This is a study of interest rates movements during global financial crisis in US market.

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As a manager in tail risk hedging business, one of the important risk contributions comes from large financial crisis. Financial market is built from four cornerstones: Stock market, Commodity market, Bond market and Currency market. As crisis happened, money flow within-or-out the financial system which caused large movements of all financial products. As a starting point we are trying to narrow the subject to focus only on interest rates. Interest rates stands for the backbone of the whole system since it represents the cost of borrowing money and the opportunity cost of being lazy. To have a better understanding of rates movements provides us with deep knowledge of how to make correct and profitable strategies.

Major financial crisis types:

- Currency Crises: Speculative attack on the currency resulting in a devaluation (or sharp depreciation), or forcing the authorities to defend the currency by expending large amount of international reserves, or sharply raising interest rates, or imposing capital controls.
- Sudden Stops: Large (and often unexpected) fall in international capital inflows or a sharp reversal in aggregate capital flows to a country, likely taking place in conjunction with a sharp rise in its credit spreads.
- Foreign and Domestic Debt Crises: Country cannot (or does not want to) service its foreign debt.
- Banking Crises: Banks to suspend the convertibility of their liabilities or compel the government to intervene to prevent this by extending liquidity and capital assistance on a large scale.

In this study, we will identify and review all financial crisis since 1990 and focus on US market swap interest rates from 1 year to 30 year and studied the absolute and relative movements during financial crisis.

Section zero: Rate index selection

- We will use swap rate index value from Bloomberg terminal data code: USSW(X) X represents corresponding maturities, here it can be 9 values: {1,3,5,7,10,15,20,30}

Section one: Identify of major global financial crisis, since 1990:

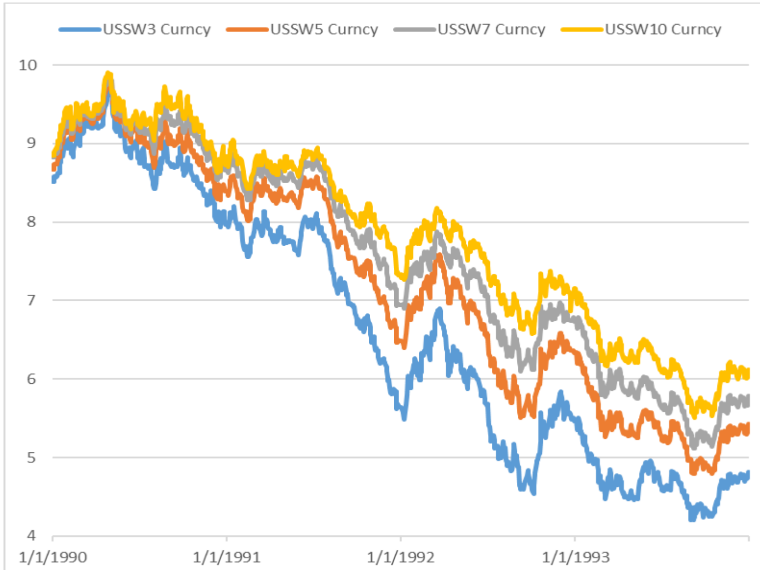
- 1991—1993, western early 1990s recession: The early 1990s recession describes the period of economic downturn affecting much of the Western world in the early 1990s, believed to be caused by restrictive monetary policy enacted by central banks primarily in response to inflation concerns, the loss of consumer and business confidence as a result of the 1990 oil price shock, the end of the Cold War and the subsequent decrease in defense spending, the savings and loan crisis and a slump in office construction resulting from overbuilding during the 1980s.
- 1997, Asian financial crisis and effects: The Asian financial crisis was a period of financial crisis that gripped much of East Asia and Southeast Asia beginning in July 1997 and raised fears of a worldwide economic meltdown due to financial contagion.
- 1998, Russian financial crisis: The Russian financial crisis (also called Ruble crisis or the Russian Flu) hit Russia on 17 August 1998. It resulted in the Russian government and the Russian Central Bank devaluing the ruble and defaulting on its debt. The crisis had severe impacts on the

economies of many neighboring countries. Meanwhile, James Cook, the senior vice president of The U.S. Russia Investment Fund, suggested the crisis had the positive effect of teaching Russian banks to diversify their assets.

