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understanding economic developments
before and after the 2008 financial crisis**

De Koning, Kees

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Conversion Theory:
the key to understanding economic developments
before and after the 2008 financial crisis

By Drs Kees De Koning

18th September 2018

Table of contents	Page
Introduction	3
1. What happens in the conversion process	4
2. The effects of transferring mortgage risks in the U.S.	5
2.1 The conversion effects on individual borrowers	5
2.2 The Northern Rock example	6
2.3 Lessons to be learned from the Northern Rock example	7
3. The effects of misdiagnosing financial developments in the U.S.	8
4. Some choices revisited	10
4.1 The legal approach	10
4.2 The economic approach	11
4.3 An alternative economic approach	11
5. Concluding remarks	13
References	14

Introduction

Conversion is a term often used for exchanging one currency into another. This can be done on basis of daily exchange rates: the spot rates, but also on basis of future needs: the forward rates. There is a second type of conversion, which in economic terms may be much more relevant than the currency spot and forward rates: it is the capacity of governments, central banks and the financial sector to turn long term debt obligations into daily tradable ones and vice versa.

Currently, individual households, governments, central banks, pension funds and the banking system converts current income into future expenditure and convert current expenditure into future debt obligations.

Individual households do this by saving for a future pension and/or making other savings to spend at a future date. They, collectively, also use other people's savings to spend in the current period by entering into long-term mortgage obligations or taking out student loans.

Governments are major players in the conversion processes. They borrow funds to accommodate current expenditure, but also borrow for infrastructure projects that require very long term pay back periods with very uncertain cash flows. They, sometimes, do not record future payment obligations originating from pension promises to civil servants and other households.

Central banks also actively participate in the conversion process. In response to the 2007-2008 financial crisis, the five central banks of the U.S., U.K., the Eurozone, Japan and Switzerland collectively injected some \$11 trillion into their economies through quantitative easing. Only this year has the Fed began to reduce its balance sheet, while the U.K. has postponed its reduction process. The ECB has stopped buying government bonds recently.

Pension funds are major players in the conversion process. According to the latest statistics, they manage \$41.4 trillion in accumulated assets¹. Monthly payouts have to be squared with expected future income flows.

Banks make their living from the conversion process. Deposit taking, often short-term, is converted into longer term lending both to governments, businesses and individual households. Securitization has the opposite effect.

The main cause of the 2007-2008 financial crisis was that long term debt obligations on U.S. home mortgages were converted into daily tradable assets creating losses arising from mispricing the risks associated with such assets. The conversion process betrayed a key weakness in managing economic developments.

¹ Willis, Towers Watson Global Pension Assets study 2017

1. What happens in the conversion process?

The aim for all investors is to make a profit on their investments. Profits are to be maximized and losses minimized. This profit aim does not square well with the conversion processes applied by governments, central banks, banks and pension funds.

Individual households are nearly always restricted in their conversion process by the limits of their income levels. They are limited in their mortgage borrowing capacity by what the banks deem responsible borrowing levels. They are also restricted through their income level in the amounts that can be set aside for future pension benefits. Furthermore, job opportunities; inflation and taxation levels may pose further restrictions on using future incomes for current expenditure outlays.

In the run up to the financial crisis of 2007-2008, two distinct stages in the conversion process occurred in the U.S. Firstly, from 2004-2007 the percentage of mortgages granted as so-called subprime mortgages increased to some 14% of all mortgages granted by the end of 2007. Subprime indicates that the subprime borrowers were less creditworthy than regular mortgage borrowers. Many of the subprime borrowers banked on a continued increase in house prices in order to protect them in the event that their income levels could no longer support their interest and repayment obligations. Secondly, from 2004 and in later years, U.S. banks and especially the investment banking side of the banking sector seized on an opportunity to transfer the funding and most of the credit risks arising from home mortgages to third parties through securitization and using the credit derivative markets. The main motivation of these institutions was to bring forward the profit stream locked up in long-term mortgages. The buyers of these products, which often received at least an AA rating from U.S. credit rating agencies, were some individuals, but on the whole mostly institutional investors. Many of such mutual funds were listed on stock markets, so that participants in these funds had the opportunity to sell at any time they wished.

