Estimating Potential Economic Losses from a Nationwide Jeepney Strike

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Abstract: Last February 6 and February 27, 2017, jeepney operators mounted a strike in protest to the planned phase-out of their vehicles. The strike happened in over 20 cities and municipalities across the country. This resulted to thousands of passengers getting stranded, forcing those affected to suspend work and classes. From how the strike put the economy at a standstill, it can be concluded that the country incurred economic losses from it. Stoppage of operations sprawled out onto other sectors, thereby causing a chain of operation disruptions, lowering productivity, and ultimately, decreasing economic output. Thus, to have an idea on how much of an impact the jeepney strike had, loss estimates should cover the entire economy. Having this value could affect the negotiations between the government officials and jeepney operators. In this paper, the overall economic loss incurred by the country was estimated using an Inoperability Input-Output Model, where the reported values of jeepney strike participation in various regions were used as the initial perturbation. Based on the available data, the jeepney strike is estimated to have resulted to an overall economic loss of over Php 471 million, or approximately 1.28% of the Philippines' daily GDP.

Keywords: jeepney strike; inoperability input-output model;

1. INTRODUCTION

Last February 6 2017, a group of jeepney operators mounted a strike to protest the planned phase-out of their vehicles. This resulted to thousands of passengers getting stranded, forcing the cities of Metro Manila to suspend work and classes. Jeepneys are the most common form of public transport in the Philippines. Figure 1 shows the percentage of jeepneys in operation with respect to the total number of vehicles plying Philippine roads. These non-air-conditioned vehicles operate both short- and long-distance routes across Metro Manila, as shown in Figure 2. To make matters worse, the strike not only happened in Metro Manila, but in over 20 cities and municipalities across the country as well.

The jeepney operators, led by transport groups PISTON, STOP and Go Coalition, and No To Jeepney Phase Out Coalition (NJPOC), demonstrated another strike of an even greater magnitude only three (3) weeks later, 27th of February 2017. PISTON President George San Mateo said that this was their response to the government's inaction to their plea to scrap the current version of the jeepney modernization program of the government (Pocopio, 2017). This order by the Department of Transportation will disallow jeepney models that are 15 years and older from plying their routes. Jeepney operators took this as an act of oppression of small jeepney operators and drivers, which will ultimately deprive them of their livelihood. As such, San Mateo threatened to continue the strike for several days and conduct regular monthly protests should the government pursue the program.

Due to the strike, many were unable to go to work and school. With over 74,000 jeepneys participating in the strike in Metro Manila alone, a great portion of the economic activity in the metropolis was at a standstill. Eighty percent of the drivers in Metro Manila and Calabarzon region were reported to have partaken in the strike (Terrazola & Mosqueda, 2017). In Cebu City, the biggest city in the Visayan region, the same proportion was reported to have joined as well. In the Bicol region, 95% of the local transport operators participated (Barcia & Lagsa, 2017). There were no reported estimates of participation in the rest of Luzon and Mindanao regions. The impact of all these, however, was dampened by the efforts of both the government and private entities which sent out trucks and other vehicles to ferry stranded commuters.

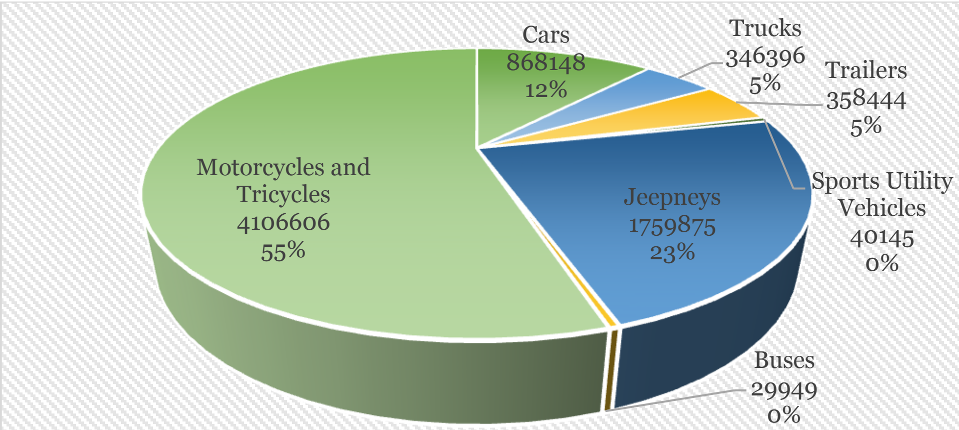

Figure 1. Comparative Statistics of Motor Vehicles (2013)
Source: Land Transportation Office

