

The Dynamics of Multidimensional Poverty in Contemporary Australia

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Abstract Progressively more researchers argue that successfully measuring social inequalities requires moving from income-based to multidimensional poverty indicators, but evidence on Australia is still largely reliant on the former. Using long-running panel data from the Household, Income and Labour Dynamics in Australia Survey we examine trends in multidimensional poverty in Australia between 2001 and 2013. We find that this has been relatively stable, with some evidence of an upwards trend following from the 2008 Global Financial Crisis. However, a closer examination of the individual components reveals a more dynamic picture. Deprivation concerning health, material resources, social support and education increased over the 13-year observation period, offsetting decreases in deprivation concerning safety perceptions, employment and community participation. Additionally, using counterfactual simulations, we examine the relative roles of different poverty domains in explaining changes in Australian multidimensional poverty. We find that recent year-on-year changes in multidimensional poverty are mainly driven by fluctuations in social support, health and material resources. Altogether, our findings suggest that Australian poverty-reduction policies would enhance their effectiveness and efficiency by focusing on improving disadvantage in the domains of health and material resources.

Keywords Social disadvantage · Multidimensional poverty · Poverty dynamics · Counterfactual simulation · Decomposition methods · Panel data · Australia

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1 Introduction

Poverty monitoring is one of the main pillars of policy planning in countries across the globe. Australia is no exception and in fact provides an important case study. For many years, the country has enjoyed rapid economic growth. From 2000 to 2014, *per capita* gross domestic product (GDP) in Australia grew at an annual rate of 1.5 %, significantly faster than in other highly developed countries, such as Germany (1.2 %), the United Kingdom (1.0 %), the United States (0.9 %), and Japan (0.7 %) (WDI 2015). In 2014, Australia ranked 1st in the World in terms of average wealth (Credit Suisse 2015). However, the proportion of the population that is relatively poor—currently one in eight—is increasing, the share of the population that is ‘deeply and persistently disadvantaged’ has not decreased in the last decade, and income inequality is on the rise (ACOSS 2013; Azpitarte 2014; McLachlan 2013; OECD 2014a, b; Whiteford 2013). Additionally, some commentators argue that the country has entered economic slowdown (Robinson et al. 2015; Treasury 2015; OECD 2014c; Jakobsen 2014), which could have the most profound impacts on the lives of the most vulnerable. To arrest the negative impacts of these scenarios, it is important to gain holistic and more nuanced insights into the drivers and dynamics of poverty and disadvantage in contemporary Australia.

A gap in our current understanding of social exclusion and disadvantage in the Australian context is how much various factors have contributed to changes in poverty rates in recent times. This is important for strategic planning and policymaking, as it provides policy planners with the tools necessary to devise policy interventions that maximise economic growth and reduce socio-economic deprivation in targeted and cost-effective ways. The few studies that have examined factors associated with poverty and disadvantage in Australia rely solely on correlations (e.g. Saunders 2011; Smith 2005). Hence, their results help identify the risk factors associated with falling into poverty, but do not provide estimates of what share of the observed poverty changes can be attributed to each factor. This is limiting, as it makes it hard to gauge the extent to which perturbations in different factors affect the distribution of multidimensional poverty, and therefore minimises the policy applicability of research findings.

In this paper, we calculate multidimensional poverty rates for Australia for the time period comprised between 2001 and 2013 using individual-level panel data from the Household, Income and Labour Dynamics in Australia (HILDA) Survey. We then use a novel methodological approach proposed by Shorrocks (2013) to decompose changes in multidimensional poverty rates into the individual contributions of separate poverty dimensions, namely material resources, employment, education, health, social support, community participation and personal safety. Key findings indicate that multidimensional poverty in Australia was relatively stable between 2001 and 2013, with some evidence of an upwards trend following from the 2008 Global Financial Crisis (GFC). However, probing into its components reveals substantial heterogeneity in temporal trends in domain disadvantage as well as in the contribution of different domains to overall poverty over time.

2 Background

Despite Australia’s robust economic growth rates in the last few decades, previous research indicates that such growth has not been ‘distributionally neutral’ (Azpitarte 2014; Leigh 2013; Saunders 1992). Instead, some social collectives have benefited disproportionately

more from economic growth than others. In particular, evidence suggests that Australia's 'poorest of the poor' have gained little from the socio-economic opportunities created by the recent phase of economic growth. Hence, despite its comparatively 'healthy' economy, poverty is not a trivial matter in Australia. Income inequality in the country is high, and on the rise. In 2012, 13.8 % of the population was poor in relative terms, defined as having an income that is 50 % lower than the country's median income (OECD 2012). This is higher than the analogous estimate for year 2000, of 12.2 %, and than the OECD average for 2012, of 11.3 % (OECD 2014b). Increasing poverty and inequality are indicative of growing disparities between advantaged and disadvantaged population groups, and these can have profound impacts on Australia's ability to sustain economic development in the coming years. Hence, poverty monitoring should be a crucial component of Australian policymaking, as it allows planners to identify priorities for intervention. Doing so is particularly timely given recent national debates surrounding increases in public deficit and the need for Government budget cuts to portfolios such as social protection, health services and the education system (Treasury 2015).

Appropriately measuring poverty is nevertheless a necessary prerequisite to appropriately monitor poverty. Progressively more poverty researchers argue that disadvantage goes beyond income deprivation, with the debate increasingly moving into the multiple dimensions of social deprivation and exclusion. While income remains a very important resource (ABS 2012) and a gatekeeper to participation in socio-economic transactions (Harding and Szukalska 2000), 'thin' conceptualizations of disadvantage that are solely based on income ignore the fact that people have different capabilities to convert income into resources that improve living standards (Callander et al. 2011). More importantly, many aspects of poverty are ignored by a narrow focus on things that can be purchased by income, including health, community participation and feeling safe (Alkire and Foster 2011).

