2023 S.T. Yau High School Science Award (Asia)

Research Report

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Title of Research Report

An Empirical Research Examining Australian Government's COVID-19 JobSeeker Supplement: Assessing its Economic Resurgence Potency through the Multiplier Effect

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Abstract

As a result of the COVID-19 pandemic, the Australian economy experienced a prolonged contraction in the business cycle, which was reflected in the lowered levels of aggregate demand. Notably, the pandemic lockdown propelled a peak of cyclical unemployment of 13.6% in April 2020. In response, the Australian government increased the transfer payments to unemployed workers, aiming to support the post-pandemic recovery process. This paper will examine the effectiveness and efficiency of the Australian government's COVID-19 JobSeeker Program by measuring the cumulative multiplier.

The JobSeeker unemployment benefit scheme is the Australian government's pre-existing fortnightly financial aid to unemployed workers from 22 to 65 years old. In response to the COVID-19 recession, the government supplemented the scheme by an additional $550 to the base rate, which ranges from $566 to $612, depending on family structure and assets.

The impact of the JobSeeker supplement program is particularly potent for individuals experiencing constrained access to liquid assets. Notably, consumption of the supplement recipients is highly responsive, as the marginal propensity to consumption is generally higher amongst lower-income earners.

Through the Difference-in-differences estimator approach, which is further extended to assess the multiplier and welfare effects, our results revealed the positive outcome of the supplement implementation in stimulating consumption amongst households, which expedites the recovery process of the recession. The result informs cross-national stakeholders on the effectiveness of extending unemployment benefits, signalling a potential strategy for the economy from prospective recessions.

Keywords: COVID-19 Aftermath, Unemployment Benefits, Difference-in-Differences, Aggregate Demand Effect, Cumulative Multiplier, Quantitative Welfare Effect

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Commitments on Academic Honesty and Integrity

We hereby declare that we

1. are fully committed to the principle of honesty, integrity and fair play throughout the competition.
2. actually perform the research work ourselves and thus truly understand the content of the work.
3. observe the common standard of academic integrity adopted by most journals and degree theses.
4. have declared all the assistance and contribution we have received from any personnel, agency, institution, etc. for the research work.
5. undertake to avoid getting in touch with assessment panel members in a way that may lead to direct or indirect conflict of interest.
6. undertake to avoid any interaction with assessment panel members that would undermine the neutrality of the panel member and fairness of the assessment process.
7. observe the safety regulations of the laboratory(ies) where we conduct the experiment(s), if applicable.
8. observe all rules and regulations of the competition.
9. agree that the decision of YHSA(Asia) is final in all matters related to the competition.

We understand and agree that failure to honour the above commitments may lead to disqualification from the competition and/or removal of reward, if applicable; that any unethical deeds, if found, will be disclosed to the school principal of team member(s) and relevant parties if deemed necessary; and that the decision of YHSA(Asia) is final and no appeal will be accepted.

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1 Introduction

During the surge of the COVID-19 pandemic, Australia faced significant economic and public health implications. Government regulations on business operations and quarantine resulted in a dramatic fall in overall economic productivity, associated with declining employment and household income.

Amongst the most effective macroeconomic government interventions, a stimulus package (a government-issued package to stimulate an economy) aims to reinvigorate the economy and prevent further recessions by boosting employment and consumer spending (Hayes et al., 2021). The usefulness of a stimulus package is affirmed by Keynesian economics, which argues that recessions are not self-correcting; instead, the economy's recovery process mainly depends on government intervention and fiscal expenditure (Hayes et al., 2021). Fiscally-issued stimulus packages were implemented in various countries in contemporary recessions. The effectiveness of such policy varies depending on the compensation direction, commonly attempting to increase welfare or output.

Fiscal stimuli were introduced in 2020 to reduce adverse economic effects on firms and households. Consequently, it boosted GDP by 7% from 2021 to 2022. Most notably, the Australian government employed the Economic Support Payments (ESP), JobKeeper and the Coronavirus Supplement with the latter two policies resulting in successful economic responses (RBA 2021). In particular, $20 billion was distributed by the government to the JobSeeker Supplement alone for a 6-month period.

To examine the JobSeeker supplement's effect, this paper explicitly models consumption dynamics in response to a crisis by demonstrating the correlation between consumption and income, measured through the Difference-in-Differences (DiD) estimator. The model further utilises a heterogeneous agent approach to match statistics in order to assess the effectiveness of the supplement program during the COVID recession by examining the sensitivity of consumer spending to a persistent shock in the economy. Specifically, in proving the correlation and causation between the supplement and an

increase in the marginal propensity of consumption (MPC), this paper investigates on an individual scale the difference in spending after the intervention relative to a counterfactual in which the supplement is not provided. This paper explored how a stimulus, or increased government spending, can compensate for decreased private spending, thereby boosting aggregate demand (AD) effect and closing the output gap in the economy.

The effectiveness of the supplement in GDP and welfare terms are measured in macro models where microeconomic heterogeneity across consumer circumstances is considered. Moreover, the cumulative multiplier methodology provides a concrete and quantifiable measure of the policy's capacity to propagate increased consumption and economic vibrancy. The observed multiplier surpassing unity signifies a tangible amplification of the policy's economic influence. Nevertheless, a prudent interpretation of this outcome is warranted- an interpretation which acknowledges the simplified linear assumptions inherent in the methodology and the necessity for precise and robust data inputs.

Furthermore, including the DiD estimator significantly enriches the analytical framework by employing a quasi-experimental design to discern causal links between the policy and observed consumption augmentations. It is paramount, however, to recognise the intrinsic limitations of these methodologies. The DiD estimator's efficacy hinges upon the assumption of parallel trends in the absence of the policy, which might not hold under all contextual scenarios. Both methodologies, whilst invaluable, are underpinned by ideal conditions and might inadvertently omit potential externalities or unintended repercussions of the policy's implementation.

In summation, the amalgamated insights stemming from the DiD estimator, AD effect, cumulative multiplier, welfare effect and complementary methods furnish a multifaceted comprehension of the JobSeeker supplement's implications. Such insights serves as guiding lights for policymakers,

facilitating fiscal decisions that harmonise with economic resurgence, societal well-being and equitable distribution of advantages.

2 Related Work

During our research and design process, we drew inspiration from sources examining the impact of income shocks from COVID-19 and non-COVID-19-related causes.

Christopher Carroll, Edmund Crawley, Ivan Frankovic, and Hakon Tretvoll's 2022 study compares the impact of 3 US unemployment benefit schemes: Unemployment insurance (UI), Stimulus Checks and a two-year income-tax cut in aiding economic recovery from a recession. To establish their model on the spending patterns, the researchers examined the splurge factor of individuals, which is dependent upon their subjective discount factors and educational status. In this study, the researchers' model both the impact of the policy and its counterfactual on spending to assess the welfare effects. Given that the stimulus check is given out in the first quarter of the recession, statistics show that consumption increased by 3% compared to the counterfactual within the first quarter and then dropped to 1% in the next quarter, with the remaining sum spent over the next few years of the recession. In addition, they employed the concept of the Intertemporal Marginal Propensity to Consume (IMPC), which considers the speed of householding spending as well as factoring in the traditional MPC. They findings demonstrate that approximately 60% of the stimulus package are spent by consumers immediate after receipt and after a year, the increasing consumption was greater than the cost of the of the stimulus package. Thus, the multiplier for this policy equates to the multiplier 1.343. And compared with the other 2 policies assessed, Carroll et al (2022) found that stimulus check instigated a comparatively substantial multiplier effect.

Moreover, an Australian study conducted by Laura Berger-Thomson, Elaine Chung and Rebecca McKibbin (2009) showcases the correlation between data from the Household, Income and Labour

Dynamic in Australia Survey (HILDA) and the marginal propensity to consume (MPC) of Australian consumers. This paper explored two different types of policy changes, namely income tax rates and lump-sum transfers in order to identify the effects of shocks to income on consumption. Their findings demonstrate that households with lower income have a tendency towards spending a more significant percentage of extra income. Meanwhile, individuals at higher risk of losing their jobs are more likely to save the extra supplement instead of spending it. This is relevant to our study as it characterizes the Australian consumer context and allows us to hypothesize the outcome of our model.

On the other hand, a wide range of literature has also investigated the impacts of COVID-19 stimulus packages on consumer behaviour. For instance, Misra, Singh, and Zhang (2020) examined the impact of the stimulus payments afforded by the American CARE Act of 2020 on the expenditure of recipients. Through tracking the bank transactional data of recipients before and after receiving the supplement payment, Misra, Singh, and Zhang (2020) identified an immediate surge in consumer spending, with a significant proportion of the stimulus payment spent within just days of it being received. They observed the most significant increase in financial transactions, such as ATM withdrawals and spending towards necessities and living essentials. In addition, the researchers found a distinct correlation between one's area of residence and their response to the stimulus: where the MPC for individuals living in densely populated metropolitan areas are triple that of their counterparts, whose MPC equals 0.51.

Furthermore, Kubota, Onishi, and Toyama (2021) utilised a similar method of data collection to model the response of households to a universal cash entitlement program implemented by the Japanese government as financial aid during COVID-19 titled the Special Cash Payment (SCP) program. This encompasses a supplement of 100,000 Japanese yen (JPY) to all Japanese citizens registered with Basic Resident Registration System. The researchers quantified the impacts of the SCP program through measuring's outflows: encompassing cash withdrawals and bank transfers. The researchers found that the balance within individuals' debit accounts played a crucial role in determining their MPC, in

comparison to all other forms of assets. Thus, they calculated an MPC value of 0.49 from observing spending six weeks following the payment.

