

# Nowcasting Thailand Economic Activity Using the Google Mobility Data

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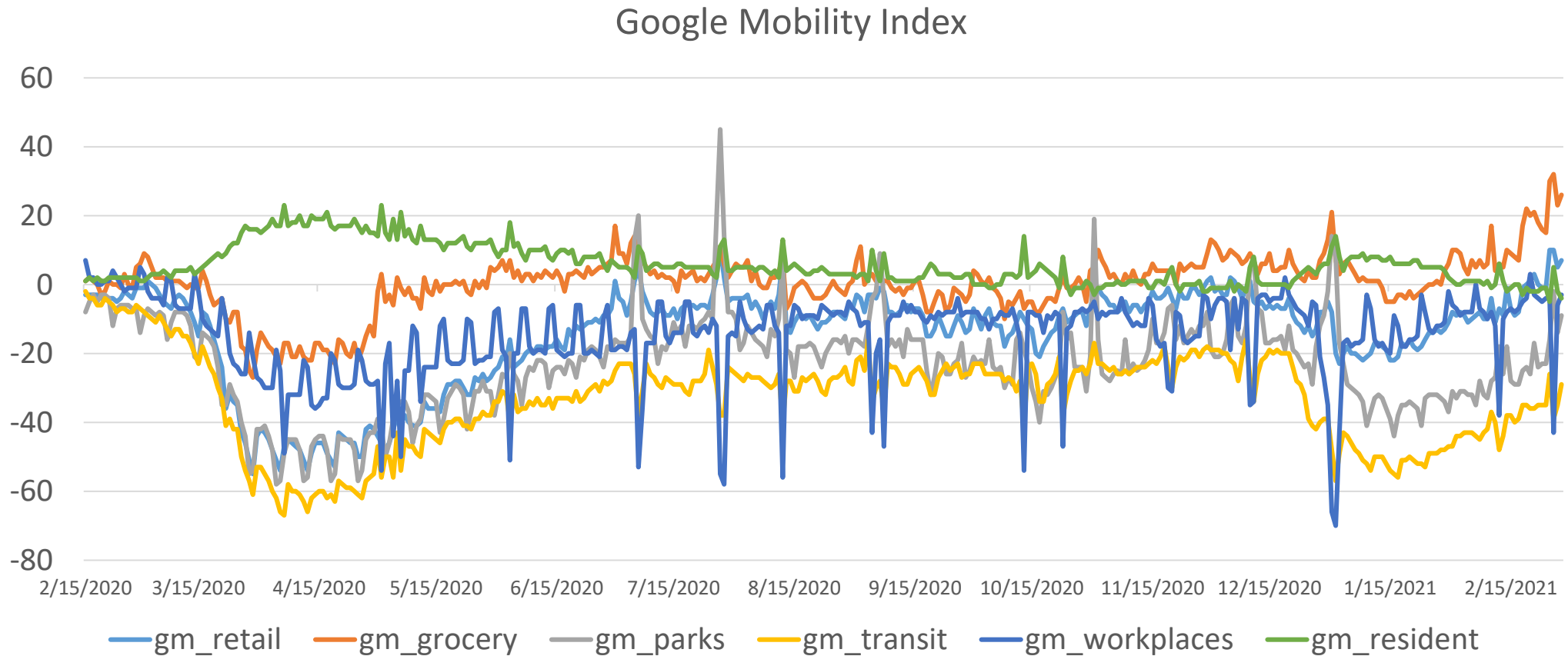
# Motivation and Objective

- Forecasting economic activity in the covid-19 pandemic era
- Most of Thailand's economic indicators lag in an announcement
  - GDP announcement (1 month and 3 weeks)
  - Monthly indicators (most of them at least one month lag)
- Novel data – Google Mobility Data
- **Objective: Compare the forecasting performance of the ARIMA, ARIMAX and MIDAS using google mobility index on Thailand's economic activity**