Sociologist Peter Townsend (1979) was one of the first to recognize that poverty should not be defined in exclusively monetary terms, but should instead be viewed as the lack of ability to meet a minimum standard of living. His relative deprivation approach to poverty proposed that people should be considered to be disadvantaged if they do not have access to resources which are customary, approved or widely encouraged in the society in which they live (Townsend 1979). Importantly, not all of the 'indispensable' items proposed by Townsend in his pioneer work in the UK were income-based; they included factors such as the quality and quantity of family activities, recreation time and social relations. Similarly, though with a stronger focus on absolute poverty, the work of Amartya Sen conceptualised disadvantage as a lack of capabilities, freedom or resources to participate in mainstream society (UNDP 2008; Sen 1999; Nussbaum and Sen 1993). This implies a shift from conceiving disadvantage in terms of 'the means of living' people dispose of, to the 'opportunities' they are given to choose the life that they want to live (McLachlan 2013). Inspired by Townsend's (1979) conceptualization of relative deprivation and Sen's (1985, 1989, 1999) notions of functioning and capabilities, global efforts have recently been made to probe beyond income-based measures of poverty and develop more comprehensive disadvantage measures that include other aspects of living standards –such as health, education and social support (Saunders 2015; Alkire and Foster 2011; UNDP 2008, 2011).

Over the years, there has been a lively debate as to how to better measure poverty in Australia. From the 1960s to the first half of the 2000s, poverty was equated to income deprivation (Callander et al. 2013). During this time, a myriad of relative and absolute poverty lines were proposed, with the resulting variation in poverty estimates being somewhat artificial and undermining the usefulness of poverty statistics for policymaking

(Laderchi et al. 2003; O'Boyle 1999; Hagenaars and de Vos 1988). However, research in Australia has recently begun to mirror global trends and adopt a multidimensional approach to poverty measurement and monitoring (Saunders et al. 2008; Saunders and Bradbury 2006). To date, the bulk of this body of evidence is based on 'static' analyses that fail to prove into poverty dynamics (McLachlan 2013) or are confined to specific population groups, including children (Harding et al. 2006) and Indigenous Australians (Altman et al. 2008). As an exception, Scutella et al. (2013) recently proposed a dynamic multidimensional poverty index using indicators that span seven domains of socio-economic exclusion (material resources, employment, education and skills, health and disability, social support, community participation, and personal safety perceptions). This is the basis of the Social Exclusion Monitor (SEM) adopted by the Melbourne Institute of Applied Economic and Social Research (MIAESR) and the Brotherhood of St Laurence which is widely used in contemporary multidimensional poverty research in Australia. Azpitarte (2014) applied this approach to HILDA Survey data and found that multidimensional poverty rates in Australia changed little between 2001 and 2008, and that low income people benefited more from economic growth than multidimensionally disadvantaged people.

Our research extends previous work, particularly Scutella et al. (2013) and Azpitarte (2014), in several ways. First and foremost, we use state-of-the-art counterfactual analysis techniques that enable us to identify which dimensions of socio-economic exclusion contributed more and which contributed less to recent changes in multidimensional poverty. In particular, the technique we use is superior to that employed in previous studies in that it decomposes changes in multidimensional poverty rates into contributions attributable to changes in each of the underlying factors. Second, we extend the observation period until 2013, which enables examination of the potential impacts of the 2008 GFC on multidimensional poverty trends in Australia. Some research suggests that the 2008 GFC had a benign effect on the country's income poverty. However, it is not clear whether or not the GFC had any effects on rates of multidimensional poverty or differential effects across multidimensional poverty domains (Edwards 2010, Saunders and Wong 2012).

3 Data and Methods

3.1 Dataset and Sample

We use data from the HILDA Survey, an ongoing Australian household panel survey which since 2001 collects annual information on all members of sample households aged 15 and over (Summerfield et al. 2013; Watson and Wooden 2009). Wave 1 of the panel contained 19,914 individuals living in 7,682 households across Australia and was largely representative of the Australian population. We restrict our analytical sample to the working-age population (aged 25–60 years) so that any observed changes in poverty and disadvantage are not artificially affected by changes experienced by people who enter the labor force for the first time or exit it permanently. This is the conventional approach in the literature (OECD 2009). To be able to examine dynamics into and out of disadvantage domains, we also exclude observations from individuals who did not participate in the immediately preceding survey wave.

3.2 Multidimensional Poverty Index

The panel data from the HILDA Survey contain annual measurements of individual- and household-level factors that are known or suspected to contribute to poverty. This makes the dataset fit for examining trends in multidimensional poverty at the aggregate-level. To capture multidimensional poverty, we use the SEM, a multidimensional poverty index created by the MIAESR in liaison with the Brotherhood of St Laurence (Scutella et al. 2013). This enables comparability with earlier studies. Our analysis involves combining information from 21 indicators available on an annual basis in the survey data into a single poverty index, decomposable into 7 life domains.¹ The indicators used for the derivation of this index are shown in Table 1. A sum-score approach is employed to combine the 21 indicators into 7 domain indices, which are then added up to create the final multidimensional poverty index. We use Y_{it}^j to denote a person's score on the j th domain of poverty. Each domain j consists of n_j component indicators, denoted by y_{it}^c , which are all binary variables whose value is either 0 (not disadvantaged) or 1 (disadvantaged). The term Y_{it}^j is calculated by taking the arithmetic mean of the component indicators included in the j th poverty domain (Eq. 1). The SEM index, denoted by Y_{it}^{pov} , is the sum of all Y_{it}^j 's. The values of the resulting index range between 0 and 7, where higher values correspond to higher levels of socio-economic disadvantage (Eq. 2). As done by others before us, we refrain from weighting the different index components (i.e. we assign equal weights to each dimension and indicator within each dimension). This simplifies algebraic manipulation substantially and, most importantly, prevents subjective judgments to permeate poverty definitions (Alkire and Foster 2011). The same approach was used by the developers of the SEM (Scutella et al. 2013).

$$Y_{it}^j = \frac{\sum_{c=1}^{n_j} y_{it}^c}{n_j} + e_{it} \quad (1)$$

$$Y_{it}^{pov} = \sum_{j=1}^7 Y_{it}^j = Y_{it}^{mat} + Y_{it}^{emp} + Y_{it}^{edu} + Y_{it}^{hea} + Y_{it}^{soc} + Y_{it}^{com} + Y_{it}^{saf} + e_{it} \quad (2)$$

¹ The original Social Exclusion Monitor consists of 29 indicators (Scutella et al. 2013). In this study, we only used the 21 indicators that appear in all 13 waves of the HILDA Survey. The design of the SEM Framework took into account issues of measurability, objectivity, parsimony and correspondence to community notions of social exclusion (see Scutella et al. 2009; Kostenko et al. 2009). To gauge the reliability of the SEM in this sample we calculated Cronbach's α for all the 21 indicators and estimated it to be approximately 0.51. While this value falls within the acceptable range for Cronbach's α , it does not reach the optimal threshold of 0.70. This is nevertheless explained by the weak correlation between some of the indicators. For instance, some indicators in the social support and community participation dimensions are weakly correlated with some indicators in other dimensions. On the other hand, when Cronbach α is calculated across the scores for the seven domains, its value is 0.68. See Kostenko et al. (2009) for a more detailed discussion of the statistical properties of the SEM, including sensitivity checks that demonstrate that the robustness of the index to using 'item response theory' instead of sum-score approaches in its construction.

