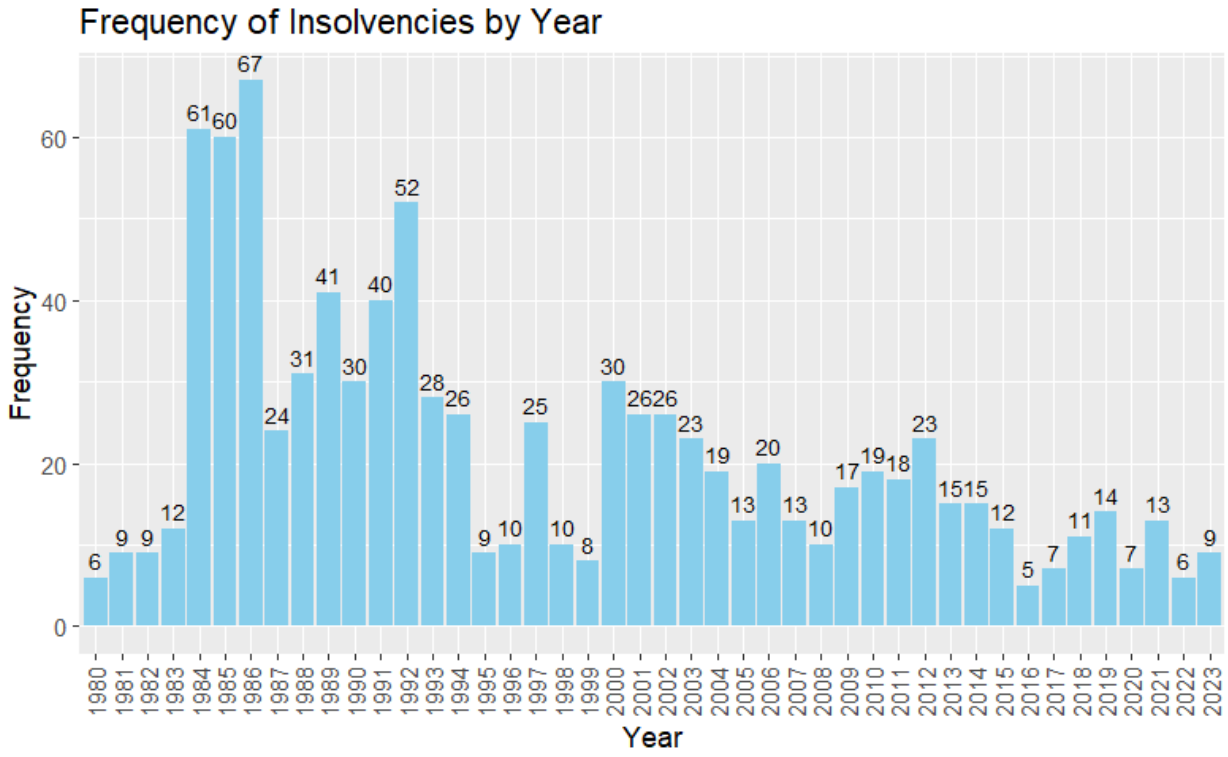
Data Analysis Summary Report

1.



There is a gradual increase in insolvencies in the late 1980s and early 1990s, reaching a high of around 67 in 1986.

Insolvencies then appear to decrease somewhat in the mid -1990s, before rising again in the late 1990s and early 2000s.

Insolvencies then appear to decline somewhat in the early 2010s, before rising again in the late 2010s and early 2020s.

Overall, the number of firm insolvencies during the 1980-2000 period varied across regions and industries, reflecting the complex interplay of economic, regulatory, and market factors prevalent during those years such as banking crisis and economic downturns.

Summary stats

Year		Frequency	
Min.	:1980	Min.	: 5.00
1st Qu.	:1991	1st Qu.	:10.00
Median	:2002	Median	:16.00
Mean	:2002	Mean	:21.11
3rd Qu.	:2012	3rd Qu.	:26.00
Max.	:2023	Max.	:67.00

2.

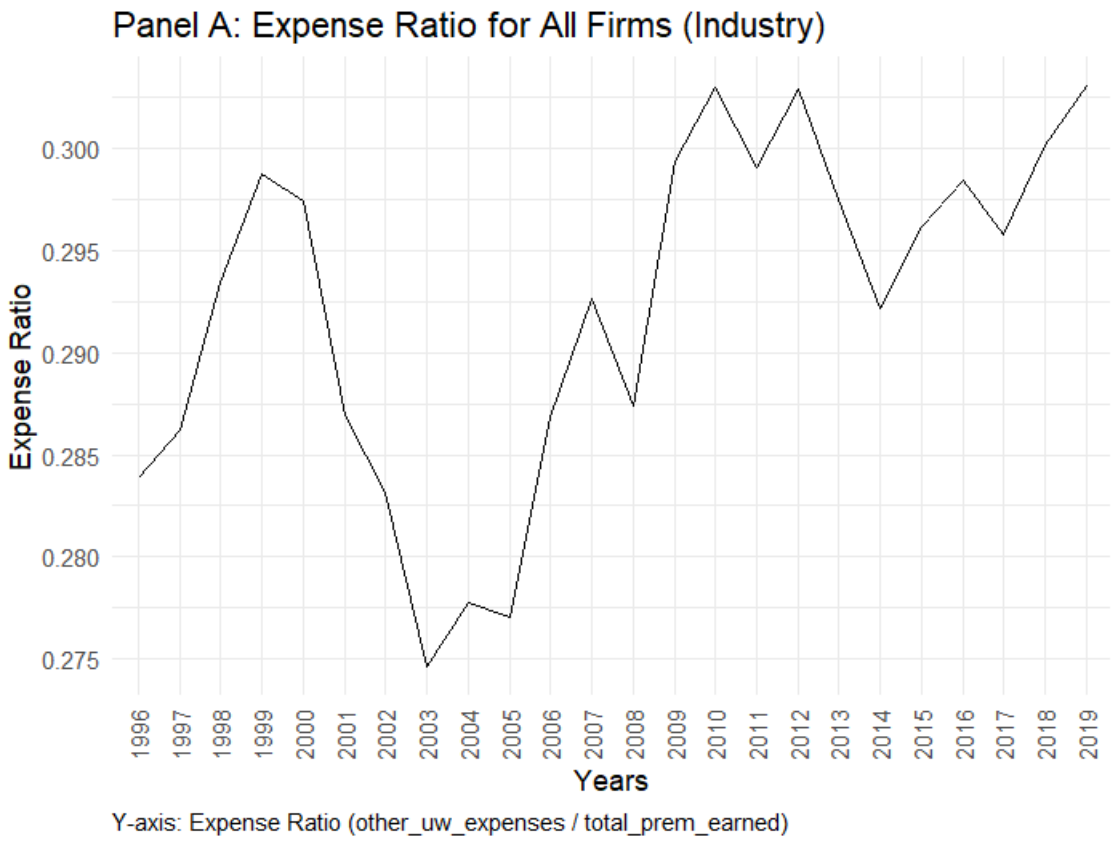
No.	Year	Leverage Ratio	Premiums to P/H Surplus	Liabilities to P/H Surplus
1	1996	1.30924E+11	0.94	1.87
2	1997	1.59262E+11	0.86	1.70
3	1998	1.47512E+11	0.83	1.61
4	1999	1.44396E+11	0.79	1.61
5	2000	1.30509E+11	0.82	1.64
6	2001	1.13435E+11	0.86	1.73
7	2002	1.14789E+11	0.98	1.90
8	2003	1.39553E+11	1.03	1.90
9	2004	1.73485E+11	0.96	1.79
10	2005	1.82513E+11	0.94	1.83
11	2006	2.22186E+11	0.83	1.69
12	2007	2.46674E+11	0.75	1.57
13	2008	1.83925E+11	0.79	1.68
14	2009	2.17955E+11	0.72	1.53
15	2010	2.21092E+11	0.69	1.50
16	2011	1.93691E+11	0.69	1.57
17	2012	2.12743E+11	0.70	1.58
18	2013	2.48296E+11	0.69	1.50
19	2014	2.50737E+11	0.71	1.46
20	2015	2.4433E+11	0.72	1.48
21	2016	2.49556E+11	0.69	1.41
22	2017	2.47047E+11	0.66	1.39
23	2018	2.382E+11	0.74	2.50
24	2019	2.39658E+11	0.71	1.44

Premiums to P/H Surplus: This ratio seems to be consistently below 1, indicating that premiums collected are lower than the policyholder surplus. This suggests the companies might have a good buffer to cover potential liabilities.

Liabilities to P/H Surplus: There appears to be a slight downward trend in this ratio over time, suggesting a potential improvement in the financial strength of the companies relative to their liabilities.

3. Expense Ratio

Panel A



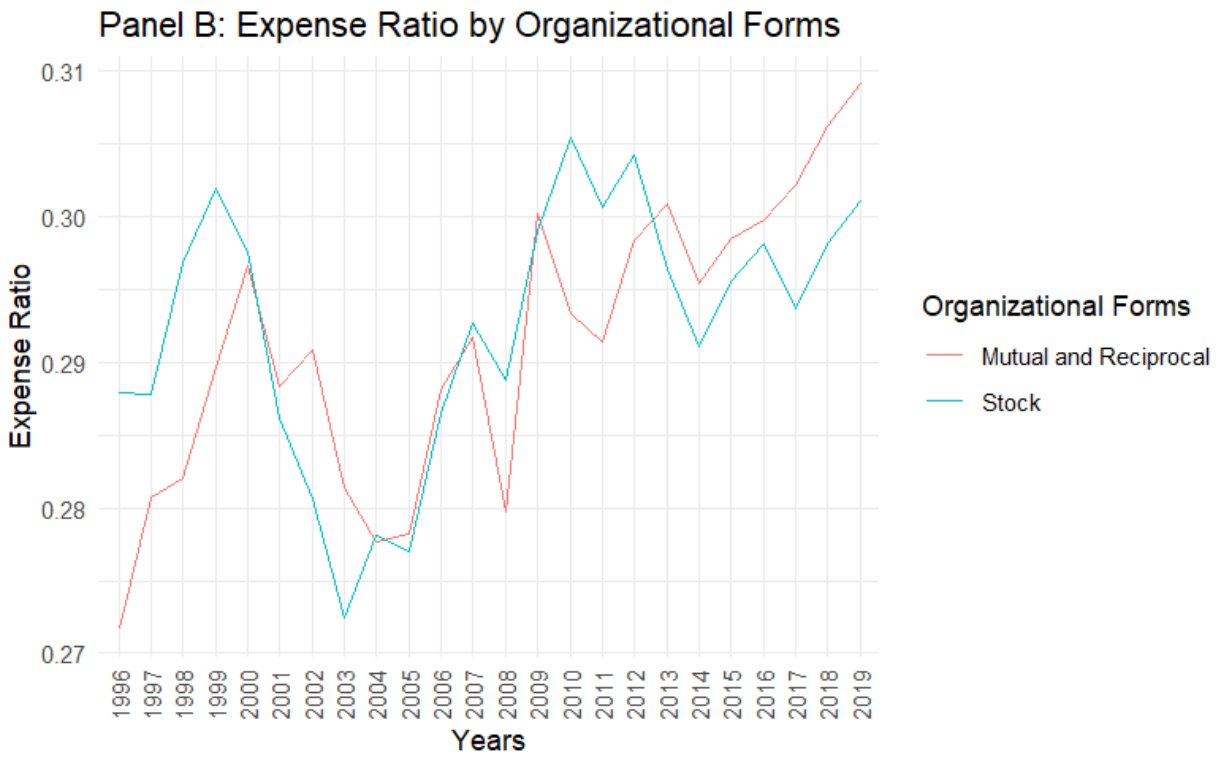
Increased costs: Insurance companies may experience higher costs due to factors such as inflation, regulation, or new technology.

Changes in business mix: A shift towards more complex or expensive insurance products could lead to a higher expense ratio.

Lower investment returns: If insurance companies earn lower returns on their investments, they may need to increase premiums or reduce expenses to maintain profitability.

Higher expense ratio was seen across firms during early 2000s and 2009 to 2013 but was almost in the range of 0.28 to 0.3 for all the years.

Panel B



Expense Ratio by Organizational Form seems to be fluctuating between Mutual and reciprocal and Stock firms throughout the years 1996 to 2019.

