




Welsh Government

**The Impact of the Severn Tolls on
the Welsh Economy**

Executive Summary

216322

Issue | 30 May 2012



This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 216322

ISBN 978 0 7504 8035 2

Ove Arup & Partners Ltd
4 Pierhead Street
Capital Waterside
Cardiff CF10 4QP
United Kingdom
www.arup.com

ARUP

Executive Summary

Background

The Severn Crossings are the primary gateway to South Wales, catering for average daily traffic of around 80,000 vehicles. The first Severn Bridge was opened to traffic in 1966. The Second Severn Crossing was opened in 1996 and the two bridges now operate in tandem. Tolls have been in place for the entire history of the Severn Crossings and, as with most toll bridges around the world, the charges have been used to pay for their construction, maintenance and operation through a concession agreement with a private operator.

The concession agreement currently in place ends at the point that the operator has collected £996m in 1989 prices. Recent estimates have suggested that this point could be reached by around 2017. Following the end of the concession agreement, ownership (as well as the future maintenance burden) will transfer back to the UK Government. This offers the opportunity to consider the possible implications of alternatives to the current user charging regime on the Severn Crossings.

In December of 2010, the report of the Welsh Affairs Committee enquiry into the Severn Crossings Toll was published. One of the main findings of the Committee was the lack of robust evidence for the impact of the tolls. This study, commissioned by the Welsh Government and undertaken by Arup and the University of the West of England (UWE), is the first comprehensive assessment of the impact of the tolls on the Severn Crossings.

Study Approach

The complex relationship between the Severn Crossings and the Welsh economy is such that the study covers a broad range of transport and economic issues. The terms of reference for the study are to assess the impact of the tolls on the Severn Crossings in relation to traffic patterns, the environment, impacts on consumers and businesses, effects on the labour market, influences on business location and the impacts on overall economic performance of South Wales, and the comparative effects on the South West of England.

The study employs a number of scenarios to consider the potential impact of a range of alternative tolling regimes were they to be introduced after 2017. For simplicity three different scenarios were chosen, each of which have been compared against a 'do minimum' scenario under which the tolls are assumed to remain unchanged (in real terms¹) from current levels:

- *Scenario 1 – Reduce tolls on both bridges by 50%;*
- *Scenario 2 – Remove tolls from the Severn Crossings, and;*
- *Scenario 3 – Increase tolls on both bridges by 50%.*

The scenarios are intended to examine the potential effects of toll removal or reduction. An equivalent increase in the toll has also been used to explore the

¹ This is equivalent to the current arrangement under the concession agreement whereby toll prices are adjusted at the start of each year 'by the same percentage as the percentage difference between the retail prices index for March 1989 and the retail prices index for the month of September immediately preceding the making of the order'. (Severn Bridges Act 1992, <http://www.legislation.gov.uk/ukpga/1992/3/section/9>). The adjustment is rounded to the nearest 10 pence.

symmetry or otherwise of the effect of an increase or decrease in the toll. All of the scenarios are highly simplified and none of the scenarios are intended to represent policy proposals.

Given that the level of the toll has remained unchanged (in *real terms*) over the past decade (since the tolls are adjusted in line with inflation), the study is unable to draw conclusions from historical changes in the toll on the Severn Crossing. Therefore, the conclusions of the assessment are based on what we can infer from existing patterns of behaviour, on secondary evidence, and through modelled transport behaviour and economic impacts building on logical and evidence based assumptions. The following research and analysis was undertaken:

- A literature review of the impact of road tolls, including tolled bridges, elsewhere;
- High-level traffic and transport modelling;
- A survey of businesses in South Wales and the South West of England;
- In depth interviews with a selection of businesses and representative groups;
- A survey of consumers in the South West of England, and;
- Modelling of the effects of tolling on productivity.