3 Data Sources

3.1 ABS Microfinance Data

This paper's empirical analysis relies on bank transaction data from the Australian Bureau of Statistics to measure income and consumption changes. Covering a large proportion of JobSeeker recipients in Australia and New Zealand with millions of transactions, this dataset accounts for an extensive scale of transaction-level spending and trends based on demographics such as gender, debt balance, and saving accounts. These accounts are occasionally referred to as individuals for the remainder of the paper.

This dataset defines consumer spending as the sum of card spending, cash withdrawals and other electronic payments, including debt payments but excluding transfers to other accounts. Whilst the term 'JobSeeker recipient' refers to individuals who have received the monthly JobSeeker payment. Through this criterion, it is identified that around 200 000 unemployment benefits recipients in 2020 are present in this data set. Although, this number is likely to be amplified as individuals with varied income sources are more difficult to identify.

This bank transaction data is categorised into a broad sample, including every account available in this data, covering period from January 2019 to 2021. Furthermore, most accounts' data were only available for comparison for around three months on average; the observed changes in consumption and household income level may reflect changes in the sample composition rather than the actual effect of the JobSeeker Supplement. Additionally, changes to the eligibility criteria, like the liquid asset tests and work requirements, may imply the occurrence of a changing consumer dynamic for JobSeeker recipients.

April 2020 to September 2020			
	Unit	JobSeeker Recipients	Non-Recipients
Total accounts observed	No.	150337	543131
Monthly			
Average income	$	3445	3075
Median income	$	2399	2095
Average spending	$	3263	3641
Median spending	$	2525	2811
Average account balance	$	884	1733
Median account balance	$	185	364
March 2019 - March 2020 and October 2020 - August 2021			
	Unit	JobSeeker Recipients	Non-Recipients
Total accounts observed	No.	305214	1424235
Monthly			
Average income	$	2651	3210
Median income	$	1553	2366
Average spending	$	2547	3619
Median spending	$	1898	2842
Average account balance	$	579	1408
Median account balance	$	101	288

Table 1: Broad Sample Summary Statistics

3.2 Comparisons to household survey data

Two household surveys were extensively used, along with the ABS microfinance data. In particularly we employs data from the Household, Income and Labour Dynamics in Australia (HILDA) Survey and the Survey of Income and Housing (SIH) to inform the construction of our model. The HILDA Survey is a panel study that monitors a sample of over 17,000 individuals spanning the period between 2001 to 2021. The longitudinal nature of the HILDA Survey makes consumer spending patterns and labour market trends easily observable. Melbourne Institute: Applied Economics & Social Research, 2022). On the other hand, the SIH is a nationally inclusive cross-sectional survey of households, gathering data on income, wealth, and additional attributes for nearly 15,000 households carried out every couple of years. Therefore, this data set is useful in aiding the verification and cross-referencing of the representativeness of the bank transaction data.

The two-survey data are utilised to eliminate and recognise sampling bias in the ABS Microfinance Data by comparing income and unemployment benefit distribution in the bank transaction data to the corresponding distribution in the two household administrative data.

Through this, it is illustrated that the main proportion of supplement recipients in the bank transaction data are low-income households. This mirrors the existing bias in the bank account sample towards individuals more likely to apply for credit, whom are presumably more liquidity constrained.

3.3 JobSeeker Supplement Effect on Household Income and Spending Changes

During the period of supplement, the economy saw a sudden increase in consumer spending and income for all JobSeeker recipients. Explicitly, the median monthly spending in May 2020 was 24% and 52% higher than the median monthly spending in April and March respectively. Furthermore, our data demonstrates an additional $500 in spending, which equates to around half of the monthly value of the supplement. Similar trends were evident around the expiry of the supplement in September 2020, when both income and spending decreased comparatively (Figure 1).

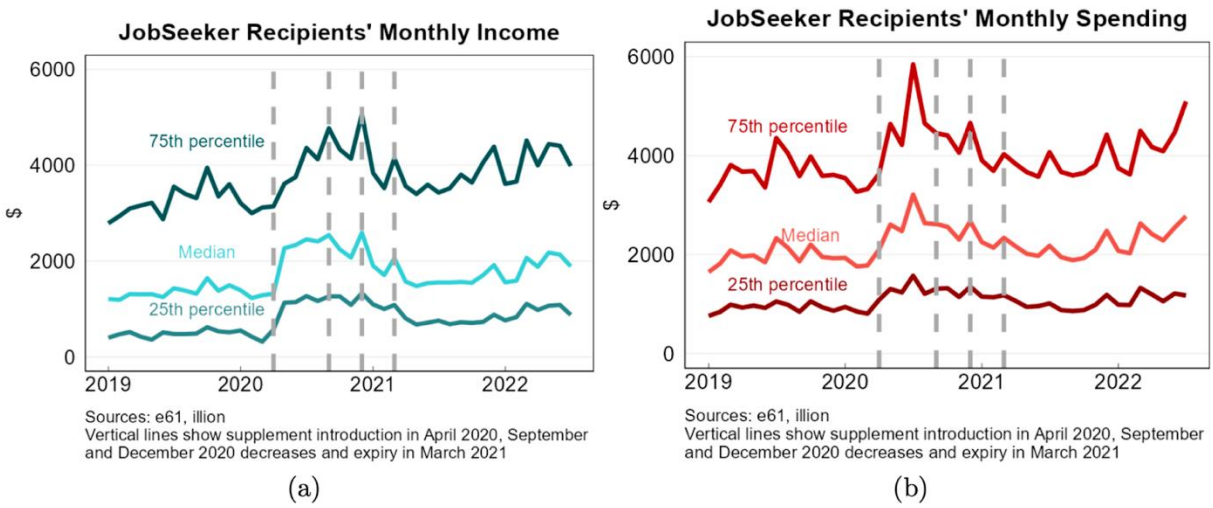


Figure 1

It is assumed that government restrictions during the COVID-19 pandemic negatively affected consumption. Nevertheless, this predicted decrease is not explicitly demonstrated in the data below, which, amidst Victoria's long lockdown periods and Western Australia's fewer lockdowns, illustrated little difference in both spending and income across JobSeeker recipients or non-recipients.

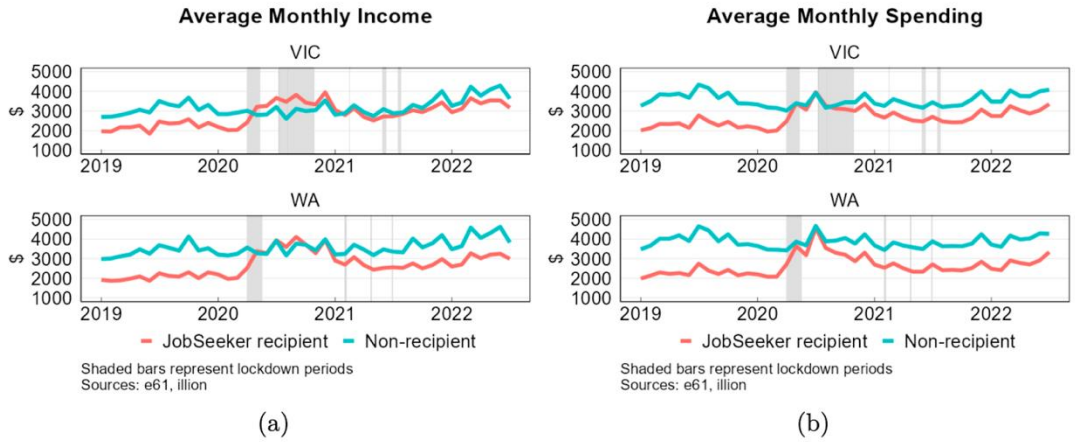


Figure 2

Measuring savings of bank deposit balances could be examined across the course of the pandemic to determine patterns in income and spending. There was a distinct spike in savings for both recipients and non-recipients at the beginning of the initial lockdown period in April 2020. This might be a consequence of restrictions on the movement of people or a decrease in consumer confidence during economic shocks, leading to precautionary saving behaviour. As a result, the savings of JobSeekers remained elevated even after the end of the supplementary period, whilst non-recipients returned to pre-pandemic level as government restrictions eased.

