TRANSCRIPT

ROAD SAFETY COMMITTEE

Inquiry into serious injury

Melbourne — 28 October 2013

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Witness

Professor L. Connelly.

The CHAIR — On behalf of the Parliament of Victoria Road Safety Committee I would like to welcome this afternoon to our hearings in relation to serious injuries and the mitigation of serious injuries Professor Luke Connelly. Luke has joined us today, I understand, from the University of Queensland. Thank you for travelling to Victoria for our hearings today. As you can see, Melbourne weather is beautiful one day and even better the next.

There are a couple of formalities I would just like to run through. The evidence you are giving today is protected by parliamentary privilege. Comments made outside the hearing are not afforded such privilege. The transcript will become a matter of the public record. I note too that there is the option to give evidence in camera, though that is probably not likely today. Just prior to starting, it would be appreciated if you give your name, the position you hold and whether you are representing an organisation or speaking in your own capacity. I now invite you to speak to your presentation.

Prof. CONNELLY — Thank you, Chair. My name is Professor Luke Connelly. I am a professor of health economics at the Australian Centre for Economic Research on Health, as well as the Centre of National Research on Disability and Rehabilitation Medicine, school of economics, and the UQ Centre for Clinical Research. I am here representing myself, though I should say that I work in a centre that is funded by a CTP regulator in Queensland — the Motor Accident Insurance Commission.

The CHAIR — You used an acronym just then, did you?

Prof. CONNELLY — UQCCR is the University of Queensland Centre for Clinical Research.

Overheads shown.

Prof. CONNELLY — I have formulated a brief presentation on valuing health risk and resource trade-offs today that I hope will be of use to the committee in its deliberations. Essentially applications of economics in the public sector often involve either a cost-benefit analysis or a cost-effectiveness analysis. Cost-benefit analysis demands that the benefits be monetised — that is, the benefits must be estimated in monetary units. The advantage of doing that is that that enables benefits and costs to be compared in the same units, so cost-benefit analysis allows us to answer the question, 'Is it worthwhile to invest in X?'. A cost-effectiveness analysis, on the other hand, does not require the monetisation of benefits. What has to happen in a cost-effectiveness analysis is that outcomes must be measured in comparable physical units so that the cost per unit of output can be computed.

In the health sector interventions are rarely assessed by monetising their benefits. Usually a special form of cost-effectiveness analysis is used called cost-utility analysis. It uses a measure that combines the quantity and the quality of life, usually a quality-adjusted life year, as the denominator. The purpose of the cost-effectiveness analysis in the health sector — cost-utility analysis — is to compare the cost per quality-adjusted life year saved. In theory if all the health sector interventions are evaluated in a similar way, then comparisons across those could be made and we could compare quite different interventions that have consequences for the quantity or quality of life or both. Under particular assumptions, that information can be used to maximise the social benefit that is created from the distribution of the health budget across its possible purposes.

While cost-utility analysis is widely used in the health sector, it is actually a more limited approach than CBA, and the reason for that is that it does not allow us to answer that question of whether or not a particular intervention is worthwhile in the sense that the social benefits outweigh its social cost. It is important to point out there too that when economists talk about costs we are thinking about opportunity costs, which means the benefits of the next best use of those resources as opposed to necessarily a market measure of costs.

The problem with doing cost-utility analysis in the health sector is that commonly it leads back to a question by commissions and policy-makers of what a QALY is worth. In a sense, that question betrays perhaps a problem — that we are not actually using the right technique to start with, in the sense that if we really want to know whether it is worthwhile to make a particular investment, we probably should be trying to monetise benefits. An additional implication is that across other sectors where cost-benefit analysis is used the translation problem still exists as well, so we are ultimately left to ask, or answer, this question: what is the shadow value of a QALY? What is our willingness to pay to produce a QALY or save a quality-adjusted life year?