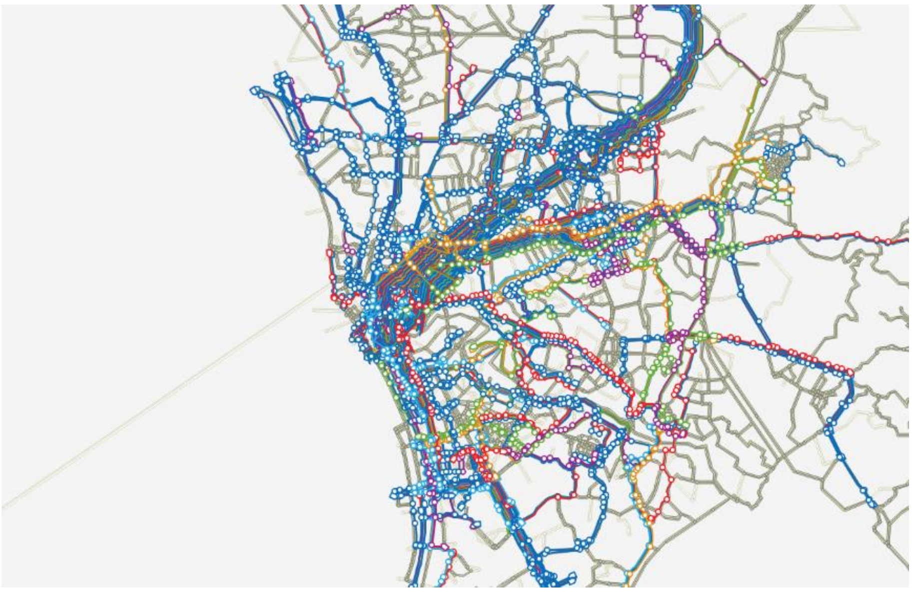

Figure 2. Jeepney Routes in Metro Manila (in EMME4)

Nonetheless, looking at how the jeepney strike affected all other sectors, it is easy to conclude that the country still incurred economic losses from it. Stoppage of operations sprawled out onto other sectors, thereby causing a chain of operation disruptions, lowering productivity, and ultimately, decreasing economic output. Thus, to have an idea on how much of an impact the jeepney strike actually had, loss estimates should cover the entire economy.

Having this value could affect the negotiations between the government officials and jeepney operators. A small number can be used to support the modernization program, while a large estimate can strengthen the demanding power of jeepney operators. Having a figure capturing the overall impact of the jeepney strike can most definitely add more context as to how much the jeepney strike affected people's lives, and in turn, change the dynamic of the dialogues between the policy makers and their constituents. In lieu of this, this paper aims to estimate the overall economic losses from the February 27 jeepney strike.

2. FRAMEWORK

The interdependence of different economic sectors is encapsulated by the input-output (IO) model. It provides a view of the interaction between different sectors of the economy, with the goal of estimating the input requirement for each type of goods or service (Leontief, 1936; Miller & Blair, 2009). The rationale is that the output of any industry is needed as an input in many other industries, or even for that industry itself, therefore, the "correct" (i.e. shortage- and surplus-free) level of output of any industry must be one that is consistent with all the input requirements in the economy, so that no bottlenecks will arise anywhere.

One extension of the IO models focuses on the spread of operability degradation in a networked infrastructure system (Haimes & Jiang, 2001). It can be used to focus on the contraction of final demand as a consequence of an exogenous shock, which propagates throughout the production of interdependent economic infrastructures (Santos & Haimes, 2004). This extension of the IO model is called the inoperability input-output model (IIM), where a change in production can be taken as the difference between the planned production and the degraded production, and a change in demand can be taken as the difference between the planned final demand and the degraded final demand.

The inability (as a percentage) of a certain infrastructure to produce and meet the final demand is referred to as inoperability. This is expressed as a ratio with which a sector's production is degraded relative to some ideal or "as-planned" production level (Santos, n.d.). For example, when a sector with an ideal production output of 100 units is hit by a natural disaster, reducing its production to 90 units, the production loss of 10 units, which is 10% of the ideal production output, translates to a sector inoperability value of 0.10. Values range from 0 to 1, where 0 represents a fully functioning system and 1 corresponds to a system with total failure (Tan et al., 2014).

