

ARE PENSION FUNDS TOO CONNECTED?



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1. Abstract

As a society we have seen the risk of defaulting financial institutions and the risk of a domino- effect. This study aims to find out if a pension fund is susceptible to another financial crisis with financial institutions that are Too Big To Fail (TBTF) and too interconnected to every part in the financial system.

Over the decades the financial network has evolved into a system that is more complex, more concentrated, more interconnected and has homogeneous financial institutions in terms of investment portfolios and in terms of activities. The combination of all these aspects leads to network fragility.

Pension funds are connected to interconnected TBTF institutions through four connections. The connections are: (1) shares of these institutions, (2) bonds of these institutions, (3) bank loans to these institutions and (4) derivative contracts. Through logical reasoning, literature review and expert opinion the conclusion can be drawn that pension funds are susceptible to the effects of Too Big to Fail and Too Connected to Fail. The magnitude of the effects can be small when the initial shock is small, but it can become large when the initial shock is powerful enough to force pension funds to take actions that would hurt the people they invest for.

2. Acknowledgements

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4. Introduction

Since the bankruptcy of Lehmann Brothers and the subsequent financial crisis, governments and regulators are trying harder to save financial institutions. The actions of these governments and regulators are aimed to isolate the problem and prevent it to spillover to other financial institutions and companies and eventually to the world economy.

Many politicians and regulators find it unpleasant that the financial system has become too complex and too interconnected and that the banking sector has become too large and that even some individual banks and other financial institutions have become Too Big To Fail. These TBTF financial institutions are also known as Globally Systematically Important Financial Institutions (G-SIFI). Regulators and politicians believe that these financial institutions have become extremely big in size and connected to other financial institutions that the default of one of these institutions could lead to a financial crisis.

Ben Bernanke's (former chairman of the Federal Reserve) comment to justify the Fed's rescue of Bear Stearns shows what the world was dealing with and what central banks were afraid of:

Normally, the market sorts out which companies survive and which fail, and that is as it should be. However, the issues raised here extended well beyond the fate of one company. Our financial system is extremely complex and interconnected, and Bear Stearns participated extensively in a range of critical markets. With financial conditions fragile, the sudden failure of Bear Stearns likely would have led to a chaotic unwinding of positions in those markets and could have severely shaken confidence. The company's failure could also have cast doubt on the financial positions of some of Bear Stearns thousands of counterparties and perhaps of companies with similar businesses. Given the current exceptional pressures on the global economy and the financial system, the damage caused by a default by Bear Stearns would have been severe and extremely difficult to contain. Moreover, the adverse effects would not have been confined to the financial system but would have been felt broadly in the real economy through its effects on asset values and credit availability (Financial Crisis Inquiry Commission, 2010).

Since then, researchers all over the world have been studying the financial crisis and the so-called factors that led to the crisis such as, TBTF institutions, complexity and concentration in the financial system, interconnectedness and financial contagion. This has led to more insight of the financial system, which is helpful for this research about pension funds.

5. Research Goal & Methodology

During the financial crisis we witnessed the failure of many financial institutions and the government bailouts to avert further failures of financial institutions. The attention during and after the crisis was focused on the banking industry because the banking industry is very interconnected and has financial institutions that are deemed Too Big To Fail.

One sector that did not get much attention from researchers and from the media while they lost a vast amount of capital due to the financial crisis, but did cause social unrest in The Netherlands are the pension funds. The Dutch pension sector was hit hard by the financial crisis due to the losses on the financial markets and the turmoil that caused many financial institutions and non-financial companies to file for bankruptcy. The effects of this crisis combined with an aging population caused some pension funds to fail, forcing the pension funds to reduce pension entitlements and rights.

A pension fund is failing when the cash inflow from contributions and return on investments do not cover all the liabilities. There are two types of failing. The first type of failing is that one single pension fund is forced to reduce pension fund entitlements; this is called an idiosyncratic failure. The second type is that multiple pension funds failing all together (simultaneously) which can be considered as a systemic failure. A systemic failure can arise when TBTF institution fail and takes all the connected institutions into bankruptcy.

This study focuses on the pension fund sector and its place in the financial network and the consequences and impact the interconnected banking sector has on the pension funds.

Research Goal

As a society we have seen the risk of defaulting financial institutions and the risk of a domino- effect. This study aims to find out if a pension fund is susceptible to another financial crisis with financial institutions that are Too Big To Fail and too interconnected to every part in the financial system.

Research question

To reach the goal described above a research question is formulated.

The main research question of this study is: *Are pension funds in the financial world susceptible to the effects of TBTF and TCTF?*

To answer the research question, a set of sub questions has been formulated.

1. What is a financial network?
2. How important is TBTF in the financial system?
3. What is the effect of interconnectedness in the financial system?
 - 3.A. What is the effect of contagion in an interconnected financial system?
 - 3.B. What is homogeneity and how does it affect financial institutions?
4. In which way are pension funds connected and what are the consequences?

This is a descriptive research that aims to understand the financial system in terms of network theory and interconnectedness. To answer the questions that are stated above an extensive amount of literature has been analyzed about TBTF, interconnectedness

and contagion. Considering that literature on pension funds on being TBTF, or too connected to fail is rare, literature about TBTF banks, and too connected banks have been analyzed and then evaluated if its applicable to pension funds.

To answer the question about networks, scientific literature about network theory and financial networks has been studied and analyzed. For contagion and interconnectedness, scientific literature about contagion and contagion in financial networks has been studied and analyzed. Literature about interconnectedness was most of the time among the same literature as that of contagion and financial networks. Literature from the industry itself has been analyzed as well and since the matter is quite recent much information has been collected and analyzed from working papers and policy papers to governments and regulators.

Once all the literature has been studied and analyzed two interviews were conducted. The interviews are used in this research to verify the existing literature and to gain information about the current situation at the pension fund, expected risk from investment activities or other related risks to the financial markets. In addition, interviews are great way to gather information, which is usually unknown, and it is a useful tool to ask for opinions about the subject.

Finally a concluding remark will be made about the current position of the pension funds PFZW/PGGM in the financial network and how it is connected. PFZW is the pension fund and PGGM is the asset manager of PFZW. In the remainder of the report PFZW and PGGM will be used interchangeably.

6. What is a financial network?

Evolution of modern financial network

The financial network has evolved into a system that is more complex, more concentrated, more interconnected and has homogeneous financial institutions in terms of investment portfolios and in terms of activities. The combination of all these aspects leads to network fragility.

Since the collapse of Lehman Brothers a vast amount of papers have been published about TBTF, contagion, domino effect and most recently financial networks. Papers from (Allen & Babus, 2008), (Gai & Kapadia, 2010), (Haldane, 2009), (Haldane & May, 2011), (Kroznner, 2010), (Moussa, 2011) and (Yellen, 2013) all describe the financial system as a network.