That is a brief introduction to the way things are different in health. In relation to the Medicare schedule and the pharmaceutical benefits schedule, for example, cost-utility analysis is the most common form of analysis that is seen by the advisory committees to the commonwealth Minister for Health on the safety, effectiveness and cost effectiveness of new and extant technologies. In relation in particular to monetising benefits there are basically three popular approaches to monetising health risk trade-offs in economics. There are others, but I will not touch on them. There is a method called the friction cost method, which debuted for a while, and it did not really gain traction in the literature. The other more common approaches used are the human capital approach, stated preference approaches and revealed preference approaches.

The human capital approach involves assigning values to life and limb that are based purely on their value in production. That approach measures only a subset of the benefits of interventions that can affect morbidity and the length of life as well. The remaining techniques are consistent with the latent construct that is of interest to us, which is: what is the maximum amount a person would be willing to pay for a reduction in some risk to health or life? Or conversely and equivalently in theory, what is the minimum amount a person would be willing to accept for an increase in some risk to health?

The most important point to make here, first off, is that the stated preference approaches are survey methods, and a noteworthy example of this — the most commonly used since the 1960s in economics, especially environmental economics and other economic problems where there are not natural market prices of some goods or resources — is contingent valuation. Contingent valuation is a survey approach that involves asking people questions about their willingness to pay for a good or their willingness to accept compensation for a loss, and the important point about the trade-offs that we are considering here is that they are not trade-offs about an identified life and a certain probability of death or survival. What we are talking about are small changes in risk, and the value that people are willing to pay to avoid that small increment in risk or willing to accept as minimum compensation for a small increase in risk, for example.

This contingent valuation approach has come under quite intense scrutiny over the last two decades in particular. The first concerted inquiry into its use followed the Exxon Valdez oil spill in Prince William Sound, and the reason for this is that under the United States Oil Pollution Act the President must establish procedures to establish damages to natural resources due to the discharge of oil, and so a panel of eminent economists, including two Nobel Laureates, was appointed in 1992 by George Bush, Snr, to inquire into the validity of contingent valuation measures of non-use value, meaning environmental resources that are not being used for other production purposes but may have social value.

That panel highlighted a number of problems. I will read what is on these slides now. One of the statements from that panel reads as follows:

> The CV technique is the subject of great controversy. Its detractors argue that respondents give answers that are inconsistent with the tenets of rational choice, that these respondents do not understand what it is they are being asked to value (and, thus, that stated values reflect more than that which they are being asked to value), that respondents fail to take CV questions seriously because the results of the surveys are not binding, and raise other objections as well. Proponents of the CV technique acknowledge that its early (and even some current) applications suffered from many of the problems critics have noted, but believe that more recent and comprehensive studies have already or soon will be able to deal with these objections.

More recently, just last year Jerry Hausman, in a very strident piece of criticism of contingent valuation approaches entitled ‘Contingent Valuation — from Dubious to Hopeless’, said this:

> Approximately 20 years ago, Peter Diamond and I wrote an article for this journal analysing contingent valuation methods (Diamond and Hausman 1994). At that time Peter’s view was that contingent valuation was hopeless, while I was dubious but somewhat more optimistic. But 20 years later, after millions of dollars of largely government-funded research, I have concluded that Peter’s earlier position was correct and that contingent valuation is hopeless.

These are the three problems that are said to remain, and I will go through each of these in turn shortly. Hypothetical response bias is an important problem. There are large differences between willingness to pay and willingness to accept values in practice — in fact they should be equal theoretically but they seldom are. There are problems of what are called embedding and scope, which means that valuations of projects are prone to differ depending on whether or not they are evaluated on their own or as part of a larger project.

So the basic problem of hypothetical bias — the first one of these three points — remains, even after the recommendations of the Arrow, Solow et al panel, which pointed out a number of things that modern contingent valuation studies should do. Hypothetical bias is basically that people say they will do things but

then proceed to do other things. They do not do what they say they will do. This is repeated in the literature. A number of studies exist of intentions to buy new products, for example, with findings that these tend to be overstated. The recent work in a study by Hsiao et al and Morwitz et al also produced similar results. This type of hypothetical bias affects both private and public goods, and it seems to be fairly large. In fact the NOAA panel recommended halving the contingent value estimates produced for non-use value.