Severn Crossings Traffic and Travel Patterns

Based on two-way vehicle count data, since 2003 there has been steady growth in traffic across the M4 Second Severn Crossing, with an average annual growth over the period of 1.78%, compared with 0.63% across the UK motorway network. In 2008, in terms of Annual Average Daily Traffic (AADT)², 61,455 vehicles crossed the M4 Second Severn Crossing per day and 17,772 crossed the M48 Severn Crossing per day. The M48 carries more local traffic with the majority of origins / destinations being Monmouthshire, Bristol and the South West of England, whilst the M4 is more strategic in nature serving a much wider market, with origins and destinations from across all areas of South Wales and across Southern England.

There is a small directional imbalance, with 4.7% more traffic in the eastbound direction compared with the westbound direction. This is due to the fact that the toll is charged only in the westbound direction and therefore a small proportion of traffic crossing uses an alternative route to make the westbound trip (via Gloucester).

Direct Costs of the Severn Tolls

In 2011, the cost of the toll stood at £5.70 per car, or £11.50 for small buses and for goods vehicles of up to 3.5 tonnes and £17.20 for heavy vehicles in excess of 3.5 tonnes. As noted, the toll is adjusted in line with the Retail Price Index. Since 2000, growth of nominal GVA per capita and wages in Wales slightly exceeded the rate of growth of the toll price until the recession which started in 2008. Over the period 2000 to 2010, the toll is largely unchanged relative to GVA per capita and wages. Growth in fuel costs, vehicle maintenance costs and vehicle tax and insurance costs have significantly exceeded growth in the price of the toll. However, vehicle purchase costs have fallen since 2000 such that total 'motoring expenditure' inflation has risen slower than the price of the toll.

The toll increases the cost of journeys between South Wales and parts of the South and South West of England. It is useful to place the cost of the toll in the context of

² The number of vehicle travelling in both directions per day, averaged over the year, taken from automatic vehicle count data provided by Traffic Wales.

total journey costs, taking into account fuel costs, vehicle maintenance and depreciation costs as well as the opportunity cost of time spent travelling. Average costs and 'values of time' for different road users are provided by the Department for Transport for this purpose.

The proportion of trip costs accounted for by the toll varies greatly across different types of user. For a car journey (excluding commuters and business travel) the toll represents approximately 19% of trip costs for a journey between Cardiff and Bristol³. For a business traveller, considering the value of lost productive time, toll costs fall to approximately 8% of trip costs. For goods vehicles making the equivalent journey, tolls represent 23% of total journey costs for a light goods vehicle and 21% for a heavy goods vehicle. The proportionate impact of the toll falls with distance travelled.

Annual Toll Costs

Total revenue from the tolls (both crossings combined) in 2010 amounted to £76m. Taking all goods vehicles toll payments and toll payments of business users, the direct toll costs imposed on businesses can be roughly estimated to be £47m (excluding VAT) in 2009 prices, with remaining £34m (including VAT) being paid by consumers. Therefore the total cost to businesses and consumers, once VAT is taken into account, is in excess of £80m a year.

There are further direct costs imposed by the toll due to the time related costs of the stop-start delay at the toll booths and the impact on drivers taking alternative routes and therefore experiencing longer journey times and costs. The latter appears (based on the small directional imbalance) to make up a relatively small proportion of trips.

Conversely, tolls and user charges are often associated with having congestion relieving effects which serve to reduce congestion and improve journey times for other users who are willing to pay tolls. Whilst this is not a major factor for the Severn Crossings (given that the Crossings themselves operate well within capacity), traffic modelling suggests that the tolls are likely to have a minor positive effect on traffic flows elsewhere on the network.

There is no data available which allows an accurate assessment of how these costs are split between vehicles and businesses based in Wales, or elsewhere. Given that it is likely that there is some 'cost pass through' or sharing of toll costs between the toll payer and the end customer this is highly complex. In either case (excluding the significance of through journeys to or from Ireland) the tolls represent a cost imposed on economic transactions between South Wales and the South and West of England.

