



Futures Team

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Security

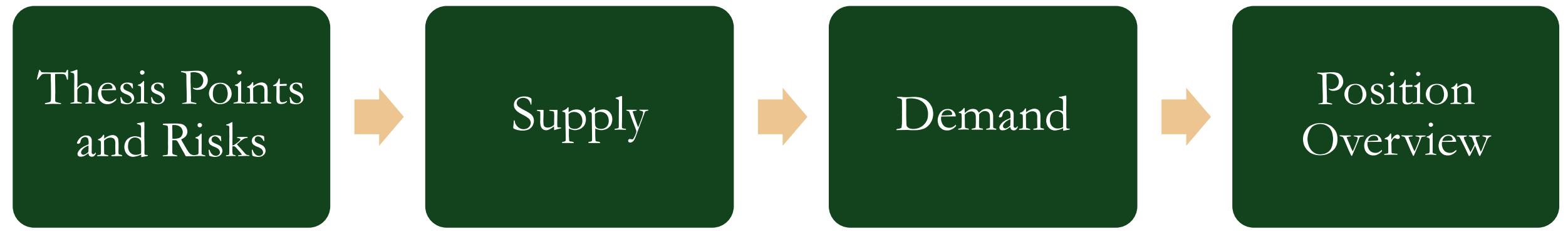
Palladium (\$XPD)

View

Bearish

Investment

Sell Palladium Futures
Contract (\$PAZ5)
Expires December 29th,
2025



Thesis

- About 85% of palladium is used in catalytic converters, which electric vehicles do not require
- Current market sentiment indicates a potential decrease of automobile demand
- Russia exports around 45% of palladium, so the easing of tensions could increase the supply
- Elevated interest rates reduce the demand for automobiles

Thesis Risks

- The growth of hybrid vehicles could outpace the growth of electric vehicles
- President Trump ends the 25% tariff on automobile parts, decreasing the price of automobiles thus spurring demand
- Currency risk adds a risk of our contract price increasing due to strengthening currencies
- New use cases for palladium would increase demand

Background Information

What is Palladium

- Palladium is a precious grey white metal, that is often found as a byproduct of other metals
- It has many use cases like: catalytic converters, electronics, medicine, dentistry, etc.
 - However catalytic converters is the most common by far at 85% of palladium usage
 - The production of this metal is heavily concentrated

The Main Use of Palladium

- The main use of palladium is for catalytic converters
- This is the converter used to reduce harmful emissions from the car engine
- It is seen in hybrid & petroleum cars but not used in electric vehicles

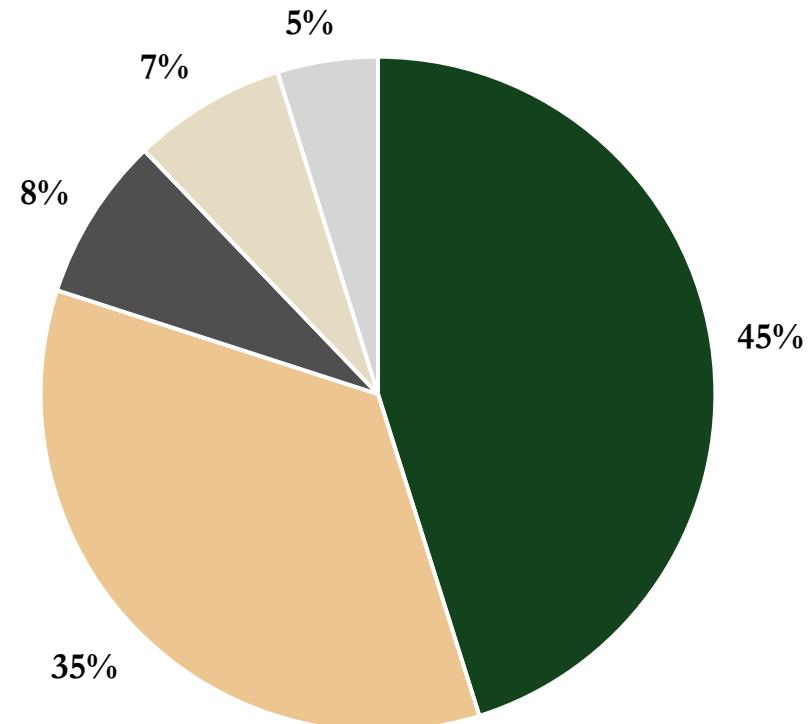


Supply

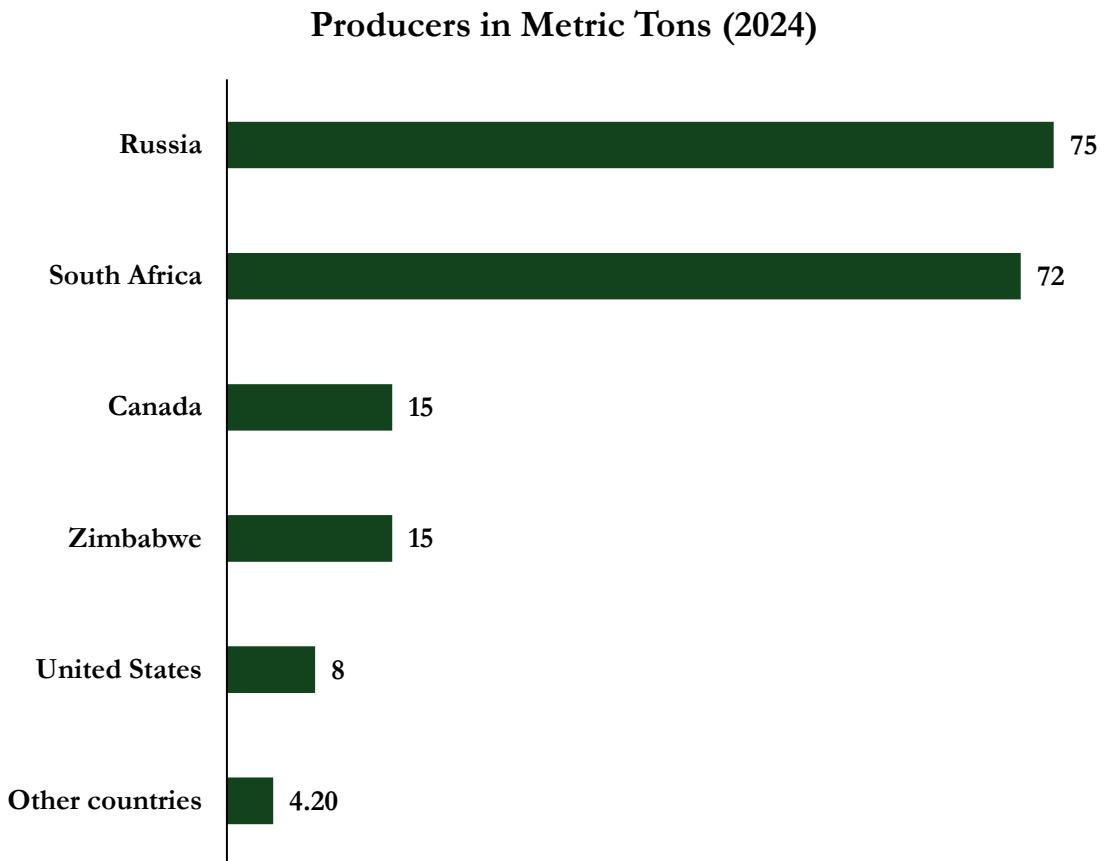
Palladium Recycling

- Recent news about palladium involve a scientific discovery of palladium particles growing and contracting with an experiment
- The small group of palladium particles were able to be restructured into a larger nanoparticle structure
 - This potentially allows for the recycling of palladium particles
 - As palladium is around 30 times rarer than gold, this discovery can help boost the supply of palladium
- If scientists are able to control the stability of palladium nanoparticles, this could revolutionize the way palladium is used

Top Producers of Palladium



■ Russia ■ South Africa ■ Canada ■ Zimbabwe ■ United States



Russia and Ukraine Conflict

Russia

- Stalling negotiations on peace talks
 - Trump has threatened “secondary tariffs” on buyers of Russian oil
- Putin proposed UN led temporary government
 - Challenged Zelenskiy’s legitimacy raising tensions
- 3/28 - sent a drone strike killing 4

Ukraine

- Ukraine wants to change Trump’s aid proposal
 - This proposal would give U.S. control over mining, oil, gas, and minerals
 - Trump claims Zelenskiy is trying to back out of the deal
- Ukraine agreed to a ceasefire pending Russian agreement

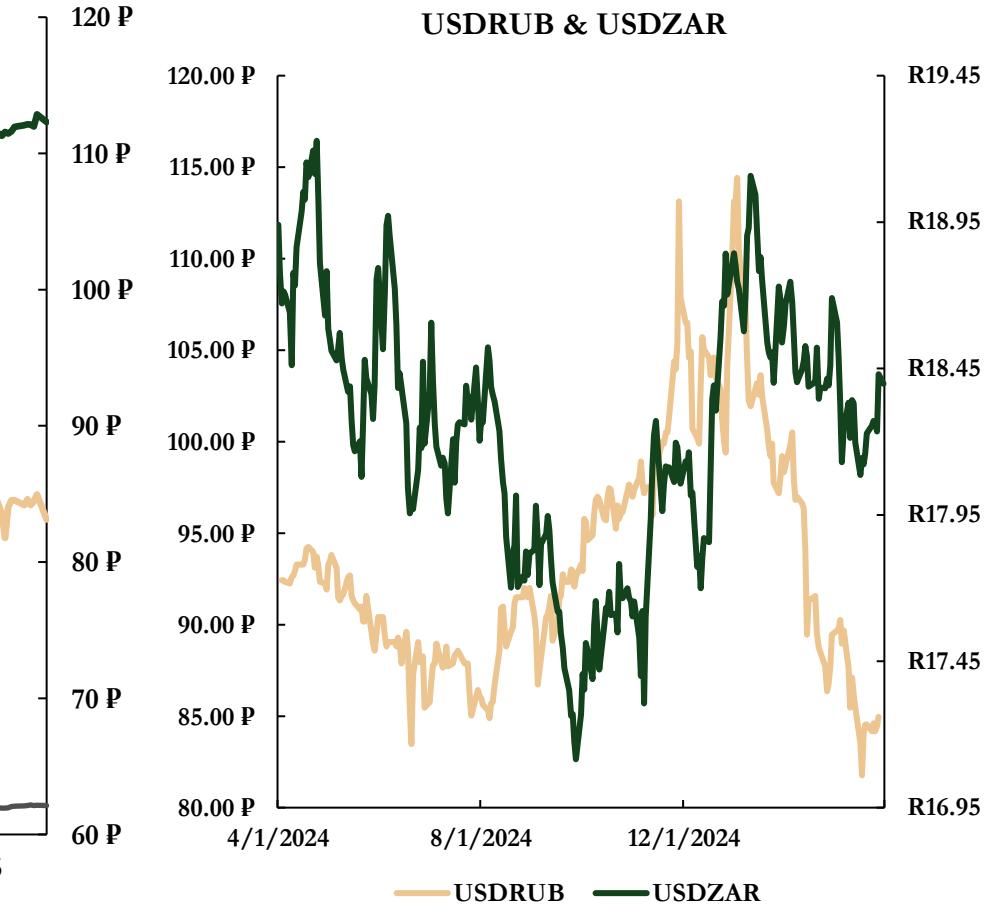
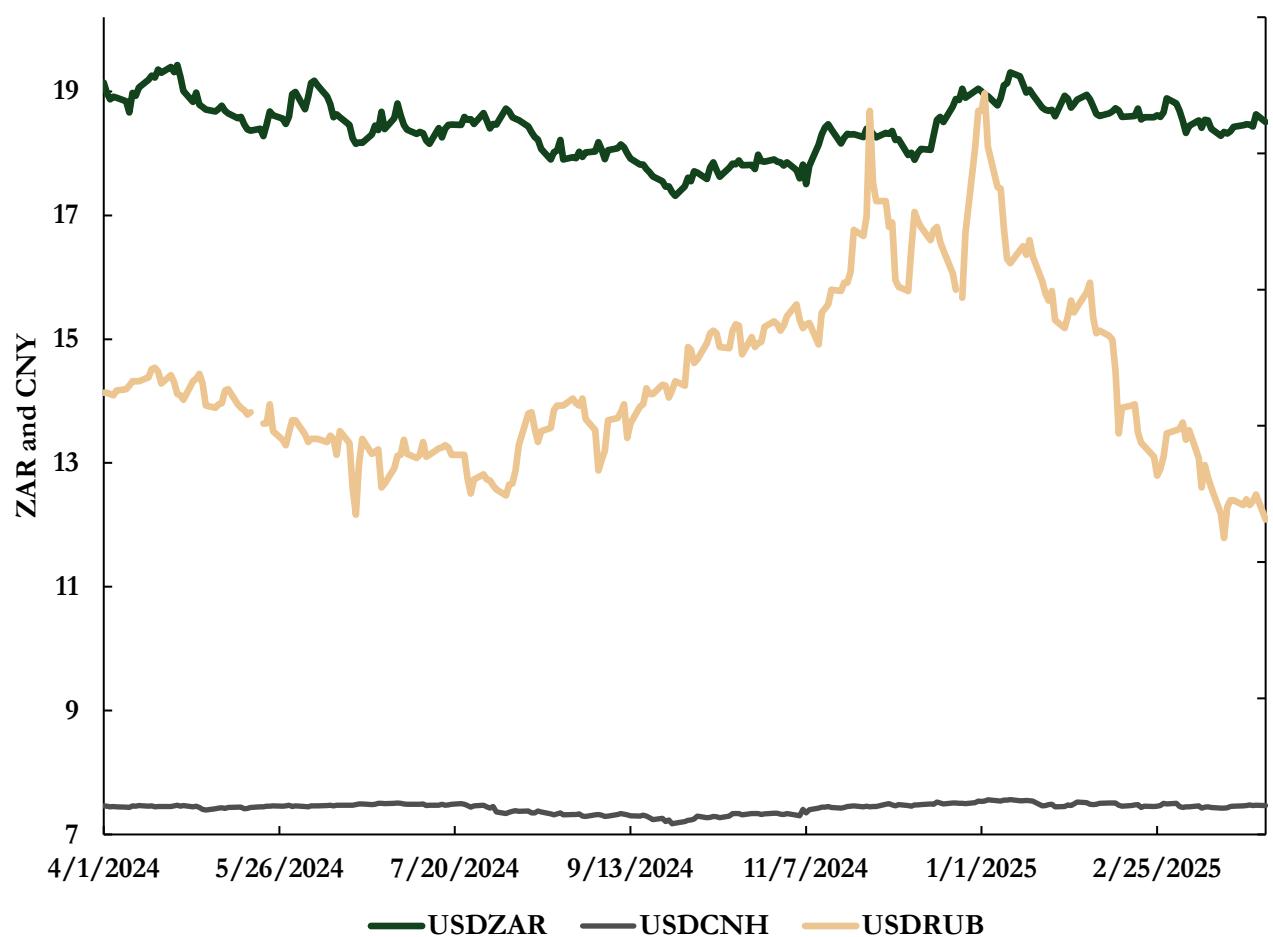
Takeaway

- **Resolution would open up trade for Russia**
 - Filling the market with supply, decreasing price
- **Continuation of the conflict**
 - Keep supply/demand as it
- **Increase in restrictions**
 - Supply is restricted and price increases

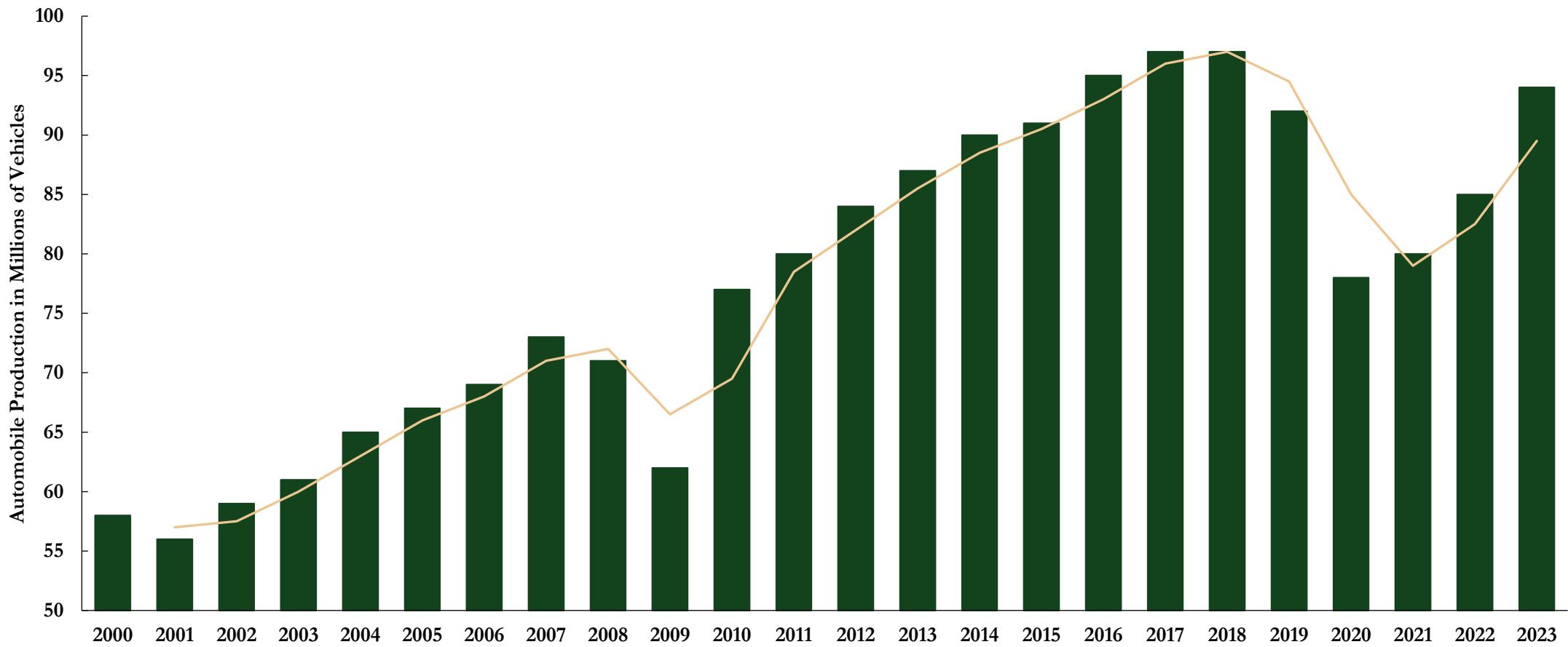
South Africa Macro Overview

- Africa National Congress is in charge of economic policy
 - In a coalition with the Democratic Alliance, currently arguing over the budget
 - Talks of collapse of the coalition if there is no agreement – **ZAR weakened 1.1%**
- SA is looking to reset trade relations with the U.S.
 - Recently fired their ambassador last month
 - If relations do not improve, then we could see a weaker Rand
 - Trade proposal “AGOA” possibly being revoked - \$23.7b traded in 2023
- U.S. recently halted aid to SA
 - Trump also refuses to attend G20 meetings in SA