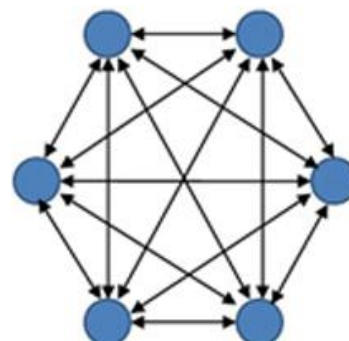
According to Haldane (2009) today's financial system or network has become complex, homogeneous and interconnected. The main reason that the financial system had become more complex and interconnected was diversification of risk. Risk could be bundled, sliced, diced and then re-bundled for onward sale. All this happened in two manners, securitization and derivatives. While these instruments were being sold to the market, the network chain lengthened, nodes in the network became bigger and interconnections between them multiplied. Furthermore, as firms diversified and engaged risk management strategies that had common characteristics, the diversification of individual firms created less diversity in the aggregate system. The network became more homogenous (Scott, 2012).

The concept of a network

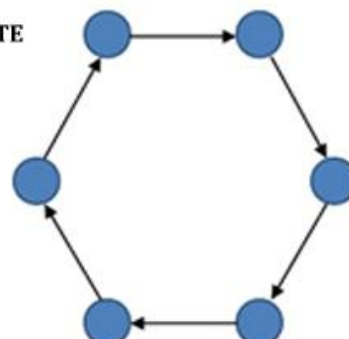
The general concept of a network is quite intuitive: a network describes a collection of nodes and the links between them. The notion of the nodes is fairly general, they may be individuals or firms or countries, or even collections of such entities. A link between two nodes represents a direct relation between them; for instance, in a social context a link could be a friendship tie, while in the context of countries a link may be a free trade agreement or a mutual defense pact (Allen & Babus, 2008). In this paper the nodes represent banks and non-bank financial institutions, while the links are direct exposures such

CHART 1

A. COMPLETE NETWORK



B. INCOMPLETE NETWORK



as having in the particular bank or financial institution and indirect exposures such as holding same portfolios.

One of the first papers about financial networks is that of Allen and Gale in 2000. They developed an important model of financial networks that provided insights how financial networks functions. In their paper “Financial Contagion” Allen and Gale compared two network structures: a complete network, in which all banks lend to and borrow from all other banks, and an incomplete, in which each bank borrows from only one neighbor and lends to only one neighbor. Chart 1 presents these two network structures.

As chart 1 shows, incomplete networks are more prone to contagion than complete networks when an institution defaults. Defaults occur when an institution fails to fulfill an obligation. (Moussa, 2011) defines default as the event when the losses incurred by a financial institution render it insolvent.

Consider a bank defaults, which in turn leads to an immediate write down in value of their liabilities to their creditors. The losses affect the capital of the creditors and if these losses exceed the capital of creditors than these banks also become insolvent. Ultimately these banks default too which causes a second round of losses to their creditors and the cycle repeat itself again. This domino effect is most likely in an incomplete network and not in a complete network. When a bank defaults in a complete network, the losses are distributed among all the connected banks. In this case every bank endures a small hit instead of a complete blow, which would lead to financial distress.

Network complexity

Haldane and May draw analogies of the dynamics of ecological food webs and with networks within which infectious diseases spread to the financial system. In their paper they mention that the financial system is much like an ecosystem but there are major differences. The main comparison is that too much complexity implies instability, which was found earlier in model ecosystems. Today’s ecosystems are the winnowed survivors of long-lasting evolutionary processes, whereas the evolution of financial systems is a relatively recent phenomenon. Nor have selective pressures been entirely dispassionate, with the hand of government a constant presence shaping financial structures (Haldane & May, 2011). The striking statement of Haldane and May is that in financial ecosystems, evolutionary forces have often been survival of the fattest rather than the fittest. Here they point out that governments will always help out the financial firms, which are too big to fail and let the smaller one fail.

Network concentration

Financial network do not appear to be particularly uniform: instead they appear to exhibit fat tails, with a small number of key players who are very highly connected both in terms of the number of interbank relationships they have and in terms of the overall value of those relationships. This reflects the underlying concentration in the banking sector (Gai et al. 2011). If a network is highly connected and concentrated the network is than vulnerable to liquidity crises and the contagion is certainly to spread faster especially if a large connected key player is hit.

Network properties

Great deal of research has been done in the past decades about networks in different disciplines, such as physics, biology and epidemiology. Haldane points out that there are three key results from the research on networks, which are relevant for the financial system in terms of connectivity and stability. These three key results are: (1) “robust-yet-fragile” property of connected networks, (2) “long- tailed distribution” of connected networks, and (3) “small world” property of connected networks. What do these three points mean?

Within a certain range, connections serve as a shock absorber; the network disperses and dissipates disturbances. In this case connectivity creates robustness of the network. From a certain point interconnections no longer create a robust network, but actually serve as shock- amplifiers as losses cascade. The initial shock might be small but through the connections in the network the damage can be quite severe. Even a modest piece of news might be sufficient to take the system beyond its tipping point.

The second key network property is the long- tailed distribution. Networks are made up by nodes and their links. A node has a certain amount of links to other nodes, what is called the degree of a node and can be measured. When links are randomly configured in a network, the degree distribution should be symmetric, bell- shaped, if it’s depicted in a histogram. But many networks do not have a bell-shaped distribution; they have a thin middle and long fat tails. Which means that there is a larger than expected number of nodes with both a smaller and a larger number of links than average. This implies that if a financial giant, which functions as a hub might get in distress, could risk the entire financial system.

The small world property is the third key network property. Although networks tend to exhibit local clustering, certain key nodes can introduce short cuts connecting otherwise detached local communities. A small world is more likely to turn a local problem into a global one.

As you can see in the charts 2 and 3 taken from (Haldane, 2009), over the past decades the network has changed. The scale (more bigger players) and interconnectedness (more connections between players) has increased considerably and the average path length has shrunk (more players have now direct links with each other). All this leads to a financial network that is highly interconnected, has a long-tailed degree distribution and small world properties.

CHART 2

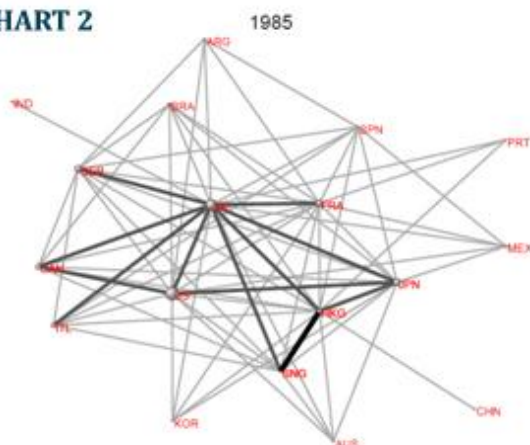
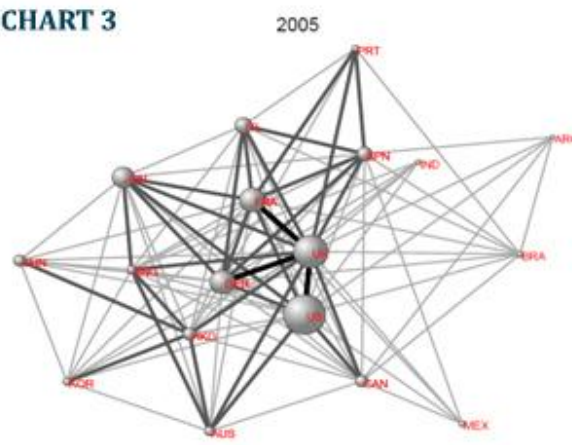


