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Access Economics

The economic impact of selected communities receiving bushfire compensation payments

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Contents

Executive summary

The Black Saturday bushfires of 2009 were Victoria's and Australia's most deadly, resulting in the deaths of 173 people across the state. The two most deadly fires were the Kilmore East and Murrindindi fires, which later merged to form the Kinglake Fire Complex, and resulted in 159 of the total deaths.

In the aftermath of the fires, the Victorian Government announced a Royal Commission to investigate the causes and subsequent responses to the fires. Shortly after the Royal Commission announcement, survivors of the Kilmore East fire launched a class action lawsuit. Following the findings of the Royal Commission, the Kilmore East class action was further pursued, in part due to the Royal Commission's finding that electrical assets contributed to the fire. Survivors of the Murrindindi fire launched a class action in 2012 following the closure of a police investigation that determined not to pursue criminal proceedings relating to the cause of the fire. Both cases were settled out of court for a total of approximately $800 million, including approximately $200 million for personal injury and dependency payments and approximately $500 million for economic loss and property damage.[1] The personal injury claims cover the economic losses and pain and suffering caused by injuries sustained during the fires and the dependency claims cover financial dependency losses caused by the loss of lives in the fires. The economic loss and property damage payouts relate to the loss of homes, businesses, vehicles, fences, gardens, sheds, farm animals, other business assets and income loss. Following a period of claims assessment, distribution of payments commenced in December 2016 and was completed in April 2017.[2]

This study assesses the expected economic impact of these compensation payments on the fire affected Victorian Local Government Areas (LGAs) of Yarra Ranges, Whittlesea, Murrindindi, Nillumbik and Mitchell (collectively "the study region").

The distribution of compensation within the community has the potential to generate long-term economic benefits for the fire-affected communities. The way the payments are used by recipients leads to different economic benefits for the region. In general, payments that were used to rebuild capital that was lost in the fires – such as homes and infrastructure – will typically lead to more lasting benefits to the region than when the payments are used like any other discretionary household expenditure - such as clothing, dining out and holidays. This is because the invested money helps create or sustain jobs and economic growth in the region, unlike discretionary household expenditure, which will typically see more of the benefits leaking outside of the region.

However, the final use of the money is unknown, because the use of compensation payments is at the discretion of the claimant. This means that there is uncertainty in the precise quantity of the regional economic impact. To reflect this uncertainty, the economic impact of the compensation payments is modelled under two scenarios. The scenarios consider the following uses of the compensation payments:

- Scenario one assumes recipients spend their personal injury and dependency payments and economic loss and property damages payments entirely on discretionary household consumption items. The model allocates this expenditure based on the recipient's location: within one of the five LGAs of the study region; the rest of Victoria; or, to the Rest of Australia and overseas. Accordingly, this scenario assumes approximately $300 million in compensation payments is spent in the study region on consumption items. Money spent on consumer items does not generate the same long run economic gains as investment. Given this, we would expect this scenario to generate a smaller overall impact on the study region's economy compared to scenario two. Furthermore, as with all consumption, some of the

[1] The remaining $100 million was for court-approved costs of running the two cases.
[2] (2009 Victorian Bushfires Royal Commission); (Kilmore East Kinglake bushfires Class Action Settlement: Orders of Justice Osborn made on 23 December 2014, 2014)

money is assumed to "leak" to other regions. Although the benefit of this spending is not captured in monetary terms within the study region, individuals experience higher levels of welfare as they spend the money in a way that is desirable to them. Payments may also influence locational decision making (such as the decision to remain in the region), and if that happens, further regional economic benefits will occur beyond what has been modelled in this study.

- Scenario two assumes the personal injury and dependency payments are still spent on discretionary household consumption, and are allocated based on the recipient's location, as in scenario one. However, this scenario assumes recipients spend their economic loss and property damages payments on rebuilding homes and local infrastructure that were lost and/or damaged during the fires. The model assumes all this expenditure is within the study region and allocates the expenditure based on the type of economic loss or property damage suffered. Accordingly, this scenario assumes approximately $350 million in compensation payments is spent in the study region on rebuilding and consumption items.

This study finds that the compensation payout supports employment and economic growth in the study region and in the rest of Victoria in both scenarios. However, the extent of the benefit differs for each, as follows:

- Compensation payouts in the first scenario, which assumes the payout is spent on discretionary household expenditure, are expected to increase the size of the study region's economy by $117 million and the rest of Victoria's economy by $108 million in net present value terms ($2015-16 and 7% nominal discount rate) over the period from 2016-17 to 2024-25. Employment in the study region increases by an annual average of 36 full time equivalent jobs (FTEs) over the period from 2016-17 to 2024-25, and by an average of 99 FTEs over the period from 2016-17 to 2018-19, which aligns with the period over which the compensation payouts are assumed to be spent. Once the payments have been spent, employment begins to return to its original levels and indeed, by 2024-25 the incremental employment generated by the payouts is effectively zero. Employment in the rest of Victoria increases by an annual average of 44 FTEs over the period from 2016-17 to 2024-25. As businesses employ workers, their employees continue to inject money into the economy as they spend their incomes, which sustains and creates further jobs in the study region.

- Compensation payouts in the second scenario, which assumes the payout is spent on both discretionary household expenditure and investment in rebuilding homes, businesses and community facilities, are expected to increase the size of the study region's economy by $183 million and the rest of Victoria's economy by $23 million in net present value terms ($2015-16 and 7% discount rate) over the period from 2016-17 to 2024-25. Employment in the study region increases annually by an average of 72 FTEs and in the rest of Victoria by 15 FTEs over the period from 2016-17 to 2024-25. This ongoing increase in FTEs results from the investment in businesses. Like in scenario one, as businesses employ workers, their employees continue to inject money into the economy as they spend their incomes, which sustains and creates further jobs in the study region.

It is likely that recipients will spend part of their money rebuilding and investing in the study region and part on discretionary household expenditure, but the balance is not known. Therefore, it is expected that the final outcome will be in between the two scenarios.

The economic impacts are also assessed for a select number of communities, based on the size and nature of each of the communities in the study region. The communities of Kinglake, Marysville, Yarra Glen, Whittlesea, Narbethong and Healesville received the largest proportions of payouts respectively. Collectively, these six communities account for almost half of the payouts. Of these, Kinglake, Marysville and Narbethong were particularly affected by fire. Collectively, they accounted for around two-fifths of losses suffered.

Deloitte Access Economics

1 Background

1.1 Purpose of this report

This report presents the findings of an economic impact analysis study conducted by Deloitte Access Economics using an in-house computable general equilibrium (CGE) model. The study is based on information and anonymised data provided by Maurice Blackburn. All data sources, assumptions and other relevant information are documented in this report for completeness and transparency.

This economic impact analysis provides an estimate of the regional impact of the settlement funds following the Black Saturday class action lawsuits for the Kilmore East and Murrindindi fires. The payouts received from the class action fall into one of two categories:

- Personal injury and dependency payments
- Economic loss and property damages: Losses under this category include homes, businesses, fences, gardens, sheds, farm animals and equipment, and economic losses (e.g. earnings).

Payments made to insurers for economic loss and property damage claims have been excluded from this study.

Distribution of the payouts began in December 2016 with the final payments distributed in April 2017. Use of the money is at the complete discretion of the recipient.