- 2000—2002, Dot-com bubble: The dot-com bubble (also known as the dot-com boom, the tech bubble, and the Internet bubble) was a historic speculative bubble and period of excessive speculation mainly in the United States that occurred roughly from 1994 to 2000, a period of extreme growth in the use and adoption of the Internet.
- 2007—2009, World Wide Financial Crisis: The financial crisis of 2007–2008, also known as the global financial crisis and the 2008 financial crisis, is considered by many economists to have been the most serious financial crisis since the Great Depression of the 1930s.
- 2009—2019, European debt crisis: The European debt crisis (often also referred to as the eurozone crisis or the European sovereign debt crisis) is a multi-year debt crisis that has been taking place in the European Union since the end of 2009. Several eurozone member states (Greece, Portugal, Ireland, Spain and Cyprus) were unable to repay or refinance their government debt or to bail out over-indebted banks under their national supervision without the assistance of third parties like other eurozone countries, the European Central Bank (ECB), or the International Monetary Fund (IMF).
- 2014, Russian financial crisis: The financial crisis in Russia in 2014–2015 was the result of the sharp devaluation of the Russian ruble beginning in the second half of 2014. A decline in confidence in the Russian economy caused investors to sell off their Russian assets, which led to a decline in the value of the Russian ruble and sparked fears of a Russian financial crisis. The lack of confidence in the Russian economy stemmed from at least two major sources. The first is the fall in the price of oil in 2014.
- 2014—2016, Brazilian economic crisis: Brazil experienced a severe economic crisis. The economic crisis became coupled with a political crisis in Brazil that resulted in the impeachment of president Dilma Rousseff and in widespread dissatisfaction with the political system.
- 2018, Turkish currency and debt crisis: The Turkish currency and debt crisis of 2018 (Turkish: Türkiye döviz ve borç krizi) was a financial and economic crisis in Turkey. It was characterized by the Turkish lira (TRY) plunging in value, high inflation, rising borrowing costs, and correspondingly rising loan defaults. The crisis was caused by the Turkish economy's excessive current account deficit and large amounts of private foreign-currency denominated debt, in combination with President Recep Tayyip Erdoğan's increasing authoritarianism and his unorthodox ideas about interest rate policy.

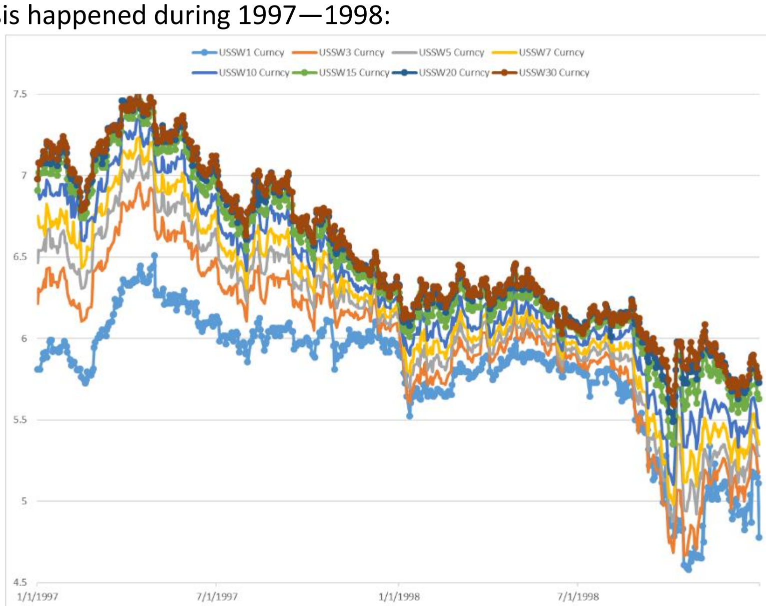
Section two: Study of market movements for each crisis period

- Period one, 1991—1993:
    - Since lack of available market for swap 1, 15, 20, 30, here we only look into swap with maturity 3, 5, 6, 10, see below charts.