CHART 3



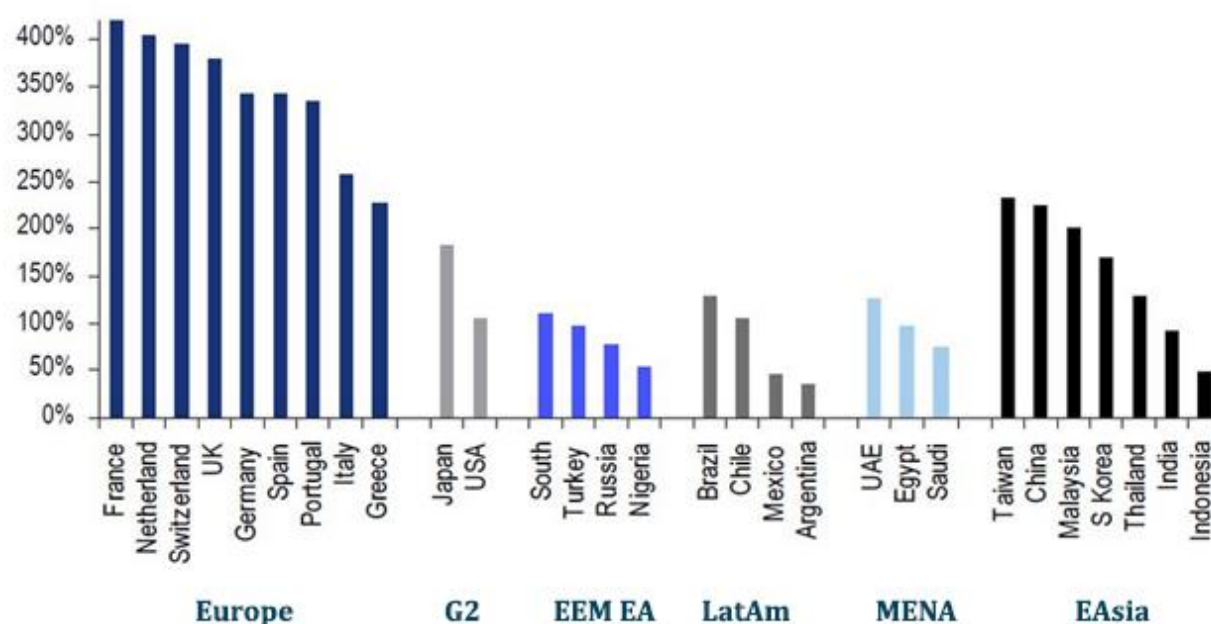
7. How important is TBTF in the financial system?

Too big to fail (TBTF). What does it mean? In the article of (Greene, McIlwain and Scott, 2010) there is a clear definition given of the phrase 'too big to fail'. A company is too big to fail when, in order to stave off unacceptable political or economic risks, governments would put taxpayer money at risk to avert the company's failure rather than wind it down in a bankruptcy or resolution proceeding.

The financial crisis of 2007-2009 reduced the number of large financial firms, but at the same time it created bigger financial firms (due to forced or arranged mergers and acquisitions) and made the financial sector more concentrated with the few remaining large financial firms.

In case of large financial companies who are actually TBTF the risks that they create are severe due to the extensive amount of counterparties, large amounts of capital and substantial leverage. If such a company files for bankruptcy it can have a devastating effect on national and global economies and the financial system as a whole (systemic risk) as we recently experienced with the collapse of Lehman Brothers in 2008.

CHART 4: TOTAL BANKING ASSETS AS % OF GDP



Source: BofA Merrill Lynch Global Research, Central Bank data, Haver

The need for Large Global Financial Institutions

The combination of growing markets and increased interconnectedness has led to a significant need for global institutions that can efficiently serve companies by managing, financing, producing, and selling across a complex supply chain and an increasingly global customer base (HPS insight, 2013).

Global banks do not only take deposits and make loans, they provide other services for companies such as, trade finance, currency hedging and interest rate risk management,

transaction and payment services, securities underwriting, and offer billion dollar lines of credit all over the world. They offer financial services all over the world to help multinational companies.

Another reason why large financial institutions are needed is the need for syndicated loans. Syndicated loans are usually large loans and they can be in the billions. Multinational companies often need these loans if they want to make investments. Due to the large size of the loan, banks create a syndicated loan with other (large) banks to share the risk.

So the large financial institutions are needed to serve the large multinational corporations. The size of these multinational corporations and their need for capital and financial services without much complexity are the reasons for the need of large financial institutions.

As mentioned, there are a few positive economic effects of having several TBTF financial institutions in the global financial network, but at the same time there are negative economic effects as well. These negative effects may cause serious harm to the counterparties of these TBTF institutions and ultimately to the rest of the global financial network.

Concerns about Too Big To Fail

Financial institutions that are Too Big To Fail are actually the hubs in the network. They are so big that they can and are connected to most financial institutions and large multinational corporations around the world. Since these large financial institutions are connected to so many other financial institutions and non-financial institutions their failure would create an immense devastation. Not all counterparties will have sufficient liquidity to overcome the losses endured due to the failure and are likely to fail shortly after.

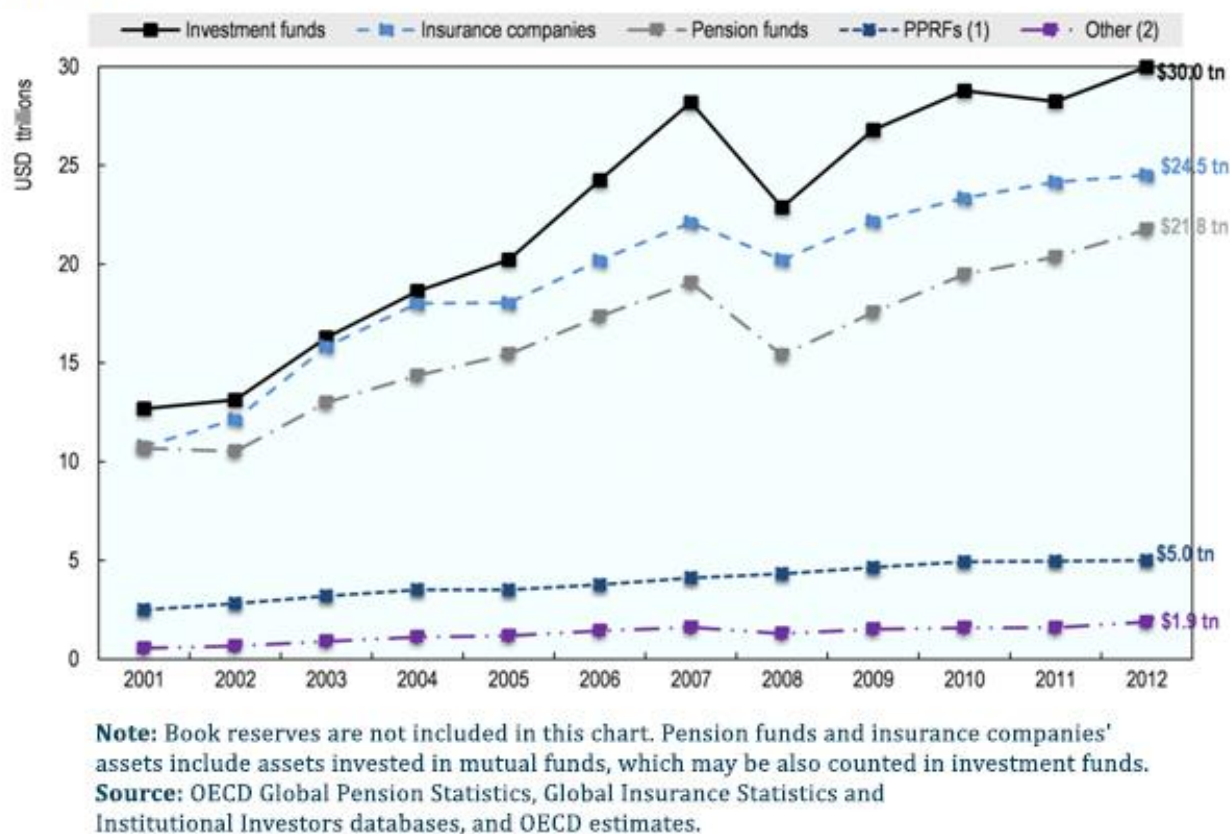
Another consequence of TBTF is that investors perceive them as creditworthy due to the TBTF policy of regulators and governments and the possibility of a government bailout and thus creating a situation in which TBTF institutions have access to capital at a discount, which leads to unfair competition in the financial sector.

