



# **Harnessing Big Data for Public Policy: The Case of Administrative Trade Data from the Philippines**

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# Outline

- What is Big Data?
- Uses of Big Data in Businesses
- Role of Big Data in Public Policy
- Public Administrative Data as Big Data
- The Long Panel of Administrative Trade Transactions Data from the Philippines
  - Applications in Research and Policy
- Future Directions

# What is Big Data?

- Big data are **large amounts** of information in **various forms and frequencies** that are being collected from multiple sources
- **Four Vs** of Big Data:
  - Volume
  - Variety
  - Velocity
  - Veracity

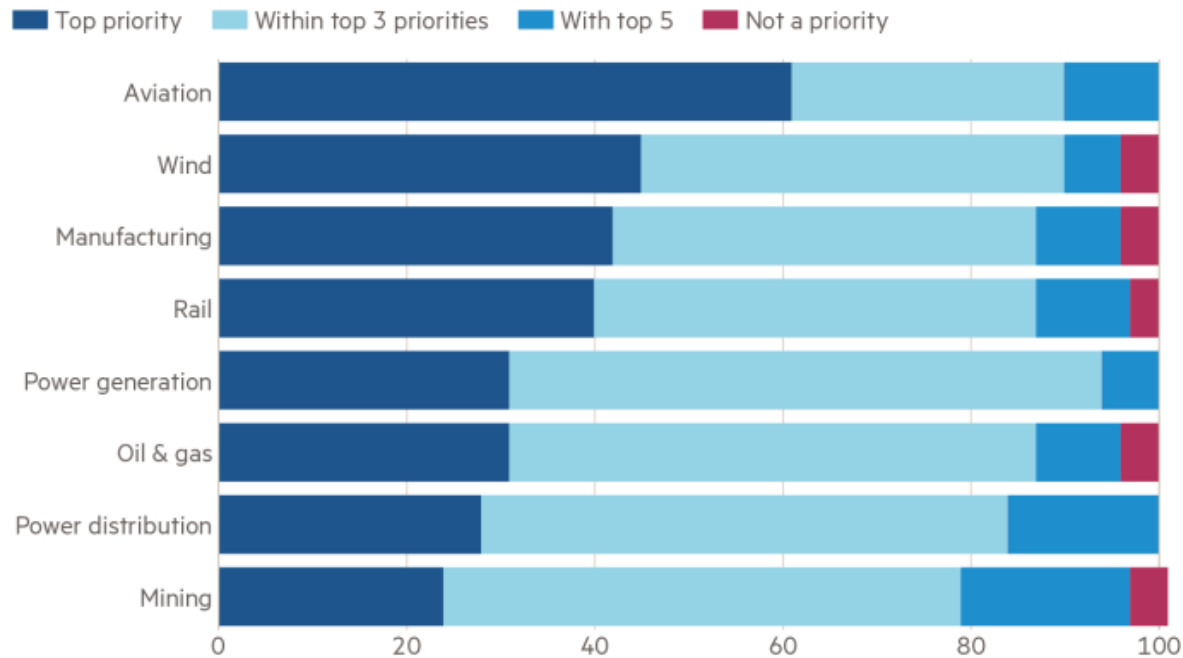
# Uses of Big Data in Businesses

- More data means more opportunities to assess current performance, recalibrate medium- and long-term business strategies, and ultimately improve **profitability** and **competitiveness**.
- Examples
  - **Gather useful insights** on demand trends, supply chain constraints, emerging market opportunities
  - Analyze data from the digital trails in mobile apps, search engines, and social media platforms to **improve product design and service delivery**.
  - Collect real-time feedbacks and reviews from social media to **come up with timely and well-targeted business solutions** anchored on consumer behavior, public sentiments, and social interactions.