The IIM has been featured in many applications including modeling of infrastructure interdependencies and risks of terrorism (Santos & Haimes, 2004; Santos, 2006), multi-state regional electric power blackouts (Anderson, et al., 2007), extreme weather events (Crowther et al., 2007, Haggerty et al., 2008; Baghersad & Zobel, 2015; Aviso et al., 2015) and other scenarios with supply chain disruptions (Pant et al., 2011; Blos & Miyagi, 2015). In all these studies, the IIM was used to model economic interdependence and forecast economic impacts and overall effects of various future scenarios. In this paper, the initial perturbation will be applied onto the affected sectors in the case of the jeepney strike.

3. THEORY

In order to produce each unit of the *j*th commodity, the input need for the *i*th commodity must be a fixed amount, which can be denoted as a_{ij}. Specifically, the production of each unit of the *j*th commodity requires a_{1j} of the first commodity, a_{2j} of the second, …, and a_{nj} of the *n*th commodity. This system constitutes the requirements for the economy to function and meet the production demand. However, each sector's output is ultimately produced with a goal to satisfy consumers' demand. Hence, a sector's total output is the sum of intermediate demand and final demand, as shown in the following:

$$x_1 = a_{11}x_1 + a_{12}x_2 + ... + a_{1n}x_n + f_1 \qquad (1)$$

where x_1 is the total production output needed from industry 1, f_1 denotes the final demand for its output, and $a_{1j}x_j$ is the input demand of the *j*th industry. Thus, for the entire economy, the system can be written as a matrix equation as follows:

$$\mathbf{x} = \mathbf{Ax} + \mathbf{f} \qquad (2)$$

where x is the total output matrix, **A** is the technical coefficient matrix, and **f** is the final demand vector, with $n \times 1$, $n \times n$, and $n \times 1$ dimensions, respectively, where n stands for the number of sectors. The product, **AX**, represents the portion of the total production used for internal consumption. Given the final demand, **f**, the total production matrix $\boldsymbol{x}$ can be computed from

$$\mathbf{x} = (\mathbf{I} - \mathbf{A})^{-1}\, \mathbf{f} = \mathbf{L}\, \mathbf{f} \qquad (3)$$

where **L** is known as Leontief inverse or the total requirements matrix. This captures the multiplier effect that ripples throughout the different sectors. This equation gives the production output needed from every sector to satisfy both the demands from internal and consumer utilization.

With matrix **A** consisting of elements a_{ij}, denoting input requirements of sector j from sector i, normalized with respect to the total input requirement of sector j, the model encapsulates the interdependence of different economic sectors. Furthermore, following the linear relationship of matrix equations, the model allows for the analysis of changes in final demands due to external causes, and its system-wide effects on the interconnected network of the economy. This characteristic, used to calculate the effects of a change in demand for a certain type of commodity to the entire system, is shown in the following equation:

$$\Delta x = \mathbf{L}\, \Delta d \qquad (4)$$

The inoperability input-output model has a similar structure to the Leontief IO model, as shown in the following equations

$$\mathbf{q} = \mathbf{A}^*\mathbf{q} + \mathbf{c}^* \qquad (5)$$

$$\mathbf{q} = (\mathbf{I} - \mathbf{A}^*)^{-1}\, \mathbf{c}^* \qquad (6)$$

where **q** is the sector inoperability, resulting from an initial perturbation **c***, and **A*** is the interdependency matrix. The latter is a transformation of the Leontief technical coefficient matrix **A**, which tells how much additional inoperability is contributed by a column sector to the row sector. The demand perturbation, **c***, is a vector comprised of the final demand disruptions to each sector, consisting of elements also normalized between 0 and 1. The interdependency matrix is calculated using the following matrix equations

$$\mathbf{A}^* = \hat{\mathbf{x}}^{-1} * (\mathbf{A} * \hat{\mathbf{x}}) \qquad (7)$$

Economic loss is then computed as the product of inoperability and total output of each sector, as shown in the following equation

$$\mathrm{EL_i} = \mathrm{q_i} * \mathrm{x_i} \qquad (8)$$

where EL_i is the economic loss estimate for sector i, q_i is the sector inoperability, and x_i is the total output of sector i. For this paper, the total output values used were from the year 2015, the latest available data.