Table 1 Indicators of poverty dimensions

| Domain | Indicator | Description |
|-------------------------|---|--|
| Material resources | Household income | 1 if income is less than 60 % of median income |
| | Long-term unemployment | 1 if currently unemployed, looked for work for the past 4 weeks, and was unemployed for the preceding 12 months |
| Employment | Unemployment | 1 if unemployed |
| | Marginal attachment to the labour force | 1 if not employed but looking for work or not employed and not looking for work because of the belief of being unlikely to find work |
| | Underemployment | 1 if working less than 35 h per week |
| Education and skills | Living in a jobless household | 1 if no household member is employed and at least one household member is aged 15 to 64 |
| | Poor English-language proficiency | 1 if the respondent speaks a language other than English at home and reports that not speaking English well |
| | Low level of education | 1 if the respondent does not study full-time and his highest qualification is less than high school completion |
| | Limited work experience | 1 if the respondent has spent fewer than three years in paid employment |
| Health and disability | Poor general health | 1 if the respondent has poor general health (0–50 on a 0–100 scale) |
| | Poor physical health | 1 if the respondent has poor physical health, (0–50 on a 0–100 scale) |
| | Poor mental health | 1 if the respondent has poor mental health, (0–50 on a 0–100 scale) |
| | Long-term health condition | 1 if the respondent has a long-term health condition, disability or impairment |
| Social support | Disabled member in the household | 1 if the respondent lives in a household that has a disabled member |
| | Little social support | 1 if the respondent receives little social support (0–30 on a 0–70 scale) |
| | Low social activities | 1 if the respondent gets together socially with friends/relatives at most once or twice every 3 months |
| Community participation | Low neighbourhood satisfaction | 1 if the respondent's satisfaction with his/her neighbourhood is low (0–5 on a 0–10 scale) |
| | Low community connection | 1 if the respondent's satisfaction with feeling part of local community is low (0–5 on a 0–10 scale) |
| Personal safety | Non-participation in community activities | 1 if the respondent is not currently a member of a sporting, hobby or community-based club/association |
| | Non-participation in voluntary work | 1 if the respondent is not engaged in any voluntary activity in a typical week |
| | Poor perceived personal safety | 1 if the respondent's satisfaction with safety is low (0–5 on a 0–10 scale) |

See Scutella et al. (2013) for further details

3.3 Identifying the Drivers of Multidimensional Poverty Dynamics Through Counterfactual Simulations

The model shown in Eq. 2 can be expanded to decompose the observed change in the index between times t and $t + r$ into changes in the different domains that constitute it (Eq. 3).²

$$\Delta_{t \rightarrow t+r} Y_i^{pov} = Y_{it+r}^{pov} - Y_{it}^{pov} = \Delta Y_{it}^{mat} + \Delta Y_{it}^{emp} + \Delta Y_{it}^{edu} + \Delta Y_{it}^{hea} + \Delta Y_{it}^{soc} + \Delta Y_{it}^{com} + \Delta Y_{it}^{saf} \tag{3}$$

The estimation of Eq. 3 can be viewed as an income-decomposition problem. Oaxaca (1973) and Blinder (1973) first proposed methods to decompose group differences in income. To illustrate their method, let us assume that the income of individual i from the g th group ($Y_i^{(g)}$), is a function of group membership ($X_i^{(g)}$), economic returns to membership in a specific group ($\beta^{(g)}$), and an error term ($\epsilon_i^{(g)}$) (Eq. 4). Usually, the income variable is expressed in the natural logarithmic form. For simplicity, we will assume that there are only two groups of individuals ($g = 0, 1$). In the Oaxaca-Blinder decomposition method, explaining the difference in group averages in income, denoted by $\bar{Y}^{(1)} - \bar{Y}^{(0)}$, can be accomplished by reconstructing the income for one group assuming that its members have the income structure of the members of the second group (Eq. 5). The $\bar{Y}^{(1)} - \bar{Y}^{(0)}$ difference can be arithmetically expressed as a sum of two components, where the first term corresponds to differences in group membership and the second term corresponds to differences in economic returns between groups (Eq. 6).

$$Y_i^{(g)} = \beta^{(g)} X_i^{(g)} + \epsilon_i^{(g)} \rightarrow \bar{Y}^{(0)} = \hat{\beta}^{(0)} X_i^{(0)} \text{ and } \bar{Y}^{(1)} = \hat{\beta}^{(1)} X_i^{(1)} \tag{4}$$

$$\bar{Y}^{(c)} = \hat{\beta}^{(1)} X_i^{(0)} \tag{5}$$

$$\bar{Y}^{(1)} - \bar{Y}^{(0)} = \left(\bar{Y}^{(1)} - \bar{Y}^{(c)} \right) + \left(\bar{Y}^{(c)} - \bar{Y}^{(0)} \right) = \hat{\beta}^{(1)} \left(\bar{X}^{(1)} - \bar{X}^{(0)} \right) + \left(\hat{\beta}^{(1)} - \hat{\beta}^{(0)} \right) \bar{X}^{(0)} \tag{6}$$

Application of the Oaxaca-Blinder decomposition method is straightforward. In practice, it only entails fitting a linear regression model and perusing the estimated regression coefficients and the sample means of the explanatory variables. However, the approach has two well-known shortcomings. First, the Oaxaca-Blinder method can only be used to explain average differences in characteristics, while differences in other parts of the distribution are left unexplained (Bourguignon and Ferreira 2008). Second, results of the Oaxaca-Blinder decomposition differ when different subgroups are used as the reference group, and thus depend on an arbitrarily chosen reference category (Oaxaca and Ransom 1999; Jones and Kelley 1984).