Long term funding had been converted into daily tradeable obligations. The conversion process was complete.

What needs to be understood is that lending banks underwrote mortgages to make a profit from them. They expected that doubtful debtors levels would remain below their provisions level made for such event occurring during the lifetime of the mortgages. So far this was a logical extension of a supply, demand and risk factor assessment by the lenders. What was not logical was that the profit motive led banks to sell credit risks to investors without a bank guarantee for performance. If a company sold a faulty product, product liability rules would be enforced to ensure that the customer would not suffer any financial losses. Why did the same rules not apply to the investment banking community?

2. The effects of transferring mortgage risks in the U.S.

Individual mortgage borrowers are, by their very nature, borrowers who depend on banks and other financial institutions to grant them a mortgage loan. The decision-making is wholly on the financial sector side.

Mistakes made by the financial sector should have led to institutions, their shareholders and their management teams accepting responsibility and paying for their actions. An individual bank may claim that it was the collective behavior of all banks and financial institutions in granting mortgage loans and that the last lender tipped over the whole structure of mortgage lending. However, both the banking and financial regulators as well as each individual financial institution involved in mortgage lending, should have been alert to the risks taken during the 2004 to 2007 mortgage lending period.

The selling off of such mortgage portfolios accelerated during the period 2004-2007 as compared to previous periods.

Securitization began to take off in the mid-1990s. The total amount of mortgage-backed securities issued almost tripled between 1996 and 2007, to \$7.3 trillion. The securitized share of subprime mortgages (i.e., those passed to third-party investors via mortgage backed securities) increased from 54% in 2001, to 75% in 2006. The subprime part of all home mortgages reached \$1.46 trillion at the beginning of 2007 or about 14% of the total home mortgage amount outstanding in the U.S. at the time. In the mid-2000s as the housing market was peaking, Government Sponsored Enterprises (GSE) securitization market share declined dramatically, while higher-risk subprime and Alt-A² mortgage private label securitization grew sharply. As mortgage defaults began to rise, it was among mortgages securitized by the private banks. GSE mortgages –securitized or not– continued to perform better than the rest of the market.

2.1 The conversion effects on individual mortgage borrowers

The selling of such mortgage portfolios in secondary markets did nothing for the original borrowers. They did not gain anything from it. On the contrary, their obligations were to be fulfilled over a 30 year period and a daily price setting for such risks, -as was the standard in mutual funds invested in mortgage backed securities-, left the door wide open for defaults on some of the portfolios. This had a contagion effect on all mortgage loans included in such portfolio. Good and bad mortgage loans became callable on a daily basis. Bad lending decisions infected sound lending!

² Alt-A mortgages are better loans than sub-prime, but below prime mortgages

2.2 The Northern Rock example

Northern Rock was a U.K. building society, with a history dating back to 1850. In 1997, it decided to demutualize and turn into a bank. Its main product line was home mortgages. It was an aggressive lender and by mid-2007, it had captured a market share of 19% of all new mortgages sold in the U.K. at the time.³ This made it the market leader in the U.K. Its total asset base at the time was £113bn.

Northern Rock was quite unique among U.K. banks in relying on short-term wholesale money market funds for over 70% of its funding. Most other U.K. banks relied heavily on 'sticky' customer deposits to fund their long-term lending.

Northern Rock's wholesale funding structure was executed through offshore vehicles. On the 9th of August 2007, BNP Paribas decided to suspend three of its investment funds with exposure to the troubled U.S. mortgage market, including sub-prime mortgages. The worldwide banking sector curbed lending to each other as a consequence of the uncertainties about potential losses and contagion risks. Overnight interbank interest rates shot up. Northern Rock was one of its earliest "victims", as a lack of willingness by other money providers to roll over existing exposure and increasing costs of funds conspired to inflict material damage to the banks' financial condition and prospects.