After analyzing all the literature about TBTF, the view emerges that one of the biggest concerns about TBTF is that if the government steps in to prevent the insolvency of a financial company, the company will have little to no incentive at all to avoid risk and thus taking more risk (moral hazard).

The concerns about TBTF banks are justified considering the devastating effect of the default of Lehman Brothers and the aftermath of the subsequent crisis. But not only banks are too big to fail, many other financial institutions are too big to fail if you would consider their assets to the GDP of the country they are located. Pension funds have a lot of capital, which they invest. From the perspective of the society these pension funds are important because people are often obliged to participate in a pension fund scheme and their retirement depends on the pension funds performance. Social unrest can arise if a large pension funds fails and has to alter benefits to retirees and ask more contribution from current participants.

A 2013 survey of the OECD on large pension funds showed that institutional investors (pension funds, public pension reserve funds, mutual funds, and insurance companies) in the OECD held \$83.2 trillions in assets and that the combined GDP of the OECD countries was \$46.1 trillion.

CHART 5

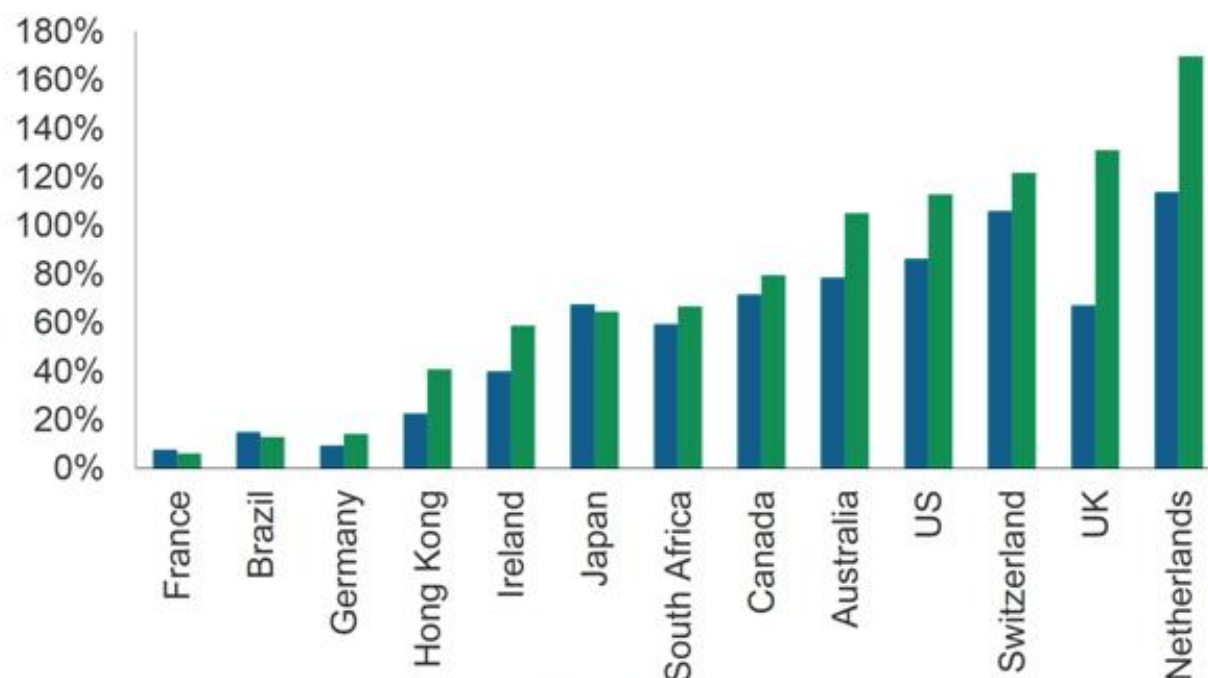


The same survey of the OECD shows that The Netherlands has two of the largest pension funds. These two pension funds are ABP with \$412.4 billion and PFZW with \$171 billion at the end of 2012. In terms of total assets relative to the national economy, these two Dutch pension funds have a ratio of 73.8% of the Dutch GDP (ABP 52.2% and PFZW 21.6%).

Another study (Tower Watson, Global Pension Assets Study, 2014) on global pension assets has found that the total pension fund assets in comparison to GDP in The Netherlands is the highest in the world and it is likely that the number will grow further since the economy is not expanding in a fast pace and the financial markets are. According to the study the total assets of the Dutch pension funds were around 170% to the Dutch GDP at the end of 2013.

CHART 6: PENSION ASSETS AS % OF GDP

■ 2003 ■ 2013



SOURCE: TOWER WATSON, GLOBAL PENSION ASSETS STUDY 2014

These studies show the TBTF character of the Dutch pension funds. The huge amount of capital that has been accumulated over the years is an important source of funding for investment projects and funding capital for banks.

Traditionally, institutional investors have been seen as sources of long-term capital with investment portfolios built around the two main asset classes (bonds and equities) and an investment horizon tied to the often long-term nature of their liabilities. In recent years diversification benefits and higher expectations of investment returns are increasingly driving investors to alternative investments, such as private equity, real estate, infrastructure and commodities (OECD, 2013).

Since pension funds have begun to diversify their investments it is more likely that they are more susceptible to externalities of TBTF banks and the effects of interconnectedness in the financial world. How can a diversified investment portfolio of a pension fund lead to bad performance and ultimately to the reduction of the pension rights? Because the financial world is now more a financial network, almost every financial institutions is connected to one or more financial institution.

8. What is the effect of interconnectedness in the financial system?

Since Too Big To Fail another phrase has emerged; Too (Inter) Connected To Fail. This new phrase marks the shift of view of researchers and regulators from TBTF to TCTF. The realization is that not the size of the bank that matters but its connections to other banks and non-banks. These connections can be direct or indirect and some of them are strong and others are weak.

