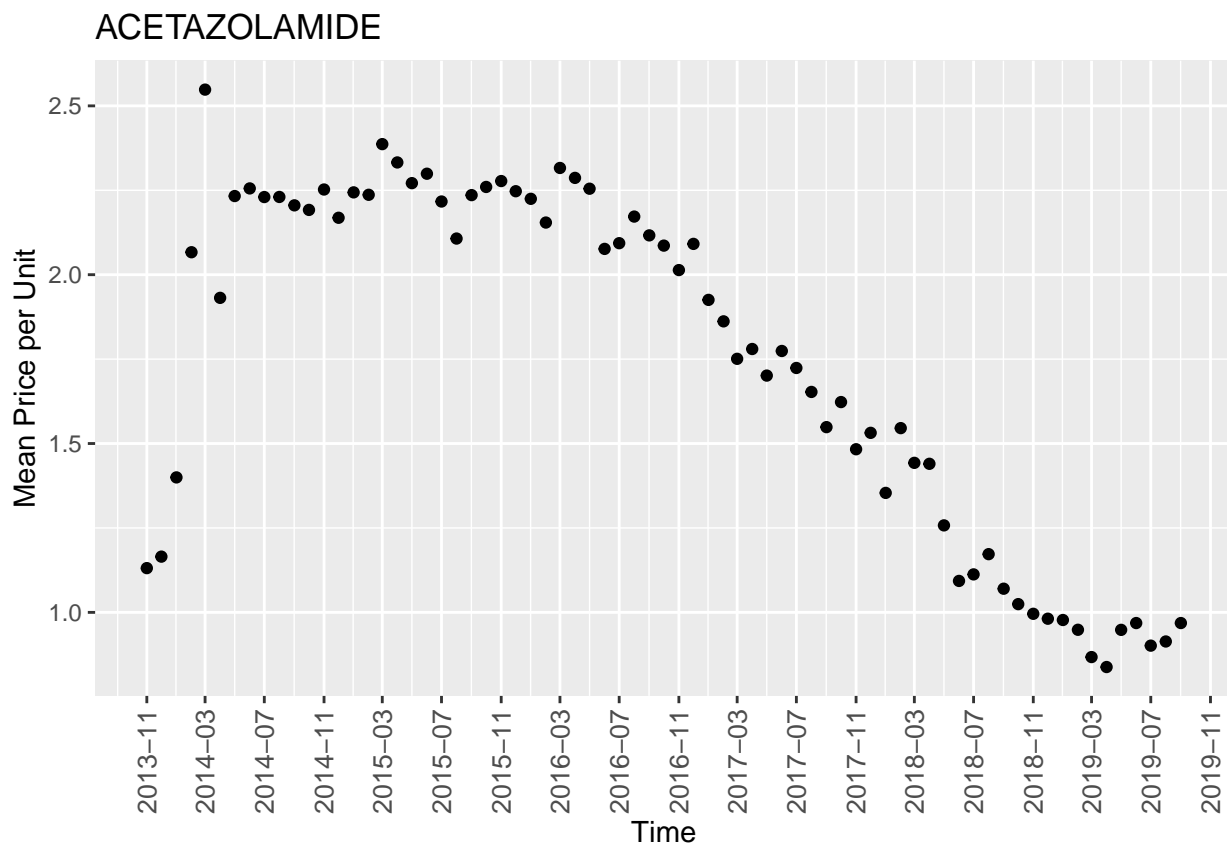


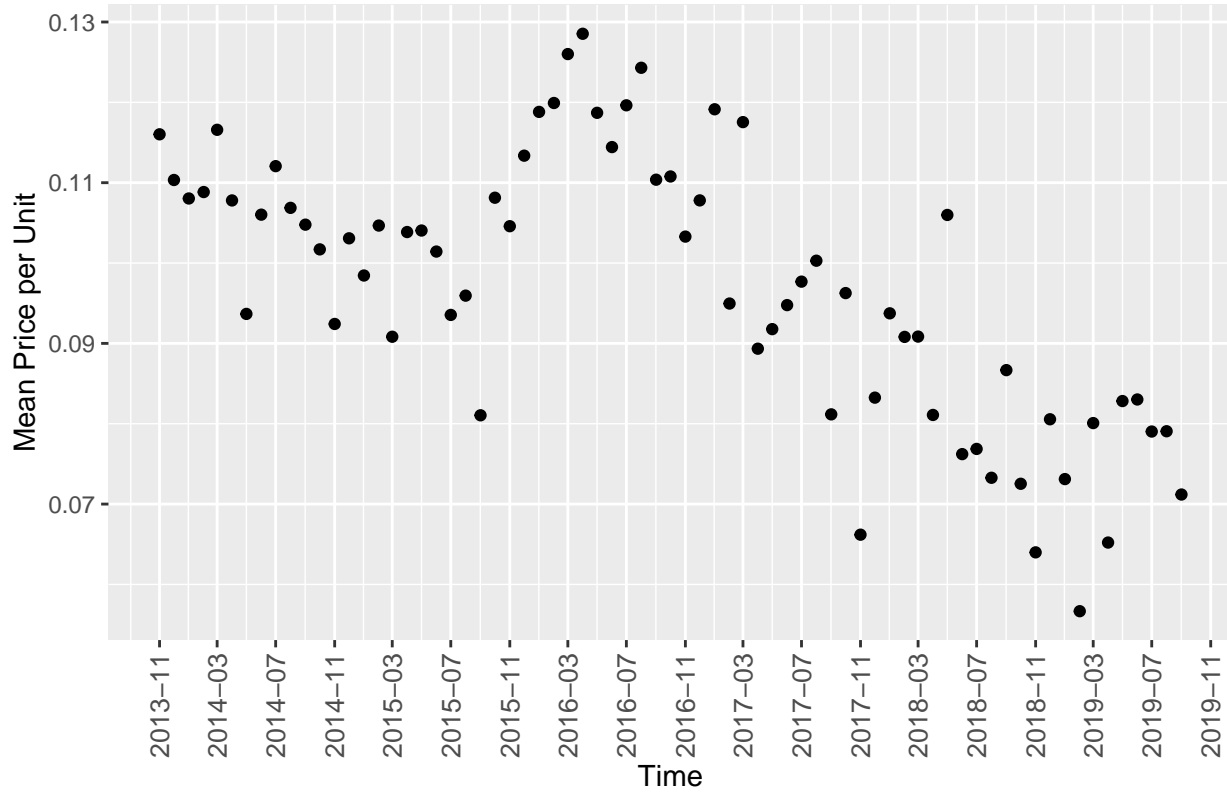
Top Cartelized Drugs' Price over Time

1. Scatter Plots of Top Cartelized Drugs' Mean Price over Time

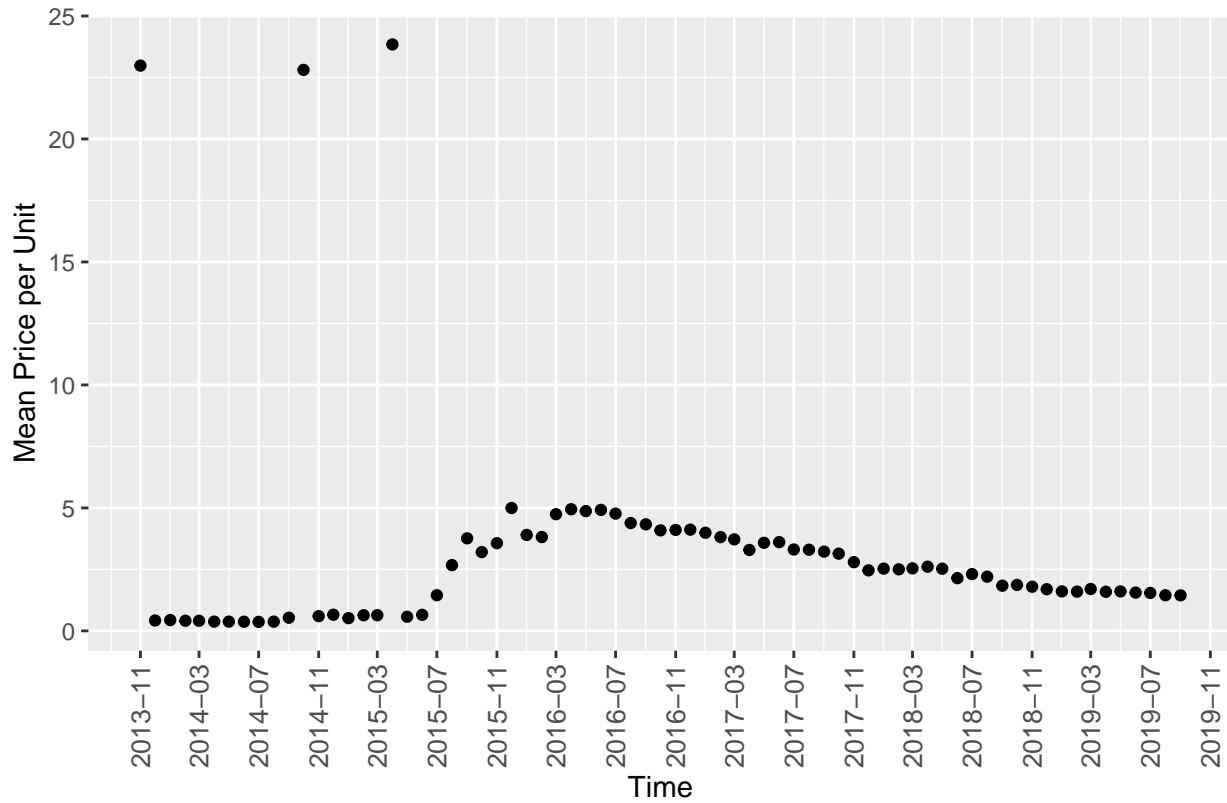
Scatter plots of selected drugs from the list of top cartelized drugs obtained from literature are presented as below. Some definite trends can be seen in mean price unit over time. However, there are also the occasional outliers. This is due to the fact that price data for different drug products is not reported to the system at the same consistent intervals (some monthly, some every 4 months, etc.). There is thus missing data within the dataset across time, and when mean price is aggregated over month for each drug, the occasional inclusion of certain drugs offering would make the mean price for that month jump drastically. For subsequent analysis, backfilling missing data must be carried out to overcome this complication.