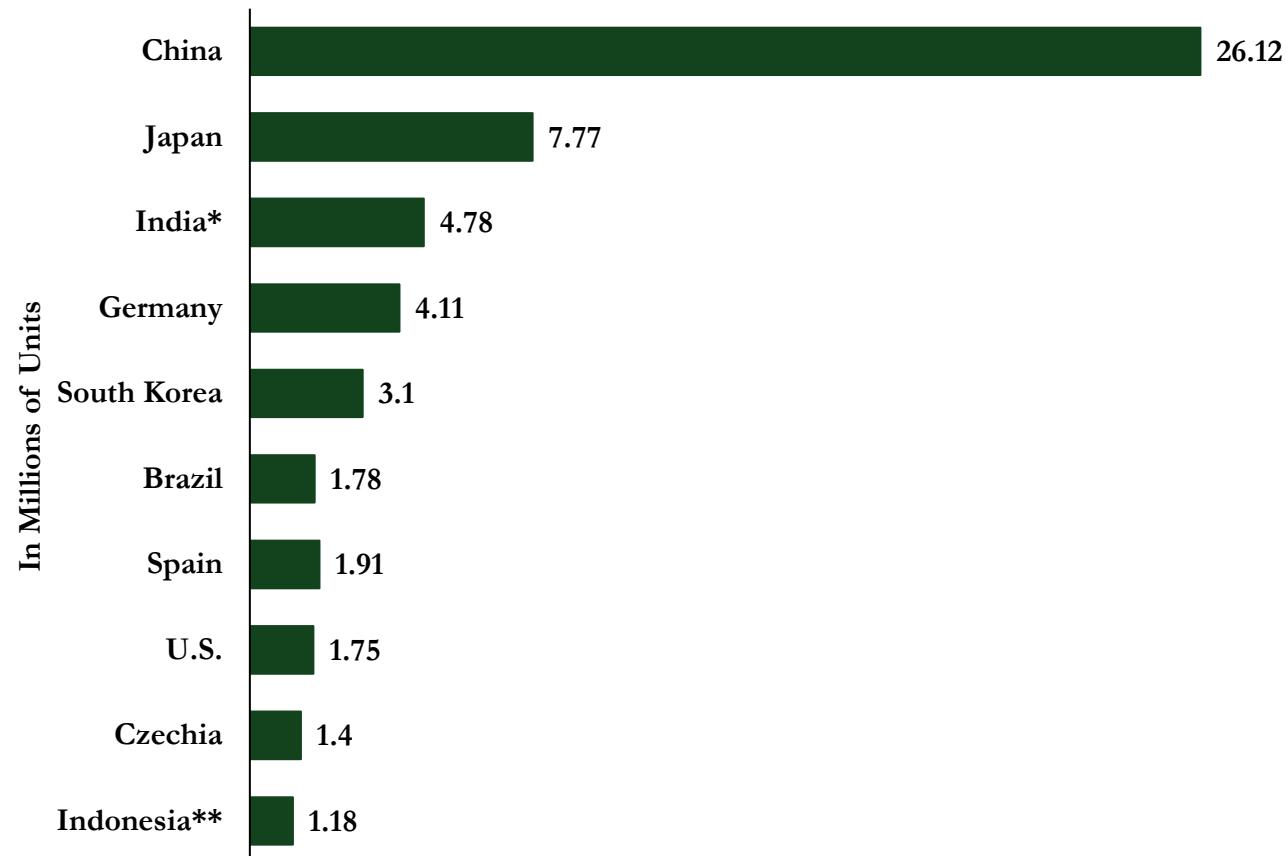
Currency Markets



Total Motor Vehicle Production

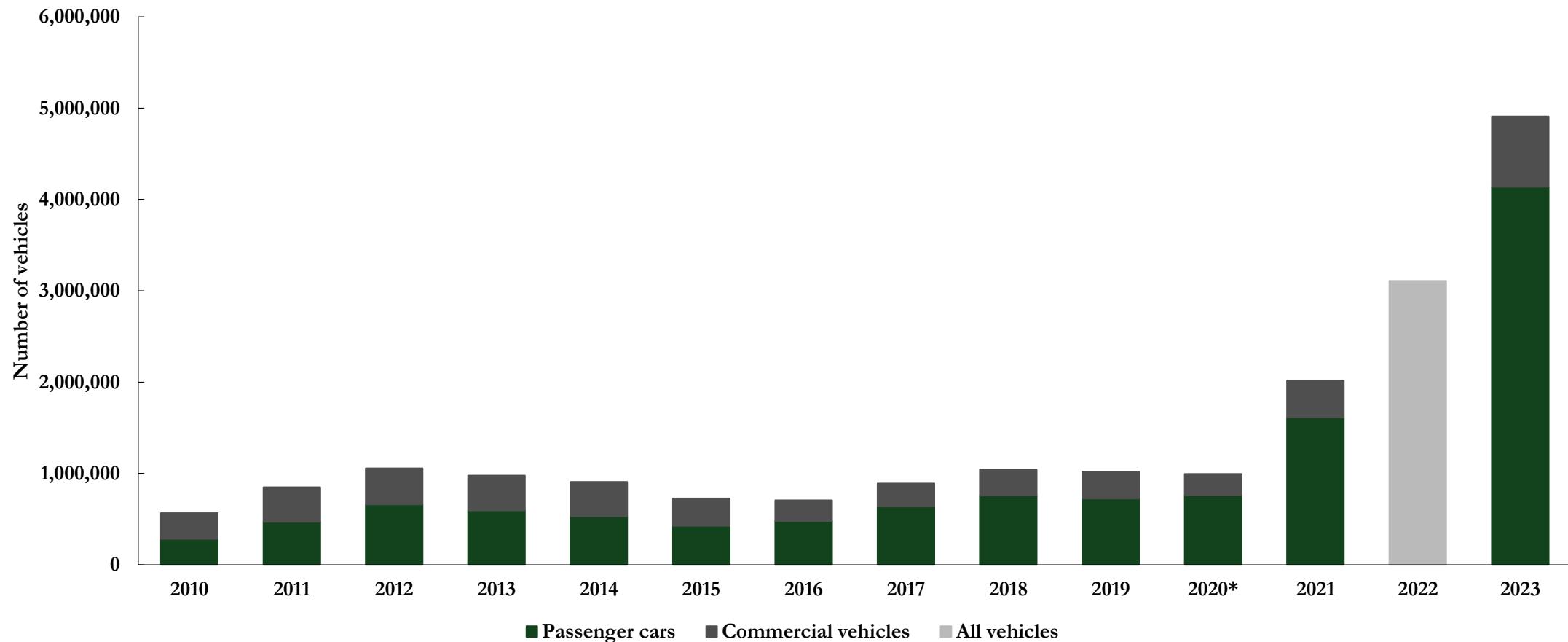


Passenger Car Production by Country

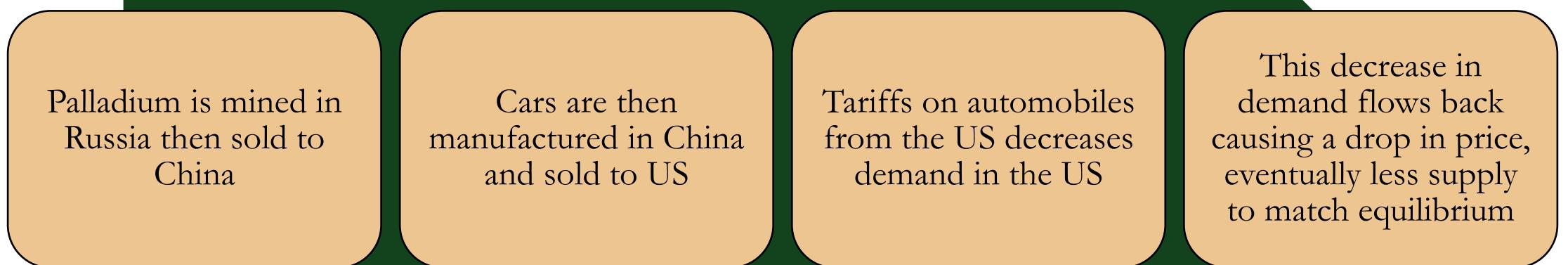


- China produces by far the most cars on a global basis
 - Led by SAIC, Changan, Dongfeng, Geely, and BAIC
 - Worldwide, Volkswagen and Toyota lead the way

China's Vehicles Exports

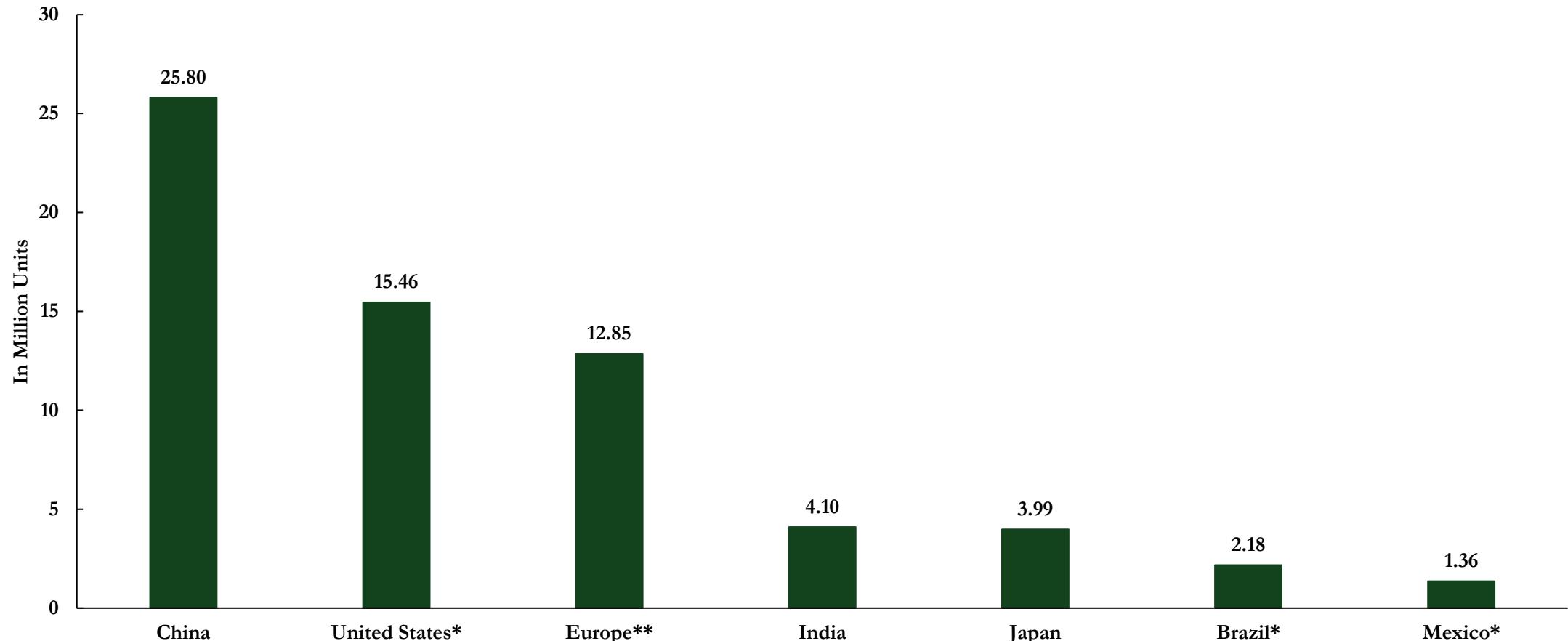


Impacts on China Tariffs



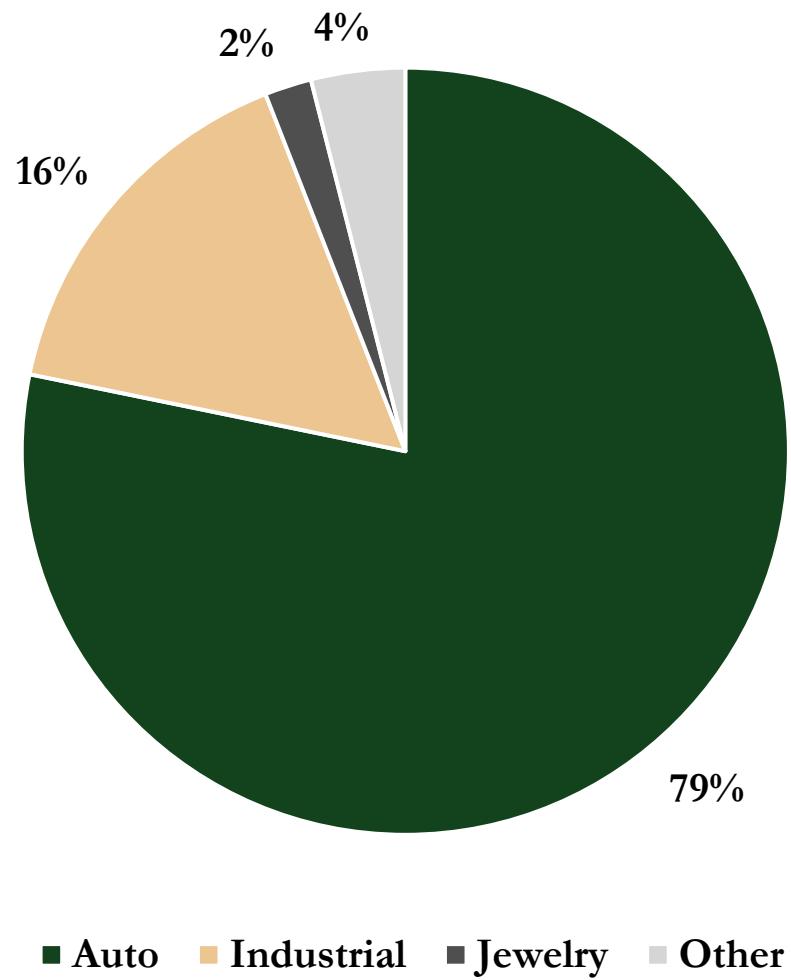
Demand

Largest Auto Markets Worldwide

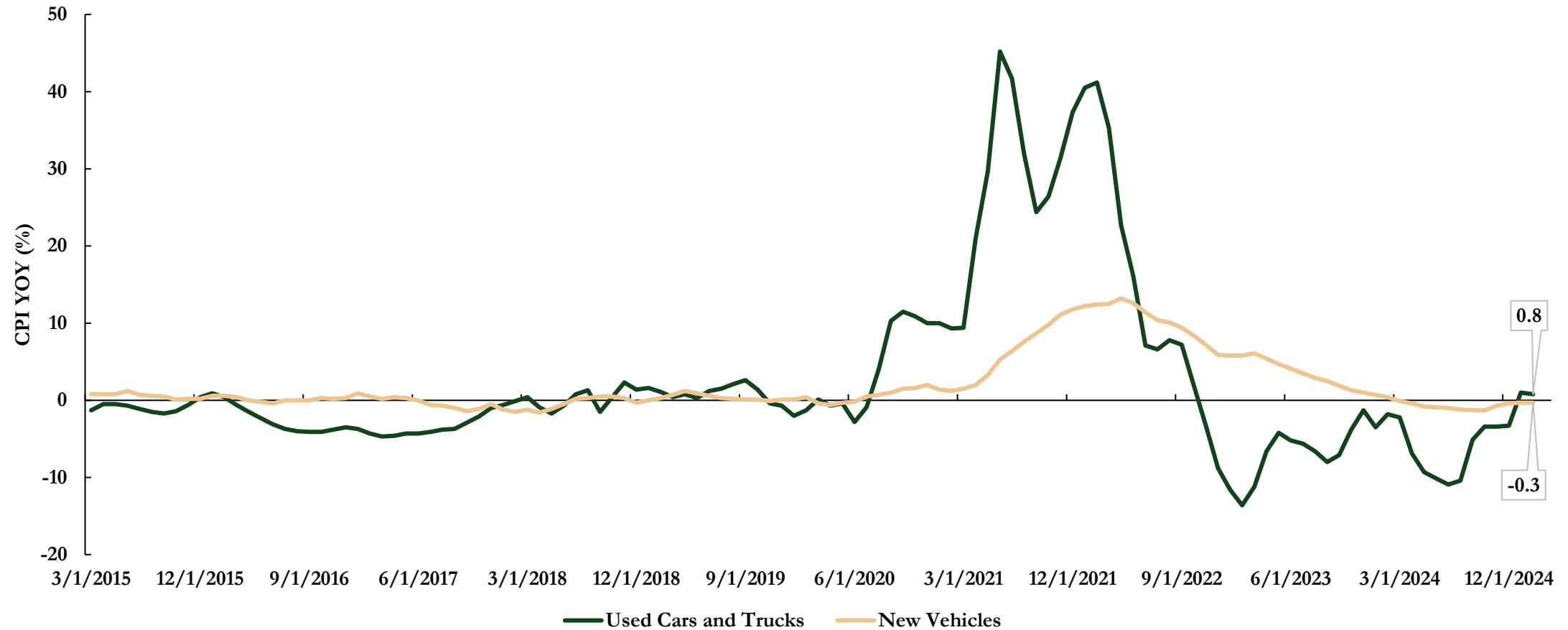


Palladium Uses

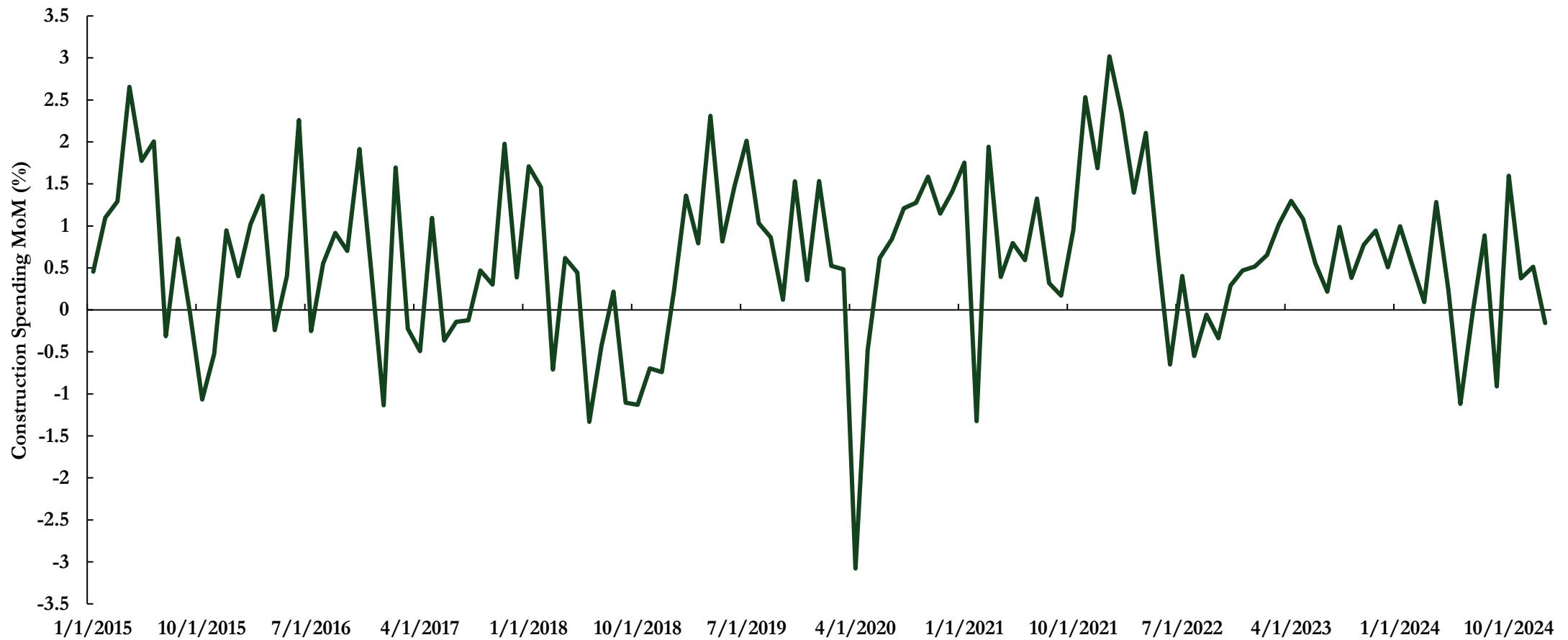
- Large majority is used for cars, trucks, and other vehicles
- Majority of uses are price **elastic, discretionary goods**
 - Meaning very sensitive to changes in price and less income leads to less purchases
 - ex. cars, jewelry, industrials



Car Prices in the U.S.

