

Evaluating the PwC
"Review of the Road Safety Remuneration System"

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The Department of Employment of the Commonwealth of Australia commissioned PricewaterhouseCoopers Australia (PwC) to evaluate the "first three years" of operation of the Road Safety Remuneration Tribunal (RSRT) (PricewaterhouseCoopers, 2016). Since the Road Safety Remuneration Act (RSRA) passed in 2012 and only began operations at the beginning of 2013, the period PwC reviews can only be the first year due to normal start-up lags, and especially data lags. With the Department of Employment commissioning the report on 27 June 2015 and PwC completing the report on December 31, 2015, PwC not only began its review only eighteen months after the RSRT began functioning but could use at most one complete year of safety and other performance data. Despite this lack of data, in the report PwC heroically estimates both costs and benefits of the RSRT over a fifteen-year span by extrapolating sketchy data for the first year all the way to 2027. It is easy to see the arbitrariness of this fifteen-year "forecast" in Table 29, which estimates flat incremental "assumed" regulatory costs for fifth through fifteenth year and, in Table 30, inestimable "assumed" regulatory benefits in terms of safety. PwC never shows its work, so readers cannot determine the methodology used for these estimates.

The Department of Education, Employment and Workplace Relations commissioned PwC before the Road Safety Remuneration Act passed to develop a benefit cost analysis that would determine whether the proposed RSRA would be efficient from an economic perspective. PwC estimated at the time that the costs would outweigh the benefits with a ratio similar to the ratio it found in the 2016 analysis (PricewaterhouseCoopers Australia, 2011). By engaging the same consulting firm for the current analysis, and by not engaging competent social scientists (of which Australia has many), the Department of Employment risked serious confirmation bias (Nickerson, 1998), which it appears to have achieved. While the fact that the 2016 report confirms the results estimated by PwC in that 2011 report doesn't prove confirmation bias, combining their strong recommendation that the costs

exceed the benefits by almost exactly the same numbers with the errors in their analysis suggests that confirmation bias has played an important role. While an evaluation of the 2011 report is beyond the scope of this review, presumably PwC made the same errors resulting in the same invalid result it found in the present study.

Finally, while in several places in the report PwC acknowledges that the government's mandate includes driver health as well as safety, the report contains no evidence that PwC even attempted to analyze the health effects of long hours that low rates compel drivers—especially owner-drivers—to work. Health effects of long work hours are costly, and truckies must drive long hours when their rates of pay are low. Diabetes and cardiac disease, as well as other stress-related endocrine disorders, are common among truck drivers who work long hours, often for low remuneration, under great stress. These occupational illnesses and disorders are extremely expensive to treat and may shorten drivers' work lives, shifting enormous costs to Australian society. These costs likely far exceed the costs of crashes (Belzer, 2008).¹

Working time regulations in Australia are broadly similar to those in the U.S. Repeated surveys of American truck drivers have shown that on average, American truck drivers work between 60 and 65 hours per week and must do so in part due to low rates of remuneration and an average of 20-25 hours of unpaid time every week (Belzer, 2000, Belzer et al., 2002, CHEN Guang X. et al., 2015, Rodriguez et al., 2006, Saltzman and Belzer, 2002, 2007, Sieber et al., 2014). Obviously this loss of productivity reduces national productivity and economic efficiency, but special interests that demand that they retain the option have great political power and can overwhelm the public interest (for the classic exposition of this theory, see Olson, 1971). Regulation that allows hirers to force drivers to wait to load or unload, or spend their valuable time performing other tasks for free, promotes "moral hazard"² and allows these powerful parties to capture economic rents,³ which are inefficient.

Research has shown that these long working hours have a powerful negative effect on truck drivers' health (Apostolopoulos et al., 2010). Dembe et al. cite dozens of review articles, empirical studies, and meta-analyses showing that long working hours lead to "hypertension, cardiovascular disease, fatigue, stress, depression, musculoskeletal disorders, chronic infections, diabetes, general health complaints, and all-cause mortality" (Dembe et al., 2005). In an analysis of a large longitudinal dataset of American workers—a dataset comprehensive enough so that the authors can control for age, race, occupation, industry, employer, demographic and both personal and family economic status, health insurance status and other factors—Dembe et al. use Cox regression analysis (a.k.a. "survival analysis") to determine the

¹ While the study referenced here is a critique of a faulty benefit cost analysis performed in support of extending U.S. truck drivers' legal hours of work to 84, methods used and health cost issues are similar to those in Australia.

