Cost, Uncertainties and Profit in Commercial and Social Insurances

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29 June 2021

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*Publisher version of the paper is available at: `https://link.springer.com/article/10.1007/s43546-021-00097-y`

Abstract

Here, we argue that the commercial for-profit insurance companies act more like a memory-less system in a way that the premiums paid by the policy holders during one accounting period will be of no avail to them during subsequent periods although the excess premiums earned in the previous periods may rest in the companies' retained earnings. Moreover, commercial insurances are subject to many over-head costs, taxations and uncertainties which are not present in the realm of social insurances. As the costs and uncertainties are greatly reduced and the profits earned in the previous periods are available to meet present and future expenditures, social insurances entail a lower amount of premium for the policy holders than its conventional commercial counterpart. The objective of this study is to quantify the extent of profit made by the commercial insurance companies born out of the premium after meeting up operating expenditures and claim settlements and how this profit evolves over time after being invested at the risk free rate. To us, this is the amount of money that would otherwise rest in a trust fund available for future claim settlement if there were equivalent social insurance schemes in place. To do so, we collect annual country level data of premium collection, claim settlement and operating expenditure incurred for 04 (four) OECD countries from OECD insurance database [28] and extrapolate the profit trends into the future using appropriate ARIMA/ARIMA-GARCH framework. As anticipated, the profit shows an explicit upward trend after making a V-shaped recovery right after the global financial crisis of 2008.

Keywords

Social insurance; Commercial insurance; Comparative analysis; ARIMA-GARCH modeling

1 Introduction

Concepts of social insurances have been heavily used throughout the developed world to implement universal health coverage, unemployment insurance, illness and disability insurance scheme and various other social safety net programs. Although, such programs across the world may vary in terms of coverage and contribution from the individual, they have some common traits: All such programs are state-sponsored and are implemented as not-for-profit trust funds instead of for-profit limited liability companies. The contributions to the scheme are often mandatory or heavily subsidized that lures the eligible candidates to willfully sign up for the scheme. Thus extensive risk pooling is carried out in the process and if there is any shortage in the raised fund then it will be compensated from the general taxation revenue. Examples of such schemes include but not limited to Medicare [14], Pension Benefit Guaranty Corporation program [10], the Railroad Retirement Board program [41] in United States, Canada Pension Plan (CPP) [23], German Sickness fund and unemployment insurance program [18], Italian National Health Services program [40] and so on. Scope of the social insurance is thus far largely limited to the social security programs and they have never been tried for in other commercial setup like fire and allied insurance, industrial all risk insurance, burglary and housebreaking, marine cargo insurance, cash in transit, cash in safe, cash on counter insurance, fidelity guarantee insurance, motor car and house insurance and many others. Here, we argue that the commercial for-profit insurance companies for the above-stated purposes collect substantially more premiums than the consolidated amount of claim settlements and incurring operating expenditures. Thus they have surplus in their premium collection account and from this, they make payment for corporate and premium taxes, pay their agents for marketing purposes, reward their owners through dividends, spend money for advertising and publicity purposes and frequently indulge in risky investments and often incur losses in the process. Social insurance scheme does not have any of the stated over-head costs except for claim settlement and meeting up operating expenditures. So, if all the stated insurance schemes would have been implemented as state sponsored not-for-profit social insurance scheme, then the amount of extra premiums collected on the process would rest in the trust account instead of being spent on different over-head costs as mentioned above and would

be available for future claim settlement. This would heavily reduce the premium burdens on the policy holders in the periods to come. The policy holders would still get the same amount of coverage in terms of claims, operating expenditures would still be met sustainably from the internal sources (from the premiums) and no subsidy from the government side would have been required.

Here, we argue that the social insurance program can provide more affordable means of risk mitigation than the commercial insurances. If the profit of the insurance company is retained instead of being distributed to the stockholders and if we can escape the agency commission and advertising expenditure by making the subcription to the scheme mandatory and eliminate corporate and premium taxes by incorporating it as a not-for-profit trust fund then a substantial amount of future claims can be settled from the previously earned premiums and accumulated interest there on. Here, we try to quantify the excess premiums paid by the policy holders over the course of time with up to date accrued interest and analyze its trend using the empirical data of 04 (four) OECD countries. The rest of the article is organized as follows. Section: 2 sketches a brief overview of the birth of the commercial and social insurances and how they evolve to their current forms over the course of time. Section: 3 provides the formal definition of social insurance. In section: 4, we describe different cost heads which are exclusively associated with commercial for-profit insurances. Section: 5 discusses several risk factors inherent to the commercial insurance scheme which are not applicable for a government-run not-for-profit social insurance scheme. Section: 6 explains the methodology followed to quantify the overhead costs associated with the commercial insurances. Section: 7 presents the methods used to forecast accumulated profit gathered by different commercial insurance companies in 04 (four) OECD countries. Section: 8 tabulates the forecasting results. Section: 9 analyzes the findings from a country-level perspective. Section: 10 presents the limitations and future scope of the current study and finally, Section: 11 concludes the article.

2 Birth and Evolution of the Commercial and Social Insurance

Concept of insurance as a risk management technique dates back to the early Bronze Age (4th Millennium BC) when the Babylonian traders widely used the so called bottomry contract as a tool to mitigate maritime risk [11]. In bottomry contract, loans were given to the seafaring merchants by taking the ship and the cargo within it as security and loans would only be repaid with handsome interest if the ship

returned after a successful voyage. If instead, the ship capsized into the sea in the middle of a voyage then loans were waived off. The concept survived as only a handful of ships experienced the perils of the sea while the rests were successful in their voyage and paid back the loan with opulent interest. Thus the concept of risk sharing took its first route through human society in a marine pathway and underwent a dramatic set of evolution ever since. Chinese traders of the early to middle Bronze Age (3rd millennium BC) adopted a new approach to risk mitigation and used to redistribute their maritime damages across all participating vessels in order to keep the losses to a reasonable proportion for each sailor in the sea [39]. Similar techniques had been applied by the Babylonians in as early as middle to late Bronze age (2nd millennium BC) and was inscribed along with other 281 laws into the famous Code of Hammurabi by the 6th Babylonian king Hammurabi. The maritime law of general average was invented and practiced by the Rhodians during the Iron Age (1st millennium BC) where all the stakeholders proportionately shared the total maritime losses. Rhodes, being a small, seafaring nation of southern europe, established trading colonies along the costs of Italy, France and Spain. As venturing through the seas became their main course of business they developed the first set of ancient maritime laws of dispute settlement and documented it in Lex Rhodia which is popularly known as the ancestor of all maritime laws [15]. Lex Rhodia, as a set of maritime laws, had been eventually adopted by the Roman empire into its constitution as can be seen from the Digest of Justinian, Book XIV, Title II compiled by the order of Eastern Roman emperor of the 6th century Justinian-I [9].

Meanwhile, the concept of group insurance tended to evolve in the ancient Roman empire when merchants and craftsmen formed associations/guilds of their own for mutual benefits and for the furtherance of their professional interest. Guilds formed in the Roman era eventually fell with the Roman empire [12] and the practice was invigorated again in the medieval Europe. Confraternities of craftsmen including masons, carpenters, carvers were formed in Europe during the middle ages [21] which served the common interest of the craftsmen, gave them substantial bargaining power, protected them from catastrophe and stored wealth in the coffers which acted as a cushion against risk.

However, the first specimen of insurance as a separate contract was drafted in Genoa, Italy on Februray 13, 1343 which marked the break from the ancient practice of *Mutuum Nauticum* or marine loan which was proved to be inadequate to meet the needs of a sedentary merchant during the commercial revolution [27]. The great fire of London in 1666 which destroyed nearly 13,200 houses accelerated the development of modern fire insurance and the first company of its kind to offer fire insurance for the properties came into existence in 1681 under the name 'Insurance Office for

Houses'. The development of modern marine insurance is tied to Edward Lloyd, a Welshman who opened a coffee house in Tower Street, London. Lloyd's coffee house in Tower Street became a vibrant meeting place for sailors, traders and underwriters which, after a successful metamorphosis, turned into Lloyd's of London [31], [26], London's premier insurance and reinsurance market. The first company to offer life insurance was formed in London in 1706 by William Talbot and Sir Thomas Allen [5], [17].