On 14 September 2007, a joint statement by the Bank of England, Treasury and the Financial Services Authority was issued, which said that they all believed Northern Rock to be solvent and that the standby funding facility would enable the bank "to fund its operations during the current period of turbulence in the financial markets".

This statement did little to take away the fear factor. On 17 September 2007, the result was a run on Northern Rock by individual customers as customer deposits were only secured to the extent of £33,000. This was the first run on any U.K. banking institution since 1878.

Through a process of conversion, Northern Rock's long-term lending had morphed into short term funding obligations. After the BNP Paribas fund closures, Northern Rock's funding flows from wholesale markets virtually evaporated and their costs of funding increased rapidly. Northern Rock's equity capital buffer and its level of liquid funds were woefully inadequate to cope with these shocks. Confidence was shattered.

The run on Northern Rock drove the Bank of England to grant the bank a three-year loan of £25 billion, but reactively after the run on Northern Rock had occurred. To calm the fears of depositors in Northern Rock, the Chancellor of the

³ <http://news.bbc.co.uk/1/hi/business/7007076.stm>

Exchequer issued a 100% guarantee to all private depositors at Northern Rock, for £35,000 instead of the prevailing limit of £33,000.

The Northern Rock example was used as it had only U.K. mortgages on its books. It did not have any overseas mortgage exposure. It had not underwritten any U.S. mortgages of any type. Nevertheless its funding structure, pricing of its funding and use of conversion led to its dramatic demise.

2.3 Lessons to be learned from the Northern Rock debacle

The first lesson is that solvency for a bank is subordinated to its liquidity position, either a realistic one or a perceived one by a bank's customers. Trust by customers can easily and quickly be lost in case any doubts arise about a financial institution's ability to repay customer deposits. No one wants to be the last customer in line waiting to see whether a bank can return its deposit. All customers want priority treatment, rather than waiting for a government sponsored rescue scheme to be put in place.

The second lesson is that over-reliance on the mortgage-backed security markets for a substantial share of its funding exposes a bank to acutely increased liquidity risks, either in the volume of borrowings and/or in its cost of funds.

The third lesson is that developments are inter-linked. If, in 2007, the U.S. mortgage backed securities had been regarded as a sound investment, then it would have been unlikely that BNP Paribas would have stopped trading in its three investment funds. The suspicion that something was amiss and that such situation would lead to investment losses for the fund providers would have been reduced. The conversion of long term into daily tradeable obligations would have remained an acceptable proposition. Northern Rock would have had less difficulty in funding its mortgage portfolio. However, the key was that Northern Rock, just like many American investment banks, relied too strongly on interbank and financial market funding. The financial regulators did not challenge Northern Rock's risk structure. Nor did the financial regulators in the U.S. act upon the risks associated with sub-prime mortgages, especially their conversion into mortgage-backed securities. In order to generate profits for themselves in the short run, most U.S. investment banks sold so-called "investment grade" paper that ended up in losses for the investors, including American Insurance Group (AIG).

The main reason that so few economists predicted the financial crisis of 2008 is that the economic models that were used by Central Banks and others did not include the losses on daily tradable securities as an indicator of future economic growth constraints. However these losses caused interbank lending to come to a grinding halt in 2007, as banks no longer trusted one another any more.

3. The effects of misdiagnosing financial developments in the U.S.

In the U.S., a liability regime for mis-selling financial products did and does exist. As at October 2017, \$150 billion in fines had been collected by the Department of Justice from various U.S. and foreign banks involved in the subprime mortgage crisis.⁴ However the strange element in all this is that the proceeds were not used to compensate home mortgage borrowers, but were used for general government expenditure purposes.