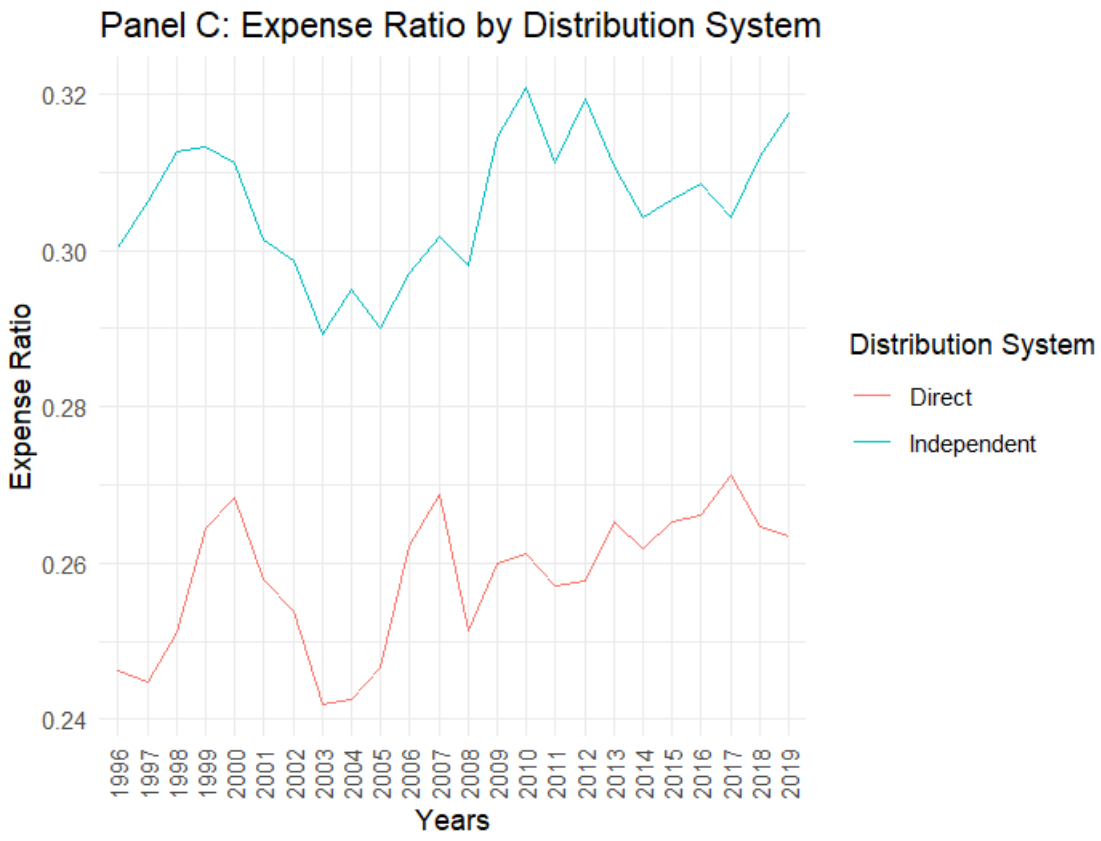
Possible Reasons for the Difference:

Management Structure: Mutual and reciprocal companies are typically member-owned, and may have different expense structures compared to stock companies which are driven by profit maximization for shareholders.

Operating Costs: Mutual and reciprocal companies might incur higher operating costs due to factors like member services or unique investment strategies.

Higher economic distress in early 1980's to 2000 and later recession post 2008 could have caused higher expense ratio for both the organization forms.

Panel C



In conclusion, the higher expense ratio of independent agents could be primarily driven by distribution costs (commissions and marketing) and operational overhead. However, their ability to offer personalized service, expertise, and a wider range of products allows them to compete with direct agents despite the cost disadvantage. Customer acquisition cost, sales and marketing cost may be higher for independent agents than direct agents leading to higher expense ratio

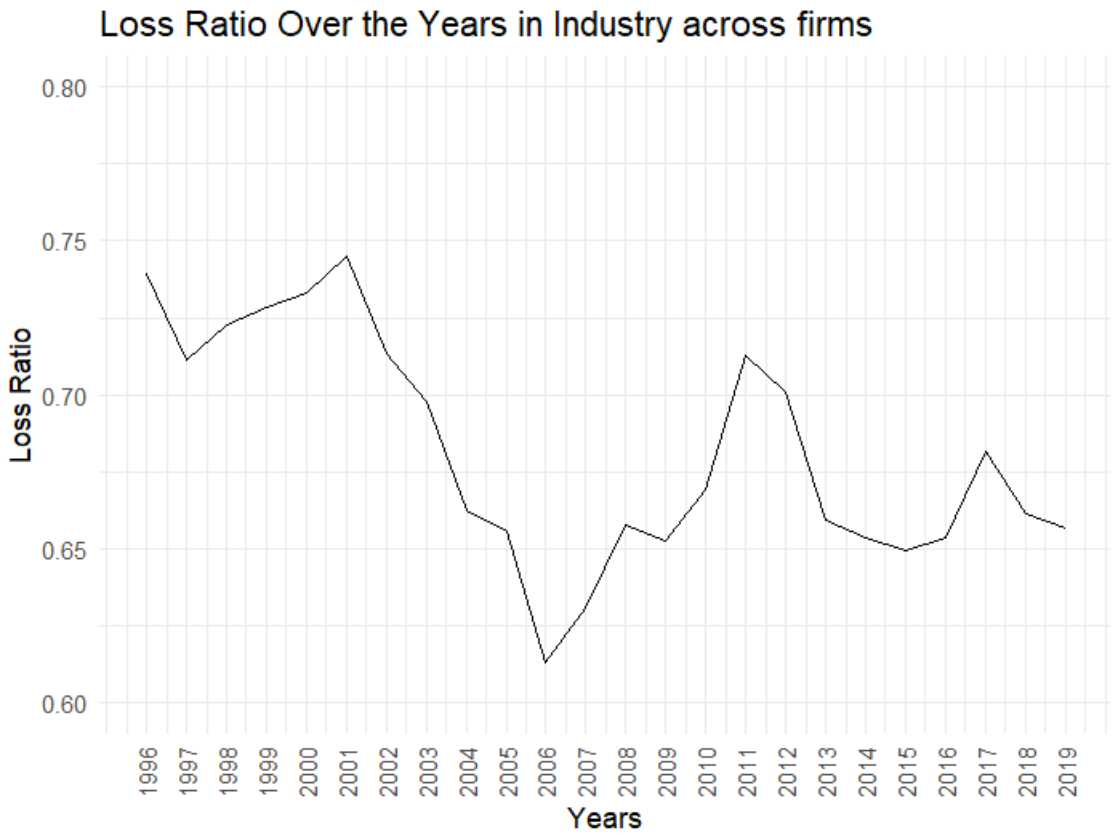
Here are some additional factors to consider:

- Technology Adoption: Independent agents who effectively utilize technology to automate tasks and streamline processes could potentially reduce their expense ratios.
- Regulation: Regulations impacting agent commissions or fees could affect expense ratios for both independent and direct agents.

Independent agents typically have higher expense ratios than direct in both early 1980s and around 2008 during economic downturn.

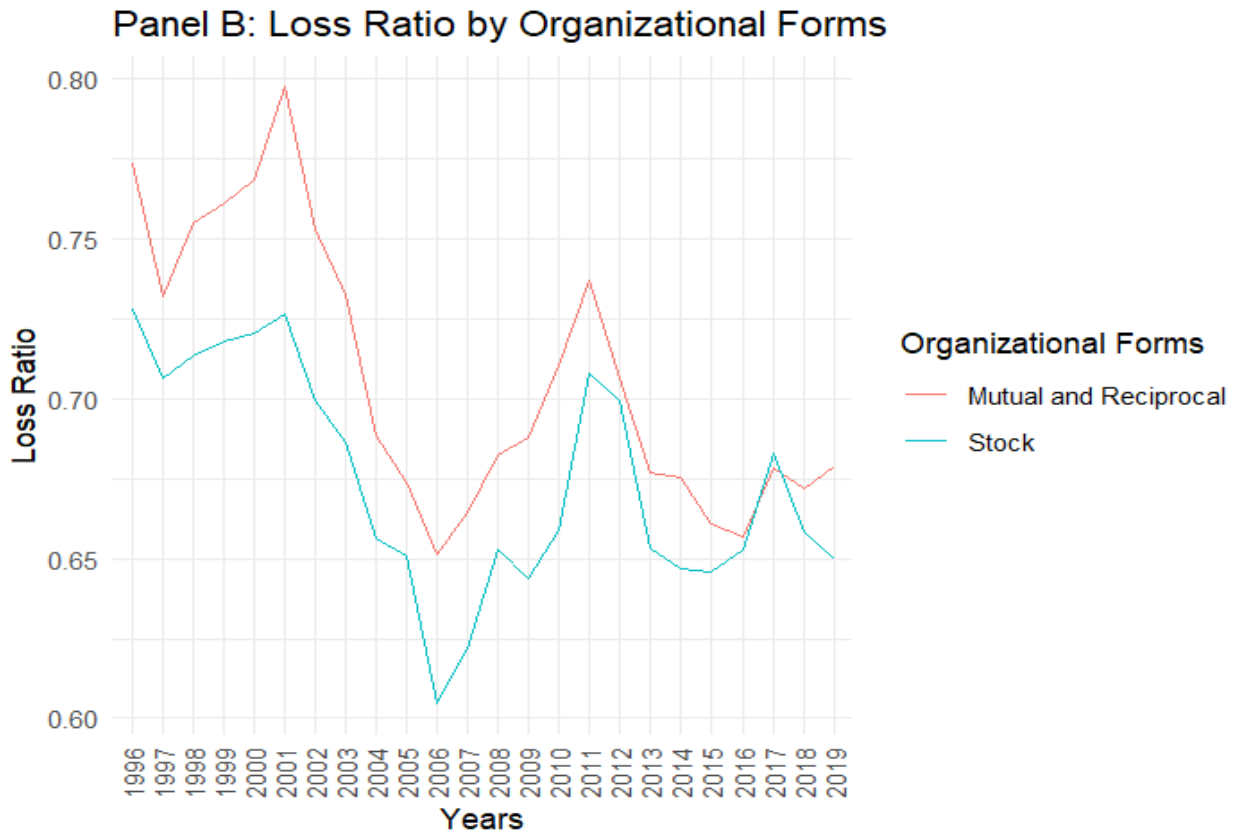
4. Loss Ratio

Panel A



The loss ratio for all firms in the appears to be relatively high during 1980's to 2000 and then again it spiked in 2010 and 2011 post recession.

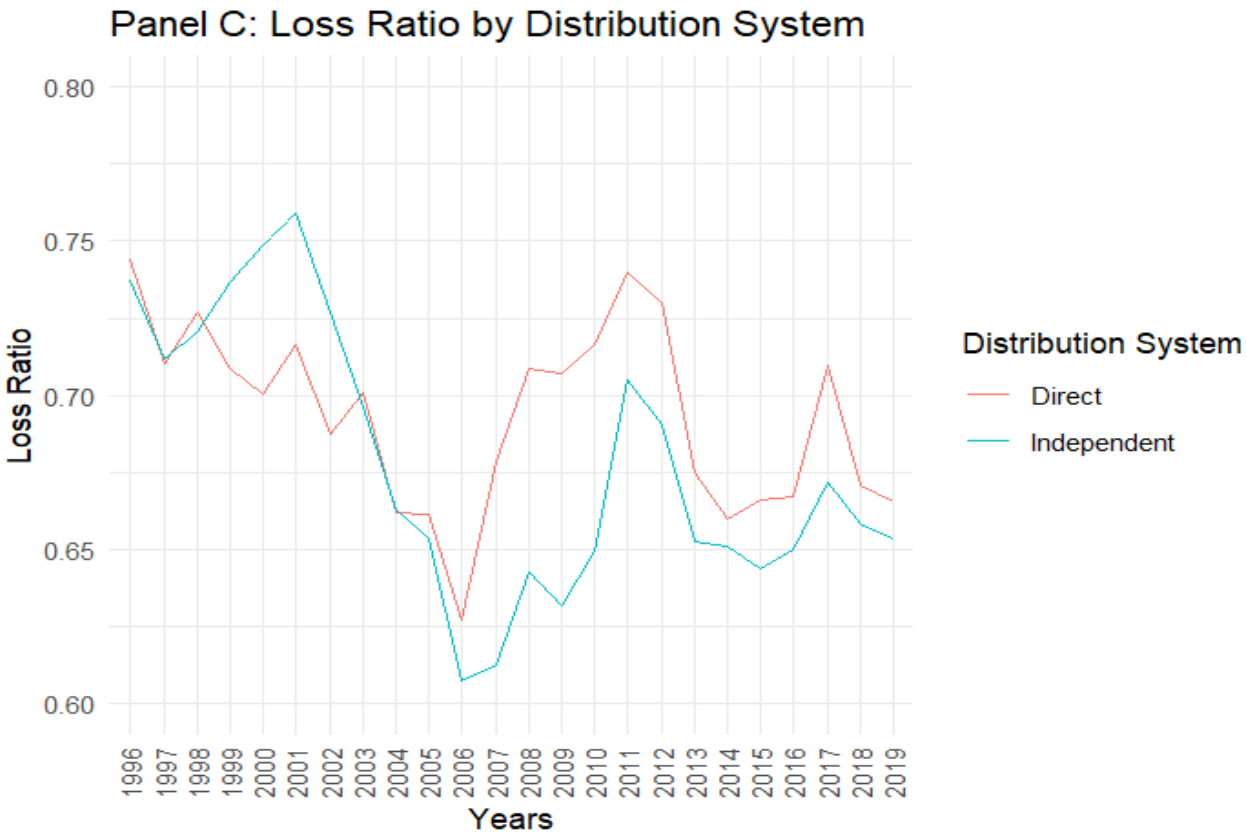
Higher loss ratios are seen in early 2000 and highest in 2001 could be due to the dot com bubble burst and terrorist attacks on World trade center which caused heavy claims on property and casualty insurance industry. The lowest loss ratio on the graph is 0.65, which occurred in multiple years including 2006, 2010, and 2013. The higher loss ratio seen near 2011 might be due to inflation and changing market dynamics.



Mutual and Reciprocal vs. Stock

Profit Motive: Stock firms are driven by profit maximization for their shareholders. They might be more likely to take on riskier policies with potentially higher premiums to increase profits, even if it leads to a higher loss ratio.

Policyholder Focus: Mutual and reciprocal firms are owned by their policyholders, and their primary objective is to provide insurance at cost. They might be more selective in their underwriting practices and avoid high-risk policies that could lead to a higher loss ratio.



Fluctuations: The loss ratio for both direct and independent agents appears to fluctuate over time.

Similar Trends: The trends in loss ratios seem to be roughly similar for both distribution systems from 2010 onwards.

Economic Downturn: The early 2000s witnessed the bursting of the dot-com bubble and a subsequent recession. This economic downturn could have led to an increase in claims across various insurance lines across independent agents.

Terrorism Events: The 9/11 attacks in 2001 might have caused some insurance companies face higher losses due to settling claims for huge people at a time.

