Sector Shockwaves: Analyzing Volatility in the S&P 500

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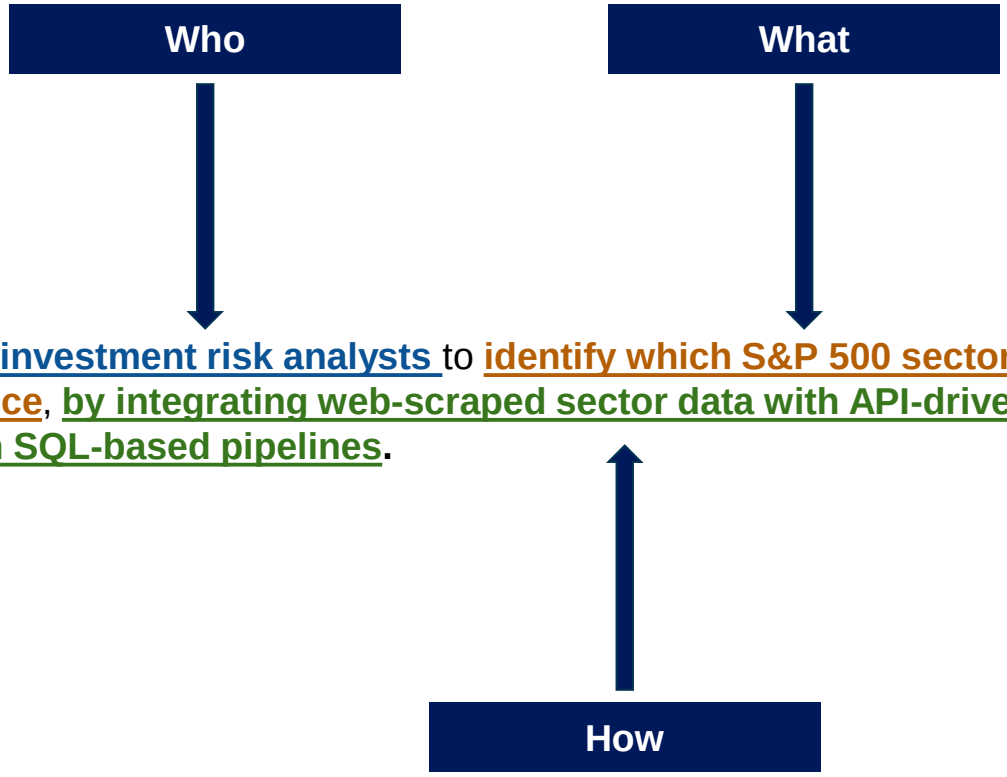
Spencer Chavez

GitHub

A start-to-finish equities analysis framework to draw strong insights

Why I have strong conviction in our solutions' ability to meet your needs and provide value to stakeholders



My framework empowers **investment risk analysts** to **identify which S&P 500 sectors offer the best risk-adjusted performance**, **by integrating web-scraped sector data with API-driven price data and analyzing it through SQL-based pipelines**.

Investment Risk and Quantitative Group Analyst Job Description

Job Description Highlights

Key Points

- Demonstrates advanced SQL proficiency
- Mimics real financial workflows
- Handles large-scale market data
- Blends analytics, domain knowledge
- Delivers risk-based performance insights