The detrimental impact on home mortgage borrowers, on the income levels of many individual households and on government revenues and expenditure levels can be illustrated with a few statistics about employment levels, government debt levels, new housing starts and average income levels.

In May 2007, the U.S. economy had an unemployment rate of 4.4% with 2.231 million unemployed persons. By October 2009 the unemployment rate had gone up to 10.0% with 9.087 million unemployed⁵. Nearly 7 million individuals lost their jobs in slightly over two-years. It took to July 2018 to get the number of unemployed back down to 2.406 million. This was an adjustment period of over 11 years marked by tremendous hardship for those unemployed during it.

One of the other main consequences of the financial crisis was the change in U.S. government debt levels⁶. In 2007 Q4, the outstanding level of government debt was \$9.229 trillion. By 2017 Q4 the level had more than doubled to \$20.492 trillion. To put this in a historical perspective: from Q4 1977 to Q4 1987 U.S. Federal government debt increased by 338% from \$ 718.9 billion to \$2.431 trillion. From Q4 1987 to Q4 1997 the debt increased by 226% to \$5.502 trillion. From Q4 1997 to Q4 2007 the debt increased by 168% to \$ 9.229 trillion and from Q4 2007 to Q4 2017 the debt increased by 222% to \$ 20.492 trillion.

In a study⁷ by William Dupor, economist at the Federal Reserve Bank in St. Louis, it was calculated that, as a consequence of the recession, the debt to GDP level increased by 16% from Q2 2007 to Q2 2009 or 8% per year. From Q2 2009 to Q2 2012 the ratio increased by 6.2% per year. From Q2 2012 to Q2 2015 the ratio only increased by 1.4% per year.

⁴ <https://www.dwhhttp.com/en/financial-crisis-bank-fines-hit-record-10-years-after-market-collapse/a-40044540>Benjam

⁵ <https://fred.stlouisfed.org/series/UNRATE/>

⁶ <https://fred.stlouisfed.org/series/GFDEBTN>

⁷ <https://www.stlouisfed.org/on-the-economy/2017/january/how-us-debt-gdp-ratio-changed>

From Q3 in 2007 to Q3 in 2009 the U.S. government debt level increased from \$9.007 trillion to \$13.561 trillion, an increase of \$ 4.554 trillion. Nominal GDP for the U.S was \$14.535 trillion by Q3 2007 on an annualized basis and \$14.420 trillion on the same basis per Q3 2009. This implies that the U.S. government received fewer taxes and had to increase social security payments for a total amount of some \$4.5 trillion over a two-year period. U.S. individual households, as the ultimate guarantor of U.S. government debt, suffered a heavy loss.

The recession had a dramatic effect on the level of new housing starts⁸. A peak was reached in January 2006 when 2.273 million new homes were started on an annualized basis. By April 2009, this level had dropped to 478, 000 and by June 2018, new housing starts were only still at about half the level of 2006 at 1.177 million new homes on a per annum basis.

The total U.S. outstanding home mortgage amounts for Q1 2008 were \$10.6 trillion.⁹ By Q1 2018 these volumes only stood at \$10.1 trillion. Over a ten-year period, the volume of outstanding mortgage loans had barely kept pace with the repayments level. No wonder that home ownership levels have dropped¹⁰. A low point for home ownership was Q1 1994, when home ownership reached a long-term low of 63.8% in the U.S. By Q2 2004 it reached its peak of 69.2%. Since then it continued to drop to a new low of 62.9% by Q2 2016. The latest data are for Q1 2018 when the level reached 64.2%. The changes in home ownership and in the level of mortgages outstanding plus the new housing starts statistics all show the harmful long-term effects of the mortgage-backed securities misselling disaster.