# Uses of Big Data in Businesses

**Figure 1. Importance of big data in the private sector**

Respondents who said big data was important relative to other priorities in their company (%)



Source: Accenture  
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# Role of Big Data in Public Policy

- The World Bank (2017) identifies three major areas where there are vast opportunities for big data to revolutionize governments:
  - Big data analytics can be used to **evaluate and enhance** the quality and targeting of existing public services
  - Governments may use big data platforms such as social networking websites to **learn about public sentiments** and encourage civic participation in policy and social debates.
  - Big data should usher a new era of **smart and fact-based policy-making**.

# Public Administrative Data as Big Data

- Big data is often associated with large, complex, and unstructured “found” data from the internet (e.g., Google searches and web browsing history, social media posts, and online commercial transactions)
- But large-scale found data can also be generated from records of various transactions in banks, supermarkets, hospitals, schools, trains, ports, and government offices.
- Examples of administrative data collected by government: tax records, SEC and business registries, health and school records.

# Public Administrative Data as Big Data

- Hand (2018) describes public administrative data using the following OECD criteria:
  - The **subject of the data and the agent** that provides the data to the statistical authority are often different;
  - The purpose of the data collection was originally **non-statistical**;
  - Data collection usually aims for a **complete coverage** of the target population; and
  - The **administrative unit controls the methods** by which the data are collected and processed.



# Public Administrative Data as Big Data

- Advantages of big public administrative data
  - Large and semi-systematic data based on sample sizes much larger than surveys
  - Provides aggregate analyses based on complete knowledge of the population
  - May be used to formulate tailor-made policies for specific groups or observations
  - May serve as basis for doing a more targeted survey of interesting groups or observations
  - Panel administrative data are useful in performing cohort and longitudinal analyses
  - Governments have direct control and ready access to these data

# Public Administrative Data as Big Data

- Issues in analyzing big public administrative data
  - How do we **re-arrange or repurpose** the information according to a particular analytical framework?
  - What **research and policy questions** can be answered using the data?
  - How do we **process and analyze** these data?
  - Does it require **novel statistical and computing methods**?
  - What **potential quality issues** may arise from using administrative data given that these are primarily collected by a non-statistical agency?
  - To what extent do confidentiality issues restrict the access and use of these data?



# The Long Panel of Trade Transactions Data from the Philippines

- Escaping the Middle- Income Country Trap (EMIT)
- Research consortium between UP and EUR
- Funded by Netherlands Scientific Council –  
Wotro (2011-2016)
- Research focus on Philippine Exports

# The Long Panel of Trade Transactions Data from the Philippines

- The PSA, the University of the Philippines, and Erasmus University Rotterdam collaborated to match the **universe of trade transactions** of all Philippine firms from 1991 to 2012 with the Surveys/Censuses of Establishments from 1996 to 2012.
  - Long enough to cover the critical periods such as the 1997 Asian financial crisis, the dotcom crisis of 2001, the global financial crisis of 2007, and the major events of ASEAN regional integration.

# The Long Panel of Trade Transactions Data from the Philippines

**Table 1. Basic description of trade data**

	Trade data		
	All	Manufacturing	Non-manufacturing
<b>Observations</b>			
Export	2,081,199	1,045,004	1,036,195
Import	6,385,562	3,027,894	(3,357,668)
<b>Number of firms</b>			
Exporting	64,115	7,406	56,709
importing	92,288	8,561	83,727
<b>Revenues (\$billion)</b>			
Export	846	657	288
Import	995	707	
<b>Products</b>			
Export	7,336	6,533	6,437
Import	9,038	8,666	8,823
<b>Countries</b>			
Export	276	273	262
Import	265	250	254
<b>Unit Values (\$)</b>			
Export			
Median	13.5	17.5	10
Average	57	65	49
Import			
Median	9	14	5.5
Average	3,051	2,645	3,416
<b>Age (years)</b>			
Export	13	16	7
Import	13	18	8

# The Long Panel of Trade Transactions Data from the Philippines

Universe of exports and imports of all Philippine firms (1991 – 2012)

- Product Code (PSCC 7 Digits/ AHTN 10-digits)
- FOB value (constant US\$)
- Insurance & freight costs
- Country of Destination