Thus far, insurance companies formed in Europe during the enlightenment era were privately incorporated with no government involvement. However, as the concept of welfare state evolved in Europe during the late nineteenth century, government began to take part in insurance market with a view to ensure economic and social welfare of its citizens. It was the conservative German chancellor, Otto Von Bismarck who took the first attempt to promote healthcare for the underprevileged through Sickness Insurance Law of 1883. The bill was intended to protect the German industrial workers from various health hazards by drawing periodic contribution from both the employers and the employees. The bill was the first one in a row which was followed by Accident Insurance Law of 1884 and Old Age and Disability Insurance Law of 1889. The waves of welfare oriented thinking in Germany crossed national boarder and reached the mind of the British politicians which resulted into passage the The National Insurance Act 1911 in the parliament which provided the British workers and their dependents the first contributory system of insurance against illness and unemployment [19]. Government funded insurance program or the social insurance became a common sight in the healthcare sector of twenteith century Europe and universal health care system has been implemented in many European countries including Sweden (1955)[33], Iceland (1956)[22], Norway (1956)[13], Denmark (1961)[16], Finland (1964)[4] and the list continues to grow. So far, the concept of social insurance has only been heavily used to finance universal health coverage, state-run unemployment and disability insurance programs and various social security schemes and has never been used to provide commercial insurance products like auto insurance, fire, riot and earthquake insurance, property, marine, overseas insurances and things alike. Here, we explore the possibility of social insurance paradigm to deliver commercial insurance products and perform some sort of *what-if* analysis on it.

3 The Social Insurance

Social insurance system is indeed an insurance scheme that is run and administered by the state itself. When a state attempts to protect its citizens from various

economic and social hazards by risk pooling, a social insurance scheme is born. Social insurance scheme is achieved through compulsory contribution from all citizens of a country to a state-administered trust fund which is then used to fund disability and old age benefits, medical care and other social security programs [1]. Dissecting the above definition of social insurance exposes its main characteristics:

- Social insurance is a government sponsored insurance program. Benefits, eligibility and coverage are often defined by statute.
- Unlike commercial insurance, premiums and claims are attributed to a not-for-profit trust fund. Excess premium received during an accounting period will retain with the fund and any shortage of fund will be addressed by the government from the general taxation revenue.
- Subscriptions to the scheme are often mandatory in order to compensate for adverse selection and moral hazards.

Social insurance being a government sponsored not-for-profit insurance scheme slashes some major cost heads associated with conventional commercial insurance including agency commission, advertising expenditure, dividend expense, corporate taxes and so on. Moreover, certain uncertainties like probable winding up and bankruptcies of the commercial insurers are eliminated which add to customer satisfaction and reduction of premium. Reduction in premium is partly due to the fact that uncertainties and probable losses are usually accounted for by building up extra provisions which are sourced from accumulated profits/retained earnings which, in turn, are built up from collecting extra premiums from the policy holders. A brief description of some costs and uncertainties associated with commercial insurance is presented in the next section.

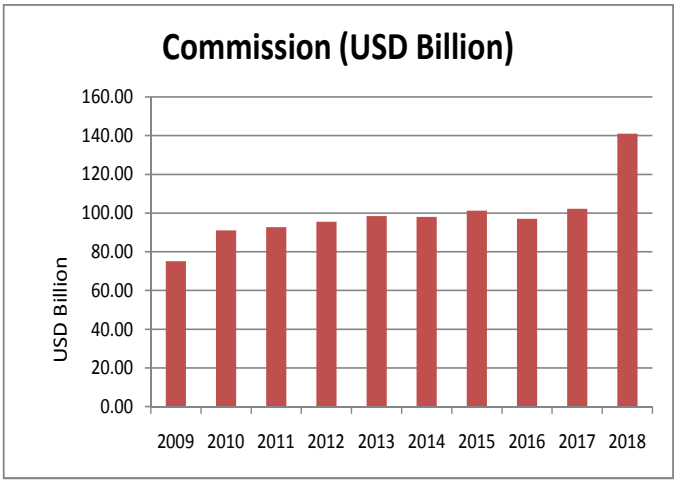
4 Overhead Costs Associated with Commercial For-Profit Insurance Companies

Certain cost heads associated with modern commercial insurances simply do not exist in the realm of social insurances. A yet not comprehensive list of some of these staggering expenditures involved only with the day to day management of a for-profit commercial insurance company is appended below.

- **Agency commission:** Private for-profit insurance companies often recruit licensed agents to sell their products to people. The compensation of the agents depends

upon the companies' commission policy as well as on the number of policies sold by the agents. Higher the number of policies sold by the agents higher will be their compensation. For term life insurance, agents may make up to 40-90% of the first year premium of the policies they sold and 2-5% or less in the subsequent years [24], [37]. According to the data provided by US Bureau of Labor Statistics, the median pay for an agent is $\$50,560$ per year or \$24.33 per hour as on 2018 [38]. Moreover, OECD insurance statistics suggest that total commission expenditure for direct insurance in US alone amounts to nearly \$140.97 billion during 2018 (Commission expenditure for direct life and non-life insurance amount to \$51.21 and \$89.76 billion respectively [29], [30]). An infographic of US commission expenditure for direct insurance during 2008-2018 is presented in Fig: 1. Data presented in Fig: 1 are collected from 'Balance sheet and income series' for direct life and non-life insurance companies in United States from OECD insurance database [29], [30]. These huge expenditures are met up from the premiums collected which eventually results into a higher premium burden on the policy holders.

Figure 1: Commission for direct insurance in US



On the other hand, for social insurance, there is no agency commission as every eligible candidate is mandated by law to participate in the scheme. As agency commissions are simply wiped out social insurances are supposed to entail lower insurance premium as compared to their commercial peers.

- **Advertisement and publicity cost:** Private insurance companies like all other for-profit limited liability companies tend to spend an extensive amount of money on advertising which includes but not limited to print and online platforms advertising,

radio and television broadcasting, email marketing etcetera. According to S&P Global Market Intelligence [34] top 04 (four) US auto insurance underwriters jointly spent $4.01 billion on advertisement during 2017. Not to mention this staggering expenditure is made through the profits of the insurance companies which is mostly accumulated through the collection of premiums. Social insurance happens to avoid such an overwhelming cost as there is no incentive to advertise: Every eligible candidate is mandated to sign up for the scheme by statute.

- **Payment of dividends:** Like all other for-profit companies private insurance companies are collectively owned by their share holders and are liable to their boards of directors for the payment of a handsome amount of dividend on an annual basis. According to the latest data available to date (2020), yearly dividend yields for top 10 (ten) life insurance companies in US range from 14.27% to 4.04% which are well above the risk free rate [8]. Total industry average of life insurance dividend yield is found to be 4.05% which is greater than the weighted average bank deposit rate of the US [8]. As these dividend yields are mainly derived from the receipt of the premium from the policy holders they add substantially to the premium and are supposed to provide an upward thrust on to it. On the other hand, as the social insurance programs are usually sponsored by the government and are usually implemented as not-for-profit trust funds they do not come up with yearly dividend yields for their owners which interprets to a significant reduction in premium.

- **Dividend equalization:** In order to streamline dividend payments through business cycles many for-profit companies often choose to build up dividend equalization accounts which are entirely sourced from the profit during economic booms. Profit stored in the dividend equalization account during economic boom is used to distribute a healthy proportion of dividends to the share holders even during economic downturn when annual profits are relatively scarce. Dividend equalization account thus created will mean nothing to the policy holders who purchase insurance policies and is intended for the benefits of the stock holders of the insurance companies at the expense of the policy holders.