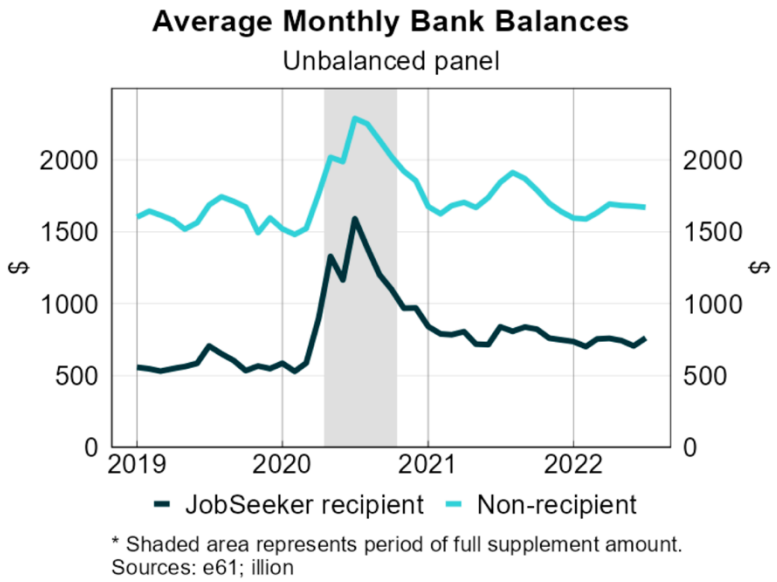


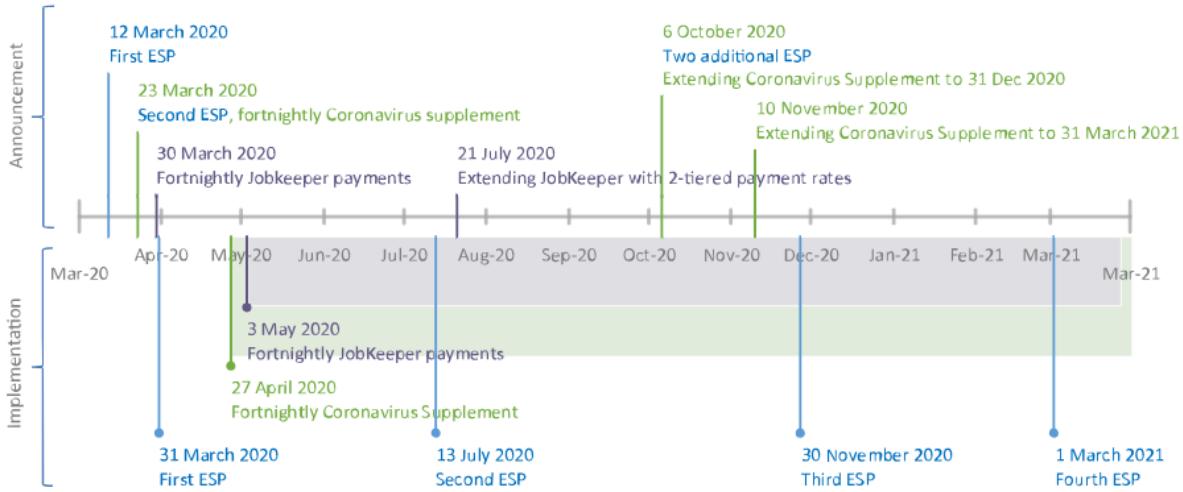
Figure 3

However, no causations can be proven. This trend and descriptive evidence are only informative of a correlation between increased spending and income around the initiation of the JobSeeker Supplement. The following sections of this paper aim to explain the supplement's causal effect on its recipients.

3.4 COVID stimulus package data

Additionally, RBA's transactional banking services data (in direct provision of COVID-19 stimulus payment) is utilised to oversee the whole JobSeeker implementation period. This allows for the evaluation government's total expenditure of monthly direct credit payments to households, indicating peaks in March and September 2020, mirroring the initiation and extension period of the JobSeeker Supplement.

The figure below illustrates the timeline of every stimulus payment provided by the Australian government and the number of active policies.



Source: Australian Taxation Office, Commonwealth of Australia, RBA and the Treasury

Figure 4: COVID-19 Australian Policy Timeline

A comparison table between COVID-19 stimulus pay checks and the Great Financial Crisis fiscal policies is constructed below, illustrating the total expenditure of the JobSeeker Supplement across the entire regular payment period. This allows for comparisons between government policies when similar recessive shocks are present within the current economy, which assists the examination of the JobSeeker Supplement Policy's overall effectiveness.

Table 1: Key Differences of the GFC and COVID-19 Stimulus Payments

COVID-19 stimulus	GFC stimulus
Size of the stimulus payments disbursed by the RBA	
> $120 billion for ESP, Coronavirus Supplement, and JobKeeper	$20 billion
Range of recipients	
• ESP: between 5 and 6.6 million households and individuals • Coronavirus Supplement: about 2.2 million individuals received fortnightly JobSeeker top-ups • JobKeeper: more than 1 million businesses received the fortnightly wage subsidy, supporting 3.6 million individuals	• More than 5 million households and individuals received welfare payments • 8.4 million tax payers received a tax bonus
Payment methods	
28.5 million electronic, direct credit transfers for ESP and JobKeeper payment plus regular welfare payments including the Coronavirus Supplement	16.7 million payments: • 12.4 million electronic transfers • 4.3 million cheques
Operational efficiency	
Exclusive use of electronic, direct credit transfers (processed in bulk) enabled swift availability of funds to recipients. In the main, the delivery was as part of normal business operations.	The use of cheque issuance required more preparation to be operationally ready. Availability of funds to recipients lagged issuance by 9 days on average.

Table 1: Differences between the GFC and COVID-19 Stimulus Payments in Australia

4 Methodology

This paper simulates the effect of the JobSeeker Supplement to model the response of stimulus recipients in their level of consumption via an event-study design of the COVID-19 pandemic. Through employing a Difference-in-Differences (DiD) estimator that compares the recipient and the counterfactual, we aim to measure the causal effects of the supplement implementation through the discrepancies in the marginal propensity of consumption (MPC). Section 5 will outline the initial base estimator and further assess the threats to identification in this model.

The First-Difference (FD) estimator addresses the JobSeeker recipient's (treatment group) causal difference outcomes, comparing their consumption and income levels before the supplement implementation and after. Through this process, the FD controls factors that remain constant over time in the recipient group. The FD estimator is then extended to the Second-Difference (SD) model, which considers the causal outcomes in the controlled group (non-JobSeeker recipients) when exposed to the same environment as the treatment group. The final DiD model is then parameterised to reduce all time-depending factors by removing the SD estimates from the FD. Explicitly, the framework for this estimator model is based on the Australian Bureau of Statistics's DiD model with an added function of the effect of aggregated demand and analysis of the welfare effect on the overall economic recovery.

The results estimated from the DiD model are further used to quantify the impact of the JobSeeker supplement using the aggregate demand effect and cumulative multiplier. The multiplier measures the relationship between the added consumption expenditures up to a specific time horizon and the total cost of the supplement. The calculation involves comparing the changes in consumption (due to the supplement) and the government's expenditure on the policy. And a resultant multiplier greater than 1 indicates that the policy's benefits extend beyond its initial cost, contributing to overall economic growth. This assessment helps policymakers understand the potential return on investment

through evaluating levels of consumption and economic output. Further, policymakers can gauge the temporal dynamics of the unemployment benefit's impact by examining the multiplier's behaviour over time. This is especially relevant in the context of the COVID recession, where the timing of the stimulus effect is crucial in stabilising the economy.

Finally, this paper extends previous literature such as Carroll et al.'s (2022), Hinterland et al. (2023) to assess the utility function of the JobSeeker supplement considering the multiplier effect. The aggregate welfare impact of the JobSeeker supplement is derived from the primary aggregate consumer utilities function, which considers the social planner's discount rate. It is calibrated by incorporating the steady-state baseline, consumption units, cost factors, and welfare benefits. As a result, policymakers are able to holistically understand the societal impact and real-world implications of the policy beyond economic indicators, guiding further fiscal decisions to maximise the welfare of individuals and society as a whole.

5 Topic Modelling/ Sentiment analysis

5.1 Research design

Each calendar month t, a consumer i faces a stochastic income (or spending) stream, denoted by $y_{i,t}$. Accordingly, they choose to consume at a particular fraction of their income.

This paper uses bernoulli distribution with the indicator variable $D_{i,t} = 1$ for JobSeeker recipients *i* who receive the supplement in month *t*, and $D_{i,t} = 0$ for the controlled group (non-recipients).

$$p^{t=sup} = E\left[y_{i,t=sup}(1) - y_{i,t=sup}(0) \middle| i\ received\ supplement\ in\ t\right] \quad (1)$$

Where $y_{i,t}(0)$ refers to the Jobseeker recipient's (i) potential spending or income in month t, during which did not receive the Jobseeker supplement, $y_{i,t}(1)$ refers to the Jobseeker recipient's (i) potential spending or income in month *t*, during which received the supplement. The function *p*, therefore, represents the expenditure *E* outcome in accordance with the supplement.

To determine the causal effect of the JobSeeker supplement on recipient spending, the counterfactual of those individuals not receiving the package will be included in the model. Thus, the model will be parameterised to evaluate the average effect in each month, of the JobSeeker supplement on spending *y*. This is further calibrated to the COVID-19 JobSeeker benefit extension period between April and September 2020 ($t = sup$).

A major limitation of this base model is that it assumes all JobSeeker recipients automatically receive the supplement, it does not account for the counterfactual average spending in which the JobSeekers did not receive the supplement. This factor will be referred to as: $E\left[Y_{i,t=sup}(0) | i\ received\ supplement\ in\ t\right]$. This counterfactual will be proxied in later sections, where the paper considers different approaches to calibrate the model.

5.2 The first differences approach

The first difference (FD) estimator below demonstrates the difference in the level of spending overtime for individual benefit recipient i in post-supplement period w in comparison to the baseline, pre-supplement period of $w - s$.

$$E[Y_{i,w} - Y_{i,w-s} | i\ received\ supplement] \quad (2)$$

To calculate the immediate effect of the JobSeeker Supplement, this paper restricts the modelled comparative time frame to the fortnight before and after the initiation of the supplement. Explicitly, this mitigates the potential for confounding time effects, in which variation within te period after receiving the initial stimulus may affect the level of consumption, depending on the recipients' proportion of liquid assets.

The dates of the first payment (with the additional supplement) varied across the categories of recipients. Therefore, to indicate the average proportion of spending after the first payment is received, data are re-centred to ensure that day when t = 0 is the first day with the unemployment benefit. To calculate the average spending on each day, this paper measures through an omitted day of t = -14.

