



TigerGraph

Risk Management in Turbulent Economic Times with Graph Analytics

The Dual Impact of COVID-19

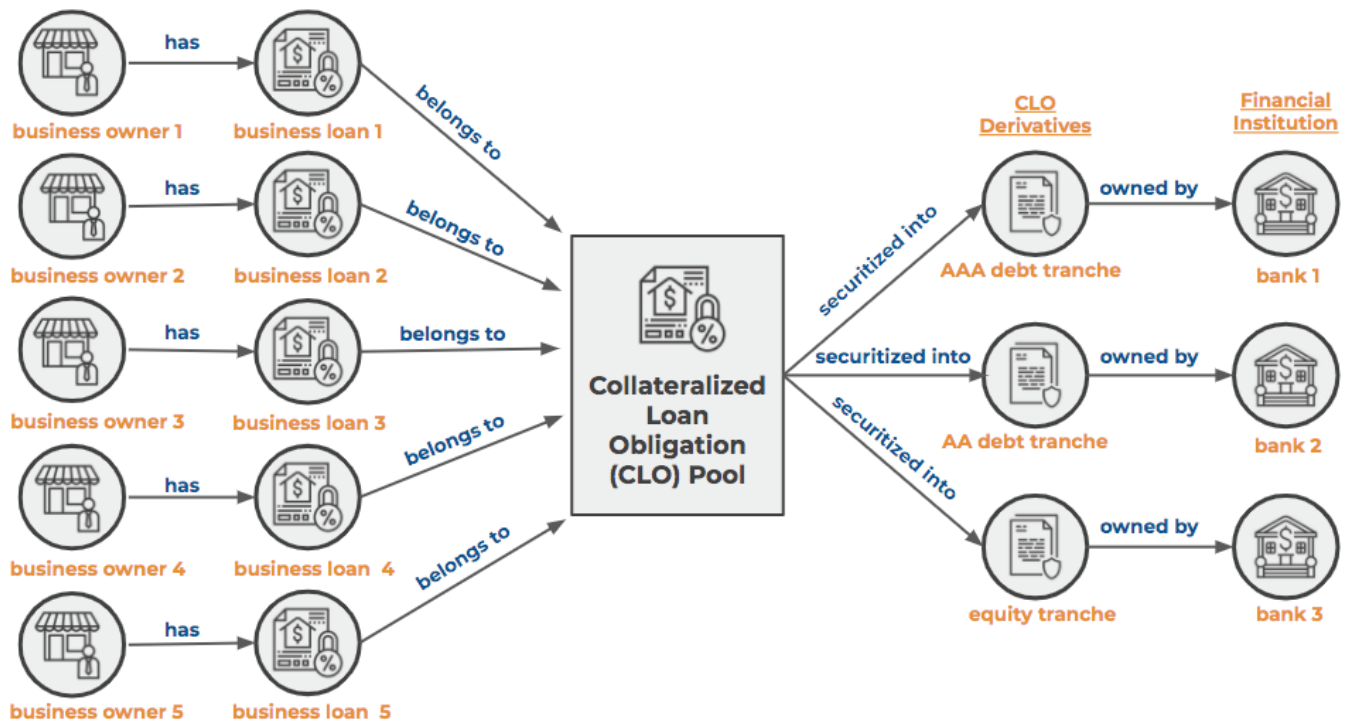
The disruption to the global economy due to COVID-19 delivers two major shocks at the same time:

- 1. Demand Shock** - The first shock pertains to the global demand for goods and services. Every major country is in the process of implementing social distancing measures: from bars, restaurants, and hotels to planes, trains, and automobiles, a sudden drop in economic activity is leading to a sharp drop in the demand for goods and services.
- 2. Supply Shock** - The second major shock is to the global supply chain and it's unfolding at a rapid pace with reduction, or total shutdown, in factory output. Disruptions to the supply chain are profoundly affecting manufacturing from Asia to Europe to the Americas.

What do these two major shocks—a steep drop in demand for multiple segments and a sudden disruption in the global supply chain—mean for the local, state, national and the global economy? They will test and expose the vulnerabilities for three key areas for the financial infrastructure. Fortunately, graph analytics can help.