U.S. real median income level is another statistic that sheds lights on the economic picture over the last 20 years. The U.S real median income level¹¹ reached \$60,062 in 1999, a high compared to previous years; by 2007 it had fallen slightly to \$59,534. The financial crash had a profound effect on the real median household income level as it dropped to \$ 54,569 by 2012 and only by 2016 had it reached the level of 1999 again at the level of \$60,309. In real terms, median incomes barely moved over a 20-year period. The major drop occurred between 2007 and 2012. It took another four years to reach the same income level as about 20 years earlier.

⁸<https://fred.stlouisfed.org/series/HOUST>

⁹ <https://fred.stlouisfed.org/series/HHMSDODNSFederal>

¹⁰ <https://fred.stlouisfed.org/series/RHORUSQ156N>

¹¹ <https://fred.stlouisfed.org/series/MEHOINUSA672N/>

4 Some choices revisited

In this chapter some questions will be raised about the approaches used to counteract the effects of the subprime mortgage lending.

4.1 The legal approach

In a previous paper by this writer: “Did Central Banks apply the right strategies after the financial crisis?¹²”, the level of Foreclosure Filings, the Completed Foreclosures and the Home Repossessions over the period 2004-2016 were explored. Over the years 2007 to 2014 inclusive 21.228 million U.S. households were confronted with Foreclosure Filings. In the U.S. household survey of 2007¹³ it was calculated that in 2007, there were 51.234 million households with a mortgage. The fact that 21.228 million (or 41.4% of all mortgage holders households) were confronted with Foreclosure Filings over the period 2007-2014 showed the significant legal powers at the disposal of the lenders. The subprime share of the total mortgage market was around 14% of the total market size in 2007¹⁴ or about \$1.5 trillion in volume. The securitized element was about 75% of the \$1.5 trillion or \$ 1.1 trillion.

The question has to be raised how was it possible that 41.4% of all mortgage holders were affected and threatened with foreclosures and home repossessions over the period 2007-2014, while the securitized subprime market size was “only” 10.4% of all outstanding home mortgages in 2007.

One can only compare it to a snowball effect. It starts relatively small, but increases with more and more homeowners being threatened with foreclosures and home repossessions. Over the period 2007 to 2011, the median U.S. home sales price¹⁵ dropped from \$313.600 in 2007 to \$263,400 in 2011. Only by 2014 did average house prices return to the 2007 level. More foreclosure filings led to a greater drop in average home sales prices.

There is and must be a better way to run an ailing economy and one that is not based on foreclosures.

¹² <https://mpr.aub.uni-muenchen.de/id/eprint/82751>

¹³

https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_17_1YR_S2506&prodType=table

¹⁴ <https://www.frbsf.org/education/publications/doctor-econ/2009/december/subprime-mortgage-statistics/>

¹⁵ <https://fred.stlouisfed.org/series/MSPUS>

4.2 The economic approach

The economic downturn in 2007-2009 prompted the U.S. Federal government to borrow an additional amount of more than \$4.5 trillion as a consequence of lower tax receipts and higher social security payments. This spending did prevent economic growth from dropping further than without it but nevertheless Real GDP levels¹⁶ dropped from Q3 2007 on an annualized level of \$15.667 trillion to Q3 2009 \$15.189 trillion measured on the same annual basis. In other words the \$4.5 trillion injection was unable to stem the slightly over 3% loss in real GDP over this period.

The Federal Reserve engaged in large-scale asset purchases over a number of years: Quantitative Easing. In an article written by Stephen D. Williamson¹⁷: “How well does this tool work?” the author explains the use and the prescribed benefits from this unconventional policy tool. The main aim was a liquidity supply to the financial markets and a tool to adjust especially long-term interest rates. The assets purchased were government treasuries and some corporate bonds and mortgage backed securities, the latter mostly from Government Sponsored Enterprises, such as Fannie Mae and Freddy Mac. In total \$3.6 trillion of assets were purchased in three different programs.¹⁸ Currently the Fed is in the process of selling some of its holdings.