Several alternative methodologies have been proposed to address these limitations, all of which involved trade-offs (see Bourguignon and Ferreira 2008; Bourguignon et al. 2005 for reviews). One of the most recent methodological advances aimed at addressing these issues is the Shapley-based decomposition method proposed by Shorrocks (2013). Unlike

² The term ϵ_{it} in Eqs. (1) and (2) corresponds to the measurement error in the latent construct of multidimensional poverty. We assume that these measurement errors are cancelled out over time, and hence, the temporal change in the latent multidimensional poverty can be expressed as the sum of the temporal changes in the observed values of the individual components.

the Oaxaca-Blinder method and most other techniques, the Shapley-based decomposition method can accommodate quantiles, variances and any other features of the underlying distribution of the outcome variable being used –not just its mean. Furthermore, it can also address the path-dependency issues inherent to other methods mentioned before.

To illustrate the Shapley-based decomposition procedure, suppose that we treat individuals as the unit of analysis and there are two time periods. The characteristic of interest is the person’s level of disadvantage ($Y_{it}^{poverty}$), as in Eq. 2. For notation purposes, we express $Y_{it}^{poverty}$ as a function of C components where each component is denoted by F_{it}^c , $c = 1, 2, \dots, C$; $t = 0, 1$ (Eq. 7) and the term $M(Y_t)$ is used to denote a specific characteristic feature of the distribution of Y_t (e.g. mean, quantiles, poverty, inequality, etc.). Our aim is to decompose the change in the characteristic feature of the distribution of Y_t between time $t = 0$ and time $t = 1$ (i.e. $M(Y_1) - M(Y_0)$), into the contribution of changes in F_t^c (i.e. $F_1^c - F_0^c$). In other words, we are interested in measuring the percentage contribution of the value of $F_1^c - F_0^c$ to the value of $M(Y_1) - M(Y_0)$ for each $c = 1, 2, \dots, C$. In this study, $M(Y_t)$ represents the headcount multi-dimensional poverty rate (Eq. 9). The term z represents the multidimensional poverty line.

$$Y_{it} = f(F_{it}^1, F_{it}^2, \dots, F_{it}^{C-1}, F_{it}^C) \tag{7}$$

$$M(Y_{it}) = \emptyset(f(F_{it}^1, F_{it}^2, \dots, F_{it}^{C-1}, F_{it}^C)) \tag{8}$$

$$\frac{1}{N} \sum I(Y_{it}^{poverty} < z) \tag{9}$$

The algorithm above to estimate the contribution of F^c on $M_1(Y_1) - M_0(Y_0)$ consists of three steps. First, using the formula provided below, one computes the counterfactual poverty distributions at the initial time period and the corresponding parameter of interest $(MY_0)^{(c)}$ for each factor F^c .

$$M(Y_0)^{(0)} = \emptyset(f(F_{i0}^1, F_{i0}^2, \dots, F_{i0}^{C-1}, F_{i0}^C)) = M(Y_0) \tag{10.1}$$

$$M(Y_0)^{(1)} = \emptyset(f(F_{i1}^1, F_{i0}^2, \dots, F_{i0}^{C-1}, F_{i0}^C)) \tag{10.2}$$

$$M(Y_0)^{(2)} = \emptyset(f(F_{i1}^1, F_{i1}^2, \dots, F_{i0}^{C-1}, F_{i0}^C)) \tag{10.3}$$

$$M(Y_0)^{(C-1)} = \emptyset(f(F_{i1}^1, F_{i1}^2, \dots, F_{i1}^{C-1}, F_{i0}^C)) \tag{10.4}$$

$$M(Y_0)^{(C)} = \emptyset(f(F_{i1}^1, F_{i1}^2, \dots, F_{i1}^{C-1}, F_{i1}^C)) = M(Y_1) \tag{10.5}$$

Second, one computes the contribution of F^c by subtracting $M_0(Y)^{(c-1)}$ from $M_0(Y)^{(c)}$. Both the absolute contribution (Eq. 11) and the percentage contribution (Eq. 12) can be used.

$$(F_{i1}^c - F_{i0}^c) = M(Y_0)^{(c)} - M(Y_0)^{(c-1)} \tag{11}$$

$$(F_{i1}^c - F_{i0}^c) = \frac{M(Y_0)^{(c)} - M(Y_0)^{(c-1)}}{M(Y_1) - M(Y_0)} \tag{12}$$

Third, steps one and two are repeated for all possible orderings of F^c 's and then the average of (11) and (12) is used as the estimate of the absolute and relative contribution of each of

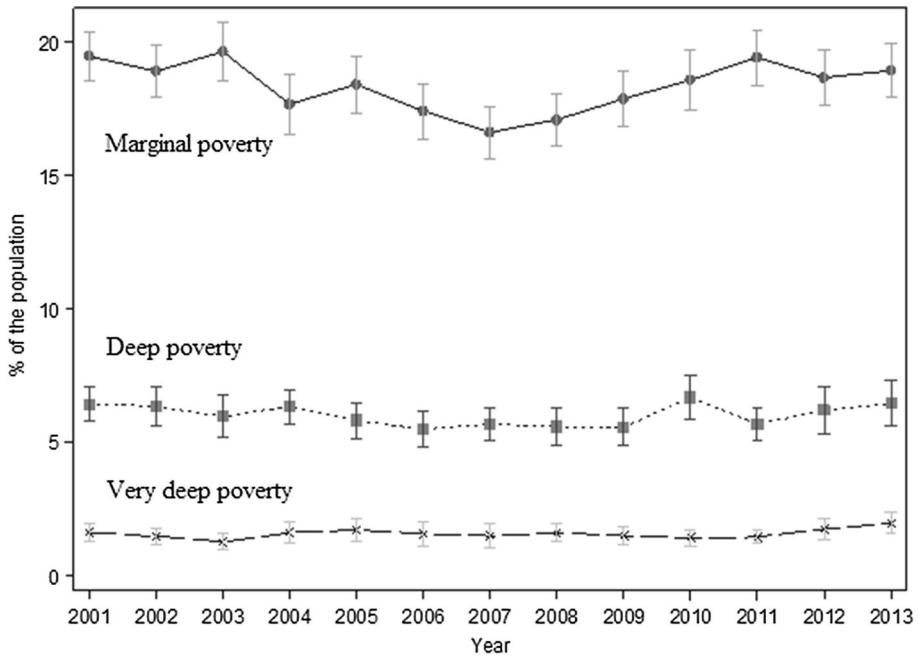


Fig. 1 Time trends in multidimensional poverty rates. *Notes* HILDA Survey data (2001–2013). Respondents aged 25–60 years. *Vertical lines* denote two-sided 95 % confidence intervals using the exact method, assuming normally distributed variables

