“How does financial aid for low-income families in Singapore affect children’s behaviour and life outcomes over time?”

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Background Information

Motivation behind research question

- Singapore is widely regarded as a high-income and highly urbanised nation-state
- Income inequality still exists with some families living under relative poverty

- To tackle income inequality, the Singapore government actively provides social support schemes in the form of **financial aid** and **support services** to these **low-income families** via **various governmental and non-governmental organisations**.

Motivation behind research question

- Financial aid can help offload the financial burden carried by low-income households by increasing consumption of goods and services that they would otherwise be unable to afford due to their household budget constraint.

- We are interested to see the impact of these financial aid on children's future outcomes as Singapore prides itself on meritocracy whereby **every child in Singapore is entitled to a formal education** and **social mobility can be achieved through one's capabilities and not their financial background**.

How our research is useful to policymakers

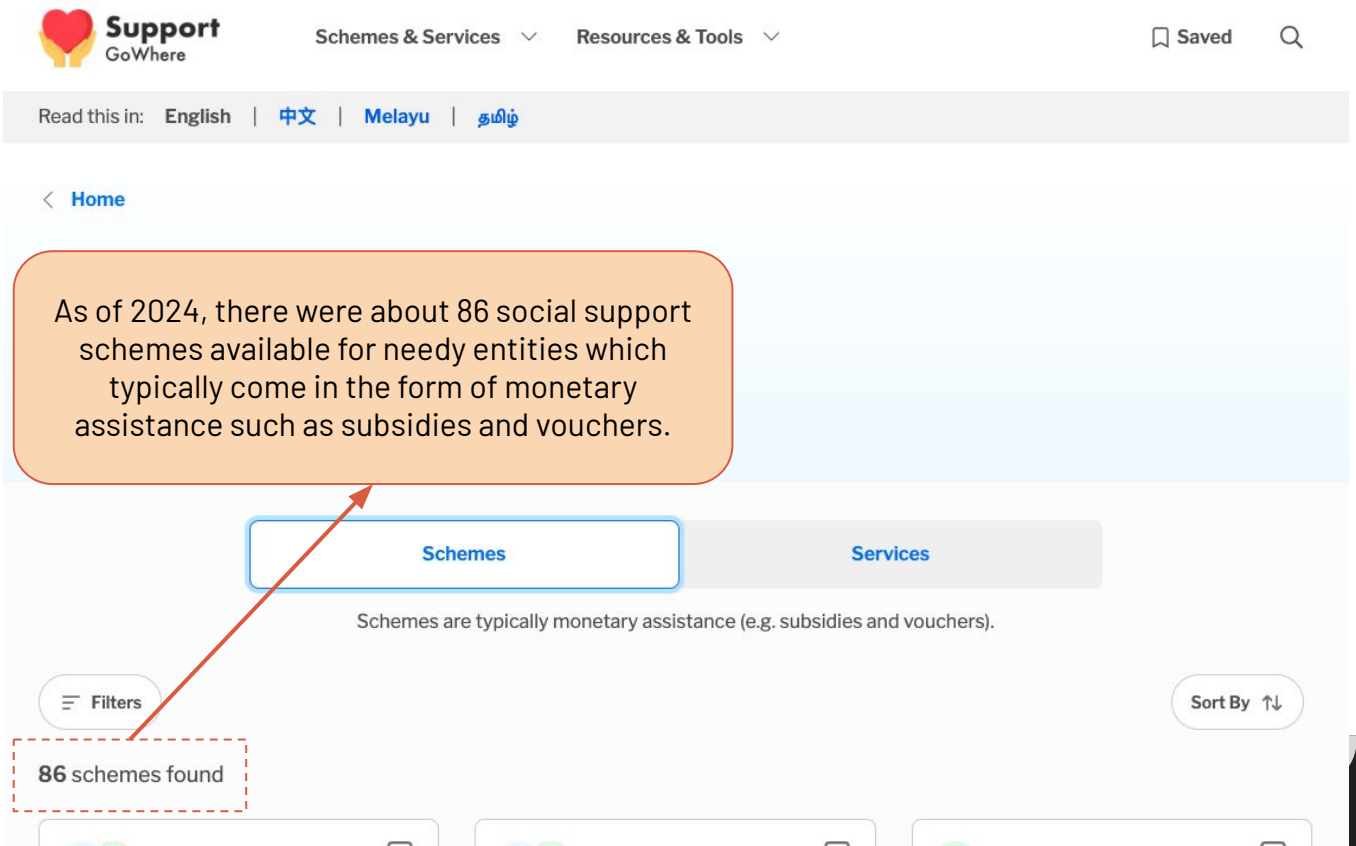
- Through this research design, we aim to identify the causal effects of financial aid on children from low-income households on children's future outcomes in terms of education, health and social behaviours.
- For policymakers, we foresee that this will help them in the following ways:
  - Evaluate the **effectiveness** of **financial aid distributed to eligible households**
  - Facilitate **proper allocation** of government resources to **maximise societal welfare**
  - Identify areas in **which financial aid policies can be improved**