ECN

Nine Annual Surveys of Establishments (ASE) in 1996, 1997, 1998, 2001, 2003, 2005, 2008, 2009, 2010 ; three Censuses of Philippine Business and Industry (CPBI) for 2000, 2006, 2012

Rich firm-level data (e.g., location, ownership, employment, revenues, costs, capital spending)

IMP

# Pelkmans-Balaoing (2017): Birth, death, survival, and re-entry of firms in export markets

This study tracks distinct types of exporters using the following definitions:

- **New entrants:** firms present in  $t + 1$  but not in  $t$ ;
- **One-time entrants:** entered in  $t$  but permanently exited in  $t + 1$ ;
- **Re-entrants:** entered in  $t$ , but already previously entered and exited;
- **Surviving first entrants:** new entrants in  $t$ , surviving in  $t + 1$ ;
- **Permanent exiters:** exited in  $t$ , and did not re-enter until the end of data series;
- **Permanent exiters-plus:** permanent exiters with three or more survival spells (years); and
- **Resilient exporters:** new entrant in  $t$  that survived till end of data series.

# Pelkmans-Balaoing (2017): Birth, death, survival, and re-entry of firms in export markets

## Firm demographics of Philippine exporters, 1991-2012

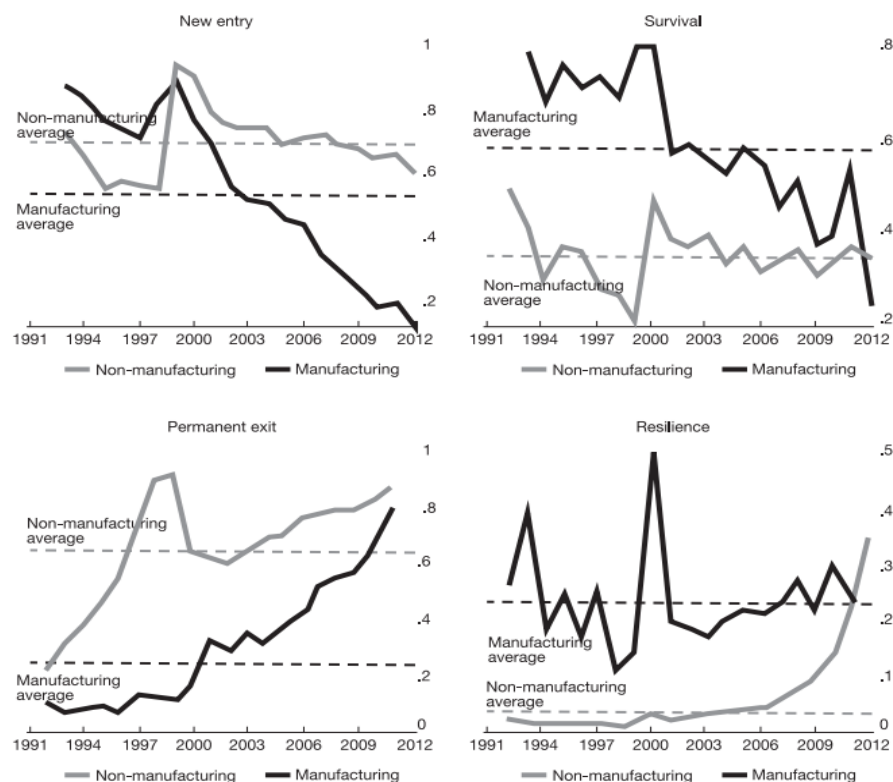
	All	Manufacturing	Non-manufacturing
All	64,115	7,406	
Total firms in 1991	6,719	927	5,792
Total firms in 2012	9,125	2,832	6,293
New entrants <sup>1</sup>	57,396	6,479	47,849
Permanent exiters <sup>2</sup>	50,984	3,685	47,299
One-time entrants <sup>3</sup>	24,659	974	23,685
Re-entrants <sup>4</sup>	27,362	5,409	21,953
Resilient firms <sup>5</sup>	4,427	1,725	2,702
Permanent ex-plus <sup>6</sup>	16,012	2,323	13,689
Rates of:			
New entry <sup>7</sup>	66%	53%	69%
Survival <sup>8</sup>	37%	58%	34%
One-time entry <sup>9</sup>	41%	14%	46%
Permanent exit <sup>10</sup>	59%	23%	63%
Resilience <sup>11</sup>	5%	23%	3%