Today's financial markets are a highly complex system of financial institutions with a high degree of interdependence and multiple interconnections. Scott (2012) notes that banks, insurance companies, hedge funds and brokers have become highly interconnected with each other as well as in their own sector over the past decade and thereby increased the level of systemic risk.

To illustrate what the risks are when financial markets become too complex and financial institutions too connected, a short recap is noted about Lehman Brothers and AIG.

Lehman Brothers

On 15 September 2008, Lehman Brothers filed for Chapter 11 bankruptcy, which caused panic all around the financial markets. Uncertainty about its causes and contagious consequences brought many financial markets and institutions to a standstill. The market for Credit Default Swaps (CDS) froze, as Lehman was believed to be counterparty to around \$5 trillion of CDS contracts.

Banks hoarded liquidity for fear of lending to infected banks, causing gridlock in term money markets, spreads on lower- rated companies' bonds spiked and there was an effective boycott of the remaining large US investment banks. (Haldane, 2009)

Since then billions are spend to prevent a domino effect, which was caused by Lehman Brothers. One of the first TBTF institutions that got bailed out by the US Government was American International Group (AIG). Lehman Brothers caused major damage to the financial system and to its counterparties, although it was a mid-sized investment bank. The damage that could have been created if AIG would have defaulted and filed for bankruptcy is far more severe due to the sheer size of AIG, the vast amount of CDS and counterparties.

As often mentioned in the literature banks need to work together. Banks work with one other because no single bank can hope to access the full range of available capital and investment opportunities in our complex economy. Connections between banks are also formed for risk sharing, which can help minimize but cannot eliminate the uncertainty faced by individual agents. Although connections between banks can serve as a risk sharing mechanism, there is a dark side to it. The same connections that are formed willingly can spread contagion between banks and can cause serious financial trouble for banks connected to stressed banks in the network. Gai and Kapadia (2010) use an analogy where they compare an epidemic occasion with a financial crisis and mention that more links creates more channels of contact, which makes it easier for the infection to spread.

Banks need each other and therefore they form connections in several ways. A bank that is Too Connected To Fail (TCTF) is bank that has connections to most of the (biggest) banks in the world. These connections are established through (1) the interbanking market where banks lend out excess capital to banks with shortage of capital. Other connections between banks that exist are: (2) having and serving the same clients, (3) holding the same assets and (4) derivatives trading.

Interconnectedness has much to do with the structure of the financial network. As mentioned in the chapter about the financial network, there are complete networks and incomplete networks. A fully interconnected financial network where all financial institutions have connections with each other is more resilient. Should one of the institutions fail than all the other remaining banks would absorb the loss equally with no further losses or defaults. In the case of an incomplete network in which financial institutions are only linked to a single institution it is more likely to see a domino effect because the loss of the first failing institution is not spread evenly.

8 .A. What is the effect of contagion in an interconnected financial system?

There are two words in the previous chapter, which stand out; contagion and network. The financial network and the properties of a financial network has been covered in chapter 6, but contagion has not been covered yet.

The definition of contagion is not clearly defined in finance. There is a definition from epidemiology, which describes it as a mechanism of transmission from one infected victim to other potential victims (Kolb, 2011). In 'A Primer on Financial Contagion,' Pericoli and Sbracia consider five definitions of contagion. For this paper only 3 definitions are relevant. (1) Contagion is a significant increase in the probability of a crisis in one country, conditional on a crisis occurring in another country. (2) Contagion occurs when volatility of asset prices spills over from the crisis country to other countries. (3) Contagion is a significant increase in co-movements of prices and quantities across markets, conditional on a crisis occurring in one market or group of markets (Pericoli and Sbracia, 2003).

Helwege (2010) describes in the article: Financial firm bankruptcy and system risk how systemic risk works and what kind of policy responses can help to avoid a systemic risk. Helwege focuses on two types of contagion that might lead to system risk: Information contagion and counterparty contagion. (1) Information contagion, where the information that one financial firm is troubled is associated with negative shocks at other financial institutions largely because the firms share common risk factors; or (2) counterparty contagion, where one important financial institutions collapse leads directly to troubles at other creditor firms whose troubles snowball and drive other firms into distress (Helwege, 2010). Helwege clearly explains that a systemic risk that is caused by a domino effect (counterparty risk) should hold certain conditions. These conditions must be met to create the "perfect storm". These conditions are as follow: first the initial bank should be TBTF. Second, it must have experienced a large decline in the value of its assets so that the losses imposed on other firms are substantial. In addition the losses imposed on these creditors should be a large portion of their assets. This all explains that in order to have a systemic risk the ties between the banks must be very strong and intertwined. Information contagion has the same impact but the process is different compared to counterparty risk. For example during the subprime crisis there were several financial firms in distress, but the one that caught the attention of the regulators was in much worse shape than the others. Investors in the other firms waited for new information and re-assessed the remaining firms, which eventually led to sharp declining stock prices.

Gai and Kapadia (2010) mention in the paper 'Contagion in financial network' two key channels of contagion in financial systems by which default may spread from one institution to another; direct counterparty exposures and knock- on effects of distress at some financial institutions on asset prices can force other financial entities to write down the value of their assets. Gai and Kapadia mention further that a high number of links with other financial institutions may lower the probability of a default due to contagion as stated above, but at the same time it will make the financial institutions that survive the default of one institution vulnerable to a second-round default.

Another problem that can arise in a connected financial network is that once a financial institution files for bankruptcy, investors will have a hard time assess the other institutions and thus withdraw their money. Since investors have insufficient information they might also withdraw funding from institutions that have nothing in common with the failed institution, which can lead to the failure of these institutions. At the same time lenders are having a hard time assessing the creditworthiness of their borrowers and stop lending to others, which leads to a freeze in the interbank market.

Since banks and financial institutions face withdrawing of funds and are facing a freeze in the interbanking lending they are forced to hoard liquidity. In other words, they will try to sell anything to have enough liquidity to survive the crisis. This will lead to a fire sale of assets that will ultimately lead to a decline in the remaining assets, which could make the institutions insolvent in the worst case.

Summarizing, it is safe to state that contagion itself is dangerous and has a damaging effect. Consider contagion in an interconnected financial network where capital and information flows freely. All it takes is one financial institution that fails and the rest of the financial network comes to a stop thanks to all the connections between all the financial institutions that make it possible that contagion spreads at a fast pace.