This estimate:

$$y_{i,t} = \sum_{k=-16}^{15} \beta_k \, 1(t = k)_{i,t,} + a_i + \varepsilon_{i,t} \quad (3)$$

Where an individual recipient i spends $y_{i,t}$ on day t. β_k is the FD estimator coefficient on individuals for days since first receiving the supplement. $1(t = k)_{i,t,}$ is an indicator variable that takes the value 1 if it is day k, since receiving the first payment, and 0 otherwise, and αi represents individual fixed effects.

$y_{i,t}$ indicates evident augmentations in level of spending daily for the fortnight after receiving the payment. These spikes of consumption are higher in the fortnight after relative to the fortnight before receiving the supplement, which demonstrates a sustained and escalated consumer spending dynamic after the supplement in the following fortnight. Specifically, spending was $100 higher on day 0 than any of the omitted days. Similarly, observations of significant increases around the fortnightly pay days are clearly indicated for recipients' income level after applying similar mechanics in (3), Although, this model did not distinguish the increase in income with JobSeeker and other stimulus packages around day 0. Therefore, the estimated growth for income may be lower than the modelled result. Similar analysis could be applied to income, which indicates significant increases after the implementation of the supplement. This trend is less causational as other sources of income are accounted for, including possible payments from other stimulus policies. However, income on day 0 is averagely $545 more than the pre-supplement period, similar to the supplement amount of $550.

It is estimated that the total recipient spending after the implementation caused a $700 increase in spending than prior to the added supplement averagely. Total income of recipients was around $1100 higher following the supplement bonus. This calculates to a marginal propensity of consumption (MPC) of the supplement of 0.58 for its immediate effect, which implies for every additional dollar received in the supplement, 0.58c are spent.

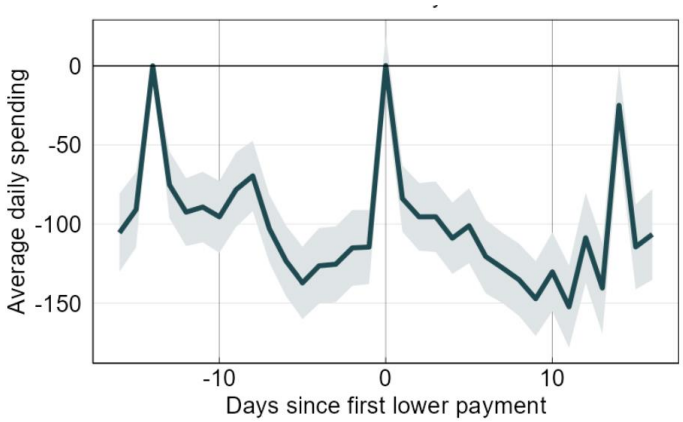


Figure 5: Average Daily Spending after September JobSeeker Decrease (Relative to Day - 14)

Contrary to the spending reaction observed in response to increased income, conducting a similar analysis for the instances of a reduction in supplement payments in September and December 2020, as well as the ultimate expiration of the supplement in March 2021, does not yield conclusive evidence of a notable decline in spending. Following the decreased payment in September 2020, a marginal decrease in spending was observed in the subsequent fortnights (as depicted in Figure 9).

However, the reduction in spending during December 2020 and the cessation of the supplement in March 2021 do not exhibit statistically significant declines in spending or income (for further elaboration, refer to Appendix A). This trend is accounted for by the presence of accumulated savings among recipients throughout the duration of the complete supplement period. Moreover, the prevailing economic conditions were exhibiting signs of improvement during this period, and the anticipated reduction and gradual phasing out of the supplement likely contributed to the absence of pronounced declines in spending behaviour.

5.3 The difference-in-differences approach

A limitation in the measuring of the responsiveness of the JobSeeker supplement on consumer spending in the FD method is the possible confounding time effects as it occurs simultaneously with the COVID-19 lockdowns and Australia's implementation of alternative fiscal stimulus packages, such as the JobKeeper wage subsidy program. The ramifications of COVID-related recessions and policies may have induced or accelerated the changes in consumption for JobSeeker recipients.

To estimate any causal effect reliably, several crucial assumptions must be satisfied. Following Columbia University's 2007 DiD model publication, this paper considers assumptions including exchangeability, positivity, the Stable Unit Treatment Value Assumption (SUTVA) and the parallel trend assumption:

1. **Intervention Unrelated to Outcome at Baseline**: the allocation of the intervention or treatment should not be determined by the outcome being studied. Any differences in outcomes observed between the treatment and control groups before the intervention should be due to factors other than the treatment itself.

2. **Composition Stability for Repeated Cross-Sectional Desig**n (SUTVA): If the study employs a repeated cross-sectional design, it is necessary to assume that the composition of the intervention and comparison groups remains stable over time (Columbia University, 2007). SUTVA assumes that each unit's treatment status does not depend on the treatments assigned to other units, and there is no interference or spillover between units.

3. **No Spillover Effects** (SUTVA): the effects of the treatment should be localised to the group receiving it, without affecting the outcomes of the control group.

4. **Parallel Trends in Outcome:** It requires that, in the absence of the treatment, the difference in outcomes between the 'treatment' and 'control' groups remains constant over time. This is essential because the DiD method leverages the divergence in these trends after the treatment to estimate the causal effect. Assessing the parallel trend assumption usually involves examining pre-treatment data and visually inspecting whether the outcomes were moving in parallel before the intervention.

Fulfilling these assumptions is crucial in ensuring the internal validity of DID models and the accuracy of causal effect estimates. If the parallel trend assumption is violated, for instance, the DID estimates may be biased, leading to inaccurate conclusions about the treatment's true impact.

5.3.1 Outline

To address such omitted variable bias in the baseline model, this paper estimates consumer spending sensitivity in response to benefit shock and implications on the marginal propensity of consumption (MPC) within the selected sample. A counterfactual - the control group, is utilized to contrast and compare the effect of the added JobSeeker Supplement bonus with the treatment group of stimulus recipients. This can further mitigate the variable bias by evaluating the changing consumer spending dynamic. This model defines a JobSeeker recipient as an individual that received the JobSeeker payment in each month *t*, including additional wage earnings during that receiving month.

The difference-in-differences (DiD) estimator calculates the average change over time for the treatment group (recipients) less the average change over time for the control group (non- recipients):

$$DID\ Estimator \equiv E\left[y_{i,t=sup}(1) - y_{i,t=sup}(0) | i\ received\ supplement\ in\ t\right] -$$

$$\mathrm{E}\left[y_{i,t=sup}(1) - y_{i,t=sup}(0) | i\ did\ not\ received\ supplement\ in\ t\right] \quad (4)$$

Potential confounding time effects are reduced as unobserved time-invariant differences between the two groups are subtracted. It is assumed that a similar response would incur between the treatment and control group in the absence of the supplement.

5.3.2 Parallel trends assumption

The underlying assumption of the DiD Model ensures the functionality of the overall model. To test this, income and consumption are compared across the control and treatment groups in the period leading up to the introduction of the added supplement. The data suggests that JobSeeker recipients, in comparison to its counterfactual earn and spend less on average, with the level of consumption and income between the two groups evolving in a parallel manner in the period prior to the COVID pandemic.

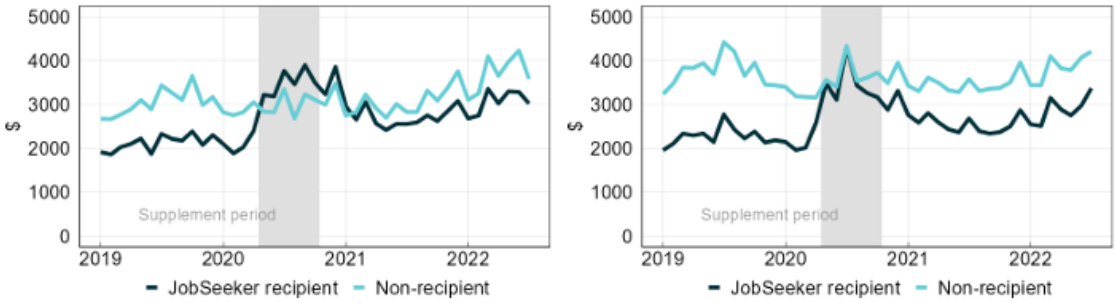


Figure 6: Unconditional average monthly trends in Income (left) and Spending (right)

It is hypothesised that recipients and non-recipients will differ in both observed and unobserved characteristics, yet the proportion of spending to monthly income was similar when demographics of age, gender, and geographical location were controlled variables.

The pre-treatment time-series pattern is predicted to reflect a potential bias because the similarities between the two groups within the selected sample were more apparent in comparison to the broader census of the population. This could suggest that the control of the model provides a better comparison group to model the treatment effect on the JobSeekers.

5.3.3 Regression Model for DiD Estimator

This paper uses the DiD estimator regression introduced in Oscar Torres-Reyna's 2015 model, and compares he treatment group (JobSeeker recipients) to the control group (non-recipients). This model further illustrates the mechanism, in which differences between treatment and control groups should stay constant overtime if the event never happens (Torres-Reyna, 2015).