Leveraging cutting-edge market data using Tiingo API

Why our LLM framework offers a superior value proposition

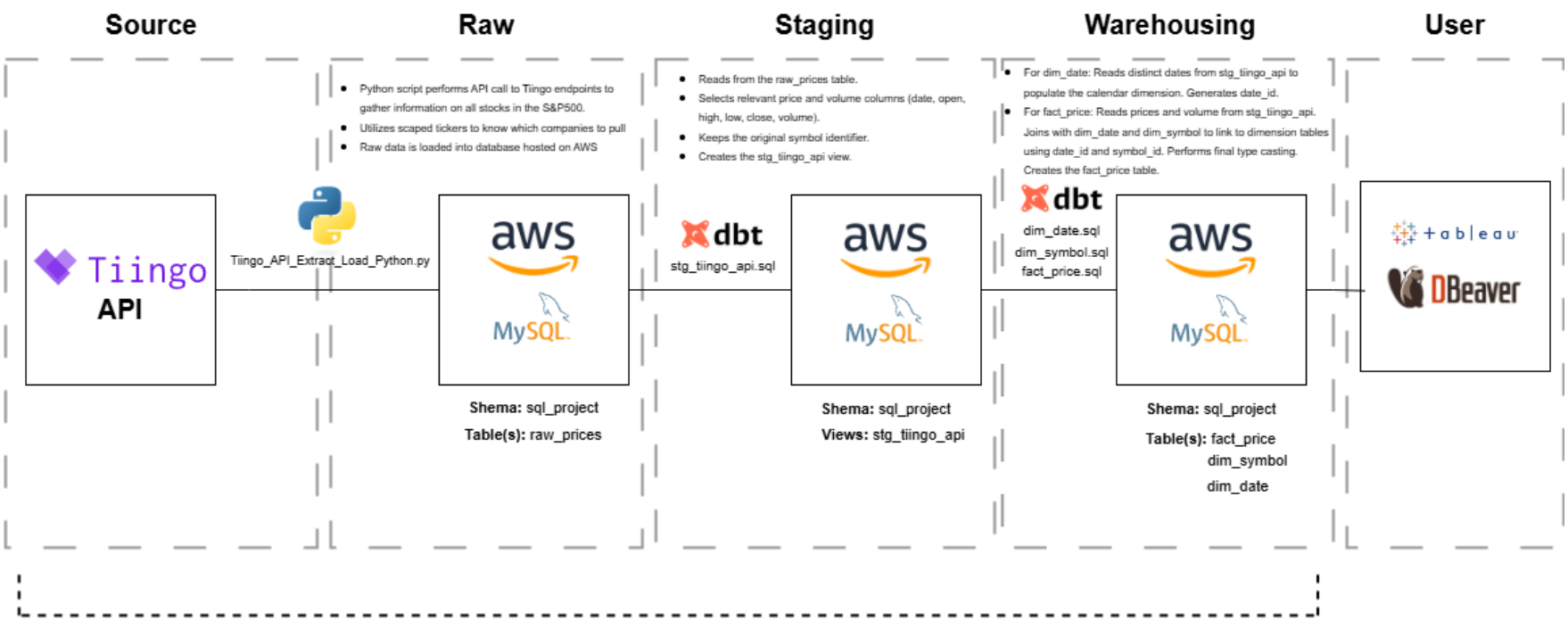
API Provider

Tiingo

Data Collected	Job Relevance
	• Provides historical equity pricing necessary for measuring risk-adjusted returns. • Showcases proficiency in consuming financial APIs for dynamic, up-to-date market data. • Enables complex performance and volatility calculations aligning with investment risk analysis needs.