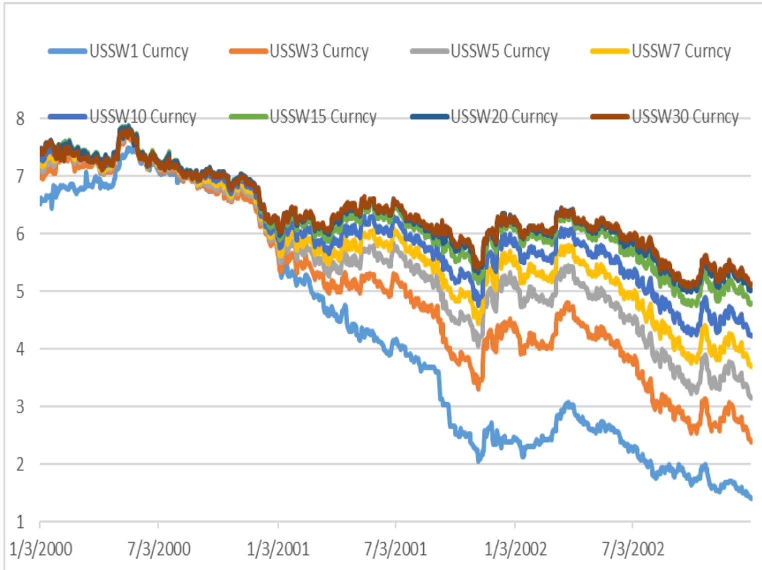
The overall market rates dropped a lot during this crisis, with a significant drop in the near end compared to the far end. Meaning only looks in term of the yield curve shape it actually turned more steeper after 1991. As the crisis hit Euro badly caused a momentum shift to quality with a wider longer term to short term spread. The overall rates market generated a more normal yield curve shape thanks for Euro crisis.

- Period two, Crisis happened during 1997—1998:



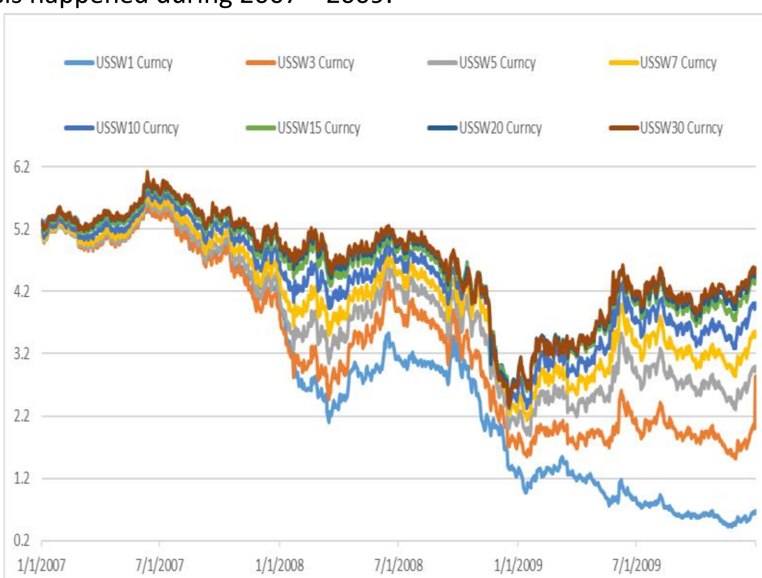
At the beginning of 1997 Asian financial crisis, the market overall rates started to drop by 1 pct. And the spread between longer end and shorter end got narrower from around 1 pct in the start of 2017 to 0.5 pct in the start of 1998. This movement in US rates was quiet different from the previous Euro crisis by the spread measure in US market even if the overall flight-to-quality movements was similar to the previous Euro crisis. Actually, US market saw a high probability of crisis to itself as the spread narrowed that much in the late 1997.