4.3 An Alternative Economic Approach

With over \$8 trillion spend between the U.S. Government and the Federal Reserve, the first through borrowings (debt creation in 2008 and 2009) and the latter through money creation; one may wonder why the economic recovery took so long to materialize. After all, the amount of securitized sub-prime mortgages outstanding was “only” \$ 1.1 trillion at its highest level.

It seems that the key to understanding what happened is linked to the changes in the financial position of individual households. They were the ones affected by foreclosure filings, increased unemployment rates, dropping house prices while their outstanding debt levels remained static. Arrears in payment obligations forced many to forego additional consumption. Many of them were also the ones who lost their own equity in their homes: a loss that caused dropping home ownership levels as they could no longer save enough for down payments on a different home. Indirectly, each household would have to pay for the \$4.5 trillion in the additional government debt. The simple conclusion was and is that individual households were left to manage on their own while being presented with the bill from the greed and mismanagement by the financial sector.

¹⁶ <https://fred.stlouisfed.org/series/GDPC1/>

¹⁷ <https://www.stlouisfed.org/publications/regional-economist/third-quarter-2017/quantitative-easing-how-well-does-this-tool-work>

¹⁸ <http://www.numbernomics.com/nomicsnotes/?p=7375>

The concept by the financial sector was one of instant profits for us –the sellers of risks- and the potential losses for others: including the general public and the government. This is why banking and other financial sector profits cannot be compared with profits from ordinary companies. The latter do not trade in financial risks.

The main objective of an alternative economic approach is to stop the snowball effect in its tracks. Only by doing so can the economy keep functioning to its full potential, rather than accept the snowball effect of cumulative losses to individual households, to companies and the government.

In 2007-2008, the cause of the crisis was the losses incurred or expected to be incurred by investors in U.S. mortgage backed securities. A U.S government backed fund could have been put in place to buy up such mortgage-backed securities, especially the ones that had a substantial share of sub-prime and Alt-A mortgages. The Federal Reserve, with the proviso that the Federal Government would cover any losses, could have affected such purchases. The Federal Reserve could track down the originators of the mortgages and force them to hand over the accumulated loan loss reserves to the Federal Reserve as well as at future dates any future provision that should be made over the remaining years of the mortgage. The originators should be held responsible for their mortgage origination actions. The \$150 billion collected in fines should have been transferred to such fund.

The second initiative is to avoid, in principle, legal action against mortgage borrowers. A government organization would be needed, to review and revise, if necessary, the terms and conditions of the outstanding mortgage loan. This has to be done quickly so that borrowers know their own cash-flow implications and the originating financial institution knows the size of the additional loan loss reserves that need to be transferred to the Federal Reserve.

These two initiatives, if they had been in place, would have prevented the cash-flow crisis for individual households as well as shielding them from a loss of equity on their homes. Such initiatives would also have dramatically reduced the fiscal deficit of 2008-2010. Consumer demand would probably be reduced somewhat, but certainly nowhere near the level experienced over these years. Unemployment levels might have increased somewhat, but far below the seven million jobs lost.

The need for quantitative easing would have been much reduced. The crisis occurred on mortgages already in place and a lowering of interest rates helps future mortgage clients, but not existing ones on 30 year fixed rate loans. As the data shows the total outstanding mortgage portfolio did not increase over the ten years from 2008. Liquidity support was needed for individual households, but QE does not directly provide such relief to this group of households.

Concluding remarks

Individual households are not the only ones affected by conversion of long term liabilities into daily tradable ones. Government debt levels in some countries are probably going to create another worldwide crisis of confidence. In a recent speech in New York, the governor of the Bank of England warned of an emerging market 'fire sale' after a decade of growth of asset management holdings in these countries from \$50 trillion to \$80 trillion, of which some \$30 trillion were invested in illiquid assets.¹⁹

It is useful and necessary to study trends in conversion in order to predict and ultimately prevent financial crises. After all money should empower an economy and not handicap it.