Leveraging cutting-edge market data using Tiingo API

Data Pipeline Diagram



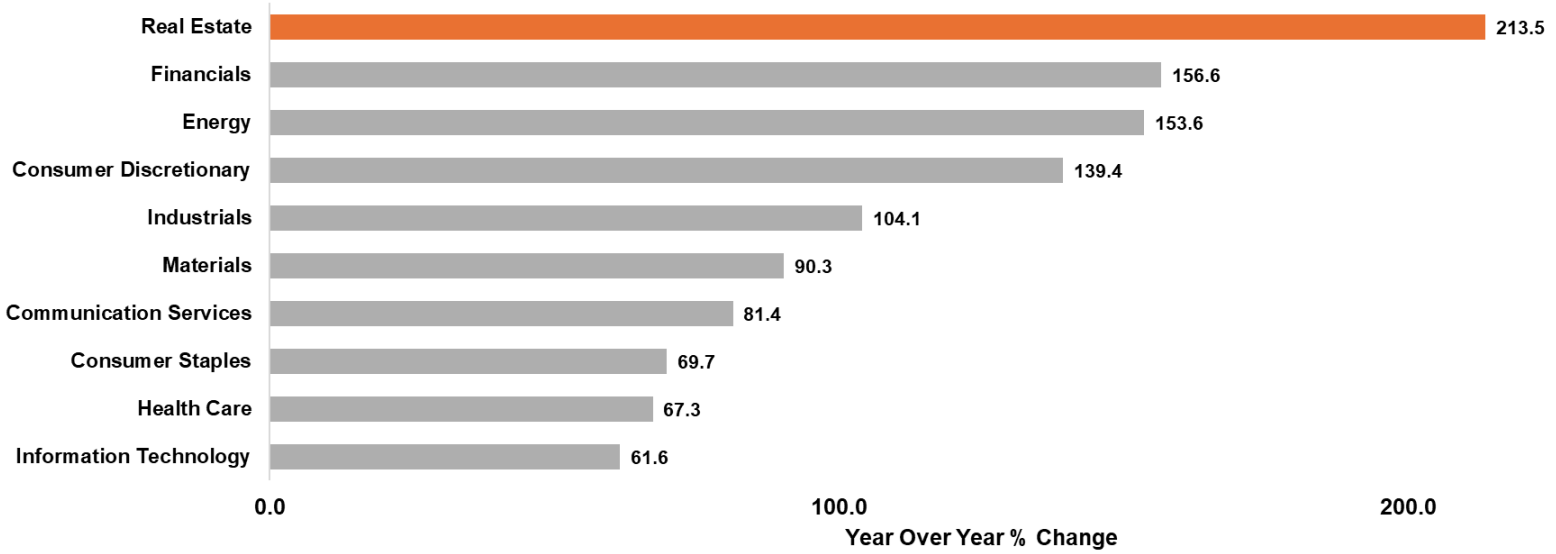
- tiingo_api_pipeline.yml:
  - Runs on a schedule (or manually).
  - Executes Python script to fetch latest stock prices from Tiingo API.
  - Loads fetched price data into the raw_prices table in MySQL.
- wikipedia_web_scrape_pipeline.yml:
  - Runs on a schedule (or manually).
  - Executes Python script to scrape the S&P 500 company list from Wikipedia.
  - Loads scraped company data into the raw_wikipedia_sp500 table in MySQL.
- dbt_pipeline.yml:
  - Runs on a schedule (likely after data ingestion) or manually.
  - Executes dbt run command.