Source: Authors own computations based on Philippine Statistical Authority trade database



# Pelkmans-Balaoing (2017): Birth, death, survival, and re-entry of firms in export markets

## Rates of new entry, survival, one-time entry, permanent exit and resilience, 1991-2012



Source: Author's calculation based on PSA Trade database

# Pelkmans-Balaoing (2017): Birth, death, survival, and re-entry of firms in export markets

## Policy Implications

- What **constraints and opportunities** are specific to different types of firms?
- Government can track one-time entrant firms and firms that have permanently exited after initially experiencing success in entering new export markets. **What happened to their entrepreneurial capital?**
- The characteristics of resilient firms are important to uncover the possible **factors of that contribute to a firm's** success in highly demanding foreign markets.

# Mendoza (2019): Participation of Philippine Manufacturers in Global Value Chains (GVCs)

Typology of firms based on GVC activities

- **Type 1** firms have purely domestic operations.
- **Type 2** establishments import but not export
- **Type 3** manufacturers export but not import.
- **Type 4** firms are simultaneous exporters and importers located outside special economic areas
- **Type 5** manufacturers are two-way traders operating near or inside economic zones.

# Mendoza (2019): Participation of Philippine Manufacturers in Global Value Chains (GVCs)

## Examples of Common Activities in Different Firm Types

Type 1	Manufacturer of locally-sold banana and cassava chips, manufacturer of purified tube ice, manufacturer of locally-sold fruit preserves and candies (e.g., mango, pineapple, and durian), manufacturer of locally-sold fruit and alcoholic beverages (e.g., calamansi juice and tubâ)
Type 2	Manufacturer of animal feeds, manufacturer of fertilizers, flour miller that sells to local bakeshops, manufacturer of locally-sold plastic kitchen wares, manufacturer of LPG, manufacturer of locally-sold plywood that used imported materials
Type 3	Exporter of coconut-based products, exporter of dried mangoes, exporter of processed seafood, exporter of semi-processed ores; export of rattan-based furniture
Type 4	Exporter of branded breads and snacks that used imported flour, exporter of garments and apparel that used imported textile, exporter of furniture that used imported wood and paint
Type 5	Manufacturer of printed circuit boards, manufacturer of wire harnesses, manufacturer of metal parts for electronics assembly, manufacturer of camera parts and components, manufacturer of hard disk drive, manufacturer of semiconductors

Sources: ASPBI and CPBI (various years)

# Mendoza (2019): Participation of Philippine Manufacturers in Global Value Chains (GVCs)

**Test of Equality of Means: Type 1 vs. Types 2 to 5 Firms**

Characteristic	Unit	Type 1	Type 2	Type 3	Type 4	Type 5
Age (as of 2012)	Years	16.71	26.80*** (-11.91)	16.38 (0.51)	27.11*** (-11.47)	18.21*** (-2.38)
Employees	Persons	72.85	112.84*** (-5.96)	235.17*** (-17.18)	253.16*** (-20.90)	484.20*** (-35.98)
Wage	'000/Person	66.80	94.97*** (-7.89)	90.87*** (-7.21)	124.36*** (-13.10)	131.67*** (-19.57)
Capital-Labor Ratio	'000/Person	254.17	367.66*** (-3.26)	389.56*** (-4.07)	489.66*** (-5.65)	780.98*** (-5.65)
Revenues	Million	108.09	215.60*** (-4.67)	591.95*** (-8.85)	1,164.90*** (-12.06)	1,232.49*** (-19.55)
Labor Productivity	'000/Person	373.56	542.80*** (-4.91)	1009.07*** (-4.61)	1055.26*** (-12.77)	1055.02*** (-17.87)
TFP	In	4.99	5.31*** (-22.83)	5.30*** (-23.17)	5.48*** (-30.19)	5.56*** (-46.82)

