age*: A005

- *Education:* N/A
- *Race:* N/A
- *Marital Status:* A006
- *Geographic:* A096
- *Sample Weights:* N/A

Family Expenditure Survey (1980)
- *Gross Income:* P345, P353
- *Finance Indicator*: A211 = 25
- *Occupational Category:* A210
- *Gender:* A004
- *Age*: A005
- *Education:* A010
- *Race:* N/A
- *Marital Status:* A006
- *Geographic:* A096
- *Sample Weights:* N/A

Family Expenditure Survey (1985)
- *Gross Income:* XP345, XP353
- *Finance Indicator*: A211 = 25
- *Occupational Category:* A210
- *Gender:* A004
- *Age*: A005
- *Education:* A010
- *Race:* N/A
- *Marital Status:* A006
- *Geographic:* A098
- *Sample Weights:* N/A

Family Expenditure Survey (1995)
- *Gross Income:* XP345, XP353
- *Finance Indicator (3-digit SIC)*: IND1 = {60-67}
- *Occupational Category:* A210
- *Gender:* A004
- *Age*: A005
- *Education:* A010
- *Race:* N/A
- *Marital Status:* A006
- *Geographic:* A098
- *Sample Weights:* N/A

Family Expenditure Survey (2000)
- *Gross Income:* XP345, XP353

- *Finance Indicator (3-digit SIC)*: SIC90 = {60-67}
- *Occupational Category:* A210
- *Gender:* A004
- *Age*: A005
- *Education:* A010
- *Race:* N/A
- *Marital Status:* A006
- *Geographic:* A098
- *Sample Weights:* N/A

Expenditure and Food Survey (2005)
- *Gross Income:* P051, P053
- *Finance Indicator (3-digit SIC)*: SIC90 = {60-67}
- *Occupational Category:* NSSEC
- *Gender:* A004
- *Age*: A005P
- *Education:* A010
- *Race:* A012P
- *Marital Status:* A006
- *Geographic:* GORA
- *Sample Weights:* WEIGHTA

Annual Population Survey (2010)
- *Gross Income:* GROSS99, GROSSPAY
- *Finance Indicator:* IND07M = 7
- *Occupational Category:* NSECMMJ
- *Gender:* SEX
- *Age*: AGE
- *Education:* EDAGEBAND
- *Race:* ETH01
- *Marital Status:* MARTSTA
- *Geographic:* GOVTOF
- *Sample Weights:* PWTA14

Annual Population Survey (2015)
- *Gross Income:* GROSS99, GROSSPAY
- *Finance Indicator:* IND07M = 7
- *Occupational Category:* NSECMMJ
- *Gender:* SEX
- *Age*: AGE
- *Education:* EDAGEBAND
- *Race:* ETH01
- *Marital Status:* MARTSTA
- *Geographic:* GOVTOF

- *Sample Weights:* PWTA17

Data for aggregate compensation in the financial sector was obtained from the Office of National Statistics. As explained, the amount of excess compensation is simply the product of the finance premium and the aggregate amount of compensation:

$$Excess_t = premium_t * compensation_t$$

Two difficulties need to be overcome to obtain a continuous time-series of aggregate excess compensation. First, the aggregate compensation series is only available from 1987 onward. Second, due to available survey limitations, we only have estimates of the finance premium for 5-year intervals (with a gap in 1990). Thus, we extended the aggregate compensation series backwards to 1985 using a simple linear extrapolation. Similarly, we used a simple linear interpolation to fill in the gap years in the finance premium. These two extended series are then used to calculate the excess compensation series for the period 1985 to 2015.

Excess Profits

To calculate excess profits, we drew on work that made the distinction between "risk management" and "risk taking", especially Haldane, et. al., (2010) and Wang (2011). The idea is that risk taking is not a contribution to economic output while risk management is. One way to control for this is to utilize risk-adjusted rates of return when measuring profits, whereas it is usually the case that profits without risk adjustments are reported.

A related approach is to recalculate value added in finance, utilizing a measure of value added that controls for risk. For the UK we will follow Haldane and Madouros (2011), who utilize a study by Colangelo and Inklaar (2010).

According to Haldane, in 2009, value added in finance was about 10% of UK GDP. But when the distinction between risk taking and risk management is taken into account, this is likely to be an over-estimate. As quoted in Haldane and Madourous, Colangelo and Inklaar (2010) suggest that, for the Eurozone as a whole, adjusting for risk-taking would reduce the estimated output of the financial sector by about 25-40% relative to the current methodology. If the same factor were applied in the UK, the measured contribution of the financial sector would suddenly drop to about 6-7.5% of GDP. That's a measurement error of about £35-£55 billion based on 2009 data. Using the lower bound of this estimate by Colangelo and Inklaar, this would suggest that excessive profits are roughly 25% of total financial profits, on average, on an annual basis over this period.

Aggregate financial sector profits in real 2013 pounds are depicted below in Figure 5. As can be seen in the figure, financial sector profits peaked at roughly £110 billion immediately before the global financial crisis in 2007 and subsequently remained between £60 and £70 billion. To put a total price tag on the amount of excess profits, as before, we can apply the lower bound 25% excess profits share in suggested by Colangelo and Inklaar and compute the cumulative net present value. Carrying out this calculation for the 1995-2015 period, the

total cost of the financial sector embodied in excess profits amounts to roughly £400 billion in real terms, or around 22 percent of 2015 GDP.

Figure 5: Real Financial Sector Operating Surplus.

References

Arcand, Jean-Louis, Enrico Berkes and Ugo Panizza. 2012. Too Much Finance. IMF Working Paper. WP/12/161.

Cecchetti, S. and E. Kharroubi. 2012. Reassessing the impact of Finance on growth. BIS Working Paper Series #381.

Colangelo, Antonio and Robert Inklaar 2010. Banking Sector Output Measurement in the Euro Area - A Modified Approach, ECB Working Paper Series No. 1204.

Haldane, A (2010) "The $100 billion question," Speech at the Institute of Regulation & Risk, Hong Kong, 30 March, https://www.bis.org/review/r100406d.pdf

Haldane, Andrew, Brennan, Simon and Vasileios Madouros (2010), "What is the contribution of the financial sector: Miracle or mirage?", in Turner et al (2010) "The Future of Finance: The LSE Report", London School of Economics and Political Science, available at http://harr123et.files.wordpress.com/2010/07/futureoffinance-chapter21.pdf

Haldane, Andrew and Vasileios Madouros, 2011. What is the Contribution of the Financial Sector?, VOX, 22 November.

Loayza, Norman and Ouazad, Amine and Ranciere, Romain, 2018. Financial Development, Growth, and Crisis: Is There a Trade-Off? *NBER Working Paper*, No. 24474, April.

Philippon, Thomas. 2014. Has the U.S. Finance Industry Become Less Efficient? On the Theory and Measurement of Financial Intermediation. *American Economic Review*. September.

Philippon, Thomas and Ariell Reshef, 2012. Wages and Human Capital In The U.S. Finance Industry: 1909–2006, *The Quarterly Journal of Economics,* Vol. 127 November, Issue 4.

Wang, J. Christina. 2011. What is the Value Added of Banks? Voxeu.org, December 8.