Impacts on Traffic and Transport

Evidence from Toll Roads Elsewhere

Empirical evidence on the elasticity of demand⁴ with respect to road tolls is limited because of the relative scarcity of toll roads and crossings worldwide, as well as the lack of ex-post assessment following the introduction or removal of tolls. In general,

³ Based on the Cardiff to Bristol leg of a return trip assuming half the toll cost applies to each leg, under average morning peak conditions.

⁴ In economics, an elasticity measures how a change in one variable affects another. In this case, the elasticity of demand with respect to the toll refers to the sensitivity of demand for travel on a tolled road to changes in the prices of the toll. Price elasticity (point elasticity) is measured as the ratio of the percentage change in demand to the percentage change in the price. A negative elasticity typically occurs because demand is inversely correlated with price.

toll elasticities in existing studies tend to be based on the introduction of a toll or an increase in the level of a toll.

The elasticity of demand with respect to a toll is highly dependent on a range of local and contextual factors. In general, available evidence suggests that transport demand is relatively inelastic to toll price, with toll price elasticities typically lying within the range -0.1 to -0.5⁵. A key determinant of the elasticity of demand is the availability of an alternative, untolled route although there are many other factors. Given the travel distance required to avoid the Severn Crossings for most journeys between England and Wales, it may be reasonable to assume that the price elasticity of demand for the Severn Crossings is probably towards the lower end of this range.

As with transport effects, a review of the literature on the economic effects of toll roads highlights the difficulty of applying experience from elsewhere given the strong influence of local and contextual factors. There are a number of ex-ante studies which have considered what might happen should a toll be removed, although this study was not able to identify any applicable evidence of the impact on local or regional economies from studies undertaken following a change in a tolling regime.

Modelling the Effects of Traffic and Transport

As noted, because tolls have been in place since their opening, there is no reliable historical change in tolling regime on which to base an estimate of the effect of tolling on traffic demand. Furthermore, the lack of a comprehensive literature on toll responses, and the importance of locally specific factors, is such that the most appropriate approach to analysing each of the toll scenarios is a modelled approach.

The M4 traffic model was used for this purpose given its status as the primary traffic model covering the Severn Crossings. The 'core area' of this traffic model covers the strategic highway network in South East Wales to a high level of detail, with the broader coverage extending into parts of the South West of England. The current (2010) and future year model were updated to reflect changes in traffic flows across the bridges since 2005 using count data provided by Traffic Wales.

A high level traffic analysis was undertaken for each of the scenarios for the years 2018, 2023 and 2028. These provide approximate estimates of changes in traffic flows based on the modelling.

The headline results under each scenario show that reducing the tolls by 50% would result in an estimated increase in total traffic (as against a 'do minimum' scenario similar to the existing toll charges) in the order of 5% based on predicted conditions in 2018. Removing the tolls entirely (as well as eliminating any toll collection delay⁶) would result in an estimated increase in traffic across of 12%. This is equivalent to around 11,000 vehicles per day. An increase in the toll of 50% is estimated to reduce traffic by nearly 5%. In reality, traffic responses are dynamic and users' behaviour will adjust over time, whilst the traffic model is effectively static. It should be noted that the estimated traffic responses to the each of the tolling scenarios outlined above are, in effect, long run responses to changes in toll.

⁵ Demand is considered to be *inelastic* if the change in demand is less than proportional to the change in price (ie. the elasticity is between 0 and 1 or 0 and -1). Given that tolls make up a proportion of total journey costs, this does not necessarily imply that overall transport demand is inelastic to total transport costs.

⁶ The delay experienced by users at the toll booth is likely to vary greatly across the day/week/year. It has only been possible to employ a rudimentary approach to incorporating the effects of toll booth delay based on observations undertaken in the spring of 2007.

Generally, under average conditions, the increase in traffic under the toll removal scenario would be expected to result in marginal changes in traffic flow and speed. However, the scenarios do highlight potentially more significant effects at the Brynglas tunnels where capacity is already constrained. A more detailed assessment of forecast traffic impacts under varying traffic conditions would be required before firm conclusions can be drawn on the effects on congestion more generally. The analysis also shows that reducing or removing the tolls would result in a permanent increase in carbon emissions, although removing the stop-start delay at the toll booth would have some offsetting effect. The magnitude of the change would probably be small in comparison with total emissions from transport in Wales.