5. Combined Ratio

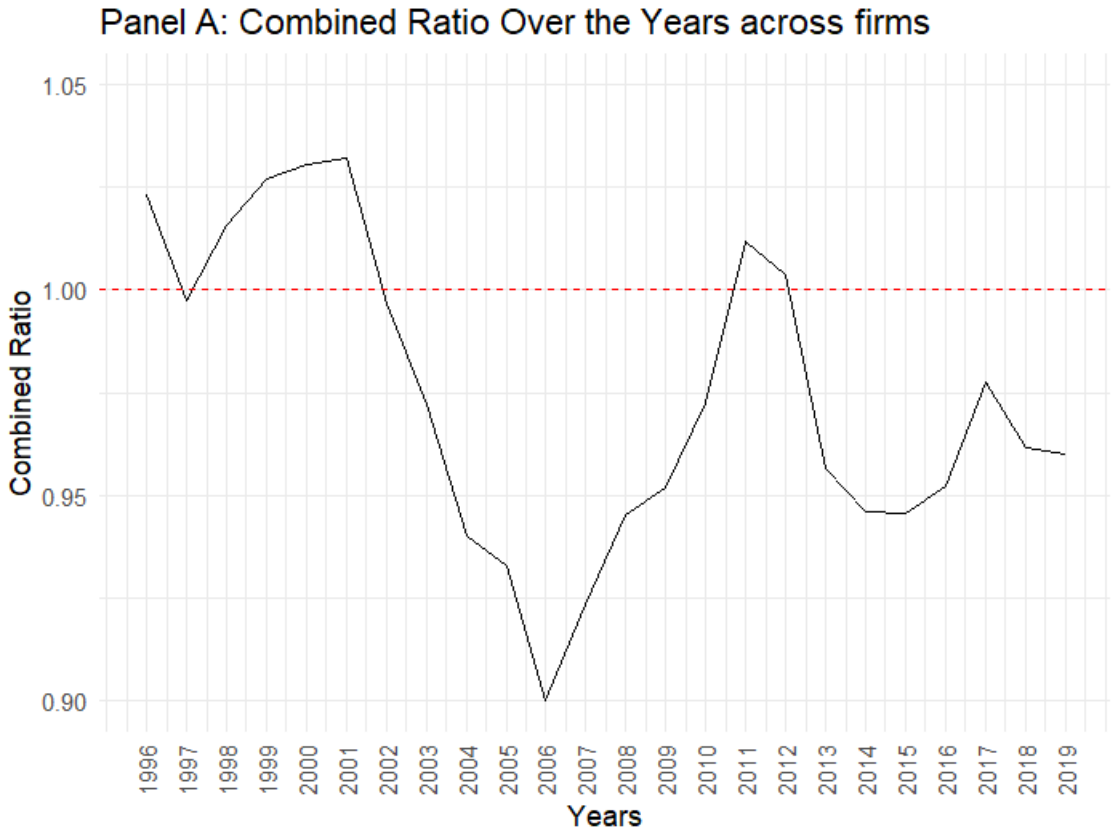
	year	expense_ratio	loss_ratio	combined_ratio
	<fct>	<dbl>	<dbl>	<dbl>
1	1996	0.284	0.739	1.02
2	1997	0.286	0.711	0.998
3	1998	0.293	0.722	1.02
4	1999	0.299	0.728	1.03
5	2000	0.297	0.733	1.03
6	2001	0.287	0.745	1.03
7	2002	0.283	0.713	0.997
8	2003	0.275	0.698	0.972
9	2004	0.278	0.663	0.940
10	2005	0.277	0.656	0.933
11	2006	0.287	0.613	0.900
12	2007	0.293	0.631	0.923
13	2008	0.287	0.658	0.945
14	2009	0.299	0.653	0.952
15	2010	0.303	0.669	0.972
16	2011	0.299	0.713	1.01
17	2012	0.303	0.701	1.00
18	2013	0.297	0.659	0.957
19	2014	0.292	0.654	0.946
20	2015	0.296	0.650	0.946
21	2016	0.298	0.654	0.952
22	2017	0.296	0.682	0.977
23	2018	0.300	0.662	0.962
24	2019	0.303	0.657	0.960

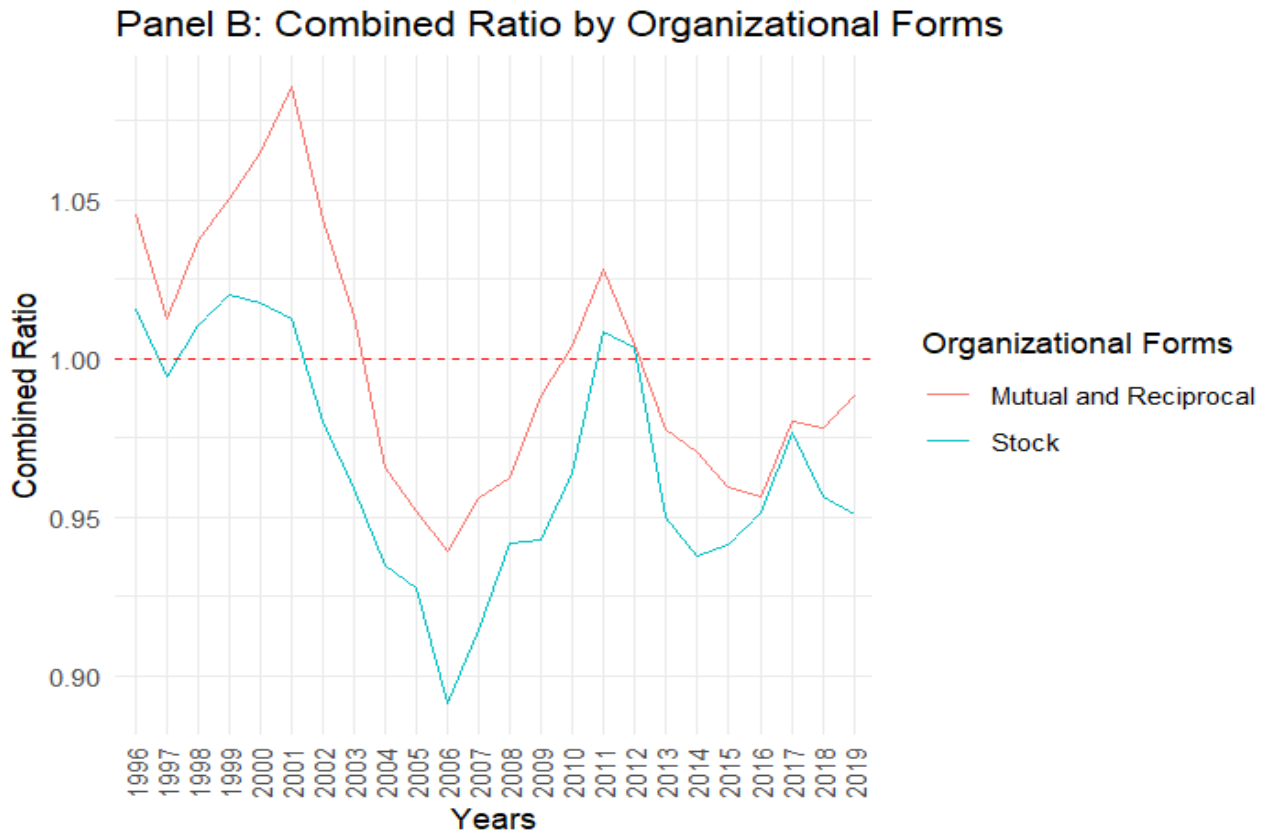
Fluctuations in the combined ratio giving higher seen higher in earlu 1996-2001. Dot-com Bubble Burst: The bursting of the dot-com bubble in early 2000 led to a significant decline in stock market values and investor confidence. This economic downturn could have impacted insurers' investment income and profitability.

Insurance Market Consolidation: The late 1990s and early 2000s saw a wave of mergers and acquisitions in the insurance industry as companies sought to achieve economies of scale and expand their market presence. Integration challenges and restructuring efforts could have affected operational efficiency and performance.

Low Interest Rates: Persistently low interest rates in the aftermath of the 2008 financial crisis continued to pose challenges for insurers' investment portfolios. Low yields on fixed-income investments limited investment income and profitability.

Emerging Risks: The insurance industry faced emerging risks such as cybersecurity threats, climate change-related events, and geopolitical uncertainties. Insurers needed to adapt their underwriting models and risk management strategies to address evolving risk landscapes.



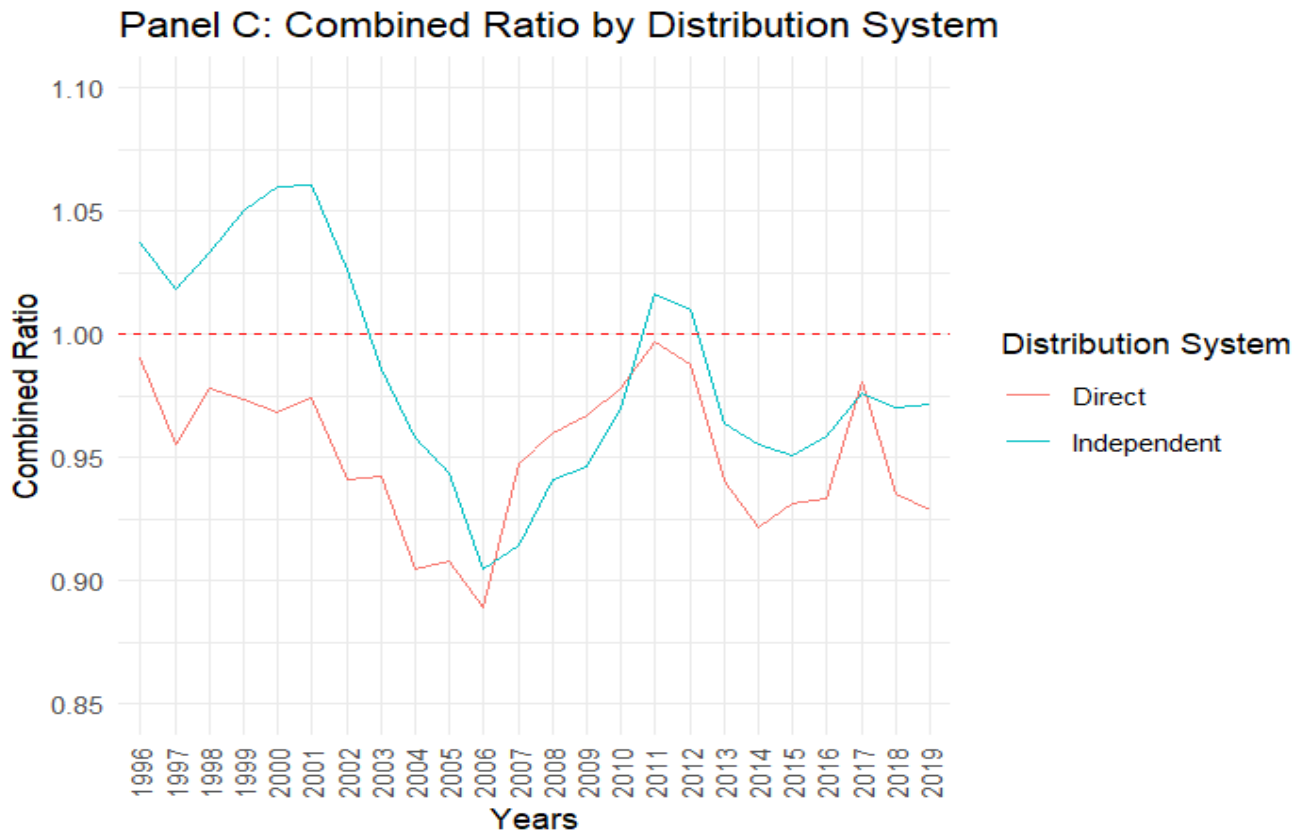


Profit Motive: Stock firms are driven by profit maximization for their shareholders. They might underwrite more business even if it leads to a higher expense ratio or loss ratio, as long as they can still generate a profit.

Policyholder Focus: Mutual and reciprocal firms are owned by their policyholders and focus on providing insurance at cost. They might be more selective in their underwriting practices to minimize risk and keep expenses lower.

The combined ratio fluctuates more for both but stays below 1 indicating profitability after early 2002 and then it rose again during the financial crisis of 2008, and after that it becomes lower.

Both have different cost structure and amount of risk associated with the investment, where stock companies generated higher profit than mutual and reciprocal due to higher risk associated with it but had lower combined ratio meaning more profitable than the mutual and reciprocal.