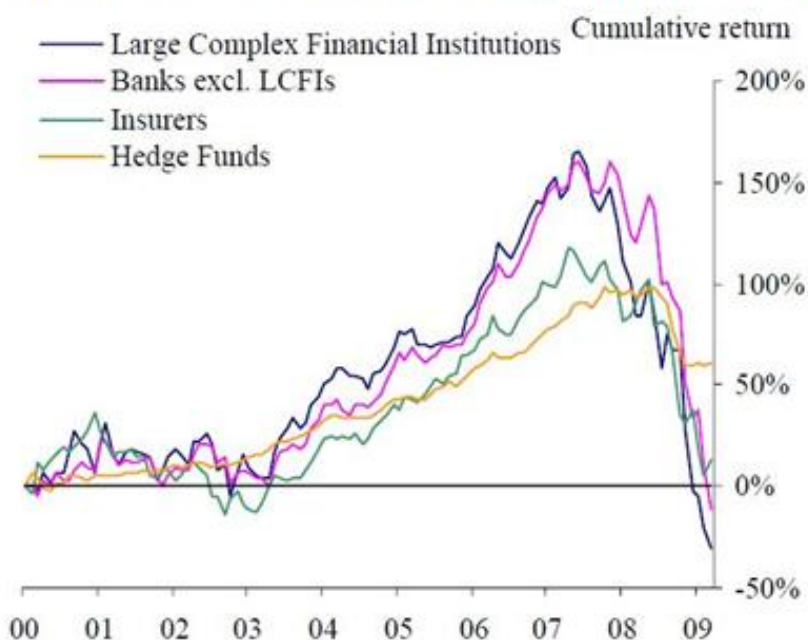
Scott (2012) notes in “interconnectedness and Contagion” that contagion compared to other industries, (1) strikes financial institutions more often, unfolding more rapidly than in other sectors of the economy, (2) spreads among a larger constellation of peer institutions, (3) causes a larger number of failures, and (4) spills over to the real economy where it inflicts collateral damage on industries that depend on the financial sector as a source of long- term capital (Scott, 2012)

8.B. What is homogeneity and how does it affect financial institutions?

Over the past couple of decades financial institutions became less diverse or in other words more homogeneous. This is no different than in the past, Scott (2012) notes that the Chicago banking Panic of 1932 was the result of homogenous balance sheets impairments due to the fallen asset prices. The causes of homogenization in the last couple of decades before the crisis of 2007-2009 according to Haldane are: the pursuit of return, and the management of risk. The pursuit of yield resulted in a return on equity race among all types of financial firm. As they collectively migrated to high- yield activities, business strategies came to be replicated across the financial sector. Imitation became the sincerest form of flattery (Haldane, 2009). The network had become more homogeneous, in other words, financial institutions became similar institutions. Banks migrated to activities, which would bring in higher returns, they merged with other banks and or insurance companies with other activities or took over other banks and or insurance companies.

The chart below shows the similar pattern between bank, insurance companies, hedge funds and large complex financial institutions (LCFIs). The chart is from the paper of Haldane. Looking at the chart it becomes clear that before, during and right after the crisis the different types of financial firms are almost correlated. Pension funds are not in the chart, but if you take in to consideration that the financial network has become homogeneous you can image a line just like the in the chart.

CHART 7: WEIGHTED-AVERAGE CUMULATIVE TOTAL RETURNS



Source: Bloomberg, CreditSuisse/Tremont and Bank calculations.

(a) Sample based on banks and insurers in S&P 500, FTSE All Share and DJ EuroSTOXX indices as at March 2009. Excludes firms for which returns not quoted over entire sample period.

Wagner (2008) states that homogenization of financial companies has benefits but more importantly it has also negative effects. With homogenization is meant that financial companies such as banks and insurance companies due to M&A, deregulation and diversification hold the same assets. The negative effect can be explained as followed: In a more homogeneous financial system it becomes unlikely that an institution will be able to borrow from others when it has liquidity needs, simply because other institutions are probably having liquidity needs at the same time and thus leading to interbank market failure. As mentioned before diversification is one of the reasons. Wagner mentions that diversification has a negative effect since it increases investments in (risky) projects and reduces the incentive to hold liquidity. The benefit of diversification is that it makes companies more similar to each other, which leads to lower costs in a crisis. Another problem with homogenization is contagion. Contagion can arise when a bank has a liquidity problem and is forced to liquidate the assets, which will depress prices and could cause problems for other banks. Since banks are more similar to each other it is wisely not to rely on the inter banking market since they all have the same liquidity problem and thus it is wise to hold more capital.

Diversification from the point of view of a bank is actually a good strategy, but from a network perspective it makes the system more fragile when banks possess the same assets and have the same income stream and it creates great uncertainties since banks do not know if their counterparties are stable.

STAKE HOLDERS

GOVERNMENT

LEGISLATION

REGULATOR

DNB
SEC

**FINANCIAL
MARKETS**

PENSION FUND



**RETURN
VS.
RISK**

**RETIREEES

BENEFITS**

**CONTRIBUTING
MEMBERS**

MANDATORY
CONTRIBUTION

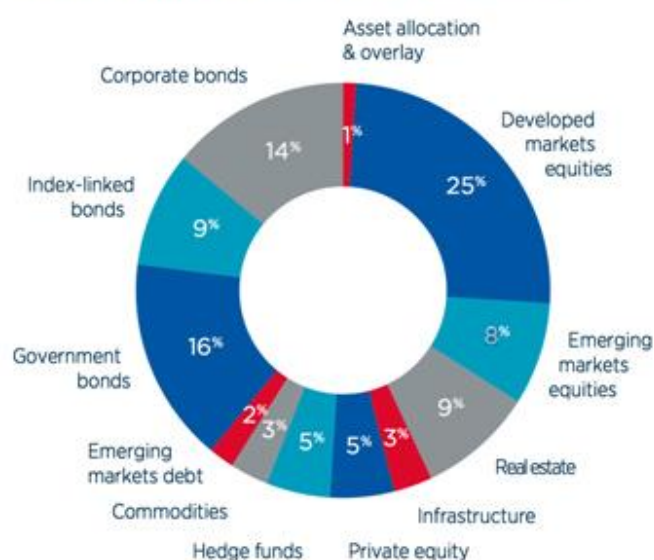
9. In which way are pension funds connected and what are the consequences?

As stated in chapter 7, Dutch pension funds are rather big. Both ABP and PFZW are in the top 5 of the biggest pension funds in the world in terms of total assets. ABP en PFZW combined have assets worth as 72% of the Dutch GDP and have approximately 4 million members. The impact of these two large pension funds is rather large for the Dutch society and social stability since a large part of the Dutch labor force depends on them for their retirement.

The societal importance of a pension fund is quite large and therefore it is important for these pension funds to be careful with their investments and the risks these investments pose for the pension funds and ultimately for their members. Pension funds have to seek for good investment opportunities with high returns and low risk, while they are under strict supervision of De Nederlandsche Bank (Dutch Central bank) and with a Dutch government that imposes stringent regulation.

Pension funds invest in different asset classes, such as stocks, government bonds, corporate bonds real estate, etc. considering the ratings and the risks (chart 8 shows how ABP's assets are invested). Strict regulation prohibits pension funds to invest in low rated assets because they pose a higher risk than highly rated assets. Therefore they mostly invest in government bonds of governments with a high rating and a positive outlook. Pension funds invest in stocks of large multinationals and financial institutions next to government bonds and corporate bonds.

CHART 8: HOW ARE ABP'S ASSETS INVESTED?



SOURCE: ABP RESPONSIBLE INVESTMENT REPORT 2013

According to the interviewees who are experts in their field of business and work for PFZW and PGGM, the pension fund is well diversified and has different types of investments, such as real estate, infrastructure next to the investment noted above and bank loans and they trade with various counterparties with derivatives to hedge their interest- and currency risk.

PGGM trades on a daily basis on the financial markets on behalf of the pension fund members of PFZW. The pension fund is vulnerable to the consequences of TBTF financial institutions and the interconnectedness in the financial system since they have investment activities and derivatives trade activities.