the F_c 's to poverty changes.³ To apply the Shapley-based decomposition approach in the succeeding analysis, we use ADECOMP, a Stata-automated routine developed by Azevedo et al. (2012).

4 Multidimensional Poverty in Australia, 2001–2013

Figure 1 illustrates the prevalence of multidimensional poverty in Australia between 2001 and 2013 using three headcount measures of 'marginal', 'deep' and 'very deep' multidimensional poverty. We adopt the thresholds used by the Brotherhood of St Laurence and MIAESR: 'marginally disadvantaged' individuals are those individuals who score more than 1 but less than 2 in the multidimensional poverty index described before, 'deeply disadvantaged' individuals are those who score between 2 to 3, and 'very deeply disadvantaged' individuals are those who score 3 or more (Azpitarte 2013). In the period

³ The Shapley-based decomposition algorithm constructs a counterfactual distribution for Y_t by changing the values of F_{it}^c from the observed value at the initial time period to the observed value at the succeeding time period, one at a time, by holding the values of all other factors constant. In the example above, this was done chronologically from F_{it}^1 to F_{it}^c . Thus, the values of (11) and (12) depend on this specific ordering of factors. However, had we started from F_{it}^c to F_{it}^1 or followed any other ordering, the results would have been different. In reality, the third step in this method averages the contribution of each factor across all possible permutations or 'paths' and uses the resulting average to estimate the factor's contribution to $M_1(Y_1) - M_0(Y_0)$.

comprised between 2001 and 2013, the average sample prevalence of ‘marginal disadvantage’, ‘deep disadvantage’ and ‘very deep disadvantage’ was relatively stable over time, with 18.4, 6 and 1.6 % of respondents experiencing these forms of disadvantage, respectively. As shown in Table 2, between 2001 and 2013 there were slight increases in ‘marginal disadvantage’, ‘deep disadvantage’ and ‘very deep disadvantage’, of 0.6, 0.4 and 0.4 % points, respectively. The sample average in the overall multidimensional poverty index, which theoretically can range from 0 to 7, also increased modestly, from 0.76 in 2011 to 0.80 in 2013. While annual changes are generally small, it is interesting that declining trends in the overall multidimensional poverty index, ‘marginal disadvantage’ and ‘deep disadvantage’ began to stall and/or reverse in 2008, coinciding with the onset of the GFC.

However, this picture of relative stability masks variability in the prevalence and trends in poverty at the domain-level. Table 2 shows the average score for each of the domains that comprise SEM: material resources, employment, education, health, social support, community participation and safety perceptions. Disadvantage concerning community participation (with a mean score of 0.24) and health and disability (0.15) are the most prevalent forms of disadvantage in Australia over the 2001–2013 period, followed by material resources (0.13). In contrast, disadvantage relating to employment (0.08), education and skills (0.07), social support (0.07) and safety perceptions (0.04) is rarer. Table 2 and Fig. 2 illustrate also the over-time prevalence of poverty with respect to the seven disadvantage domains. Between 2001 and 2013 there were modest reductions in disadvantage concerning safety perceptions (−0.03), employment (−0.01), and community participation (<−0.01). However, disadvantage increased modestly in the domains of health and disability (+0.04), material resources (+0.03), social support (+0.02) and education and skills (+0.01).

Furthermore, we find more year-on-year variation in each dimension relative to the modest year-on-year changes in the values of the multidimensional poverty index. Three sorts of temporal trajectories over the observation window are apparent for different poverty indicators: (1) almost monotonic downward trends (personal safety), (2) almost monotonic upward trends (material resources, health and disability, social support, education and skills), and (3) trends that resemble a U shape (employment, community participation). While identifying the specific drivers of each of these trends is beyond the scope of this paper, it is important that for the items following a U shape trajectory, the vertex of the U coincides with the onset of the GFC (at around 2008). That is, the GFC seem to have reversed long-running trends towards poverty reductions in employment and community participation. It also seems to have contributed to stalling trends towards poverty reduction in personal safety, and to an increase in poverty concerning health and disability.

We now turn our attention to the drivers of annual changes in ‘marginal’, ‘deep’ and ‘very deep’ multidimensional poverty in Australia in the 2001–2013 period. To do so, we identify which of the 7 dimensions of disadvantage contributed more (and which less) to overall changes in multidimensional poverty over the observation window using the Shapley-based decomposition method (Shorrocks 2013). For ease of interpretation, we split the analysis into three observation periods: (1) 2001–2005, (2) 2005–2009, and (3) 2009–2013. These observation periods represent different economic environments in Australia. The 2001–2005 period was a time of strong economic growth when real GDP per capita in Australia grew at an average annual rate of 2.3 % (WDI 2015). The 2005–2009 period was a time of moderate economic growth leading to the GFC. Over these years, real GDP per capita grew at an average annual rate of 1.5 % (WDI 2015).