  - Transforms data from raw tables -> staging views -> warehouse tables within MySQL.

2020 proves to be the most volatile year for equities in 10 years, with the Real Estate sector leading the charge

Business Question

Which GICS sector in the S&P 500 has experienced the largest year-over-year increase in daily price volatility since 2015, and when did it occur?

Most Volatile Year-Over-Year Change (2019-2020) by Sector



Insights

- Real Estate volatility surged 213.50%
- All sectors increased over 60%

Recommendation

- Monitor Real Estate exposure closely
- Use defensive sectors as hedges

Prediction

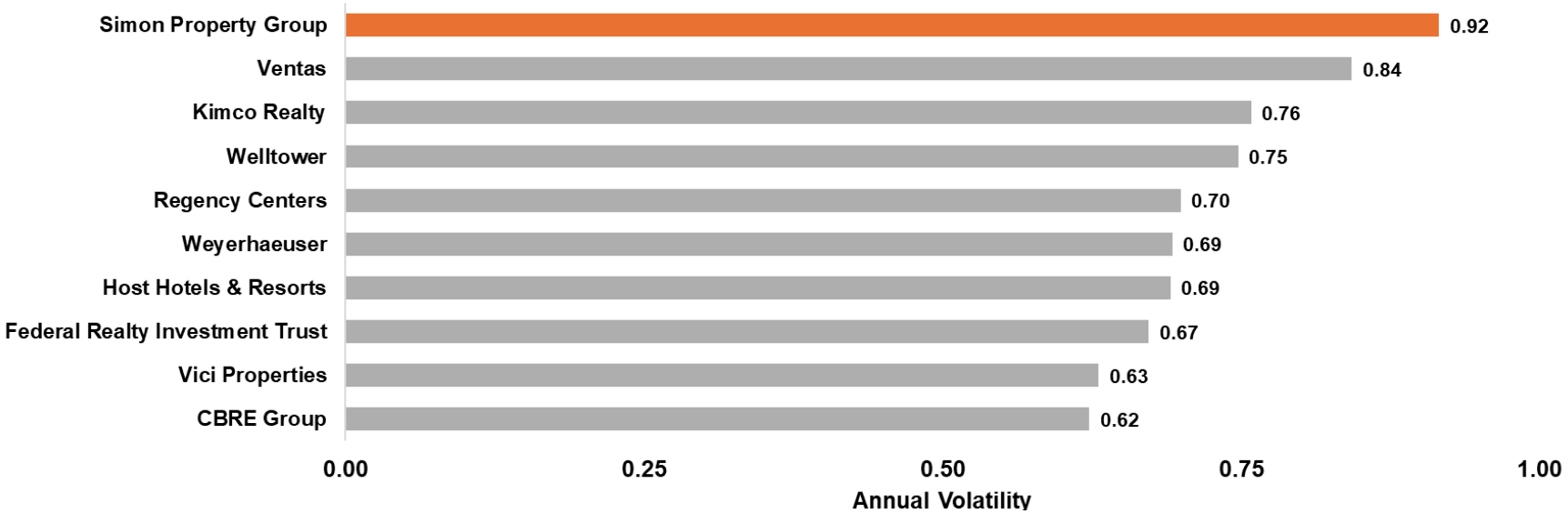
- Real Estate remains crisis-sensitive
- Volatility stays above pre-2020 levels