- **Tax payments:** Insurance companies are subject to different kinds of taxes and types and extents of these taxes depend upon the jurisdiction in which they are incorporated and operating. Generally, two broad categories of taxes are imposed on the insurance companies: taxes on premiums and taxes on corporate profit. Taxes on premiums are usually collected on gross premiums received by the insurance companies in an accounting year and in US the tax rates usually vary

across the states. For example, average health insurance tax on premium is found to be 2.25% of the premiums and it ranges from as high as 4.625% in Hawaii to as low as 0.0% in Utah [2]. At the same time like all other for-profit companies the insurance companies are also subject to corporate taxes which are calculated on its total taxable income in one accounting year. In this case effective tax rate can be as high as 30% for the health insurance companies incorporated and operating in US [2]. In addition to the above two types of taxes, insurance companies are also supposed to pay retaliatory taxes which are intended to equalize assessed taxes on foreign and domestic insurers operating in a particular state in US. On the other hand, surpluses of the social insurance scheme like the surpluses of all other not-for-profit organizations as well as the premiums they collect are tax-exempt.

- **Non-Retention of Profit:** In the previous sections we have discussed different cost heads associated with the commercial for-profit insurance companies including agency commission, dividend expenditure, dividend equalization, advertising and publicity expenditure and tax expenditure whereas social insurances being not-for-profit government regulated schemes are carefully shielded away from all such costs. Moreover, any earning that are retained with the commercial insurance companies after meeting up all the costs only adds to the capital base of the companies which eventually enhances the shareholders' equity with no perceived impact with the premiums imposed upon the policy holders. In other words excess premiums collected in an accounting year by the commercial for-profit insurance companies will be of no use towards the determination of the premiums in the upcoming years. On the other hand in social insurance all incomes and expenditures are usually reflected to the balance of a trust fund [1] and any excess in this account is available for future claim settlement and meeting up upcoming operating expenditures which supposedly reduces the premium burdens on the policy holders in the periods to come.

5 Risk Factors Associated with the For-Profit Commercial Insurances

As the commercial insurance companies are usually privately incorporated for-profit companies they are subject to several profit maximizing ill-practices and volatilities. The following paragraphs are intended to name a few of such uncertainties inherent to commercial insurances.

- **Bankruptcy after making risky investments:** Insurance companies often indulge into risky businesses with a view to make an exorbitant profit. While the profits from these risky ventures (if any) are distributed amongst the share holders as dividends the losses arising from these are usually born to the policy holders through enhanced premiums. In some cases, the losses arising from these risky investments are so magnanimous as to lead the insurance company itself to the brink of bankruptcy. The near failure of American International Group (AIG) back in 2008 which was then a leading multinational finance and insurance company with over $1.0 trillion in assets is a classic example of the indulgence of insurance companies with risky assets. It is estimated that during 2008 financial crisis, AIG lost nearly $99.3 billion which was then rescued by Federal Reserve Board, the Federal Reserve Bank of New York and the US Treasury and the rescue package amounted to nearly $182.3 billion [25]. It is said that AIG invested heavily in mortgage backed securities resulting to a loss of $21 billion. Another $28.6 billion losses stemmed from the credit default swap that had been written down by AIG [25]. In the absence of $182.3 billion rescue package AIG would be forced to file bankruptcy which would create uncertainties for its policy holders. Near failure of AIG is not the only time in history when an insurance company attempts to file a bankruptcy after losing its fortune in risky ventures. In fact, it is very prevalent and the bankruptcy of Executive Life Insurance Company after investing heavily in junk bonds is another notable example in this regard. During the junk bond market turmoil of 1989-1990 the company attempted to write down nearly $515 million of its junk bond portfolio which exacerbated its eventual failure, cut public confidence and brought about regulatory intervention [7]. On the other hand, social insurance being sponsored by the government itself and run on sovereign guarantee is quite immune from the possible bankruptcies as it does not usually involve itself in the risky game of profit making through unsafe and highly volatile investments.

- **Vulnerability to negative publicity:** Private insurance companies are very much vulnerable to adverse publicities both in online and print media. Sometimes the intensity of negative publicity may be so acute as to contribute heavily to the ultimate winding up of an insurance company. One classic example when bad investments coupled with negative publicity added to the eventual collapse of a life insurance company is the case of Executive Life Insurance Company which was a main subsidiary of First Executive Corporation back in 1990s. In January 1990 amidst the junk bond market turmoil, First Executive Corporation (FEC) attempted to write down some $515 million of its junk bond exposures

which resulted into an immediate rating downgrade and regulatory restrictions on FEC. Critical media coverage of FEC writing down its junk bond investments and the subsequent regulatory measures hastened FEC to the liquidation of some additional $4.0 billion assets in junk bond market (the point when the junk bond market reached its bottom) and this collapse was partly due to the adverse publicities faced by FEC [7]. Although, competitors of FEC in the life insurance market faced even worse downturn as their real estate portfolio underwent a 36.6%-41.6% decline as compared to the junk bond market decline of only 9.2%. While the competitors survived, FEC collapsed mainly due to adverse publicity campaign which discriminatively targeted FEC [7]. On the other hand, as the social insurances are not profit oriented, do not invest in risky securities and are usually backed by government guarantee they are actually immune from these negative propagandas and to date no such incidence in the social insurance arena is recorded.

- **Window dressing and payments of inflated tax on profit:** Window dressing is an umbrella term and generally encompasses a diverse set of accounting tactics generally practiced by many for-profit organizations which is intended to make its annual financial statements look promising to its investors as well as creditors. With a view to creating a positive impression amongst its stakeholders many for-profit companies often show an artificially inflated profit in its financials. On the way, it eventually compels itself to pay higher corporate taxes on the profit it never realizes in true sense with the sole benefit of showing a better financial health than actual. There are a plenty of techniques of window dressing. To name a few, a company may choose to capitalize its current expenditures to enhance its apparent profitability in the eyes of potential investors. If the expenses would be accurately booked into the account then the company's profitability would have been quite low and in fact that would be the true profit of the company. As the company's profit is subject to corporate taxes at a very high rate, in doing so, the company chooses to be taxed on the profit it never earns. This acts as a vicious cycle which reduces the profitability of the company in the subsequent periods which lures the company to window dress even more in near future. In fact, this has been one of causes of the bankruptcy of WorldCom back in 2002 which was then the world's largest bankruptcy filing in history [3]. It is said that the WorldCom's problem was partly due to the fact that it heavily capitalized its current expenditure only to show an artificially high profit in its financials i.e., profits were overstated by $3.8 billion [3]. Like all other for-profit companies the whole bunch of window dressing techniques are there in the disposal of the privately held insurance companies which

may be enticed to adopt any of these fraudulent techniques hampering the greater interest of the company and policy holders in the long run. Although scams in the level of WorldCom are yet to be identified in the insurance sector, financially distressed insurance companies are found to be more prone to window dressing than their solvent counter parties during 1970s [32]. Specifically, when the insurance regulators opt to use financial ratios as benchmarks for overall financial health of the insurance sector they need to be aware of possible window dressing and should update their models every now and then [32]. In more recent times numerous other studies have reported the problem of probable window dressing by the insurance companies and have suggested regular update of regulatory framework to tackle down the issue (See for example, Chen and Wong (2004) [6], Sikes et al (2014) [35] among others). On the contrary, social insurance being a government sponsored program does not happen to have a profit-craving management and board which may choose to hamper the greater interest of the company itself as well as the policy holders by hiding its true financial picture.

