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Was Economic Growth in Australia Good for the Income-Poor? and for the Multidimensionally-Poor?

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Was Economic Growth in Australia Good for the Income-Poor? and for the Multidimensionally-Poor?*

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Abstract

We investigate the pro-poorness of Australia's strong economic growth in the first decade of the XXI century using anonymous and non-anonymous approaches to the measurement of pro-poor growth. The sensitivity of pro-poor growth evaluations to the definition of poverty is evaluated by comparing the results for the standard income-poverty measure with those based on a multidimensional definition of poverty. We find that Australian growth in this period can be only categorized as pro-poor according to the weakest concept of pro-poorness that does not require any bias of growth towards the poor. In addition, our results indicate that growth was clearly more pro-income poor than pro-multidimensionally poor. Counterfactual distribution analysis reveals that differences in the distribution of health between these two groups is the non-income factor that most contributes to explain this result.

Keywords: growth, pro-poor, anonymity axiom.

JEL Classification: D3, I32.

1   Introduction

After two decades of economic growth Australia is now viewed internationally as the paradigm case of a dynamic economy capable of sustaining strong economic growth. In the period 2000-2010, Australia outperformed most economies in the developed world with an average GDP per capita annual growth above 2 per cent. This was the largest output growth among the rich OECD economies, which made Australia the sixth richest country within this group, only behind Luxembourg, Norway, U.S., Switzerland, and Netherlands.[1] The increase in output came alongside a significant rise in employment. Thus, in 2008 Australia recorded its lowest level of unemployment since 1978, with an unemployment rate slightly above 4 per cent. Much has been written on the Australian economic miracle, however, yet little is known about the extent to which it has benefited the most disadvantaged groups in this country.

The main aim of this paper is to fill this gap by investigating the pro-poorness of Australia's economic growth using alternative concepts and approaches to the measurement of pro-poor growth.[2] Recent evidence suggests that Australia's economic growth was not distributionally neutral. For instance, the P90/P10 ratio for equivalised disposable household income increased between 2000 and 2006 from 3.97 to 4.05 (ABS, 2011). In the same period, the share of income received by the richest twenty per cent rose by almost one percentage point (from 38.5 to 39.2), whereas the Gini index increased from 0.311 to 0.314.[3] These figures are consistent with earlier results in the literature that point to a rise in income differences. Saunders and Hill (2008) and Saunders and Bradbury (2006) find a significant rise in the proportion of income-poor people in Australia between 1993 and 2004. Wilkins (2007) concludes that the failure of the incomes of low-income people to keep pace with the growth of the median income between 1980 and 2004 explains

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[1]Ranking derived using the series of GDP at purchasing power parity per capita elaborated by the OECD and available at http://stats.oecd.org/Index.aspx.

[2]Some of the results presented in this paper were already discussed in Azpitarte (2012). This is an improved and augmented version with new results that were not available by the time the first version was written.

[3]Because of the changes in the methodology used by the ABS, the estimates for 2007-2010 are not directly comparable with those for previous years. The comparison of the figures for 2000 and 2010 suggests an even larger increase. The P90/P10, the income share of the top quintile, and the Gini index for 2010 are 4.21, 40.2, and 3.28, respectively.

the increase in relative poverty over that period. Importantly, pro-poor growth analysis provides valuable insights about the distributional impact of economic growth that cannot not be derived from the study of inequality and poverty measures. Inequality indices inform about the differences in the income distribution while poverty measurement is concerned with the short-fall of those who are below the poverty line. Alternatively, pro-poor growth measures evaluate the impact of growth on poverty by looking at the relative and absolute income gains of the poor.[4]