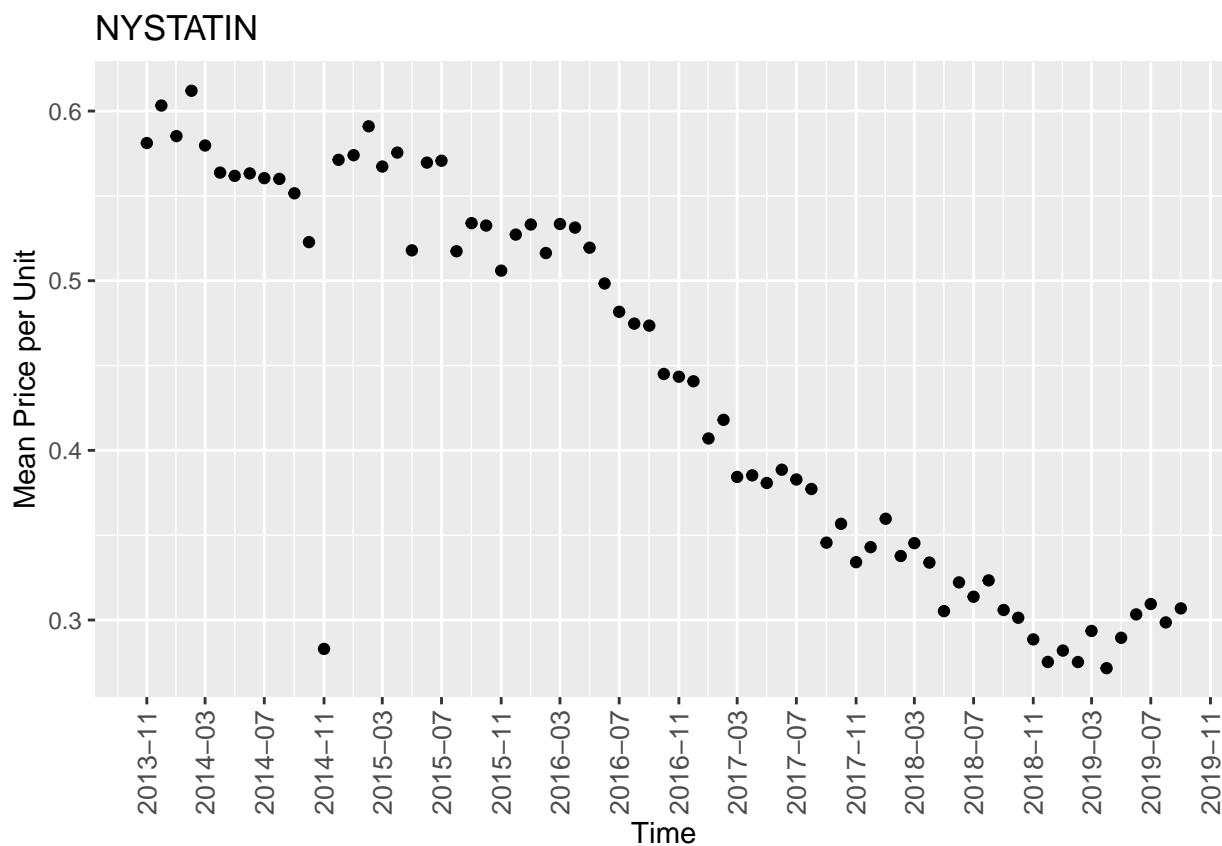


GLYBURIDE



LEFLUNOMIDE

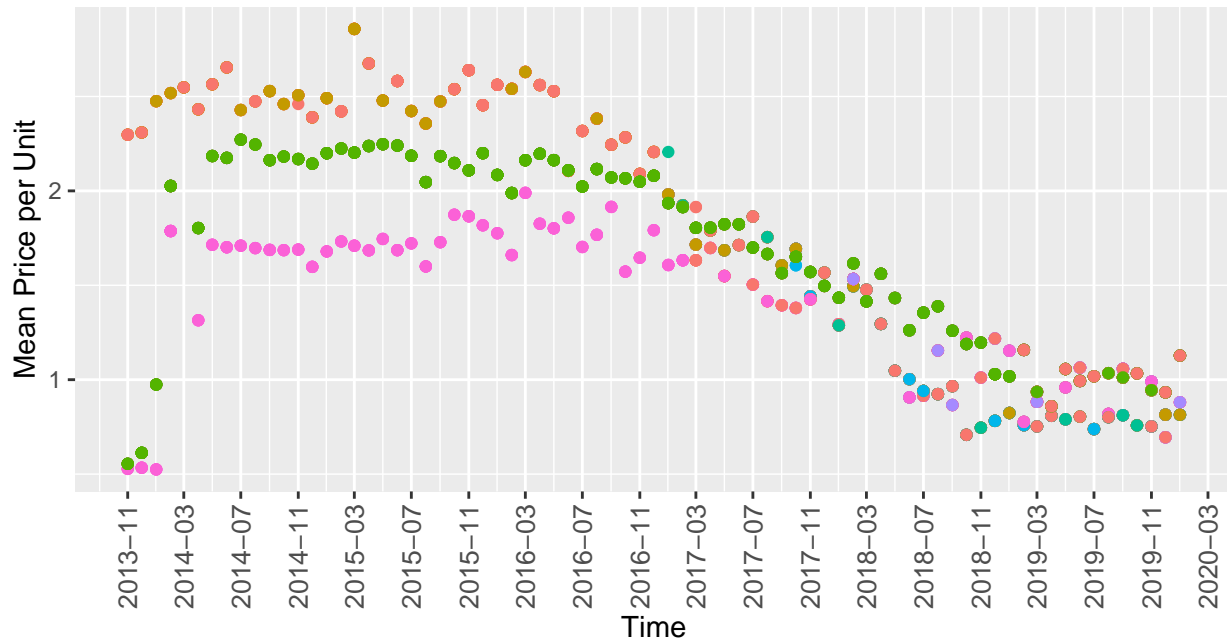