In terms of the question of exactly what to do with contingent evaluation results, though, if we are to retain them — such as halving them — there is not a lot of empirical evidence to suggest that on a regular basis halving these would even lead to reliable estimates of the value of a life, for example. There have been a number of attempts to try to rationalise the differences between willingness to pay and willing to accept results from contingent valuation studies, but they have not really been successful. The persistence of this gap, as Hausman said, is:

> … likely due to the reality that answers to contingent valuation do not actually reflect stable or well-defined preferences but instead are opinions invented on the fly.

The scope and embedding problem is easiest explained at this result from the NOAA panel, which notes:

> Desvouges' [et al 1992] result is very striking; the average willingness to pay to take measures to prevent 2000 migratory birds (not endangered species) from dying in oil-filled ponds was as great as that for preventing 20 000 or 200 000 birds from dying. Diminishing marginal willingness to pay for additional protection could be expected to result in some drop. But a drop to zero, especially when the willingness to pay for the first 2000 birds is certainly not trivial, is hard to explain as the expression of a consistent, rational set of choices.

Diamond and Hausman in 1994 provide another similar example, where the value of cleaning up one lake is approximately equal to the stated willingness to pay of cleaning up five lakes. They proposed an adding-up test, and this is how it works: you ask one group of respondents about their willingness to pay for a particular public good X, you ask a second group about their willingness to pay for public good Y, and then you ask a third group about their willingness to pay for public goods X and Y together. What you then do is subtract the second of these, the willingness to pay for Y, from the willingness to pay for X and Y, and you should approximately get X. That is the adding-up test.

Desvouges and others, in their study in 2012 following this original 1994 proposal, conducted a review of 109 contingent valuation studies, and they found that only one of them passed the scope test. The weak version of a scope test is the proposal that as the size of the program, for example, produces more output, you should also see increases in willingness to pay, but that is a very weak version of the test. There was only one of those 109, apparently, which was a study about water cleanliness, that passed a scope test of that very weak kind. There is no specification in this weak scope test about how large these increments have to be; simply that there are increments in value in willingness to pay. But even that one study failed the Diamond-Hausman adding-up test.

What Desvousges and others did was expand the Chapman survey, showing that some of the incremental values obtained directly by contingent valuation were three times those obtained when willingness to pay is estimated for a program that includes all the increments. So once again they showed that contingent valuation results are unreliable.

This is a case study of the Copyright Tribunal of Australia that Hausman uses. The problem that was being addressed by this tribunal was the level of compensation that cable TV providers should pay to copyright owners for the retransmission of the content of the free-to-air broadcasts. This was a study that was conducted by two well-known and respected economists, Carson and Borland. In the first part of this study more than 2600 individuals were sampled. They were given 10-minute personal interviews at home with surveyors who visited them. They were asked questions about household structure and behaviour, and they were asked to read descriptions of retransmission and the available substitutes. Then they were asked what they would choose if they had the choice of paying a certain amount per month and continuing to receive the free-to-air services from their cable provider or not payment that amount per month and losing those channels but perhaps being able to get them via another source, such as buying a TV aerial, for example.

They were randomly allocated to these bids of $1, $2.50, $5, $7.50 and $10. While I call those 'bids', these were the amounts per month that were randomly assigned. People were then asked, for example — and this is

not verbatim; this is me — 'If the monthly fee were $2.50 to enable you to continue to receive these free-to-air broadcasts via your cable provider, would you be willing to pay?', and they answered yes or no.

It was then found surprisingly that the first part of the study did not have correct implementation of the call-back procedure by which respondents who were not home at the time when interviewers visited would be called back. So they repeated this study with another 2300-plus respondents. The only significant change in the second study was that respondents in the second study were shown both a monthly fee and its annual equivalent. That was really the only significant change that happened, but the results are quite surprising. You can see here across the top of this table, which is table 1 in Hausman's paper, that actually more people were willing to pay $10 than were willing to pay $7.50 in both studies. Up the top there we have only 1 more, 140 versus 139, who said they would pay. Down the bottom we have 90 versus 85 individuals who were willing to pay.