Both interviewees view the TBTF problem as problematic to the financial stability in the globalized world. It has become a source of systemic risk and it makes moral hazard possible since they have the implicit guarantee that they will get a bail out if they fail. Because of this implicit guarantee, these TBTF financial institutions will take more risk

and risking the financial stability. Not only do they view these large financial institutions as a risk for the financial stability but also their numerous connections to all the other banks and institutions in the financial network. Financial institutions that are TBTF are according to the experts and FSB (Financial Stability Board) the largest and most connected banks in the world. However banks are not alone, large insurers are also TBTF. These large insurance companies fund commercial banks and they design and sell complex financial products and have other activities next to insurance activities.

Are pension funds TBTF?

The interviewed experts are not quite on the same page on this topic. According to one of the experts pension funds are TBTF because of their size, many stakeholders, amount of participants and the impact on society and financial markets. The consequences of a failing pension fund are that pension contributions have to be increased, indexation can be limited and an extreme measure is the reduction of pension benefits. Pension funds are large investors in financial markets and the size of their investment portfolio is rather large, so when a large pension fund fails, the impact on the financial markets will be quite large. The unwinding of all their positions could make markets move and could cause asset prices to go down.

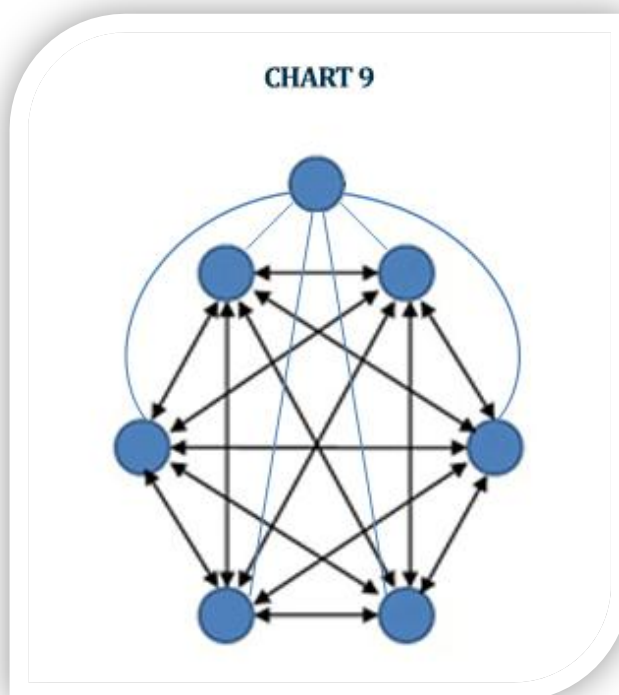
The other expert states that pension funds are not TBTF because they are different compared to banks. The participants of a pension fund cannot leave the pension fund, since they are mandatory participants. There is no such a thing like a bank run; participants are not able to take out their pension savings from the pension fund. Another feature of a pension fund is that they are not leveraged. The only problem that a pension fund can face is that it is unable to meet its obligation to pay out pension benefits to retirees and to meet up to its derivatives contracts. So a pension fund should have sufficient liquidity to meet its obligations.

Connections

Pension funds have four connections to these TBTF and TCTF financial institutions.

These four connections are formed through, (1) shares of these institutions, (2) bonds of these institutions, (3) bank loans to these institutions and (4) derivative contracts.

To be clear, the pension fund has four links to a single institution. These connections might not be that strong like that of interconnected banks, however consider these four links to a single institution and raise that single institution to all the large banks in the financial network. These links don't look that weak any longer but rather strong. Chart 9 shows these connections. The blue links are the connections between the pension fund and the interconnected banks.



What are the consequences of these connections to big and interconnected banks? First of all, the financial system is built upon trust. Trust between the key players in the financial network and trust from the public to the financial institutions that operate in the financial system. Without trust, the financial system, as we know it would stop to function. For instance, banks are highly leveraged and most of their funding comes from large pension funds and insurance companies. When pension funds and other financial institutions lose their confidence in these highly leveraged banks they will withdraw their funding from the bank, leaving the bank with large long-term liabilities without any funding. These banks are then forced to wind down their loans to consumers and companies. The negative impact will trickle down and hurt the rest of the real economy. Since companies are not able to get affordable loans to support their activities or investments they will eventually be forced to scale down their activities, which will force them to let employees go. People with no work and income cannot longer pay contributions to their mandatory pension scheme, which leads to lower contributions inflow for the pension funds. This can be a problem for pension funds because the liabilities will remain the same. In such a situation the pension should increase their return or increase their contributions to prevent the coverage ratio to drop below the threshold of 105%.

Banks trade with each other, work together when they are syndicating loans, hedge each other's risks through derivatives and provide loans to each other via the interbanking market. They are really interconnected. When a large interconnected key player fails, the other banks will face a problem, since they will lose funding, the transactions and contracts with the failed bank. PGGM faces the same problem when it comes to derivatives contracts. When a counterparty fails, the interest swap contracts are no longer of use, which leaves the pension fund exposed.

PGGM is connected to large interconnected banks, such as J.P. Morgan, Citigroup, and Goldman Sachs. When one of these institutions fail, PGGM will have a problem, and will have to buy new derivatives contracts from other counterparties in a difficult environment, which will cost time and money. Not only will it cost time and money, but due to the size of the counterparty it is likely that PGGM will have to buy derivative contracts from smaller counterparties or from counterparties with a lower rating, which will increase the risk for PGGM. Another possibility is to raise the limit of an existing counterparty, which will raise their exposure to the counterparty and thus increasing the risk.

Another consequence of interconnectedness is the involvement of governments when a failed institution is rescued from bankruptcy. Governments use taxpayer money to save large financial institutions, putting themselves into trouble when it comes to state finances. When the state finances are in a bad shape, the rating agencies will lower the rating with the effect that pension funds that invest in those same countries will be exposed to a higher risk.

A final consequence of interconnectedness has to do with the homogenization of the financial world and contagion. As stated in chapter 8 financial firms are becoming to look similar when compared for assets as well as for returns. In a situation like this it is likely that contagion can spread via assets. Since all financial institutions are looking for high returns and lower risk they will diversify their portfolio, which will lead to similar

investment portfolios. When one or more asset classes in the portfolio decrease in value, all the financial institutions that have these assets in the portfolio will start making losses. To contain the loss, they will start to sell the asset(s), which will be likely a fire sale. In such a scenario all the value of the asset will be gone and the financial institution will start to produce losses. The shares of these institutions will drop in value too due to poor performance. In such a case the pension fund will be hit from two links. The first will be the drop of the asset value in the portfolio. The second hit will come from their investment in the shares of the financial institutions. The impact may seem small, but when the losses are stacked up, the total impact can be large.