The above changes in traffic demand have been applied to recent data on SRC plc toll revenue in order to understand the financial implications of the scenarios⁷. Total revenue in 2009 was £77.4m. The *reduction* in revenue if the toll were halved is estimated to be approximately £36m per annum (2009 prices), a 46% reduction. An increase in the toll of 50% would result in *additional* revenue of around £36m per annum, a 41% increase. In each case, the change in revenue is less than proportional to the change in toll because of the offsetting effect of higher or lower traffic flows.

Impacts on Business Performance and Location

Based on the responses from the business survey as well as evidence drawn from more in depth interviews, an analysis was undertaken of the impacts of the Severn Crossing on the performance, behaviour and competitiveness of business in South Wales.

Business Costs and Performance

The research confirms the importance of the Severn Crossings for businesses in South Wales. Of those businesses surveyed, 50% considered the crossings to be either 'important' or 'very important' for their business. The proportion of businesses for which the tolls are 'significant' is a substantial minority, with 12% reporting the tolls to be significant and 8% reporting the tolls are highly significant. The importance placed on the tolls was closely related to the particular sector, location and operating structure of the firm in question. Not unexpectedly, businesses based in South Wales are more likely to place importance on the crossings and the tolls than businesses based in the South West of England.

The significance of toll costs, however, must be seen in the context of overall operating costs. For the vast majority of businesses direct toll costs represent a very small proportion of total costs. For the service sector and 'high value' manufacturing firms, transport costs typically make up a small proportion of overall costs and therefore toll charges are of diminishing importance.

The exception is transport and logistics businesses predominantly engaged in trade between the South and West of England and South Wales. Evidence provided to the Welsh Affairs Committee, as well as media reports⁸, suggests that, at the highest end, a small number of businesses spend in excess of £200,000 per year on tolls. This was supported by consultations with representatives of freight operators. An illustrative analysis suggests that toll costs could, in the most extreme cases amount to between

⁷ Estimated changes in toll levels and traffic flows have been applied to the latest available data on Severn Crossing revenue from 2009 taken from SRC plc Annual Reports. The analysis assumes that SRC plc revenue is unchanged in real terms from 2009 and ignores the effect of changes in demand between 2009 and 2018.

⁸ <http://www.bbc.co.uk/news/uk-wales-11719614>

5% and 10% of annual vehicle operating costs⁹ for freight vehicles. Given that profit margins tend to be relatively low in this sector, the implications for business performance and profitability can be significant where a firm is predominantly engaged in ‘cross-Severn’ goods transport.

Business Location and Markets

It should be considered that the tolls could be expected to deter competition in local markets as well as providing a barrier for Welsh businesses when competing in England, although the relative size of the two markets is such that any ‘barrier to trade’ is likely to be felt more keenly by business in South Wales. Based on the analysis of the survey responses, businesses were more likely to report that tolls affected their cost base and profitability than they were to suggest that the tolls deter customers or place their business at a disadvantage, in comparison with businesses located in England, when competing in particular markets.

Within the logistics sector, there is some evidence of businesses being encouraged by toll costs to locate vehicles at depots in England rather than in South Wales, although for the most part freight businesses are likely to be engaged in movements involving either a Welsh pick up or drop off for which any operator, whether based in England or South Wales, would be subject to the toll.

Where toll costs are significant for businesses, tolls effectively increase the cost of doing business in South Wales, thereby making South Wales a less attractive location for investment. Location decisions are highly complex and businesses will consider access to markets, access to skills, wage costs, costs of land and property. More generally, evidence from the business survey suggests that the quality of existing transport links (quality of access to motorways, local road network, public transport, and parking) are seen as a key advantage of firms’ current location. When asked about the main disadvantages of their location, transport related factors were also frequently identified by Welsh firms. The Severn tolls were specifically noted by one firm to be a disadvantage without being prompted.