As the final use of the money is not known, this report models two scenarios with two different sets of assumptions regarding the uses of monies paid. In reality it is likely that the impact will be somewhere in between the outcomes of these two scenarios.

- Scenario one assumes recipients spend their personal injury and dependency payments and economic loss and property damages payments entirely on discretionary household consumption items, such as clothing, dining out, leisure activities, holidays and other discretionary items. Individuals are assumed to mostly spend this money close to home, and as such the injection of money into the community is apportioned based on the location of the recipient: within one of the five LGAs of the study region; the rest of Victoria; or, to the Rest of Australia and overseas. Accordingly, approximately $300 million in compensation is assumed to be spent in the study region under this scenario. As with all consumption however, some of the money is assumed to "leak" to other regions. This can occur due to taxes, to pay a producer outside the study region, or when recipients spend money outside the study region such as on holidays. Leakages are an assumed component of any regional economic analysis and are captured in the economic modelling approach used in this study. Although the benefit of this spending is not captured in monetary terms within the study region, individuals experience higher levels of welfare as they spend the money in a way that is desirable to them. Payments may also influence locational decision making, and if that happens, further regional economic benefits will occur beyond what has been modelled in this study.

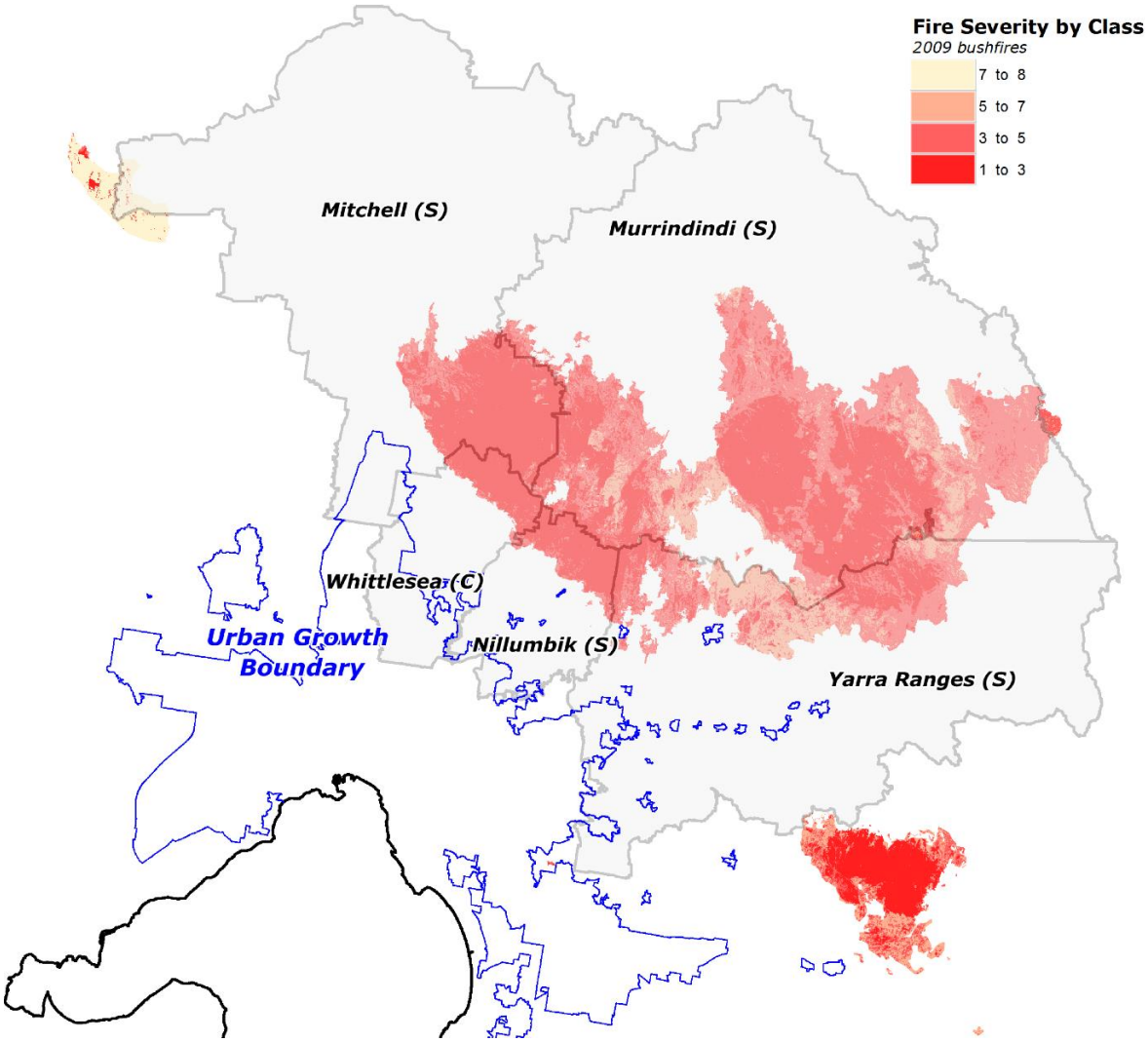
- Scenario two assumes the personal injury and dependency payments are still spent on discretionary household consumption, and are allocated based on the recipient's location, as in scenario one. However, this scenario assumes recipients spend their economic loss and property damages payments on rebuilding homes and local businesses that were lost and damaged during the fires. The model assumes all this construction expenditure is within the study region and allocates the expenditure based on the type of economic loss or property damage suffered. Accordingly, approximately $350 million in compensation is assumed to be spent in the study region under this scenario.

1.2 Black Saturday Bushfires

The Black Saturday Bushfires of February 7th 2009 caused the death of 173 people. Of the fifteen major fires that burned across the state, the two deadliest were the Kilmore East Fire and the Murrindindi Fire that later merged to form the Kinglake Fire Complex. Combined, these two fires resulted in 159 of the total deaths, destroyed 168,542 hectares and 1780 houses.[3]

The Kilmore East fire burned across the Shires of Nillumbik, Mitchell and Yarra Ranges as well as the City of Whittlesea, with deaths occurring in the communities of Kinglake, Kinglake West, Steels Creek, St Andrews, Strathewen, Flowerdale-Hazeldene, Arthurs Creek, Humevale, Reedy Creek, Strath Creek, Toolangi and Yarra Glen. The Murrindindi Fire burned to the north east of the Kilmore East fire and caused deaths and damage in and around the towns of Marysville, Narbethong and Buxton.[4] These communities are located on the north-eastern urban fringe of metropolitan Melbourne and largely lie in dense bushland, typically with hilly topography.

Figure 1.1 Map of study region including the local government areas of Yarra Ranges, Whittlesea, Murrindindi, Nillumbik and Mitchell



Sources: Victorian Bushfires Severity Map 2009 (Polygons); Planning scheme Urban Growth Boundary – Vicmap Planning; ABS ASGS, 2011.

[3] (2009 Victorian Bushfires Royal Commission, pp. 342-346 (Appendix A))
[4] (2009 Victorian Bushfires Royal Commission)

The loss of life, livestock and property due to these fires was devastating to the communities directly hit and to many others in the surrounding area. Some communities were more affected by the fires than others, due both in part to their resident population, the level of preparedness and, ultimately, the path of the fire.