Study 2 finds a 32 per cent higher share of respondents who stated that they were willing to pay $10 per month for retransmission. In study 1, 39 per cent more respondents than in study 2 were willing to pay $7.50. Finally, although I have not shown it in this slide, in order to apply an adding-up test, more field work was conducted on behalf of Hausman and the co-investigator and they proved that the results failed to satisfy the adding-up test. The sum of the two incremental options they put to people, as opposed to the willingness-to-pay amount when presented as a single scenario, was 64 per cent greater, so that study failed the adding-up test as well.

This is an interesting outcome because, on the basis of the arguments put to it, the Copyright Tribunal of Australia decided to disregard the contingent valuation evidence completely. Quoting a 1965 case, it argued that a:

> … person exercising quasi-judicial functions must … not spin a coin or consult an astrologer, but he may take into account any material which, as a matter of reason, has some probative value … If it is capable of having any probative value, the weight attached to it is a matter for the person to whom Parliament has entrusted the responsibility of deciding the issue …

On that basis, it concluded that:

> Courts and tribunals must proceed on the basis of probative evidence, not speculation … We have such a level of doubt about the survey that we attach no weight to it.

The alternative to stated preference studies is revealed preference studies. The type of revealed preference studies I am referring to here are also referred to as hedonic price or hedonic wage studies. The revealed preference studies in the literature examine the trade-offs between health risk and the money that people make in practice. This was first observed back in the 18th century by Adam Smith, who said that:

> … the wages of labour vary with the ease or hardship, the cleanliness or dirtiness, the honourableness or dishonourableness of the employment.

We can observe these types of trade-offs being made in other markets, too: in property markets, motor vehicle markets and so on. So when we buy our small vehicle with superior fuel efficiency, we also incur a higher probability of injury or death ceteris paribus (all other things being equal). The best available data tends to come from observations on labour markets. There is an Australian study by Peter Abelson which provides a good overview of the issues that are involved and ultimately recommends that Australia adopt a value of statistical life of between $3 million and $4 million for a healthy, prime-age individual. That at the time of writing was approximately $151 000 per life year saved, assuming 40 years of life lost, or about $176 250 in 2013 Australian dollars. According to Aldy and Viscusi, the most plausible labour market estimates involve value of statistical life values in the US$300 000 range.

I will talk no more, then, about the revealed preference data except to say that these revealed preference data come from actual observation of what people do in practice, rather than what they say they will do. Personally, my view is that these are more reliable studies than stated preference contingent valuation studies.

There are two remaining issues that I just wanted to touch on in relation to the issues you are considering and your terms of reference. One of them I have referred to as cross-portfolio issues. They include the problem of different sectors or different portfolios potentially adopting different decision rules as a source of inefficiency. Viscusi noted in an earlier paper about 13 years ago that at the time the road authority in the US was using a cost per statistical life or a value of statistical life of about $5 million, while at the same time the EPA, which I believe was barred from actually doing cost-benefit analysis, was making investments with an implied marginal

value of statistical life of $5 billion, so essentially transport was avoiding investments that were 1000 times more cost effective than the EPA's investments.

This could be a real problem across sectors, especially if the thresholds that are used in, for example, the health sector are lower than those used elsewhere in government. There was some evidence produced a number of years ago based on Pharmaceutical Benefits Advisory Committee decisions. Its actual decisions suggested that listings were highly likely to be recommended to the minister by the PBAC if the cost per QALY was less than $46 000 in 1998–99 values and highly unlikely if the values were up over about A$76 000. So there is some evidence that a lower threshold than those being implied in this work is actually being applied in practice in the health sector.

For example, if a threshold of $75 000 per life year were applied to health sector investments or health portfolio investments and a $225 000 threshold were applied to road safety investments, then some investments that pass the threshold test in the road safety environment would fail the threshold test in the health portfolio and the social return to public investment would not be maximised.