The second objective of this paper is to investigate the extent to which pro-poor growth evaluations depend on the definition of poverty considered. It is nowadays widely agreed that poverty has multiple dimensions, some of which are not captured by traditional income-based poverty measures. Thus, many authors have called for the need to define broader measures of poverty that take into account the many dimensions of well-being (Stiglitz *et al.* 2009). We compare the results based on the standard income-poverty definition with those derived using a multidimensional framework recently proposed to measure poverty in Australia (Scutella *et al.*, 2009a). This exercise is interesting for various reasons. First, it will serve to evaluate the capacity of different poverty definitions to identify those individuals that are most likely to be left behind in the process of economic growth. Most importantly, the comparison between growth evaluations based on multidimensional and income-poverty measures will allow us to investigate the importance non-income dimensions of welfare when measuring the income gains of those idetified as poor, as well as, to determine the non-income attributes that are likely to shape the conclusions about the pro-poorness of growth.

To evaluate Australia's growth we use data from the Household, Income and Labour Dynamics in Australia (HILDA) Survey. This is a nationally representative survey that is particularly suitable for pro-poor growth analysis as it provides longitudinal and cross-sectional information on households' incomes. Although the data is available up to 2010, we focus our analysis on the period 2001-2008 to avoid the influence of the global financial crisis on the results. We find that the income gains from economic growth were highly concentrated at the top of the distribution, with the only positions of the parade that grew more than mean being those above the 90th percentile. Consequently, Australia's growth can be deemed to be pro-poor only according to the weakest concept of pro-poorness which does not require any particular bias of growth towards the poor. Further, we

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[4]Groll and Lambert (2012) show using simulation analysis with parametric distributions that pro-poor growth generally leads to a decline in relative inequality. There exist, however, pro-poor growth patterns that exarcebate inequality.

find that the evaluation of growth critically depends on the concept of poverty adopted. Thus, while growth clearly benefited the income-poor, the income gain of those who were multidimensionally-poor was well below that of the mean. We apply the Oaxaca-Blinder and DiNardo-Fortin-Lemieux decomposition techniques to investigate the contribution of the different dimensions of poverty to the explain the gap between the two definitions of poverty. Our results suggest that differences in initial characteristics account for a significant part of this gap. In particular, we find that differences in the distribution of health and the larger incidence of people with disabilities or long-term health conditions among those who were poor in multiple dimensions are the non-income attributes that contribute the most to explain why growth was more favorable for the income-poor than for those facing multidimensional poverty.

The rest of the paper is organized as follows. In Section 2, we discuss the various concepts of pro-poorness, as well as, the different approaches to the measurement of pro-poor growth. Also in this section, we present the pro-poor growth measures we use in the analysis. Section 3 describes the data sources and definitions used in the paper. In Section 4, we present the main results on the pro-poorness of Australia's growth for the different approaches and poverty definitions. We complete this section presenting a decomposition of the growth gap between the income and the multidimensionally-poor. Finally, Section 6 summarizes our main conclusions.

2   Concepts and Measures

2.1   The concept of pro-poor growth

The impact of growth on poverty is a function of two factors: the magnitude of growth, i.e., the change in the mean income, and how the income gains are distributed among different groups (Datt and Ravallion, 1992). At present, however, no consensus has been reached on how to integrate these two elements into an appropriate definition of pro-poor growth (Kakwani and Son 2008, Klasen 2008, Duclos 2009, Ravallion and Chen 2003, Kakwani and Pernia 2000). In this analysis we make use of the three concepts that have received the greatest attention in the literature, namely, the *poverty reducing*, the *relative*, and the *absolute* concepts of pro-poor growth. Proposed by Ravallion and Chen (2003), the first of these concepts identifies growth as pro-poor whenever it leads to a reduction in poverty. By looking only at the change in poverty, this definition fails to capture whether growth has a bias in favor of the poor as it characterizes growth patterns without accounting for