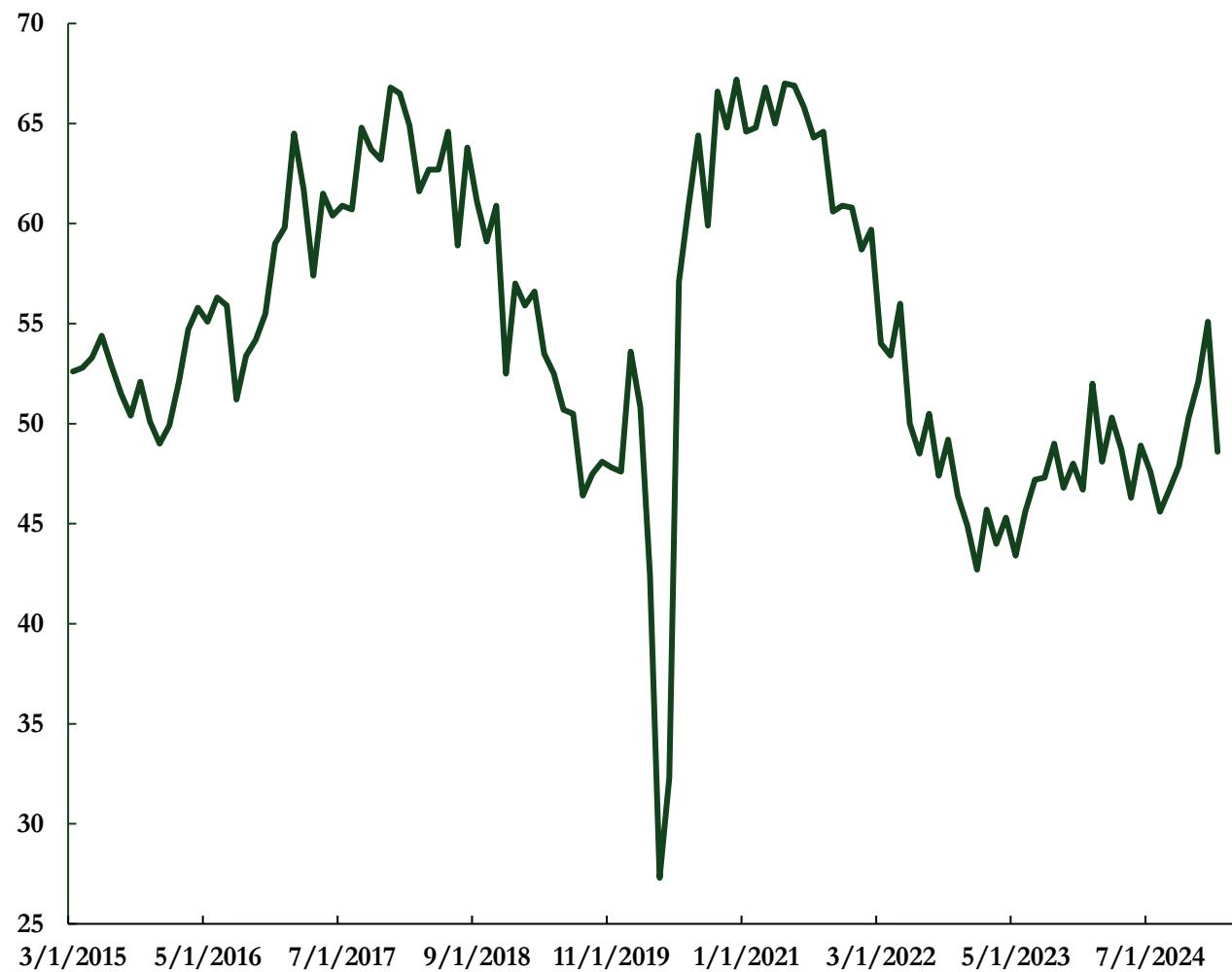


Construction Spending



ISM New Orders - Manufacturing

- Currently at 49.0 as of 4/1
- Showing slight market downturn with less investment in manufacturing
 - This means less orders for construction vehicles

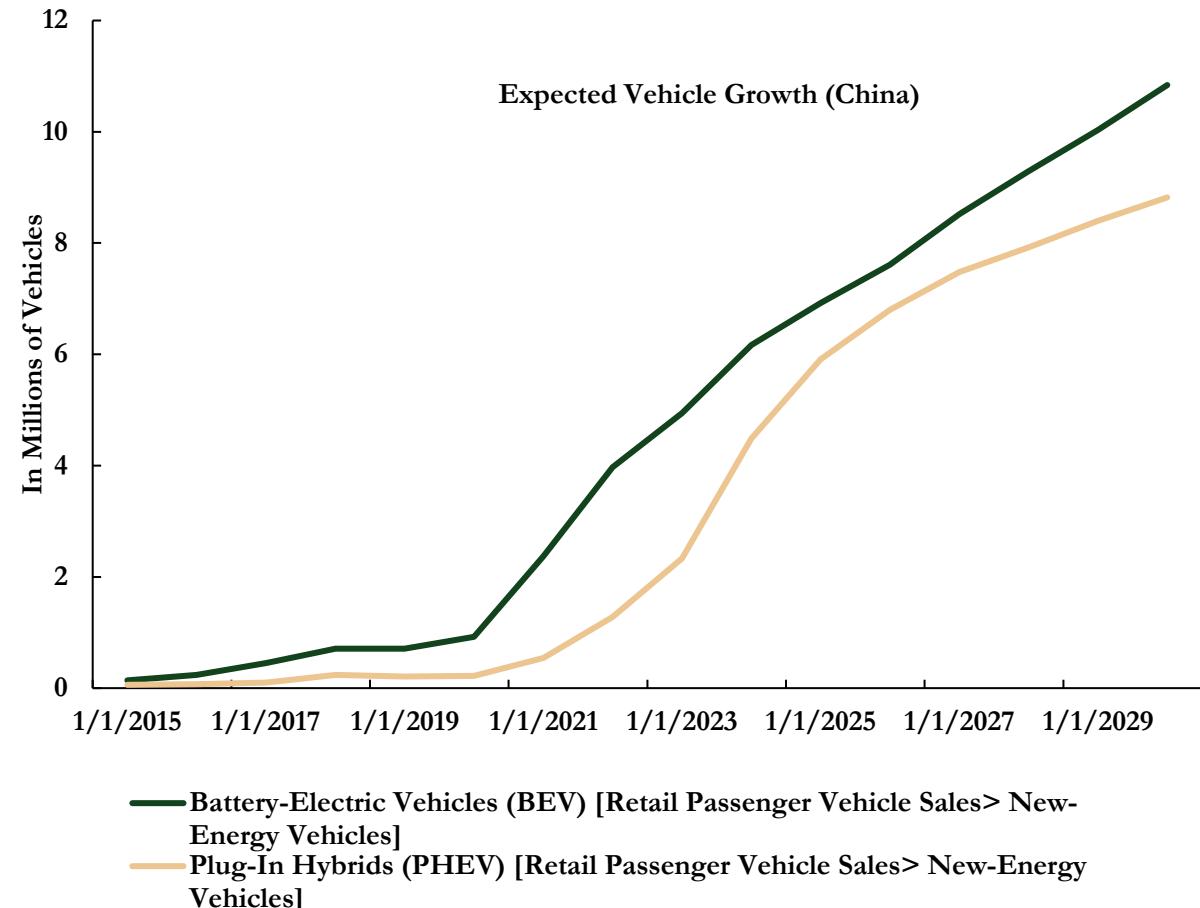


EV Market Share Growth

- Electric vehicle growth continues to outpace gas powered vehicle growth
 - EV sales grew 9% in Q2 2024 compared to the previous year
 - Gas powered car sales decreased by 3.8% during the same timeframe
- The biggest reason against the purchase of an EV is the issues of traveling with a battery powered vehicle
 - EV chargers has doubled since 2022
 - Tesla has adaptable chargers for different EV brands
 - BYD's newest charger can charge 250 miles in five minutes (1,000 kilowatts)
 - ZEEKR is launching a charger station in Q2 2025 which is 1,200 kilowatts

Palladium Use in Hybrid and EVs

- Electric vehicles do not require catalytic converters as fully-electric cars do not produce emissions
 - Catalytic converters are used to reduce harmful emissions being released
- There is no palladium used in the manufacturing of electric vehicles
- However, plug-in hybrid vehicles still require catalytic converters as they have internal combustion engines, which produce emissions



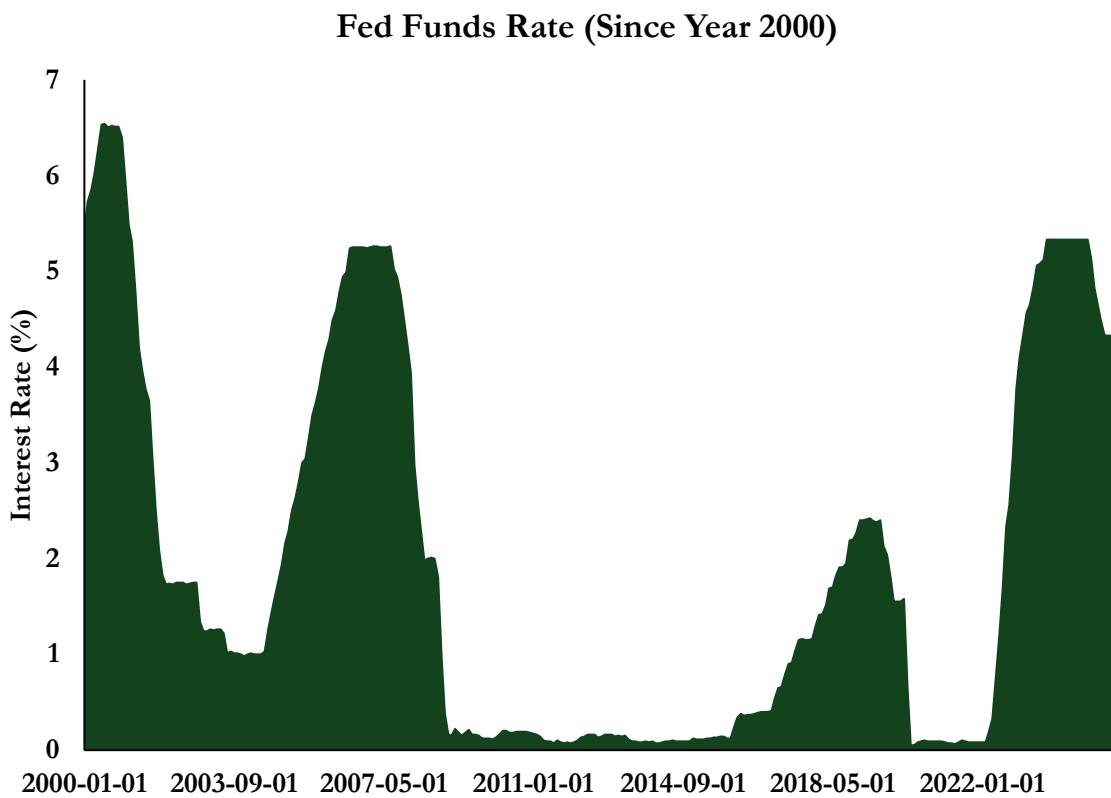
Auto Tariff Impact on Demand

- President Trump recently announced a 25% tariff on imported cars, light trucks, and auto parts
- Of the US-made cars, **more than half were assembled with foreign parts**
 - Of the top ten manufacturers of catalytic converters, **only two are domestic** (Tenneco, Corning Inc.)
 - Ford produces 1.8 million catalytic converters from their South Africa plants
 - Experts expect about a \$3,000 increase of domestic car prices

Emerging Use Cases

- Hydrogen energy, which typically uses platinum-based catalysts is adopting new electrocatalysts that make use of palladium
- Nornickel, the world's largest palladium miner expects hydrogen energy related uses of palladium to increase Chinese demand by 15% of current consumption by 2027
 - This is offset by an expected 29% fall in traditional demand during the same time frame in China
- Palladium finds use in electronics, being used in OLED display structures and printed circuit board coverings

Interest Rates



- Current rate: 4.25 - 4.50
- The Federal Reserve is expecting 2 rate cuts by 2026
- Fed members have noted unusually high uncertainty in their forecasts
- Core PCE continues to stay higher than desired
- 2.8% vs. 2.7% expected YoY in February

Economic Scenarios

Scenario 1

- Inflation remains higher than expected
 - Tariffs increase cost of goods across the economy
- Labor market takes hit as firms try to compensate for rising costs
- Fed is forced to keep higher Fed Funds rate to avoid hyperinflation

Scenario 2

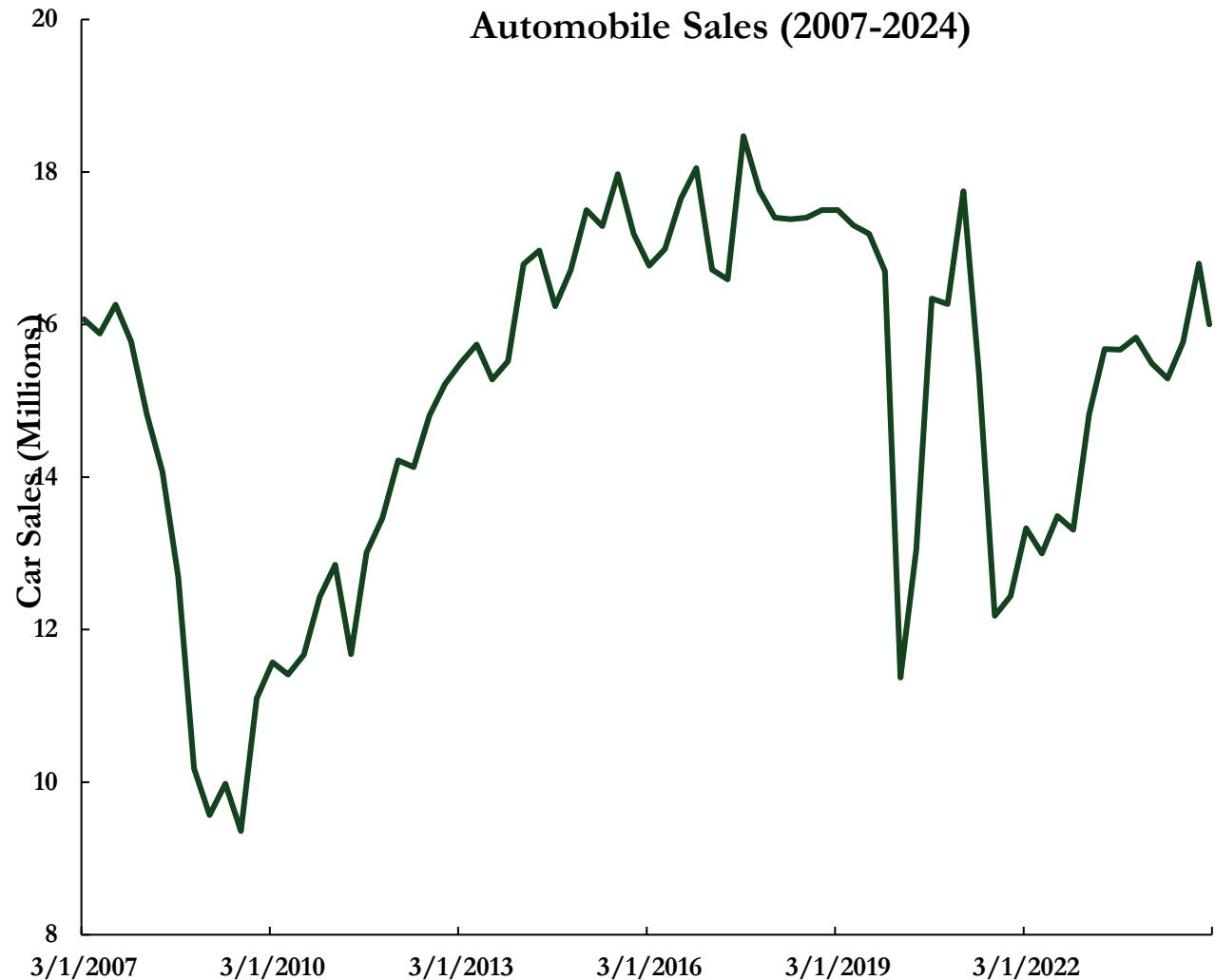
- Inflation remains in line with expectations
- Inflation caused by tariffs is strictly transitory
 - Jerome Powell has suggested this is his “baseline” expectation
- Fed gradually lowers rates while maintaining a healthy dual mandate

Scenario 3

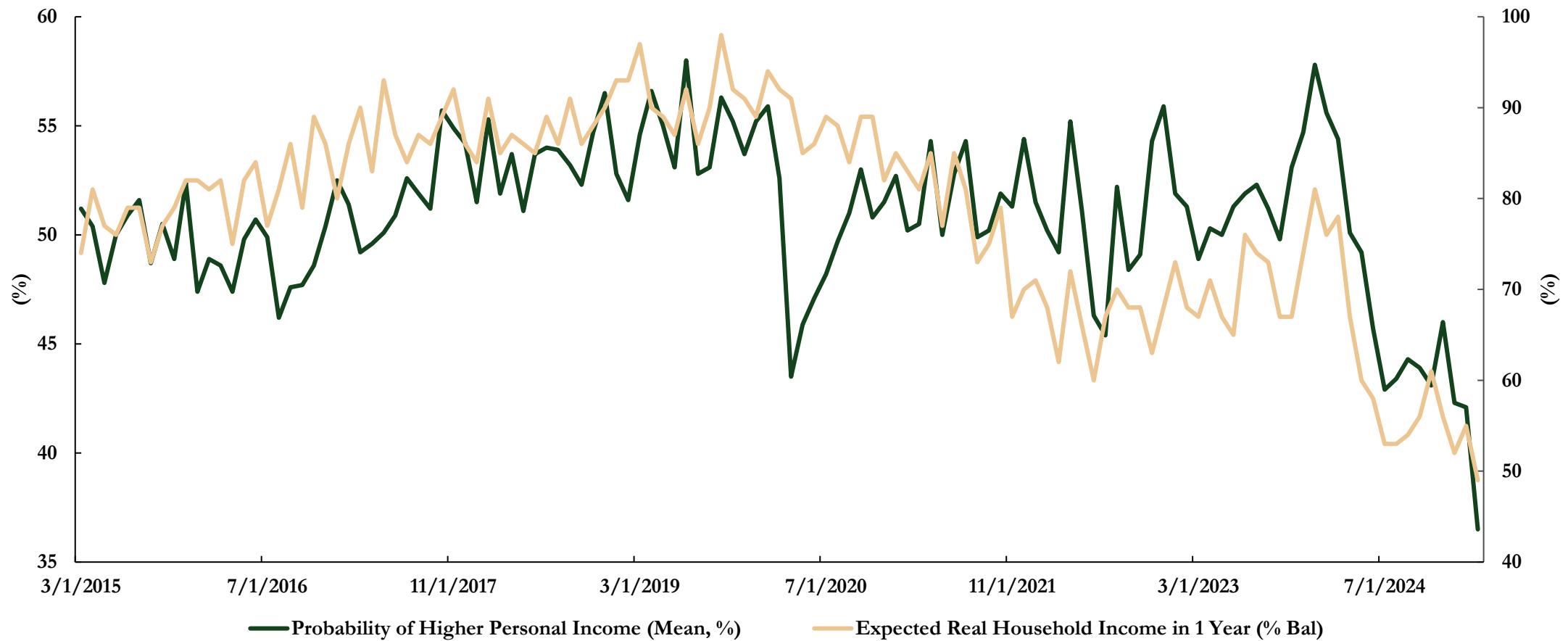
- Economy growth slows at an alarming rate
 - Driven by tariffs and reduced consumer spending
- Fed would be forced to cut rates faster than anticipated
- Goldman Sachs increased recession odds from 20% to 35%