Table 2 Multidimensional poverty indicators, domains and index, Australia 2001–2013

| Indicator | All years | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|---|-----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Multidimensional poverty index | 0.762 | 0.788 | 0.766 | 0.758 | 0.760 | 0.759 | 0.735 | 0.726 | 0.738 | 0.739 | 0.777 | 0.765 | 0.788 | 0.801 |
| Percentage marginally poor | 18.372 | 19.491 | 18.927 | 19.654 | 17.678 | 18.419 | 17.430 | 16.632 | 17.096 | 17.881 | 18.589 | 19.426 | 18.678 | 18.936 |
| Percentage deeply poor | 6.012 | 6.417 | 6.344 | 5.957 | 6.335 | 5.810 | 5.485 | 5.684 | 5.576 | 5.556 | 6.680 | 5.668 | 6.191 | 6.451 |
| Percentage very deeply poor | 1.550 | 1.603 | 1.463 | 1.252 | 1.594 | 1.707 | 1.554 | 1.480 | 1.588 | 1.483 | 1.412 | 1.433 | 1.737 | 1.955 |
| Material resources | 0.129 | 0.114 | 0.119 | 0.120 | 0.129 | 0.124 | 0.118 | 0.129 | 0.132 | 0.128 | 0.144 | 0.138 | 0.137 | 0.145 |
| Income poverty | 0.129 | 0.114 | 0.119 | 0.120 | 0.129 | 0.124 | 0.118 | 0.129 | 0.132 | 0.128 | 0.144 | 0.138 | 0.137 | 0.145 |
| Employment | 0.080 | 0.096 | 0.084 | 0.080 | 0.077 | 0.077 | 0.076 | 0.075 | 0.072 | 0.076 | 0.080 | 0.077 | 0.081 | 0.086 |
| Long-term unemployment | 0.018 | 0.026 | 0.020 | 0.016 | 0.014 | 0.016 | 0.017 | 0.016 | 0.017 | 0.018 | 0.018 | 0.017 | 0.019 | 0.019 |
| Unemployment | 0.024 | 0.040 | 0.033 | 0.026 | 0.024 | 0.024 | 0.020 | 0.019 | 0.018 | 0.018 | 0.024 | 0.019 | 0.020 | 0.027 |
| Marginal attachment to the labour force | 0.071 | 0.109 | 0.097 | 0.088 | 0.081 | 0.075 | 0.069 | 0.056 | 0.052 | 0.054 | 0.060 | 0.058 | 0.056 | 0.062 |
| Underemployment | 0.214 | 0.208 | 0.193 | 0.193 | 0.194 | 0.206 | 0.216 | 0.217 | 0.215 | 0.224 | 0.227 | 0.229 | 0.232 | 0.231 |
| Living in jobless household | 0.072 | 0.095 | 0.079 | 0.079 | 0.073 | 0.062 | 0.062 | 0.065 | 0.058 | 0.066 | 0.069 | 0.062 | 0.077 | 0.093 |
| Education and skills | 0.072 | 0.070 | 0.069 | 0.067 | 0.065 | 0.075 | 0.072 | 0.069 | 0.065 | 0.078 | 0.076 | 0.073 | 0.073 | 0.082 |
| Poor English-language proficiency | 0.009 | 0.009 | 0.011 | 0.011 | 0.009 | 0.011 | 0.007 | 0.006 | 0.003 | 0.009 | 0.009 | 0.007 | 0.009 | 0.014 |
| Low level of formal education | 0.141 | 0.171 | 0.169 | 0.166 | 0.164 | 0.151 | 0.149 | 0.144 | 0.140 | 0.120 | 0.118 | 0.116 | 0.115 | 0.113 |
| Limited work experience | 0.066 | 0.029 | 0.027 | 0.024 | 0.023 | 0.064 | 0.059 | 0.057 | 0.053 | 0.103 | 0.101 | 0.096 | 0.095 | 0.120 |
| Health and disability | 0.152 | 0.138 | 0.129 | 0.142 | 0.144 | 0.149 | 0.146 | 0.145 | 0.148 | 0.158 | 0.166 | 0.163 | 0.165 | 0.178 |
| Poor general health | 0.178 | 0.143 | 0.155 | 0.161 | 0.167 | 0.176 | 0.171 | 0.171 | 0.173 | 0.180 | 0.199 | 0.203 | 0.203 | 0.212 |
| Poor physical health | 0.076 | 0.071 | 0.068 | 0.071 | 0.073 | 0.074 | 0.073 | 0.073 | 0.069 | 0.074 | 0.085 | 0.079 | 0.083 | 0.091 |
| Poor mental health | 0.103 | 0.099 | 0.104 | 0.105 | 0.106 | 0.104 | 0.102 | 0.097 | 0.103 | 0.099 | 0.107 | 0.099 | 0.101 | 0.111 |
| Long-term health condition | 0.256 | 0.190 | 0.179 | 0.233 | 0.235 | 0.255 | 0.253 | 0.258 | 0.258 | 0.290 | 0.281 | 0.287 | 0.284 | 0.319 |
| Presence of disabled family member | 0.146 | 0.186 | 0.139 | 0.142 | 0.141 | 0.133 | 0.131 | 0.126 | 0.134 | 0.146 | 0.159 | 0.147 | 0.152 | 0.157 |
| Social support | 0.072 | 0.060 | 0.062 | 0.068 | 0.067 | 0.076 | 0.073 | 0.066 | 0.077 | 0.063 | 0.076 | 0.085 | 0.085 | 0.079 |
| Little social support | 0.018 | 0.014 | 0.014 | 0.018 | 0.018 | 0.019 | 0.016 | 0.018 | 0.017 | 0.018 | 0.017 | 0.021 | 0.021 | 0.025 |