How eligibility for financial aid works

- In general, financial assistance in Singapore is distributed according to one's household income after being means-tested and verification of one's households circumstance has been completed.
- This is done through the use of Singapore government systems such as HOMES (Household Means Eligibility System) that supports public agencies in their conduct of means-testing as part of their assessment in determining the level of assistance for households.

HOMES

Types of financial aid



There are 9 major categories in which the Singapore government provides support to low-income households.

Different schemes will have different eligibility criteria depending on either **gross household income** or **household income per capita** requirements.

Infant Care and Child Care Subsidies

Infant care · Child care · Subsidies

Helps defray preschool fees for Singaporean children.

Kindergarten Fee Assistance Scheme (KiFAS)

Kindergarten · Subsidies

Provides subsidies for kindergarten programmes to ensure that it remains affordable and accessible for Singaporean...

Assurance Package (AP) Cash

Cash assistance · Budget 2023

$700 to $2,250 cash payouts over 5 years from 2022 to 2026 for adult Singapore Citizens aged 21 and above, residing in...

Assurance Package (AP) MediSave

Budget 2023 · CPF top-ups · Seniors

MediSave top-up of $150 each year from 2023 to 2025, for Singapore Citizens aged 20 and below, or 55 and above, residing in Singapore.

Assurance Package (AP) Seniors' Bonus

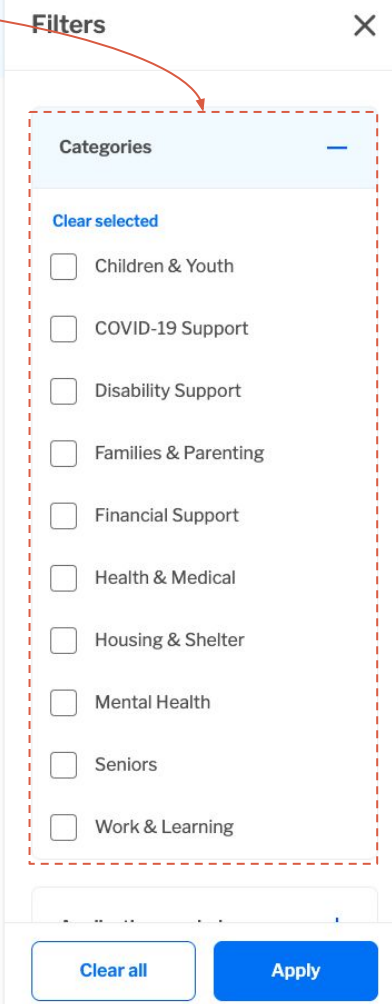
Budget 2023 · Cash assistance · Seniors

$600 to $900 cash payouts over 3 years from 2023 to 2025 for eligible Singapore Citizens aged 55 and above.