4. MULTI-REGIONAL INOPERABILITY INPUT-OUTPUT MODEL (MRIIM)

The 2000 IO Account of the Philippines (National Statistical Coordination Board, 2006) was used in this study as the latest published 2006 IO Account of the Philippines contains some questionable elements in the IO tables (e.g. Construction industry having zero input to all other sectors). Despite containing data from almost two decades ago, its use still has merit, as shown in Magtibay-Ramos et al. (2010) where both forward and backward linkages between different Philippine economic sectors did not significantly change from 1979 to 2000. Nonetheless, the 2000 IO tables were recalibrated using 2015 GDP values to come up with more realistic estimates.

The published IO tables were disaggregated into 11, 60 and 240 sectors. As this paper focuses on the economic loss from an initial perturbation specifically in the jeepney sector, the 240-sector table was used. However, researchers can also tailor the IO table to a certain dimension depending on the focus of their study. Thus, other subsectors not of much importance were aggregated. Table 1 shows the final aggregation re-specification of the IO table used in this study, where transportation sectors were kept disaggregated.

Table 1. Disaggregation of Sectors

Sector	Description
1	Agriculture, Fishery and Forestry
2	Mining and Quarrying
3	Manufacturing
4	Construction
5	Electricity, Gas and Water
6	Bus line operation
7	Jeepney and other land transport services
8	Railway transport
9	Public utility cars and taxicab operation
10	Tourist buses and cars including chartered and rent-a-car
11	Road freight transport
12	Water Transport
13	Air Transport
14	Communications and Storage
15	Trade
16	Finance
17	Real Estate and Ownership of Dwellings
18	Private Services
19	Government Services

Table 2, on the other hand, shows the final regional disaggregation. These regions were chosen as only these have reported values on jeepney strike participation. The number by which the regions were disaggregated to, however, will not affect the inoperability calculations, as the base value for inoperability calculations for the unrepresented regions will remain to be zero. This, the authors would like to note, would result to under-estimation as a portion of the initial perturbation (e.g. Operation disruption in Region 3) will be unaccounted for.

Table 2. Regional Disaggregation

Region	Description
1	NCR
2	Region 4-A
3	Region 5
4	Visayas
5	Rest of Luzon and Mindanao

The 2000 IO Account of the Philippines contains values for the entire country. However, the rate of participation across different regions is not homogenous. Thus, the IO table should be further disaggregated with respect to regions to allow the appropriate introduction of the initial perturbation. To do this, non-survey techniques in regionalization of national coefficients (Miller & Blair, 2009) were employed, specifically, the two-region logic with more than two regions approach. First, location quotients were calculated as follows

$$LQ_i^r = \left(\frac{x_i^r/x^r}{x_i^n/x^n}\right) \tag{9}$$

where LQ_i^r is the location quotient of sector i in region r, x_i^r and x^r are the gross output of sector i in region r and total output of all sectors in region r, respectively, and x_i^n and x^n are those quantities at the national level. The intra-regional coefficients are then calculated as follows

$$a_{ij}^{rr} = \begin{Bmatrix} (LQ_i^r)a_{ij}^n & \text{if } LQ_i^r < 1 \\ a_{ij}^n & \text{if } LQ_i^r \geq 1 \end{Bmatrix} \tag{10}$$

where a_{ij}^{rr} is the input coefficient of sector i to sector j in region r and a_{ij}^n is that of the national level. The off-diagonal coefficients are then calculated as follows

$$a_{ij}^{\tilde{r}r} = a_{ij}^n - a_{ij}^{rr} \tag{11}$$

$$a_{ij}^{r\tilde{r}} = a_{ij}^n - a_{ij}^{\tilde{r}\tilde{r}} \tag{12}$$

where $a_{ij}^{\tilde{r}r}$ is the import coefficient from the rest of the economy to region r and $a_{ij}^{r\tilde{r}}$ is the import coefficient from region r to the rest of the economy. The coefficients are then converted to flows shown as follows

$$\begin{bmatrix} \boldsymbol{A}^{rr} & \boldsymbol{A}^{r\tilde{r}} \\ \boldsymbol{A}^{\tilde{r}r} & \boldsymbol{A}^{\tilde{r}\tilde{r}} \end{bmatrix} \begin{bmatrix} \hat{x}^r & 0 \\ 0 & \hat{x}^{\tilde{r}} \end{bmatrix} = \begin{bmatrix} \boldsymbol{Z}^{rr} & \boldsymbol{Z}^{r\tilde{r}} \\ \boldsymbol{Z}^{\tilde{r}r} & \boldsymbol{Z}^{\tilde{r}\tilde{r}} \end{bmatrix} \tag{13}$$

These are calculated for every region r, to produce the following summary.