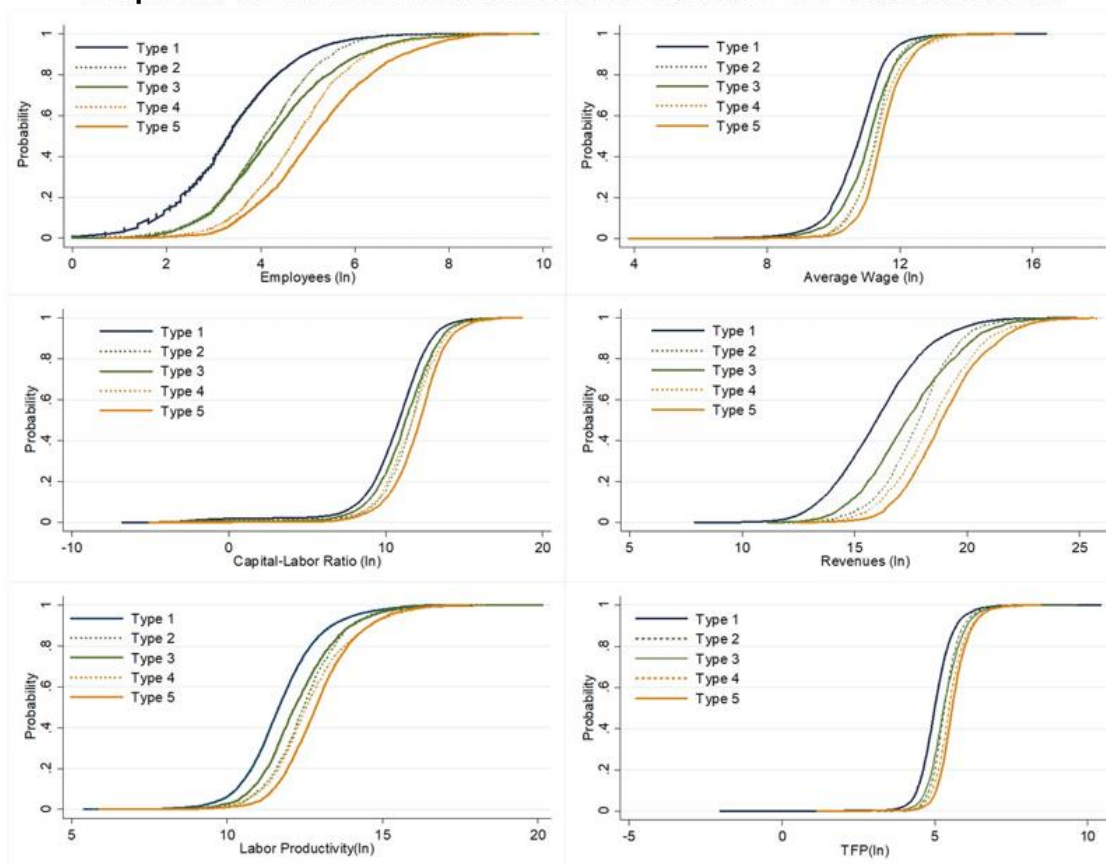
Source: Author's calculation based on data from the PSA

\*p<0.10, \*\*p<0.05, \*\*\* p<0.01

Notes: All monetary amounts are in pesos and expressed in constant 2000 prices using the GDP deflator.