- Period three, Crisis happened during 2000—2002:



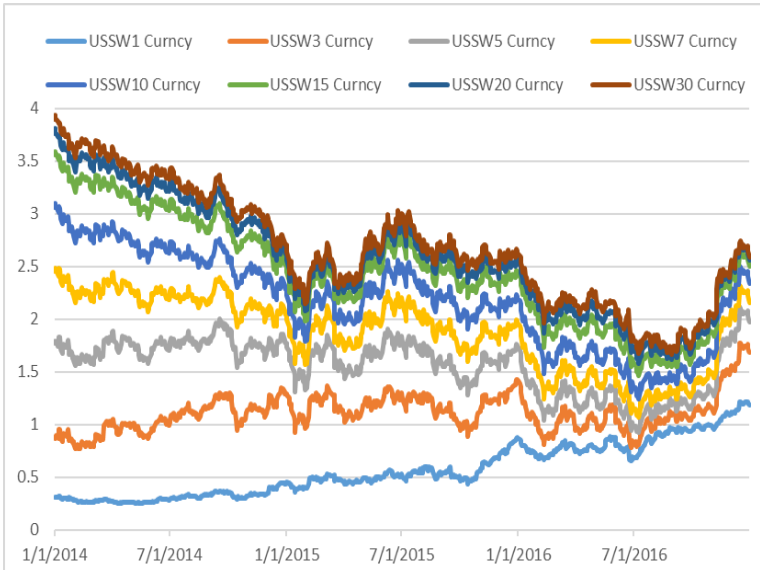
As the dot-com bubble started to crush, the overall market rates dropped a lot. This is a normal movement of flight-to-quality, however a closer look revealed that the actual spread between longer and shorter end was actually getting wider. As the perspective of the market, the yield curve shape turned to be normal than before. Meaning the market put a confident view on the recovery from this crisis.

- Period four, Crisis happened during 2007—2009:



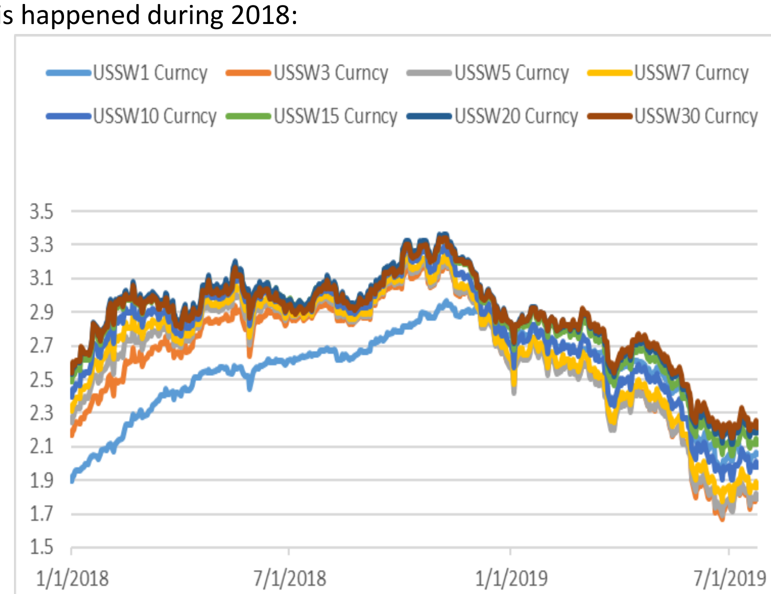
As the sub-debt bubble crashed in 2008, the rates market getting much narrower since middle of 2008. The overall rates stated almost the same and followed by a shape drop in the end of 2008. In the perspective of US market the impact is huge and the spread between longer and shorter rates goes crazy. The overall flight-to-quality movements can be seen here as well the rates dropped more than 1.5% in just two months combined with a invert yield curve in the end of 2008. However, starting 2009 things getting better as investor believed they can make it through. Shown in the graph as the rates starts to raising and the spread started to get wider especially after middle of 2009.

- Period five, Crisis happened during 2014—2016:



The Brazilian economic crisis and China stock market crash actually gave a not clear view for US market, the short-term rates started to raise and the long-term rate dropped. Around the middle of 2016, the spread between longer term and short term narrowed so much again. This indicated of a short-term market nervous but eventually been released. In this crisis, the overall market rate is not dropping that much may because the absolute rate is too low to drop but the market really not afraid that much of this crisis. Also, the recovery of the market goes quick and fast than before.

- Period six, Crisis happened during 2018:



Turkish currency and debt crisis in 2018 actually gave a positive impact on US market as the rates went higher and spread stay almost the same. However, starting 2019 the overall market start getting nervous again as shown a major flight-to-quality movements. During 2018 the spread staying at a historical narrow level and possibly eventually leads to a overall rate dropping movements. But the Turkish crisis is indeed not feared by the US market.