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How the U.S. financial crisis could have been averted.

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Introduction

In the U.S., the 2007-2008 financial crisis was caused by a lack of understanding of the implications of households committing to use future incomes for a purchase of a home. Committing future income flows to acquire goods and services in the current period requires households to make a judgment about future interest rates, about the household's ability to earn an income in future years, about a possible future state of health and about growth in income levels and changes in future inflation levels: a near impossible task! On top of this, households have absolutely no control over the amounts other households borrow, notwithstanding that such collective borrowings can have a major impact on the shift from an income based financing to borrowing against the values of the assets: the homes.

The choice –demand- for goods and services is infinitely simpler when current income is being used to buy such items. If only current income is being used, the choices of what to buy are limited by the level of income and savings.

Economic theories and economic models have given too little weight to the difference between committing current or future incomes. It is not just individual households who have to struggle with such a choice; also governments have to make such judgments in their spending behavior.

This paper will focus on the mortgage borrowing levels in the United States over the period 1996-2016. The paper will examine the factors that drive the supply of funds as the supply side totally determines the outcome of the mortgage borrowing levels. Households are for 100% dependent on the willingness of lenders to commit funds. The major drawback of this dependency is that lenders not only find their security in future households' income levels, but also in the values of the assets: the homes being financed. As this paper will demonstrate, the volume of funds lend can and often does affect the price developments of all homes and it is thereby a factor which can cause a major deviation from the only factor which matters: the ability of households to repay such mortgage borrowings out of future income levels.

As the statistics will show, the financial crisis for U.S. individual households already happened in 2003, long before the banking crisis of 2007-2008.

1. The key questions

1.1 Setting the framework

The U.S. housing market is in many aspects similar to any other market: there is a supply and a demand level for homes as well as a market price. What is different from most markets is that for many buyers the costs of a home exceed their income and savings levels by a substantial margin. Hence a large number of buyers will have to use borrowed funds in order to acquire a home.

Buyers will know that their ability to repay their mortgage has to come out of future income; the income affordability test. The mortgage providers will know this also, but in addition they require a claim on a property in case the buyer is unable to service the mortgage.

What makes the housing market different from other markets is that the market price for all homes is not only determined by demand –the need for homes based on population growth, the number of new households, changes in taste patterns and the annual write off of a small number of homes- but equally by the volume of funds –especially borrowed funds- allocated to the housing market per time period.

What the collective of lenders can achieve and no mortgage borrower can prevent is that the volume of funds allocated to the housing market in any single year can drive up the market price of all homes, irrespective of the borrowers ability to service mortgage debt. It establishes an asset value rather than an income affordability based method of finance.

The only and ultimate test to the soundness of the U.S. housing market and implicitly to the U.S. economy as a whole is whether individual households can repay their mortgage obligations out of future income levels. The financial crisis occurred because this simple truth was overshadowed by the asset-based method of financing, inflating house prices beyond the capacity of households to service their mortgage debts or pay the inflated rents. For U.S. individual households their financial crisis already occurred in 2003, long before the banking crisis of 2007-2008.

A good illustration of the impact on the U.S. housing market that the asset based finance method has had over the income affordability one has been set out in section 1.2 with the help of statistics covering the period from 1996-2016.

1.2 Statistical evidence of what happened in the U.S. housing markets over the period 1996-2016

Table 1: The developments of the volume of mortgage lending, the annual housing starts, the average U.S. home sales price, the nominal median income of households and U.S. home sale prices based on such incomes

Year	1 Volume of Home mortgage Lending X U.S.\$ billion	2 Annual Housing starts X thousands	3 Average U.S. Home sales price X U.S. dollars	4 Median Household Nominal Income X U.S. dollars	5 Income Affordability House price X U.S. dollars
1996	329	1370	166,400	35,492	
1997	341	1566	176,200	37,005	173,494
1998	437	1792	181,900	38,885	182,308
1999	524	1708	195,600	40,696	190,798
2000	544	1532	207,000	41,990	196,864
2001	685	1568	213,200	42,228	197,980
2002	907	1788	228,700	42,409	198,828
2003	1112	2057	246,300	43,318	203,089
2004	1211	2042	274,500	44,334	207,852
2005	1351	1994	297,000	46,326	217,233
2006	1327	1649	305,900	48,201	226,025
2007	1057	1037	313,600	50,233	235,553
2008	319	560	292,600	50,303	235,881
2009	186	581	270,900	49,777	233,414
2010	-167	539	272,900	49,276	231,065
2011	104	694	263,400	50,054	234,713
2012	105	976	285,400	51,017	239,229
2013	223	1010	319,300	53,585	251,271
2014	312	1081	312,500	53,657	251,609
2015	407	1160	352,500	56,516	265,015
2016	596	1226	384,000		

With the help of table 1, two more statistics can be developed: the annual number of housing starts that could have been made if house prices had developed in line with income earning capacities of the U.S. population. The second statistics compares the gap between the average home sales price and the affordable house price, based on income growth levels. This gap reflects the switch from income based financing to an asset based one.