# Mendoza (2019): Participation of Philippine Manufacturers in Global Value Chains (GVCs)

Empirical Cumulative Distributions of Various Firm Characteristics



Source: Author's calculation based on data from the PSA

# Mendoza (2019): Participation of Philippine Manufacturers in Global Value Chains (GVCs)

## Policy Implications

- Heterogeneity calls for a more **nuanced approach** to industrial and export policy
- Deeper understanding of the structures of different sectors is needed to ensure that **interventions are designed according to the specific need** of a particular industry.
- In light of self-selection, Mayer and Ottaviano (2007) argue: “do not waste time helping the incumbent superstars” but instead “**nurture the superstars of the future.**”
- Monitor the performance of **threshold firms**

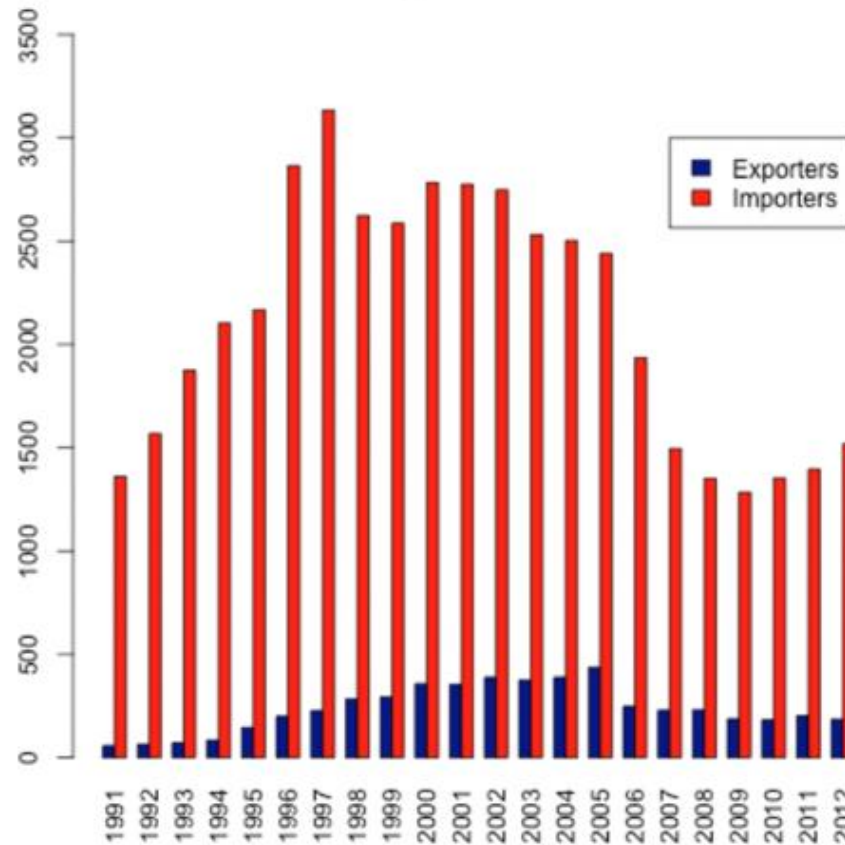
# Analysis of the Automotive Sector

- One advantage of this long panel of trade transactions data is our ability to zoom into more **disaggregated industry and/or commodity classifications**
- **Examine trends** of specific firm-level information using the longitudinal nature of the dataset
- Example: Automotive sector