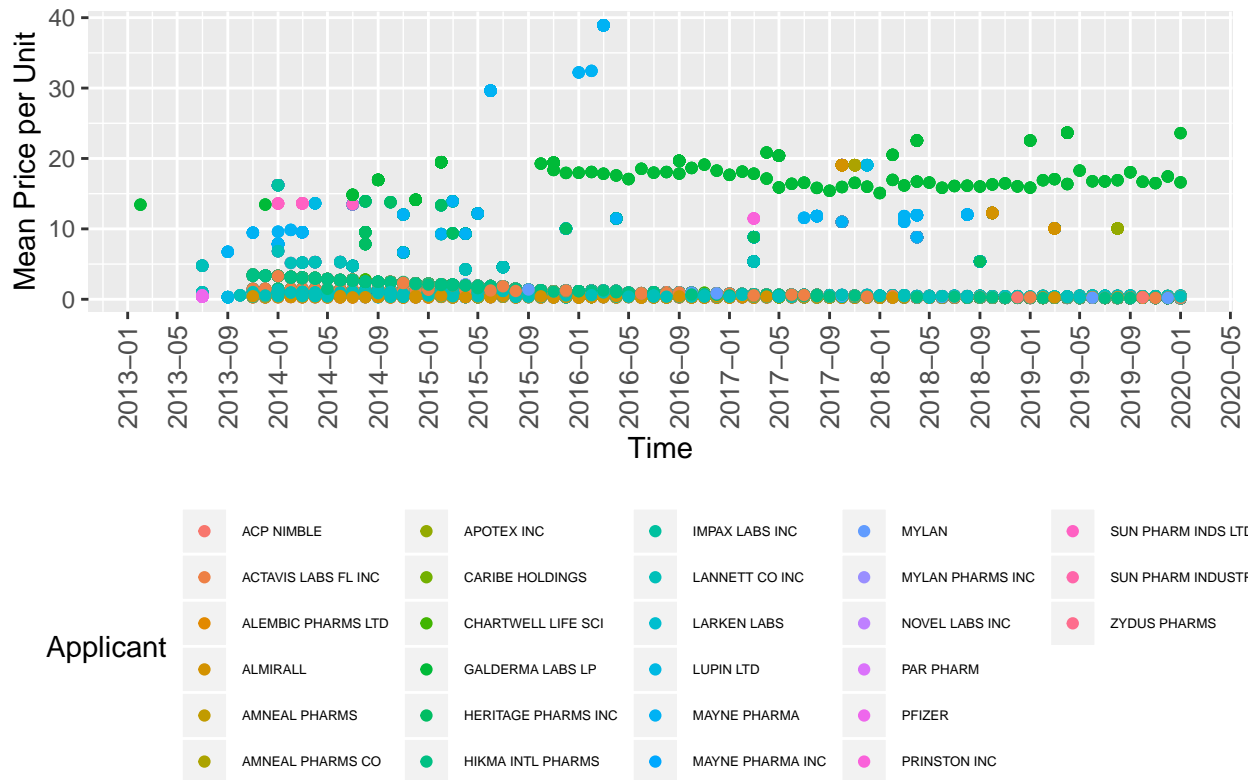
2. Scatter Plots of Top Cartelized Drugs' Price over Time by Applicant