# Google Mobility Data

- Google – “community mobility index” show movement trends by region, across different categories of places
  - Grocery & pharmacy, Parks, Transit stations, Retail & recreation, Resident, Workplaces
  - Percentage change from a baseline level (median value for 5 weeks between early Jan and Feb 2020)

# Google Mobility Data



# Literature Review

- Using Mobility data to forecast covid19 case – Ilin et al (2020)
- Economic Activity and Google Mobility – Sampi and Jooste (2020), Putra and Arini (2020)
- Nowcasting in Thailand with Google Trend – Nakavachara and Lekfuangfu (2018)

# Nowcasting Exercise (1)

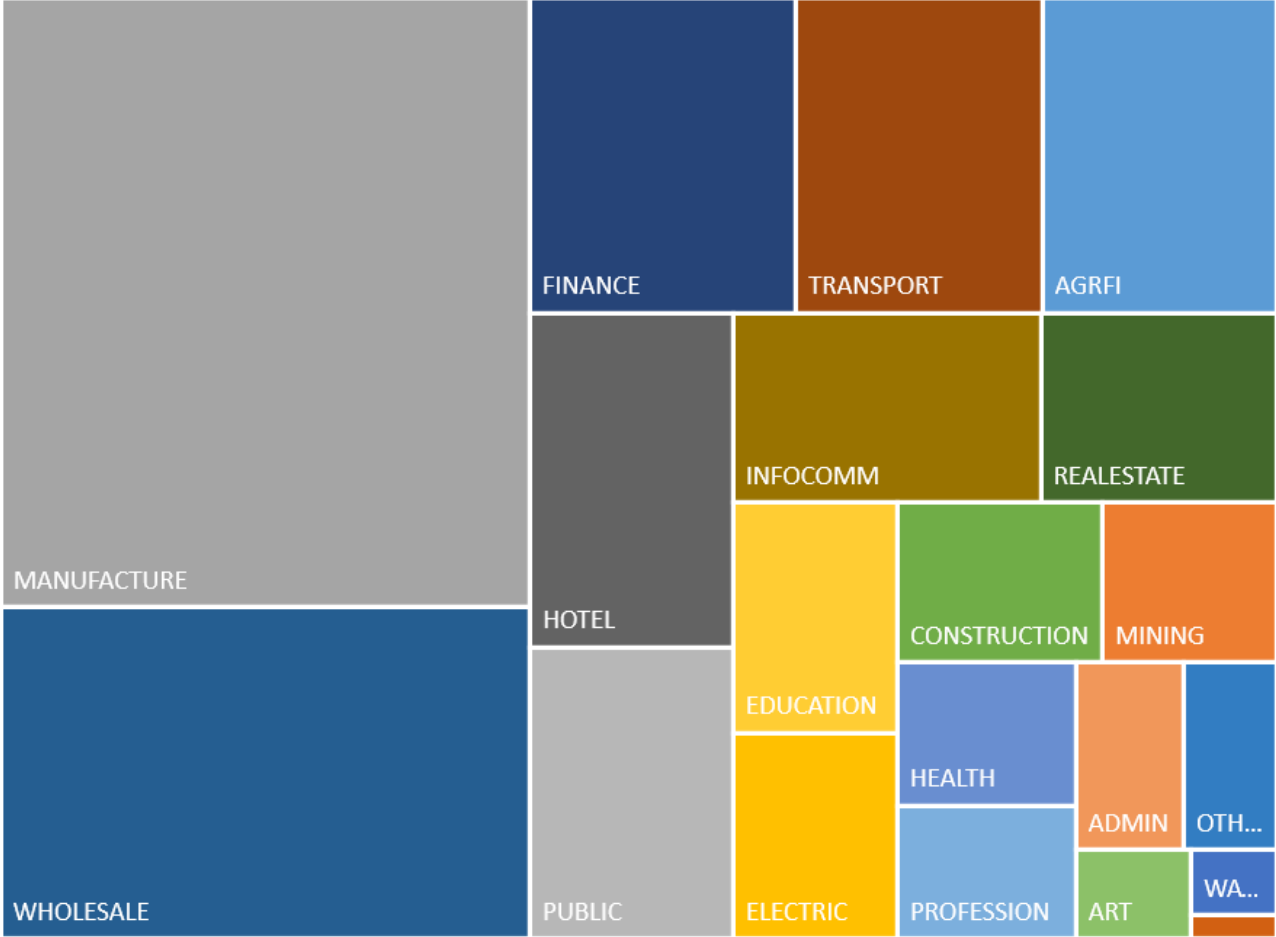
- Compare three models
  - ARIMA model
    - only the past information of target variable
    - Longer estimation period
  - ARIMA model with explanatory variable –ARIMAX
    - Use the monthly average of google mobility (the beginning period – Feb 2020), try different index
    - Shorter estimation period – but we can figure out the usefulness of forecasting (Hyndman's book)
  - Mixed Data Sampling (MIDAS)
    - Lag of daily google mobility