² <http://www.economicshelp.org/blog/105/economics/what-is-moral-hazard/>

³ <http://www.economicshelp.org/microessays/economic-rent/>

probability of workplace illness and injury. They find conclusively that health and safety risks increase unambiguously as workers exceed the “normal” 40-hour workweek (their data link long hours to health damage by the day—from 8 hours to fourteen hours and more—and by the week—from 40 hours to 65 or more). Long hours, which in part stem from low remuneration, transfers costs to society as an “externality”.⁴

These long workweeks occur when drivers do not earn enough in a normal week of work to pay their bills. Indeed, the data show that as driver compensation rises, drivers choose to trade labor for leisure. They would rather spend time enjoying their lives and with their families than behind the wheel of a truck for 70 or 80 hours a week (Belzer, et al., 2002, pp. 52-57). While it is far beyond the scope of this review to estimate the cost to the Australian economy of lost productivity of acutely or chronically ill drivers whose health has been damaged by long hours at low rates of pay, a valid benefit cost analysis must include the health as well as safety benefits of greater compensation, including the mandated compensation for unpaid hours of labor. A French study, for example, found that long hours of work cost the French workplace health system 19.3% of its spending (Béjean and Sultan-Taïeb, 2005). Research suggests that alcohol, drug, and mental health conditions, at least in part related to work stress which for truckies would be associated with long hours and unpaid labor time, accounted for a \$785 billion loss to the U.S. economy (DeLeire and Manning, 2004). The TWU (2013) says that their drivers report losing one day of pay every week just to idle time caused when hirers or cargo owners waste drivers' time loading, unloading, or waiting, something the RSRT's Order prevents (to this end, the RSRT Order promotes economic efficiency as well as health and safety). Add the fact that long-haul truckies drive an average of 224,488 km per year (4,674 km/week) and estimating an average speed of 80 km/hr, that's 58.5 hours of driving and 68.5 hours or labor per week, with 15% of that for no pay, reducing their take-home remuneration accordingly,

This review will address concerns with the PwC report section by section.

1. Background to this review

PwC consulted with stakeholders in preparation of this review. According to this section, it mostly conducted its review with government authorities and private industry. If it consulted with the New South Wales government regarding the experience with their Tribunal mechanism, it did not report what it learned. It appears that it consulted with only one worker representative, the TWU, and the rest were industry associations, non-union owner-driver associations, and employer and hirer representatives, which represent shippers and consignees that own the freight and pay for transport of freight. PwC conducted two surveys, results of which are reported at length throughout the report and documented in Appendix B, but because they did not get support from the TWU to distribute the second survey, because the TWU apparently had issues with survey design and implementation

⁴ <http://www.economicshelp.org/micro-economic-essays/marketfailure/negative-externality/>

(concerns that seem justified to me, as a scholar), results are biased toward the opinions of everyone but the truck drivers—the employers of drivers, the hirers of drivers, and those who pay the employers and hirers; only 96 truck drivers responded to the first survey and there was no second survey. Oddly, while PwC acknowledges this in Appendix B, they do not mention this fatal survey weakness in the report and when reporting results (PricewaterhouseCoopers, 2016, pp. 3 and 64-65). Important information like this should be reported in the body of the report and not buried in voluminous appendices. The report provides no information on survey design except to say that the surveys of employers was Internet-based, a method fraught with the risk of biases that neither are known nor acknowledged. All the questions ask for opinions that introduce subjective and unverifiable pseudo-data for analysis. PwC substituted these opinions for data, probably because accurate data were scarce. Results of the surveys should be discounted entirely.

2. Road transport industry and safety

In this section, PwC acknowledges the economic factors driving truck safety, including the propensity to speed and to drive while fatigued, among other factors. They confirm that owner drivers "are paid significantly less than their employee counterparts" (PricewaterhouseCoopers, 2016, pg. 8), suggesting that hirers and cargo owners quite knowingly hire owner drivers just to cut cost. They confirm that heavy vehicles are overrepresented in road crashes and workplace fatalities. However, in this section they seem to confine their analysis to property damage. Later in the report, again in the appendix, they will look at injury and death and apply a conventional metric for the statistical value of death and injury, as well as property damage.

3. The Road Safety Remuneration System

The PwC report reviews the RSRS and the RSRT, the Tribunal created to implement the Act. The Tribunal appears to be constructed in a similar fashion as state-level tribunals within the Australian industrial relations system, with similar functions and a similar mandate.

4. The need for the System

PwC mentions the statistical studies that show significant links between compensation and safety. The studies PwC uses are limited to just four, which are international in origin. It does not discuss these studies until Appendix C (the literature review) and a later appendix, where the economic analysis lies.