Physical-Occupancy REITs show highest volatility during Covid-19 Pandemic

Business Question

Which sub-industries or individual companies within the Real Estate sector drove the large volatility increase observed in 2020?

Top 10 Most Volatile Equities in S&P 500 Real Estate Sector During 2020



Insights

- Retail REITs most volatile (91.59%)
- Digital REITs most stable (40.54%)

Recommendation

- Balance digital and traditional REITs
- Set sub-industry specific risk limits

Prediction

- Digital-physical REIT divide continues growing
- Traditional REITs face ongoing volatility

Utilized Python to extract key S&P 500 metadata from Wikipedia

Scraped Site Host

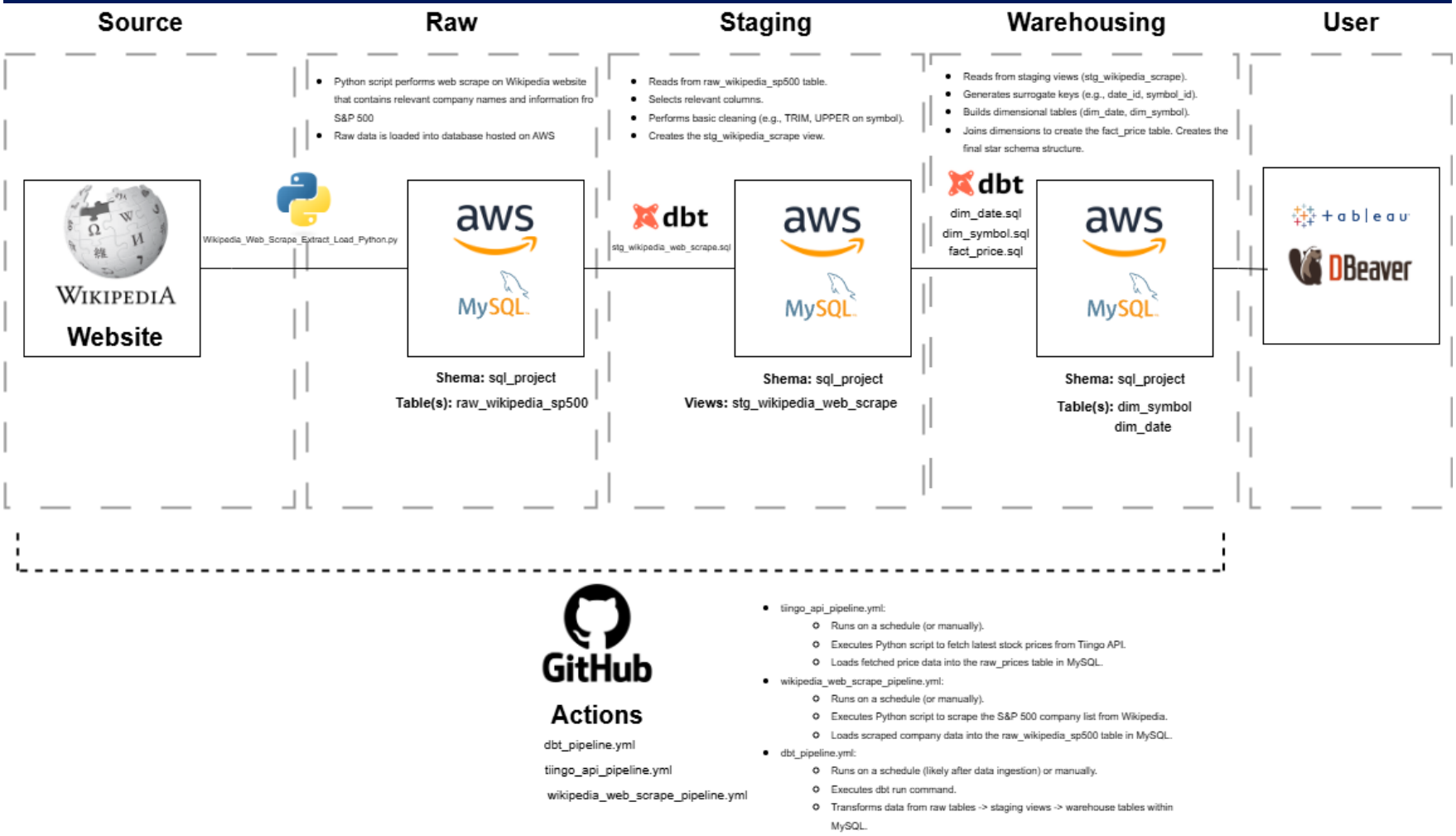
Data Collected

Job Relevance

- Demonstrates capability to augment internal datasets with external information (S&P 500 listings, sector tags).
- Confirms a solid grasp of sourcing and cleaning real-world data for analytics.
- Enriches sector-level insights crucial for portfolio or market-wide analysis.

Utilized existing online databases to extract key S&P 500 metadata from Wikipedia