Table 2 Comparison between income and asset based house financing

Year	Income Affordability Housing Starts x thousands	Actual housing Starts X thousands	Year	Income Affordability Housing Starts x thousands	Actual housing Starts X thousands
1996		1370	2006	5871	1649
1997	1965	1566	2007	4487	1037
1998	2397	1792	2008	1352	560
1999	2746	1708	2009	797	581
2000	2763	1532	2010	0	539
2001	3460	1568	2011	443	694
2002	4466	1788	2012	439	976
2003	5475	2057	2013	887	1010
2004	5826	2042	2014	1240	1081
2005	6219	1994	2015	1536	1160

Table 3 Comparison between average home sales price and income based house prices

Year	Average U.S. Home sales Price X U.S. dollars	Income affordability House price X U.S. dollars	Year	Average U.S. Home sales Price X U.S. dollars	Income affordability House price X U.S. dollars
1997	176,200	173,494	2006	305,900	226,025
1998	181,900	182,308	2007	313,600	235,553
1999	195,600	190,798	2008	292,600	235,881
2000	207,000	196,864	2009	270,900	233,414
2001	213,200	197,980	2010	272,900	231,065
2002	228,700	198,828	2011	263,400	234,713
2003	246,300	203,089	2012	285,400	239,229
2004	274,500	207,852	2013	319,300	251,271
2005	297,000	217,233	2014	312,500	251,609
			2015	352,500	265,015

The sources and the methodology of the data used are explained in section 5.

2. The speed of mortgage lending, the U.S. example.

2.1 The choice between an income or asset based mortgage lending system

The choice between an income or asset based mortgage lending system is made by the suppliers of funds: the lenders. Their collective action of mortgage lending can have two totally different effects. If, for 2003, the volume of lending was solely restricted to follow the income earning capacity of the borrowers, then -as the calculations in above statistics showed- the mortgage volume needed to built about 1.6 million homes would have been \$325 billion. Instead \$1.112 trillion was provided as new mortgages. The extra \$787 billion was used to drive up the average house price to \$246,300 rather than the \$203,089 one; the latter figure is based on the income earning capacity. In 2003, lenders funded the U.S. housing market predominantly based on asset prices rather than on an income earning capacity.

The differences between these two methods of funding are key to the understanding of the financial crisis. Households took up the full \$1.112 trillion in new mortgages in 2003. Their income growth could only support \$325 billion in new mortgage debt. Their future “negative” income impact was \$787 billion, or \$43,211 per each new home built in 2003. It also happens to be equal to a full year’s income based of the median nominal income for 2003. Furthermore this phenomenon of supplying the housing market with a higher level of funds than income growth could absorb, started already in 1999. In 1999 \$219 billion was the overfunded amount, in 2000 \$229 billion, in 2001 \$369 billion and in 2002 \$589 billion. The total negative income impact for the years 1999-2003 was \$2.19 trillion. On a nominal median income of \$43,318 in 2003, every mortgage borrower had a negative future income impact \$253,091, which nearly represents 6 years of average earnings. The \$2.19 trillion represented 31.7% of all mortgage debt outstanding per end of 2003. To express this in other terms, if mortgagors would have been kept on the mortgage payments according to the income based funding method, their maturity of their mortgage would have to be extended by 9.5 years to 39.5 years, due to this asset based mortgage funding system. These facts are based on data from 1999 to 2003. The asset based funding cycle did not stop in 2003 and went on well into 2007.

A mortgage extension of nearly ten years on average indicated that the financial crisis for individual households occurred in 2003. This was well before the accelerated sales drive of subprime mortgages, which started from 2004, and the extensive use of mortgage securitization, which also started more or less at the same time. An IMF Working paper of 2013¹: “Securitization: Lessons learned and the road ahead”, deals extensively with the subject of subprime mortgages and their securitization.