6 Quantifying the Overhead Cost Associated with Commercial Insurance

In the previous sections we have discussed different cost heads that are exclusively related to commercial insurance and are not found in the realm of social insurance. For example, the commercial insurances are supposed to pay agency commissions to their agents, distribute a handsome proportion of their annual earning as dividends to their owners, invest extensively for promotional purposes and so on. However, all such costs are absent in social insurance as it is often implemented by the government and the subscriptions to the scheme are made compulsory by legislation and is usually incorporated as a trust fund with no intention of making and/or distributing profit out of it. Only two types of costs are associated with the social insurance: First is the settlement of claims put forward by the policy holders and the second is the day to day operating expenses which includes payments of salaries of the employees, rent and utility payments and things like these. In social insurance anything that remains with the insurance companies after the payment of claims and operating expenditure is retained in a trust fund which is used for future claim settlement and meeting up upcoming operating expenditures. However, in commercial insurances the retained earnings are either distributed upright amongst the stakeholders according to their proportion of share holdings or are kept for future use by the insurance company itself. In the later case it eventually adds to the capital base of the insurance

company. In either case it is of no use to the policy holders who have actually paid for this. Thus the commercial profit-oriented private/public insurance companies behave more like a system without any memory: Policy holders do need to forget about any extra premium they have paid in the previous periods and to pay the premium in full during present period. Here, we argue that if the insurance scheme is implemented as a not-for-profit trust fund (social insurance) instead of a for-profit limited liability company (commercial insurance) then it will effectively and less expensively hedge against unforeseen losses. If the profit of the insurance company is retained instead of being distributed to the stockholders and invested in safe securities like the government bonds then a fraction of all upcoming claims can be addressed from the interest income of the accumulated profit which results into a lesser amount of premiums for the policy holders to pay in future. In other way the policy holders get to enjoy anything they have paid in excess as premiums with interest thereon in the upcoming periods which lessens their burden of premiums.

To quantify the extent of extra premiums associated with the commercial insurances we collect country-level time series data of premium collection, claim settlement and operating expenditure of all commercial life and non-life insurance companies working inside a particular country from OECD insurance database [28]. OECD insurance database is the single most comprehensive insurance database to date that facilitates country level insurance data from 2008 to 2018. We also collect time series data of interest rate of government securities from IMF database [20]. We then subtract the amount of claim payment and operating expenditures incurred during a particular period from the premiums collected during the period. Anything in excess of claim settlement and operating expenditures is the sheer profit of the insurances companies which is then invested in the government securities at the existing rate. Profits and interest there to are accumulated over the years and are reinvested in the government bonds. Starting from 2008 we calculate the consolidated amount of country-wise profits gathered by different commercial insurance companies up to year 2018. To be precise we calculate the following quantities at country level:

$$AP_i = \sum_{j=2008}^{2018} (P_{ij} - C_{ij} - OE_{ij}) \times (1 + d_{ij})$$

where AP_i is the accumulated profit of all the insurance companies working inside country i, P_{ij}, C_{ij} and OE_{ij} represent the combined sum of premium collected, claim settled and operating expenditure incurred during year j by all the insurance companies in country i. d_{ij} represents interest rate on government securities in

country i during year j. A sneak peek of what is going on here is depicted in Fig: 2 and 3.

Figure 2: Country-level Data of Accumulated Profit (AP) of All Commercial Insurance Companies for USA

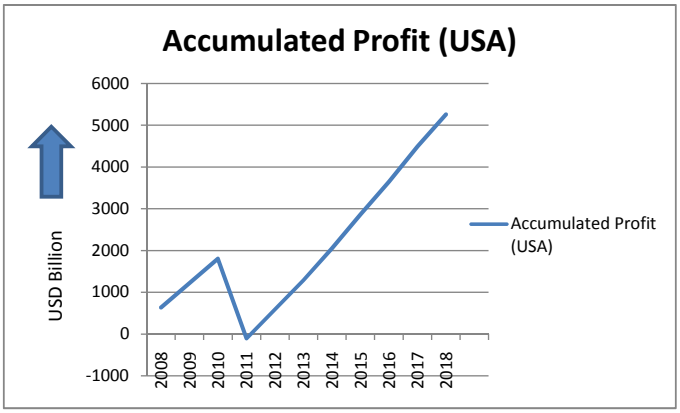


Figure 3: Country-level Data of Accumulated Profit (AP) of All Commercial Insurance Companies for Different OECD Countries

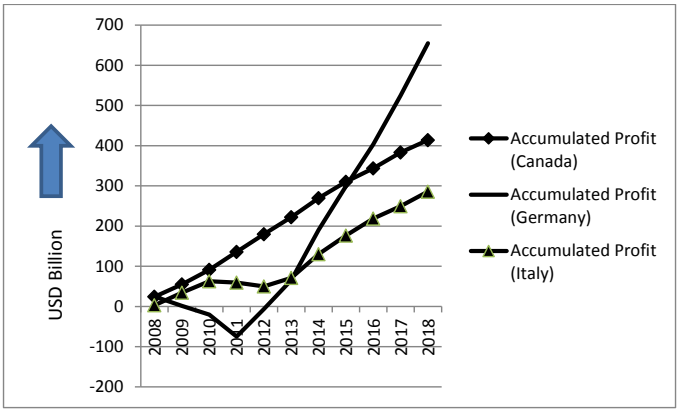


Fig: 2 shows the aggregate amount of excess premiums with up to date interest thereon received by all the US insurance companies during 2008-2018. It has been observed from Fig: 2 that the value of AP is positive throughout the sampling interval except for 2011 when it becomes negative for a short while. The negative value of AP in 2011 stems from the fact that during this period US insurance companies settled down a surprisingly high volume of claims with a consolidated value of \$3.70 trillion whereas the premium collection and operating expenditures totaled to \$2.15

and \$0.31 trillion respectively. The situation changes abruptly after 2011 and the AP becomes positive from the next period reaching a staggering sum of \$5.26 trillion in 2018.

Fig: 3 presents the value of accumulated profit (AP) for 03 (three) other OECD countries including Canada, Germany and Italy. From Fig: 3 it is evident that the Canadian insurance companies during 2008-2018 have successfully raised sufficient amount of premiums to cover up both their periodic claim settlement and operating expenditures. Thus the accumulated profit (AP) profit is found to be positive throughout ultimately reaching \$414.07 billion in 2018.

For German data AP has been found negative during 2010, 2011 and 2012. During 2010 and 2011 German commercial insurance companies raised \$241.05 and $\$255,71$ billion of premiums whereas the claim settlement and operating expenditure involved amounted to \$262.24 and \$308.66 billion respectively. As the premiums earned are not sufficient to cover up entire claim settlement and operating expenditures of the respective year AP becomes negative for 2010 and 2011. However, premium collection exceeds claim settlement and operating expenditures during 2012 and the negative value of AP is partially compensated. Nonetheless AP remains negative in 2012 and after that it becomes positive and eventually rises steadily up to \$654.89 billion during 2018.

It can be seen from Fig: 3 that Italian insurance companies are also successful in raising enough premiums to meet up operating expenditures and annual claim settlement resulting into consistent positive values of AP with upward trend. During 2018 the value of AP for Italian commercial insurance companies reaches nearly \$285.93 billion starting from 2008.

So from the above discussion it has been observed that over the years the commercial insurance companies in all the 04 (four) jurisdictions have raised substantial amounts of premiums which are more than sufficient to cover up total operating expenditures and claim settlement in the respective periods. The total amount of premiums collected after being offset by the operating expense and claim settlement are assumed to be invested in government securities which are widely regarded as the safest kind of investments and are backed by the sovereign guarantee. Cumulative sum of excess premiums thus collected till 2018 with opportunity cost there to have been found to be \$5.26 trillion, \$414.07 billion, \$654.89 billion and \$285.93 billion for USA, Canada, Germany and Italy. If the insurance schemes in these regions were implemented as a not-for-profit trust fund instead of a conventional commercial profit-based schemes then it would have resulted into \$5.26 trillion, \$414.07 billion, \$654.89 billion and \$285.93 billion savings for policy holders in USA, Canada, Germany and Italy.

7 Forecasting Methodology

In the previous section we have seen that the accumulated profits (AP) gathered by different commercial insurance companies during 2008-2018 amount to $5.26 trillion for USA, $414.07 billion for Canada, $654.89 billion for Germany and $285.93 billion for Italy. In all cases profits show distinctively upward trends. In this section we will analyze the trends of these accumulated profits over the upcoming years using ARIMA-GARCH framework. A brief description of the ARIMA-GARCH framework used for forecasting is given below.

The first step of our analysis is to select a suitable ARIMA representation of the time series to be forecasted in order to model the conditional mean of the AP. In ARIMA framework we are meant to deal with stationary time series only. So, to begin our analysis we perform an appropriate number of differencing on our AP time series to induce stationarity on it. The next step is to identify a suitable ARMA model with autoregressive and moving average terms by analyzing the Autocorrelation Function (ACF) and Partial Autocorrelation Function (PACF).