1.3 Aftermath of the fires

1.3.1 Royal Commission

In the aftermath of Black Saturday, the Victorian Government announced a Royal Commission. The Commission was tasked with looking into the causes and the subsequent responses to the fires that hit Victoria in late January and early February of 2009. The Royal Commission concluded on July 31st 2010. The final report comprised of four volumes, plus the summary, and covers:

- The fires and fire related deaths (Volume I)
- Fire preparation, response and recovery (Volume II)
- Establishment and operation of the commission (Volume III)
- The statements of lay witnesses (Volume IV)

Total economic cost of the fires

As part of its inquiry, the Royal Commission sought a broad estimate of the costs directly attributable to the Black Saturday fires, with the final figure estimated to be more than $4 billion. The final $4 billion figure is argued to be a conservative estimate and comprises the following losses across all fires that burned throughout Victoria over January and February of 2009:[5]

- $645 million for the 173 lives lost;
- $1.2 billion paid out for insurance claims (84% property or contents; 16% motor vehicle claims) – a likely underestimate due to the fact that approximately 13% of destroyed residential properties were without cover, whilst many others were underinsured;
- $1.081 billion in rebuilding costs funded by the Victorian Bushfire Reconstruction and Recovery Authority; Victorian Bushfire Appeal Fund and other donors;
- $77 million for loss and damage to public infrastructure including roads, schools and community facilities;
- $658 million for timber (loss of timber, replanting costs);
- $25 million for damage to assets held by Telstra and Melbourne Water;
- $593 million in additional response costs including supplementary funding for the firefighting effort; and,
- $90 million in administrative costs for the Royal Commission.

However many losses were unquantifiable, with the commission acknowledging that there exists much "debate about a suitable methodology for costing bushfires [with] major data shortages preclud[ing] a definitive estimate of [all] the costs"[6], including:

- Injuries sustained due to lack of data on hospitalisation costs, long term treatment costs and lost wages;
- Stock and crop losses;
- Destruction of trout farms; and,
- Loss of wildlife and flora, including nearly 90,000 hectares of national park.

Causes of the Kilmore East and Murrindindi Fires

Police investigations following the Kilmore East fire determined the cause to be electrical failure, with extensive discussion provided by Volume 1 of the Royal Commission report.

The cause of the Murrindindi fire was listed as suspicious, but not discussed further by the Royal Commission so as to not prejudice criminal proceedings. After further investigation, criminal proceedings were ruled out.

[5] (2009 Victorian Bushfires Royal Commission, p. 345 (Appendix A))
[6] (2009 Victorian Bushfires Royal Commission, p. 342 (Appendix A))

1.3.2 Class Actions

Two class action lawsuits were launched in response to the fires. The Kilmore East class action begun in 2009 shortly after the fires, and was pursued in part due to the Royal Commission's finding that electrical failure contributed to the fire. The Murrindindi class action was launched in 2012 after the closure of the police investigation. The class action alleged that the Murrindindi fire was caused by electrical failure. The actions were filed on behalf of those who suffered injury, loss or damage during the Kilmore East and Murrindindi Fires. Both suits were settled out of court, with the settlement distribution totalling approximately $800 million. Of the $800 million, approximately $200 million was for personal injury and dependency payments and approximately $500 million was for economic loss and property damage.[7]

The Supreme Court of Victoria approved the settlement amounts for the Kilmore East Fire on December 23rd 2014 whilst the Murrindindi Fire settlement was approved on May 27th 2015.[8] Following a period of claims assessment, the distribution of payments commenced in December 2016, with the majority of distributions completed by April 2017. The value of each payment varies depending on the individual's assessed losses and individuals are able to spend the money however they wish.

[7] The remaining $100 million was for court-approved costs of running the two cases.
[8] (Kilmore East Kinglake bushfires Class Action Settlement: Orders of Justice Osborn made on 23 December 2014, 2014)

2 Methodology

Computable general equilibrium (CGE) modelling is one of many economic tools that can be used to assess the ongoing economic effect of an injection of funds into an economy. This study assesses the economic impact of the bushfire compensation payments on the study region using such a model.

In addition to pure economic impacts, which we value in dollar terms, communities can expect to see a welfare benefit from spending the money in a way that is desirable to them. The community level impact is considered with respect to these welfare gains. The monetary impact that could be expected is additionally modelled based on the employment supported by each community.

2.1 Inputs to the modelling and community analysis

This study is based on anonymised information provided to Deloitte Access Economics by Maurice Blackburn. Key inputs include the size of the compensation payouts made in relation to non-subrogated claims. Importantly, the modelling is based on 2011 Census data so the damage from the bush fires, including the destruction of capital, is assumed to have already occurred (given the bushfires occurred in 2009).

The class action settlement payment is assumed to be paid by an insurer located overseas. As such, the CGE model uses a fall in capital funds in the rest of the world to model the payments made by the responsible energy companies (and their insurers) following the outcome of the Black Saturday Bushfire class action court cases.

2.2 CGE database development

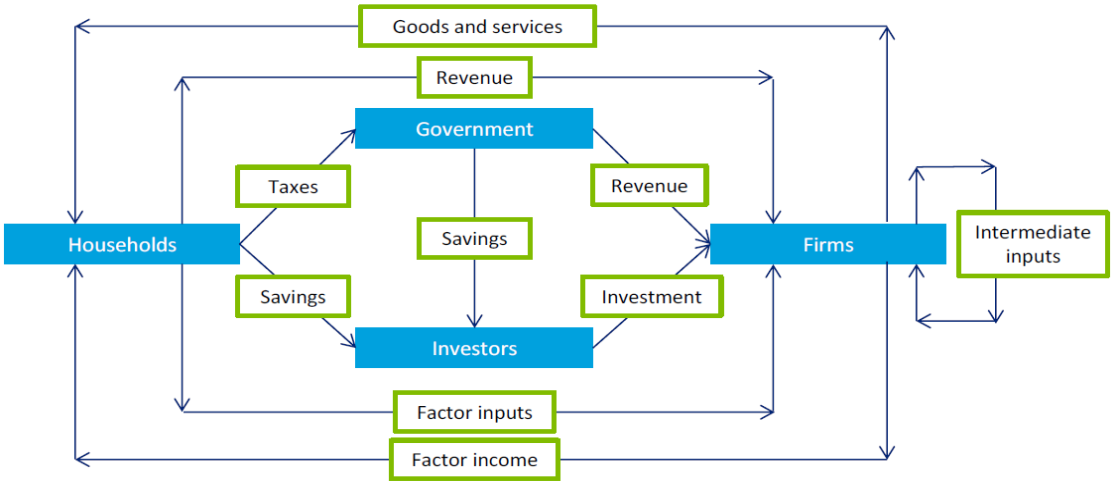
This study is particularly interested in the economic impact of the Black Saturday class action compensation payments on the regional economies affected by the bushfires. The study region reflects the LGAs that were affected by the Kilmore East and Murrindindi Fires and subsequently in receipt of compensation payouts relating to these fires. Five LGAs make up our study region, which covers the shires of Yarra Ranges, Murrindindi, Nillumbik and Mitchell and the City of Whittlesea. For this project, the CGE model has been customised to explicitly identify the five LGAs of interest and accounts for the study region's unique characteristics including employment totals, regional production and trade flows.