¹ <https://www.imf.org/external/pubs/ft/wp/2013/wp13255.pdf>

In the run up to the financial crisis of 2007-2008, the key indicator which was missed or not acted upon was the income affordability index. Average median nominal incomes of households in the U.S. went up by 17.06% over the period 1997-2003, while the home mortgage debt grew by 95.3% over the same period (Q4 1996-Q4 2003). Even more striking is the volume of mortgage funds allocated in 2003. If the entire new mortgage lending in 2003 had been allocated to new housing starts, then as table 2 shows 5.475 million new homes would have been 100% funded with new mortgage money, rather than the 2.057 million actually started. This figure is based on the assumption that house prices would have moved up in line with the nominal median household income levels between 1997 and 2003. The 5.475 million new homes in the U.S. would have meant that the total housing stock of 116 million homes would have been replaced in 21 years. The average life span of U.S. homes is difficult to assess, but it may well be over 100 years for newly constructed homes. Again a further indication that the asset-based mortgage lending system outweighed the income based method by a great margin.

Driving up house prices through mortgage lending growth, far in excess of the nominal median income changes, exposes all mortgagors to excessive risks of default, especially the more recent borrowers.

The issue was that all mortgage lending has effects on the prices of homes –both existing and new homes-, on the ability of future mortgagors to get onto the property ladder and on the quality of the loan book outstanding. Every year from 1997 and later, the gap between income and asset based mortgage growth levels widened with the result that 5.475 million homes could have been built in 2003 with the money allocated to new mortgage lending. The 5.475 million are far in excess of any potential housing demand based on population growth, which runs at around 1.6 million homes a year.

Competition between banks does not lead to an annual mortgage lending ceiling being applied. Banks may be the initial shock absorbers, if loan defaults go up. But individual households and the whole economy suffer the most through increased unemployment and reduced disposable income levels as well as through a value loss on their properties. Those on the lower income levels are the hardest hit, as they are the most likely to need to borrow a higher percentage of their income in order to get on the housing ladder. The effects of these factors constitute a systemic risk to the whole U.S. economy.

In 2003, short-term economic indicators were all positive; the real problem was one of losing sight of how mortgage-borrowing levels did affect future disposable income levels.

2.2 The speed of mortgage lending

One can distinguish two different speeds in mortgage lending; the first one is the speed for an individual household to get a mortgage approved. For each individual this is the most important speed. However there is also a macro-economic speed in mortgage lending, being the volume of all new home mortgages disbursed in a single year.

In the U.S. in 1997, the total home mortgage lending volume was \$ 341 billion. By 2003 this volume had increased to \$1.112 trillion. The speed of lending had more than tripled, to be exact by 326%.

Why is such macro-economic speed important?

This speed should be linked to income growth levels of individual households, to population growth and to changes in the quality of desirable homes.

The nominal median income levels of households in the U.S. increased from \$37,005 in 1997 to \$43,318 in 2003, an increase in income levels of 17.06%. The median income levels are calculated on basis that half of the numbers of households earn less than the median level and the other half earn more.

The second element to be taken into account is the growth in the number of households over the period 1997-2003. In 1997, there were 102.5 million households in the U.S and by 2003 the number had grown to 112 million; a household numbers growth of 9.27% over the period 1997-2003 or nearly 1.6 million new households each year.

In 1997, the percentage of homes owned was 65.7% of all homes or 67.3 million homes. By 2003, the ownership rate had gone up to 68.6% of all homes or 76.83 million homes. Between 1997 and 2003 11.2 million new homes were built, more than covering the increase in home ownership rates.

On nearly all accounts, such as the growing number of new housing starts over the period 1997-2003, the increase in the percentage of households owning their own home, the fact that new housing starts outstripped the level of home building for owner-occupier transactions, all justified the belief that these developments were signs of a healthy economic development.

What was clearly overlooked was the fact that nearly all these positive developments were only made possible, not by households using their own income and savings to reach these goals, but by massively extending their borrowed money (mortgage) obligations. With a nominal median income growth of 17.06% over the period 1997-2003, individual households increased their mortgage borrowing levels by 326% over the same period.

In the U.S. over the period 1997-2003, the household mortgage debts to income levels were totally ignored. It should have come as no surprise that when massive amounts of borrowed funds were pumped into the property markets that house prices accelerated faster than in previous years. This fact provided lenders and borrowers with the impression that loans to values were improving rather than declining. Such a *fata morgana* misled most bankers and equally the supervisory authorities.