To do so we plot the ACF and PACF of the appropriately differenced AP series and examine the patterns. If both the plots of ACF and PACF show exponential decay then the underlying series is supposed to contain both autoregressive and moving average terms. On the other hand if only the ACF plot shows exponential decay whereas the PACF plot shows significant spikes at the first lags which disappear quite abruptly then the data are said to be generated from a purely autoregressive process. However, if the PACF plot shows exponential decay and ACF plot shows significant spikes during the first few lags then the process is assumed to be a moving average one. Once we are done with the nature of the process we take appropriate autoregressive and/or moving average terms and estimate the model using ordinary least squares. After the model is estimated we plot the correlogram of the residuals and note down the lag numbers that still contain substantial information. The model estimated in the first step is then modified to include additional autoregressive and moving average terms. The process continues until and unless no substantial information content is left in the residuals of the estimated model as can be seen from the correlogram plot of the residuals. However, in doing so we always strive to find a rather parsimonious model to fit our data instead of an over-parameterized one. The over-parameterized model may seem to perform well on the training data set. Nonotheless it is supposed to suffer heavily when it is used to forecast beyond the training range. To select an appropriate model in this gradual step-by-step procedure we use Akaike Information Criteria (AIC) to compare amongst the probable models. Model that minimizes the AIC will be preferred.

Once the model has been selected we estimate it using standard OLS and note down the t-Statistics and p-values corresponding to different autoregressive and moving average terms. A specific autoregressive/moving average term is said to be significant if its p-value is less than 5%. We also note down SIGMASQ which represents the volatility of the estimated model. When weighting one model against the other we prefer the one with the lower volatility (SIGMASQ).

In the next step we check for serial correlation and heteroscedasticity in the residuals of the estimated models. To do so we check the value of the Durbin-Watson Statistic of the estimated model. If the Durbin-Watson Statistic is close to 2 then the model is assumed to be free from the problem of serial correlation. On the other hand to check for heteroscedasticity in the residuals we perform ARCH-LM test. The null hypothesis of the ARCH-LM test is that the residuals are homoscedastic. If the null hypothesis cannot be rejected @5% level then we know that our estimated ARIMA model does not suffers from the problem of heteroscedasticity which is a desirable trait. In the absence of heteroscedasticity we forecast the series using our estimated model up until 2025.

On the other hand if the null hypothesis of the ARCH-LM test can be rejected @5% level then it implies our estimated ARIMA model suffers from heteroscedasticity. To overcome this problem we estimate an ARIMA-GARCH model instead of a purely ARIMA model. ARIMA-GARCH model comes up with two different linear equations: The first one is an ARMA representation of the appropriately differnced series intended to capture the conditional mean of the seris while the second equation is intended to capture the conditional variance.

Once the appropriate ARIMA-GARCH model has been estimated it is then used to forecast the time series into the future.

8 Forecasting Results

Details of the ARIMA representation selected for modeling US data are presented in Table: 1. From Table: 1 we see that the model contains 02 (two) autoregressive terms AR(1), AR(2) and 01 (one) moving average term MA(4). It is also noted that the US data are differenced 02 (two) times before being fed into the model. Model estimation section of Table: 1 presents the estimated coefficients along with the standard errors, t-Statistics and the corresponding p-values. It is evident that all the p-values corresponding to AR(1), AR(2), MA(4) and SIGMASQ are significant @5% level. We then use the estimated model to produce the forecasted values of AP for US data up until 2025 and the forecasted results are presented in Fig: 4. From Fig: 4 it is evident that the AP continues to show an upward trend reaching $16.70

Table 1: ARIMA Model Used For Forecasting Accumulated Profit for Commercial For-Profit US Insurance Companies

Model Specification:

Country	Time Range	Differencing	AR terms	MA terms
USA	2008M01-2018M01	2	AR(1), AR(2)	MA(4)

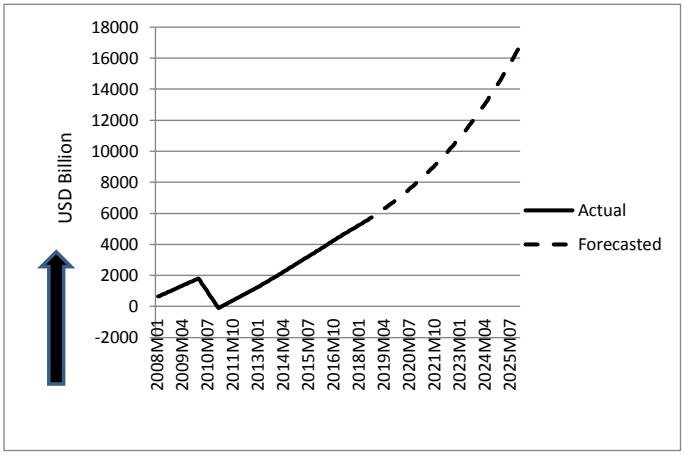
Model Estimation:

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AR(1)	-9.56E-01	2.33E-02	-40.9519	0
AR(2)	-0.496954	0.054822	-9.064918	0
MA(4)	0.161493	0.06687	2.415037	0.0173
SIGMASQ	2.257607	0.081629	27.65685	0

Model Performance:

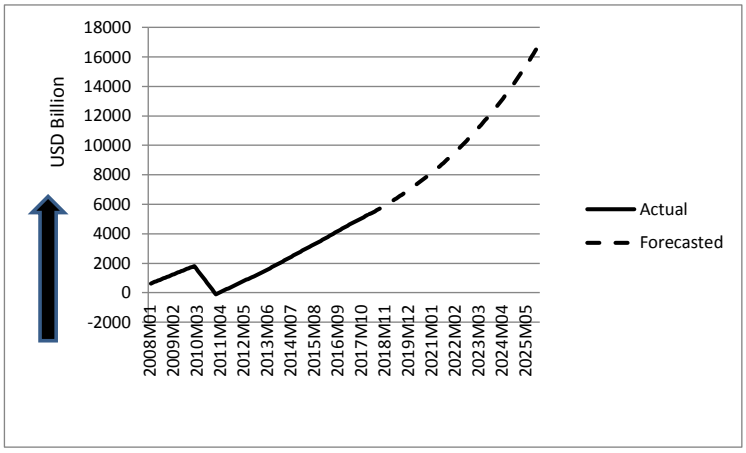
R-Squared	0.547755
Adj. R-Squared	0.535957
Durbin-Watson Statistic	2.253981
Remark	No Serial Correlation
Obs. R squared (ARCH test)	44.20702
p-value	0
Remark (@5%)	Presence of ARCH Effect

Figure 4: Actual and ARIMA Forecasted Accumulated Profit (AP) for Commercial For-Profit US Insurance Companies



trillion in 2025. It implies that the extra premiums born to the insurance policy holders in US during 2008-2025 along with the opportunity cost there on amount to $16.70 trillion. If the insurance scheme was operated using a social principle instead of a for-profit commercial one then the policy holders would have saved around $16.70 trillion during 2008-2025. Moreover, from the model performance section we can see that the R-Squared and Adjusted R-Squared values of the fitted model are 0.55 and 0.54 respectively which represent a good fit. Durbin-Watson Statistic of the model is found to be nearly 2.25. As the DW Statistic is close to 2.00 we can conclude that the model does not suffer much from the problem of serial correlation in its residuals which is a desirable trait. We also check for the presence of heteroscedasticity in the residuals of the estimated model using ARCH-LM test. Obs. R-Squared for the ARCH test is found to be 44.21 with p-value of 0.0 which results into the rejection of the null hypothesis @5% level. Rejection of null hypothesis for the ARCH-LM test indicates the presence of strong heteroscedasticity in the residuals of the estimated model. Presence of heteroscedasticity in the residuals implies that our fitted ARIMA model may not be appropriate for producing the forecasts. Rather an appropriately fitted ARIMA-GARCH model would better serve the purpose.