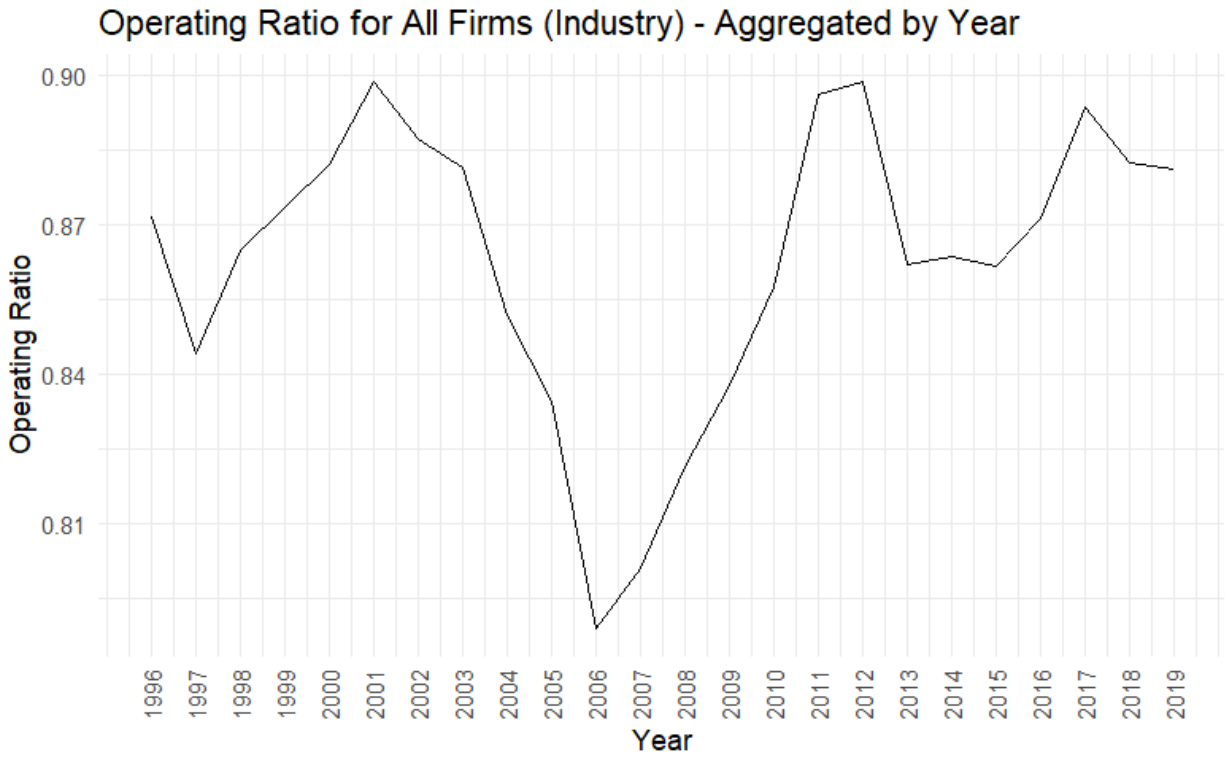


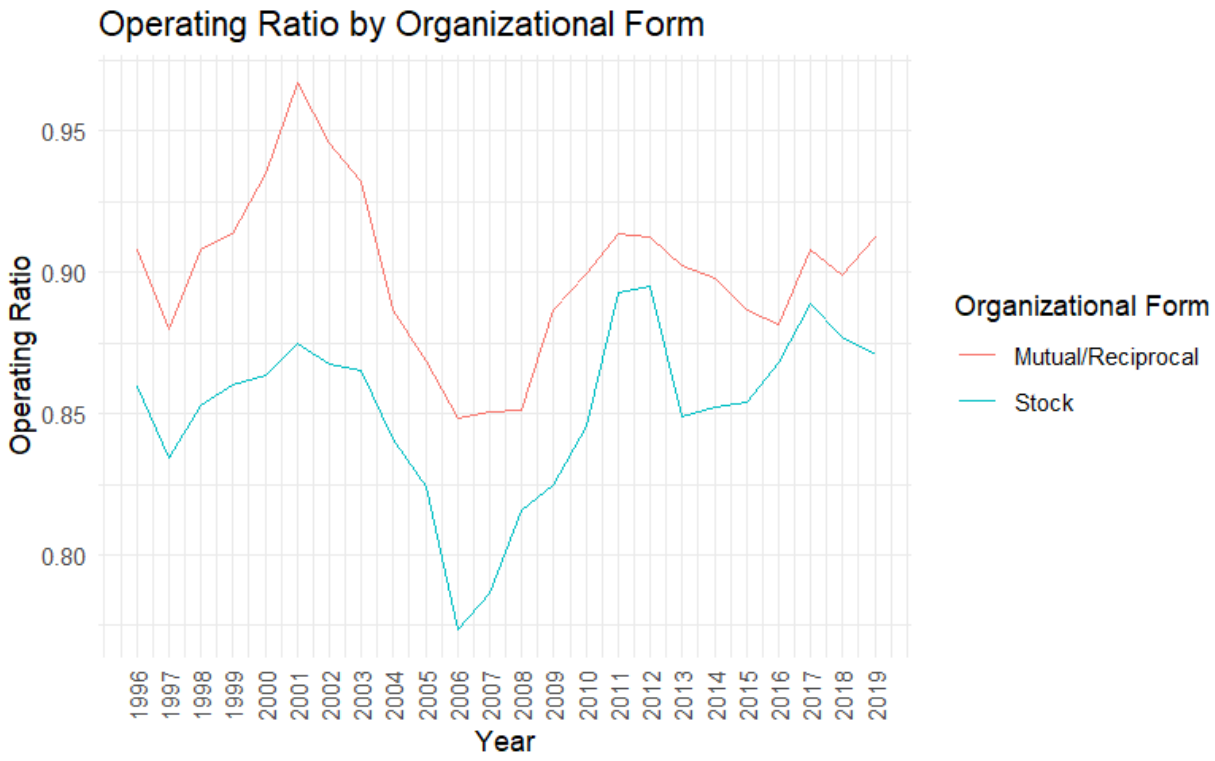
Here we see that combined ratio is higher for Independent agents in early 2000's while direct agents have a comparatively lower combined ratio indicating that direct agents were profitable during early 2000's.

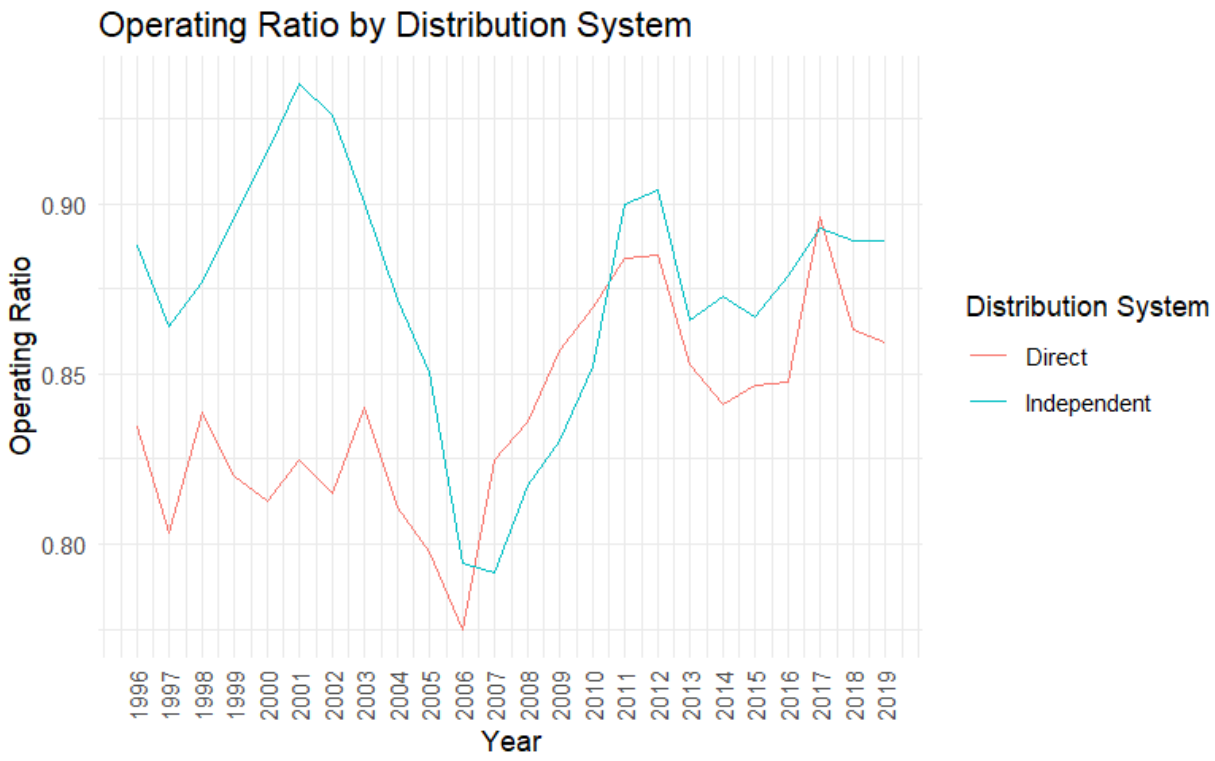
Rising Competition: Direct insurers with potentially lower operating costs gained traction, putting pressure on independent agents to keep premiums competitive. This could have led to lower premiums and potentially higher combined ratios if expenses remained constant.

Shifting Risk Landscape: Events like the 9/11 attacks in 2001 might have made some insurers more risk-averse. Independent agents, seeking to stay competitive, might have offered policies with slightly higher inherent risks, leading to a higher chance of claims and a higher combined ratio.

6. Operating Ratio



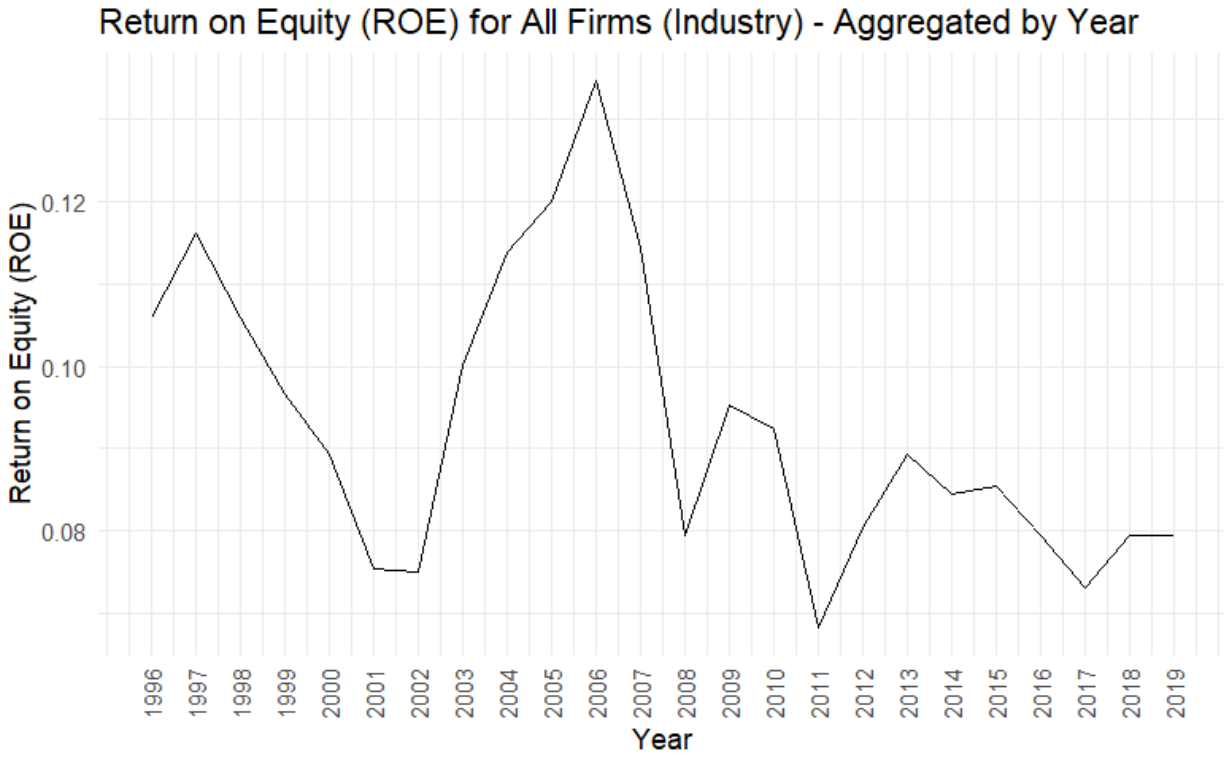




The operating ratio is seen lower than 1 in almost all three graphs where we see that Mutual and reciprocal had higher operating ratio than Stocks and Independent agents had higher operating ratio than direct agents. The highest ratios were in early 2000's because of the financial crisis, no regulation in the insurance industry.

Perhaps the greatest difference for Mutual vs stock is that it cannot raise money it may need in the equity markets, as stock insurers can. This can hamper growth through mergers and acquisitions leading to higher operating ratio. Policyholders have little power in Mutual because they cannot vote, as shareholders of stock insurance companies can. Because of their differently-perceived pecking orders, shareholders' interests (strong stock value and short-term financial performance) may take precedence over the interest of policyholders.