2.3 The short term over the long term

Most economists focus on short-term developments, like the next quarterly GDP growth figure, the monthly inflation level, the level of new housing starts, the level of unemployment and the quarterly income growth data.

In 2003, U.S GDP growth level ran at 2.8% on an annual basis; the unemployment level fluctuated from 5.8% in January to 6.3% in June to 5.7% by December and the CPI-U inflation levels started the year at 2.60% in January and finished the year at 2.27% in December.

By December 2003, there were 2,057,000 new housing starts made on an annualized basis in the U.S.

U.S. wide nominal median family income was \$43,318 over fiscal year 2003 compared to \$40,696 over 1999.

All these short-term economic indicators showed a very respectable performance.

There is nothing wrong with such obsession with short-term data interpretation. Economic models are built around such short-term movements. However, there are elements in economic developments, which cannot be captured by short-term data, but have to be studied with an eye to the longer term.

In previous papers, the writer has drawn attention to the long-term risks that home mortgage borrowings levels can represent to the disposable income levels of individual households. It was demonstrated that the cycle that started in 1997 did last to 2017. Preventive measures were not taken in 2003 and curative measures after 2007-2008 did not prioritize saving households from the damaging effects of a fall in house prices and a drop in incomes. Nearly all banks were saved, but households had to fence for themselves, with the disastrous economic results of slow or no growth, a complete breakdown in new housing starts, a doubling of the unemployment rate from some 5% to 10% in 18 months and a reduction back to 5%, which took some 6 years. U.S federal government debt doubled between 2008 and 2017 from some \$10 trillion to just over \$20 trillion.

The statistics in section 1.2 clearly show the longer-term picture, which is that initially from 1997 to 2003 the volume of mortgage lending stimulated the U.S.

economy. However below the headline short-term success, a gap started to emerge between the ability of households to service mortgage loans and the actual average house price. The latter was strongly influenced by the rapid increase in the volume of mortgage lending over the period 1997-2003. It was not the demand for homes that drove up the average house price, but the volume of mortgage funds that the financial sector allocated to individual households per time period. In 2003 the gap was already so large that with the mortgage funds disbursed, 5.475 million new homes could have been built. This is on the assumption that the allocation per household would have followed the income-based method. The 5.475 million-supply levels would have been extremely excessive, considering that the annual demand for new homes in the U.S. hovers around 1.6 million units. The income based method of mortgage funding clashed in a major way with the asset-based method of financing.

The collective financial sector had moved the goal posts from an income-based approach to an asset based one.

This process did not stop or was halted in 2003, it continued to well into 2007. The end result was that over the period 2005-2015 24.475 million households were confronted with foreclosure proceedings. This represented 33.3% of the 73.580 million households who had a mortgage in the spring of 2008.

In the short term the dangers of an asset based method of funding were disguised. The financial sector complimented itself on making higher short-term profits, without taking excessive risks since average house prices were rising. Banks did not acknowledge that house prices were rising **because** of the decisions made by the collective financial sector itself (including those of Fannie Mae and Freddy Mac). No individual bank was the main cause in funding excessively large mortgage volumes. In a way, it was and still is a system malfunction that can only be corrected by supervisory authorities.

The long-term effects started to become clear by 2006 and 2007, when the level of foreclosure filings went up sharply. The income-based method of financing became the only game in town, once again. By 2008, the annual level of mortgage lending dropped sharply and even by 2016, the level was only 53% of the 2003 level of lending.

3. The fata morgana effects

3.1 The role of the financial sector in mortgage lending

Just like households, banks have to make a judgment about the borrowers future abilities to repay a mortgage loan. As most U.S. mortgages are entered into for a period of 30 years, such judgment requires a forecasting skill that relies more on

hope and fear than on scientific insight. Over such period, bank management teams will have changed, shareholders will have changed and the end results of the lending decision may only well be known after a substantial time period. An error of judgment may only show up after many years.

There is a second element that is even more worrying. The collective of banks can make mortgage loans available with a speed –the collective funds lend per time period- which not only influences the ability of households to acquire a home, but at the same time may drive up the prices of existing homes in excess of the households' nominal income growth levels.

There is no mechanism in the competition level among banks to stop such events from happening. No single bank will stop lending voluntarily only to accommodate other banks to increase their market share in order to reach an annual mortgage-lending ceiling. Not only is reaching a countrywide mortgage lending ceiling per time period a task that a competing banking sector will never be able to achieve, what is even less desirable is that banks praise themselves that their loans to asset values have improved as a result of their own collective mortgage lending decisions.