To further investigate market competition, selected scatter plots are produced for top cartelized drug prices, this time segregated by applicants (i.e. manufacturers). It can be observed that for each market defined by a specific active ingredient/drug molecule, there is very clear segmentation visible in mean price. This is due to the fact that while the active ingredient may be the same chemical molecule across different manufacturers, manufacturers do produce the drugs in different dosage and forms.

ACETAZOLAMIDE


















DOXYCYCLINE

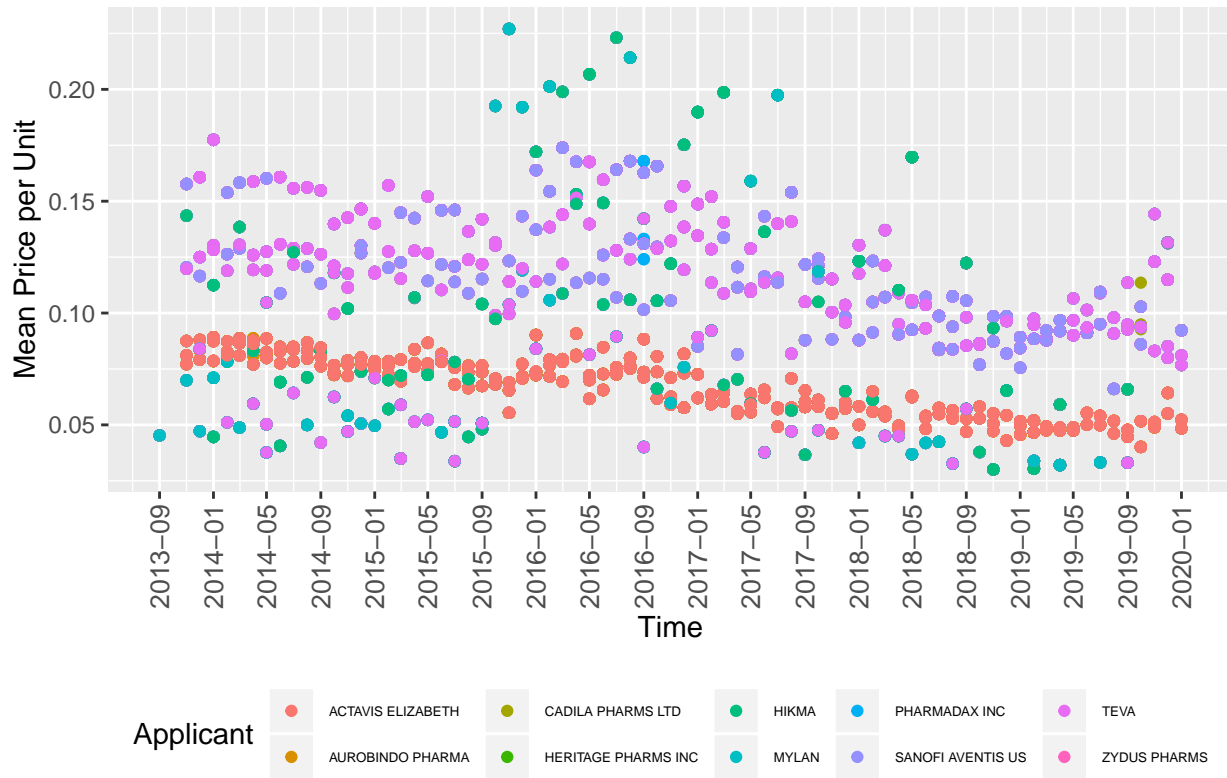


	AUROBINDO PHARMA		EMCURE PHARMS LTD		PRINCETON INC		UPSHER SMITH LABS
	AUROBINDO PHARMA LTD		INVAGEN PHARMS		TEVA		

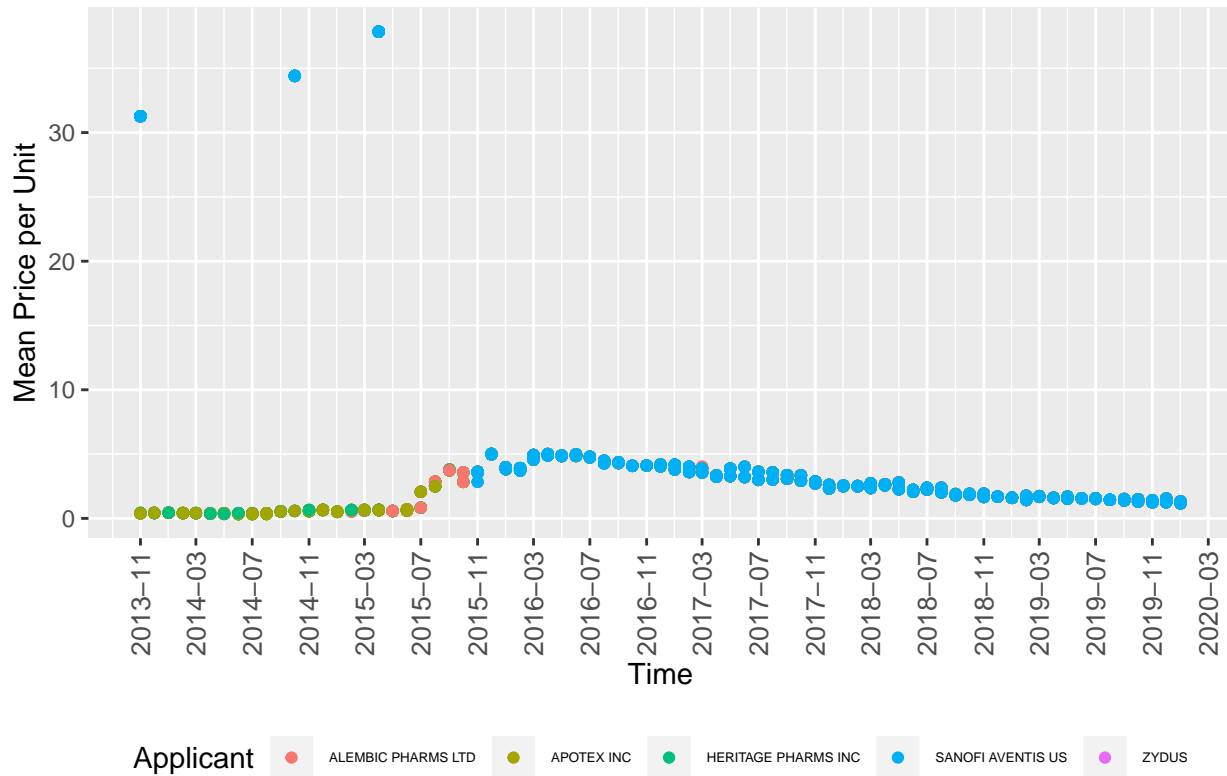
The scatter plot displays the mean price per unit for five regions from July 2013 to March 2020. The y-axis, 'Mean Price per Unit', ranges from 0 to 3. The x-axis, 'Time', shows dates at six-month intervals. The data points are color-coded by region: blue (North America), green (Europe), purple (Asia), orange (Oceania), and pink (Africa). Most regions maintain a relatively stable price between 0.1 and 0.6 units throughout the period. However, the Europe region (green) shows a significant upward trend starting in late 2016, peaking at approximately 3.1 units in early 2018 before declining. North America (blue) also shows a slight increase in price starting around late 2016, peaking around 0.6 units in early 2018. The other regions (Asia, Oceania, Africa) remain relatively stable and low, generally below 0.4 units.

	ACCORD HLTHCARE		HERITAGE PHARMS INC		PFIZER		TEVA PHARMS		WATSON LABS TEV
	APOTEX		MYLAN		SANDOZ		UNIQUE PHARM LABS		ZYDUS PHARMS
	AUROBINDO PHARMA LTD		PAR PHARM		SUN PHARM INDS INC		WATSON LABS		ZYDUS PHARMS US