# Analysis of the Automotive Sector

Number of Firms Trading in Automobile-Related Products



Source: Author's calculation based on data from the PSA

# Analysis of the Automotive Sector



Source: Author's calculation based on data from the PSA

# Analysis of the Automotive Sector

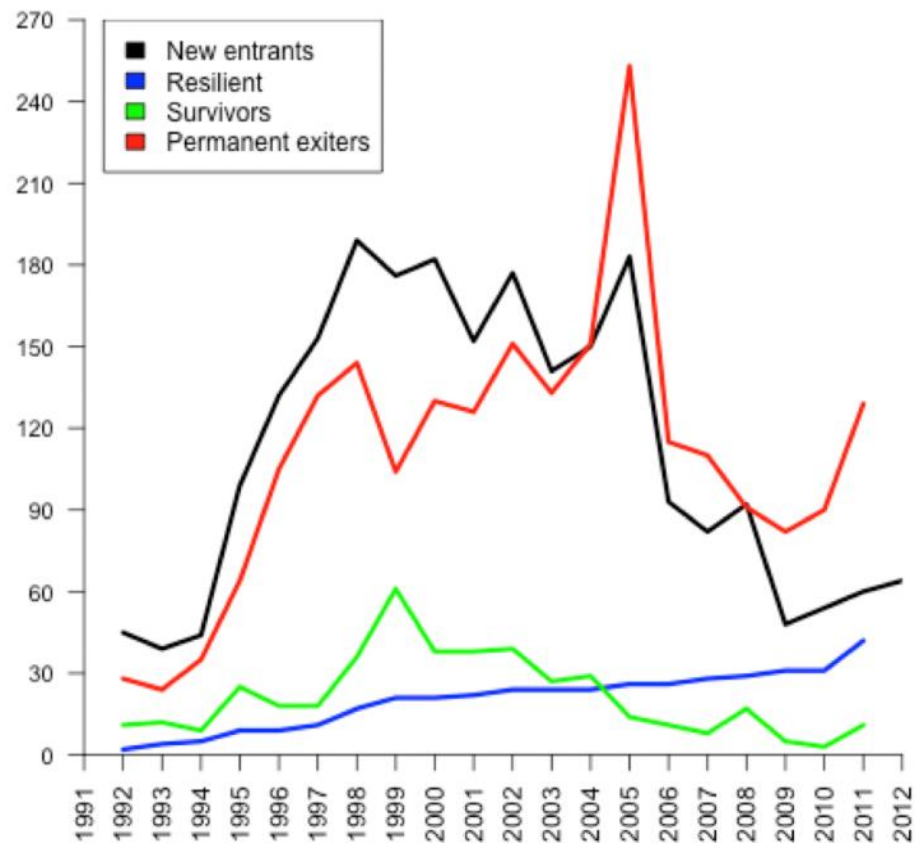
## Top Automobile-Related Export Products

PSCC7	Description	Average Annual Export Value	Average Annual Percent Increase	No. of Firms	Average Annual Percent Increase	Average Annual No. of Transactions
7731301	Wiring harnesses for motor vehicles	763	3.09	637	4.67	2,916
7843301	Brakes & Servo-Brakes & Parts of Motor Vehicles	264	14.81	89	15.81	528
7843919	Oth Parts & Accessories, NES, of Motor Vehicles	226	90.80	1,059	33.16	4,012
7843409	Other Gear-Boxes of the Motor Vehicles	184	11.13	146	2.32	670
7621100	Radiobroadcast Receivers, Used In Motor Vehicle,W/ Sound Recording/OTH Apparatus	103	27.06	89	8.40	603
6251001	Steel Belted Automobile Tires, Pneumatic, Of all Sizes, New	73	74.03	183	17.04	1,548
7812021	Passenger Cars W/ Spark Ignition Combustion Engine,Exceeding 1,500 NOT 3,000 CC, New	42	174.74	42	65.45	109
7781201	Lead-Acid Storage Batteries for Automobiles and Trucks	32	5.87	107	8.59	515
7843911	Other parts and accessories for vehicles, Propeller shafts	19	*	13	*	35
7843914	Other parts and accessories for vehicles for vehicles of subheadings 8703.21 to 8703.23	14	-0.66	62	-8.93	251

Source: Author's calculation based on data from the PSA

# Analysis of the Automotive Sector

## New Entrants, Survivors, Permanent Exits and Resilient Firms in the Automotive Sector



# Future Directions

- This Philippine trade transactions dataset stimulates a **rich agenda for research and policy analysis**.
  - performance of firms active in global production networks
  - the product upgrading and innovation choices of Philippine firms.
  - the patterns of product-destination export spells across different types of firms
  - differential impact of export processing zones on firm performance.
  - drivers of firm-level productivity

# Future Directions

- **Mainstreaming** of this dataset in formulating policy on competition, regulation and other interventions in narrowly-defined industries
- Regular and timely **updating** of the database to incorporate new incoming data
- **Linking** this dataset to other public micro data (e.g., labor force surveys, wage data, SEC financial data, and BIR tax records)



# **Harnessing Big Data for Public Policy: The Case of Administrative Trade Data from the Philippines**

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