Table 2 continued

| Indicator | All years | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|---------------------------------------|-----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Low social activities | 0.126 | 0.106 | 0.110 | 0.119 | 0.116 | 0.134 | 0.130 | 0.114 | 0.137 | 0.107 | 0.136 | 0.149 | 0.149 | 0.132 |
| Community participation | 0.238 | 0.248 | 0.252 | 0.241 | 0.240 | 0.236 | 0.232 | 0.230 | 0.229 | 0.235 | 0.234 | 0.229 | 0.246 | 0.243 |
| Low neighbourhood satisfaction | 0.048 | 0.052 | 0.049 | 0.042 | 0.046 | 0.049 | 0.048 | 0.046 | 0.056 | 0.049 | 0.043 | 0.046 | 0.048 | 0.053 |
| Low community connection | 0.109 | 0.153 | 0.148 | 0.125 | 0.112 | 0.108 | 0.098 | 0.098 | 0.101 | 0.105 | 0.087 | 0.079 | 0.099 | 0.107 |
| Non-participation in comm. activities | 0.640 | 0.633 | 0.636 | 0.633 | 0.637 | 0.643 | 0.649 | 0.636 | 0.619 | 0.633 | 0.650 | 0.636 | 0.672 | 0.642 |
| Non-participation in voluntary work | 0.155 | 0.153 | 0.174 | 0.166 | 0.162 | 0.145 | 0.133 | 0.141 | 0.141 | 0.152 | 0.157 | 0.156 | 0.165 | 0.170 |
| Personal safety | 0.035 | 0.063 | 0.051 | 0.039 | 0.039 | 0.036 | 0.031 | 0.026 | 0.028 | 0.029 | 0.028 | 0.027 | 0.030 | 0.030 |
| Poor perceived personal safety | 0.035 | 0.063 | 0.051 | 0.039 | 0.039 | 0.036 | 0.031 | 0.026 | 0.028 | 0.029 | 0.028 | 0.027 | 0.030 | 0.030 |

HILDA Survey data (2001–2013). Respondents aged 25–60 years

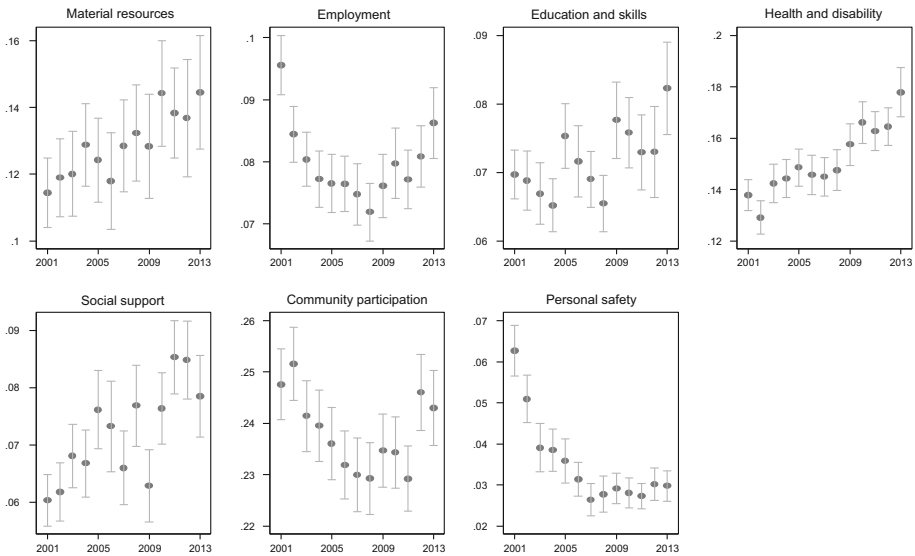


Fig. 2 Time trends in multidimensional poverty dimensions. *Notes* HILDA Survey data (2001–2013). Respondents aged 25–60 years. *Vertical lines* denote two-sided 95 % confidence intervals using the exact method, assuming normally distributed variables

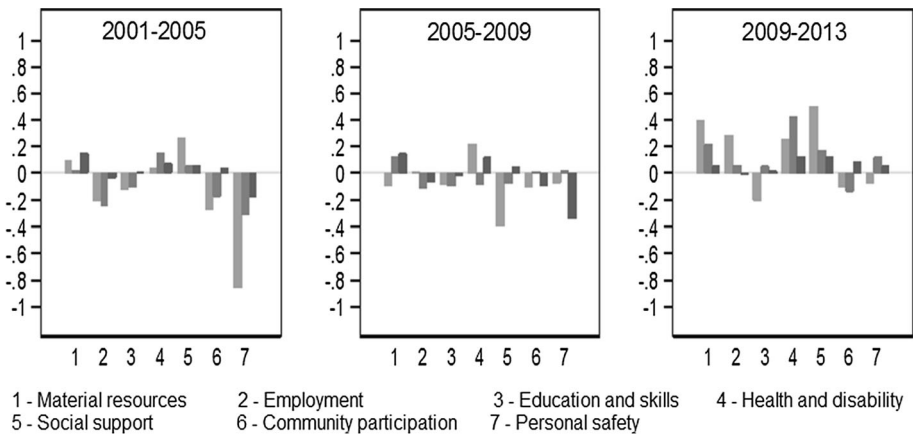


Fig. 3 Decomposition of changes in multidimensional poverty, 2001–2013. *Notes* HILDA Survey data (2001–2013). Respondents aged 25–60 years

Finally, the 2009–2013 period coincides with the GFC and its follow-up years. Over these years, Australia experienced more modest economic growth and real GDP per capita grew at an average annual rate of 0.9 % (WDI 2015).

The results of our decomposition of annual changes in ‘marginal’, ‘deep’ and ‘very deep’ multidimensional poverty in Australia are presented in Fig. 3. When the bar associated with a given factor is below the value 0, this means that such factor contributed to *decreasing* multidimensional poverty rates. Conversely, when the bar associated with a

given factor is above the value 0, it means that the corresponding factor contributed to increasing multidimensional poverty rates. The net reduction in multidimensional poverty in the 2001–2005 period in Australia (from 0.788 to 0.759 for the overall SEM; Table 2) was a product of ‘offsetting’ forces. On the one hand, changes in personal safety, employment, education and community participation contributed to decreasing poverty—particularly the first of these. On the other hand, changes in material resources, health and social support contributed to increasing poverty. The overall value of the SEM decreased also in the 2005–2009 period, from 0.759 to 0.739, and so did the different rates of multidimensional poverty. The drivers behind these changes were nevertheless different to those in the previous time period. Specifically, changes in almost all domains contributed to decreasing poverty equitably. As an exception, changes in material resources and health contributed to increasing poverty. A very different picture emerges for the GFC and post-GFC period (2009–2013). During this time, all factors contributed to increasing poverty, with social support, health, material resources and employment being responsible for the lion share of such increases.

5 Discussion and Conclusion

In this paper we have examined change and stability in multidimensional poverty and its drivers in contemporary Australia, using advanced counterfactual analyses and panel data from the HILDA Survey covering the 2001–2013 period. In doing so, we have contributed to the limited body of evidence by unveiling how the different dimensions of disadvantage interact with each other and how such interactions shape multidimensional poverty over time.