Thus, below is the regression model used to represent the causal relationship between the JobSeeker supplement and recipient spending.

$$Y_{i,t} = \beta_{i,t} time_t * treated_i + \delta_{i,t} + \beta_i + \beta_t \qquad (5)$$

This model measures the function $Y_{i,t}$, and the income or spending level for consumer *i* in month *t*. $treated_i$ is an indicator variable to determine whether consumer *i* is a JobSeeker recipient, restricted

to the supplement period (April to September 2020) with the indicator variable $time_t$. The coefficient $\beta_{i,t}$ determines the difference in changes in consumption due to the supplement program in the corresponding months. $\delta_{i,t}$ is a vector of controlled variables, including other income (JobKeeper wage subsidy). Finally, β_t represents the fixed time trend effect on the control group every month whilst t and represent the fixed baseline average for each consumer's spending.

After the regression for income and expenditure are estimated individually, the outcome is used to estimate the MPC from the supplement by comparing the ratio of the expenditure (C) DiD estimator to that of the income (Y). The average treatment effect (ATE), which considers the central tendency differences between the treatment and controlled groups is used to compare these two variables.

$$MPC = \frac{ATE^C}{ATE^Y} = \frac{\beta^C}{\beta^Y} \quad (6)$$

Nonetheless, the DiD regression model still contains endogeneity and some key limitations, including the following:

1. The recently unemployed individuals that have become a JobSeeker supplement recipient may display different characteristics to those that were ongoing payment recipients,
2. Previously ineligible people have become eligible for the supplement due to the government's removal of liquid asset test and the lenient partner income test,
3. An earlier study indicates that many new recipients from March to June 2020 were previously not in the labor force, likely due to changes in eligibility criteria (The Australian Treasury, 2021).

5.4 Aggregate Demand Effects

The baseline model is extended in this paper to assess the feedback from aggregate consumption to income on aggregate demand effects during the supplement period. As a result of this implementation, the change in consumption away from normal non-recession period consumption level will be reflected in the Australian labour income. This aggregate demand effect is evaluated as:

$$AD(C_t) = \left(\frac{C_t}{C_n}\right)^k \quad (7)$$

C_n represents the level of consumption in non-recession periods, whereas the aggregate demand extension includes the idiosyncratic income of JobSeeker recipients, which is multiplied by $AD(C_t)$. Accordingly, the function variable $y_{AD,i,t}$ is used to evaluate each consumer's illiquid assets.

$$y_{AD,i,t} = AD(C_t)y_{i,t} \quad (8)$$

The JobSeeker supplement is distributed as a stimulus check upon commencement of the recession when the multiplier effect is most active. Subsequently, a significant portion of the additional spending generated by the supplement will be quickly multiplied (Carroll et al., 2022). However, since JobSeeker supplements might also be issued after the recession has ended, some of the spending influenced by the supplement will not be subject to the multiplier effect. Nevertheless, the high MPC of JobSeeker recipients indicates that the policy will still have a considerable impact on their overall utility, even if their spending after the recession is not multiplied.

6 Main Result

6.1 DID Estimator Findings

The outcomes derived from the DiD regression analysis provide valuable insights into the effects of the JobSeeker supplement on recipients' financial behaviour. Specifically, during the time period when the supplement was in effect, individuals who were beneficiaries of the JobSeeker program experienced a notable surge in their average monthly income by $1014. This figure is particularly noteworthy in light of the fact that the actual monetary value of the supplement was $1100 per month (Australian Treasury, 2022).

In parallel, the estimations from the analysis reveal a discernible trend in terms of monthly spending. JobSeeker recipients, when compared to those not receiving the supplement, demonstrated an average increment of $500 in their monthly expenditure patterns. Thereby, highlighting the efficacy of the supplement in incentivising spending amongst the treatment group.

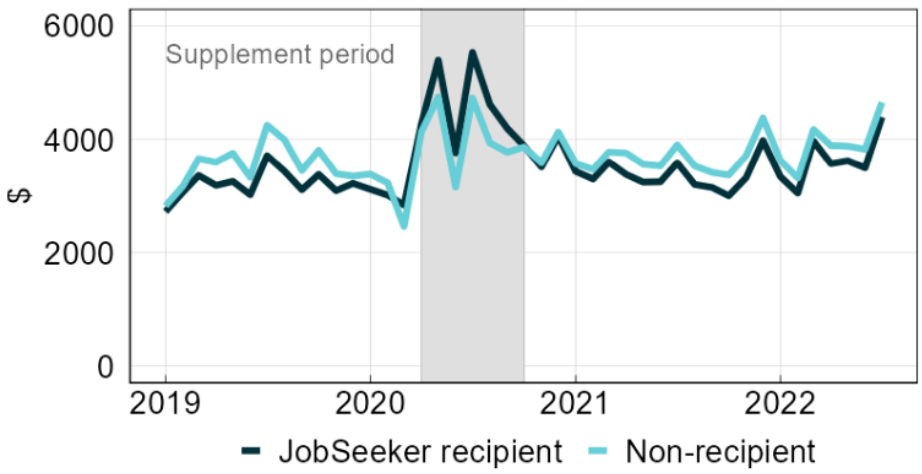


Figure 7: Average Monthly Spending with Supplement period highlighted[1]

[1] Estimates are conditional on consumer and time-fixed effects.

Furthermore, the calculated MPC derived by dividing the estimated monthly increase in spending by the corresponding income increase through the ATE approach yields a value of 0.5. This indicates that on average, JobSeeker supplement recipients allocated $0.50 out of each additional dollar they received through unemployment benefits towards their monthly consumption. This finding underscores the significant role of the supplement in bolstering consumer spending, as recipients directed a notable portion of their stochastic income towards consumption, consequently creating multiplier effects (Section 6.2).

Conclusively, the DiD estimator quantifies the observational behaviours among recipients, highlighting the tangible impact of the supplement on the augmentation of consumption levels during the entire six month period in which the supplement was in full effect.

6.2 Cumulative Multiplier

This section will employ the concept termed the cumulative multiplier to quantify the relationship between two factors: the net present value (NPV) of augmented consumption expenditures up to a govern time horizon *t*, as well as the entire duration's present value of the JobSeeker supplement's cost. Consequently, the formulation of cumulative multiplier up to the designated time is modelled as:

$$M(t) = \frac{NPV(t,\Delta C)}{NPV(\infty,\Delta G)} \quad (9)$$

In the equation, ΔC signified the supplementary aggregate consumption expenditure released up to time t in the supplement, when compared to the established baseline value. Correspondingly, ΔG encompasses the complete government outlay resulting from the supplement's implementation. The NPV of a given factor Z_t is expressed as $NPV(t,Z) = \sum_{s=0}^{t}\left(\prod_{i=1}^{s}\frac{1}{R_i}\right)Z_s$, where R represents the net cash flow of JobSeeker recipient *i*, product operated at time *t*.

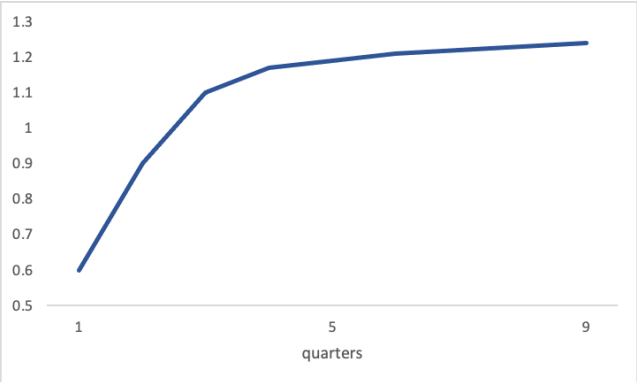


Figure 8: Cumulative multiplier with respect to time of JobSeeker Supplement implementation, considering the active aggregate demand effect.

Figure 8 illustrates the cumulative multiplier effect on various time horizons, while Table 2 presents the long-run multiplier effect for the JobSeeker supplement. After a year, due to the impact on aggregate demand effect, the cumulative consumption surpasses the supplement's cost. As time elapses, the supplement culminates in an overall multiplier of 1.26.

The JobSeeker supplement showcases a notably elevated multiplier effect. Its spending is distributed over four quarters, making it targeted by providing added income exclusively to consumers with significant MPCs due to unemployment. However, since its implementation is gradual, some additional supplement spending occurring in the later quarters, potentially post-recession, in addition to the baseline JobSeeker package. Overall, the majority of policy expenditure takes place during the COVID recession.

Long-run Multiplier (AD effect)	1.15
Long-run Multiplier (1st round AD effect)	1.08
Proportion of policy spending amid the recession	48.7%

Table 2: AD effect (long-run cumulative multiplier) induced by the JobSeeker supplement during the COVID-19 recession

Table 2 introduces the Long-run Multiplier through the first round only AD effect. Notably, the supplement initiates an immediate rise in consumers, which may stimulate additional consumption. Consequently, this impetus triggers an aggregate demand effect, amplifying all individuals' income and further increasing consumption. This study labels the sum of this initial and the indirect consumption enhancement as the "first-round AD effect", as used in Carroll et al.'s 2022 study. Additionally, the AD effect persists as the incidental rise in consumption leads to subsequent income elevations, fostering further consumption growth in a cascading manner. It is arguable that these subsequent phases of the AD effect might not be foreseen by individuals. As the realisation of higher-order consumption boosts hinges on consumer anticipation and corresponding actions, the overall consumption upswing could be less than the complete AD effect suggests. The first-round AD effect, as anticipated, is more modest in the absence of higher-order rounds.