THE WHOLE ECONOMY

LARGE MULTINATIONALS

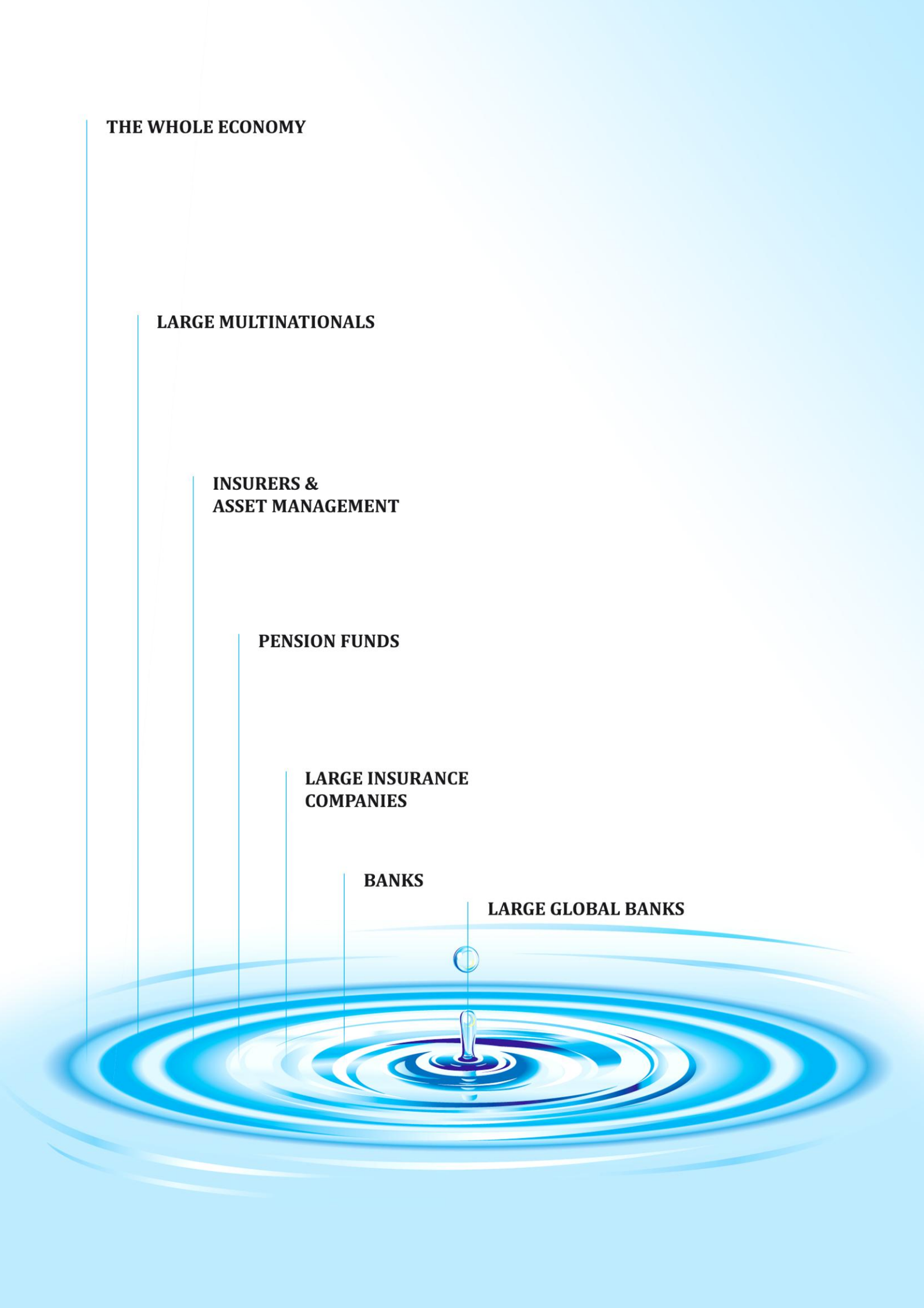
**INSURERS &
ASSET MANAGEMENT**

PENSION FUNDS

**LARGE INSURANCE
COMPANIES**

BANKS

LARGE GLOBAL BANKS



10. Conclusion

The research question for this thesis is: *Are pension funds in the financial world susceptible to the effects of TBTF and TCTF?* An extensive amount of literature has been studied and experts have been interviewed to validate the findings in the literature and to ask for their opinion on the subject.

Chapter one explained the concept of a network and the evolution of the financial system into a network that has become more complex, more concentrated, more interconnected and has become homogeneous. The combination of these aspects has made the financial system more fragile and susceptible to contagion. In chapter two the importance of TBTF is discussed. According to literature and the experts, TBTF is a great risk to the stability of the financial system. Too big to fail institutions have numerous counterparties, large amount of capital and are highly leveraged. If an institution that is TBTF fails, the effect on national and global economies and on the financial system are devastating. The effect of interconnectedness in the financial system is explained in chapter three. Interconnected institutions pose more threat to the stability of the financial network, since they can pull several financial and non-financial companies down when they file for bankruptcy. The 'disease' can spread easily in the financial network via the multiple connections between all the interconnected institutions and create a domino effect of failing institutions. One aspect of the financial system has made it possible that contagion can travel fast within the financial system, and that is homogeneity. One of the negative effects of homogeneity is that in a more homogeneous financial system it is unlikely that an institution will be able to borrow from others when it has liquidity needs, because other institutions are probably having liquidity needs at the same time. Chapter four explains that pension funds are connected to interconnected TBTF institutions through four connections. The connections are: (1) shares of these institutions, (2) bonds of these institutions, (3) bank loans to these institutions and (4) derivative contracts. The effects of these connections seem limited due to diversification and policy to keep exposure to a minimum. The connections become a problem when the negative effects of these connections all come at once. The consequences can be that the pension fund has to increase contributions, limit indexation or in the extreme case, reduce pension benefits for retirees. Pension funds are investors with a long- term horizon with a diversified and large investment portfolio and that is why they are often seen as a force of financial stability in the financial system. Imagine the shock that would go through the financial markets when a large pension fund fails and has to wind down all the assets.

Through logical reasoning, literature review and expert opinion the conclusion can be drawn that pension funds are susceptible to the effects of Too Big to Fail and Too Connected to Fail. The magnitude of the effects can be small when the initial shock is small, but it can become large when the initial shock is powerful enough to force pension funds to take actions that would hurt the people they invest for.

11. Appendix

Appendix A FSB List of systemic banks

G-SIBs as of November 2013⁵ allocated to buckets corresponding to required level of additional loss absorbency

Bucket ⁶	G-SIBs in alphabetical order within each bucket
5 (3.5%)	(Empty)
4 (2.5%)	HSBC JP Morgan Chase
3 (2.0%)	Barclays BNP Paribas Citigroup Deutsche Bank
2 (1.5%)	Bank of America Credit Suisse Goldman Sachs Group Crédit Agricole Mitsubishi UFJ FG Morgan Stanley Royal Bank of Scotland UBS
1 (1.0%)	Bank of China Bank of New York Mellon BBVA Groupe BPCE Industrial and Commercial Bank of China Limited ING Bank Mizuho FG Nordea Santander Société Générale Standard Chartered State Street Sumitomo Mitsui FG Unicredit Group Wells Fargo

Source: http://www.financialstabilityboard.org/publications/r_131111.pdf

Appendix B FSB List of systemic Insurers

G-SIIs in alphabetical order as of July 2013

Allianz SE
American International Group, Inc.
Assicurazioni Generali S.p.A.
Aviva plc
Axa S.A.
Metlife, Inc.
Ping An Insurance (Group) Company of China, Ltd.
Prudential Financial, Inc.
Prudential plc

Source: http://www.financialstabilityboard.org/publications/r_130718.pdf

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