2.3 Computable general equilibrium modelling

The project utilises the Deloitte Access Economics' – Regional General Equilibrium Model (DAE-RGEM). DAE-RGEM is a large scale, dynamic, multi-region, multi-commodity CGE model of the world economy with bottom-up modelling of Australian regions. DAE-RGEM encompasses all economic activity in an economy – including production, consumption, employment, taxes and trade – and the inter-linkages between them. As with the broader Australian economy, goods and services sold in one location are often made or produced in another part of the country, or even overseas. Part of the purchase price will go to retailers, some to taxes and the rest to pay the original producer of the good or service who could be located outside of the study region. It is for this reason that money spent within a region does not create exactly the same level of economic impact in that region. Economists refer to this concept as "leakage".

Figure 3.1 is a stylised diagram showing the circular flow of income and spending that occurs in DAE-RGEM. To meet demand for products, firms purchase inputs from other producers and hire factors of production (labour and capital). Producers pay wages and rent (factor income) which accrue to households. Households spend their income on goods and services, pay taxes and put some away for savings. The government uses tax revenue to purchase goods and services, while savings are used by investors to buy capital goods to facilitate future consumption. As DAE-RGEM is an open economy model, it also includes trade flows with other regions interstate and foreign countries.

Figure 2.1 The components of DAE-RGEM and their relationships



The model compares a baseline scenario where the proposed compensation payments *do not* occur with a counterfactual scenario where they *do occur*. A set of inputs that stylise these alternative scenarios, so that the economic impact of the event can be projected are developed. More detail on the modelling framework used is provided in Appendix A.

2.4 Community analysis

Deloitte Access Economics has also assessed what the impacts have been on a select number of communities, based on the size and nature of each of the communities in the study region. While the Kinglake and Murrindindi fire complexes affected a number of communities, some communities were affected more than others, due in part to their resident population, the preparedness of the communities and, ultimately the path of the fire.

Although the economic impact of the compensation payouts in gross regional product (GRP) terms can only be reliably modelled at a broader regional level through CGE modelling, smaller area benefits at the community level can be inferred by using available small area data.

Small area Census of Population and Housing data from the Australian Bureau of Statistics (ABS) has been used together with anonymised loss and payout data provided by Maurice Blackburn to disaggregate the whole-of-region CGE impact into a community (suburb) level impact. This disaggregation has been done for the two scenarios modelled (i.e. the consumption and investment scenarios), and the top five communities for each (as measured by payouts) are profiled. This disaggregation is approximate but it gives us an understanding of the likely magnitude of the impact in each community.

The process of estimating community level impacts breaks whole-of-region economic impacts down into communities, defined as suburbs for the purpose of this exercise.

To estimate community level impacts, three key pieces of community data are used. Specifically, these are:

- **Loss data** to identify communities affected by fire damage.
- **Payout data** to distribute direct impacts for those communities that experienced fire losses.
- **Employment data by place of work** from 2011 Census to disaggregate the flow-on portion of the economic impacts.

A community is allocated a higher proportion of the economic impacts if it (i) received a higher proportion of payouts, (ii) had a larger economy measured by workers, and (iii) had an economic

structure which stood to benefit from uplifts to economic activity (for example if it had a large construction sector).

The methodology to disaggregate impacts differs between scenario one (Consumption) and scenario two (Consumption and Investment). This is to reflect that under each scenario, the manner in which payouts are spent differ.

Scenario one (Consumption) impacts are spread amongst all communities within the study region, reflecting that there are no restrictions on how payments may be spent.

Scenario two (Consumption + Investment) impacts are concentrated amongst communities that were fire-affected only. This is to reflect that the fire damage payments will likely be spent on rebuilding activity.

The results of this disaggregation are outlined in Section 3.3 Community Impacts, and estimate how the payments are likely to have resulted in economic growth within the study region. Economic impacts/economic growth are, however, only part of the equation – and the consumptive aspect of payments is equally important. This distinction, and the implications thereof, are discussed throughout this report.

3 Results

The injection from the Black Saturday compensation payouts into the Shires of Yarra Ranges, Murrindindi, Nillumbik and Mitchell and the City of Whittlesea is expected to have a positive effect overall on the study region's economy. However, the size of the impact will vary depending on how the money is spent.

In any economy, investment in businesses will see the greatest long run economic impact relative to the initial expenditure. This is because businesses create and support ongoing jobs. Employees then spend their incomes in the economy, which in turn generates wealth for others who spend their own incomes.

Similarly the purchase of goods and services manufactured and produced within the regional economy can help retain a share of the injected funds, however the total economic effect will dissipates once the money has been spent.

In any economy that trades with other regions and countries, an injection of money will not result in an identical uplift. This is due to taxes and various other leakages from the economy including the purchase of materials, machinery, equipment and services that have been produced outside the region.

3.1 Regional impacts in scenario one

Scenario one assumes that both the economic loss and property damage payment along with the personal injury and dependency payment are spent on discretionary household expenditure items such as dining out, clothes and leisure activities. Recipients are assumed to largely make these purchases close to home and as such model apportions the payment based on the recipient's location, be it within the five LGAs considered (Murrindindi, Mitchell, Nillumbik, Whittlesea, Yarra Ranges); the rest of Victoria, or the rest of Australia and overseas. Accordingly, approximately $300 million in compensation payments were assumed to be spent in the study region under this scenario. The model also applies normal trade flows to account for the realistic distribution of money to producers beyond the study region and taxes. As with scenario two, some of the money will leak from the economy, so the economic impact is not expected to match the investment.

3.1.1 Gross Regional Product impact

The economic impact of the recipients spending their compensation payouts on consumption items is estimated to benefit the regional economy. The model forecasts an increase to the study region's real GRP by $117 million and to the rest of Victoria's economy by $108 million ($2015-16) relative to forecast over the period 2016-17 to 2024-25 in net present value terms (using a 7% real discount rate).

As shown in Chart 3.1 below, economic activity first increases as individuals spend their compensation payout over the three-year period of 2016-17 to 2018-19. However, this tapers off as the payment is gradually spent by the community and consumption returns to the level it was at prior to the payments

What the modelling does not show is the welfare benefit individuals will experience as they spend this money on items that they would like. Such gains are experienced within the community even when the money flows outside the regional economy.

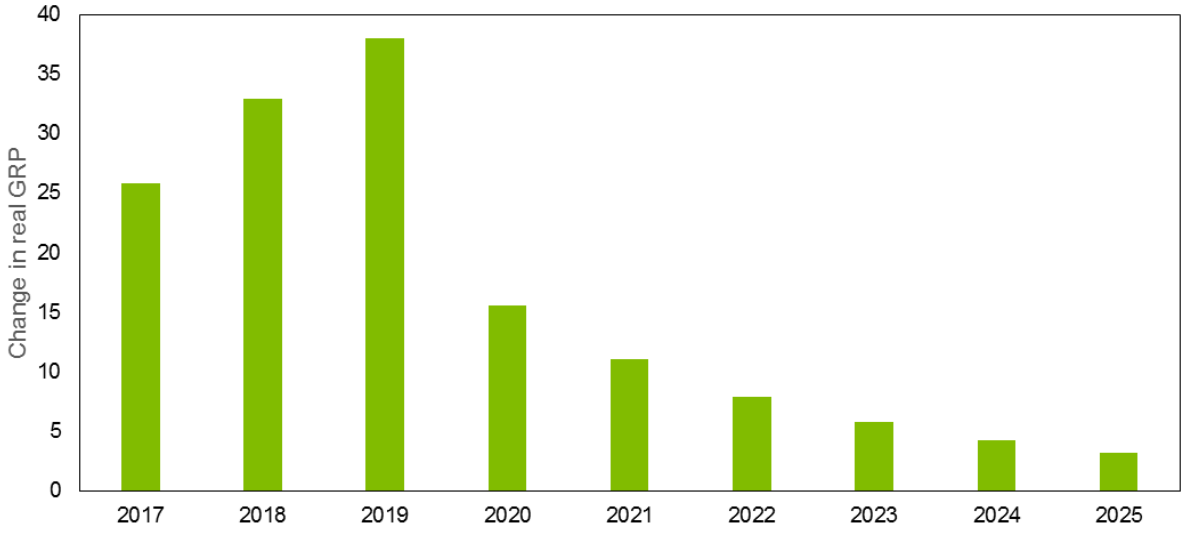
The box below illustrates one of many examples of the welfare benefit individuals have experienced from the compensation payments. It is also an example of an individual who has chosen to remain in the region because of the payments, and who, by doing so, continues to contribute to the regional economy.