6.3 Welfare Quantification

The aggregate welfare implication of the JobSeeker supplement is further assessed with utility functions. The model is constructed upon two fundamental components, moderated from welfare model assumptions in Carroll et al. (2022), Hinterlang et al. (2023) and other studies:

1. The utility experienced by each consumer *i* at any time *t* is valued equally by the social planner [2], which has a personal discount rate at random coincidence with any consumer modelled. (Carroll, 2022)
2. No social benefit of the supplement is included at times outside of the COVID recession.

By equating the utility value to the social planner, our model is suited towards the modelling of the aggregate consumer utilities, adjusted with the social planner's discount rate. Nevertheless, the simple aggregate model may incentivize the social planner to reallocate income from high-consuming to low-

[2] Social planner in welfare economics refers to a hypothetical decision-maker who attempts to maximise aspects of an area's social welfare.

consuming households to a large extent (including non-recession times) which contradicts the second component. Hence, we employ the aggregated utility function, W(JobSeeker, AD) as a foundational concept.

$$W(JobSeeker, AD) = \frac{1}{n}\sum_{i=1}^{n}\sum_{t=0}^{\infty}\beta_{SP}^{t}u(c_{i,t,Stimulus,AD}), \quad (10)$$

Where $JobSeeker \in \{None, JobSeeker\ Supplement\}$ represents whether the JobSeeker supplement is implemented at time *t*, $AD \in \{1,0\}$ is an indicator variable for the activation of AD effects amid COVID-19 economic downturn. $c_{i,t,Stimulus,AD}$, therefore, are the consumption patterns for every individual *i* in particular circumstances. The parameter β_{SP} corresponds to the discount factor of the social planner, which would be manipulated to match the reciprocal of the actual interest rate *R*. n stands for the total count of stimulated consumers (*i*).

The steady-state baseline is utilised, serving as a pivotal methodology for the conversion of welfare units into consumption units. This foundational approach allows the delineation of incremental enhancements in welfare that transpires when each consumer proportionally augments their consumption with respect to the baseline consumption. This is expressed as follows[3]:

$$W^{c} = \frac{1}{n}\sum_{i=1}^{n}\sum_{t=0}^{\infty}\beta_{SP}^{t}c_{i,t,None,0}u'(c_{i,t,none,0}) \quad (11)$$

In accordance with this precise definition, the analysis revolves around the augmentation in welfare engendered by the JobSeeker supplement and articulated in the context of steady-state consumption units (W^{c}): $\frac{W(JobSeeker,AD)-W(None,AD)}{W^{c}}$. However, this welfare augmentation lacks due consideration for the cost incurred by the government during the implementation process of the policy, represented by $PV(JobSeeker)$. Present Value (PV) refers to the current valuation of a forthcoming sum of money or a sequence of cash flows, considering a designated rate of return (Fernando, 2023). Notably, the

[3] With Log Utility $W^{c} = \frac{1}{n}\sum_{i=1}^{n}\sum_{t=0}^{\infty}\beta_{SP}^{t} = \frac{1}{1-\beta_{SP}^{t}}$

supplement payments made by the government do not depend on AD effects due to their prior definitions. Consequently, the fiscal expenditure associated with the supplement is deduced to standardise in terms of steady-state consumption units: $\frac{PV(JobSeeker)}{P^c}$, with P^c representing the marginal cost attributed to the proportional elevation of each consumer's steady-state consumption, is mathematically determined as follows:

$$P^c = \frac{1}{n}\sum_{i=1}^{n}\sum_{t=0}^{\infty} R^{-t}\, c_{i,t,None,0} \quad (12)$$

Ultimately, the normalisation of the welfare benefit is accomplished through the deduction of the policy's influence during non-recessionary periods (pre-COVID). This normalisation process encapsulates both the inclination of the society to eschew redistributive actions and the counter-productive incentive ramifications of redistribution during periods characterised by normalcy. Thus, the ultimate welfare evaluation is expressed within the confines of steady-state consumption units, as follows:

$$C(JobSeeker, AD) = \left(\frac{W(JobSeeker,AD)-W(None,AD)}{W^c} - \frac{PV(JobSeeker)}{P^c}\right) - \left(\frac{W(JobSeeker,0)-W(None,0)}{W^c}\right) \quad (13)$$

Table 3 exhibits the welfare benefits of the JobSeeker supplement, defined by equation (13). In addition, it presents welfare benefits in basis points based on equivalent consumption levels. The welfare gain of g signifies that the social planner maintains neutrality between the supplement's execution as a response to the COVID-19 recession and a long-term elevation of the baseline consumption rate by g basis points for the entire population.

In the absence of aggregate demand effects (as depicted in the first row of Table 3), the JobSeeker supplement is unequivocally successful. This is attributable to the disbursements being directed towards unemployed demographic groups, which showcases an inclination to exhibit elevated marginal utility for consumption during recessionary periods.

The second row illustrates the welfare benefits within the model's framework, incorporating aggregate demand effects during recessions. Although the supplement experiences a slightly delayed implementation, its beneficiaries – largely consisting of individuals unemployed for at least six months – promptly expend the additional benefits, culminating in substantial aggregate demand effects amidst the recession. The supplement holds the advantage of autonomic reduction if the recession subsidies premature, resulting in a reduced pool of eligible recipients.

Overall, a welfare gain of 0.61 basis points[4] signifies a relatively modest, yet positive improvement in overall utility amongst JobSeeker recipients.

$C(JobSeeker)$	0.40
$C(JobSeeker, AD)$	0.61

Table 3: Welfare gains in basis points (quantified in terms of equivalent consumption), computed for the JobSeeker supplement in the COVID-19 recession with and without AD effects

[4] The term "basis points" represents a unit commonly used to express small changes in percentages, indicating a fractional improvement in this context.

7 Discussion

7.1 Implications and Recommendations

Implementing the JobSeeker Supplement policy bears significant implications and recommendations that warrant careful consideration. The policy, designed to alleviate the financial burdens unemployed individuals face during economic recessions, stimulates consumer spending, bolsters aggregate demand and contributes to economic recovery. Its targeted nature, concentrating on those with higher MPC due to unemployment, enhances its effectiveness in promoting economic revitalisation.

Most JobSeeker recipients have increased their spending significantly under the policy relative to the counterfactual group. Further trends in household consumption around the period of gradual reduction and eventual expiry of the supplement demonstrated an insensitive response, mainly due to high household liquidity. This informs cross-national stakeholders on the importance of strengthening liquidity management in the household sector, protecting the economy from prospective recessions. Consequently, in future implementations of large-scale stimulus policies, household liquidity should be considered to sustain a high level of consumption in response to economic shocks. Our data illustrates the illiquid demographic as the recipients with the most sensitive consumption dynamics; the effectiveness of the JobSeeker Supplement is higher for liquidity-constrained individuals, stimulating a larger increase in consumption.

The cumulative multiplier achieves a value of 1.15, underscoring the policy's potential to generate a self-reinforcing effect on economic growth. This resonates with the concept of leveraging fiscal policy to stimulate economic activity, with the cumulative multiplier illustrating the substantial returns on investment when targeted policies are strategically implemented. On the same note, the aggregate welfare implication assessment highlights the policy's success in targeting the disbursement of funds

to unemployed households with more extensive marginal utility. This contributes to the enhancement of aggregate demand effects (long-term cumulative multiplier). Subsequently, this underscores the importance of well-designed fiscal policies that align with the specific needs of vulnerable population segments, thereby maximising the policy's efficacy.

However, a robust and comprehensive data collection mechanism should be established, given the sensitivity of the policy's impact on accurate data and assumptions. Real-time data on consumption patterns, unemployment rates and economic indicators are critical for accurate estimations of the supplement's effects.

Moreover, effectively integrating the JobSeeker supplement with a broader economic strategy is paramount. Whilst the supplement showcases its potential to mitigate adverse effects associated with economic recessions, its impact can be significantly magnified when operating in synergy with complementary measures. Encompassing a spectrum of programs such as skill development campaigns and mechanisms fostering long-term economic resilience, this comprehensive approach serves to fortify the overall economic landscape. By investing in human capital, the government can enhance employability of individuals within the Australian workforce, thereby fostering a sustainable foundation for economic growth beyond the immediate relief the supplement provides. This multifaceted strategy embodies a proactive response to economic turmoils, aligning short-term relief efforts with the long-term goal of fostering a dynamic and resilient economic ecosystem.

Concurrently, policymakers must exercise acute awareness of potential unintended consequences that may accompany the implementation of the JobSeeker supplement. While the policy's primary objective revolves around stimulating consumption and invigorating economic activity, its broader implications necessitate scrutiny. Possible effects on key macroeconomic variables such as inflation, government debt and fiscal sustainability should be gauged when assessing the efficiency of the policy. The substantial injection of funds into the economy can potentially fuel inflationary pressures,

leading to an increase in prices that might erode the purchasing power of households. Additionally, the financing of the supplement and its associated costs can influence the trajectory of government debt, thereby impacting fiscal stability. Therefore, achieving a delicate equilibrium between the immediate benefits of economic revitalisation and the potential longer-term challenges demands a meticulous and comprehensive assessment of the policy's multi-dimensional impacts.

ultimately, the introduction of the JobSeeker supplement policy signifies a valuable avenue for alleviating financial distress, bolstering consumer expenditure, and contributing to overall economic recuperation. Nonetheless, its assimilation into a holistic economic strategy can significantly enhance its effectiveness, harmonising short-term relief with enduring initiatives that stimulate job growth and skill development. Simultaneously, vigilant consideration of potential unintended repercussions, including inflationary pressures and fiscal implications, is crucial in maintaining equilibrium between immediate gains and sustained economic stability. By incorporating these perspectives into policymaking, policymakers can optimise the positive outcomes of the supplement whilst adeptly navigating the intricate web of challenges and trade-offs inherent in economic management.