CareShield Life

Cash assistance · Long-term · Health Insurance

Provides basic financial support for Singaporeans who become severely disabled, especially during old age, and need long-term...



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Literature Review

The Impact of Housing Assistance on Child Outcomes: Evidence from a Randomized Housing Lottery

(Jacob, Kapustin and Ludwig, 2015)

Summary of paper

- Their research question was:

  “How do housing vouchers affect children’s behaviour and life chances?”

- They were able to conduct a randomised control trial (RCT) due to the Chicago Housing Authority Corporation conducting a randomised housing lottery for housing assistance to low-income families.
- The lottery randomly assigned participants to either a treatment group (those who receive the intervention, i.e. offer of housing assistance) or a control group (those who do not receive the intervention).
- Random assignment helped to ensure that both treatment and control groups were comparable on both observed and unobserved baseline characteristics, isolating the effect of the intervention from other factors that could influence the outcomes by minimising selection bias.

Main Findings

- Authors linked applicants to a wide range of administrative databases that allow the study to the outcomes for children in these families up to 14 years after the voucher lottery.
- By comparing outcomes between the treatment and control groups, the authors could assess the impact of housing assistance on child outcomes such as educational achievement, health, and well-being, while controlling for other variables that might affect these outcomes.
- They found that the **receipt of a housing voucher had little if any impact on the education, crime or health outcomes** over a 14-year follow-up period.
- The findings are surprising given the generosity of the voucher program.
  - Other channels have to be looked at to determine better interventions for children's future outcomes

Does Money Really Matter? Estimating Impacts of Family Income on Young Children's Achievement With Data From Random-Assignment Experiments

(Duncan, Morris and Rodrigues, 2011)

Summary of paper

- Their research question was:

“To what extent does family income impacts the academic achievement and behavioral outcomes of young children?”

- The authors used a set of welfare and anti-poverty experiments conducted in the 1990s to study this research question.
- They utilised an instrumental variables strategy to leverage the variation in income and achievement that arises from random assignment to the treatment group to estimate the causal effect of income on child achievement.

Main Findings

- Their estimates suggest that a $1,000 increase in annual income increases young children's achievement by 5%– 6% of a standard deviation.
- Their results suggest that **family income has a policy-relevant, positive impact on the eventual school achievement of preschool children**.

Child Well-Being in an Era of Welfare Reform: The Sensitivity of Transitions in Development to Policy Change

(Morris, Duncan and Clark-Kauffman, 2005)

Summary of paper

- Their research question was:

“Are there points in children’s development that represent particular sensitivity to welfare and employment policies?”

- Drawing from 7 random-assignment welfare and antipoverty evaluations that provided more than 30,000 observations of children’s achievement, the authors found that times of developmental transition are the only periods sensitive to the changes in families brought about by these policies.

Main Findings

- Developmental transitions in children are critical periods for policy intervention (transition into middle childhood)
- Past research indicates that some early education programs are cost-effective methods of promoting the achievement of young children (Shonkoff & Phillips, 2000).
- Proposes that **policy interventions which are aimed directly at children as well as those focused on parents' economic outcomes can be fruitful**
  - Cash-transfer programs that encourage labour supply and/or invest in direct intervention targeting children transitioning between development stages

Other Relevant Literature

Literature Review

- Apart from the three papers covered, we also read through a few other studies related to financial aid and future outcomes.
- Many studies focused on the impact of financial aid for college students on their success in college (Wang et al., 2013;) or on post-college outcomes (Scott-Clayton & Zafar, 2019)
- We found that most of these studies were done with college students.

Why should our research be conducted?

- First, our research will cover the Singapore context, which is **not commonly found** in academia.
- Second, we have **included all types of financial aid** that are available to eligible low-income households for these children which can help identify which types of policies can best improve the future outcomes of children from low-income households.