7. ROE


Return on Equity (ROE) for All Firms (Industry) - Aggregated by Year
Return on Equity (ROE)
0.12
0.10
0.08
1996
1997
1998
1999
2000
2001
2002
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2004
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2007
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2009
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2011
2012
2013
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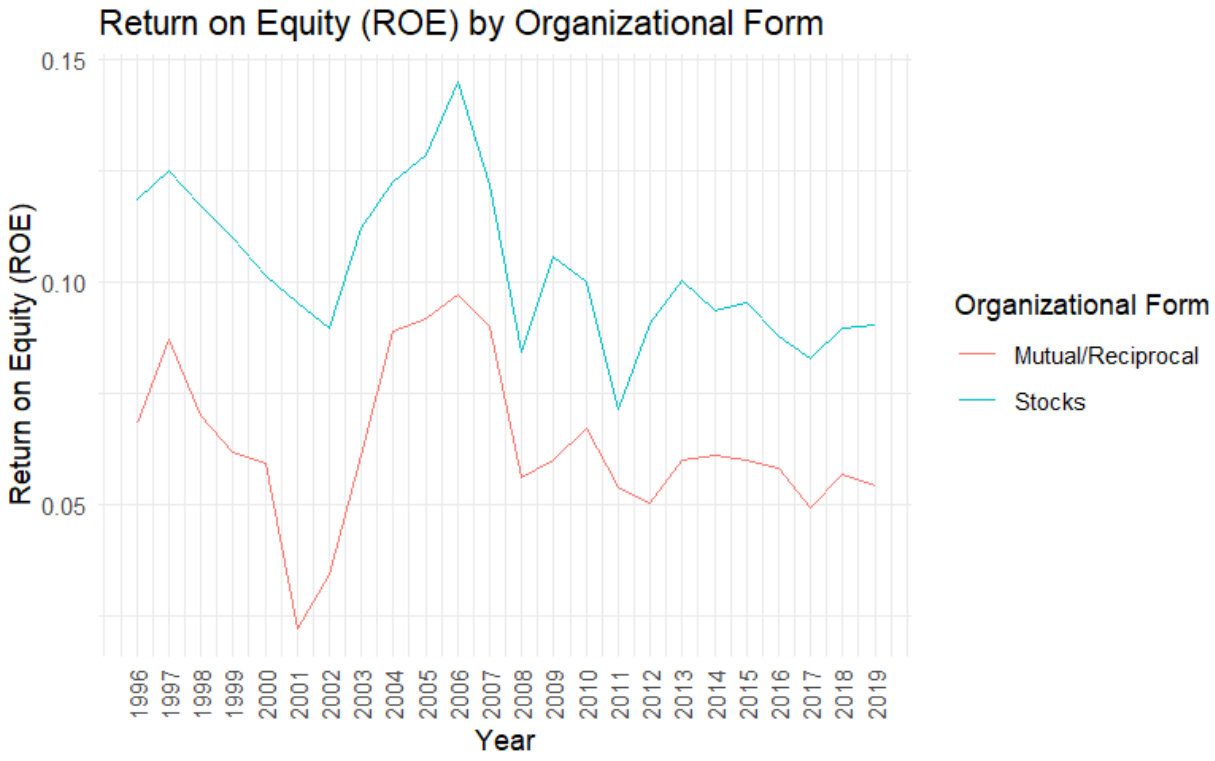
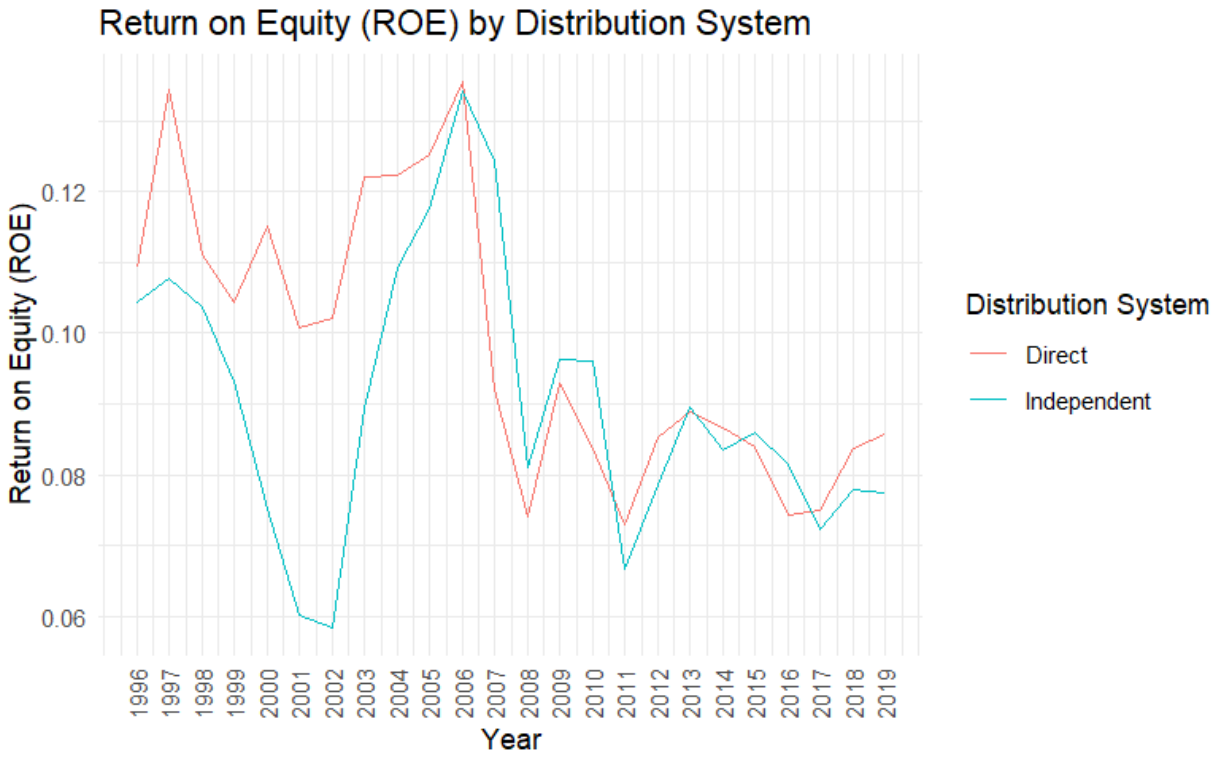
2015
2016
2017
2018
2019
Year


Return on Equity (ROE) by Organizational Form
Return on Equity (ROE)
0.15
0.10
0.05
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
Year
Organizational Form
Mutual/Reciprocal
Stocks



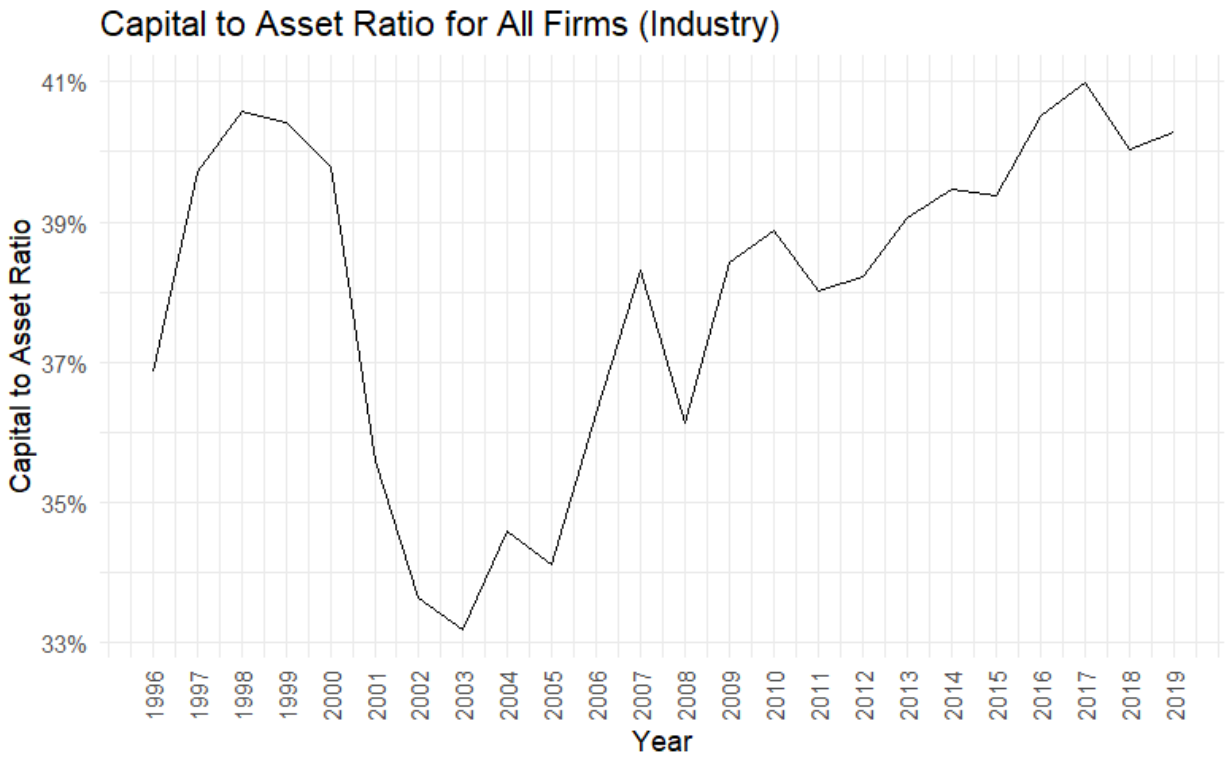
The overall ROE seems to be lowest in 2001 and highest in 2005 for all three panels. Stock organizations perform better in ROE compared to Mutuals could be because of ownership structure, cost, capital structure and risk profile.

Direct agents seem to perform better in terms of ROE in the early 2000's because of their direct relationship with insurance carriers and potentially lower commission rates. This higher profit margin can contribute to higher ROE for direct agents.

Independent agents may earn commissions on policies sold, but these commissions may be lower than those negotiated by direct agents. Additionally, independent agents may need to share their commissions with the agencies they represent, reducing their profit margins and ROE. After 2006 or 2007 Independent agents started to have more ROE may be because eof higher number of companies in the market, tough competition and declining popularity and practicality of direct agents.

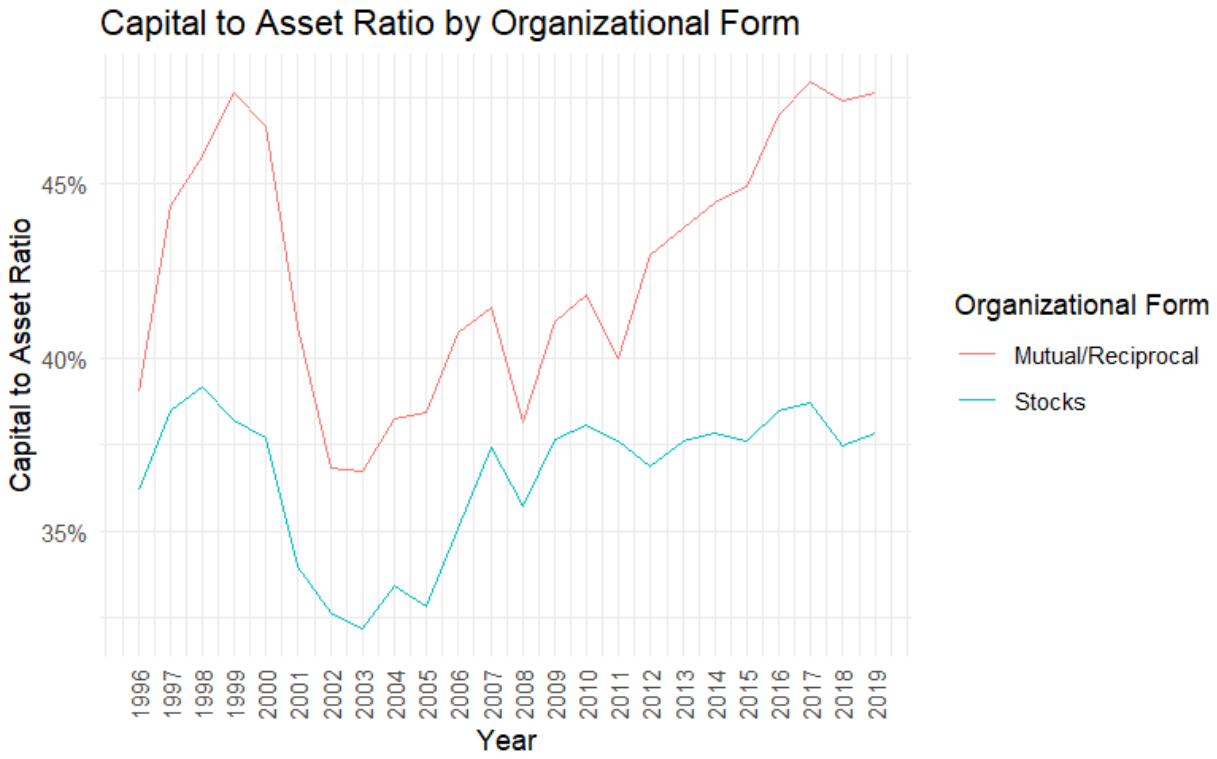
8. Capital to Asset Ratio

Panel A



Overall Capital to asset ratio for firms is seen lower in 2000 to 2005 as the early 2000s witnessed financial deregulation and relaxed lending standards in some sectors, which could have facilitated easier access to credit and increased leverage among companies. This expansion of credit may have contributed to a decrease in the capital to asset ratio as companies leveraged up their balance sheets. The early 2000s saw a period of economic expansion and growth in various industries. During economic expansions, companies may prioritize investing in assets to expand their operations and take advantage of growth opportunities. As a result, the ratio of capital to assets may decrease as companies deploy more capital into asset investments.

Panel B



Since mutual insurance companies are owned by their policyholders, they don't issue stock and don't have shareholders in the traditional sense. Instead, policyholders contribute to surplus funds through premium payments, which serve as a source of capital for the company.