Single father Chris Hobbs and his children lost their home in Marysville on Black Saturday. Mr Hobbs also lost income when the timeshare resort he was working at was destroyed by the fire. "It meant there was no spare money and no possibility of earning more."

Mr Hobbs said his compensation payment meant a great deal to him. He describes it as "the difference between staying here and having to move, which would have disrupted the education of my two school-age children. It also meant I was able to pay off my credit cards and pay for things for my children such as my daughter's camp and school formal dress."

"I'm sure many people feel the same way as I do and the vast majority of people I know are happy with the outcome."

Chart 3.1 Annual change in real Gross Regional Product in the study region (2015-16 $AUD millions) (2016-17 to 2024-25)– *Deviation relative to forecast baseline*



Source: DAE RGEM

3.1.2 Employment impact

The modelling indicates that the compensation payouts increase the need for workers within the study region, particularly in the first three years following the receipt of payments, which is when the majority of the money is assumed to be spent. CGE modelling represents an increase in employment in terms of full time equivalents (FTEs). One FTE generally equates to 1.5 jobs when the differing nature of work hours across full time, part time and casual work is accounted for.

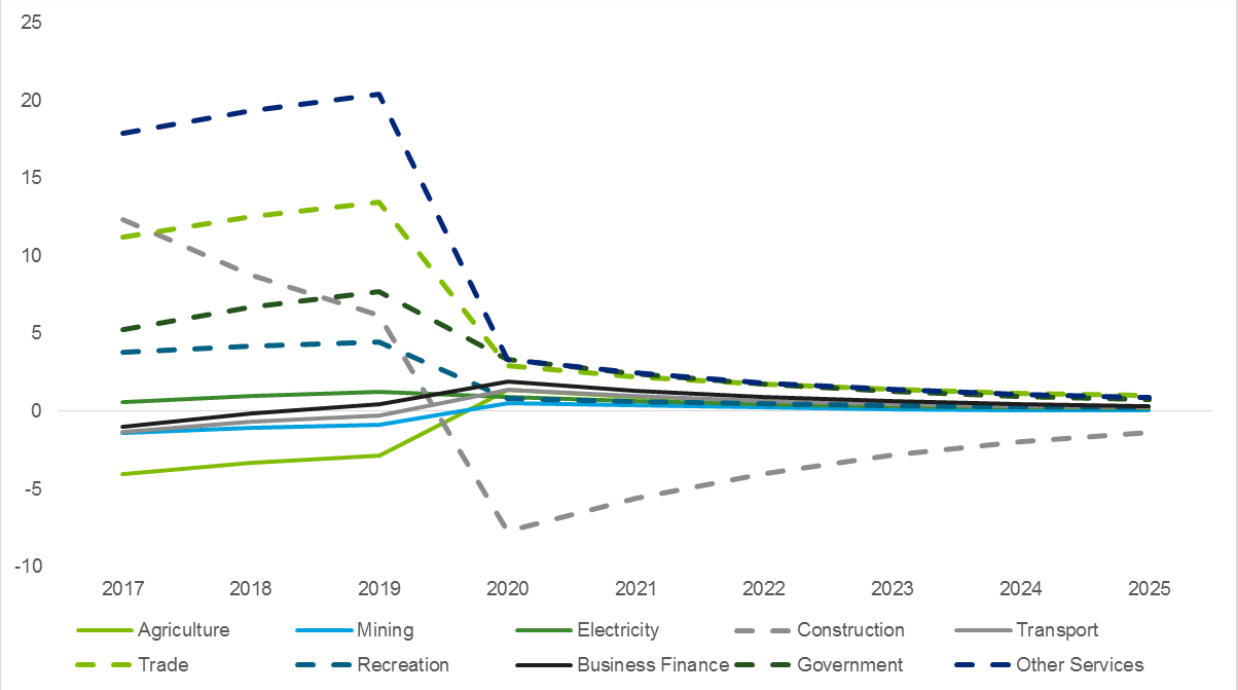
An average annual increase of around 99 FTEs occurs in the study region over the period 2016-17 to 2018-19 and of around 36 FTEs over the whole period from 2016-17 to 2024-25. Employment peaks in 2019-20 at approximately 104 additional FTEs before returning to the levels observed prior to the payments. An average annual increase of around 44 FTEs is expected in the rest of Victoria over the period from 2016-17 to 2024-25.

As businesses employ workers, their employees continue to inject money into the economy as they spend their incomes, which sustains and creates further jobs in the study region.

3.1.3 Other economic impacts on the study region

As shown in Chart 3.2 below, the compensation payout has a positive impact on a range of industries in the study region. An increase in household consumption benefits consumption-related goods and services, particularly expenditure on food, beverages, retail trade, hotels and restaurants and recreational activities. However, over the long run, as the compensation payments are spent by recipients, economic output reverts back toward the initial level. This reversion occurs because the money has not been invested in what economists call "productive capital". This type of spending includes investment in businesses and community facilities that later generate employment or income themselves, unlike consumption spending which does not stimulate economic growth once the spending ceases.

Chart 3.2 Deviation in real industry gross value added, selected industries (2015-16 $ million)