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Ideal dataset

Dependent Variables

- Educational outcomes
  - Grades attained
  - Educational pathway after secondary school
- Social outcomes
  - Participation in co-curricular activities (LEAPS)
  - Behavioural issues (alcoholism, smoking, crime and teenage pregnancy)
  - Absenteeism

Dependent Variables

- Health outcomes
  - Number of actual medical appointments visited
  - Overall health status (any pre-existing medical conditions?)

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Independent Variables

- Demographic and socioeconomic information
  - # of members in a household / working adult members in a household
  - Total household income/Household income per capita, labour income per capita
  - Location of residence
  - Parental information
    - Parent's Education level
    - Parent's Employment status
    - Parent's Occupation

Independent Variables

- Types and amount of financial aid package received
- Citizenship of household members (to check for eligibility)
- Individual-level characteristics
  - Age
  - Gender
  - Any health issues or disabilities

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Sample Data for 2020

Sample Data for Event Study/DiD

Child (i)	Year (t)	Age_{it}	Time to event (k)	$Event_{i}$ $_{t}$	$PreEvent_{it}$	$EducationAid_{it}$	$HealthAid_{it}$	Aid_{it}
1	2010	7	-2	2012	1	0	0	0
1	2011	8	-1	2012	1	0	0	0
1	2012	9	0	2012	0	0	100	100
1	2013	10	1	2012	0	50	100	150
1	2014	11	2	2012	0	50	100	150
1	2015	12	3	2012	0	50	100	150
…	…	…	…	…	…	…	…	…
1	2020	17	8	2012	0	50	100	150
2	2010	7	-1	2011	1	0	0	0
2	2011	8	0	2011	0	50	0	50
2	2012	9	1	2011	0	50	100	150
2	2013	10	2	2011	0	50	100	150
2	2014	11	3	2011	0	50	100	150
2	2015	12	4	2011	0	50	100	150
…	…	…	…	…	…	…	…	…
2	2020	17	9	2011	0	50	100	150

04

Research Design

Regression (estimating ITT)

Difference-in-difference model:

$$Outcome_{it} = \alpha + \beta_1 Aid_{it} + \beta_2 PreEvent_{it} + X'_{it}\Gamma + \gamma_i + \lambda_t + \varepsilon_{it}$$

Where:

Aid_{it} is the total amount of financial aid (per capita) that a child receives in a household;

β_1 is the coefficient of interest;

$Outcome_{it}$ can be $Grades_{it}$, $Alcoholism_{it}$, $Crime_{it}$, $Absenteeism_{it}$, etc.;

$PreEvent_{it} = 1[t < Event_{it}]$, this allows us to capture the average difference between the treatment and control groups before the event occurs;

Vector of controls X'_{it} include $LabourIncome_{it}$, $ParentsEducationLevel_{it}$, etc.;

γ_i is individual fixed effects;

λ_t is time fixed effects;

ε_{it} is the error term;

Event study model:

$$Outcome_{it} = \alpha + \sum_{k=-K}^{K} \beta_k Aid^k_{it} + X'_{it}\Gamma + \gamma_i + \lambda_t + \varepsilon_{it}$$

Where:

k ranges from -*K* to *K*, where *K* is the number of periods before and after the event.

Checking identifying assumptions

1. **Common trend assumption**

Check if pre-trends are parallel.

Difference-in-difference model:

$$Outcome_{it} = \alpha + \beta_1 Aid_{it} + \beta_2 PreEvent_{it} + X'_{it}\Gamma + \gamma_i + \lambda_t + \varepsilon_{it}$$

Check that β_2 is 0

Event study model:

$$Outcome_{it} = \alpha + \sum_{k=-K}^{K} \beta_k Aid^k_{it} + X'_{it}\Gamma + \gamma_i + \lambda_t + \varepsilon_{it}$$

Check that coefficient for the lags ($k < 0$) are 0.