Buying Power

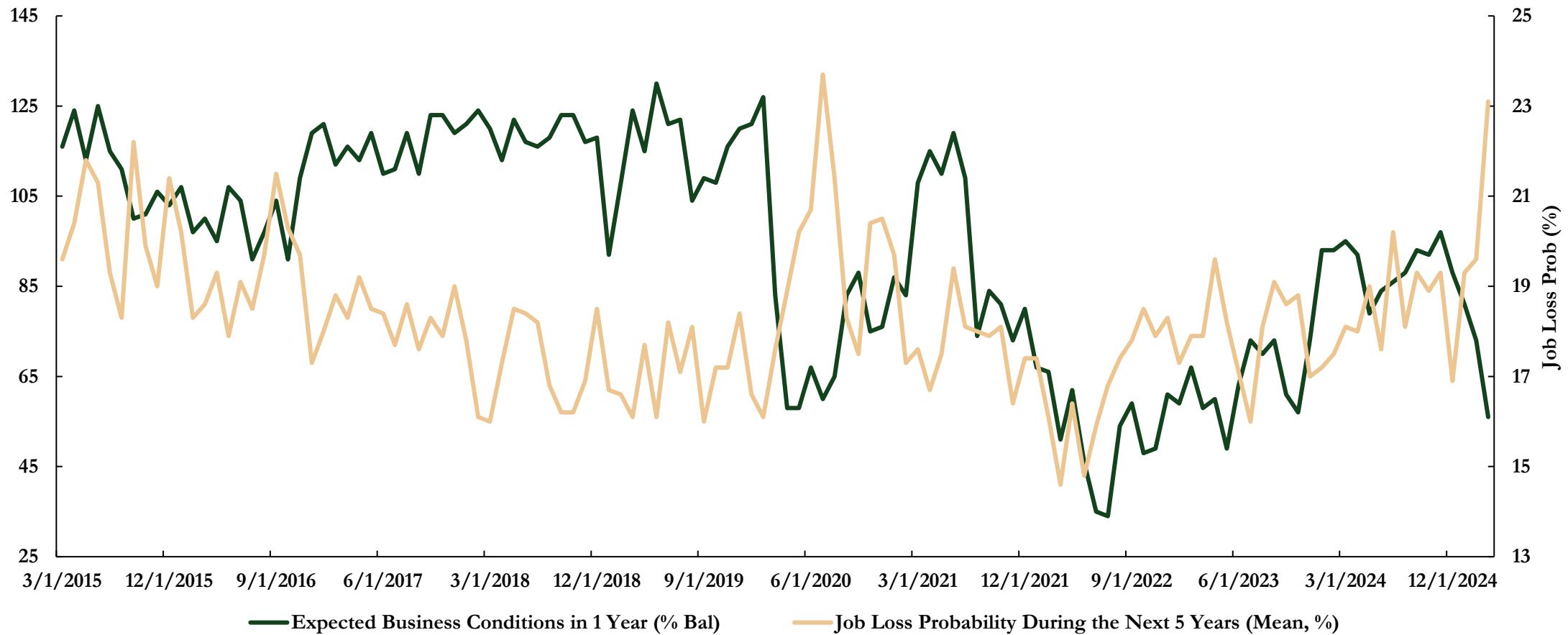
- **Scenario 1:** Inflation remains persistent, keeping rates higher for longer, decreasing incentive for consumers to make new auto purchases.
- **Scenario 2:** Lower rates and healthy economy increase buying power of average consumer.
- **Scenario 3:** Consumers halt spending as economy and labor market suffer. New car sales drop sharply.



Consumer Confidence of Income

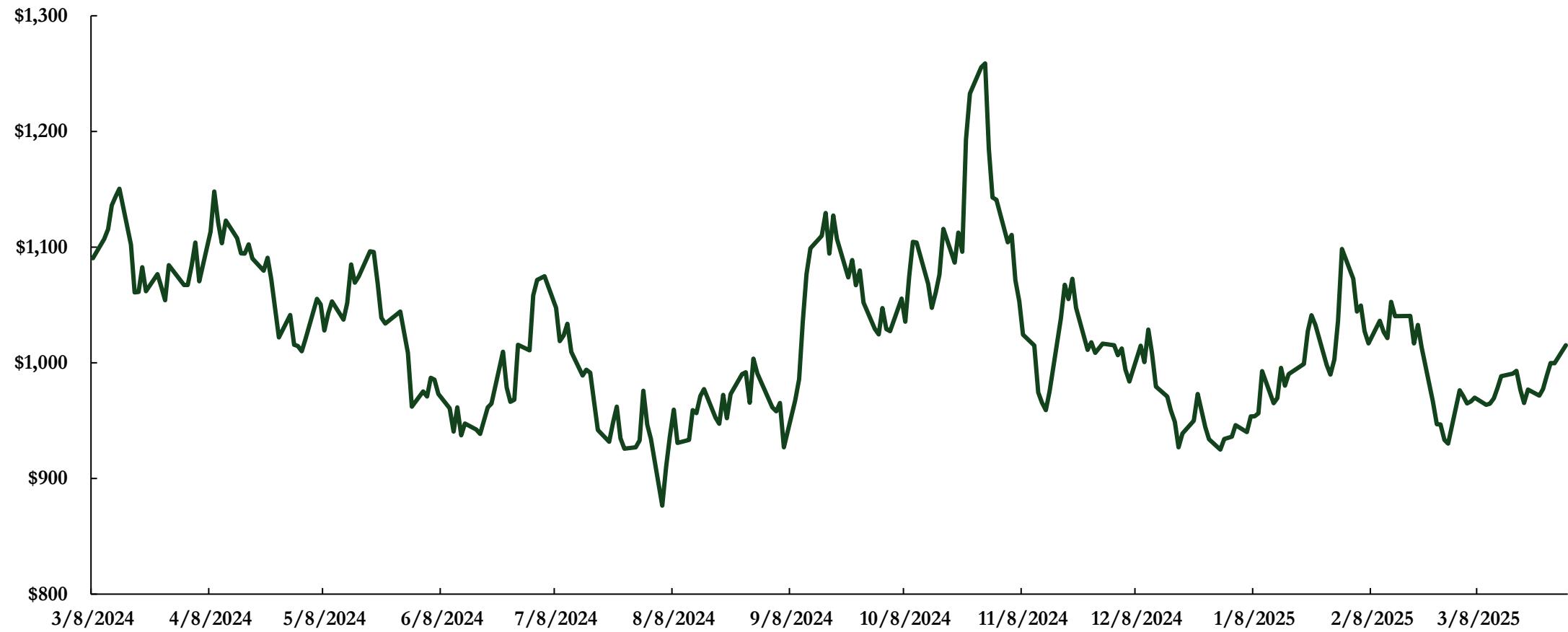


Consumer Conditions Projections



Technical Analysis

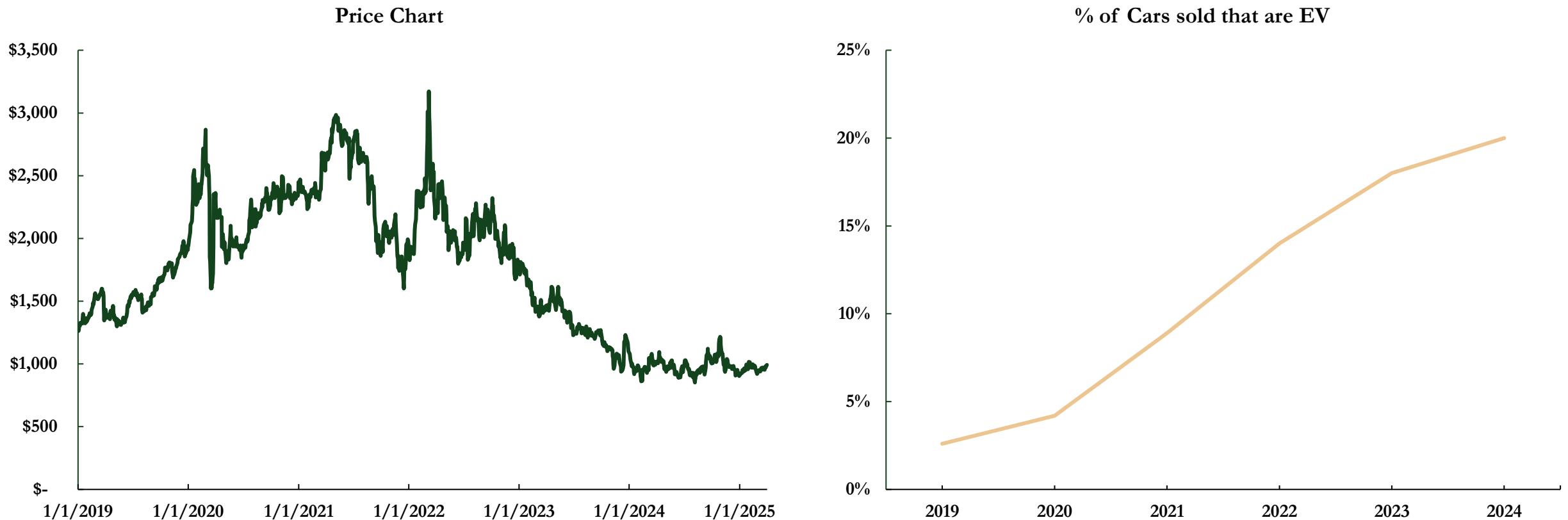
Price Chart



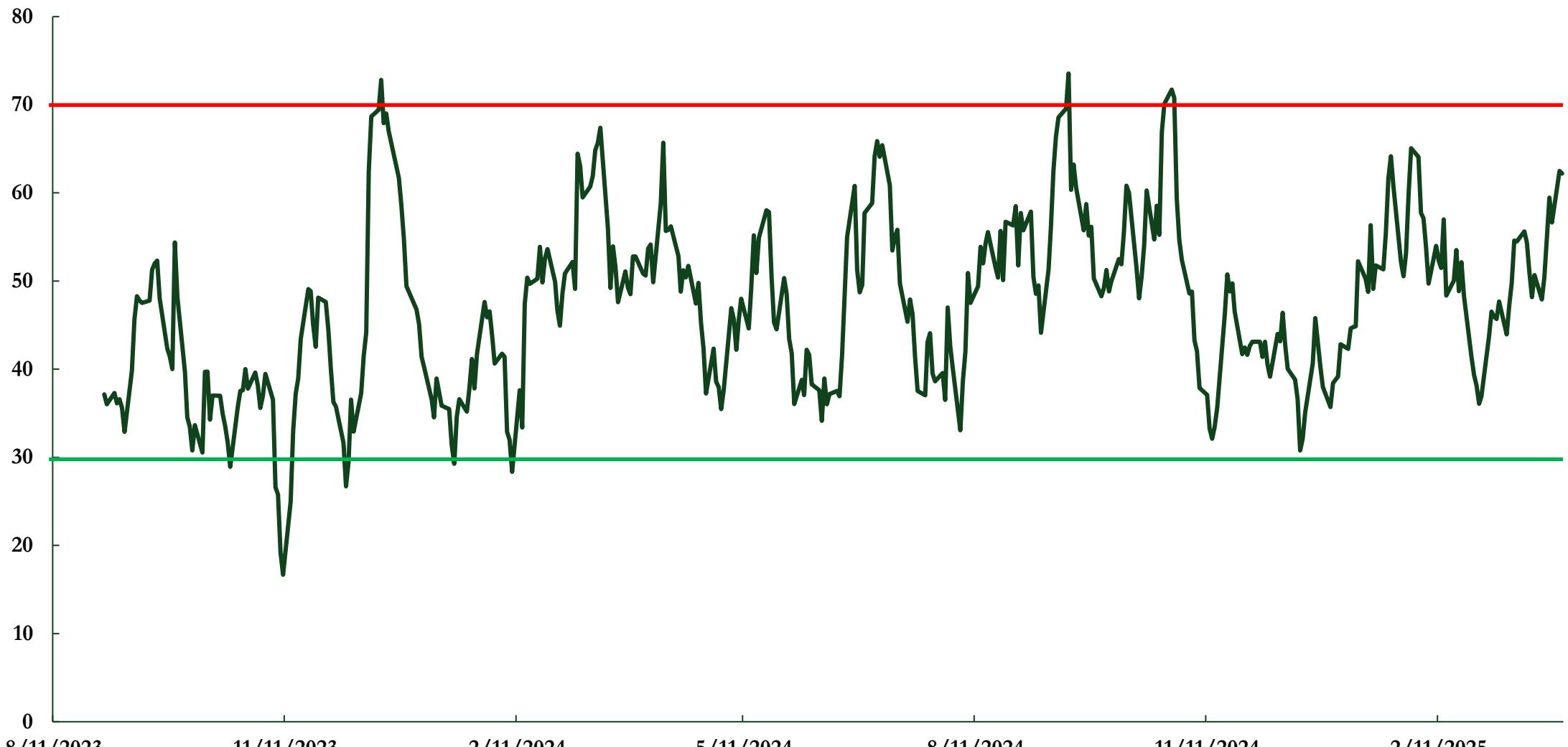
Seasonality

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
5 Year Average	2.79	1.31	0.96	-1.01	-6.52	-1.61	2.54	-0.37	-2.2	-2.5	-5.2	1.85
2025	11.36	-9.27	5.73	NA	NA	NA	NA	NA	NA	NA	NA	NA
2024	-10.75	-3.58	7.37	-5.96	-4.09	6.57	-4.95	4.4	3.47	11.62	-12.21	-7.17
2023	-7.77	-14.21	3.2	2.94	-9.19	-10.08	4.61	-4.46	1.51	-9.98	-10.16	8.99
2022	23.65	5.83	-9.01	2.6	-13.96	-3.09	9.84	-2.01	3.75	-14.79	1.98	-4.77
2021	-8.76	4.17	12.9	11.95	-3.74	-1.69	-4.34	-7.21	-22.58	4.76	-13.11	9.39

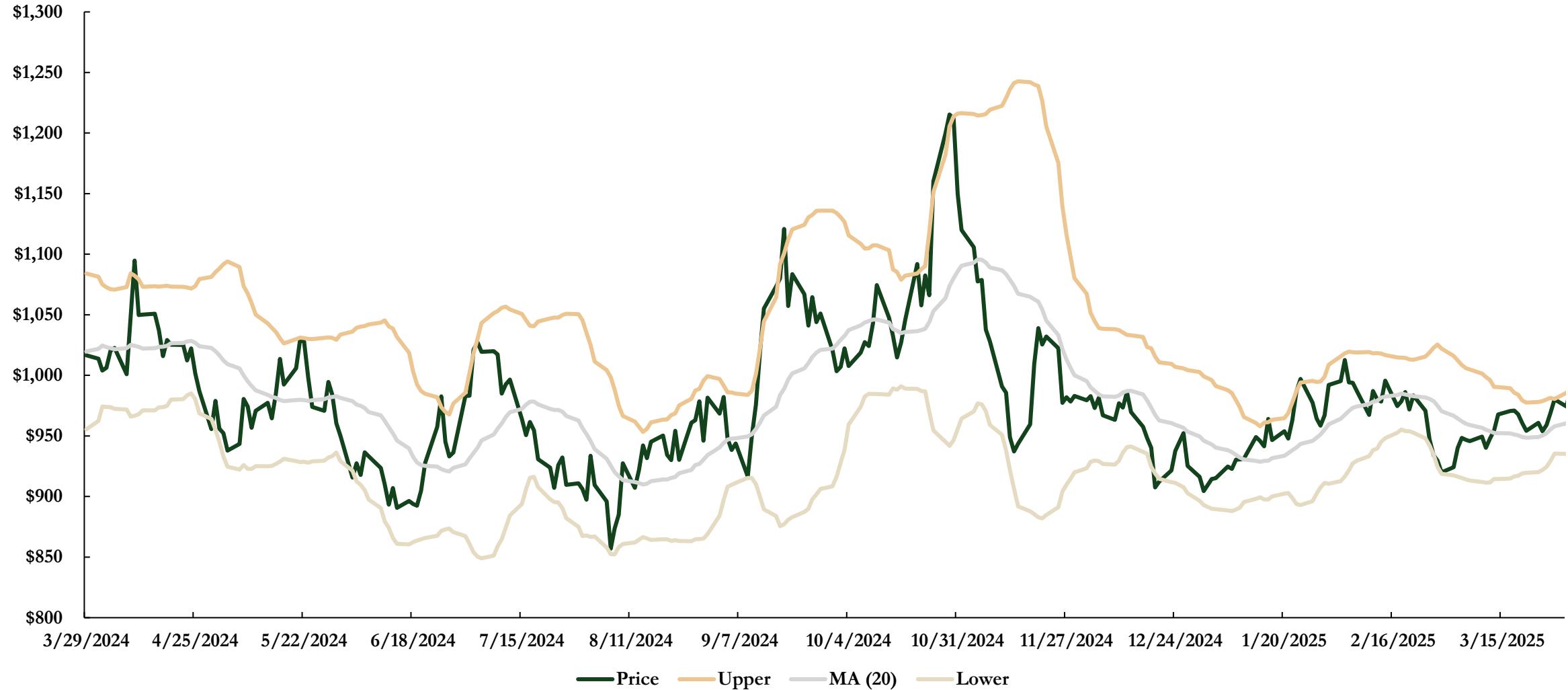
Price Chart Vs. EV Population



Relative Strength Index (RSI)



Bollinger Bands

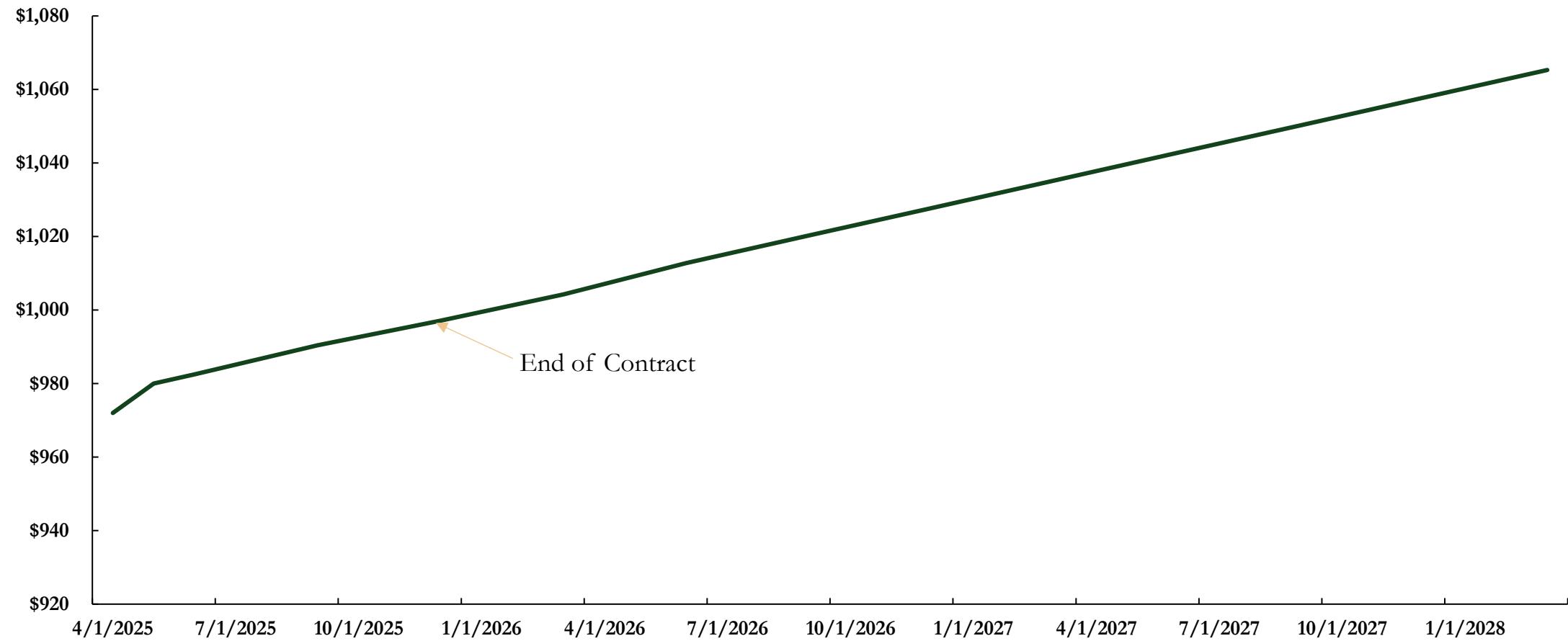


Position Overview

Normal Backwardation VS Contango

- Normal backwardation occurs when the futures contract price is below the spot price
- This is a bearish indicator as the market is expecting a decrease in price over time
 - Example: Oil is trading around \$72 currently, while the April 2026 futures contract is trading around \$66.50
- Contango occurs when the futures contract price is above the spot price
- This is a bullish indicator as the market expects an increase in price
 - Example: Palladium is trading around \$972, and our contract is worth about \$1,000