Source: DAE RGEM

3.2 Regional impacts in scenario two

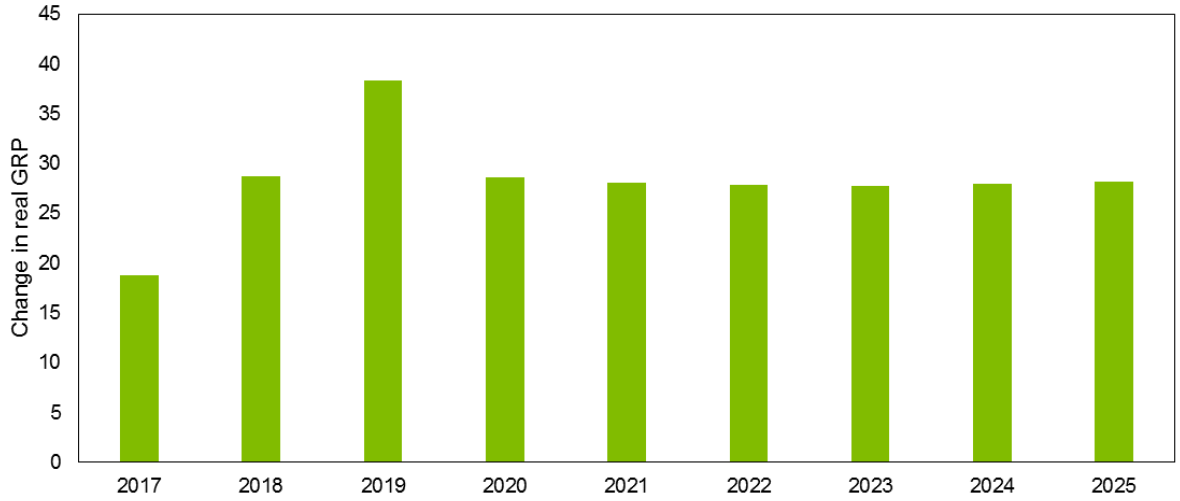
Scenario two, like scenario one, assumes that the personal injury and dependency payments are spent on discretionary household expenditure, with payments allocated to the recipient's location as recipients are assumed to spend the money close to home. However, the economic loss and property damage payments are now assumed to be re-invested in the study region. This is because it is assumed that recipients will spend this money rebuilding what was lost, including homes, businesses and community facilities. Accordingly, approximately $350 million in compensation payments is assumed to be spent in the study region under this scenario. This type of investment has the potential to create and support ongoing jobs and therefore lead to greater long run economic growth than scenario one. As with scenario one some of the money will leak from the economy, so the economic impact is not expected to match the investment.

3.2.1 Gross Regional Product impact

The results of the modelling indicate that when recipients spend their compensation payout partly on rebuilding their communities and partly on consumption items there is a positive economic impact on the study region. The total regional impact measured in GRP terms is estimated to be an increase of $183 million ($2015-16) over the period from 2016-17 to 2024-25 (in net present value terms using a 7% real discount rate). The total impact on the rest of Victoria's economy is estimated to be an increase of $23 million ($2015-16) over the period from 2016-17 to 2024-25.

As shown in Chart 3.3 below, economic activity increases initially as the compensation payout is spent on consumption and investment. Given part of the payout is invested into the community and its businesses, which are assumed to continue generating their own economic activity, the overall impact is sustained over the longer term. This will continue to generate economic benefits for the community and also welfare gains as employed individuals spend their incomes in a way that is desirable to them.

Chart 3.3 Annual change in real Gross Regional Product in the study region (2015-16 $ millions) (2016-17 to 2024-25) – *Deviation relative to forecast baseline*



Source: DAE RGEM

3.2.2 Employment impact

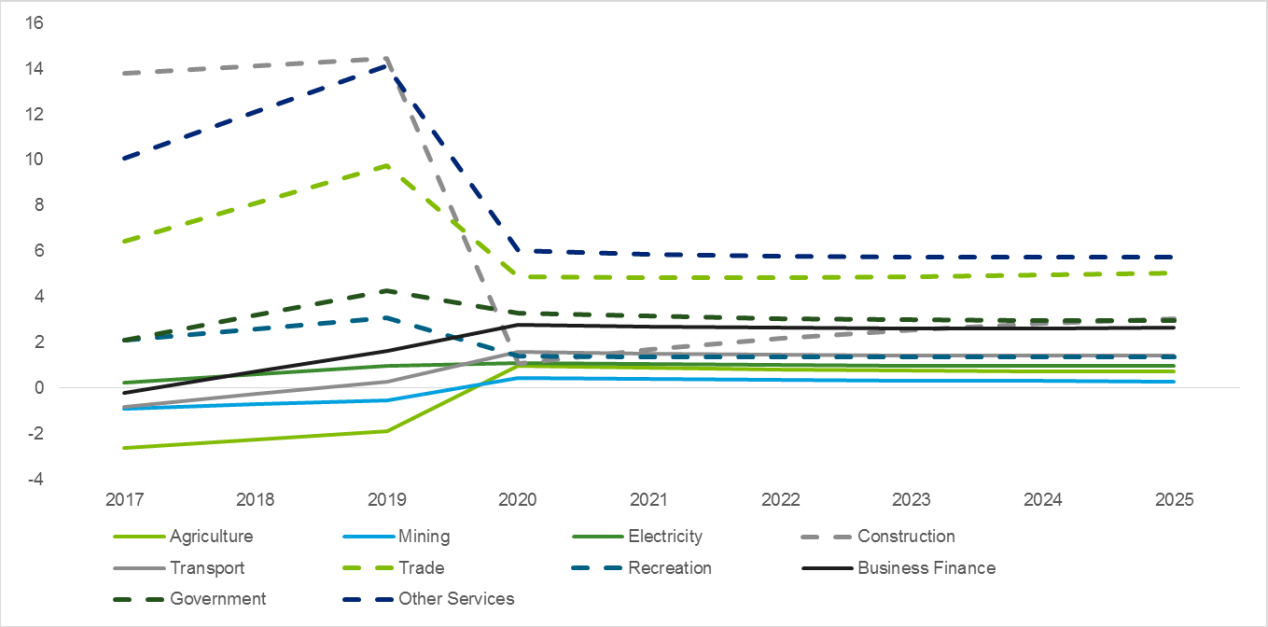
The modelling indicates that the compensation payouts to households and industries have a positive and prolonged impact on employment in scenario two. This is because the investment in businesses creates and supports ongoing employment for the communities. The model forecasts an average annual increase of 72 FTEs in the study region and 15 FTEs in the rest of Victoria over the period 2016-17 to 2024-25. Employment peaks in the study region in 2019-20, at approximately 117 FTEs above the forecast baseline.

As the spending on consumption begins to dissipate, the money invested into the study region continues to support the economy. This compares to the employment increase modelled in scenario one, where employment is expected to return to the forecast baseline after the compensation payments have been spent. Like in scenario one, as businesses employ workers, their employees continue to inject money into the economy as they spend their incomes, which sustains and creates further jobs in the study region.

3.2.3 Other economic impacts on the study region

As Chart 3.4 shows below, compensation payouts will have a positive impact on a range of industries in the study region. Construction, trade and services activity increases substantially in the first three years, due to increases in consumption and investment by businesses and households.

Chart 3.4 Deviation in real industry gross value added, selected industries (2015-16 $ million)



Source: DAE RGEM

3.3 Community impacts

The economic impacts modelled under the two scenarios have been disaggregated to community level based on the methodology described in Section 2.4. The disaggregation methodology for each scenario reflects the different ways in which the payments are assumed to be spent, and how the resultant impacts may cascade through the local economies.

The communities of Kinglake, Marysville, Yarra Glen, Whittlesea, Narbethong and Healesville received the largest proportions of payouts respectively. Collectively, these six communities account for almost half of the payouts. Of these, Kinglake, Marysville and Narbethong were particularly affected by fire, and collectively the three communities, accounted for around two-fifths of losses suffered.

The six communities are profiled below.

Kinglake

Kinglake comprises a township, forest, farmland and a national park north-east of Melbourne in the Shires of Murrindindi and Nillumbik. It is currently home to a resident population of around 1,500 residents and its local economy is driven by service sectors such as public administration and safety, education and training and health care, as well as construction and trade.

The economic impact of the bushfire compensation can be thought of as direct and flow-on. The direct impact is the payout itself, which depends on the damage suffered in the community. Kinglake and was amongst the hardest hit of the communities within the study region and it received 11.2% of the payouts paid into the study region.