This section includes several conclusions that are striking in two respects. First, they regularly use the passive voice to convey both tentativeness and authoritativeness, in tandem. Language such as "it is not clear" uses the passive voice to make a statement that does not inform the reader regarding who is making that judgment (PwC, apparently), and it uses this mechanism to declare that insufficient evidence exists showing the "link between remuneration and road

safety". PwC uses these and other linguistic devices in conclusions aimed at discrediting the RSRT (PricewaterhouseCoopers, 2016; see conclusions on pg. 18).⁵

PwC also bases conclusions on the discredited survey. PwC does not articulate the survey's design or sampling framework. However, the survey questions appear in the appendices and it is clear from the text within this section, as well as by looking at the survey, that the questions ask for opinions and feelings rather than documentable facts, but reports the results as facts. Frankly, most of the conclusions draw from these survey questions and therefore have no empirical validity. Throughout this section PwC refers to the "concerns" and "feelings" and suspicions or hunches of industry representatives regarding the RSRT, showing what appears to be a bias in favor of their subjective opinions on the system.

5. The System's safety impact

In this section, PwC reveals the remarkable extent to which they rely on the subjective responses of industry representatives, collected using an unspecified sampling frame biased toward employers and cargo owners. PwC substitutes self-report on the part of the industry for actual data, and the questions are wide open to subjective interpretation. PwC conducts no statistical analysis of any of these subjective responses to determine who among their sampling frame has these views. It even interprets the absence of complaints brought before the Ombudsman as a failure, rather than a success, and suggests that the fact that most of their small sample of drivers reports awareness of both the Tribunal's and Ombudsman's function, in the first year of operation, is somehow suggestive of failure. They report that 56% of industry representatives indicate that there have been no changes in work practices in the brief time the RSRT has been in operations, yet the converse—that almost half the respondents report changes across six categories in just the first year—suggests to me a remarkable effect. The Ombudsman reports only 12 complaints, of which about half deserved investigation, out of some 25,000 complaints nation-wide (PricewaterhouseCoopers, 2016, pp. 27-28).

Section 5.5 reports on the safety impact. Figure 19 reports descriptive data showing a remarkable decline in heavy vehicle fatal crashes in the first year of the RSRT, during which the RSRT issued one Order (PricewaterhouseCoopers, 2016, pg. 70), appearing to reverse a prior increasing trend. However, these data, and all other safety performance data reported in this section, lack any reported measures of statistical significance. With the small numbers and single-point changes reported here, it is highly unlikely that PwC is finding any real trends in which analysts could be confident. Despite the data they report, however, PwC again claims that "there is a strong view from freight companies and owner driver representative stakeholders consulted and surveyed that the System has not had an impact on safety outcomes

⁵ This ambiguous inference language runs throughout the report. PwC even uses it in Table 3 on page 35 to say that stakeholders think that overlap with CoR "under HVNL means that these requirements *will* create confusion" even as the footnote to this statement says that the NSW Government says "duplication *may* cause confusion" (emphasis added twice).

to date" (PricewaterhouseCoopers, 2016, pg. 32), and appears to believe these opinions rather than the facts they report.

This is a remarkably unscientific statement, added to the remarkably unscientific data reporting. Based on unverified statistics and this "strong view" of industry, PwC is prepared to conclude "there is not enough evidence to *conclusively* prove that the Road Transport Order has had an impact on safety outcomes given the multiple causal factors affecting road safety" (PricewaterhouseCoopers, 2016, pg. 33; emphasis added). Just as the tobacco industry kept insisting that there was no "conclusive" evidence that tobacco and cigarette smoking causes cancer, or the oil and coal industry's insistence today that there is no "conclusive" evidence that carbon emissions produce global warming, PwC's stated lack of "conclusive" evidence runs afoul of the broad consensus of scholarly research that economics does drive safety—and many, if not most, of these scholars can be found in Australia. Note that peer reviewed scientific evaluation is needed precisely because "multiple causal factors" confound simple descriptive statistical reporting, as found in this report.

In sum, there is no reason to believe that this section displays any rigorous analysis. It should not be taken seriously.

6. Economic impact of the System

The errors in the previous sections now compound themselves in PwC's effort to transfer their subjective and statistically unsound prior sections into an economic analysis. First, in looking at the safety benefits only, PwC ignores the health benefits associated with higher rates, including the likelihood that higher pay rates will lead drivers to work fewer hours, endure less stress, and provide a social benefit associated with being a present parent and spouse. In this regard, it is important that BCA take a total social cost approach, not simply the limited approach that PwC takes (for classic BCA analysis of surface freight transport, see Committee for Study of Public Policy for Surface Freight Transportation, 1996, for a brief summary of the requirements for BCA in transport, see Gillespie et al., 2016, pp. 87-92).⁶

Second, as discussed above, this section again articulates the asymmetric comparisons used in this report, projecting benefits and costs out fifteen years based on only one year of data.

Third, examining the survey questions used in this analysis, PwC even asks employers subjective questions regarding "economic impact"; it never asks for verifiable economic information. In other words, while the RSRT has to show objective safety outcomes in an extremely brief time, the industry only has to "rate the economic impact of each Order".