Cash Flow and Resulting Liquidity Crunch for Small Businesses

Most small businesses have the cash on hand for operating 10 days or so without the daily revenue influx. This presents a serious challenge, as an abrupt pause in the economic activities cuts the revenue for multiple small business segments such as hotels, bars, and restaurants to less than half of their regular daily income. All of these businesses have loans that were used to buy the equipment, furniture, and supplies for the business as well as the lease for the space, insurance, worker pay and a host of other financial responsibilities. **A prolonged softening of demand will lead to delayed or missed payments on the loans, furloughs, and layoffs of the daily workers, which in turn leads to an increase in the risk associated with these loans.**

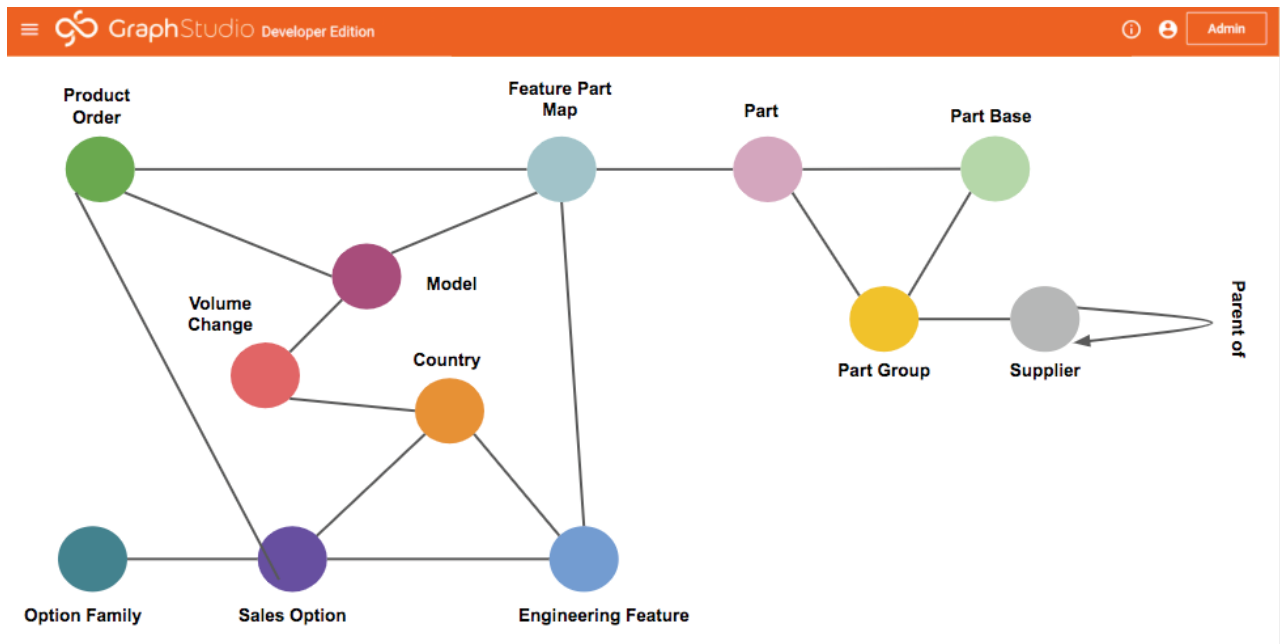


Graph analytics can model the complex interdependencies, modeling the impact of the drop in daily revenue for various segments of small businesses, to the servicing of the loans, tracking those back to the financial instruments that combine one or more of those loans, and finally, the financial institutions—banks, credit unions, governments, and other creditors—who are holding those loans as a part of their portfolio and will have the subsequent impact of the worsening of the credit risk associated with the loans. **The financial crisis of 2008-2009 was caused by an insufficient understanding of how home mortgages were bundled in the complex derivatives**, which were in turn sliced and sold broadly, making the risk assessment a very complex process. **Financial institutions, as well as the government, can avoid a repeat of that scenario** by modeling 5+ level deep financial dependency and impact analysis of small business loans using a graph database and analytics solution capable of handling the complexity.