Multidimensional poverty rates in Australia were relatively stable over the 2001–2013 period. A key reason for this was that changes in the different dimensions of disadvantage offset each other, thus contributing to the emergence of a ‘deceiving’ overall picture of poverty stability that masks significant dynamics at the domain level. Yet, we find that since the emergence of the 2008 GFC the prevalence of disadvantage increased with respect to most disadvantage domains, and that changes in most disadvantage domains subsequently contributed to increases in multidimensional poverty. The GFC coincides with the acceleration of negative trends in some domains, and the stalling or reversal of positive trends in others. While more research on the impact of the GFC on multidimensional poverty in Australia is warranted, our results are suggestive that this had a detrimental effect on multidimensional disadvantage overall, and on most of its domains. Our results also complement the findings of earlier research by Azpitarte (2014) who investigated the 2001–2008 period and was thus unable to document the more recent time trends that we observe.

Rationales about which specific poverty domains deserve more and more urgent policy investment can be built upon three grounds: (1) high prevalence of disadvantage in that domain, (2) upwards trends in disadvantage for that domain, and (3) high contributions of disadvantage in that domain to overall poverty rates. Depending on the government’s policy agenda, more priority could be given to one of these trends. Our results shed light over each of these. Community participation, health and material resources are the domains on which the prevalence of Australian disadvantage is highest. Targeting these domains would be important if the main objective is to improve socioeconomic wellbeing in various dimensions simultaneously. The domains that are experiencing the most abrupt upward

prevalence trends are material resources and health. These should be the focus of policy interventions on if the priority is to reduce socioeconomic vulnerability and promote stability. Finally, social support, health and material resources are those disadvantage domains that contribute the most to contemporary multidimensional poverty. If the main objective is to reduce the number of individuals who are multidimensionally poor, policy interventions should be geared towards addressing disadvantage in these domains.

Significantly, each of these three approaches to determine the importance of different domains to Australian poverty identified material resources and health and disability as critical areas for investment. This provides strong indication that Government expenditure in policy reduction should prioritise these arenas. For instance, policies supporting the expansion of the health care system could be used to improve disadvantage concerning health and disability, while efforts aimed at designing a more equitable system of social transfers could alleviate disadvantage pertaining material resources. However, caution must be exerted to circumvent *naïve* extrapolations from our findings: some dimensions of wellbeing may be more malleable by or responsive to public policy. For instance, policy levers aimed at enhancing opportunities in the domain of education would not result in immediate changes in poverty levels, given the time necessary to acquire new skills. Similarly, promoting community participation or social support amongst certain social strata might be more difficult than improving their income levels. Our research points towards the domains hampering overall performance, but says nothing about the feasibility of investment in those domains. Careful judgements, involving trade-offs, need to be made in that regard. Our contribution is to provide the necessary evidence so that such discussions are adequately informed.

Despite the relevance of our findings there are *caveats* to our analyses that point towards avenues for refinement. First and foremost, truly disadvantaged individuals—such as those who are homeless, incarcerated or in mental institutions—are out of the scope of the HILDA Survey (and most other surveys). As a consequence, ours are downward-biased estimates of the true extent of disadvantage in Australia. Second, questionnaire items within the HILDA Survey may not fully tap all dimensions of wellbeing. Dimensions such as Sen's notion of people's rights to make choices, exert control over their lives, and have an equal say in their community are missing, whereas some domains (e.g. employment or education) are arguably better measured than others (e.g. safety or social support). Third, the Cronbach's Alpha score for the dimensions of the SEM in our data was below the optimal threshold of 0.7 (Tavakol and Dennick 2011). Further research should be directed at refining the structure and contents of the SEM to increase its reliability. Fourth, some domains may have 'cascading' effects on others (e.g., health on employment). In other words, the assumption that one can fix one domain at a time when computing its contribution to poverty changes may be restrictive. Further research might overcome this issue by deploying orthogonal transformations that would ensure that component indices are independent from each other. Finally, our analyses are performed on an unweighted index. The use of importance weights to aggregate multiple indicators into a composite index of poverty is a contentious issue (Ravallion 2012) and using the unweighted SEM can be problematic. For example, having an income below a certain poverty threshold is treated equivalently to having low satisfaction with safety feelings or receiving little social support. Theoretically speaking, this is an issue of marginal rates of substitution. In the case of measuring pecuniary poverty indicators, we assume that the market prices provide the correct weights for aggregating income from different sources or consumption of different items. Although, it is possible to assign different weights to each poverty dimension when measuring multidimensional poverty, it is hard to do so without value judgements

permeating the choice of weights. In addition, research suggests that multidimensional poverty rates are sensitive to even small variations in weights (Martinez 2015). Future research might want to examine the robustness of our results to the application of different weighting schemes in the SEM.

The contribution of income deprivation to Australian poverty was important, yet our results highlight that expanding the focus to encompass non-income dimensions of well-being provides additional valuable information that can be used to design efficient and effective policy interventions. This implies that any policies designed to improve social wellbeing in Australia should move away from a narrow focus on income, and incorporate other dimensions, particularly health, social support and community participation. Altogether, our findings underscore the importance of taking a more holistic approach to tackling poverty and disadvantage in Australia. This, we argue, can only be realised by leveraging methodological innovation in multidimensional poverty measurement and monitoring.

Poverty and disadvantage in Australia are clearly against the national ideal of a 'fair go' and remain an 'unfinished' policy agenda, hampering national social progress and presenting true challenges to sustainable economic growth. Although the shares of Australians who are categorized as deeply or very deeply disadvantaged (1.5 and 6 %, respectively) may seem small, the actual numbers (345,000 and 1,380,000) are very large. Beyond the moral imperative of improving the situation of these people, from a public health perspective it is important to stress how even small decreases in the share of individuals experiencing this form of disadvantage would result in vast social and economic benefits at the societal level. Researchers, policy makers and other stakeholders need to redouble their efforts to ensure that the benefits of economic expansion reach individuals in all social strata; else the ongoing spell of economic growth in Australia will be remembered historically as a lost opportunity to balance the social system.

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