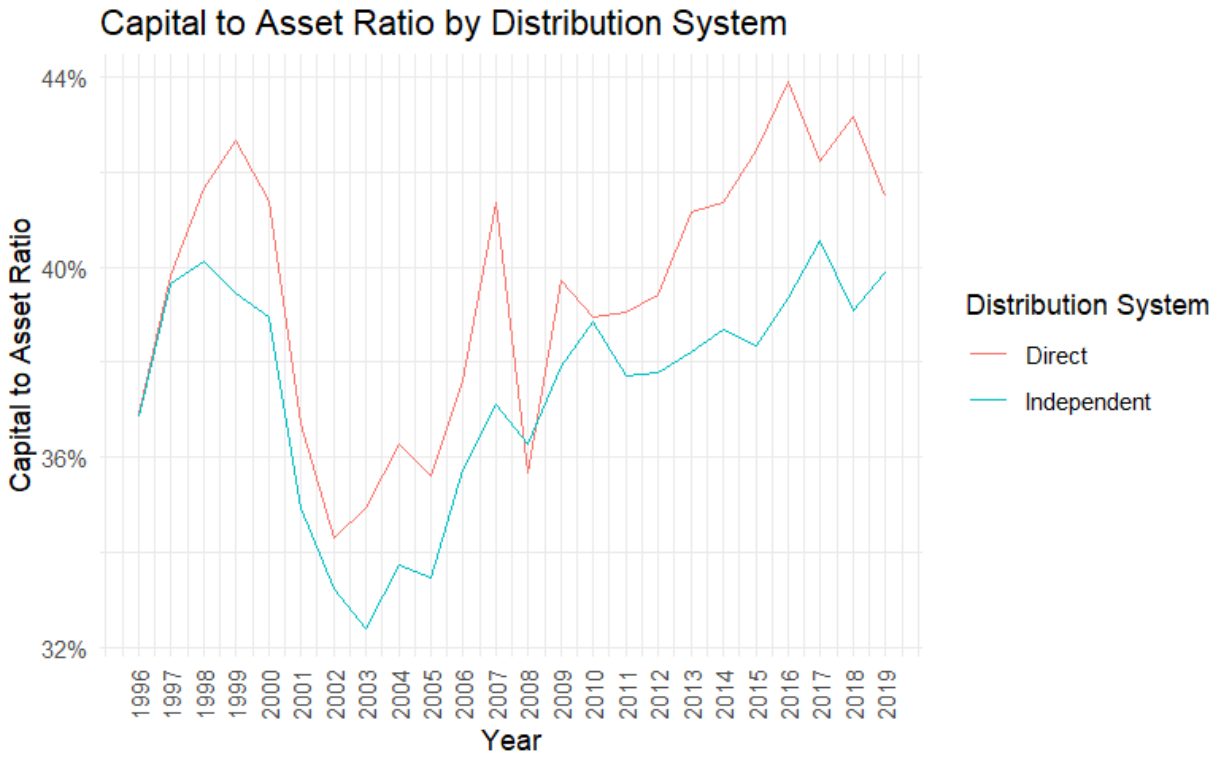
The capital-to-asset ratio for mutuals tends to be higher compared to stock insurers because they rely primarily on surplus funds contributed by policyholders to support their operations and absorb losses.

Stock insurance companies issue shares of stock and have shareholders who provide capital in exchange for ownership stakes in the company.

Stock insurers may have lower capital-to-asset ratios compared to mutuals because they have access to additional sources of capital, such as equity financing through stock issuance and debt financing through loans or bonds.

Stock insurers may choose to maintain lower levels of surplus relative to their assets, as they can raise additional capital by issuing more shares or obtaining loans from external sources.

Panel C



Direct agents tend to consistently have higher capital to asset ratio because of several factors like exclusive affiliation, financial backing, access to company resources, ownership stakes or profit sharing arrangements as compared to Independent agents.The overall capital to asset ratio is seen to be incremental after 2008 due to increased regulatory compliance, more protection like risk management enhancements like managing and mitigating huge risks. Improvements in underwriting discipline, pricing strategies, and investment performance in the post-crisis period may have boosted profitability for P&C insurers. Following the financial crisis, insurance companies may have sought to enhance their reinsurance protection to mitigate potential losses from catastrophic events and large claims.

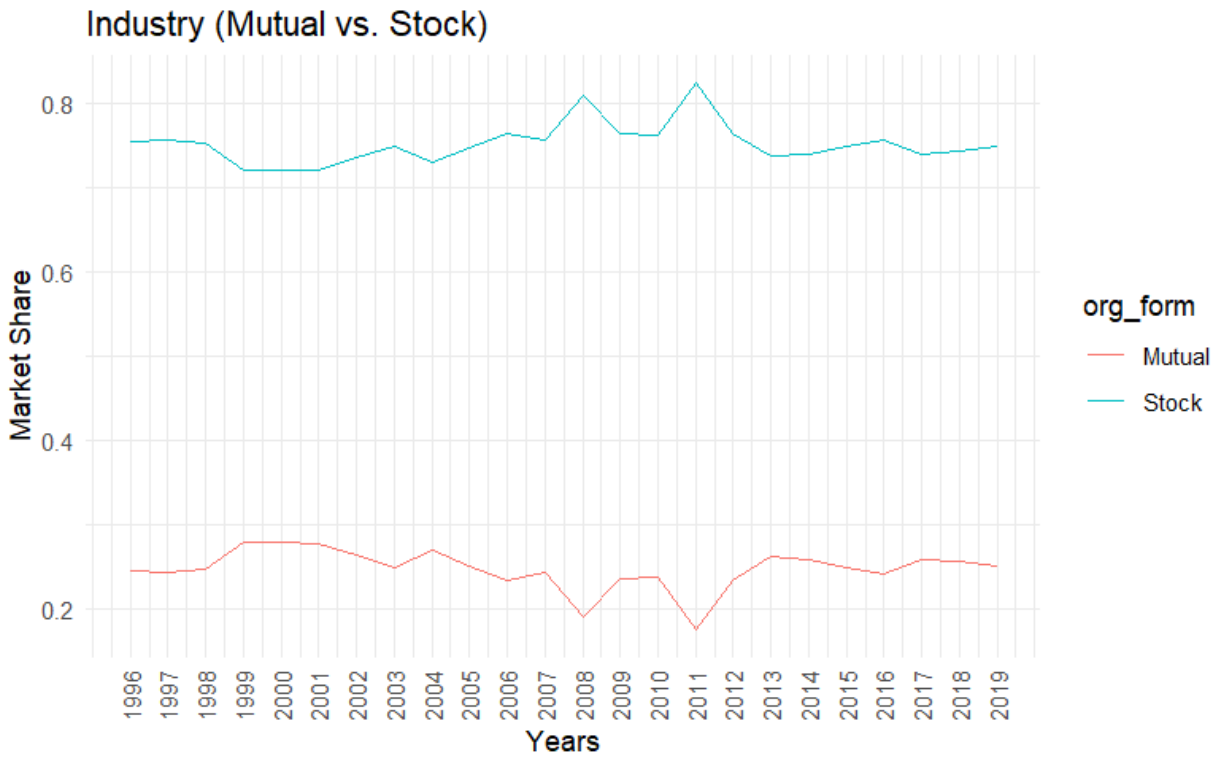
9. Net Premiums Written in Property-Liability Insurance (percent of total premiums written), by Line of Insurance

LOB	`2001`	`2005`	`2009`	`2013`	`2018`
Personal Auto	37.00	31.30	29.40	28.80	28.00
Commercial Auto	9.62	9.25	8.72	7.96	9.38
Homeowners + Farm owners	9.37	11.60	12.70	13.10	12.40
Fire + Allied Lines	3.92	4.06	6.36	5.95	5.38
Commercial Multiple Peril	6.72	7.51	8.49	6.93	6.31
General Liability	8.23	11.00	11.10	11.30	11.60
Medical Prof. Liability	3.37	3.68	3.76	3.39	2.76
Workers' Compensation	9.99	12.10	11.00	13.50	15.90
Inland Marine + Ocean Marine	2.91	2.46	3.37	3.54	2.72
Other	8.85	7.17	5.14	5.54	5.57

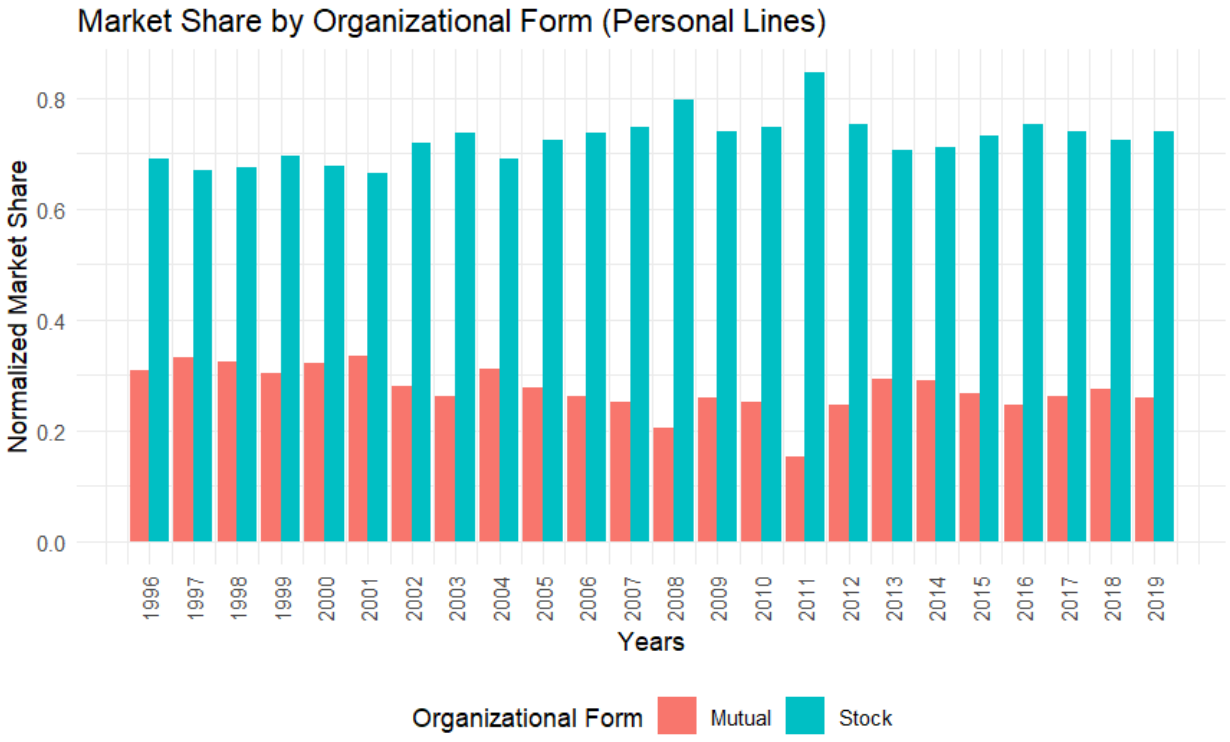
Net premiums are seen higher for Personal auto in lines of insurance followed by commercial auto and homeowners + farmowners insurance.

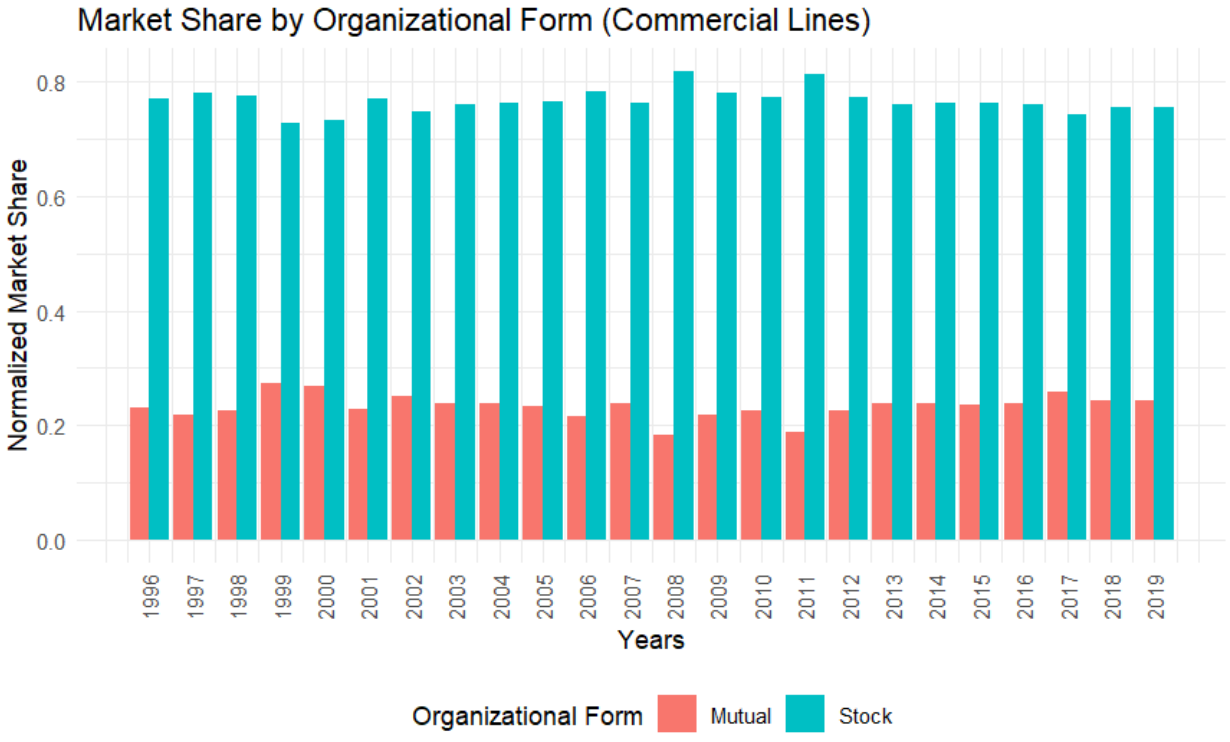
Popularity for personal auto insurance because of mandatory insurance requirement by government and policies if they have a vehicle. Areas with high population density and heavy traffic often experience more accidents and vehicle-related incidents, leading to higher insurance premiums for personal auto coverage in those regions. Personal auto insurance is a necessity for vehicle owners in many regions. As a result, the demand for personal auto insurance policies tends to be consistently high. Next necessity will be homes hence homeowners insurance is seen higher compared to others. Workers compensation is also a higher indicator of net premiums as the industry depends on workers and most of casualty and accidents happen in heavy duty work associated with workers.