# Nowcasting Exercise (2)

- The last data of SPI and MPI – January 2021
- Test period - December 2020 and January 2021
- Comparing one-period ahead forecast
- Model selection for ARIMA and ARIMAX using data through November 2020

# THAI ECONOMY

GDP 2015-2019

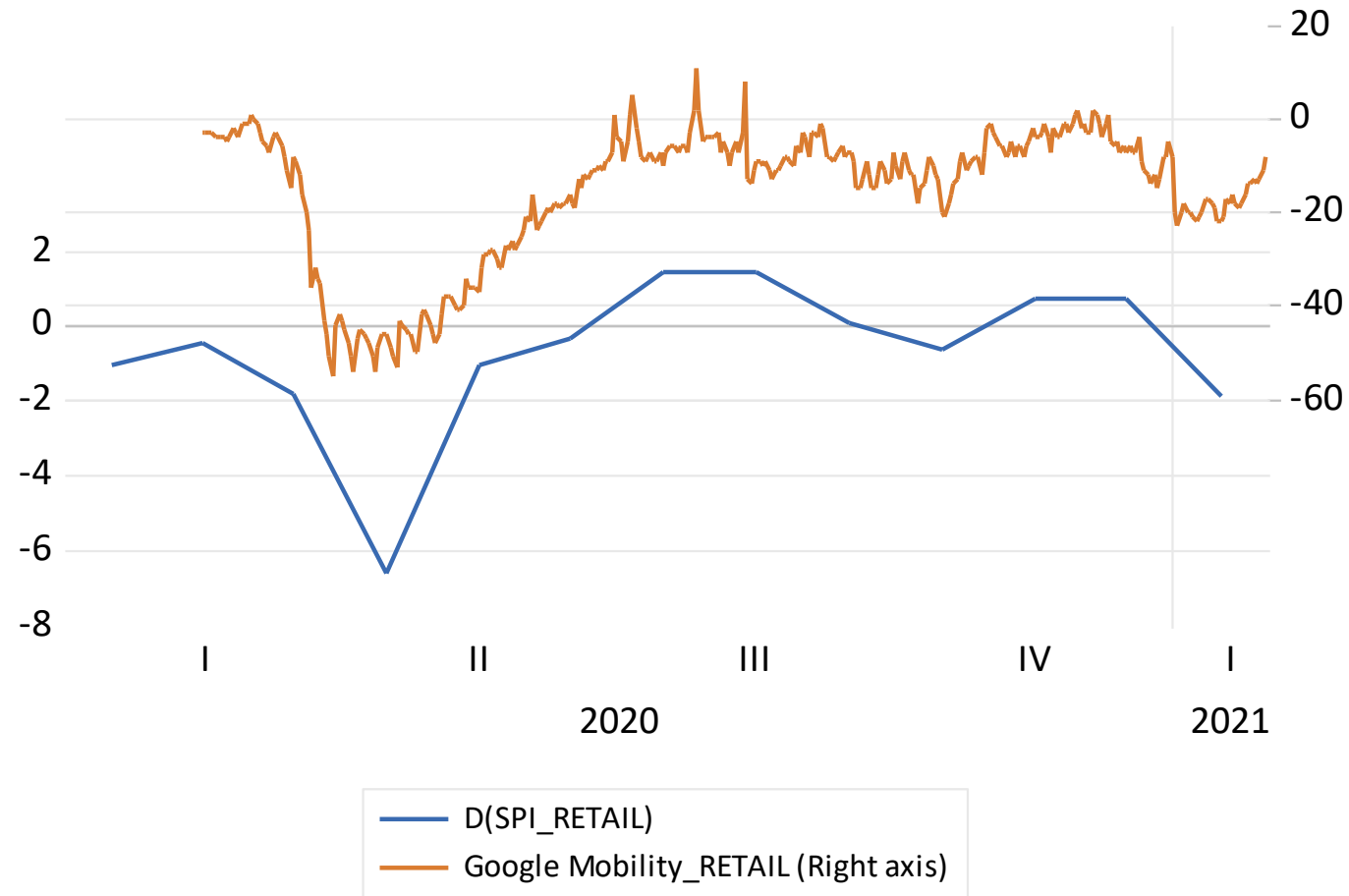




# Data

- Economic Activity – Focus on the monthly indicators (good proxy for the Real GDP)
- Service Production Index (service sector- 65% of GDP) - monthly
- Manufacture Production Index (industry sector – 35 % of GDP) – monthly
- Google Mobility Index – daily data from Feb 2020

# Relationship between SPI and Google Mobility



# Result (1)

- Retail, Transport, hotel, information, real estate –google mobility index seems work well
- MIDAS performs better than ARIMA in most cases

MAPE (%)	ARIMA	ARIMAX						MIDAS					
		grocery	parks	resident	retail	transit	workplaces	grocery	parks	resident	retail	transit	workplaces
spi_retail	<b>1.60</b>	0.78	<b>0.23</b>		0.41	0.83	1.24	1.23	2.36	1.12	<b>0.03</b>	2.33	1.50
spi_transport	<b>11.52</b>	4.43	<b>1.48</b>	7.93	7.29	3.29	5.41	7.56	9.92	57.31	<b>2.94</b>	8.25	5.51