The ultimate factor that contributed to the 2007-2008 financial crisis was that banks transferred, in large volumes, their mortgage loan risks to outside investors through a securitization process. Those individuals and organizations that made the lending decisions in the first place wished to be no longer responsible for the outcome of their decisions. Securitization meant that long-term risks were converted into daily callable obligations. Betting shops use the advertising catchphrase: When the fun stops, stop betting. The fun stopped on August 9, 2007, when BNP Paribas declared that there was no liquidity in the markets anymore for three of their mortgage backed investment funds.

3.2 The policy tools used.

Interest rate setting

The interest rate instrument was used as from January 2005 to August 2006, when the effective Fed Funds rate was increased from 2.28% in January 2005 to 5.24% by August 2006.

Was this the right decision for the market circumstances of the mortgage market?

An interest rate increase does two things with regard to mortgagors and individual households: The Fed by raising the price of money hoped that the volume of mortgage lending would slow down. The data in table 1 show that there was no significant slow down in the volume of mortgage lending in 2005 and 2006. In a

way, banks devised products that slowed down the immediate effects of such interest rate increase, by offering 100% and low interest rate start-up mortgages for a few years after which the full effect of the interest rate increase would become felt.

The second effect was supposed to be on the average house prices. The asset-based method of mortgage funding had gone on ever since 1999. By 2005, average house prices far exceeded the income-based house ones. A short-term instrument, like a movement of the interest rate, cannot correct a long-term imbalance. House prices did continue to rise in 2005, 2006 and 2007, perhaps at a slightly slower speed, but rate rise did little, if anything, to close the gap between the income based and asset based method of mortgage lending. The interest instrument proved to be unsuitable for managing the gap between the assets based mortgage lending system and the income based one.

Quantitative Easing

After the financial crisis of 2007-2008, which was mainly a banking crisis, the Fed decided that a program of buying up government bonds and mortgage backed securities would provide the financial markets with liquidity to help start activities to promote economic growth. Did this help individual households? For those with an (inflated) mortgage, quantitative easing did nothing for them in the short run; one third of them suffered from foreclosure proceedings over the period 2005-2015. The side effect of QE was a lowering of long-term interest rates to historically low levels. Was the result an increase in mortgage borrowing? The answer was a definite no, as the collective of mortgage borrowers lowered their collective mortgage borrowings by 12% between Q1 2008 and Q1 2015, or in amounts from \$10.7 trillion to \$9.4 trillion. Again QE, just like the interest rate instrument, was an unsuitable instrument to help close the gap between an asset based mortgage lending system and an income based one.

3.3 The policy instruments that would have averted the financial crisis

Managing systemic risks for individual households

The main aim of managing systemic risks for individual households is to ensure that a mortgage-lending ceiling is assessed and subsequently adhered to. Such ceiling should be kept in line with the income-based mortgage lending system.

The second aim is to take countervailing actions in case the ceiling levels have been broken.

It is no solution just to force banks to improve their loan loss shock absorption capacity if simultaneously no steps are taken to manage a mortgage-lending ceiling. Systemic risks on households can be avoided and in doing so, it will

improve the banking sector's profitability over existing home mortgages. It will also have a positive spin off for economic growth levels and for improving levels of employment and incomes for individual households. The extensive use of low interest rates and quantitative easing would not have been needed.

In two previous papers: "The myth of economic growth in the United States"² and the "A review of the global financial crisis and its effects on working class households- a tale of vulnerability and neglect"³, the impact of not managing a mortgage-lending ceiling has extensively been discussed. Also the costs in terms of lost economic growth, unemployment and household income growth, the doubling of U.S. government debt and the drop in homeownership rates were all set out.

Two main solutions were suggested. One was aimed at enforcing a mortgage-lending ceiling system: "A traffic light system for the banking world", indicating whether the speed of lending was satisfactory (green light), was somewhat too fast (amber warning) or was excessive (red indication). Violating the traffic rules would incur penalties for banks and other lenders, especially when the indication was red.