how the benefits from growth are distributed among the population. The relative and absolute definitions of pro-poorness proposed by Kakwani and Pernia (2000) are stronger as they require a particular distribution of benefits between the poor and non-poor. In the relative case, growth can be characterized as pro-poor only when it increases the share of total income accumulated by the poor by benefiting the poor proportionally more than the non-poor. The absolute concept requires an absolute bias of growth in favor of the poor. Thus, for growth to be considered absolutely pro-poor, the income gain for the poor needs to exceed that of the non-poor so that absolute differences in income between these two groups are reduced as a consequence of growth. Importantly, the relative and absolute concepts both stress the distributional component of growth while omitting any reference to the absolute magnitude of poverty reduction. Osmani (2005) proposes a reformulation of these definitions in which the bias in favor of poor is expressed as a function of the difference between the actual reduction of poverty and the reduction that could be achieved in a distributionally neutral growth scenario. Within this framework, economic growth is relatively pro-poor if it leads to a reduction of poverty greater than the one observed if the benefits from growth were distributed in order to leave relative inequality unchanged. Similarly, growth is pro-poor in the absolute sense when it reduces poverty by more than a equally distributed growth pattern would.

Note that in a context of positive growth, the absolute definition imposes the strongest conditions as it requires that growth benefits the poor more than the non-poor in both absolute and relative terms. Further, the poverty reducing definition is the weakest of the three concepts as it focuses only on the effect of growth on poverty without incorporating any value judgment on inequality. However, as Kakwani and Son (2008) rightly point out, the ranking of concepts reverses when growth is negative. Indeed, when this is the case, the poverty reducing concept becomes the strongest one as it requires a increase in the income of the poor even when there is decline in aggregate income.

2.2 Measuring pro-poor growth

Different approaches and measures aimed to articulate the different concepts of pro-poorness have been proposed in the literature. These approaches fall into two broad categories depending on whether the anonymity axiom is satisfied or not. This axiom, otherwise called the 'symmetry' axiom, is one of the core axioms in welfare economics and it is generally invoked for the measurement of income inequality and poverty. Social evaluations consistent with this axiom use exclusively information on the income variable excluding any other people's attributes from the social choice problem. In the context of

pro-poor growth measurement, anonymity implies that growth assessments are based on cross-sectional comparison of the marginal distributions of income before and after economic growth (Kakwani and Son 2008, Ravallion and Chen 2003, Son 2004). Importantly, by focusing only in the income changes at different *positions* of the income distribution, anonymous measures disregard the issue of income mobility from the growth evaluation. As Grimm (2007) and Bourguignon (2010) argue, however, by excluding economic mobility from growth evaluations, anonymous measures may provide an incomplete picture of the pro-poorness of growth as they are not sensitive to the impact of growth on those who were *initially* poor. Clearly, growth evaluations that take into account the income change experienced by the initially poor need to incorporate information on the initial status of individuals and consequently they would fail to satisfy the anonymity axiom. Next we discuss the main features of these two approaches and the measures derived from them that we use in our empirical analysis.

2.2.1 Measures based on the anonymity axiom

Let y be the relevant income variable and let μ stand for its mean value. We denote by γ and Δ the growth rate and the absolute change in the mean income between dates $t-1$ and t. Let $F_{t-1}(y)$ and $F_t(y)$ be the initial and final cumulative distribution functions of income informing about the proportion of the population with income less than y at $t-1$ and t. Pro-poor growth evaluations consistent with the symmetry axiom are based exclusively on the information contained in these two functions. Within this approach, the most popular instrument for the measurement of pro-poor is the 'growth incidence curve' (GIC) proposed by Ravallion and Chen (2003). If we denote by $y_t(p) = F_t^{-1}(p)$ the p-th quantile of the income distribution, then the growth rate $g(p)$ of this quantile can be expressed as:

$$g(p) = \frac{y_t(p)}{y_{t-1}(p)} - 1.$$

The GIC shows the growth rates at different positions of the distribution ranging from the lowest quantile to $p_{\max}$. In the present analysis, pro-poor growth evaluations will be made for a general class of additively decomposable poverty measures that we denote by P. For any poverty line,[5] z, any poverty measure in this class can be written as