In the economic impact estimates, PwC also never estimates the macroeconomic effects of rising compensation. While it treats higher remuneration for drivers and owner drivers as a transfer from hirers (Table 6), higher remuneration actually will

⁶ http://onlinepubs.trb.org/Onlinepubs/tcrp/tcrp_rpt_185.pdf; for the classic study, see: http://www.trb.org/news/blurb_detail.asp?id=2677

have a multiplier effect throughout Australia. It is only a transfer from the zero-sum perspective of a firm; from the perspective of the economy, it is higher compensation that increases spending and hence demand in a stagnant economy, increasing Gross Domestic Product (GDP). The report does not estimate the consequence the higher compensation might have after the macroeconomic multiplier occurs. The standard macroeconomic multiplier, drawn from introductory principles of economics, is about 2.5. That means that assuming the marginal propensity to consume (MPC) for a worker is 0.6 (a standard number used in economics text books; the U.S. MPC is 0.56), an extra \$100 in remuneration will multiply to grow GDP by \$250 (Krugman and Wells, 2015, pp. 318-321). The effects of changing hours of work, as well as compensation, ripple throughout an economy and must be estimated (Belzer et al., 1999). Finally, Table 6 of the report, on page 50, treats the "cost of changes to payment systems" in two components: start up cost (\$116 million) and "ongoing cost" (\$14 million). Since the System has already been set up, arguably the start up costs are already sunk. Arguably the only cost against which the repeal should be measured is the marginal ("ongoing") cost. Thus the report may inflate the costs associated with continuing the RSRT by as much as eight fold.

7. The System's efficiency

This section serves as the conclusion to the report. This review's criticisms of the PwC report have become redundant because PwC repeated the same errors throughout, particularly with respect to the biased and subjective survey and the conclusions drawn from it, the lack of statistical validity in reporting both the survey results and safety performance against which PwC judges the RSRT, and the biased language in the conclusions throughout the report, based on unconfirmed data collecting and reporting.

Appendix D: Literature

PwC mischaracterizes the studies by my team in an important way. The "result" and "Comment" summaries on pages 78-79 suggest that the crash incidence trend may be "U-shaped" and thus a safety improvement eventually "turns negative". While a full explanation would be too technical here, readers should understand that these are normal tendencies for dynamic data. Social scientists would never expect a blunt linear effect of age or tenure or experience; the effect depends on the variable. For example, as we know, young drivers who lack maturity have a higher crash probability. That probability goes down with age and optimizes approximately between the ages of 25 and 45 and then turns back up as drivers' endurance and reaction time declines with age. Similarly, a driver will tend to perform better with experience but the incremental experience effect will decline slowly, producing a classic curve of diminishing returns; experience offsets declining reaction time associated with age, which insurance rates reflect.

We expect each variable to have different characteristics. These are all controlled simultaneously in a multiple regression equation of the appropriate type. This does not mean, as PwC suggests, that there is some sort of indeterminacy associated with

these curves; probabilistic estimations are in the model equations and control for all of these factors simultaneously.

Finally, the effects reported in my team's research are robust and significant across multiple data sets. In the longitudinal J.B. Hunt study (a very large U.S. non-union carrier with North American scope of operations), at the mean, for every additional 10% in driver pay rate (and driver pay raise between low-wage pay regime in the first year to high-wage pay regime in the second year) the probability of crash declined 40%. The carrier experienced a 50% decline in turnover, a 50% decline in all crashes (with a very low value threshold) and a four-fold decline in big crashes (with a \$3,000 threshold)(Belzer, et al., 2002, Rodriguez et al., 2003, Rodriguez, et al., 2006). Subsequent research, completed in 2015 by my PhD student Michael Faulkner, showed a significant productivity gain to the firm resulting from the greater driver experience for which the trucking company paid. This was a "win" for the driver in higher wages and safety, a "win" for the carrier in lower search and turnover cost as well as casualty cost and productivity, and a "win" for society, which enjoyed a substantial improvement in road safety.

In the cross-sectional study of 102 non-union truckload long-haul carriers, at the mean, carriers remunerating drivers at a 10% higher level had a 9.2% lower crash rate. More than half of this 9.2% lower crash rate stems from the higher rate of pay; 10% of the lower crash rate can be predicted by the amount of unpaid time paid for non-driving labor (in hours per mile); and the remainder can be predicted based on the carrier's promise of a raise and payment for life insurance, health insurance, and a safety bonus. It is a surprisingly robust effect for a cross-sectional study.

Higher remuneration unambiguously leads to safer highways. Further, the higher compensation for low-wage drivers is economically efficient because to the extent that higher wages contributes to crash reduction, it brings the full cost of trucking services into the market and into price, reducing the negative externalities associated with truck crashes.

Australia wins.

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