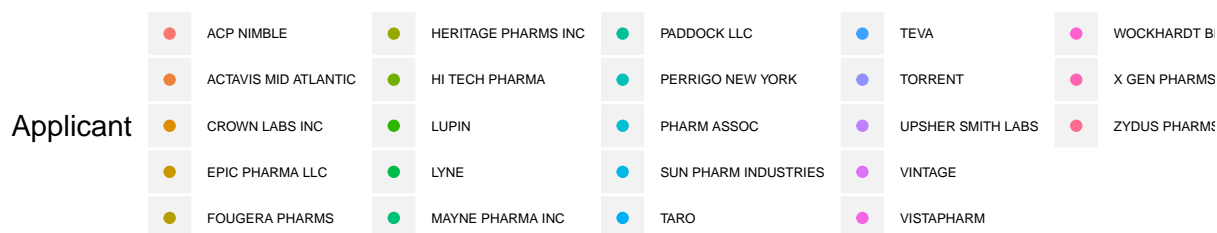
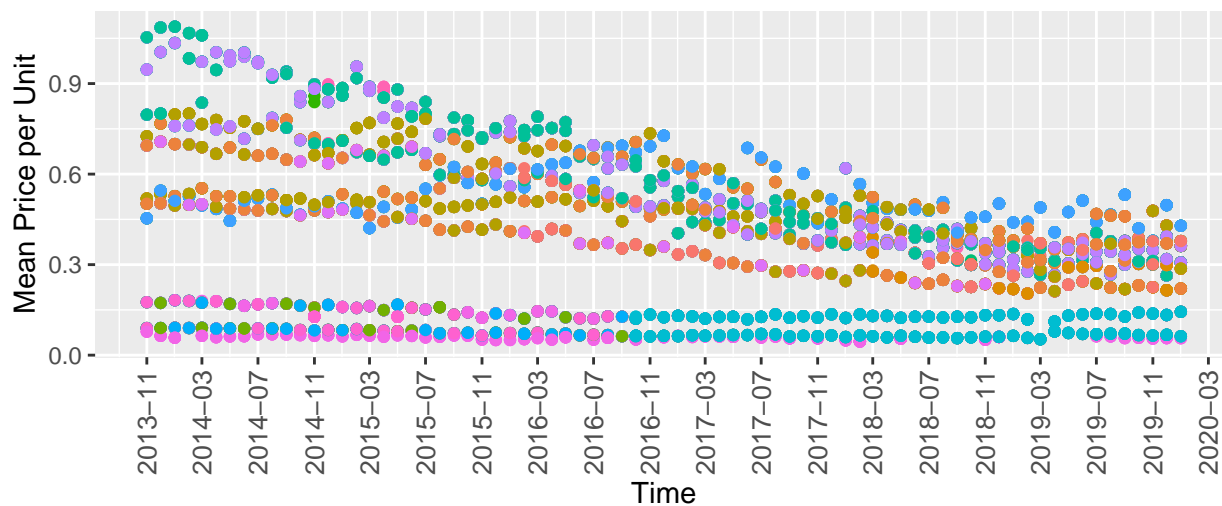
GLYBURIDE



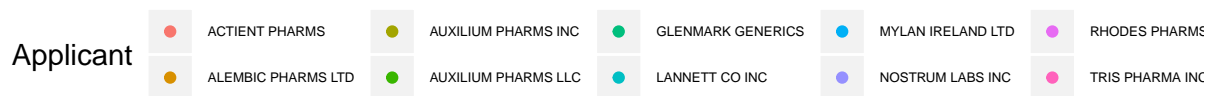
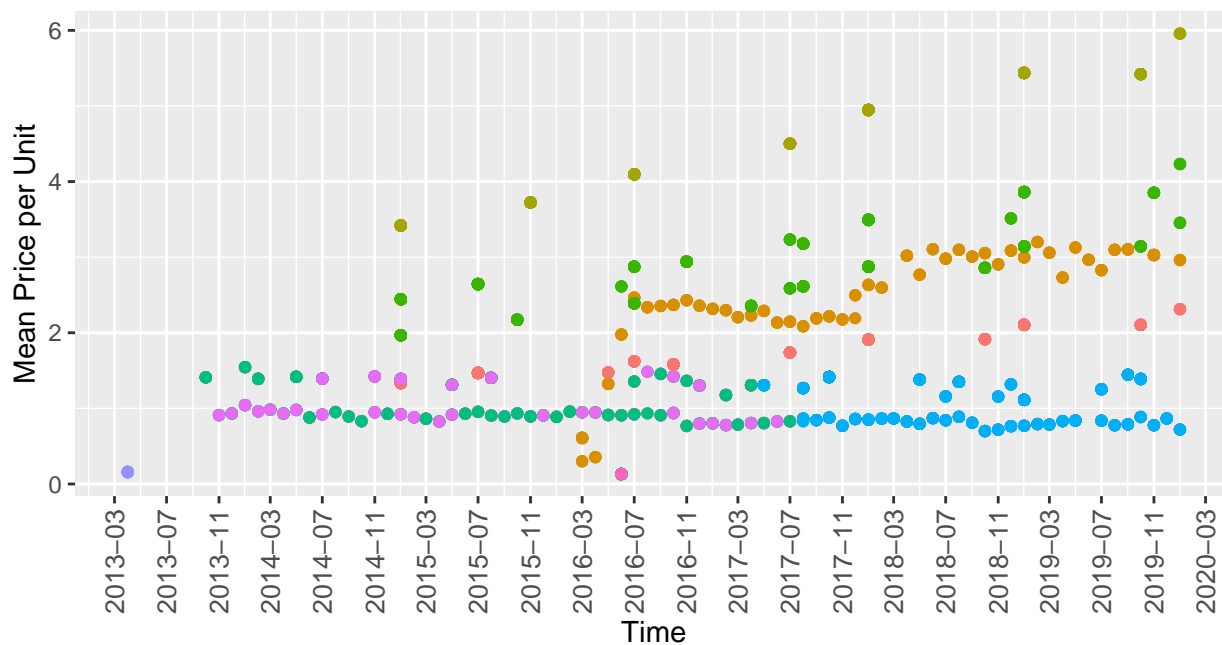
LEFLUNOMIDE