Commodities Curve

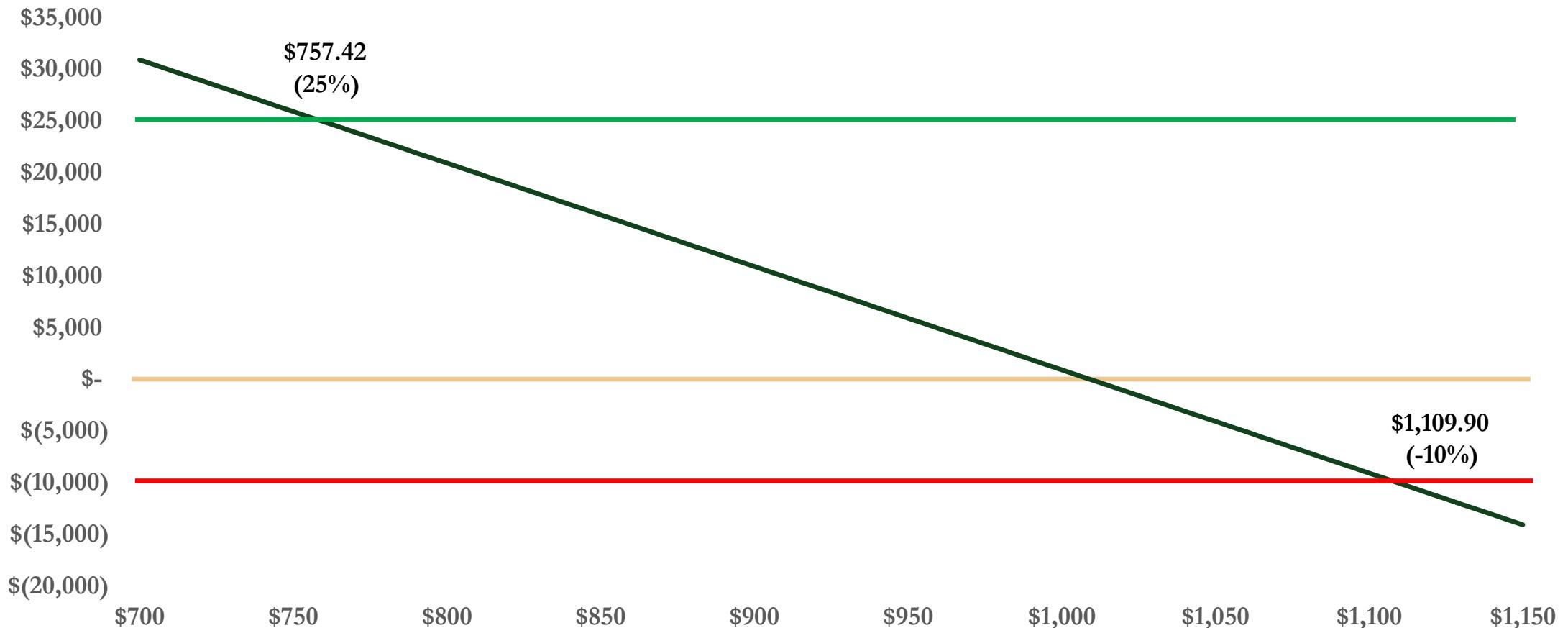


Contract Specs

- The contract size is 100 troy ounces
- The last trade is **December 29th, 2025**
- Total cost is \$100,900
- This contract requires speculators to use at least \$13,200 in margin
- We would have \$13,200 in margin
- No risk for margin call as our stop loss is at 10%

Settle Price	\$996.50
Bid	\$1,006.50
Ask	\$1,009.00
Open Interest	18 contracts
Volume	3 contracts

P/L



Appendix

Back testing Screenshot

BTST Palladium Spot \$/Oz Cu x +

Palladium Spot \$/Oz Curncy BTST Related Functions Menu

XPD ↓ 992.23 +1.53 BGN 988.73/995.72 BGN
At 20:47 Op 990.70 Hi 993.96 Lo 988.14 Close 990.70 Value 04/03/25

XPD Curncy Add Edit Actions

04/01/2024 - 04/01/2025 Today Daily

Table Chart Scatter Plot Graphics Filter

Worksheet Title BTST Backtesting & Optimization: Multi-Strategy

Strategies

Current Position Trades Profit (Loss) Statistics

	Strategy	P&L	Age	Long	Sho...	Total	Total	↓ % Total	Long	Short	Avg Dura...	Profit Factor	Shar...	Sorti...	Total Return	% Max Return	% Min Return	Wins in %	Losses in %	% Max DD	Max DD Length	Recov... From Max DD	Max DD Period	% Max Recov...	% Max Increase...	Max Increase...	Length
1	Maximum	8.50M	259	71	72	143	119.60M	119.60	62.01M	57.60M	259.00	13.00	5.39	5.53	119.60	130.02	0.00	100.00	100.00	49.63	160	74	96	130.02	258		
2	Average	1.82M	27	16	16	32.7	15.11M	15.11	6.70M	8.42M	29.59	1.62	0.74	0.76	15.11	34.66	-16.92	49.30	50.70	27.12	61.65	7.65	14.35	48.39	120.48		
3	Median	1.69M	10	11	11	22	5.32M	5.32	0.00	6.35M	12.05	0.91	0.14	0.14	5.32	18.03	-13.67	44.00	56.00	25.16	64	N/A	N/A	34.67	96		
4	Minimum	-4.32M	2	0	0	1	-44.77M	-44.77	-25.78M	-18.99M	2.80	0.00	-1.40	-1.40	-44.77	0.00	-49.63	0.00	13.11	9	N/A	N/A	22.13	7			
5	Rex Oscillator	3.62M	2	40	40	80	119.60M	119.60	62.01M	57.60M	4.18	2.20	5.39	5.53	119.60	130.02	0.00	55.00	45.00	13.11	21	30	51	130.02	236		
6	Bollinger Bands	8.50M	26	4	4	8	95.06M	95.06	47.22M	47.84M	32.50	0.00	4.05	4.13	95.06	95.16	0.00	100.00	0.00	20.53	20	9	29	95.16	258		
7	Trading Envelopes	8.50M	26	4	4	8	95.06M	95.06	47.22M	47.84M	32.50	0.00	4.05	4.13	95.06	95.16	0.00	100.00	0.00	20.53	20	9	29	95.16	258		
8	KBand	7.34M	26	8	8	16	68.48M	68.48	33.72M	34.76M	16.81	13.00	2.84	2.90	68.48	68.57	-4.32	75.00	25.00	17.86	21	25	46	76.19	252		
9	MA Envelopes	6.13M	26	7	7	14	40.70M	40.70	17.78M	22.92M	19.07	4.55	1.65	1.68	40.70	45.31	-4.32	78.57	21.43	17.75	9	N/A	N/A	51.88	135		
10	Cmnty Channel Idx	-4.32M	9	7	8	15	36.28M	36.28	18.31M	17.97M	17.93	3.65	1.47	1.48	36.28	50.02	-9.38	60.00	40.00	20.95	12	10	22	65.54	160		
11	William's %R	-2.70M	12	7	8	15	30.19M	30.19	12.94M	17.26M	17.73	2.06	1.21	1.22	30.19	59.93	-0.26	60.00	40.00	21.23	74	N/A	N/A	60.35	153		
12	Stochastics (TAS)	-2.94M	10	8	8	16	24.27M	24.27	9.74M	14.54M	16.81	2.03	1.00	1.01	24.27	61.58	-0.24	68.75	31.25	25.16	74	N/A	N/A	61.97	153		
13	MA Oscillator	-3.86M	7	11	11	22	22.04M	22.04	12.43M	9.61M	12.68	1.46	0.94	0.97	22.04	58.86	-0.59	59.09	40.91	25.86	64	N/A	N/A	59.80	148		
14	Variable MA	3.54M	5	17	17	34	12.39M	12.39	5.71M	6.68M	8.26	1.43	0.49	0.50	12.39	18.03	-9.64	32.35	67.65	13.36	18	25	43	30.63	176		
15	RSI	6.35M	137	0	1	1	6.35M	6.35	0.00	6.35M	137.00	0.00	0.14	0.14	6.35	14.46	-15.00	100.00	0.00	19.14	20	9	29	34.67	44		
16	Parabolic (PTPS)	5.32M	16	12	11	23	5.32M	5.32	-1.41M	6.73M	11.96	1.10	0.25	0.25	5.32	19.59	-9.99	52.17	47.83	24.73	55	N/A	N/A	28.70	75		
17	Rate of Change	-1.67M	2	68	68	136	1.51M	1.51	1.79M	-272.1	2.88	1.01	0.13	0.13	1.51	12.31	-27.06	37.50	62.50	35.06	68	N/A	N/A	43.53	74		
18	MACD	3.57M	14	13	12	25	-1.12M	-1.12	-2.08M	960.35	11.12	0.97	0.03	0.03	-1.12	16.56	-13.67	44.00	56.00	25.93	88	N/A	N/A	22.29	96		
19	Buy & Hold	-1.37M	259	1	0	1	-1.37M	-1.37	-1.37M	0.00	259.00	0.00	0.02	0.02	-1.37	21.11	-15.13	0.00	100.00	25.62	44	N/A	N/A	42.70	60		
20	Simple MA	3.48M	14	16	15	31	-3.67M	-3.67	-1.94M	-1.73M	9.23	0.91	-0.08	-0.08	-3.67	5.43	-16.02	35.48	64.52	18.10	22	74	96	25.54	175		
21	Accum/Distrib Osc	-1.29M	2	71	72	143	-21.59M	-21.59	-9.16M	-12.43M	2.80	0.84	-0.72	-0.72	-21.59	10.90	-34.75	37.76	62.24	41.16	68	N/A	N/A	29.76	43		
22	Fear & Greed	1.69M	4	13	12	25	-21.95M	-21.95	-12.54M	-9.41M	11.12	0.51	-0.72	-0.74	-21.95	4.32	-38.34	36.00	64.00	40.90	139	N/A	N/A	33.52	91		
23	Weighted MA	1.59M	4	17	17	34	-26.27M	-26.27	-14.20M	-12.07M	8.15	0.38	-0.81	-0.83	-26.27	3.26	-31.56	17.65	82.35	33.72	92	N/A	N/A	24.98	35		
24	Triangular MA	1.59M	4	11	11	22	-26.32M	-26.32	-14.39M	-11.94M	12.05	0.35	-0.82	-0.84	-26.32	3.26	-33.58	18.18	81.82	35.68	92	N/A	N/A	28.03	35		
25	Exponential MA	1.54M	4	19	19	38	-28.85M	-28.85	-15.60M	-13.25M	7.39	0.32	-0.89	-0.90	-28.85	3.26	-31.36	18.42	81.58	33.53	92	N/A	N/A	28.03	35		
26	DMI	2.39M	14	16	32	-33.71M	-33.71	-16.39M	-17.32M	9.06	0.29	-1.16	-1.19	-33.71	0.00	-44.32	25.00	75.00	44.32	145	N/A	N/A	22.13	72			
27	Ichimoku (GOC)	2.03M	6	7	6	13	-44.77M	-44.77	-25.78M	-18.99M	20.38	0.18	-1.40	-1.40	-44.77	0.00	-49.63	23.08	76.92	49.63	160	N/A	N/A	22.34	7		

Contracts Table

PALLADIUM FUTURE Dec25 X Generic 1st 'CL' Future Com... PALLADIUM SPOT \$/OZ Comdty +

< > | PALLADIUM FUTURE Dec25 Comdty ▾ | CT ▾ | Related Functions Menu ▾

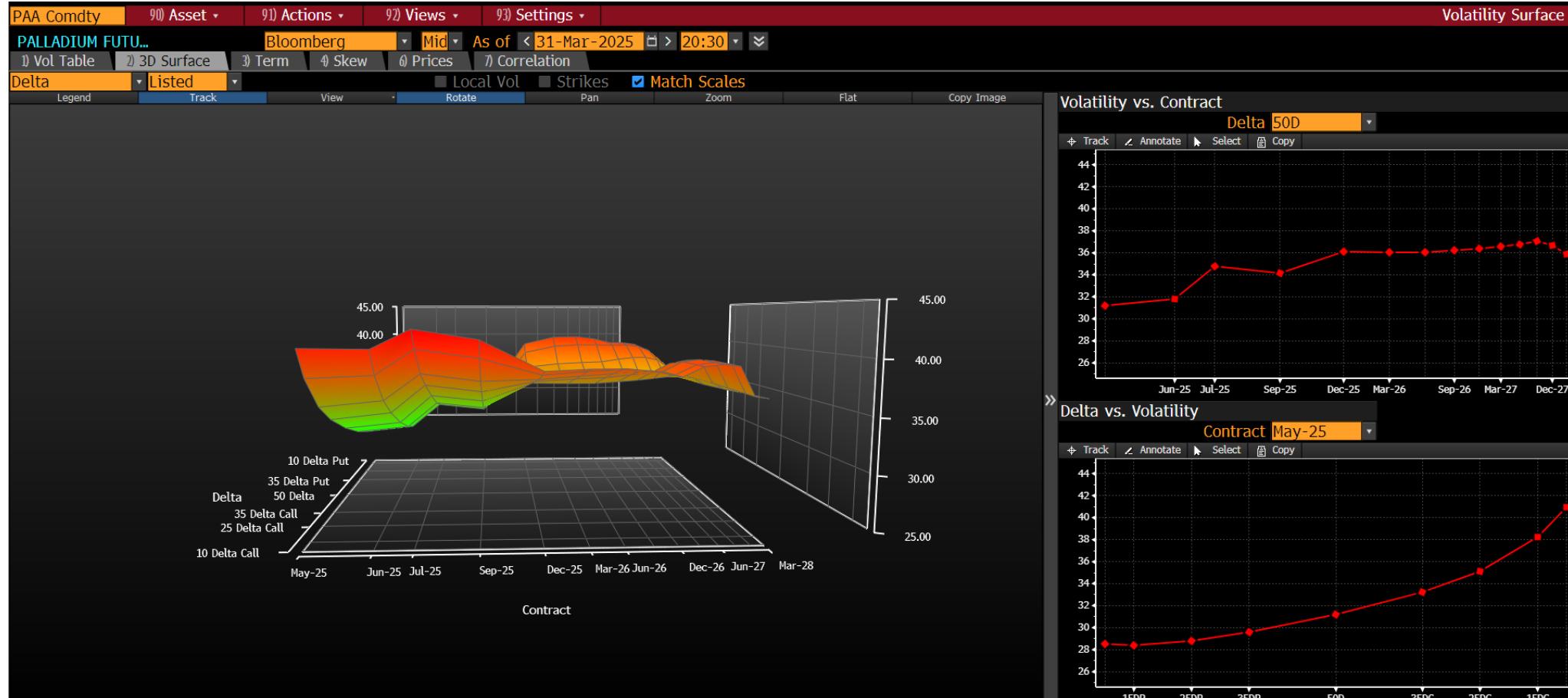
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At 13:00d	Vol --	Op .00	Hi .00	Lo .00	OpenInt 18
PAZ5 COMB Comdty		Export	Settings		
Palladium USD/t oz. Physical Future					
Source	New York Mercantile Exchange	Session	COMB	Display	Quoted Value
Exchange Symbol	PA	Currency	USD	As of 04/02/25	
Aggr Vol	3,174	Aggr Open Int	19,975	Type	Specific
Futures		Strategies			

Intraday Daily

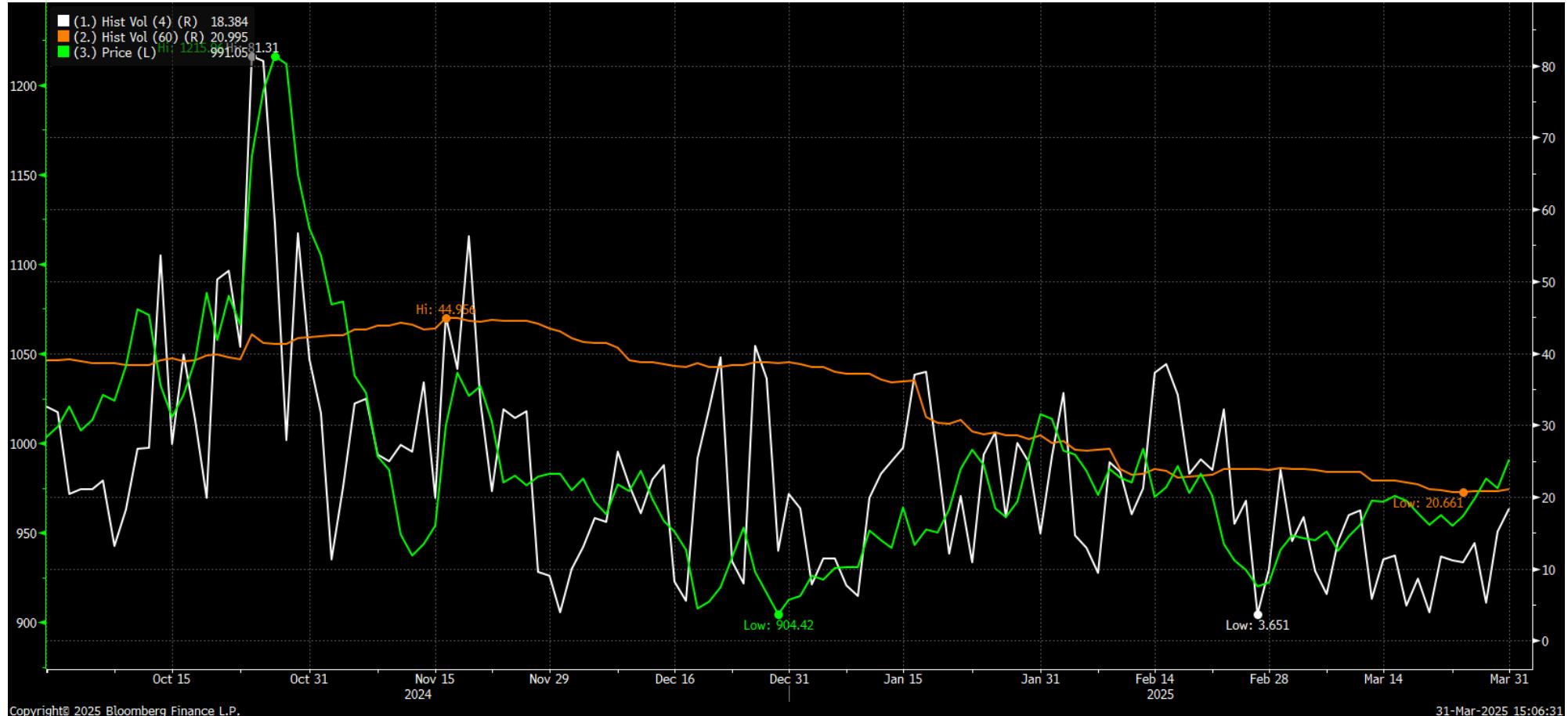
PAZ5 COMB Comdty 1015.00

20:00	00:00	04:00	08:00	12:00	16:00	20:00	00:00	04:00	08:00	12:00	16:00
31 Mar 2025											
01 Apr 2025											
Description	Last	Chg	Settle	Time	Bid	Ask	Open Int	Volume	Yest Settle		
1) Apr25	974.50s	-16.80	13:00	964.50	979.00				991.30		
2) May25	982.50s	-16.80	13:00	976.00	981.00		10		999.30		
3) Jun25	↑982.00	-18.80	14:42	981.00	981.50		19594	3122	1000.80		
4) Sep25	992.50	-15.90	13:49	988.50	989.50		351	52	1008.40		
5) Dec25	999.70s	-15.30	13:00	994.50	996.50		18		1015.00		
6) Mar26	1007.00s	-15.20	13:00	1000.50	1006.00		1		1022.20		
7) Jun26	1015.50s	-16.20	13:00	1010.50	1015.50		1		1031.70		
8) Sep26	1023.00s	-16.10	13:00	1019.50	1024.50				1039.10		
9) Dec26	1030.50s	-16.10	13:00	1028.50	1033.50				1046.60		
10) Mar27	1038.00s	-16.10	13:00	1037.50	1042.50				1054.10		
11) Jun27	1045.50s	-16.10	13:00	1046.50	1051.50				1061.60		
12) Sep27	1053.00s	-16.10	13:00	1055.00	1060.50				1069.10		
13) Dec27	1060.50s	-16.10	13:00	1065.00	1069.50				1076.60		
14) Mar28	1068.00s	-16.10	13:00						1084.10		