As with previous reports into the tolls, whilst it was established that some businesses pay regard to toll costs when considering locations in South Wales, no instances could be identified where toll costs were pivotal in a decision not to locate in South Wales. In the specific case of Regional Distribution Centres (RDCs), when choosing a location it is typical to undertake a detailed cost-benefit assessment of potential locations which takes into account all operating costs including tolls. On this basis, it is possible to imagine a situation in which the tolls contribute to a decision to locate outside South Wales. However, given the wage and fuel costs associated with journeys across the estuary notwithstanding the tolls, in most cases proximity (to the M5 corridor for example) is likely to be a more significant factor than the tolls themselves.

Impacts on the retail, tourism and leisure sectors

The study has considered whether the cost imposed on consumers by the toll deters visitors to Wales, thereby having a negative effect on the tourism or retail sectors. As with tolls and business location, the significance of the tolls in determining visitor’s travel decisions should be seen in the context of total trip costs. From this perspective, toll costs are likely to be significant mainly for trips of a short duration, such as day trips and shopping trips, and where the distances travelled are relatively short. For

⁹ Vehicle operating costs includes fuel costs, vehicle operating costs, wages, overheads and other costs such as vehicle licensing.

longer distance trips and overnight stays, the toll is likely to be a small proportion of the total costs of a visit. Therefore, 'higher value' tourism is less likely to be affected.

A survey of households in South West England was undertaken to help better understand the impact of the tolls on the perceptions of potential visitors to Wales. When asked if they would expect to make more trips to Wales by car if the Severn tolls are removed, 22% of surveyed residents of South West England said they would expect to make more trips to Wales in the next twelve months. Whilst survey responses of this nature are potentially subject to bias, the results might suggest that removing tolls would encourage more visits to Wales. Notably, the proportion of respondents expressing this view falls with distance from the crossings, perhaps supporting the assertion above that tolls are more likely to influence trips of a shorter duration.

It should, however, be considered that the tolls might be expected to deter trips in either direction. Therefore, the net effect on the Welsh visitor economy could be positive or negative. Given the importance of the visitor economy in Wales and the increasing importance of Cardiff as a retail destination (relative to Bristol for example), it is considered likely that the net effect of the tolls is, on balance, negative.

A further consideration, raised by tourism industry representatives, is whether toll negatively affects the way people *perceive* Wales as a visitor destination and whether this has an effect disproportionate to the financial cost of the toll. For example, the cost and inconvenience of the toll were highlighted as potential issues during the 2010 Ryder Cup when tourism bodies were seeking to encourage return visits. However, effects on perceptions are difficult to measure or to separate from other factors and there is no firm evidence on the link between tolls, perceptions and propensity to holiday in Wales.

Impacts on the Labour Market

Based on the current toll cost of £5.70 per vehicle, a simple analysis would suggest that toll costs for a commuter crossing the Severn each working day would amount to around £1,400 over a year¹⁰. For a commuter trip between Newport and Bristol, the toll accounts for approximately one quarter of total journey costs. As such, the tolls represent a potentially significant deterrent to commuting between South Wales and the South East of England.

Evidence from the 2001 census showed around 6,600 workers commuting from the 'Welsh Severnside'¹¹ area to the 'English Severnside'¹², with a further 8,500 travelling to work in other parts of England. There is a directional imbalance in commuting across the Severn with around 2,000 commuters travelling in the opposite direction from the English Severnside to the Welsh Severnside. It should be noted that a proportion of these commuters are likely to travel by other modes or take alternative routes to the crossings. Traffic model data suggests that there are around 12,000 return trips across the bridges made by drivers reporting that they are travelling to work, although the relationship between this number and numbers of commuters or jobs filled is not necessarily direct.

¹⁰ Based on one crossing for each working day – 240 crossings at £5.70 gives £1,368.

¹¹ The 'Severnside' area has been defined in order to broadly reflect normal commuting distances. Welsh Severnside includes Cardiff, Newport, Monmouthshire, Caerphilly, and Torfaen.