Figure 5: Actual and ARIMA-GARCH Forecasted Accumulated Profit (AP) for Commercial For-Profit US Insurance Companies



Specification, estimation and performance of the estimated ARIMA-GARCH model are presented in Table: 2. The estimated model retains the previous version's ARMA structure by including terms like AR(1), AR(2) and MA(4). Like the previous ARIMA mdoel the coefficients of AR(1), AR(2) and MA(4) are found to be significant @5% level. From the variance equation we can see that the coefficient of the squared lagged residual is also significant @5% level which speaks for the validity of the

Table 2: ARIMA-GARCH Model Used For Forecasting Accumulated Profit for Commercial For-Profit US Insurance Companies

Model Specification:				
Country	**Time Range**	**Differencing**	**AR terms**	**MA terms**
USA	2008M01-2018M01	2	AR(1), AR(2)	MA(4)
Model Estimation:				
Variable	**Coefficient**	**Std. Error**	**z-Statistic**	**Prob.**
AR(1)	-1.357639	6.62E-01	-2.051524	0.0402
AR(2)	-0.357641	1.74E-01	-2.051601	0.0402
MA(4)	0.016176	4.03E-03	4.015446	0.0001
Variance Equation:				
Variable	**Coefficient**	**Std. Error**	**z-Statistic**	**Prob.**
C	1.51E-04	5.08E-06	29.67852	0
RESID(-1)^2	3.62807	1.061045	3.419337	0.0006
Model Performance:				
R-Squared				0.291933
Adj. R-Squared				0.279725
Durbin-Watson Statistic				2.103593
Remark				No Serial Correlation
Obs. R squared for ARCH test				0.008869
p-value				0.925
Remark (@5%)				No ARCH effect

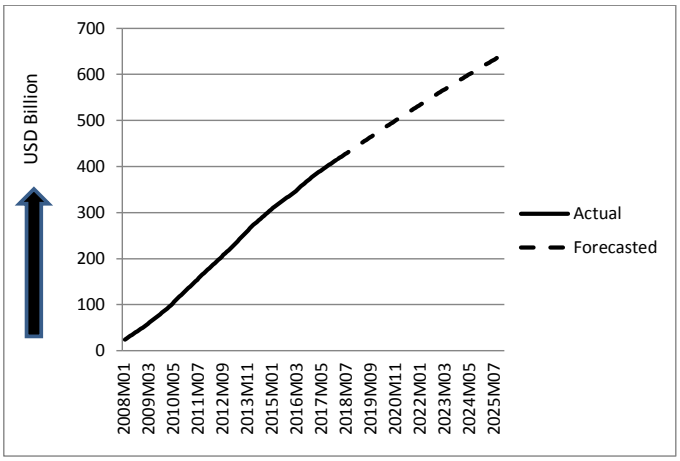
estimated ARIMA-GARCH model. We then use the model to forecast AP for US data till 2025 and the forecasted results are presented in Fig: 5. From Fig: 5 we see that AP will reach approximately \$16.82 trillion during 2025 which is very close to previous ARIMA forecast (previous result was \$16.70 trillion). Moreover, from Fig: 4 and 5 we see that the shapes for both ARIMA and ARIMA-GARCH forecast are quite similar and almost equal in values. However, the ARIMA-GARCH model entails relatively smaller R-Squared and Adjusted R-Squared values (0.29 and 0.28 respectively). Instead of the fact that the R-Squared and Adjusted R-Squared values are lower than that of ARIMA model, the estimated ARIMA-GARCH model is free from serial correlation and heteroscedasticity as evident from the model performance section of Table: 2.

In the next step we will analyze the trend of accumulated profit (AP) for Canadian data. Our fitted ARIMA model for forecasting Canadian AP comprises 01 (one) autoregressive term (AR(1)) and 01 (one) moving average term (MA(1)) and we take

Table 3: ARIMA Model Used For Forecasting Accumulated Profit for Commercial For-Profit Canadian Insurance Companies

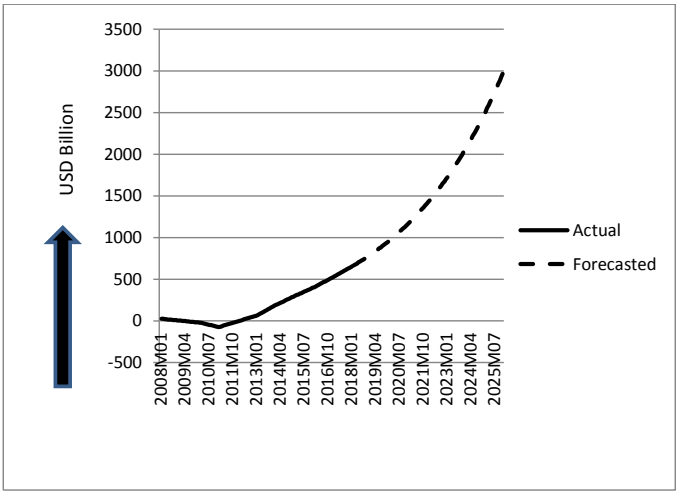
Model Specification:				
Country	**Time Range**	**Differencing**	**AR terms**	**MA terms**
Canada	2008M01-2018M01	2	AR(1)	MA(1)
Model Estimation:				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
AR(1)	0.99227	0.003902	254.2854	0
MA(1)	-0.609817	0.03876	-15.73322	0
SIGMASQ	1.66E-06	6.79E-08	24.42149	0
Model Performance:				
R-Squared				0.490082
Adj. R-Squared				0.48129
Durbin-Watson Statistic				2.085224
Remark				No Serial Correlation
Obs. R squared for ARCH test				1.918524
p-value				0.166
Remark (@5%)				No ARCH effect

Figure 6: Actual and ARIMA Forecasted Accumulated Profit (AP) for Commercial For-Profit Canadian Insurance Companies



second difference of AP before fitting it into ARIMA framework. The coefficients of the estimated model with the t-Statistics and corresponding p-values are presented in Table: 3. From Table: 3 we can see that both AR(1), MA(1) along with the SIGMASQ are very significant. We use this model to forecast AP for Canadian data up to 2025 and the forecasting results are presented in Fig: 6. From 6 we can see that AP continues to show an upward trend although its growth rate is a bit dampened over the course. However, it reaches \$643.78 billion during 2025 which implies policy holders of commercial insurances in Canada pay around \$643.78 billion in excess premiums during the period 2008-2025 as compared to social insurance. Thus \$643.78 billion could have been saved by the insurance policy holders if the scheme was implemented using the principles of social insurances. Moreover, R-Squared and Adjusted R-Squared of the model are found to be 0.49 and 0.48 respectively which represent a reasonably good fit. Durbin-Watson Statistic of the fitted model is found to be 2.08 which is very close to 2.00. This implies the model is free from serial correlation. Last but not the least the Obs. R-Squared of the ARCH-LM test is 0.166 or 16.60%. So, the null hypothesis cannot be rejected @5% level which means the residuals are homoscedastic and our fitted ARIMA model is appropriate for forecasting.

Figure 7: Actual and ARIMA Forecasted Accumulated Profit (AP) for Commercial For-Profit German Insurance Companies



Next we will see how the accumulated profit (AP) for German insurance companies evolves over time. Our ARIMA framework for modeling conditional mean of AP for German data comprises AR(1), AR(2) and MA(4) terms. The estimated model

Table 4: ARIMA Model Used For Forecasting Accumulated Profit for Commercial For-Profit German Insurance Companies

Model Specification:				
Country	**Time Range**	**Differencing**	**AR terms**	**MA terms**
Germany	2008M01-2018M01	2	AR(1), AR(2)	MA(4)
Model Estimation:				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
AR(1)	-0.939801	0.026118	-35.98291	0
AR(2)	-0.485115	0.06651	-7.293895	0
MA(4)	0.149691	0.071431	2.095595	0.0383
SIGMASQ	1.531928	0.059928	25.56271	0
Model Performance:				
R-Squared				0.536582
Adj. R-Squared				0.524493
Durbin-Watson Statistic				2.248542
Remark				No Serial Correlation
Obs. R squared for ARCH test				39.53258
p-value				0
Remark (@5%)				Presence of ARCH Effect

with coefficient t-Statistics and p-values are presented in Table: 4. From Table: 4 it is evident that AR(1), AR(2), MA(4) and SIGMASQ are significant @5% level. This implies each of the variables in our fitted parsimonious model exerts significant influence on the dependent variable. Moreover, R-Squared and Adjusted R-Squared values of the model are found to be 0.54 and 0.52 respectively which represent a good fit. The model is somewhat free from serial correlation as can be seen from the value of Durbin-Watson Statistic in Table: 4. However, it suffers from heteroscedasticity as evident from the results of ARCH-LM test. Although the model is faulty a little bit due to the presence of uncaptured heteroscedasticity in the residuals we use it for forecasting AP and compare the forecasted results to that of ARIMA-GARCH model. The forecasted results are presented in Fig: 7. Fig: 7 reveals that up to 2025 AP for German data reaches nearly $2.98 trillion. The staggering sum of $2.98 trillion could have been saved by the policy holders if they chose to pursue a social insurance scheme instead of a commercial for-profit one.