The other issue is to do with the budget constraint. An established threshold itself could prove problematic. The question of whether or not public resources actually exist to fund all projects that pass a threshold test is an important one. The threshold itself as well is dynamic, so as you increase investment in one portfolio you are likely to have diminishing returns set in and the marginal benefits of additional investments in that particular portfolio and others will change together. In particular the investments that are displaced in other portfolios, for example, may come at an increasing opportunity cost at the margin. Amiram Gafni and Stephen Birch had a paper published in *Social Science and Medicine* in 2006 which provided some detailed arguments on that.

To conclude my opening statement, in my view the revealed preference approaches are more enlightening than the stated preference approaches available to us. The use of VSL measures brings with it — that is, the hedonic wage studies — a number of challenges across public portfolios, including variability of the measures and investment rules that are used by different departments and in relation to the implications for public spending that arise from applying such measures, such as whether or not the public budget allows for all investments with the VSL less than some determined threshold — say, $4 million — to be made. Thank you.

Mr ELSBURY — Thank you very much for your presentation today. I do not think I could wipe the smile off my face at some stages in that presentation — some of the arguments I have been making! In any case, the committee notes that a substantial area of your research is focused on the cost of road crashes and the burden it may place on individuals, trauma systems and society more in general. Can you explain what the impact of road crash injuries is in terms of cost, and if possible discuss the most appropriate way you believe cost should be calculated more generally?

Prof. CONNELLY — My existing work is a paper in 2006 on the cost of road traffic crashes in Australia. We essentially use BITRE's costing methodology, and we are updating the crash epidemiology data effectively. The work I did uses a costing methodology that is somewhere between human capital methods and contingent evaluation methods. It was not motivated at the time mostly by these concerns with contingent evaluation, but I now think that probably we and BITRE got closer to the mark than we would have had we used contingent evaluation studies. My preference now would be to state that estimates of the value of statistical life based on hedonic wage studies and other market-based data, I think, have much more going for them in terms of the accuracy of those measures for valuing small changes in risk, which is what we are talking about.

Mr ELSBURY — Yes. A number of times I have pointed out that if I wanted to make sure that my family was as safe as they could be, they would be driving around in a Volvo rather than in a 2007 Corolla. In any case, it is the working out of what you can actually afford at the time you purchase the vehicle — that sort of thing. Going back to our dear friend, willingness to pay, to what extent do you see that willingness to pay is being used by health economists, and is it an appropriate way to calculate the cost of injuries and illness?

Prof. CONNELLY — Willingness to pay is increasingly being used to answer this question of what a quality-adjusted life year is worth, so economists are working on this question of, 'What is the value of a QALY?'. Some work that was done almost a decade ago also showed in relation to the valuation of life years that the results varied incredibly depending on which method was used.

It is not the concept of willingness to pay that is the source of the problem here; that is the right latent concept to be thinking about, I believe. The problem really is the method that is used to measure that phenomenon, and one of the chinks in the armour, I think, of the research that is currently being done on this question of how much you are willing to pay for a life year or a quality-adjusted life year is that although it does not use these traditional contingent evaluation approaches, it tends to use a choice method called discrete-choice experiments, or stated-choice experiments. These are still stated preference measures; they are not revealed preference measures. Once again the question of hypothetical bias and all of these other potential sources of bias, I think, still exists in relation to the use of these newer methods, which certainly are more advanced in the way that they deal with people and try to minimise bias, but I think that once again the difference between what people say they will do and what they actually do in practice is likely to be fairly radical.

Mr ELSBURY — Just going back onto that question, how broadly do you think health economists are using the willingness-to-pay model though?