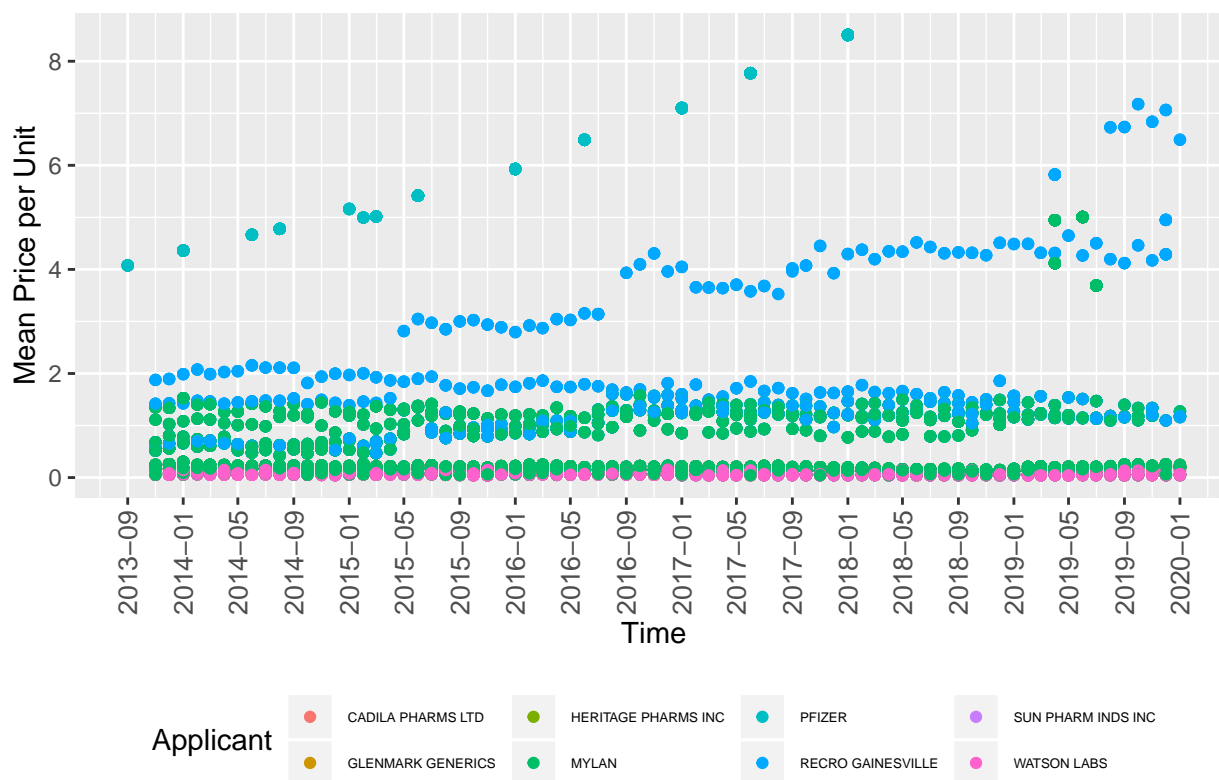
NYSTATIN



THEOPHYLLINE ANHYDROUS



VERAPAMIL HYDROCHLORIDE



3. Conclusion

This project demonstrates the feasibility of churning out price time-series data from publicly available information to produce evidence for collusion. There were two significant complications encountered: missing data across time requiring specific back-filling techniques, and manual adjustments for drug's names. While no definite conclusion regarding collusion can be reached at this time, the methodology demonstrates potential in churning out this data with more refinements.