Drs Kees De Koning
Chorleywood
U.K.

18th September 2018

¹⁹ <https://www.telegraph.co.uk/business/2018/10/19/bank-england-governor-warns-emerging-market-fire-sale-triggered/>

References

- **Willis Towers Watson Global Pensions Assets Study 2017, published February 2018**
- **BBC, London, Timeline Northern Rock Crisis, 5 August 2008**
<http://news.bbc.co.uk/1/hi/business/7007076.stm>
- **Benjamin Bathke, Deutsche Welle, Berlin, 10 August 2017: Financial Crisis Bank Fines hit Record 10 years after market collapse:**
<https://www.dwhttp.com/en/financial-crisis-bank-fines-hit-record-10-years-after-market-collapse/a-40044540Benjam>
- **Federal Reserve Bank of St. Louis: Historic Data, U.S. Civilian Unemployment rate** <https://fred.stlouisfed.org/series/UNRATE/>
- **Federal Reserve Bank of St. Louis: Historic Data, U.S. Federal Debt: Total Public Debt** <https://fred.stlouisfed.org/series/GFDEBTN>
- **William Dupor; Federal Reserve Bank of St. Louis: How the U.S Debt to GDP has changed, January 2, 2017;** <https://www.stlouisfed.org/on-the-economy/2017/january/how-us-debt-gdp-ratio-changed>
- **Federal Reserve Bank of St. Louis: Historic Data, U.S. Housing Starts: Total New Privately Owned Housing Units Started;**
<https://fred.stlouisfed.org/series/HOUST>
- **Federal Reserve Bank of St. Louis: Historic Data, U.S. Households and Nonprofit Organizations, Home Mortgages; Liability, Level**
<https://fred.stlouisfed.org/series/HHMSDODNS>
- **Federal Reserve Bank of St. Louis: Historic Data, Homeownership rate for the United States**
<https://fred.stlouisfed.org/series/RHORUSQ156N>
- **Federal Reserve Bank of St. Louis: Historic Data, Real Median Household Income in the United States**
<https://fred.stlouisfed.org/series/MEHOINUSA672N/>
- **Kees De Koning, Did Central Banks apply the right strategies after the financial crisis? MPRA paper 82751, 21 November 2017**
<https://mpra.ub.uni-muenchen.de/id/eprint/82751>

- **United States Census Bureau, American fact finder: U.S. Households Survey** 2007
https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_17_1YR_S2506&prodType=table
- **Federal Reserve Bank of San Francisco: “Where should I look to find statistics on the share of subprime mortgages to total mortgages?, December** 2009 1
<https://www.frbsf.org/education/publications/doctor-econ/2009/december/subprime-mortgage-statistics/>
- **Federal Reserve Bank of St. Louis, Historical Data, Median Sales Price of Houses Sold in the United States**
<https://fred.stlouisfed.org/series/MSPUS>
- **Federal Reserve Bank of St. Louis, Historical Data, Real Gross Domestic Product** <https://fred.stlouisfed.org/series/GDPC1/>
- **Stephen D. Williamson, Federal Reserve Bank of St. Louis: “Quantitative Easing: How Well Does This Tool Work”, Regional Economist, Third Quarter** 2017
<https://www.stlouisfed.org/publications/regional-economist/third-quarter-2017/quantitative-easing-how-well-does-this-tool-work>
- **NumberNomics: Federal Reserve’s Balance Sheet 1/2/2008 to 7/2/2018** <http://www.numbernomics.com/nomicsnotes/?p=7375>
- **Anna Isaac, Daily Telegraph: “Bank of England Governor warns of emerging market “Fire Sale” triggered by Asset Management”, 19th October** 2018
<https://www.telegraph.co.uk/business/2018/10/19/bank-england-governor-warns-emerging-market-fire-sale-triggered/>