¹² English Severnside includes Bath and North East Somerset, the City of Bristol, North Somerset, South Gloucestershire, and Stroud.

The traffic analysis suggested that removing the tolls would result in an increase in commuting across the Severn Crossings of 11% (excluding reassignment of traffic). Changes in commuting patterns will take time to play out and this should be considered a long term adjustment. This degree of change could represent upward of 1,000 commuters. However, this result is based on general observation of transport user behaviour and is a relatively crude measure. Local labour markets are complex and individuals typically make their commuting decisions based on a range of factors. Mobility, recruitment and job search geographies vary by sector and by occupation. Individuals typically make their commuting decisions based on the balance of wage and job differentials between home and work locations, differences in the cost of living / quality of life and the costs of mobility.

Some inferences can be made based on the existing profile of commuters. Firstly, the existing directional imbalance and the differential in wage rates between the 'English Severnside' and the 'Welsh Severnside' might suggest the greatest part of any increase in commuting would relate to residents of Wales travelling to jobs in England. This effect could be reinforced by patterns of migration with more affordable house prices in Wales and the rural amenity of an area such as Monmouthshire which currently has the highest number of commuters into England of the South Wales Local Authorities.

Secondly, given the occupational profile of commuters and the fact that higher paid workers are typically more mobile than lower paid workers, it is likely that additional commuters will also be above average in terms of pay and skill levels. The inference from this is that the additional commuting is likely to primarily represent changing employment search areas or changing distribution of employment rather than any increase in participation rates.

Effects on Productivity

Exploratory economic modelling techniques have been employed to attempt to quantify the overall impact of the Severn tolls on the performance of the South Wales economy. The analysis is intended to supplement the survey and other approaches through reference to statistical data on the relative performance of firms in Wales and England. The analysis builds on previous studies into the relationship between accessibility (broadly, proximity to economic mass) and economic performance. The approach taken is to estimate the extent to which differences in economic performance (in this case measured as productivity) can be explained by spatial factors that are in turn influenced by transport costs (including toll charges). Given that there is significant uncertainty in the results provided, the precise estimates provided are intended to be illustrative and should be interpreted with caution.

A peripherality variable has been constructed based on the cost of travel between all areas in the model. The research finds a statistically significant relationship between this measure of peripherality and firm productivity. The model indicates that a 1% reduction in peripherality would lead to an increase in productivity of 0.033%.

The peripherality variable has subsequently been adjusted to reflect conditions if the toll were to be removed after 2018. The impact of toll changes becomes more marked the closer the area is to the crossings. The results suggest that, based on the peripherality-productivity relationship, the tentative conclusion of the economic modelling exercise is that removing the tolls would boost productivity by in the order of 0.48% which would translate to an increase in the annual Gross Value Added (GVA) of South Wales of around £107m. This compared with 'direct' effects (reduced transport costs – i.e. toll payments) of some £80m giving a potential

‘multiplier’ of around 1.3. The results indicate that the indirect effects discussed elsewhere in this report are such that the overall impact of the toll exceeds the direct cost of the toll. However, caution should be applied in drawing precise conclusions the magnitude of GVA impacts through economic modelling techniques.

Conclusion

This study is the first comprehensive attempt to consider the effects of alternative futures for the tolls on the Severn Crossings. The study has highlighted the many complex impacts and issues related to Severn tolls. The tolls impose a cost on users of the Severn Crossings and therefore much of the analysis has focussed on the degree to which the tolls impact negatively on the economy. It is clear that such impacts are not evenly distributed across individuals, sectors or geography. The study has not attempted to consider the potential trade-offs or opportunities associated with re-investment of toll revenue following the end of the concession agreement. Furthermore, whilst the research has tested some relatively simple scenarios for the future of the tolls it has also highlighted interesting opportunities relating to alternative approaches to tolling – such as the level of toll for different vehicle types, discounts for regular use, variable tolls and new technology – which could mitigate against some of the negative impacts highlighted in this report.