Checking identifying assumptions

2. Exogeneity of financial aid:

No omitted variables that correlate with treatment variable

Are there any unobserved policy/economic shocks that occurred in the same year?

(a) Placebo (falsification) test:

- Exploit a population that was not affected by financial aid:
  - Focus on children from high-income households that are not eligible for any financial aid
  - Run the same regression and confirm that the treatment effect is not statistically significant.
- Use an outcome variable which is not affected by the potential unobserved shocks

Checking identifying assumptions

2. Exogeneity of financial aid (continued):

(b) IV strategy:

Proximity to social service offices ($Proximity_{it}$)

Relevance condition :

- Households living closer to social service offices are more likely to receive financial aid
- Statistical test: F test of the instrument in first stage regression

Check if F-statistic on the instrument is >10

First stage:

$$Aid_{it} = \pi_0 + \pi_1 Proximity_{it} + X'_{it}\Gamma + \gamma_i + \lambda_t + v_{it}$$

Checking identifying assumptions

2. Exogeneity of financial aid (continued):

(b) IV strategy:

Proximity to social service offices ($Proximity_{it}$)

Exclusion restriction:

- Requires that the instrument is not correlated to the error term,

  That the instrument only affects $Outcome_{it}$ through the receipt of financial aid
- Theoretically, the placement of social service offices is driven by municipal planning strategies aimed at community development or zoning laws, which are independent of individual household characteristics and their children's potential outcomes.

Checking identifying assumptions

2. Exogeneity of financial aid (continued):

(b) IV strategy:

Proximity to social service offices ($Proximity_{it}$)

Exclusion restriction:

- Falsification test:
  - Use a sample of individuals whose households are not eligible for financial aid
  - Run a regression of $Outcome_{it}$ against the instrument $Proximity_{it}$
  - Check that the coefficient is 0.

Testing for pre-trend

DiD with IV pre-trend check:

$$Outcome_{it} = \alpha + \beta_1 (PreEvent_{it} \times \widehat{Aid}_{it}) + X'_{it}\Gamma + \gamma_i + \lambda_t + \varepsilon_{it}$$

$\widehat{Aid}_{it}$ is the predicted Aid_{it} from first stage.

The interaction $PreEvent_{it} \times \widehat{Aid}_{it}$ allows us to check for the instrumented part of financial aid. Verify that β_1 is not statistically significant.

Event study with IV pre-trend check:

$$Outcome_{it} = \alpha + \sum_{k=-K}^{0} \beta_k \widehat{Aid}^{k}_{it} + X'_{it}\Gamma + \gamma_i + \lambda_t + \varepsilon_{it}$$

$\widehat{Aid}_{it}$ is the predicted Aid_{it} from first stage.

Verify that β_k for $k < 0$ is not statistically significant.

DiD Regression with IV

First stage:

$$Aid_{it} = \pi_0 + \pi_1 Proximity_{it} + X'_{it}\Gamma + \gamma_i + \lambda_t + v_{it}$$

Second stage:

$$Outcome_{it} = \alpha + \beta_1 \widehat{Aid}_{it} + \beta_2 PreEvent_{it} + X'_{it}\Gamma + \gamma_i + \lambda_t + \varepsilon_{it}$$

$\widehat{Aid}_{it}$ is the predicted Aid_{it} from first stage.

β_1 is the coefficient of interest.

Reduced form:

$$Outcome_{it} = \alpha + \theta_1 Proximity_{it} + \beta_2 PreEvent_{it} + X'_{it}\Gamma + \gamma_i + \lambda_t + \mu_{it}$$

θ_1 is the coefficient of interest.