Table 3. Summary of Two-Region Logic with More than Two Regions Approach

$\boldsymbol{Z}^{11}$					$\boldsymbol{Z}^{1\tilde{1}}$
	$\boldsymbol{Z}^{22}$				$\boldsymbol{Z}^{2\tilde{2}}$
		$\boldsymbol{Z}^{33}$			$\boldsymbol{Z}^{3\tilde{3}}$
			$\boldsymbol{Z}^{44}$		$\boldsymbol{Z}^{4\tilde{4}}$
				$\boldsymbol{Z}^{55}$	$\boldsymbol{Z}^{5\tilde{5}}$
$\boldsymbol{Z}^{\tilde{1}1}$	$\boldsymbol{Z}^{\tilde{2}2}$	$\boldsymbol{Z}^{\tilde{3}3}$	$\boldsymbol{Z}^{\tilde{4}4}$	$\boldsymbol{Z}^{\tilde{5}5}$	

According to Miller & Blair (2009), the off-diagonal flow matrices can be assumed to come equally from all other regions (e.g. $Z^{21} = Z^{31} = Z^{41} = Z^{51} = (1/4)\ \boldsymbol{Z}^{\tilde{1}1}$). For this paper, however, the distribution of import flows was based on regional GDP weights. The resulting table was then balanced through the RAS procedure, an iterative process to update matrices, using the GAMS software. Balanced flow values were then divided by sector total inputs to get the final technical coefficient matrix **A**, with an IO structure shown in Table 4. The interdependence matrix **A*** is then calculated using equation (7).

Table 4. Multi-Regional IO Table Structure

MRIO	Region	NCR				Region 4-A				…	Rest of Luzon and Mindanao			
Region	Sector	1	2	…	19	1	2	…	19	…	1	2	…	19
NCR	1													
	2													
	⋮													
	19													
Region 4-A	1													
	2													
	⋮													
	19													
⋮	⋮													
Rest of Luzon and Mindanao	1													
	2													
	⋮													
	19													

5. ECONOMIC LOSS ESTIMATION

Estimation of Estimation of economic loss starts from the introduction of the initial perturbation matrix c*. In this paper, the c* matrix used contains reported values of jeepney strike participation. These numbers were taken from news articles and may over- or under-estimate actual jeepney operation disruption percentages. However, as both private and government vehicles were used in place of these jeepneys, using these numbers would likely result to over-estimation. Furthermore, as these inoperability values will be introduced in the "Jeepney and other land transportation services" sector, which also covers the operation of tricycles and other modes of public transport not regulated by the Land Transportation Franchising and Regulatory Board (LTFRB), moving forward with these values, the authors would like to note, would ultimately result to over-estimation. Table 5 shows the initial perturbation in the jeepney sectors in each respective region, as well as its corresponding row in the MRIIM table. Table 6, on the other hand, shows the resulting inoperability, q, across the economy.

Table 5. Initial Perturbation in Jeepney Sectors

Region	Description	c*	Row
1	NCR	0.80	7
2	Region 4-A	0.80	26
3	Region 5	0.95	45
4	Visayas	0.80	64
5	Rest of Luzon and Mindanao	0.00 [1]	83