The flow-on impact is the uplift to economic activity in the community from the payout, which depends on the size and structure of the community's workforce. As the largest sectors in Kinglake are service-oriented, these sectors might absorb additional demand in the consumption-focused scenario one, while the construction and trade sectors will be better placed to meet demand in the rebuilding-focused scenario two.

Using the approach outlined in 2.4, and based on the payments Kinglake received and the nature of the local economy, it is estimated to experience approximately $7.3 million (scenario one) and $14.4 million (scenario two) of economic impacts as a result of the payouts, depending on how payments are assumed to be spent. These account for 6.2% (scenario one) and 7.8% (scenario two) of the total GRP impacts for the region as a whole.

Marysville

Marysville is a small town located 34 kilometres north-east of Melbourne in the Shire of Murrindindi. It is currently home to a resident population of around 400 residents and its local economy is driven by trade as well as service sectors such as public administration and safety, education and training and health care.

Marysville was also one of those communities hardest hit by the bushfires and so its direct economic impact of the bushfire compensation, being the payout, was also large, with the community receiving approximately 8.2% of the payouts paid into the study region. The flow-on impact, being the uplift to economic activity in the community from the payout, depends on the size and structure of the Marysville community's workforce. As the largest sector in Marysville is its trade sector, the community is well placed to meet the additional demand in the rebuilding-focused scenario two, while its second largest service sector may absorb additional demand in the consumption-focused scenario one.

Using the approach outlined in 2.4, and based on the payments Marysville received and the nature of the local economy, it is estimated to experience approximately $5.2 million (scenario one) and $8.1 million (scenario two) of economic impacts as a result of the payouts, depending on how payments are assumed to be spent. These account for 4.4% of the in-region GRP impacts in both scenarios.

Yarra Glen

Yarra Glen is a town located 40 kilometres north-east of Melbourne in the Shire of Yarra Ranges. It is currently home to a resident population of around 2,900 residents and its local economy is driven by service sectors such as public administration and safety, education and training and health care, as well as its trade and construction sectors.

The Yarra Glen community's direct economic impact of the bushfire compensation, being the payout, was approximately 7.8% of the payouts paid into the study region. The flow-on impact, being the uplift to economic activity in the community from the payout, depends on the size and structure of the Yarra Glen community's workforce. Yarra Glen's large service sectors are likely to be those that absorb the additional demand in the consumption-focused scenario one, and the trade and construction sectors are likely to absorb additional demand in the rebuilding-focused scenario two.

Using the approach outlined in 2.4, and based on the payments Yarra Glen received and the nature of the local economy, it is estimated to experience approximately $5.4 million (scenario one) and $9.3 million (scenario two) of economic impacts as a result of the payouts, depending on how payments are assumed to be spent. These account for 4.6% and 5.1% of the in-region GRP impacts in scenarios one and two respectively.

Whittlesea

Whittlesea is a town located 40 kilometres north-east of Melbourne in the City of Whittlesea. It is currently home to a resident population of around 5,600 residents and its local economy is driven by service sectors such as public administration and safety, education and training and health care, as well as its trade and construction sectors.

The Whittlesea community's direct economic impact of the bushfire compensation, being the payout, was approximately 7.4% of the payouts paid into the study region. The flow-on impact, being the uplift to economic activity in the community from the payout, depends on the size and structure of

the Whittlesea community's workforce. Whittlesea's large service sectors are likely to be those that absorb the additional demand in the consumption-focused scenario one, and the trade and construction sectors are likely to absorb additional demand in the rebuilding-focused scenario two.

Using the approach outlined in 2.4, and based on the payments Whittlesea received and the nature of the local economy, it is estimated to experience approximately $5.3 million (scenario one) and $10.5 million (scenario two) of economic impacts as a result of the payouts, depending on how payments are assumed to be spent. These account for 3.9% and 5.1% of the in-region GRP impacts in scenarios one and two respectively.

Narbethong

Narbethong is a town located 87 kilometres north-east of Melbourne in the Shire of Murrindindi. It has a small resident population of around 200 residents and its local economy is driven by its trade sector as well as service sectors such as public administration and safety, education and training and health care.

The Narbethong community's direct economic impact of the bushfire compensation, being the payout, was approximately 7.1% of the payouts paid into the study region. The flow-on impact, being the uplift to economic activity in the community from the payout, depends on the size and structure of the Narbethong community's workforce. Narbethong's large trade sector may absorb additional demand in the rebuilding-focused scenario two while its service sectors are likely to be those that absorb the additional demand in the consumption-focused scenario one.

Using the approach outlined in 2.4, and based on the payments Narbethong received and the nature of the local economy, it is estimated to experience approximately $4.6 million (scenario one) and $6.7 million (scenario two) of economic impacts as a result of the payouts, depending on how payments are assumed to be spent. These account for 3.9% and 3.7% of the in-region GRP impacts in scenarios one and two respectively.

Healesville

Healesville is a town located 52 kilometres north east of Melbourne in the Shire of Yarra Ranges. It has a resident population of around 7,500 residents and its local economy is driven by service sectors such as public administration and safety, education and training and health care, as well as trade.

The Healesville community's direct economic impact of the bushfire compensation, being the payout, was approximately 7.0% of the payouts paid into the study region. The flow-on impact, being the uplift to economic activity in the community from the payout, depends on the size and structure of the Healesville community's workforce. Healesville's large trade sector may absorb additional demand in the rebuilding-focused scenario two while its service sectors are likely to be those that absorb the additional demand in the consumption-focused scenario one.

Using the approach outlined in 2.4, and based on the payments Healesville received and the nature of the local economy, it is estimated to experience approximately $5.4 million (scenario one) and $10.1 million (scenario two) of economic impacts as a result of the payouts, depending on how payments are assumed to be spent. These account for 4.6% and 5.5% of the in-region GRP impacts in scenarios one and two respectively.

3.4 Summary of results

For both scenarios, the results show large benefits to the study region and community economies. It is expected that the actual regional economic impact will fall in between the two scenarios' results.

The precise quantity of the regional economic impact is uncertain because the use of compensation payments, including where they are spent and what they are spent on, is at the discretion of the claimant. The two scenarios reflect the likelihood that recipients have spent their money both on rebuilding and investing in the study region as well as on discretionary household expenditure. Generally, benefits are greater when payments are used to rebuild capital as opposed to being spent on discretionary household items. The former typically helps create or sustain jobs and economic growth in the region, while the latter typically sees more of the benefits leaking outside the region.

When the money is spent outside the study region, it is not captured in the modelling and will not grow the local regional economy. However, the payouts still represent a welfare gain for individuals as they spend their money on items they would like. These welfare benefits add value to the households and communities receiving the compensation even though the money eventually flows outside the regional economy. Chris Hobbs' story is just one of the many examples of the welfare benefit individuals have experienced from the compensation payments.

Looking at individual communities, the direct economic impact of the bushfire compensation is the payout itself, which depends on the damage suffered in the community. Those communities that were hardest hit received greater proportions of the payouts paid into the study region. The flow-on impact is the uplift to economic activity in the community from the payout, which depends on the size and structure of the community's workforce. Typically, the communities that specialise in construction and trades benefit most from this uplift.