Estimation results of ARIMA-GARCH model to forecast AP for German data are presented in Table: 5. From Table: 5 it is evident that AR(1), AR(2) and MA(4)

Table 5: ARIMA-GARCH Model Used For Forecasting Accumulated Profit for Commercial For-Profit German Insurance Companies

Model Specification:				
Country	**Time Range**	**Differencing**	**AR terms**	**MA terms**
Germany	2008M01-2018M01	2	AR(1), AR(2)	MA(4)
Model Estimation:				
Variable	**Coefficient**	**Std. Error**	**z-Statistic**	**Prob.**
AR(1)	-0.594289	3.51E-02	-16.90876	0
AR(2)	-0.276176	1.34E-02	-20.67768	0
MA(4)	0.025253	1.04E-02	2.43715	0.0148
Variance Equation:				
Variable	**Coefficient**	**Std. Error**	**z-Statistic**	**Prob.**
C	8.28E-08	2.26E-07	0.365566	0.7147
RESID(-1)^2	14.27835	0.821815	17.37417	0
Model Performance:				
R-Squared				0.462645
Adj. R-Squared				0.45338
Durbin-Watson Statistic				2.828434
Remark				Serrial Correlation Exists
Obs. R squared for ARCH test				0.044879
p-value				0.8322
Remark (@5%)				No ARCH effect

are significant @5% level. Moreover, from the variance equation we can see that the coefficient of the squared (lagged) residuals is also significant @5% level which demonstrates heteroscedasticity being nicely handled by the model. Although the fitted ARIMA-GARCH model is free from residual heteroscedasticity (see the results of ARCH-LM test presented in Table: 5) it suffers a little bit from serial correlation problem (see the value of DW Statistic presented in Table: 5). We then use the estimated model to forecast the behavior of AP till 2025 and the forecasted results are presented in Fig: 8. From Fig: 8 we can see that the AP reaches nearly \$2.99 trillion during 2025 which is very close to the ARIMA forecasted value (\$2.98 trillion). So the forecasting results imply that German insurance policy holders will pay nearly \$3.00 trillion in excess premiums owing to their purchase of commercial insurances which would have been saved if it were possible to purchase a social alternative.

Finally we will forecast accumulated profit (AP) for Italian data. Our parsimonious ARIMA framework to model conditional mean of AP consists of only one autoregressive term namely $AR(1)$. To induce stationarity in the data the AP series is differenced

Figure 8: Actual and ARIMA-GARCH Forecasted Accumulated Profit (AP) for Commercial For-Profit German Insurance Companies

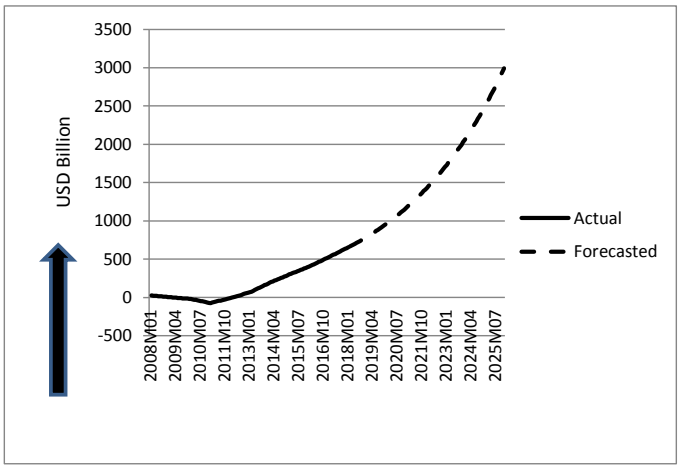
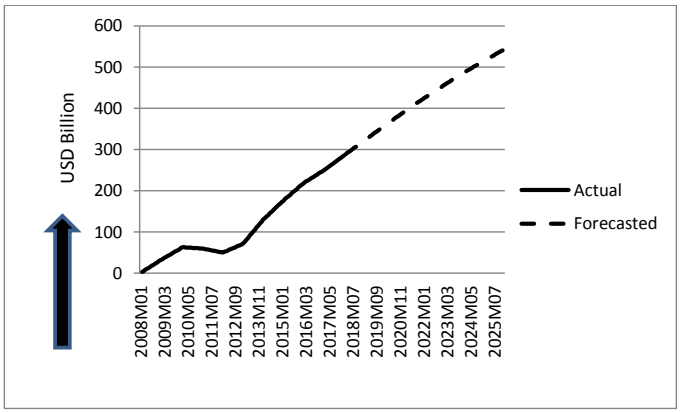


Table 6: ARIMA Model Used For Forecasting Accumulated Profit for Commercial For-Profit Italian Insurance Companies

Model Specification:				
Country	**Time Range**	**Differencing**	**AR terms**	**MA terms**
Italy	2008M01-2018M01	2	AR(1)	-
Model Estimation:				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
AR(1)	0.988426	0.006057	163.2008	0
SIGMASQ	0.0003	1.10E-05	27.30812	0
Model Performance:				
R-Squared				0.565959
Adj. R-Squared				0.56225
Durbin-Watson Statistic				2.189133
Remark				No Serial Correlation
Obs. R squared for ARCH test				4.106784
p-value				0.0427
Remark (@5%)				Presence of ARCH Effect

02 (two) times before being fed into the model. Coefficient of $AR(1)$ along with the SIGMASQ are very significant as can be seen from their p-values as shown in Table:

Figure 9: Actual and ARIMA Forecasted Accumulated Profit (AP) for Commercial For-Profit Italian Insurance Companies



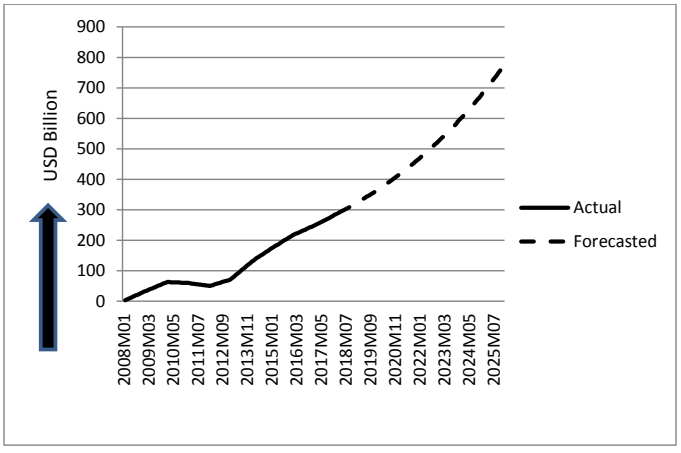
6. R-Squared and Adj. R-Squared values of the model are found to be 0.57 and 0.56 which are decent and demonstrate that our chosen ARIMA model fits the data well. The value of Durbin-Watson Statistic for the estimated model is found to be 2.19 which is very close to 2.00. DW Statistic symbolizes the absence of serial correlations amongst the residuals of the estimated model which validates the model. However, the model suffers from the problem of heteroscedastic residuals as can be seen from the results of the ARCH-LM test. As the residuals are found to be heteroscedastic we also build an appropriate ARIMA-GARCH model and compare its performance to that of the ARIMA model used in the first place. ARIMA forecasting reveals that the value of AP for Italian data will reach approximately \$542.55 billion during 2025 while still sharply pointing upward.