7.2 Limitations of the Model

Although the methods used by the paper offer a pedagogy of the effectiveness of the JobSeeker supplement on stimulating consumption and aggregate demand within Australia, certain limitations should be acknowledged. One such drawback would be the way in which the cumulative multiplier effect quantifies the policy’s impact and assumes a linear relationship between consumption and economic activity in this paper. This may oversimplify the complex dynamics of real-world economies, potentially leading to an overestimation or underestimation of the policy’s realistic effects. Moreover, the precision of the estimations is intrinsically intertwined with the availability of accurate data and the underlying assumptions inherent in its computation. This interdependence

introduces a notable dimension of complexity, particularly within contexts characterised by volatility and uncertainty, such as the COVID-19 recession.

Similarly, the welfare model's utility-based approach provides a holistic perspective but relies on simplifying individual behaviour and preferences. It assumes that all individuals share the same preferences and discount rates, which might not reflect the diverse realities of individuals' decision-making processes. Moreover, the model's calculations depend on a range of parameters, such as welfare weights and discount rates, all of which are subject to interpretation and might introduce biases into the analysis.

In addition, the methods utilised in this paper assume ideal conditions and disregard potential externalities or unintended consequences. For instance, the cumulative multiplier effect may not account for potential negative impacts on government debt or inflation resulting from increased spending. The welfare model might overlook non-economic aspects of well-being, such as psychological or health-related factors, which can be crucial in maintaining resilience during times of economic stress.

8 Conclusion

Overall, through examining the JobSeeker Supplement's strength of economic resurgence, this paper deems JobSeeker effective. Our results suggest a remarkable increase in consumer spending through aggregate demand and welfare benefits.

A positive outcome of the JobSeeker Supplement in stimulating consumption amongst households is demonstrated through the baseline DiD estimator approach, which expedites the recovery process of the recession with a calculated MPC of 0.58 on average over the six months of the implementation period.

The additional function of cumulative multiplier suggests a conspicuously elevated multiplier effect, as the stimulated consumption exceeds the cost of the implementation expenditure. Furthermore, the overall cumulative multiplier indicates rapid growth at the start of the distribution period and, as time elapses, reaching a plateau. While the gradual implementation of the supplement might result in additional supplement consumption in the post-recessionary period, when used in conjunction with the baseline JobSeeker package, the calculated long-term AD effect of 1.15 suggests heightened economic growth.

Furthermore, through evaluating the aggregate welfare implications, the welfare quantification utility function indicates the distinct injection of the JobSeeker supplement in the economy as a successful and effective government policy. When considering the active aggregate demand effect, the welfare gain basis point can be ascribed to allocating the entire disbursement exclusively to unemployed households, predisposed to manifest considerably heightened marginal utility amidst economic recessions. While there is a minor delay in the execution of the supplementary measure, its recipients expedited their usage of the extra advantages. This leads to significant aggregate demand effects on overall demand during the recession, increasing consumption substantially, comparing the calculated welfare gains in basis point with the results from Carroll et al (2022) of unemployment benefit extension - 0.580 to 0.40. It is suggested that extending the JobSeeker Supplement may incur higher welfare benefits for consumers. This comparison is deemed more extensive when aggregate demand is accounted for, with Carroll et al' s (2022) data indicating a basis point of 1.266. This discrepancy could result from the assumptions made by Carroll et al.'s (2022), where government intervention was initiated at the beginning of the COVID recession, heightening the aggregate demand effect.

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Working Papers 091222. Washington Centre for Equitable Growth.

10 Appendices

10.1 Appendix A: Household Survey Data Analysis of Income and Spending Patterns

The temporal patterns of household income and spending identified in the bank transactions dataset align closely with those observed in the annual household surveys. A notable instance is the distinct surges in income and spending observed among JobSeekers across the income distribution in the year 2020, as indicated by the HILDA survey. Although both income and spending exhibited a subsequent decline in the year 2021, they remained notably higher compared to pre-pandemic levels (depicted in Figure 9) (Melbourne Institute: Applied Economics & Social Research, 2022).