[1] No report on rate of participation of jeepney operators

Table 6. Resulting Spread of Inoperability, q

	Region				
Sector	NCR	Region 4-A	Region 5	Visayas	Rest of Luzon and Mindanao
1	0.00781	0.00408	0.00433	0.00447	0.00307
2	0.00844	0.00566	0.01037	0.00933	0.00603
3	0.01055	0.00563	0.02036	0.01400	0.00699
4	0.00047	0.00059	0.00232	0.00060	0.00121
5	0.00287	0.00333	0.00703	0.00512	0.00327
6	0.00221	0.00386	0.01534	0.00460	0.00838
7	0.80188	0.80311	0.96257	0.80379	0.00653
8	0.01590	0.02690	0.04670	0.02570	0.05258
9	0.01319	0.02458	0.04487	0.02353	0.04824
10	0.01347	0.02540	0.04542	0.02425	0.04956
11	0.00312	0.00433	0.01192	0.00528	0.00525
12	0.00196	0.00345	0.01053	0.00420	0.00643
13	0.00172	0.00230	0.00904	0.00334	0.00398
14	0.00188	0.00239	0.00660	0.00319	0.00317
15	0.00148	0.00342	0.00675	0.00425	0.00467
16	0.00264	0.00444	0.01003	0.00596	0.00364
17	0.00032	0.00074	0.00356	0.00113	0.00278
18	0.00106	0.00186	0.00397	0.00222	0.00209
19	0.00000	0.00000	0.00000	0.00000	0.00000
Legend:	(orange) Where initial perturbation is introduced		(yellow) Most affected sectors in region		

As shown in Table 6, there is, indeed, an effect on other sectors when one sector (in this case, jeepney sector) incurs operation disruptions. This shows the interdependence of the different sectors of the economy. The introduction of inoperability in the jeepney sector resulted to a spread of inoperability across the economy. Based on the inoperability metric, the top 5 most affected sectors are the following: (1) Railway transport, (2) Public utility cars and taxicab operation, (3) Tourist buses and cars including chartered and rent-a-car, (4) Manufacturing, and (5) Mining ang Quarrying for NCR, Region 4-A and Visayas, and Bus line operation, for the Region 5 and Rest of Luzon and Mindanao. Figure 3 shows the apparent spread of inoperability across the economy which stemmed from initial perturbations introduced to sector 7s in regions NCR, Region 4-A, Region 5 and Visayas.

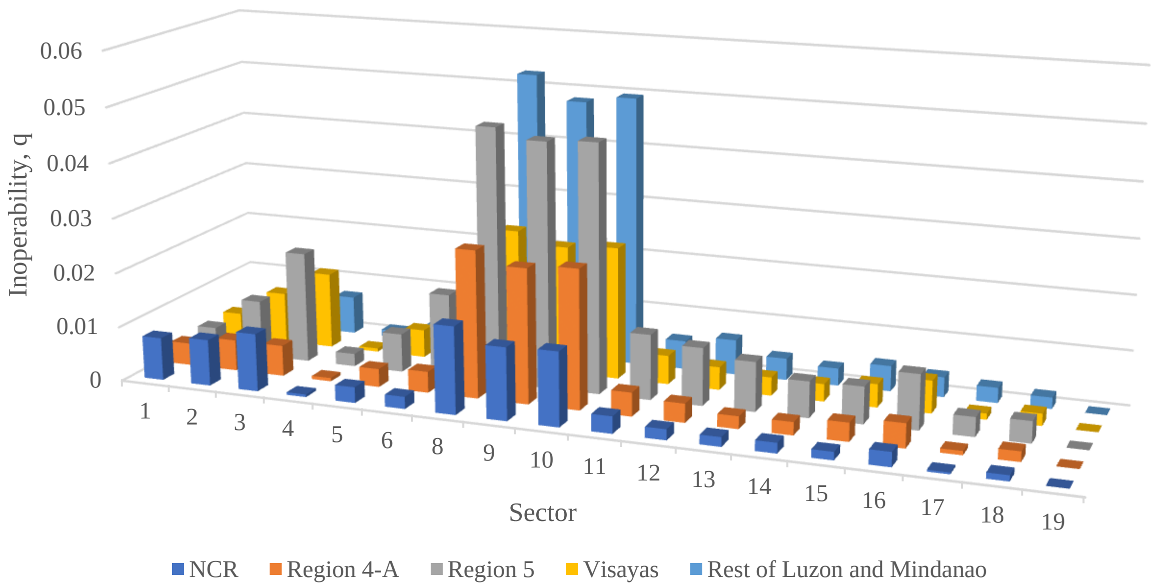

Figure 3. Spread of Inoperability, q (Without Sector 7)

It is also meaningful to express the resulting impact in terms of monetary values. These may result to a separate set of most affected sectors. To estimate the economic loss, inoperability values are multiplied with the average daily ideal production output (total output divided by 360 days) of each respective sector, where the product can be taken as a loss in terms of production output. For this paper, the total output values used were that of the year 2015. Table 7 shows the estimated economic loss in each sector within each region, calculated using equation (8). Figure 4 also shows the corresponding economic losses as inoperability spread across the economy.