On the other hand the ARIMA-GARCH model predicts that the value of AP will reach nearly \$772.84 billion during 2025. The forecasted values produced by the ARIMA-GARCH model are graphically presented in Fig: 10. The details of the estimated ARIMA-GARCH model are documented in Table: 7. From Table: 7 we can see that the coefficient of the $AR(1)$ in the equation of the conditional mean is highly significant with p-value of zero. Meanwhile, the conditional variance equation reveals that the coefficient of the squared residual is also very significant as evident from the z-Statistic and corresponding p-value. Moreover, the R-Squared and the Adj. R-Squared are found to be 0.39 which denote a reasonably good fit. However, the residuals of the model suffer from serial correlation to some extent as evident from the value of Durbin-Watson Statistic. But, the ARCH components have been nicely captured by the selected variance equation and no remnant of heteroscedasticity is observed in the estimated residuals.

Table 7: ARIMA-GARCH Model Used For Forecasting Accumulated Profit for Commercial For-Profit Italian Insurance Companies

Model Specification:				
Country	Time Range	Differencing	AR terms	MA terms
Italy	2008M01-2018M01	2	AR(1)	-
Model Estimation:				
Variable	**Coefficient**	**Std. Error**	**z-Statistic**	**Prob.**
AR(1)	0.588995	0.119069	4.946657	0
Variance Equation:				
Variable	**Coefficient**	**Std. Error**	**z-Statistic**	**Prob.**
C	5.95E-05	2.00E-06	29.79371	0
RESID(-1)^2	0.424554	0.134626	3.153586	0.0016
Model Performance:				
R-Squared				0.392576
Adj. R-Squared				0.392576
Durbin-Watson Statistic				1.65934
Remark				Serial Correlation Exists
Obs. R squared for ARCH test				0.004033
p-value				0.9494
Remark (@5%)				No ARCH Effect

Figure 10: Actual and ARIMA-GARCH Forecasted Accumulated Profit (AP) for Commercial For-Profit Italian Insurance Companies



9 Discussion

From Fig: 2 and Fig: 3, we can see that the accumulated profits of the commercial insurance companies have undergone a V-shaped recovery in and around 2011. To us, the downturn from 2008 to 2011 in the accumulated profits is partly due to the global financial crisis of the 2008 which initially started with the burst of the US housing bubble, eventually devastated the global financial landscape and led to a cross-border banking crisis [36]. As the insurance companies are also financial institutions to some extent and banks are their major customers, they are also affected by the crisis that was initially centered in the USA but gradually spread across the world like a bush fire. It is evident from Fig: 2 and 3 that the sharp decline of profits of the insurance companies starting around 2008-2009 and the eventual recovery from 2011 and onward are quite evident for US, German and Italian data. However, it can be seen from Fig: 3, that the Canadian insurance companies didn't face the economic bust at its worst. But, however, being a part of the global financial ecosystem, they are also not completely immune from the crisis. As can be seen from Fig: 3, their profits moderately slowed down during 2008-2010 and then started to get its normal pace from 2011 onwards.

Moreover, from Fig: 2 and Fig: 3, we can see that the slopes of the accumulated profit curves are steeper for US and German data than that of the Canadian and Italian ones. This implies that the profits of the commercial insurance companies are increasing more rapidly in USA and Germany as compared to Canada and Italy. Apart from the actual observations demonstrated in Fig: 2 and Fig: 3, these trends are also clearly visible in the forecasted series. Fig: 4 and Fig: 5 represent the ARIMA and ARIMA-GARCH forecasted accumulated profit (as well as the actual profit) for US data over the period 2008-2025. Both the figures show exponential growth of accumulated profit of US commercial insurance companies starting from 2011. The same holds true for German data as well. Fig: 7 and Fig: 8 depict the actual and forecasted values of accumulated profit for German for-profit insurance companies. Both the actual and forecasted series speak for the accumulated profits to increase at an increasing rate starting right after the global financial crisis. Unlike the US and German data, Canadian and Italian data portray slightly different pictures. Although, the actual and forecasted profits are growing for these two countries also (as can be seen from Fig: 6 for Canadian data and Fig: 9 and 10 for Italian data), they are only doing so at a decreasing pace. Thus far from the analysis, we have seen some structural differences amongst the profit trends of the insurance companies of the countries under investigation. For US and German data, insurance companies' accumulated profits are increasing at an increasing rate while for Canadian and

Italian data, they are increasing only at a decreasing rate.

10 Limitations and Future Work

In our current study, we have conducted empirical analysis of only 04 (four) OECD countries, namely USA, Canada, Germany and Italy. Choice of countries is mostly driven by the availability of the insurance data at the country level and the scope of the current study, i.e., incorporating more and more countries in the analysis would out-scope the current investigation in terms of volume. In fact, there is a whole host of other countries where similar studies can be conducted to measure the profit accumulated by the commercial for-profit insurance companies and its future trend. Moreover, the countries chosen in the analysis are all from the same economic basket, i.e., all of them are developed ones. The nature of the profit gathered by the commercial insurance companies in developing and least developed countries may behave differently than that of the developed ones. Thus the study can be reasonably expanded to include more countries from different economic buckets to get a complete picture of the accumulated profits made by the commercial insurance companies throughout the world. Moreover, here, we assume the insurance companies' profits are invested in risk free rate, i.e., the insurance companies are assumed to invest their extra premiums in government treasury bills and bonds. But, in practice, they often go for riskier investment to earn more profit. However, as the risk and return always accompany each other, they also have to maintain provisions for the probable losses and may often use these provisions to write off non-performing investments. As provisions are born out of the retained earnings of the insurance companies, they incur losses on the process. So, to get a more realistic snap of the whole scenario, we should take into account the real investments made by the insurance companies, their actual return on investment and provisions built and used in the process. Avoiding all these company-specific complexities, what we have done here, represents the lower or risk free bound of the profits gathered by the commercial for-profit insurance companies over the years in the country level. Thus this study can be considered as an indicative one of what is going on inside the insurance industries.

11 Conclusion

Here, we have discussed several cost heads that are exclusively related to the operation and management of the commercial for-profit insurance companies. For example, commercial insurances are subject to costs like agency commission, advertising and

publicity cost, dividend expenditure and corporate tax on profits earned and premiums collected due to their very nature of business whereas social insurances are gently shielded away from all these cost heads again due to their distinctive nature of operations and method of incorporations. For four OECD countries, namely USA, Canada, Germany and Italy, here we have empirically shown that the premiums collected by the commercial life and non-life insurance companies in these jurisdictions are substantially larger than the corresponding claim settlement and operating expenditures. If the insurance schemes in these regions were implemented in a rather social manner then these extra premiums would have resulted into a huge amount of savings from the policy holders' perspective. These savings along with the opportunity cost there on actually represent the total amount of extra money that the policy holders have so far paid for in order to get insurance coverage. These additional costs could have been easily eliminated if the insurance schemes in these regions were implemented using a government sponsored, compulsory, not-for-profit social insurance program in place of conventional, commercial, for-profit insurance schemes. Here, we discuss the prospect of social insurance in commercial setup like fire, marine, motor, travel, burglary, house insurances and so on alongside its existing role of funding universal health coverage, illness and disability insurance, unemployment and accident insurance scheme and various other social security measures. With the same amount of premiums being collected, social insurance scheme is supposed to perform better than its conventional commercial peers and unlike commercial for-profit insurances, social insurance scheme retains profits in a trust fund after adjusting an equivalent amount of claims and meeting up the same amount of operating expenditures. These retained profit can then further be used to subsidize future premiums imposed upon the policy holders that would lessen the premium burden upon them.

Declaration

- Funding: No funding is received to accomplish this work.
- Conflict of Interest: No conflict of interest exists.
- Availability of data and material: The data that support the findings of this study are openly available in OECD Insurance Database at `https://www.oecd.org/daf/fin/insurance/oecdinsurancestatistics.htm`.
- Code availability: NA

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