Volatility Surface



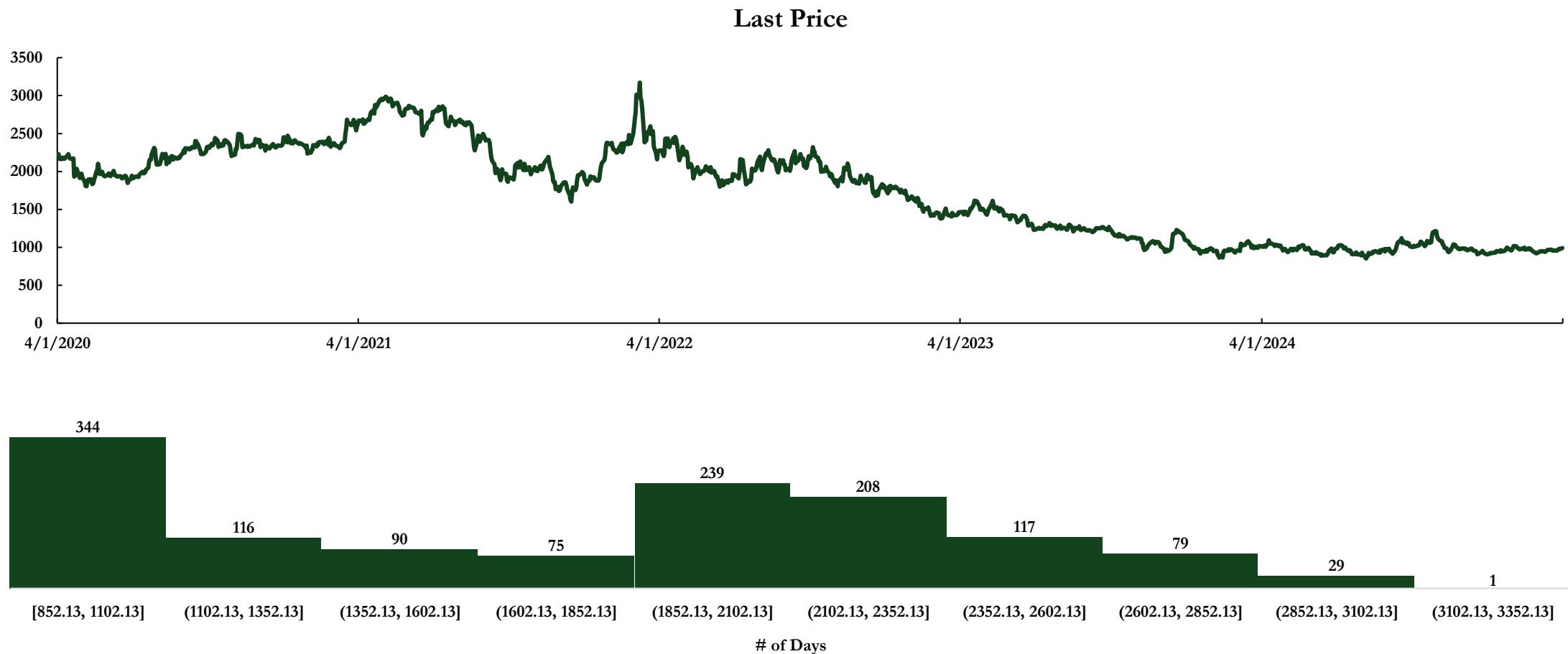
Graph Volatility



Correlations

- Platinum: 0.6
- Aluminum: 0.27
- Steel: 0.12
- Copper: 0.36
- S&P: 0.25

Histogram (5y)



Norvo Nickel Earnings Call

Norilsk Nickel 2024 Financial Results Presentation | Markets Update

Palladium Market: Balanced State as Both Demand From the Automotive Industry and Recycling Volumes Contracted

Consumption: Stagnation of Automotive Production and Declining Loadings in Autocatalysts Reduce Demand



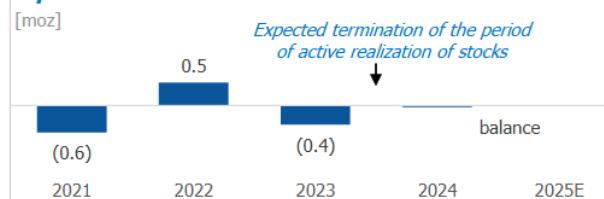
Production: Underperformance Risks in Both Primary and Secondary Production



Source: Company estimates

Note: 1. Balance of production and consumption excluding investment demand and other stock movements

Market Balance: the 2023-2024 Deficit is Covered by the Realization of Consumer Stocks



- In North America, production is expected to decline in 2025 (200 koz production cuts at the Stillwater mine) and additional optimization is possible at projects in South Africa
- Despite positive expectations in 2025, there is a risk that recycling will rise only slightly due to slower than expected monetary policy easing in developed economies
- Hybridization of vehicles will sustain palladium demand in the long term

Norilsk Nickel 2024 Financial Results | Operations and Strategy Update

Innovative Applications of Palladium



Green technology

- Catalysts – to produce green hydrogen
- Tubular membranes - to obtain ultra-pure hydrogen
- Hydrogen-air fuel cell catalyst – extracting energy from hydrogen and converting it into electrical energy
- Photocell for solar panels - to convert solar radiation into electricity



Hi-tech materials

- OLED display structures
- Coverings in printed circuit boards, contacts and electronic components



Traditional methods of use

- Fiberglass spinneret
- Electrode for production of chloralkali, for nickel extraction, for copper extraction
- Catalyst for steam reforming of methane, autothermal reforming¹ of methane, for oil hardening

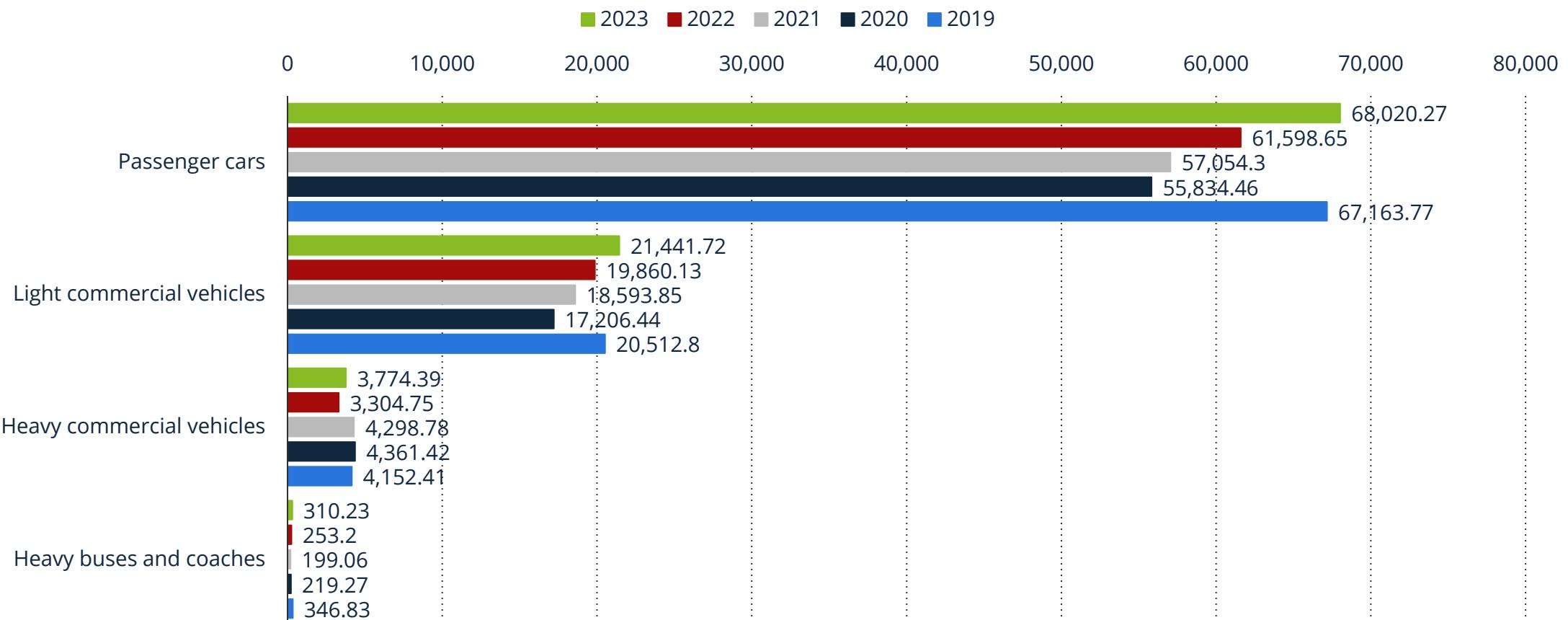


Source: Company data

Note: 1. A process in which methane reacts with a mixture of oxygen and water, which does not require additional methane consumption to heat the reactor

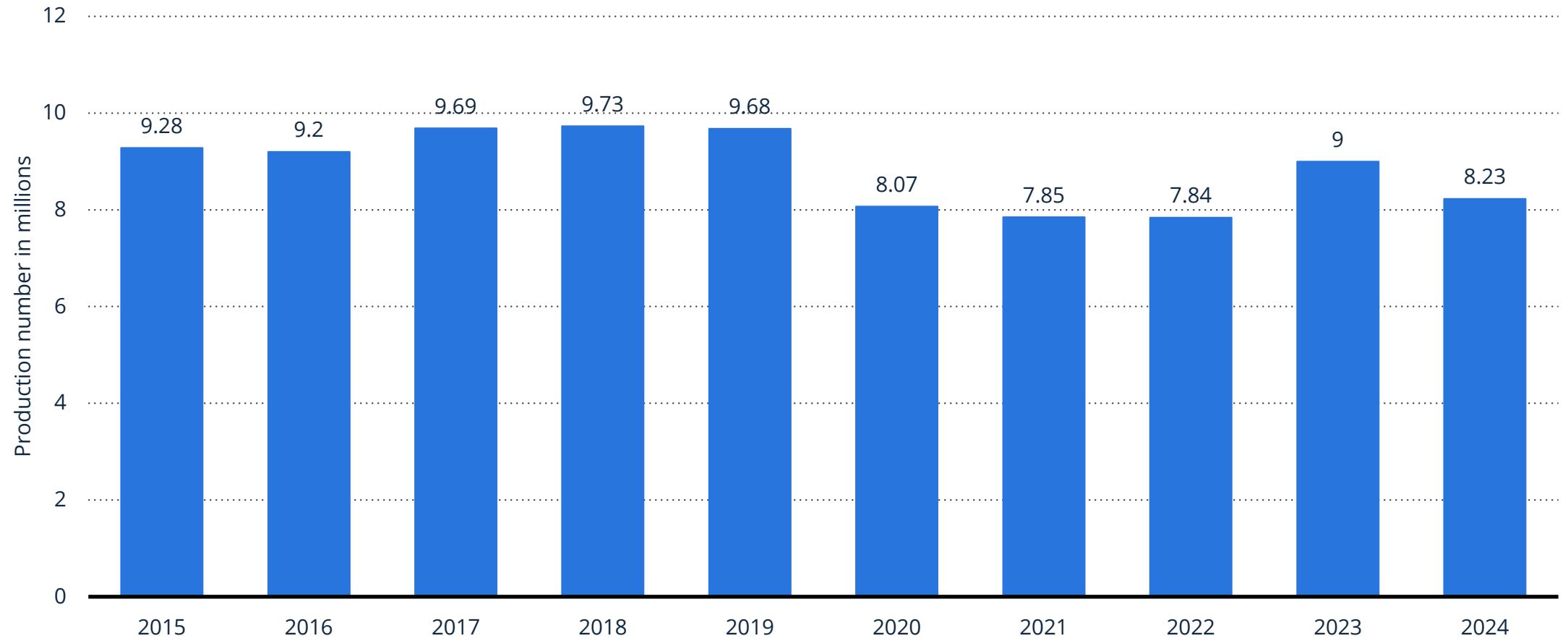
NORNICKEL | 34

Motor Vehicle production by type (1000s)