The second solution was for the situation that a mortgage-lending ceiling had not been enforced. In such case the setting up of a National Mortgage Bank was recommended to help households overcome the liquidity squeeze that has made the past decade show such low economic growth rates. Such an NMB could act as a lender of last resort for individual households on basis of sharing part of the asset (the home) with the NMB for its cash-flow help. Such help should be differentiated for each income class that an individual household belongs to. Low-income earners should be helped most. It is ironical that in 1936 the U.S. Home Owners Loan Corporation was disbanded. Had such a Corporation been in existence in 2007-2008, it could have done wonders for maintaining the liquidity position for most mortgagors and even take a subordinated share in the housing market, till mortgage lending levels were better attuned to the nominal increases in median household incomes.

Prevention by 2003 would have been the best option to correct the clash between an asset-based mortgage lending system and an income based one. Second best would have been to use the correction scheme from 2007 onwards.

² <https://ideas.repec.org/p/pramprapa/74904.html>

³ <https://ideas.repec.org/p/pramprapa/73502.html>

4. Some conclusions and recommendations

- The excessive level of mortgage funding provided by the collective U.S. financial sector over the period 1997-2003 created a large gap between the assets based method of mortgage funding and the income based one.
- The gap can best be illustrated in that the nominal income growth over the period 1997-2003 could, by 2003, afford a mortgage level of \$203,089 per new home, while the average house price had gone up to \$246,300.
- The gap can also be illustrated in that in 2003 the new mortgage lending of \$1.112 trillion would have made it possible to build 5.475 million new homes on a 100% mortgage basis, if the \$203,089 mortgage level would have been followed. The 5.475 million new homes were 3.4 times the level of demand, which can be assessed at 1.6 million new homes based on population growth and other factors.
- The economic history of the U.S. and other countries has shown that in case of excessive mortgage lending, which causes house prices to rise faster than income growth can follow, the only real fall back situation is on household's incomes. If the fall back has to depend on the value of housing assets then the drop in house prices deepen the recessionary trends.
- In the case of the U.S. this fall back on incomes involved 24.475 million households who were confronted with foreclosure proceedings started against them over the period 2005-2015; this represented 33.3% of all 73.58 million households who had a mortgage in the spring of 2008. By all accounts a shocking verdict on the ability of banks to predict income growth of individual households.
- In 2003 or in later years the authorities –Fed and other regulatory authorities- did not act upon the growing gap between asset based house funding and the income based one. Neither an interest rate adjustment nor the Quantitative Easing program was directed to close the gap between the effects of an asset based mortgage-lending program and an income based one.
- In 2003, the obvious solution of mortgage lending ceiling was not considered necessary, as the prevailing philosophy was that markets do sort themselves out. The cause of the crisis: the growing gap between asset prices and income levels was not seen as a danger as the philosophy did not take into account the annual volumes of borrowed funds allocated and to be repaid out of future incomes.
- By 2007-2008 the support devised to help the U.S. economy grow again, was based on providing liquidity to the financial markets, initially to the

ailing banks and subsequently to the government and mortgage-backed bond markets. No liquidity support scheme was developed that was directed to individual households with a mortgage.

- In conclusion, the U.S. household mortgage crisis could have been prevented by 2003, or avoided to a large degree by 2007-2008. The 2016 indications are that with an average house price in December of \$384,000 , the gap between the asset based and income based mortgage lending system is growing again. Actions may need to be taken.

5. Sources and methodologies used in tables 1, 2 and 3

Table 1, column 1 shows the actual level of new mortgage lending from 1996 to 2016. This level is abstracted from the Balance Sheet of Households and Nonprofit Organizations⁴ as published by the Federal Reserve Bank of St. Louis. Year-end data have been used. To complete the data, an estimate of the average annual repayment obligations has been made on basis of an average 30-year repayment period and an equal annual repayment amount. Table 1, column 2 shows the annual housing starts, again as published by the Fed of St. Louis.⁵ The data are based on December figures annualized. Table 1, column 3 shows the average U.S. home sales price as published by the U.S Census Bureau⁶. The data show the December data for each respective year. Table 1, column 4 shows the Median Household Nominal Income levels, again published by the Fed of St. Louis⁷. The data used are the year-end figures. Table 1, column 5 shows an approach to establish an income based mortgage-lending program. For instance, the 1996 actual average U.S. home sales price is used as base and the 1997 average nominal income is divided by the 1996 income average to show the increased level of debt absorption. This percentage increase is applied to the 1996 average homes sales price to establish the income-based average house price for 1997 and so on.

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⁴ <https://fred.stlouisfed.org/series/HMLBSHNO>

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

⁶ <https://www.census.gov/construction/nrs/pdf/uspricemon.pdf>

⁷ <https://fred.stlouisfed.org/series/MEHOINUSA646N>

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