Excessive Debt and Corresponding Risks for Manufacturers, Distributors, and Retailers

A global economic expansion of over a decade since March 2009 has resulted in the rapid expansion of corporate debt, especially for manufacturers across the globe and in the United States. Since Q1 2011, debt outstanding among nonfinancial corporations in the United States has grown by an average of 5.6 percent per quarter year over year. **At 46.4 percent of GDP in Q3 2018, nonfinancial corporations are carrying more debt today by this measure than they were just prior to the Great Recession of 2008-2009.**

As manufacturers deal with global supply chain disruptions and drops or shutdown in factory output, graph database, and analytics solutions can model the impact across the global value chain, from the manufacturer of the parts in Germany, Italy or South Korea to finished goods such as an automobile or an iPhone, modeling the impact to all of the value chain participants - the factory, the freight business, original equipment manufacturer and to the distributors and retailers who sell those products. New information, such as COVID-19 spread through local communities, border transport restrictions imposed by governments and other unplanned or unexpected events require agile supply chain planning solutions, capable of doing what-if analysis on the fly across complex global value chains.



For example, the relationships between production facilities, parts and suppliers for a manufacturer of luxury automotive vehicles are shown in the graph above. Graph analytics, by addressing challenges, can provide both the corporations as well as the governments with a single pane of glass across the entire value chain for global commerce.

Rising Short-Term Unemployment and Household Debt Servicing

Economists at Goldman Sachs predict a steep drop of 24% in GDP for the second quarter of 2020 for the United States and the unemployment is likely to spike up to 9% in the short term. Nobel Laureate Economist Paul Krugman has cautioned that **unemployment could go as high as 20%** in a few weeks. Economies around the world are forecasted to go through a severe near-term contraction, resulting in the rising unemployment rate for the short term. The global economy is expected to recover in a few quarters, but the timeline is driven by multiple factors including an evolving understanding of COVID-19 disease infection rate, treatment, and possible vaccination.

The following industries are the most at risk in terms of job security during a COVID-19 recession:

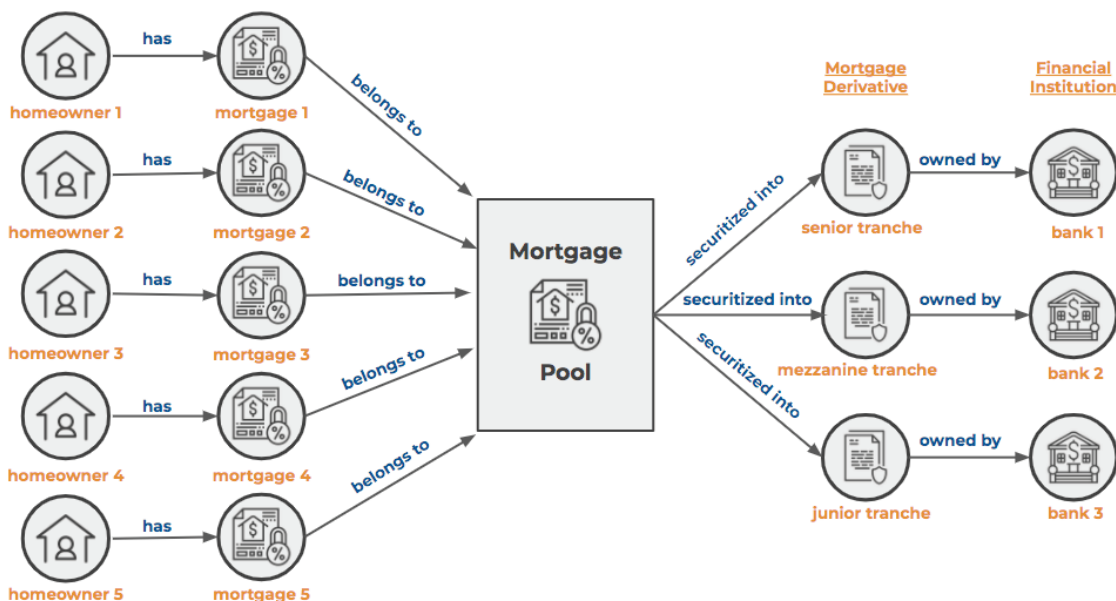
- Mining, oil & gas
- Transportation & warehousing
- Administrative services & waste management
- Arts, entertainment & recreation
- Accommodation & food services

This table shows the median salary for these industries compared to national median income:

Industry	Median Annual Earnings	Earnings Relative to National Median
Mining, Oil & Gas	\$68,544	181.48%
Transportation & Warehousing	\$40,945	108.41%
Administrative Services & Waste Management	\$27,503	72.82%
Arts, Entertainments & Recreation	\$23,045	61.02%
Accommodation & Food Services	\$17,225	45.61%

Source: Workers and Places Most Likely To Be Affected by COVID-19 Recession: 2020 Study

Workers in industries where the median annual earnings are below the national median are more vulnerable to being impacted by prolonged unemployment and have a higher probability of becoming delinquent on the loans.