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Appendix A: Economic modelling framework

The Deloitte Access Economics – Regional General Equilibrium Model (DAE-RGEM) is a large scale, dynamic, multi-region, multi-commodity computable general equilibrium model of the world economy with bottom-up modelling of Australian regions. The model allows policy analysis in a single, robust, integrated economic framework. This model projects changes in macroeconomic aggregates such as GDP, employment, export volumes, investment and private consumption. At the sectoral level, detailed results such as output, exports, imports and employment are also produced.

The model is based upon a set of key underlying relationships between the various components of the model, each which represent a different group of agents in the economy. These relationships are solved simultaneously, and so there is no logical start or end point for describing how the model actually works. However, they can be viewed as a system of interconnected markets with appropriate specifications of demand, supply and the market clearing conditions that determine the equilibrium prices and quantity produced, consumed and traded.

DAE-RGEM is based on a substantial body of accepted microeconomic theory. Key assumptions underpinning the model are:

- The model contains a 'regional consumer' that receives all income from factor payments (labour, capital, land and natural resources), taxes and net foreign income from borrowing (lending).
- Income is allocated across household consumption, government consumption and savings so as to maximise a Cobb-Douglas (C-D) utility function.
- Household consumption for composite goods is determined by minimising expenditure via a CDE (Constant Differences of Elasticities) expenditure function. For most regions, households can source consumption goods only from domestic and imported sources. In the Australian regions, households can also source goods from interstate. In all cases, the choice of commodities by source is determined by a CRESH (Constant Ratios of Elasticities Substitution, Homothetic) utility function.
- Government consumption for composite goods, and goods from different sources (domestic, imported and interstate), is determined by maximising utility via a C-D utility function.
- All savings generated in each region are used to purchase bonds whose price movements reflect movements in the price of creating capital.
- Producers supply goods by combining aggregate intermediate inputs and primary factors in fixed proportions (the Leontief assumption). Composite intermediate inputs are also combined in fixed proportions, whereas individual primary factors are combined using a CES production function.
- Producers are cost minimisers, and in doing so, choose between domestic, imported and interstate intermediate inputs via a CRESH production function.
- The supply of labour is positively influenced by movements in the real wage rate governed by an elasticity of supply.
- Investment takes place in a global market and allows for different regions to have different rates of return that reflect different risk profiles and policy impediments to investment. A global investor ranks countries as investment destinations based on two factors: global investment and rates of return in a given region compared with global rates of return. Once the aggregate investment has been determined for Australia, aggregate investment in each Australian sub-

region is determined by an Australian investor based on: Australian investment and rates of return in a given sub-region compared with the national rate of return.

- Once aggregate investment is determined in each region, the regional investor constructs capital goods by combining composite investment goods in fixed proportions, and minimises costs by choosing between domestic, imported and interstate sources for these goods via a CRESH production function.
- Prices are determined via market-clearing conditions that require sectoral output (supply) to equal the amount sold (demand) to final users (households and government), intermediate users (firms and investors), foreigners (international exports), and other Australian regions (interstate exports).
- For internationally-traded goods (imports and exports), the Armington assumption is applied whereby the same goods produced in different countries are treated as imperfect substitutes. But, in relative terms, imported goods from different regions are treated as closer substitutes than domestically-produced goods and imported composites. Goods traded interstate within the Australian regions are assumed to be closer substitutes again.
- The model accounts for greenhouse gas emissions from fossil fuel combustion. Taxes can be applied to emissions, which are converted to good-specific sales taxes that impact on demand. Emission quotas can be set by region and these can be traded, at a value equal to the carbon tax avoided, where a region's emissions fall below or exceed their quota.

Below is a description of each component of the model and key linkages between components.

A.1. Households

Each region in the model has a so-called representative household that receives and spends all income. The representative household allocates income across three different expenditure areas: private household consumption; government consumption; and savings.

The representative household interacts with producers in two ways. First, in allocating expenditure across household and government consumption, this sustains demand for production. Second, the representative household owns and receives all income from factor payments (labour, capital, land and natural resources) as well as net taxes. Factors of production are used by producers as inputs into production along with intermediate inputs. The level of production, as well as supply of factors, determines the amount of income generated in each region.

The representative household's relationship with investors is through the supply of investable funds – savings. The relationship between the representative household and the international sector is twofold. First, importers compete with domestic producers in consumption markets. Second, other regions in the model can lend (borrow) money from each other.

- The representative household allocates income across three different expenditure areas – private household consumption; government consumption; and savings – to maximise a Cobb-Douglas utility function.
- Private household consumption on composite goods is determined by minimising a CDE (Constant Differences of Elasticities) expenditure function. Private household consumption on composite goods from different sources is determined is determined by a CRESH (Constant Ratios of Elasticities Substitution, Homothetic) utility function.
- Government consumption on composite goods, and composite goods from different sources, is determined by maximising a Cobb-Douglas utility function.
- All savings generated in each region is used to purchase bonds whose price movements reflect movements in the price of generating capital.

A.2. Producers

Apart from selling goods and services to households and government, producers sell products to each other (intermediate usage) and to investors. Intermediate usage is where one producer

supplies inputs to another's production. For example, coal producers supply inputs to the electricity sector.

Capital is an input into production. Investors react to the conditions facing producers in a region to determine the amount of investment. Generally, increases in production are accompanied by increased investment. In addition, the production of machinery, construction of buildings and the like that forms the basis of a region's capital stock, is undertaken by producers. In other words, investment demand adds to household and government expenditure from the representative household, to determine the demand for goods and services in a region.

Producers interact with international markets in two main ways. First, they compete with producers in overseas regions for export markets, as well as in their own region. Second, they use inputs from overseas in their production.

- Sectoral output equals the amount demanded by consumers (households and government) and intermediate users (firms and investors) as well as exports.
- Intermediate inputs are assumed to be combined in fixed proportions at the composite level. As mentioned above, the exception to this is the electricity sector that is able to substitute different technologies (brown coal, black coal, oil, gas, hydropower and other renewables) using the 'technology bundle' approach developed by ABARE (1996).
- To minimise costs, producers substitute between domestic and imported intermediate inputs is governed by the Armington assumption as well as between primary factors of production (through a CES aggregator). Substitution between skilled and unskilled labour is also allowed (again via a CES function).
- The supply of labour is positively influenced by movements in the wage rate governed by an elasticity of supply is (assumed to be 0.2). This implies that changes influencing the demand for labour, positively or negatively, will impact both the level of employment and the wage rate. This is a typical labour market specification for a dynamic model such as DAE-RGEM. There are other labour market 'settings' that can be used. First, the labour market could take on long-run characteristics with aggregate employment being fixed and any changes to labour demand changes being absorbed through movements in the wage rate. Second, the labour market could take on short-run characteristics with fixed wages and flexible employment levels.

A.3. Investors

Investment takes place in a global market and allows for different regions to have different rates of return that reflect different risk profiles and policy impediments to investment. The global investor ranks countries as investment destination based on two factors: current economic growth and rates of return in a given region compared with global rates of return.

- Once aggregate investment is determined in each region, the regional investor constructs capital goods by combining composite investment goods in fixed proportions, and minimises costs by choosing between domestic, imported and interstate sources for these goods via a CRESH production function.

A.4. International

Each of the components outlined above operate, simultaneously, in each region of the model. That is, for any simulation the model forecasts changes to trade and investment flows within, and between, regions subject to optimising behaviour by producers, consumers and investors. Of course, this implies some global conditions that must be met, such as global exports and global imports, are the same and that global debt repayment equals global debt receipts each year.

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