Prof. CONNELLY — Health economists are not using the willingness-to-pay model particularly widely. My sense of where the literature has gone recently on this is that the question of what we are willing to pay for a QALY arises simply because of the proliferation of the use of cost-utility analysis, which still leads back to this question: where do we stop? If we are making marginal investments in health and it costs us $50 000 per QALY now and then the next one costs us $60 000 per QALY and we keep increasing the scope of investments for the things we can do to improve people's health, we still have to answer the basic question of, 'At the margin, where do we stop?'. What is the marginal willingness to pay for an extra quality-adjusted life year, and how does that compare with the investments that are open to us in other parts of the economy which may also be health improving or risk reducing?

Mr PERERA — Thank you, Professor. The committee understands that one method of calculating the pain and suffering of road crash victims is to rely on court awards in road crash negligence cases, sometimes in conjunction with a revealed preference WTP study. Are you aware of the use of this method, and if so, what is your view of it?

Prof. CONNELLY — Once again, there is some literature on this question of whether or not court awards accurately reflect willingness-to-pay values. One of the more recent studies I am aware of used about 1200 settlements in the US for product liability and intentional assault personal injury cases. They use quality-adjusted life year weights, and then they use awards for injuries they are able to identify in the claims database matched to some QALY measure that has been validated by clinicians, and then they impute from that what the value of the statistical life would be, given the proportion of what we refer to in Queensland as whole-person impairment. What they find is that actually the range they estimate is not very far away from the revealed preference studies I have been talking about. By contrast, some of the work on how juries versus judges, for example, award damages is more equivocal, although it tends to show that jury-based awards for general damages, and in particular non-economic loss, tend to be subject to more variance than judge-based rulings.

The other distinction I think is important in relation to your answer is this distinction between the value of a statistical life and trying to compensate somebody who has an identified loss of life or limb. There are several different ways you can think about this question of what the value is of a statistical life depending on what your purpose is. If your purpose is an insurance function, you want to know the optimal level of insurance that that person would buy. In relation to property insurance, the notion of 'making whole' is a useful motion because the only loss that arises when there is a property loss is a loss of property, but the person's utility function, or what makes them satisfied, does not actually change, so by replacing the whole that was lost you can restore utility to its pre-loss level.

In the case of insults to health — and take the case of fatality in particular — clearly it is not feasible to restore somebody to whole. In fact if you are looking for an insurance and efficient social solution, restoring to whole, even for severe injury, is actually not indicated by the economic theory. The reason for this is that the utility function is changed; people's utility, or what makes them happy, does change as a result of a serious injury. In fact, provided we believe all of the evidence, it is suggested that these injuries do not improve or make the utility of income greater; they actually reduce the utility of income. Those findings suggest that, according to insurance theory, if you want an efficient and optimal level of insurance, it will actually be less than restoring people to whole; it will be, in some of the empirical estimates, of the order of 85 per cent rather than 100 per

cent. The other important consideration with these questions of the value of a statistical life is the deterrence function. Once again, if you want to deter people, that is yet another separate question.

Mr PERERA — What are the ramifications, if any, of adopting the WTP approach used by transport economists in the road safety area if it is not used in other policy areas such as health?

Prof. CONNELLY — I think the main implication is, if the willingness-to-pay value is substantially different from the value being used in other areas, then once again you have a problem where an investment that will fail in one portfolio will not fail in another portfolio. The implication then is that you get too much expenditure growth from a social viewpoint in the portfolio that has a higher threshold and too little in the other.

Mr PERERA — The committee understands that the WTP approach is one among many used to assess the cost of injury and fatality in other policy areas such as health. What other costing methodologies are used, and would they be appropriate for the task of calculating the cost of injuries for policy development and to measure the cost-effectiveness of countermeasures?

Prof. CONNELLY — The costing approaches that are used on the cost side of the equation are the same, but on the outcome side of the equation they tend to be non-monetary values such as quality-adjusted life years. Certainly those approaches would be applicable where the predominant effect of the intervention is changes in health. They certainly could be used and then compared across sectors. Conversely some of the methods that are now being used to impute a willingness to pay for QALYs could be used to represent health sector decisions and compare those thresholds across portfolios.