10. Market Share, by Org Form & Commercial, Personal Lines



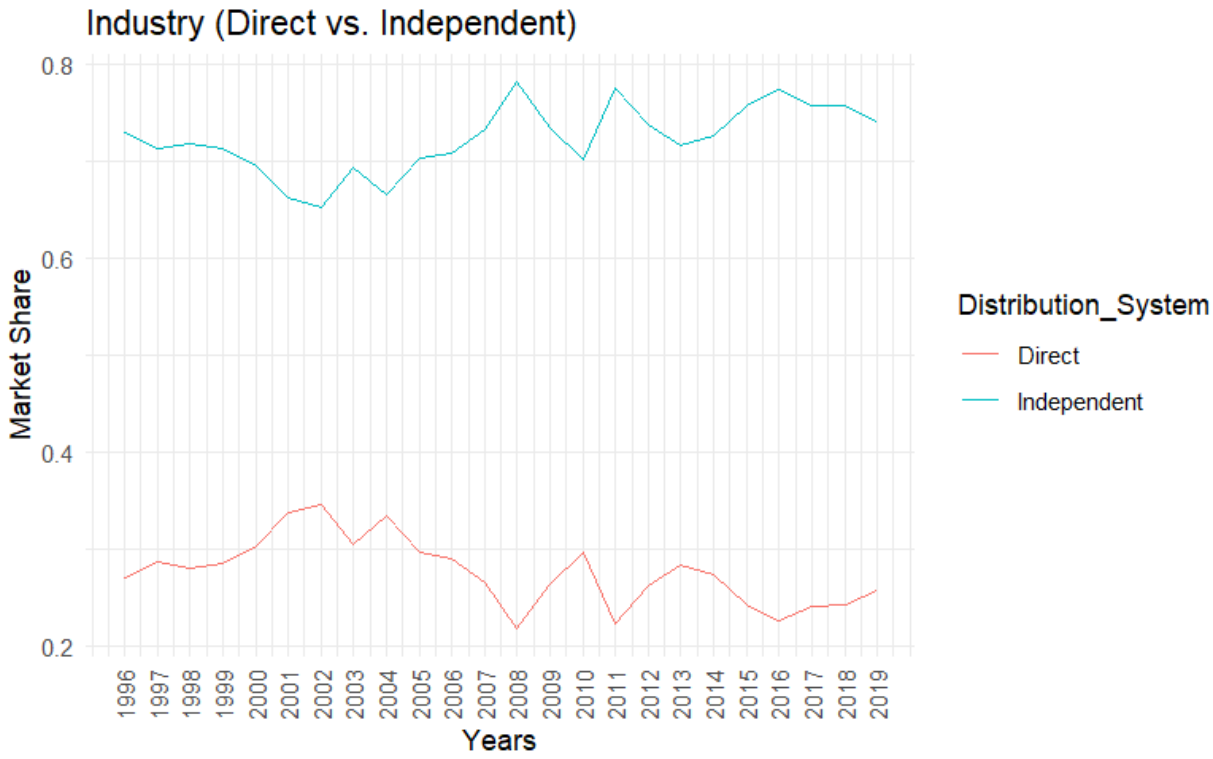
Stock companies tend to have higher market share consistently throughout the years due to high attractiveness of the industry, Stock insurance companies can attract investors by offering dividends and the potential for capital appreciation through stock price increases. This ability to generate returns for shareholders can make stock insurers more attractive investment options, leading to greater investor interest and support. They have more flexibility in doing business. Stock insurance companies may benefit from stronger market perception and brand recognition, which can attract more customers and increase their market share. This perception may stem from larger advertising budgets, brand-building efforts, and public visibility.





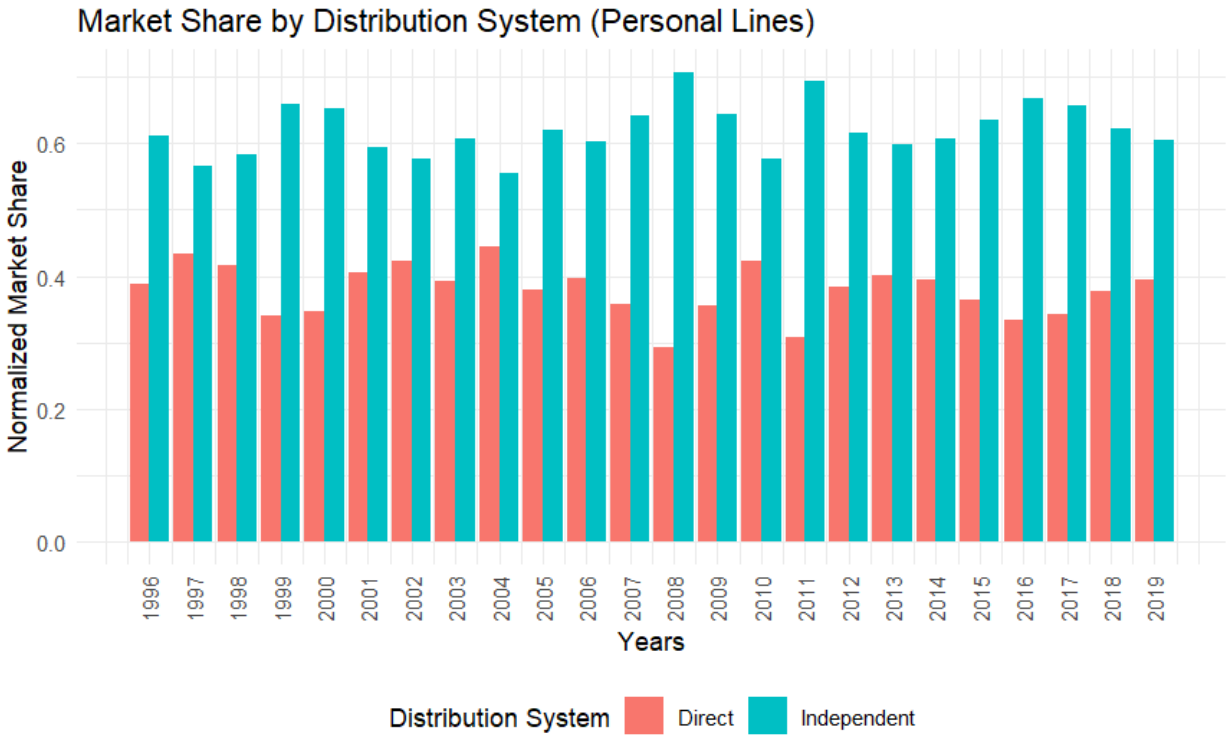
Overall Stock companies have higher market share in both personal and commercial lines because of their market agility, higher consumer service in terms of retaining the consumers, underwriting expertise, and risk management. Mutual companies have higher share in personal

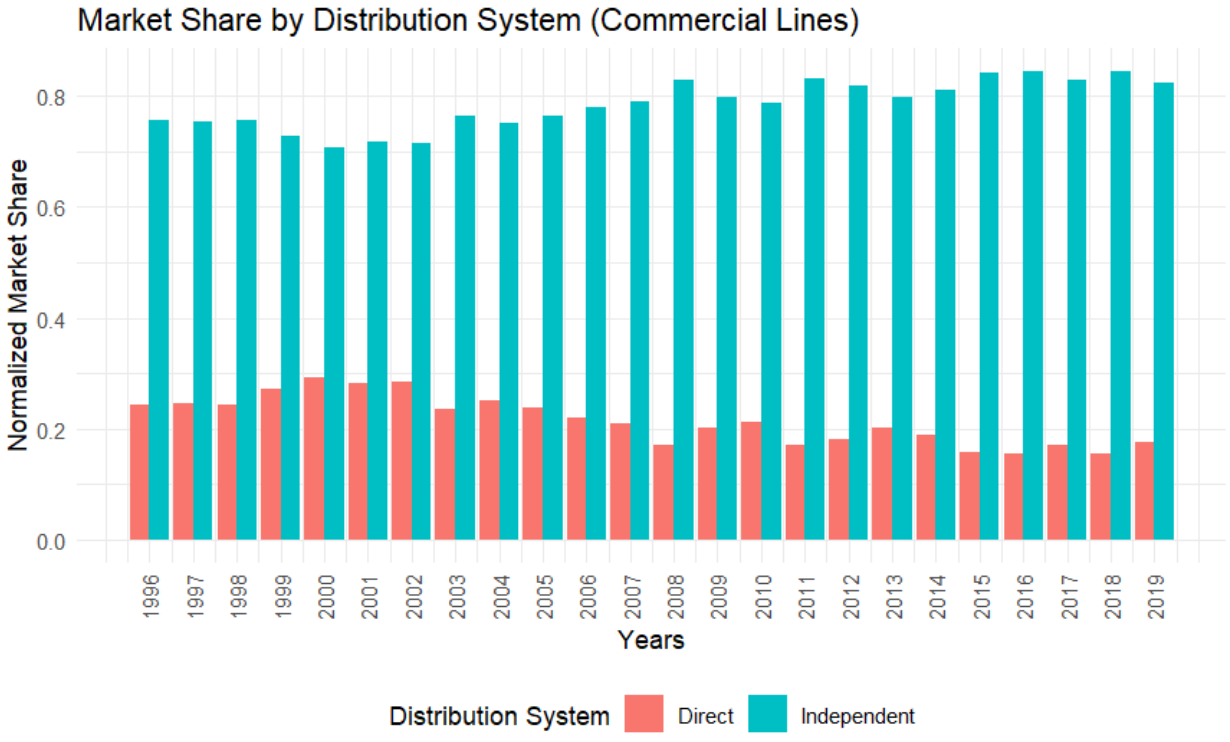
11. Market Share, by Distribution System & Commercial, Personal Lines



Overall, independent agents of insurance can leverage their local knowledge, product flexibility, personalized service, advocacy role, referral network, and competitive pricing to capture a larger share of the market compared to direct or captive agents.

Independent agents typically represent multiple insurance carriers and have access to a wide range of insurance products and services. This flexibility enables them to offer diverse coverage options to meet the diverse needs of their clients. In contrast, direct or captive agents may be limited to selling products from a single company, which could restrict their ability to compete effectively in the market.

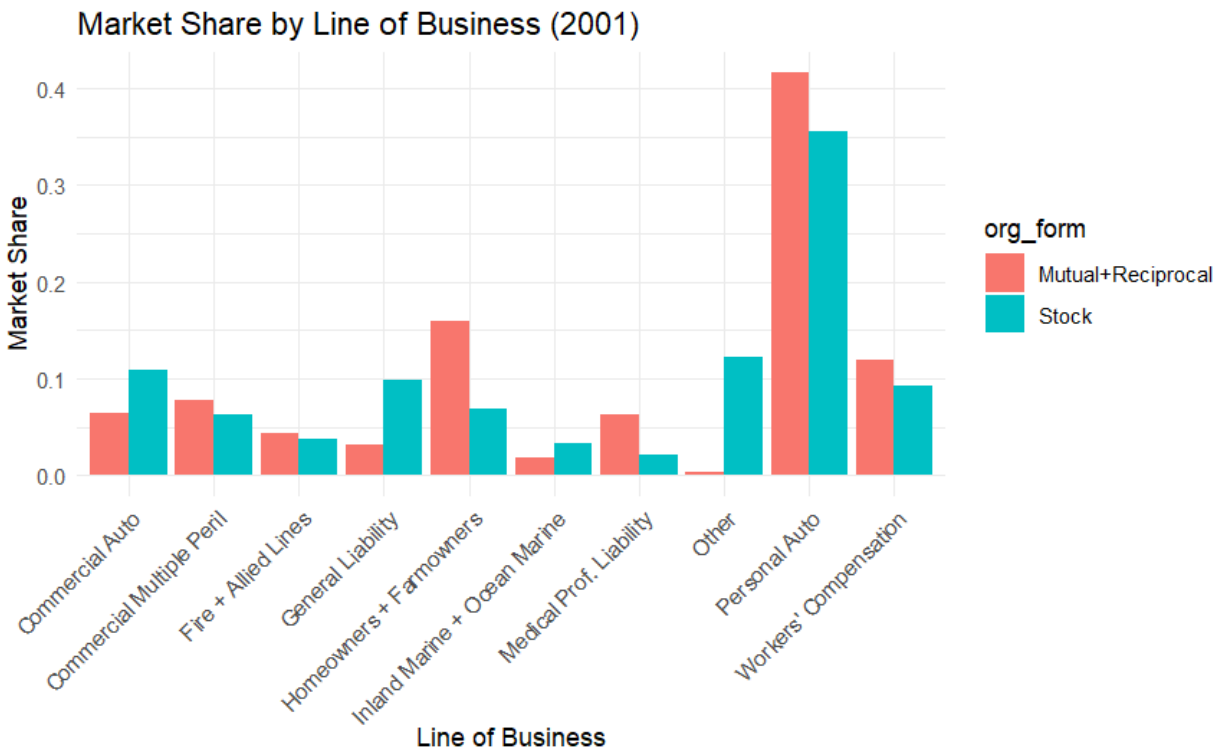




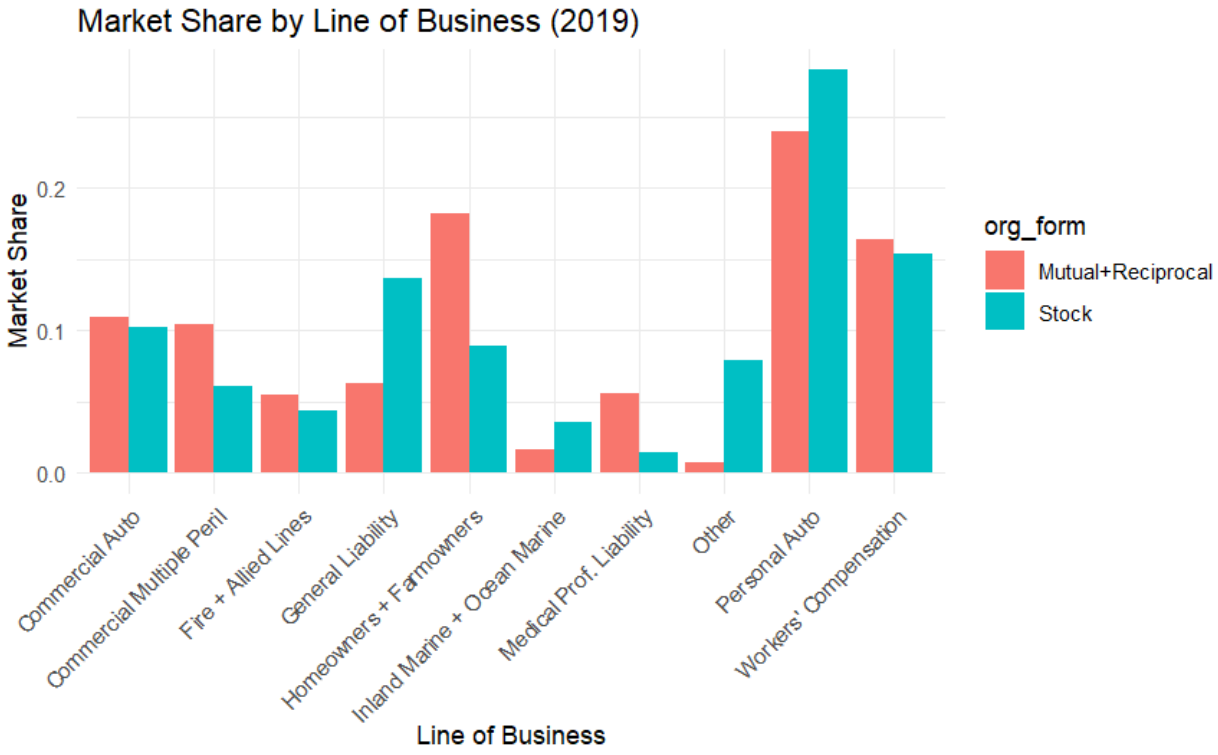
Independent agents have a higher market share in both personal and commercial lines because of personalized service, local expertise, customer relationships, advocacy role, and flexibility of independent agents contribute to their success in both personal and commercial lines of

insurance. These agents are well-positioned to meet the diverse needs of clients and provide them with peace of mind through comprehensive insurance coverage tailored to their individual circumstances. Whereas Direct agents are having a higher market share in personal lines as compared to commercial lines as due to factors like consumer preferences and marketing strategies, the distribution of market share between direct agents and other distribution channels can vary across different insurance markets and regions.