Graph analytics can model the multiple levels of dependencies starting with the layoffs in specific industries, the sharp increase in unemployment benefits and the resulting burden on the county, state and federal government coffers, possible mortgage, credit card, automobile, student and other loan payment delinquencies of affected consumers resulting in the liquidity crunch for the financial institutions holding the paper on the loans.

Modeling the what-if scenarios using graph analytics solutions will allow the governments and financial institutions to be ready with the actions that soften the blow for the affected consumers and protect the liquidity for our complex financial value chain.

The best way to get started with graph analytics is with TigerGraph Cloud. It's free and you can create an account in a few minutes. Sign up at: <https://www.tigergraph.com/cloud/>.

Some of Our Customers



“Graph algorithms scale exponentially. Graph requires scalable software, more so than any of the other situations or challenges you have considered.”

– Brad Spiers, Executive Director,
JPMorgan Chase




“With TigerGraph we can join sources of data together and make connections within the data that previously we couldn’t. We can now answer questions that, for the last 20 years, we didn’t think were possible to ask.”

– Harry Powell, Director of Data & Analytics
Jaguar Land Rover

Customer Benefits:

- Real-time fraud detection at
- 7 out of the world’s top 10 global banks
- Care path recommendations for 50 million patients
- Personalized offers for 300 million consumers
- Energy infrastructure optimization for 1 billion people

What is TigerGraph?

- The only scalable graph database for the enterprise: 40-300x faster than competition
- Foundational for AI and ML solutions
- Designed for efficient concurrent OLTP and OLAP workloads
- SQL-like query language (GSQL) accelerates time to solution
- Available on-premise & on:  Google GCP,  Microsoft Azure,  AWS

Get Started for Free at: [TGcloud.io](https://www.tigergraph.com.cn/product/cloud/starterkits/)

TigerGraph Cloud graph database as a service is built for agile teams who’d rather be building innovative applications to deliver new insights than managing databases.

Tigergraph supports applications such as fraud detection, anti money laundering, customer 360, unified ID, supply chain, knowledge graph, personalized recommendation, artificial intelligence and machine learning, etc.

STARTER KIT	OVERVIEW
COVID-19 ANALYSIS	Detect hubs of infection and track the movements of potential spreaders
CUSTOMER 360-ATTRIBUTION & ENGAGEMENT GRAPH	Create a real-time 360 view of the customer journey for attribution and engagement insights.
CYBERSECURITY THREAT DETECTION-IT	Block cybersecurity threats by detecting interconnected events, devices and people
ENTERPRISE KNOWLEDGE GRAPH (CORPORATE DATA)	Analysis of corporate data including investors and key stakeholders.
ENTERPRISE KNOWLEDGE GRAPH (CRUNCHBASE)	Knowledge graph examples featuring crunchbase data with startups, founders and companies.
ENTITY RESOLUTION (MDM)	Identify, link and merge entities such as customers with analysis of attributes and relationships.
FRAUD & MONEY LAUNDERING DETECTION	Multiple types of fraud and money laundering patterns.
GSQL 101	Introduction to TigerGraphs powerful graph query language.
HEALTHCARE GRAPH (DRUG INTERACTION/ FAERS)	Healthcare example focused on public (FAERS) and private data for pharmaceutical drugs.
HEALTHCARE-REFERRAL NETWORKS, HUB (PAGERANK) & COMMUNITY DETECTION	Analyze member claims to establish referral networks, identify most influential prescriber’s and discover the connected prescriber communities.
MACHINE LEARNING & REAL-TIME FRAUD DETECTION	Mobile industry example for detecting fraud in real-time and generating graph- based features for training the machine learning solution.
NETWORK & IT RESOURCE OPTIMIZATION	Network and IT resource graph for modeling and analyzing the impact of the hardware outage on workloads.
RECOMMENDATION ENGINE (MOVIE RECOMMENDATION)	Graph-based movie recommendation engine built with public data.
SOCIAL NETWORK ANALYSIS	Social network example for understanding and analyzing relationships.
SUPPLY CHAIN ANALYSIS	Example covering inventory and impact analysis.

<https://www.tigergraph.com.cn/product/cloud/starterkits/>



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