Another approach that might be useful, which is applied frequently in cost-effectiveness analysis but not as frequently, as far as I can tell, in some of the cost-benefit work, is work on uncertainty around parameter estimates. One of those uncertainties may actually be an uncertainty about the value of a statistical life. One of the ways we deal with this in cost-effectiveness analysis is that we run simulations with our models to address what is called second-order uncertainty. This is the uncertainty you have about the probability that this black spot project will actually result in a reduction in fatalities, and if it will, what the size of that reduction will be.

What you can do to deal with that second-order uncertainty about your parameters is run the model with what is called a Monte Carlo simulation approach. You do a number of trials with the model, and you get a distribution of cost-benefit results and a distribution of net present values, which you can then plot. You can then ask the question: if we set the value of a statistical life at $1 million, what is the probability that this intervention is important? The answer to that depends on what proportion of the net present value estimates sit above a positive $1 million threshold. You can change that threshold to determine what proportion of your simulated results actually sits beneath some threshold level.

Mr TILLEY — What is the role of injury definitions in assessing crash costs? In your view, how critical are these definitions in terms of calculating costs in a willingness-to-pay study?

Prof. CONNELLY — At the moment — and my 2006 study is an example of this — we use a very gross categorisation of injuries. We use hospitalised, medically treated — meaning non-hospitalised but medical attendance required — and fatality. These are very gross categorisations that involve a lot of heterogeneity. There will be a lot of injuries that will have long-run effects in with some others that will not, so it is very much an averaging approach. You could use a much more finely graded definition of injury — and there are certainly a number of different, competing ways you could go about that.

However, another difficulty that is associated with these definitions of injury is what the long-term prognosis is. For example, some people who have an injury that is at the minor end of severity, such as a whiplash injury, will recover autonomously with very little treatment and have no long-run health effects. Others will develop chronic problems, and for people who develop chronic problems from a whiplash injury there are not many effective treatments currently. Even within what seems like a simple area such as whiplash, there are quite complex differences — for example, people with whiplash and with or without post-traumatic stress disorder, or with or without chronic implication and pain. This is an area in which much finer gradation could be used. The returns for doing that really depend on the purposes you have in mind.

Mr TILLEY — Talking about injury, what definitions of injury do you use in your economic models specifically when assessing health-care costs?

Prof. CONNELLY — For the aggregate work we have done that tries to estimate the costs of road traffic crashes at the national, state and territory levels, we are limited by the data we actually can get — for example, police data, which we know underreports the lower end of severity of injuries. We are using aggregations that also differ across jurisdictions. For example, in our 2006 paper we had to impute the distribution of medically treated and hospitalised injuries in New South Wales — or one of the states — because we could get those proportions in other states but not in New South Wales, so we had to make an assumption about the distribution of injury.

Insurers carry much more data at a much higher level of sophistication in relation to injury and claims management. In Queensland the compulsory third-party insurers use a coding system called the abbreviated injury scale, which you can then use to create an index that is called the injury severity scale. That scale was originally developed to predict the probability of mortality following a crash, but it is widely used and there is a new version of it called the new injury severity score. In Queensland the insurers collect all that data and are required to provide that to the Motor Accident Insurance Commission, as regulator. There is quite a rich dataset available in Queensland based on that classification system.

However, there are other classification systems I am aware of. One of the most recent is called AMA 5. I am not particularly familiar with how that works, but there are a number of different taxonomies for coding and classifying injury that could be used if you are trying to improve your data. There are also trauma registries around the country — VSTORM in Victoria, for example — that collate considerable data on injured people, what types of injuries they have, their clinical indications and the external cause, so you could identify road crashes, for example. They also tend to be incomplete and to have different inclusion criteria. The trauma registry that until recently existed in Queensland, for example, used to capture anybody who had a hospital stay of more than 24 hours. I cannot remember the VSTORM criteria, but they do differ so then interstate comparisons become difficult as well.

Mr TILLEY — Was that a Freudian slip? That is the first time in this inquiry that I have heard the word 'assumption'. My definition of 'assume' is that if you assume anything, it makes an ass out of you and me.

Prof. CONNELLY — Economists are in trouble then.