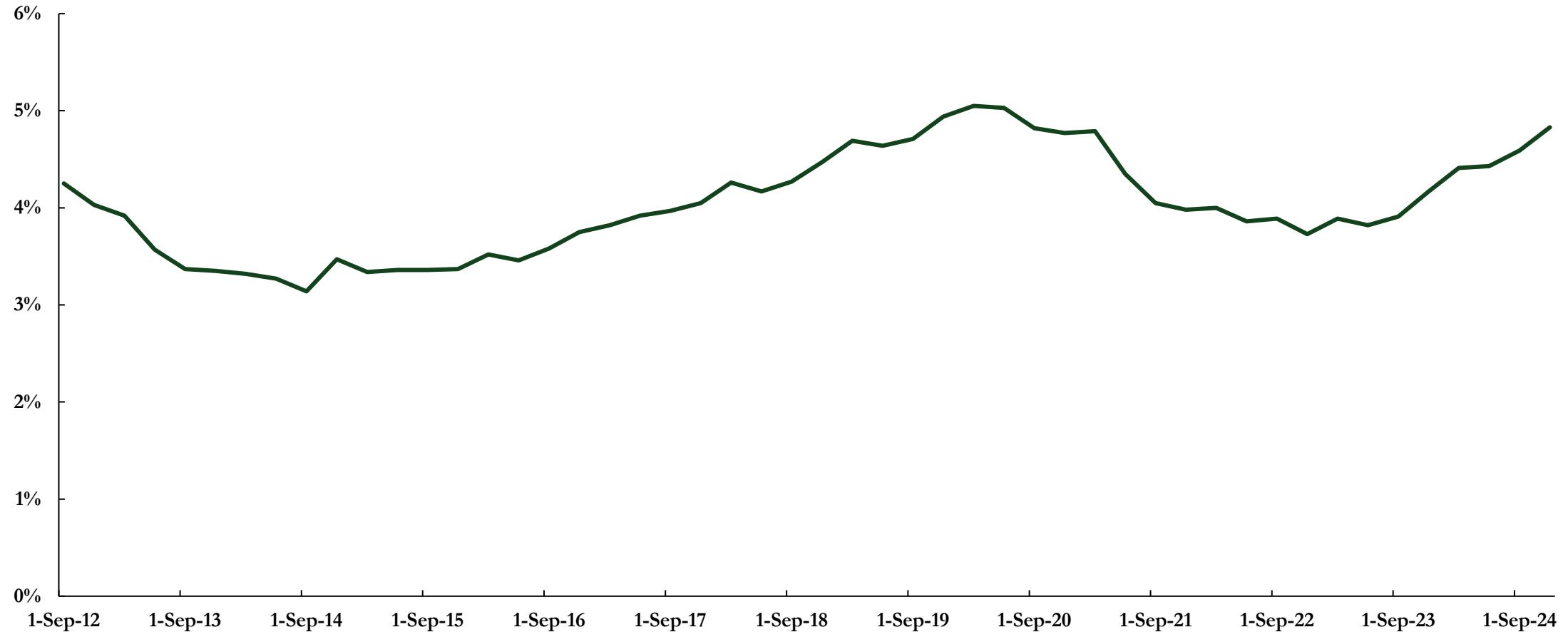


U.S. Job Market

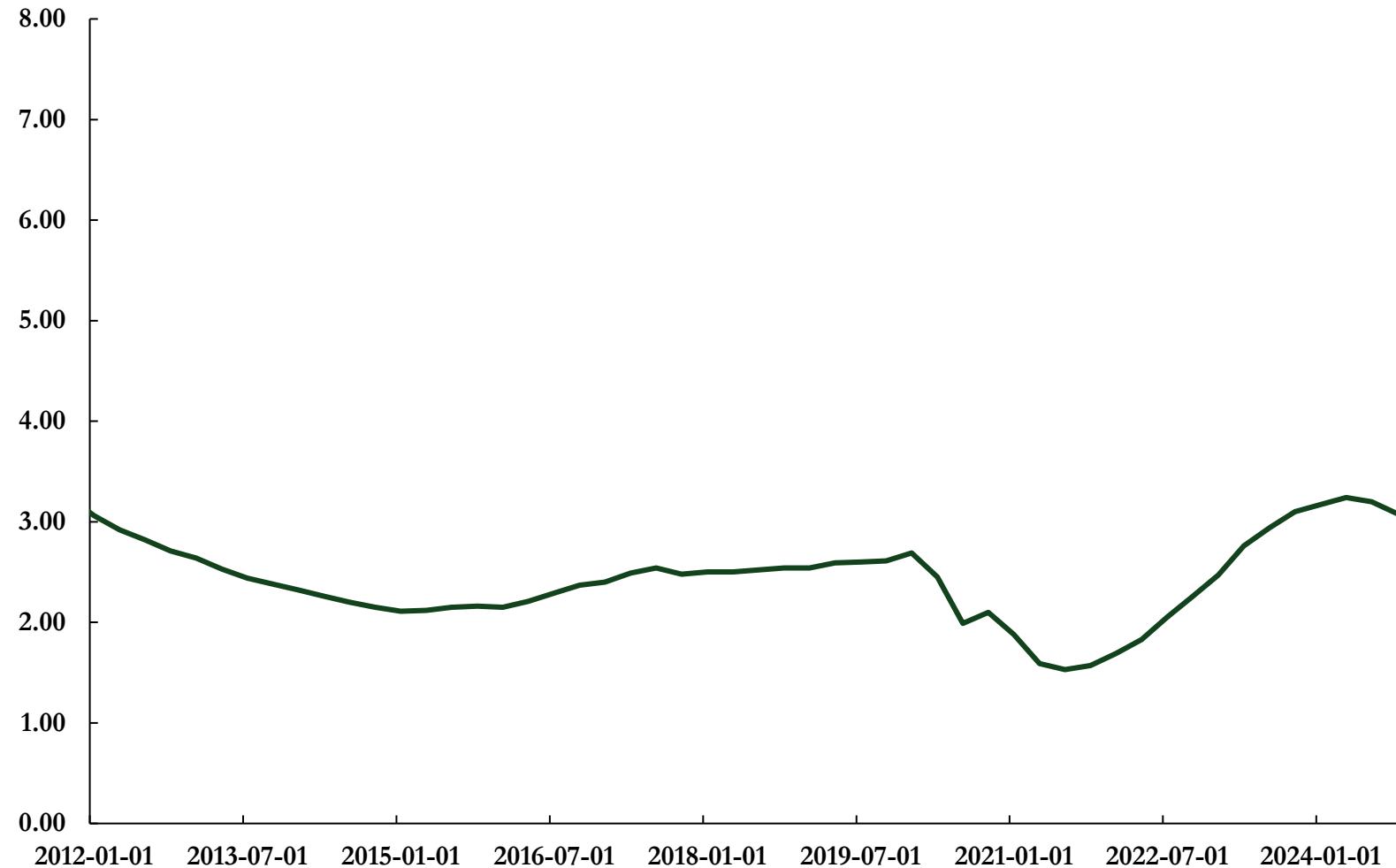
Japan Motor Vehicle Production



Auto Loans 90+ days delinquent



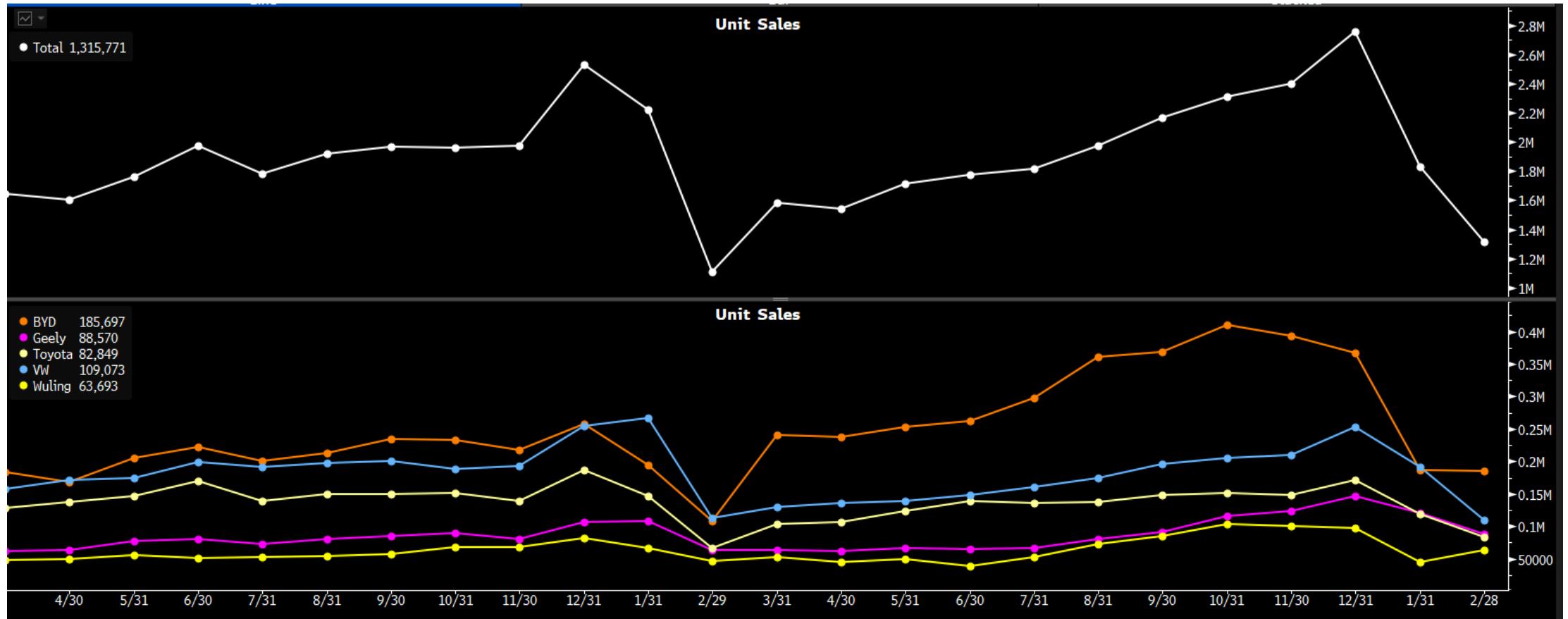
US Credit Card Delinquency



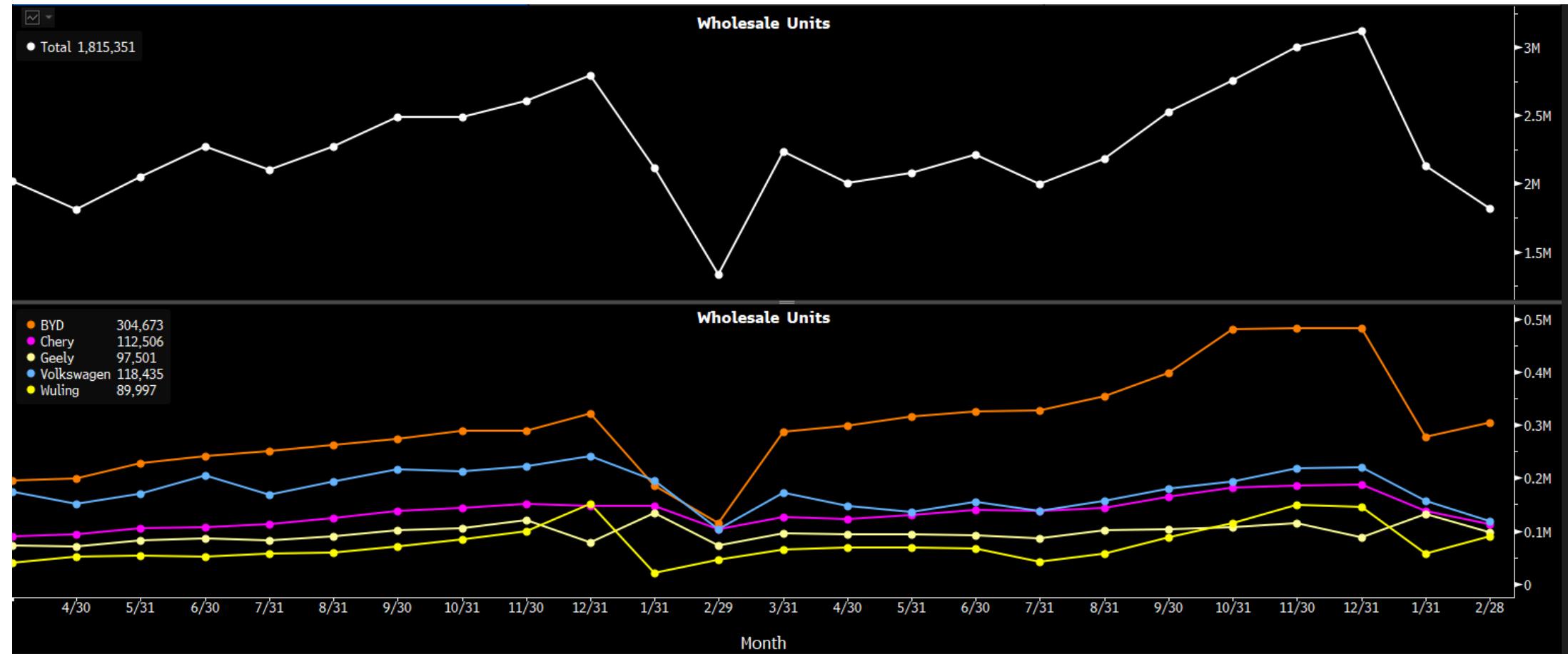
Year-on-year percentage change of auto loans originated in the United States from 1st quarter 2005 to 3rd quarter 2024, by risk score

Characteristic	<620	620-659	660-719	720-759	760+
Q3 2024	11.18%	-2.97%	-3.82%	3.55%	4.33%
Q2 2024	0.55%	1.17%	-4.88%	-0.25%	2.76%
Q1 2024	12.04%	-2.72%	-1.88%	-7.03%	6.89%
Q4 2023	-10.38%	-18.03%	-22.01%	-16.37%	0.2%
Q3 2023	-7.47%	-11.7%	-4.92%	-9.95%	5.94%
Q2 2023	-15.82%	-21.76%	-13.98%	-4.72%	-2.26%
Q1 2023	-15.6%	-25.94%	-13.39%	1.76%	-0.05%
Q4 2022	-7.78%	-6.72%	8.95%	8.2%	6.18%
Q3 2022	-10.42%	-10.24%	-10.48%	-5.64%	-1.3%
Q2 2022	0.52%	1.6%	-0.83%	-4.33%	-2.78%
Q1 2022	18.93%	28.13%	22.77%	15.2%	6.44%
Q4 2021	10.13%	13.33%	29.63%	14.51%	1.1%
Q3 2021	19.29%	14.41%	26.88%	26.39%	9.8%

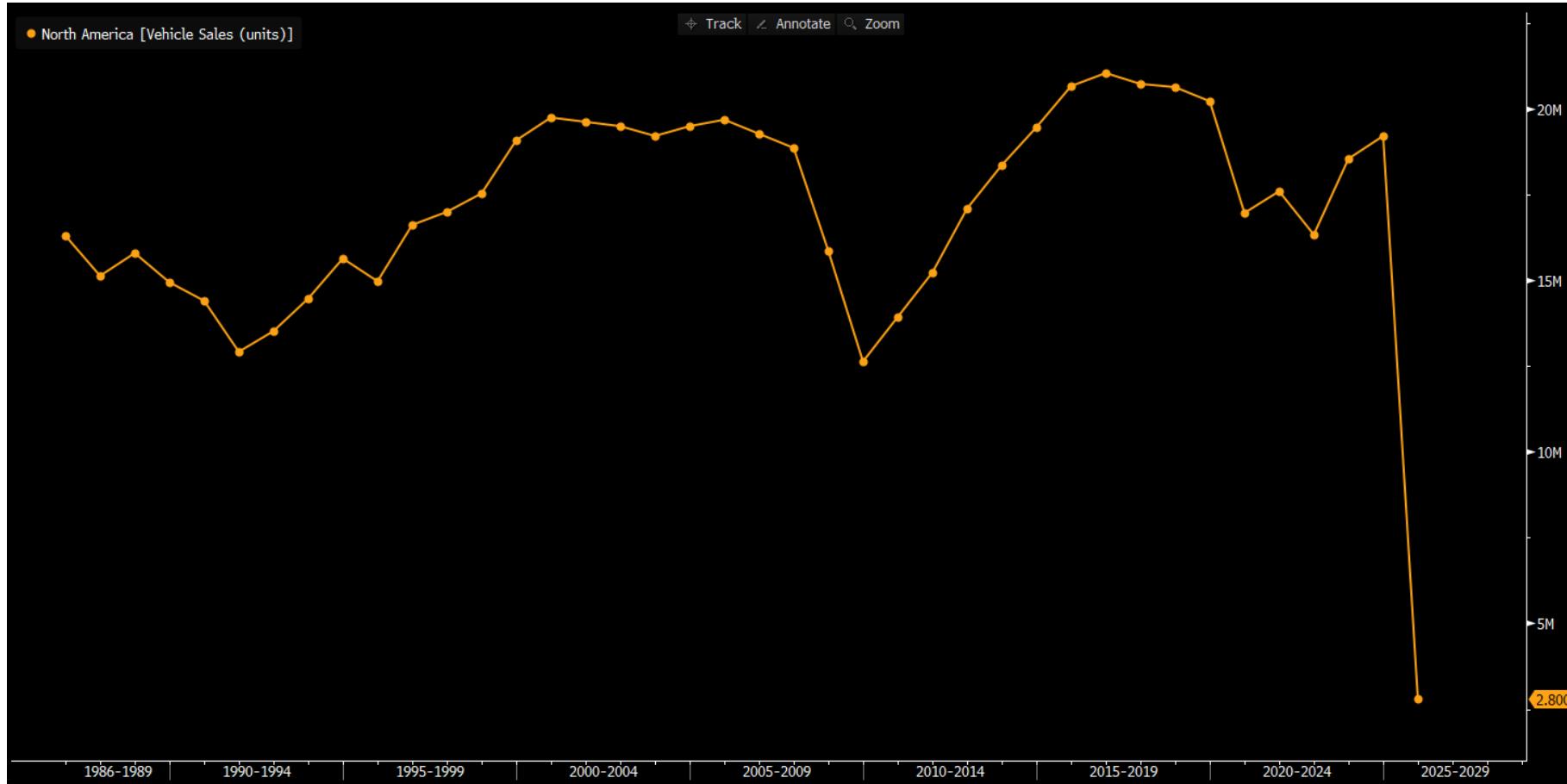
Top 5 Chinese Companies Retail Unit Sales