12. Market Share, by Organizational Form and Line

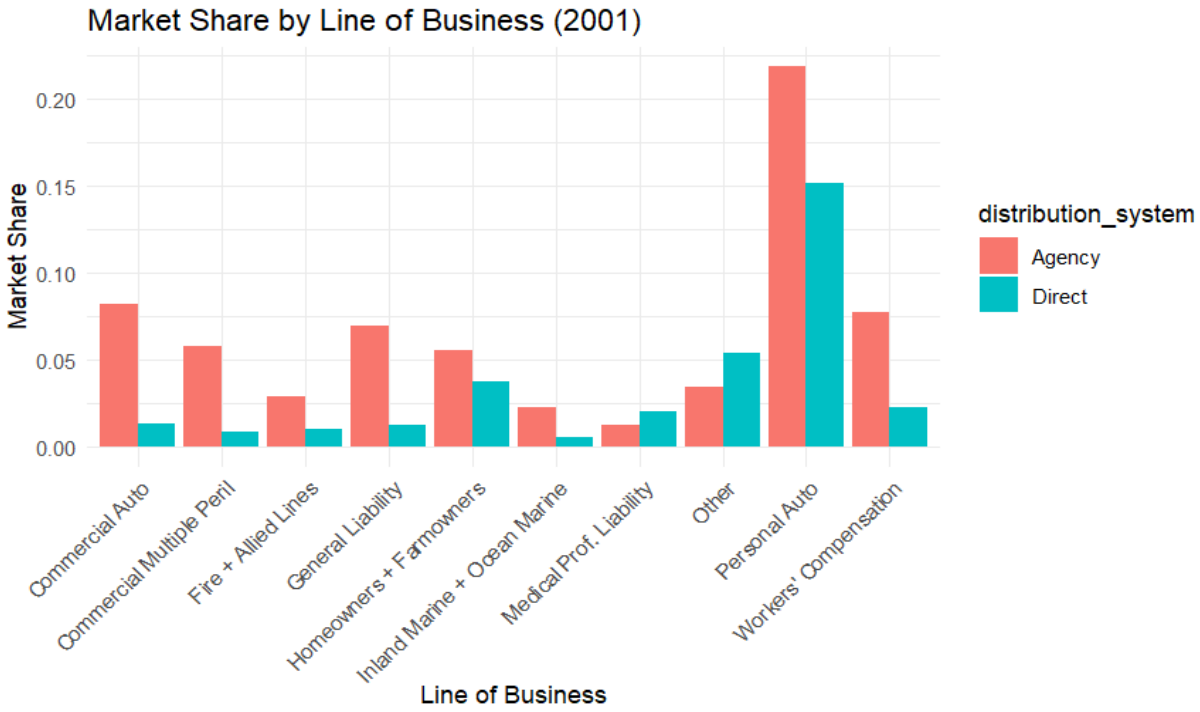


In 2001 , Personal Auto had the most market share in both Mutual and Stock organizational forms. Homeowners + Farmowners insurance is the second highest for both Mutual and Stock, whereas third most common was worker's compensation. In general, Personal auto insurance has become mandatory as a part of law and regulation too because of number of accidents occurring due to lifestyle changes, traffic, natural atmosphere changes etc. It is affordable, high in utility and just like a daily necessity. Overall, the market share of these insurance lines is higher in mutual than stock companies.

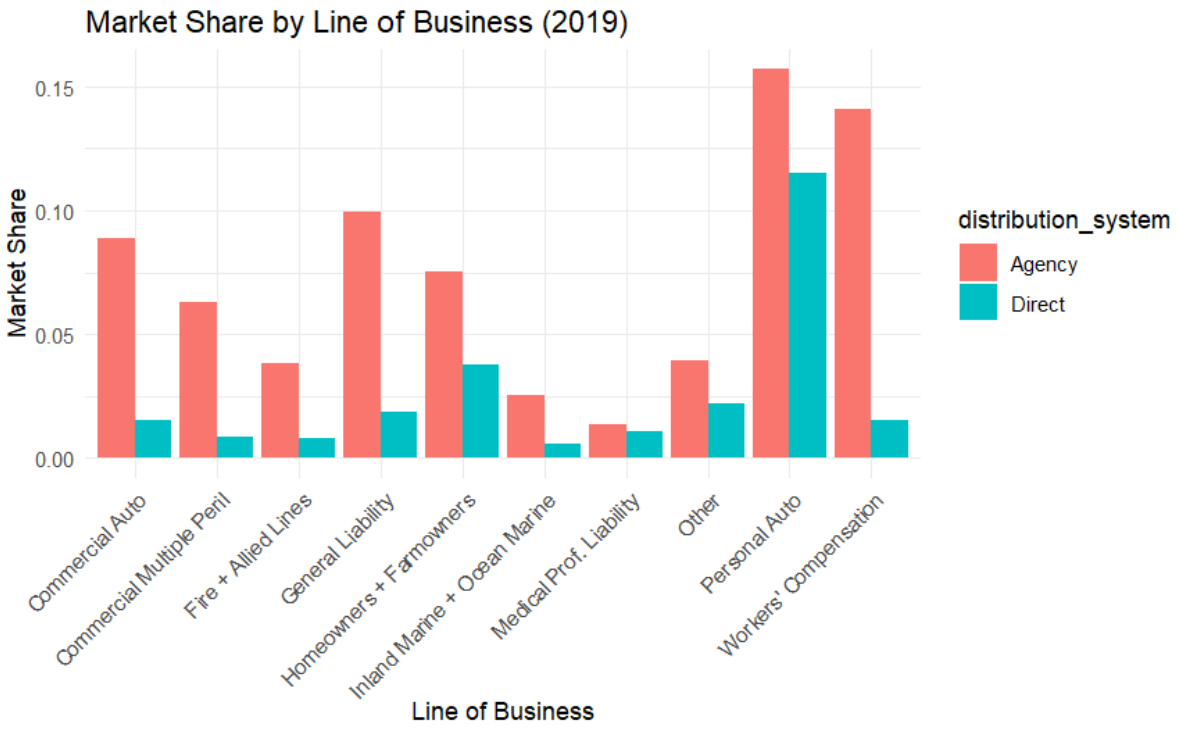


In 2019, Personal Auto still leads the insurance type in both Mutual and Stock and its share exceeds in stock companies this time compared to 2001. Secondly homeowners + farmowners is also higher. We see an increase of overall number of insurance market share growing from 2001 for eg. Worker's compensation insurance has increased due to increased education and awareness and mandate of following the laws and caring for worker benefits.

13. Market Share, by Distribution System and Line



In 2001, market share of Personal Auto remains high market in both distribution types, but it is seen higher in Agency type agents due to more flexibility and consumer support in receiving the most compatible type of insurance tailored to the customer's needs. The second one having market share is commercial auto and workers compensation under commercial lines sold by Agency. This looks different from previous graphs. As compared to Direct agents, Agency agents are selling more insurance in 2001.



Coming to 2019, we see Personal auto still leading the market share for both distribution types. We see Agency agents having more market share of all other insurance types as compared to direct agents. Worker's compensation has almost reached its share second to personal auto. The overall number of insurances have increased their market share compared to 2001.

14. Concentration (Top 4 firms, Top 10 firms, Top 50 firms, Herfindahl) by Line of Insurance

Code link for python notebook:
https://colab.research.google.com/drive/1wXfROtcYgQb1uWJqyis3gQuPbzAGJriQ?usp=sharing

Observation

Medical Professional Liability: The HHI for Medical Professional Liability is consistently the highest of all the lines of insurance listed in the table. It has ranged from 0.39 in 2001 to 0.41 in 2019. This suggests a more concentrated market for medical professional liability insurance. In 2009 Fire and allied lines were higher in top 4 concentration and kept increasing

In 2013 the other line of business was higher and kept increasing

Overall, the insurance lines in the table appear to be moderately concentrated markets. The HHI for most of the lines falls between 0.2 and 0.3. There is some evidence that the market for Homeowners + Farmowners insurance has become less concentrated over time. However, the Medical Professional Liability market appears to be the most concentrated of the lines listed. Commercial Auto: The HHI for Commercial Auto has remained relatively stable over the years, ranging from 0.2 in 2005 and 2019 to 0.24 in 2001. This suggests a moderately concentrated market.

Year	Line_of_Insurance	Top_4_Concentration	Top_10_Concentration	Top_50_Concentration	Herfindahl_Index
2001	Commercial Auto	0.21	0.41	0.77	0.02
2001	Commercial Multiple Peril	0.24	0.39	0.73	0.02
2001	Fire + Allied Lines	0.25	0.44	0.79	0.03
2001	General Liability	0.38	0.57	0.84	0.06
2001	Homeowners + Farmowners	0.21	0.37	0.71	0.02
2001	Inland Marine + Ocean Marine	0.21	0.36	0.77	0.02
2001	Medical Prof. Liability	0.39	0.61	0.95	0.05
2001	Other	0.36	0.72	0.96	0.06
2001	Personal Auto	0.23	0.4	0.8	0.03
2001	Workers' Compensation	0.21	0.4	0.78	0.02
2005	Commercial Auto	0.24	0.4	0.78	0.02
2005	Commercial Multiple Peril	0.2	0.38	0.77	0.02
2005	Fire + Allied Lines	0.2	0.37	0.77	0.02
2005	General Liability	0.28	0.49	0.81	0.03
2005	Homeowners + Farmowners	0.32	0.45	0.74	0.05
2005	Inland Marine + Ocean Marine	0.28	0.45	0.81	0.03
2005	Medical Prof. Liability	0.36	0.59	0.93	0.05
2005	Other	0.33	0.63	0.93	0.05
2005	Personal Auto	0.25	0.41	0.79	0.03
2005	Workers' Compensation	0.21	0.38	0.78	0.02
2009	Commercial Auto	0.25	0.39	0.78	0.03
2009	Commercial Multiple Peril	0.2	0.35	0.76	0.02
2009	Fire + Allied Lines	0.41	0.57	0.85	0.06
2009	General Liability	0.23	0.41	0.79	0.03
2009	Homeowners + Farmowners	0.21	0.35	0.7	0.02
2009	Inland Marine + Ocean Marine	0.27	0.47	0.84	0.03
2009	Medical Prof. Liability	0.3	0.53	0.91	0.04
2009	Other	0.36	0.58	0.89	0.05
2009	Personal Auto	0.27	0.43	0.77	0.03
2009	Workers' Compensation	0.2	0.36	0.75	0.02
2013	Commercial Auto	0.24	0.38	0.77	0.03
2013	Commercial Multiple Peril	0.16	0.31	0.71	0.02
2013	Fire + Allied Lines	0.22	0.41	0.8	0.03
2013	General Liability	0.25	0.43	0.8	0.03
2013	Homeowners + Farmowners	0.19	0.31	0.69	0.02
2013	Inland Marine + Ocean Marine	0.26	0.47	0.85	0.03
2013	Medical Prof. Liability	0.37	0.64	0.96	0.05
2013	Other	0.37	0.62	0.91	0.05
2013	Personal Auto	0.26	0.4	0.78	0.03
2013	Workers' Compensation	0.17	0.36	0.77	0.02
2019	Commercial Auto	0.2	0.36	0.77	0.02
2019	Commercial Multiple Peril	0.16	0.31	0.7	0.02
2019	Fire + Allied Lines	0.19	0.39	0.78	0.02
2019	General Liability	0.23	0.4	0.77	0.02
2019	Homeowners + Farmowners	0.15	0.29	0.66	0.01
2019	Inland Marine + Ocean Marine	0.25	0.46	0.83	0.03
2019	Medical Prof. Liability	0.41	0.63	0.96	0.06
2019	Other	0.38	0.61	0.91	0.05
2019	Personal Auto	0.27	0.39	0.78	0.05
2019	Workers' Compensation	0.23	0.43	0.8	0.03