Mr TILLEY — When it comes to assumptions, in your studies and research in general terms, how much of that is actually applied to the end result? In your last contribution you talked about figures from New South Wales and other jurisdictions and putting this together to make recommendations that governments can take up. How much of that is in place?

Prof. CONNELLY — It is very difficult. In relation to that type of work, I had done this exercise for Queensland where the data was slightly different. Then when I presented it I had people from Victoria and New South Wales asking me if I could do it for their states. The answer is that you can do it, but when there are gaps in the data you then have to make and document whatever assumptions you are using to fill those holes.

It is also true to say that the value of statistical life hedonic wage studies also have some of these types of problems associated with them. For example, some of the early studies show fairly low value of statistical life, but they tended to be — in one case, a fairly small study — drawing on workers who were in high risk professions so actually their risk tolerance was very high.

These days my confidence in the hedonic wage studies is reflected due to the fact that the data is very good; it is very reliably collected because workplace stats are well recorded, wages and income information is, for the most part, well captured and the statistical or econometric techniques that are used to try to address these problems of sample selection bias and other things that happen in observational settings where you cannot randomise the intervention are sufficiently sophisticated but the influence of those problems of noise are minimised.

Mr TILLEY — If I could just seek your indulgence, Chair; I want to continue this conversation a little bit. I would like you to give a personal view and not necessarily that of the organisation you represent. Recently we heard some commentary from motorist and lobby groups in relation to speed limits. For many years, particularly in Victoria, we have had the 'Wipe Off 5' and 'Speed Kills' campaigns. Recently there has been commentary around possibly holding trials for increased speed limits in those road networks that achieve a higher star rating, are significantly safer or have less traffic volumes. I do not know whether you have read or

heard any of the commentary in Victoria about possibly holding a trial of 130 kilometres an hour along the Hume Freeway. Do you have a personal view in relation to that? I will throw you a little bone, here but there has always been a significant degree of fear around this and hence we have defaulted to going back to a default position of 'Speed's scary'. Somebody has to have a belief or a view on this somewhere out there.

Prof. CONNELLY — As an economist I believe that these are all problems of trade-offs. There are advantages to raising the speed limits. Public health advocates, by contrast, do not want to talk about those benefits, which might be quicker trips and a range of other things, but as an economist I can see that there are trade-offs. The question once again is: at the margin do those benefits exceed the costs? The thing that people worry about in the discussions is that the costs may well exceed the benefits, but we may not know unless we have a trial.

Mr TILLEY — Is that an assumption? Are you assuming there?

Prof. CONNELLY — I do not assume, but I think some in the public health arena do.

Mr TILLEY — Thank you for your indulgence, Chair. I will get back to the serious side of business. The last conversation was as serious as the next part. A number of submissions have canvassed the use of burden of injury measures such as disability-adjusted life year and quality-adjusted life years to monitor road safety and measure long-term injury consequences. What are your thoughts on their use for this purpose? Do you have a view on their use for other purposes, such as calculating the cost of road trauma?

Prof. CONNELLY — I think that both the disability-adjusted life year and quality-adjusted life year approaches are useful for different things. By combining both quality and quantity of life it at least takes us a step closer to measuring what the burden of a disease might be or the burden of injury and loss of life is, so those measures are useful for those reasons. Neither of them actually takes us to the answer to the question, which is: is this intervention worthwhile? If we can answer the question that the cost saved per disability-adjusted life year or quality-adjusted life year is $50 000, then we are still left to answer the question: is it worthwhile? Ultimately, unless you answer that question, as the value of statistical life studies do, you cannot provide a coherent response.

The CHAIR — Professor Connelly, thank you very much for the evidence you have given today. You will soon receive a transcript of it. If you could correct any typographical or factual errors and return it to us, we then envisage that it will be placed on our website. We appreciate you taking the time to travel down from Queensland. Enjoy Melbourne and its weather while you can. Thank you.

Prof. CONNELLY — Thank you, Chair, and thank you, Committee.

Witness withdrew.