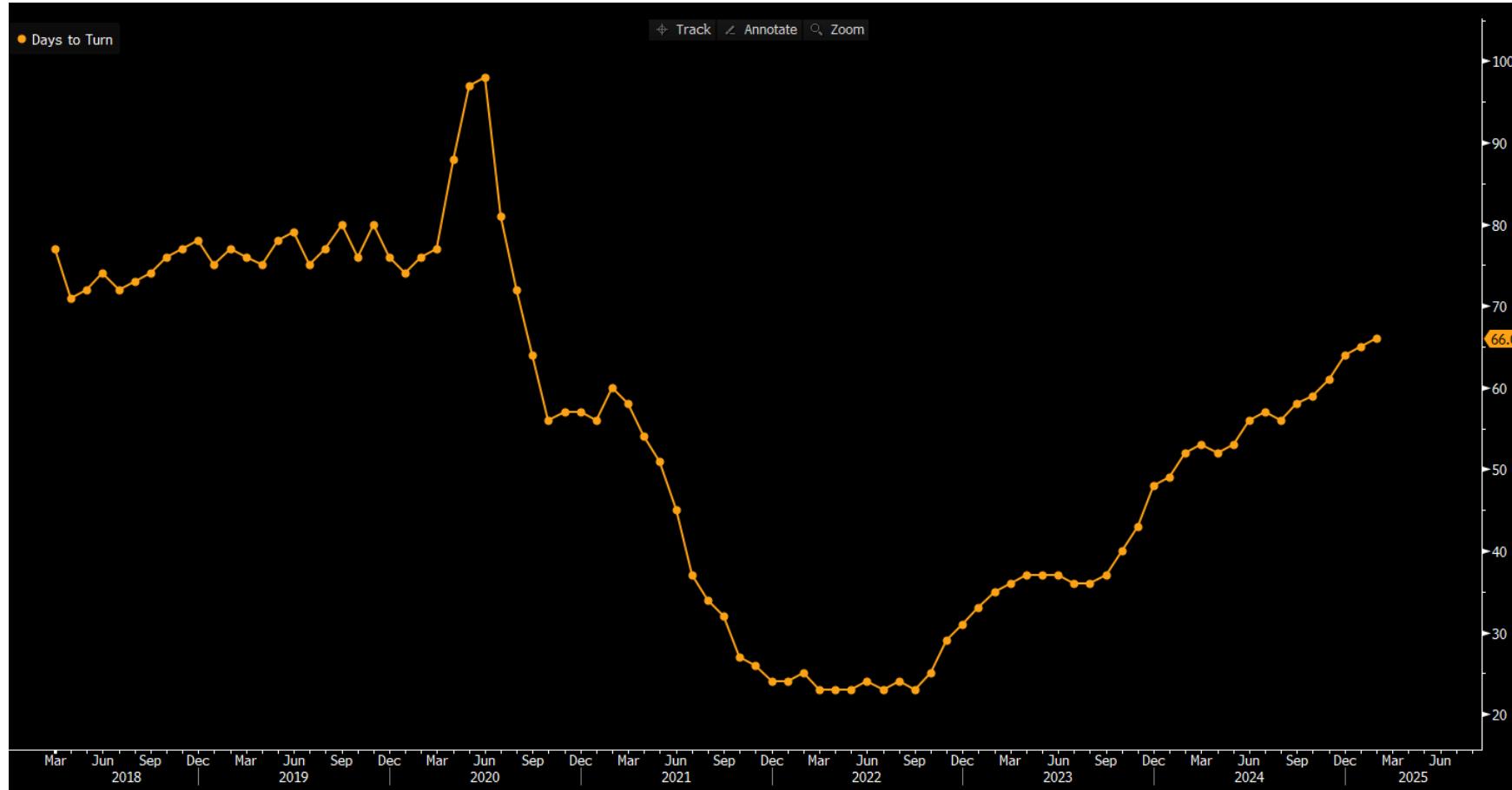
Top 5 Chinese Companies Wholesale Sales



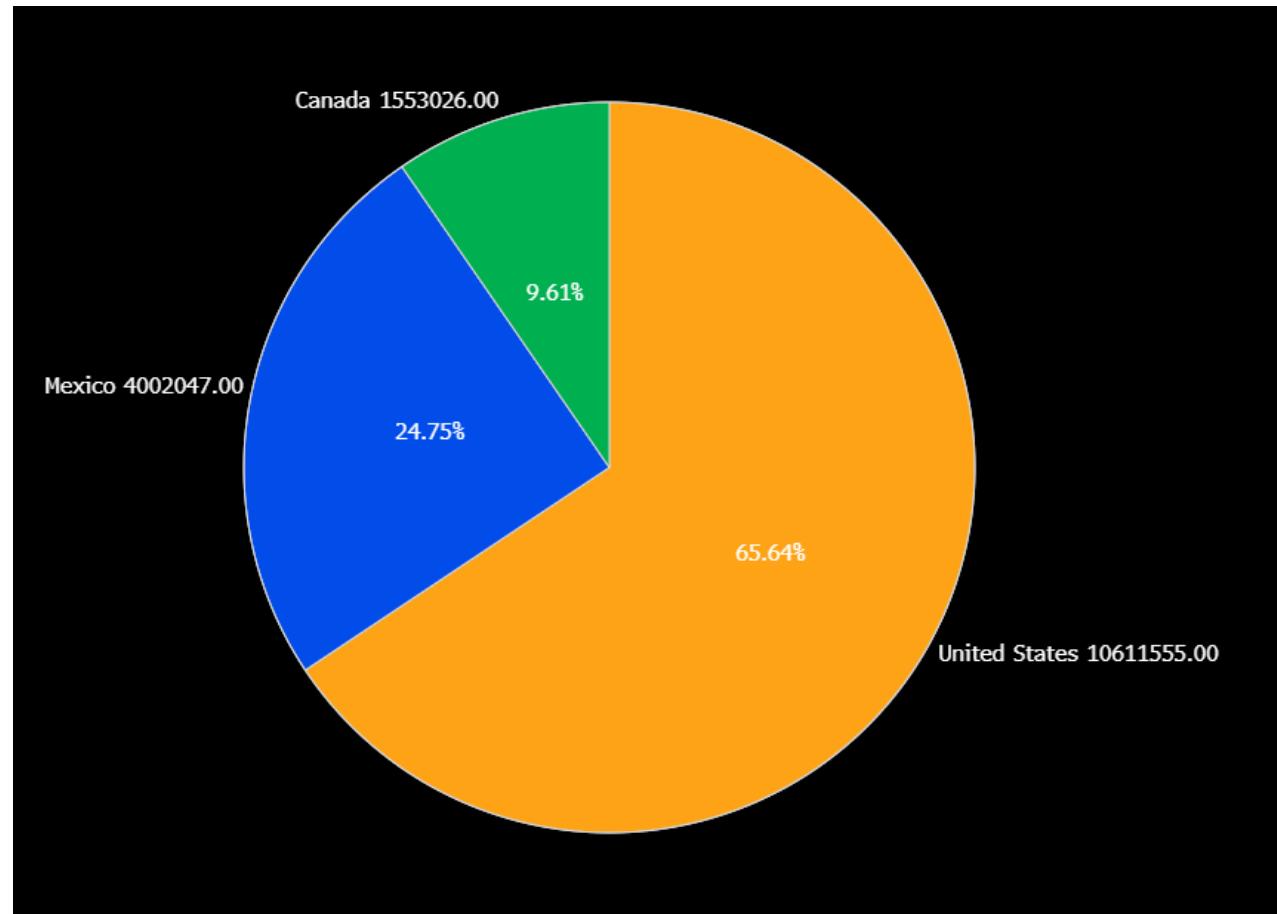
North America Vehicle Sales



North America Days to Turn

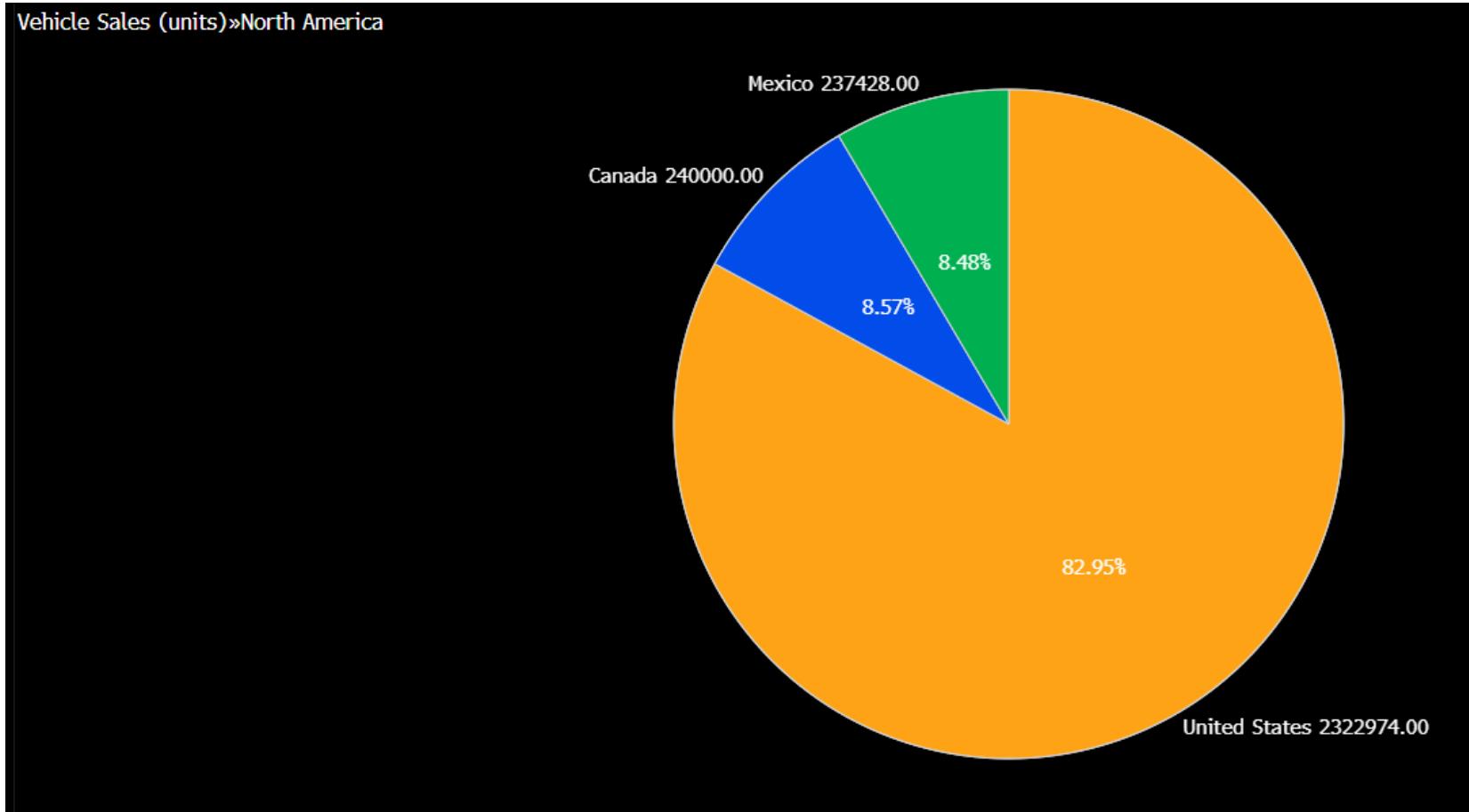


Vehicle Production (North America)

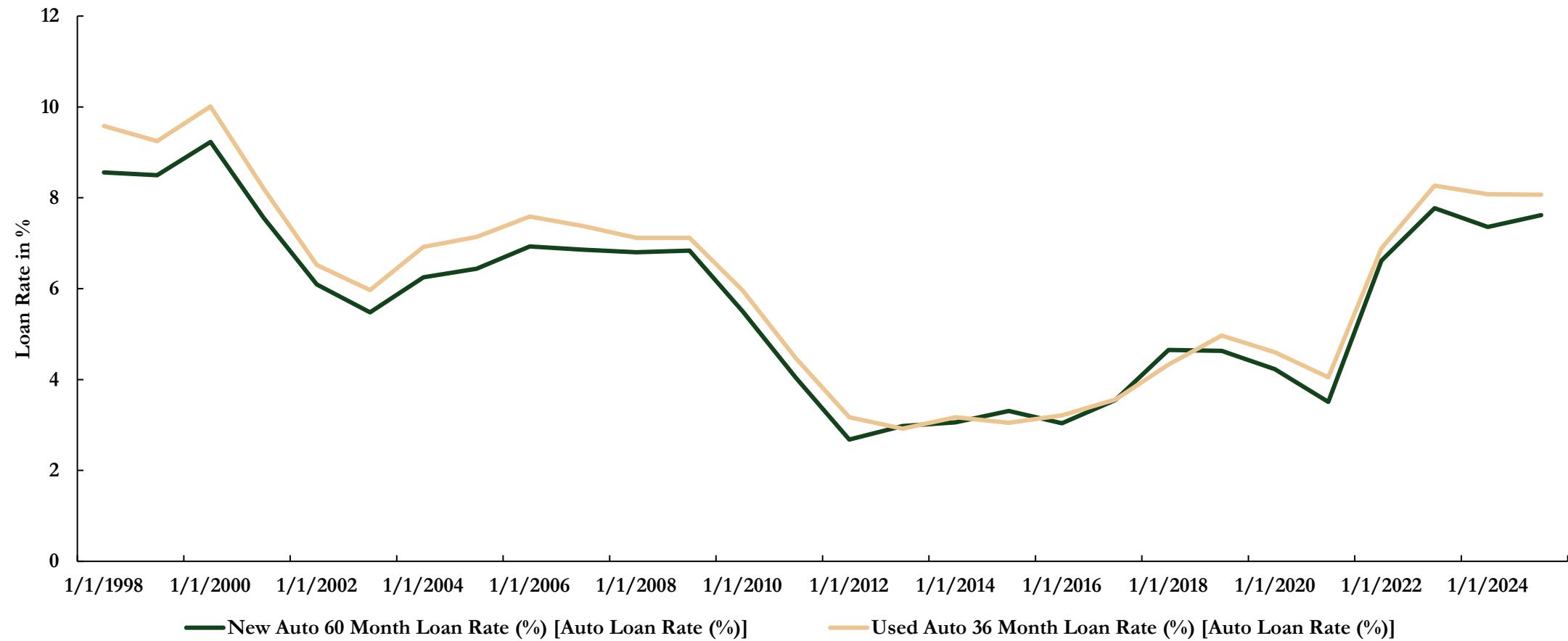


Values in units

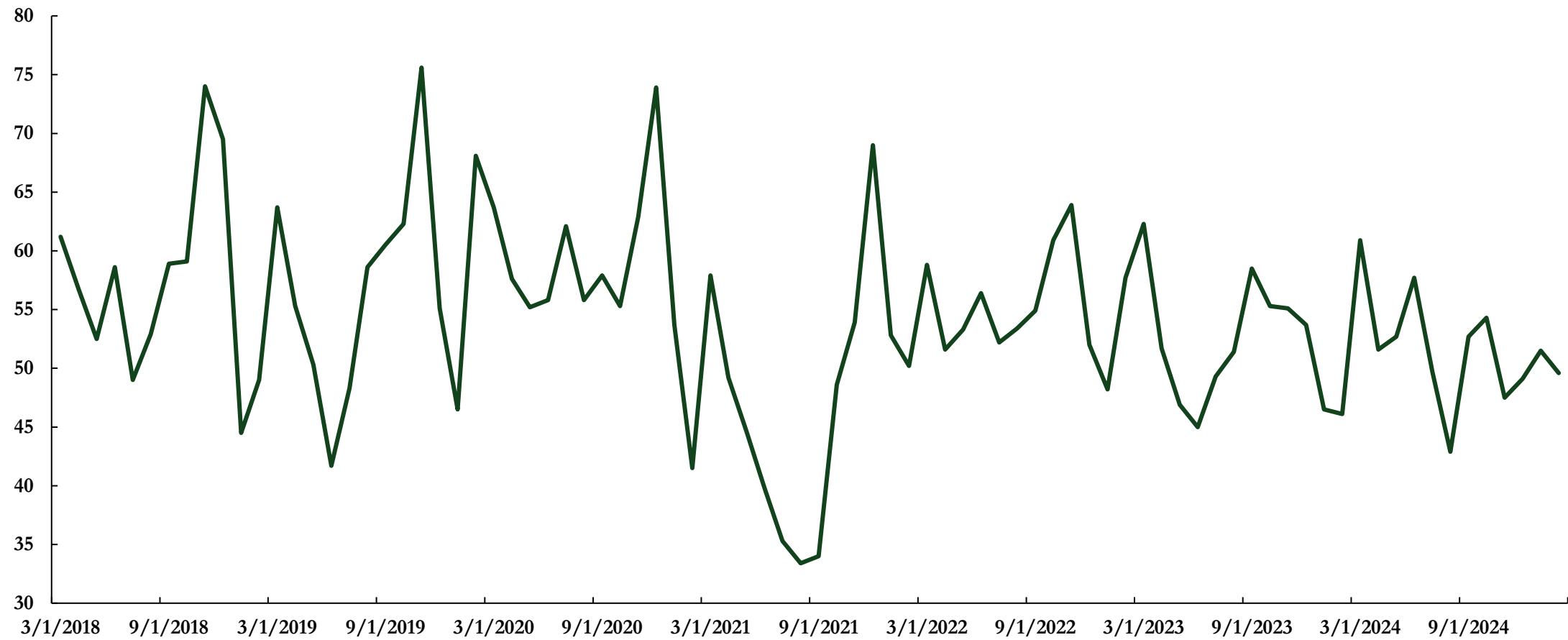
North America Vehicle Sales



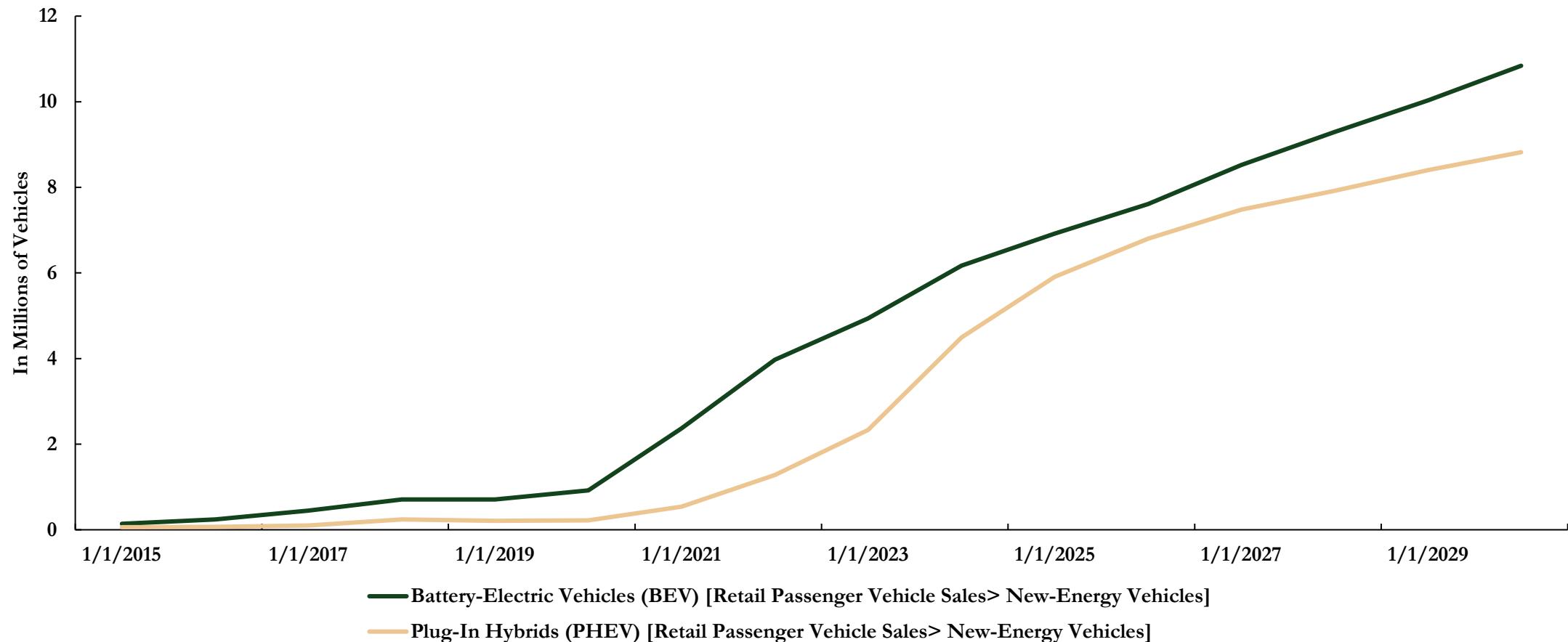
North America New Car Auto Loan Rate



China Vehicle Inventory Index (%)

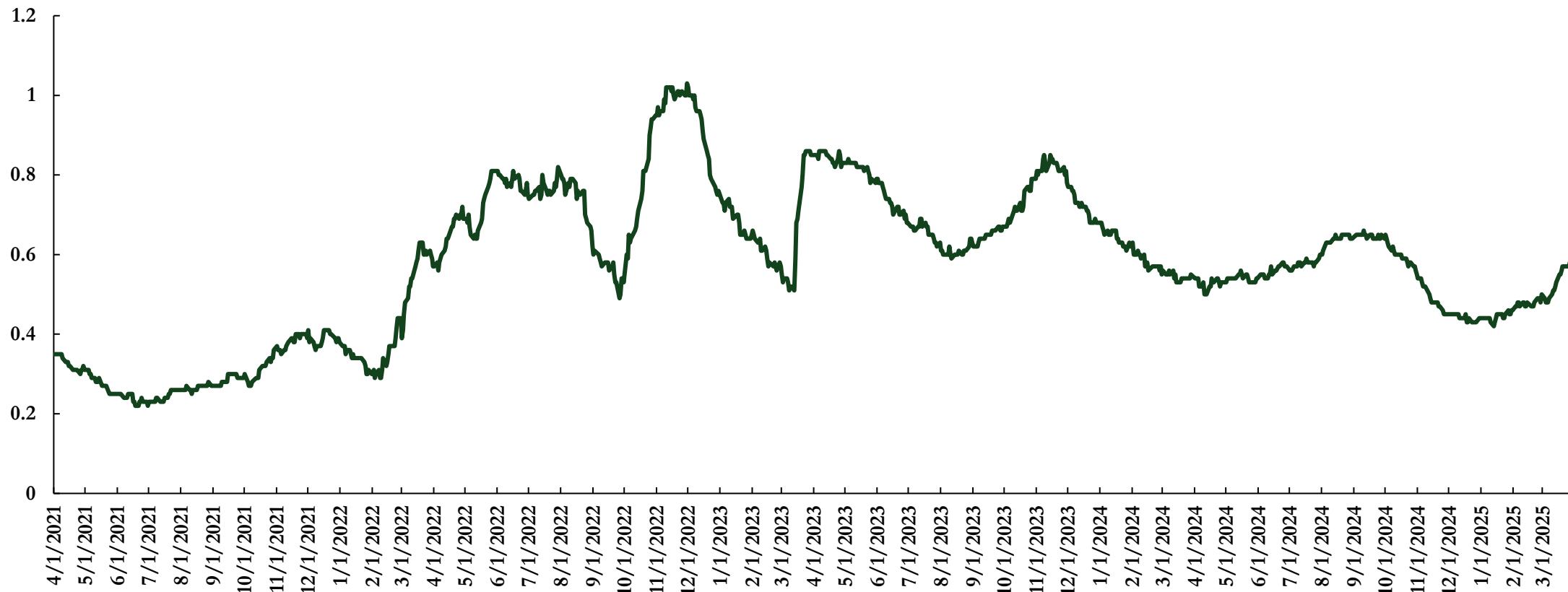


Bloomberg Intelligence Forecast (China)

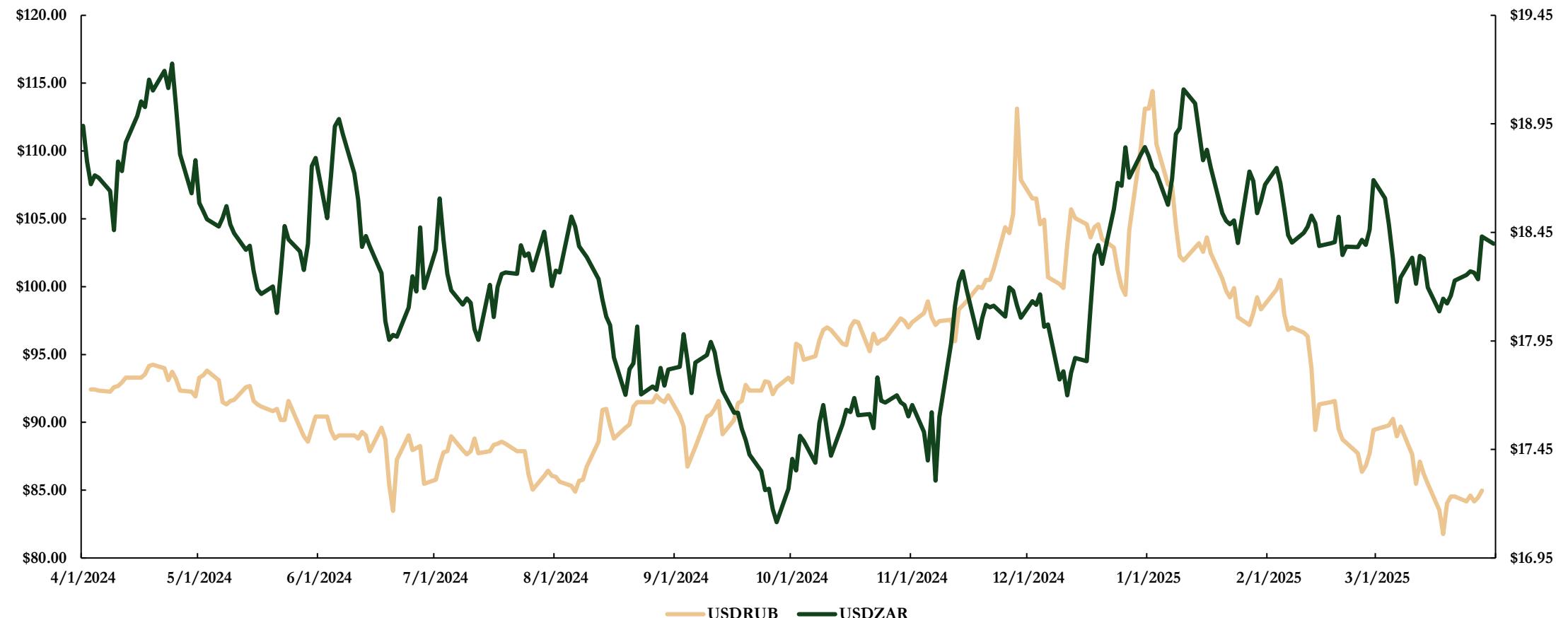


Credit Spread on ABS

LUABOAS



RUB & ZAR Expanded



America Tariff risk