Data Pipeline Diagram

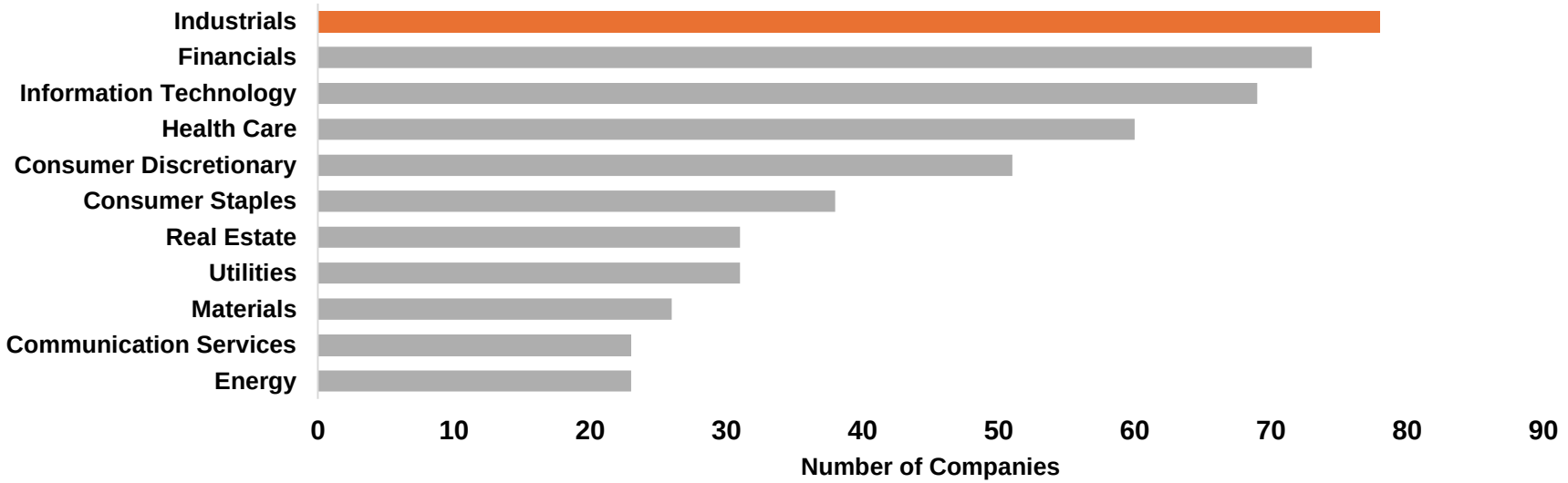


Industrials lead with a 15.6% share of S&P 500 sector distribution

Business Question

What is the current sector composition of the S&P 500, and which sectors have the highest concentration of companies?

Company Volume by Sector



Insights

- Growth sectors dominate S&P 500
- Defensive sectors notably underrepresented

Recommendation

- Monitor high cyclical sector exposure
- Balance with non-index defensive stocks

Prediction

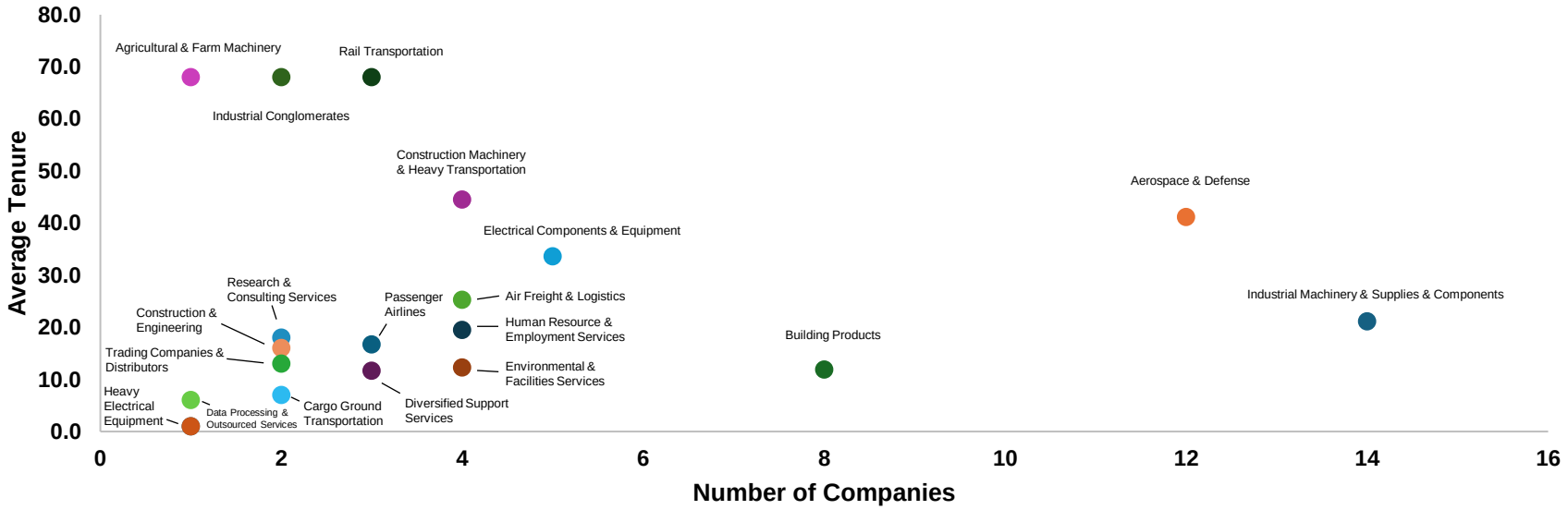
- Growth sectors continue gaining share
- Traditional sectors further consolidate

The industrial sector is comprised of both new leaders and legacy anchors

Business Question

Within the Industrials sector (the largest sector by company count), which sub-industries are most prominent, and what is the average tenure (years since being added to the S&P 500) of companies within those dominant sub-industries?

Largest S&P 500 Sector Composition by Industry



Insights

- Machinery leads in company count
- Legacy transportation shows highest tenure

Recommendation

- Balance old and new industries
- Consider tenure in risk assessment

Prediction

- Tech-driven industrials gain prominence
- Traditional industries maintain core presence