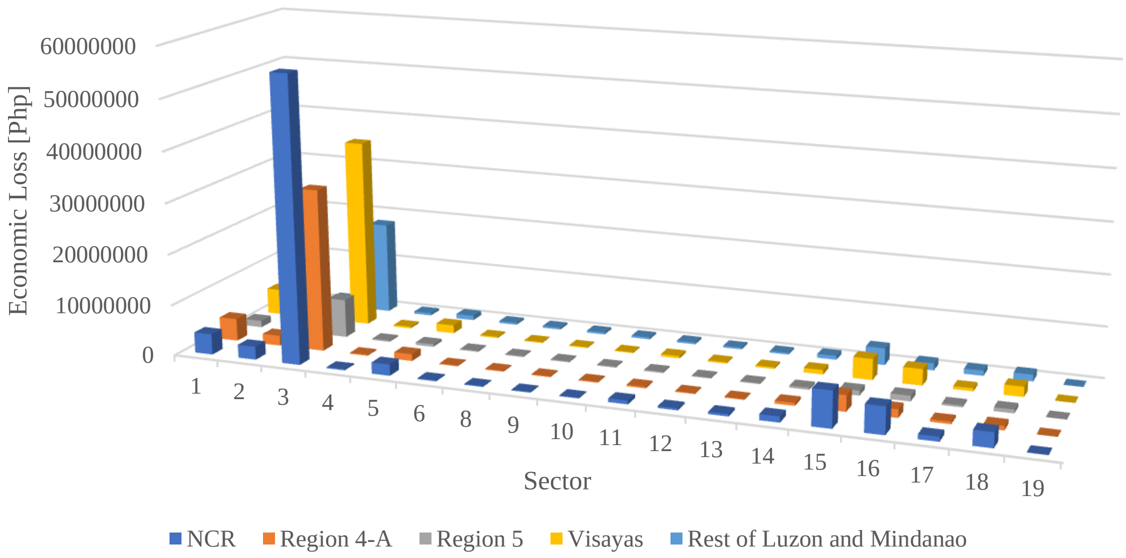

Figure 4. Spread of Economic Loss [Php] (Without Sector 7)

Comparing Figures 3 and 4, the set of most affected sectors are shown to be not necessarily the same when basing on different metrics. As shown in Figure 3, sectors 2, 3, 8, 9, and 10 were found to be significantly impacted in terms of the inability to meet the desired production output. However, when looking at the computed economic losses shown in Figure 4, sectors 1, 2, 3, 15, 16, and 19 appear to be those that were most significantly affected. This shows that higher inoperability values do not directly translate to bigger economic losses. As shown in Table 7, the top 5 most affected sectors are the following: (1) Manufacturing, (2) Trade, (3) Finance, (4) Agriculture, and (5) Private Services for NCR and Region 5, and Mining and Quarrying for Region 4-A, Visayas, and Rest of Luzon and Mindanao.

When using the economic loss metric, among all other sectors, the Manufacturing industry is most affected, incurring an estimated loss of over Php 150 million, followed by the Agriculture, Trade, Finance sectors, with over Php 19 million, Php 18 million, and Php 12 million in losses, respectively. The Mining and Quarrying, Private Services, Electricity, Communications, Real Estate, and Road freight transport sectors round up the top 10 most affected sectors with approximately Php 9 million, Php 8 million, Php 7 million, Php 4 million, Php 3 million, and Php 2 million in losses, respectively.

All these can be traced from the resulting decrease in productivity due to lower workforce attendance to lower operation efficiency (e.g. delays in sector output production). As for the regional economic losses, NCR is shown to have incurred the greatest loss, estimated at over Php 190 million. Visayas and Region 4-A follow with estimated losses of around Php 117 million and Php 95 million, respectively. All in all, the jeepney strike is estimated to have resulted to an overall economic loss of over Php 471 million. In other words, the jeepney strike is estimated to have cost the economy almost 1.28% of the Philippines' daily GDP.