spi_hotel	<b>98.84</b>	54.00	<b>27.73</b>	36.39	62.11	64.50	28.26	42.59	56.40	<b>12.13</b>	67.72	79.26	22.54
spi_info	<b>9.32</b>	16.09		14.39	18.01	17.05	15.80	10.62	13.20	14.34	12.21	12.61	<b>4.03</b>
spi_realestate	<b>5.12</b>		9.35	9.68	11.14	6.66	<b>6.45</b>	6.23	20.84	14.01	<b>1.67</b>	12.61	5.68

# Result (2)

- Models with Google mobility perform worse than ARIMA – Finance and Public Administration, MPI

MAPE (%)	ARIMA	ARIMAX						MIDAS					
		grocery	parks	resident	retail	transit	workplaces	grocery	parks	resident	retail	transit	workplaces
spi_finance	<b>2.47</b>	14.74	7.54	5.41	4.76	6.18	<b>3.08</b>	14.75	21.12	<b>3.68</b>	12.71	25.32	18.72
spi_public	<b>1.22</b>		11.64	13.88		14.30	16.38	4.00	4.95	9.02	<b>1.80</b>	2.39	5.02
mpi	<b>2.31</b>	11.27	13.81	<b>5.70</b>	7.66	17.85	7.46	12.56	16.94	11.15	11.53	20.66	10.78

# Conclusion

- Google mobility help improving forecasting in most service sectors.
- The performance between ARIMAX and MIDAS depends on the sector considered.
- ARIMA model performs between than the ones with Google Mobility in Finance, Public Administration (sectors that are quite stable).
- Google mobility does not improve Manufacturing index forecasting performance.