Event Study Regression with IV

First stage:

$$Aid_{it} = \pi_0 + \pi_1 Proximity_{it} + X'_{it}\Gamma + \gamma_i + \lambda_t + v_{it}$$

Second stage:

$$Outcome_{it} = \alpha + \sum_{k=-K}^{K} \beta_k \widehat{Aid}^{k}_{it} + X'_{it}\Gamma + \gamma_i + \lambda_t + \varepsilon_{it}$$

$\widehat{Aid}_{it}$ is the predicted Aid_{it} from first stage.

β_k is the coefficient of interest.

Reduced form:

$$Outcome_{it} = \alpha + \sum_{k=-K}^{K} \theta_k Proximity^{k}_{it} + X'_{it}\Gamma + \gamma_i + \lambda_t + \varepsilon_{it}$$

θ_k is the coefficient of interest.

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Discussion

Internal validity

Internal validity:

- Sensitivity analyses:
  - Alternative model specifications, such as using different functional forms for key variables. Additionally, we can run permutations by including/excluding sets of control variables.
- Additional instrumental variables (valid and strong), do an overidentifying test on them in addition to the F-statistic check.
- Concern: households may become ineligible for financial aid due to improving income.
  - Affecting the composition of our groups.
  - Government tends to adjust (increase) the income eligibility cap every several years. On one hand, this allows us to achieve stability in our dataset. On the other hand, this eligibility adjustment might pose a challenge to our study.

- Although, it is our hope that the application of fixed effects and instrumental variable will effectively mitigate these concerns, thus preserving the validity of our design.

External validity

External validity:

- Heterogeneity test:

First stage:

$$Aid_{it} = \pi_0 + \pi_1 Proximity_{it} + X'_{it}\Gamma + \gamma_i + \lambda_t + v_{it}$$

DiD second stage:

$$Outcome_{it} = \alpha + \beta_1 \widehat{Aid}_{it} + \beta_2 Characteristic_i + \beta_3 (\widehat{Aid}_{it} \times Characteristic_i) + X'_{it}\Gamma + \gamma_i + \lambda_t + \varepsilon_{it}$$

$\widehat{Aid}_{it}$ is the predicted Aid_{it} from first stage;

$Characteristic_i$ can be $Gender_i$, $Ethnicity_i$, etc.

Verify that β_3 is not statistically significant.

External validity

External validity:

- Heterogeneity test:

First stage:

$$Aid_{it} = \pi_0 + \pi_1 Proximity_{it} + X'_{it}\Gamma + \gamma_i + \lambda_t + v_{it}$$

Event study second stage:

$$Outcome_{it} = \alpha + \sum_{k=-K}^{K} \beta_k \widehat{Aid}^{k}_{it} + \theta_1 Characteristic_i +$$

$$\sum_{k=-K}^{K} \delta_k (\widehat{Aid}^{k}_{it} \times Characteristic_i) + X'_{it}\Gamma + \gamma_i + \lambda_t + \varepsilon_{it}$$

$\widehat{Aid}_{it}$ is the predicted Aid_{it} from first stage;

$Characteristic_i$ can be $Gender_i$, $Ethnicity_i$, etc.

Verify that δ_k is not statistically significant.

Extended regression

Our research question may reflect real-world complexities better as low-income families may be receiving multiple types of financial aid.
But we can also extend our regression to explore the specific effects that each type of the financial aid has on $Outcome_{it}$.

$$Outcome_{it} = \alpha + \beta_1 ChildAid_{it} + \beta_2 HousingAid_{it} + \beta_3 EducationAid_{it} + \ldots + \beta_9 HealthAid_{it}$$

$$+ \theta_1 PreEvent_{it} + X'_{it}\Gamma + \gamma_i + \lambda_t + \varepsilon_{it}$$

Feasibility of research

- With the development of SingPass by GovTech that pulls data from the database of various government agencies, it is highly likely that a dedicated data scientist within the Prime Minister's Office with sufficiently high security clearance will be able to access all the data points mentioned above to conduct the research.
- Data points can be anonymised to protect the privacy of individuals from these low-income households.

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Conclusion

Thanks!

Do you have any questions?

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