Table 4. Estimated Economic Loss by Sector and Region [Php]

	Region	1	2	3	4	5	
Sector	Description	NCR	Region 4-A	Region 5	Visayas	Rest of Luzon and Mindanao	PHILIPPINES
1	Agriculture, Fishery and Forestry	4,050,316	4,380,858	1,319,167	5,091,269	4,435,235	19,276,845
2	Mining and Quarrying	2,576,272	1,982,642	582,499	2,177,841	1,568,044	8,887,298
3	Manufacturing	55,968,812	31,825,698	7,508,268	36,917,456	18,051,736	150,271,970
4	Construction	243,868	214,248	270,718	335,767	474,764	1,539,365
5	Electricity, Gas and Water	2,203,622	1,347,415	519,039	1,626,015	893,446	6,589,537
6	Bus line operation	217,469	171,309	218,520	251,097	406,696	1,265,091
7	Jeepney and other land transport services	106,241,825	47,269,461	17,395,784	58,334,626	419,159	229,660,855
8	Railway transport	155,568	175,358	187,808	183,873	392,408	1,095,015
9	Public utility cars and taxicab operation	160,871	177,001	188,080	188,369	391,620	1,105,941
10	Tourist buses and cars including chartered and rent-a-car	162,521	179,004	187,845	188,701	392,119	1,110,190
11	Road freight transport	687,828	294,132	242,699	474,159	379,003	2,077,821
12	Water Transport	382,234	180,442	171,649	283,770	342,594	1,360,689
13	Air Transport	449,970	172,370	200,603	327,207	329,991	1,480,141
14	Communications and Storage	1,127,091	564,947	391,160	872,815	762,570	3,718,583
15	Trade	7,026,406	3,134,290	944,828	4,078,488	3,297,498	18,481,510
16	Finance	5,276,105	1,627,895	1,083,809	3,187,149	1,367,644	12,542,602
17	Real Estate and Ownership of Dwellings	927,765	479,243	353,475	565,180	1,020,295	3,345,958
18	Private Services	2,894,623	845,673	719,178	1,967,727	1,298,891	7,726,092
19	Government Services	0	0	0	0	0	0
	Subtotal	190,753,166	95,021,986	32,485,129	117,051,509	36,223,713	471,535,503

Legend: [orange] Where initial perturbation is introduced; [yellow] Most affected sectors in the region

6. CONCLUSIONS AND RECOMMENDATIONS

This paper shows that the economic losses coming from a disruption in the operations of a single sector can be estimated using the MRIIM. It also presents that there is, indeed, an interdependence among different sectors across the economy, and an initial perturbation in one sector will result to a propagation of inoperability onto other sectors. This paper, however, acknowledges that the baseline IO table used was from the year 2000, and that it may not accurately hold as an account of current intersectoral relationships.

On the construction of the MRIIM used in this paper, the researchers opted to disaggregate based on the availability of jeepney strike participation reports. Considering how Region 3 may have incurred a significant impact due simply to its distance to NCR, the researchers also modelled a scenario where jeepney strike participation in Region 3 is at 0.8. This resulted to an additional overall economic loss of over Php 86 million. Furthermore, assuming a 0.8 value of participation in the Rest of Luzon and Mindanao regions as well would result to a whopping amount of over Php 201 million in economic losses. As a ceiling, a 100% participation in all regions would result to an overall economic loss of almost Php 943 million, or almost 2.55% of the Philippines' daily GDP.

These numbers, however, are in themselves, over-estimations. As mentioned in the paper, the initial perturbation values used are those reported in news articles. Additionally, both private and government vehicles were used in place of jeepneys during the nation-wide strike. Lastly, the inoperability values were introduced in the "Jeepney and other land transportation services" sector, which also covers the operation of tricycles and other modes of public transport not regulated by the LTFRB. As there is no available account of the separate flow of money into the jeepney and other land transportation services, respectively, the researchers were not able to further disaggregate the sector and apply the initial perturbation values accordingly.

Even so, this paper shows how the MRIIM can be employed to demonstrate the interdependence of different sectors in different regions of the economy, and how a change in one sector in one region can propagate across the economic network. The researchers, however, acknowledge that the model tends to produce an over-estimation of impact, especially with its rigid coefficients and how it assumes a normal operating condition during an abnormal situation (e.g. introduction of an operation disruption). Nevertheless, the paper also shows how the MRIIM, primarily due to its simple structure and transparent inter-industry linkages, can quantify both intra- and inter-regional effects, and moreover, can be easily modified and integrated with other models.

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