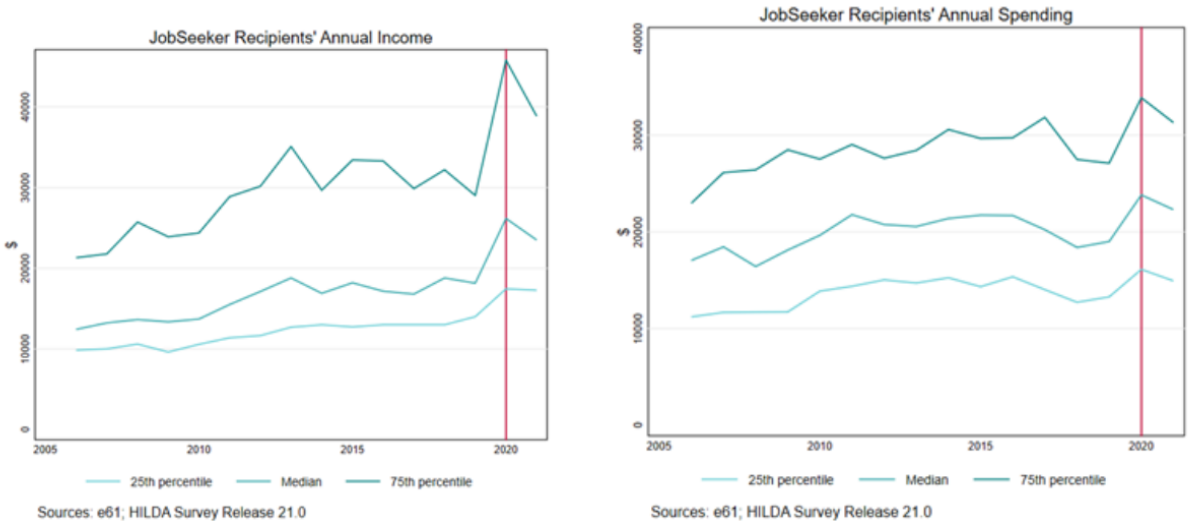

Figure 9: Income (left) and Spending (right) from the HILDA Survey

10.2 Appendix B: Cost-Benefit Relationship of the JobSeeker Supplement

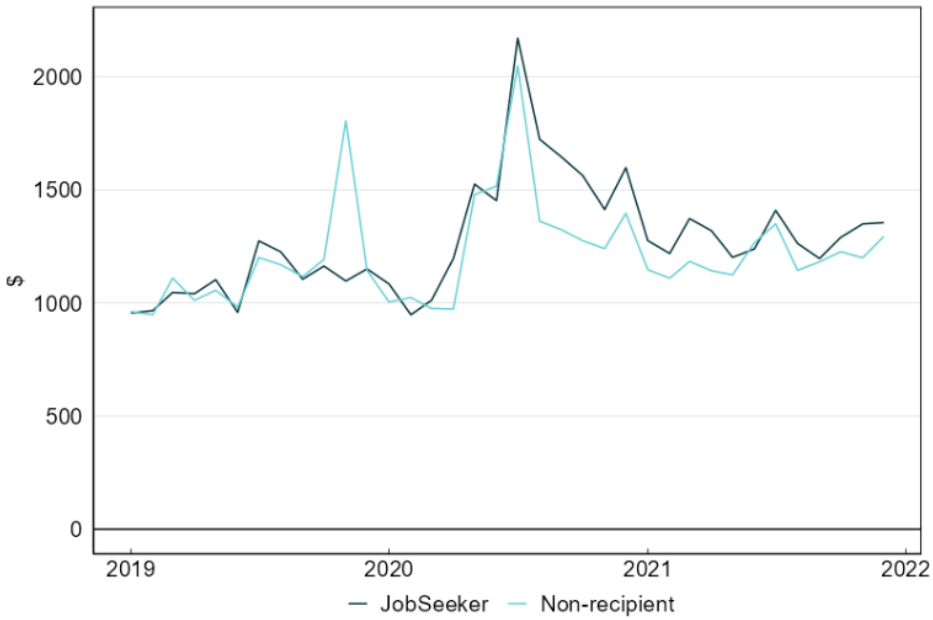

Figure 10: Average Monthly Cash Withdrawals

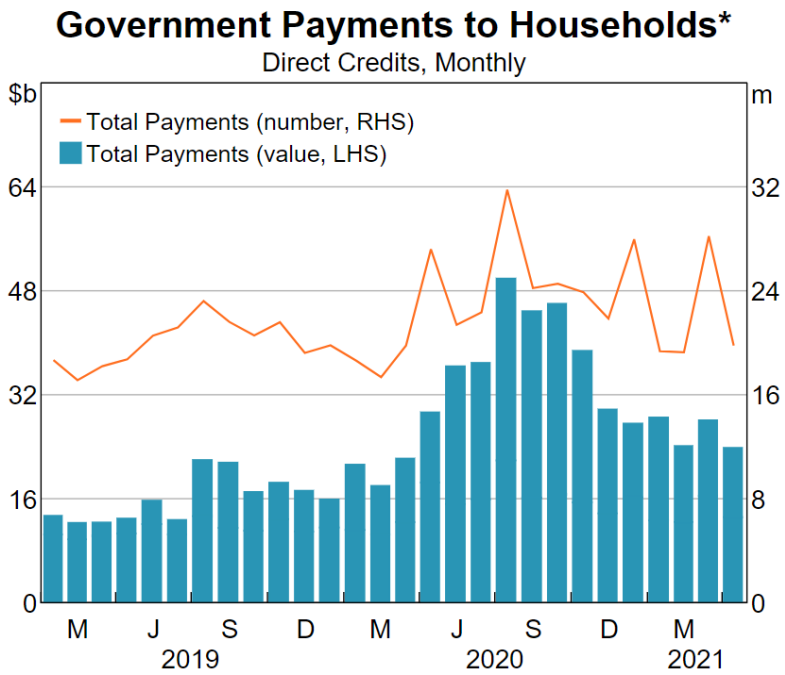

Figure 11: Source RBA

10.3 Appendix C: Regression outputs

Table 4: First Difference (FD) Regression Estimates

Microdata from the Australian Bureau of Statistics (ABS) and e61 institute

Day Relative to Supplement Receipt	**Spending**	**Income**
-16	-97.96***	58.04
	(9.23)	(61.17)
-15	-90.59***	46.98
	(8.89)	(49.68)
-14	0.00	0.00
	(.)	(.)
-13	-64.48***	30.82
	(7.83)	(38.23)
-12	-75.72***	83.17
	(8.13)	(57.08)
-11	-79.55***	189.64
	(8.23)	(59.33)
-10	-78.94***	13.77
	(8.39)	(71.48)
-9	-75.90***	246.69
	(8.55)	(64.87)
-8	-82.41***	562.08
	(8.20)	(60.09)
-7	-82.19***	21.61
	(7.92)	(50.88)
-6	-80.30***	0.67
	(8.14)	(42.01)
-5	-82.23***	-9.18
	(8.62)	(66.45)
-4	-77.24***	157.45

	(8.59)	(69.51)
-3	-79.01***	151.04
	(8.69)	(79.26)
-2	-67.09***	129.59
	(8.93)	(68.10)
-1	-77.12***	222.65
	(8.60)	(62.97)
0	98.22***	550.92***
	(7.44)	(19.66)
1	-15.65**	134.56***
	(7.69)	(44.77)
2	-33.36***	42.83
	(7.92)	(64.64)
3	-24.26***	-11.75
	(8.02)	(65.28)
4	-36.41***	24.64
	(8.35)	(80.05)
5	-40.68***	65.09
	(8.40)	(68.30)
6	-64.95***	141.45
	(8.22)	(65.34)
7	-69.75***	155.52
	(7.91)	(56.06)
8	-64.57***	40.39
	(8.17)	(43.20)
9	-73.07***	-16.55
	(8.67)	(67.36)
10	-70.72***	252.34
	(8.81)	(69.97)
11	-77.37***	170.87
	(8.93)	(68.91)

12	-73.41***	137.27***
	(9.31)	(65.09)
13	-61.90***	381.71***
	(8.58)	(51.46)
14	67.51***	529.62***
	(7.69)	(20.92)
15	-15.77**	255.19
	(7.85)	(40.93)
16	-25.42***	212.66
	(8.15)	(61.99)
Constant	219.95***	
	(5.33)	
Observations	24983	

Standard errors in parentheses

**p<0.10, **p<0.05, ***p<0.01*

Table 5: DiD Estimates

	Spending	**Income**
Treatment	609.60	1108.06
	(8.94)	(13.21)
2019-01	0.00	0.00
	(.)	(.)
2019-02	198.27***	-14.67
	(9.63)	(15.27)
2019-03	496.62***	127.59***
	(11.15)	(14.89)
2019-04	556.55***	323.81***
	(11.17)	(16.21)
2019-05	720.79***	586.76***
	(11.89)	(17.04)
2019-06	380.27***	291.65***

	(11.85)	(17.49)
2019-07	1155.76***	829.77***
	(12.75)	(18.72)
2019-08	915.22***	644.33***
	(12.58)	(19.79)
2019-09	409.23***	488.23***
	(12.08)	(19.81)
2019-10	790.61***	1062.57***
	(11.93)	(18.95)
2019-11	344.17***	453.53***
	(11.68)	(18.17)
2019-12	386.51***	675.35***
	(11.89)	(18.01)
2020-01	339.61***	331.18***
	(11.79)	(18.57)
2020-02	170.96***	260.07***
	(11.83)	(17.86)
2020-03	172.88***	320.63***
	(12.09)	(18.70)
2020-04	143.77***	391.83***
	(12.16)	(20.22)
2020-05	630.57***	337.59***
	(12.88)	(19.33)
2020-06	424.30***	342.03***
	(12.71)	(20.18)
2020-07	1421.25***	908.08***
	(13.68)	(20.47)
2020-08	582.87***	315.50***
	(12.64)	(18.75)
2020-09	686.51***	908.48***
	(12.20)	(18.98)

2020-10	902.32***	986.08***
	(11.91)	(18.34)
2020-11	648.47***	850.35***
	(11.87)	(18.40)
2020-12	1145.28***	1435.40***
	(12.18)	(19.22)
2021-01	601.70***	688.46***
	(11.90)	(18.51)
2021-02	495.86***	724.86***
	(11.87)	(18.98)
2021-03	788.31***	1143.49***
	(12.11)	(18.69)
2021-04	668.06***	818.03***
	(12.06)	(18.63)
2021-05	521.09***	666.08***
	(12.16)	(18.52)
2021-06	537.79***	1017.50***
	(12.12)	(19.49)
2021-07	843.76***	889.02***
	(12.35)	(19.78)
2021-08	548.15***	906.52***
	(12.31)	(20.31)
2021-09	590.58***	1355.95***
	(12.24)	(20.89)
2021-10	610.20***	1150.44***
	(12.22)	(19.77)
2021-11	769.90***	1403.27***
	(12.23)	(20.21)
2021-12	1241.78***	1768.01***
	(12.38)	(20.71)
2022-01	751.12***	1211.74***

	(12.15)	(20.16)
2022-02	779.79***	1442.43***
	(12.19)	(19.74)
2022-03	1482.43***	2331.86***
	(12.50)	(20.52)
2022-04	1216.88***	1854.13***
	(12.55)	(20.61)
2022-05	1084.17***	2010.65***
	(12.81)	(21.33)
2022-06	1338.96***	2186.85***
	(13.30)	(22.36)
2022-07	1443.69***	1530.88***
	(14.61)	(23.19)
Constant	2741.56***	2121.77***
	(10.28)	(15.94)
Observations	99756488	9975648

**p < 0.10 **p < 0.05 ***p < 0.01*

Standard error in Parentheses

10.4 Appendix D: Income and Spending Distributions

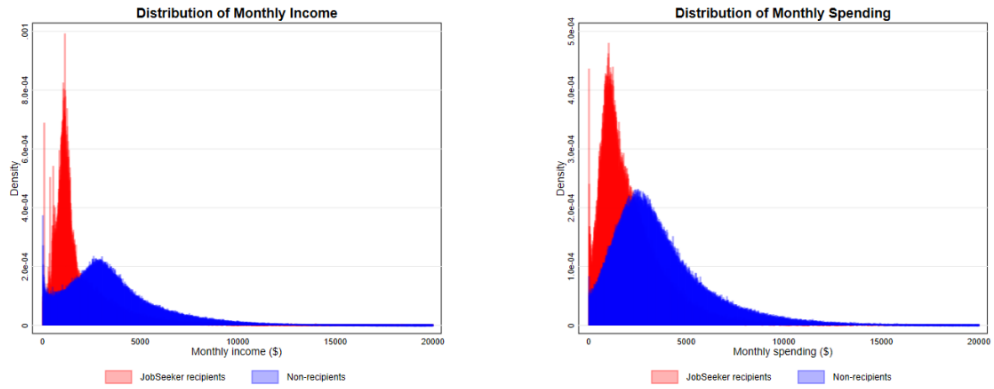

Figure 33: Unconditional Distributions of Income and Spending by Type of Recipient.

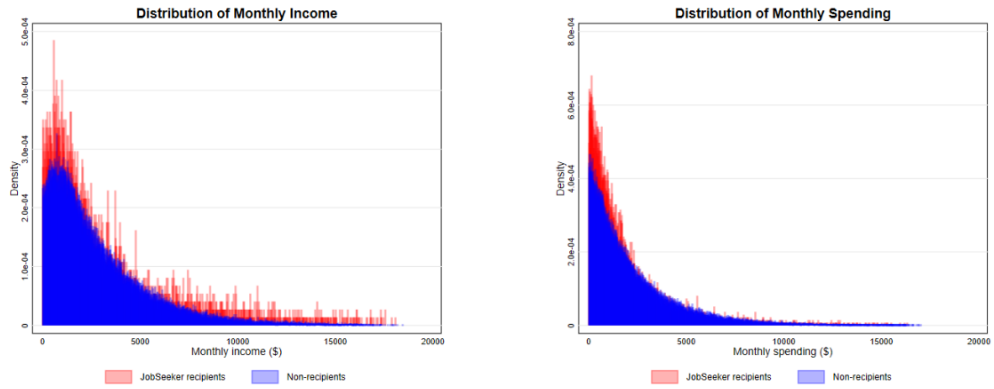

Table 6: Welfare Effect Outputs

Parameter	Value
W(JobSeeker, AD)	1.18
W(None,AD)	1.00
WC	0.60
PV(JobSeeker)	1.10
PC	1.20
W(JobSeeker, 0)	1.05
W(None, 0)	1.00