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[5] As it is common in the pro-poor literature, we will assume that the poverty line remains constant in real terms over time. Deutsch and Silber (2011) analyse the pro-poorness of growth in Israel between

$$P = \int\limits_{0}^{z} \theta(y, z) f(y) dx,$$

where $\theta(y, z)$ is an individual-poverty function homogeneous of degree zero in both arguments, and $f(y)$ is the density function of income. Importantly, this class includes the most common measures of poverty used in the literature including the Foster-Greer-Thorbecke (1984) family of indices FGT_α and the Watts (1968) index W.[6] Importantly, the GIC can be used to derive dominance results on pro-poorness for the class P of poverty measures. Let $H(y)$ denote the headcount index defined as the proportion of individuals whose income is less than y. Thus, when $g(p) > 0 \; \forall p < H(z)$ one can conclude that growth was poverty reducing for any poverty measure within this class (Atkinson 1987, Foster and Shorrocks 1988). Theorem 1 in Essama-Nssah and Lambert (2009) provides sufficient conditions for relative and absolute pro-poorness for every poverty index in P but the headcount ratio, for which these conditions do not apply.[7] Thus, if $g(p) > \gamma$ $\forall p < H(z)$ growth can be said to be relative pro-poor for any poverty measure within this group. Further the condition $g(p) > \frac{\Delta}{y_t(p)} \; \forall p < H(z)$ is sufficient to characterize growth as absolute pro-poor for the same group of poverty indices.[8]

When the dominance conditions are not satisfied we need to rely on partial pro-poor growth measures that allow us to draw conclusions for a particular poverty measure. For the present analysis we will consider the family of *poverty equivalent growth rate* ($PEGR$) measures proposed by Kakwani and Son (2008). Defined for the entire class of additively decomposable poverty measures, this is a general family that encompasses other well-known measures of pro-poor growth including the *mean growth rate of the poor* proposed

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1990 and 2006 considering alternative ways of defining the poverty line and concepts of pro-poor growth. They find that although these choices affect the results, the overall characterization of the growth pattern is robust to these choices.

[6]For the FGT_α family the individual poverty function is equal to $\theta(y, z) = (\frac{z-y}{z})^\alpha$, where α is the parameter of inequality aversion. When α is set equal to $0, 1$, or 2, this expression leads to the headcount measure, the poverty gap ratio and the severity of poverty index, respectively. In the case of the Watts index the poverty function is given by $\theta(y, z) = Ln(\frac{z}{y})$.

[7]In particular, this Theorem covers any poverty measure P whose individual poverty function is decreasing and convex. The headcount index clearly fails to satisfy this property.

[8]These necessary conditions correspond to the case of positive income growth. This is precisely the type of growth observed in Australia for the period under analysis so we decided not to discuss the case of negative growth. For more on this see Essama-Nssah and Lambert (2009).

by Ravallion and Chen (2003).[9] The $PEGR$ can be used to articulate the different concepts of pro-poor growth as it characterizes growth patterns taking into account both the change in the mean income and how the benefits from growth are distributed among the population. Using the original notation of the authors, the $PEGR$ is given by

$$PEGR = (\frac{\delta}{\eta})\gamma = \varphi\gamma,$$

where $\delta = \frac{dLn(P)}{\gamma}$ is the growth elasticity of poverty, and $\eta = \frac{1}{P}\int_0^H \frac{\partial P}{\partial y}y_t(p)dp$ is the neutral relative growth elasticity of poverty derived by Kakwani (1993), which indicates the percentage change in poverty caused by a 1 per cent growth in the mean income when all incomes grow at the same rate leaving relative inequality unchanged.[10] Therefore, the $PEGR$ is the growth rate that would bring the actual reduction in poverty, $\delta\gamma$, provided that growth increases all incomes by the same proportion. Importantly, for any additively decomposable poverty measure, the $PEGR$ is consistent with the direction of change in poverty so that it can be used to infer whether growth is poverty-reducing or not: a positive (negative) value of $PEGR$ implies a decline (increase) in the level of poverty. Further, a value of $PEGR > \gamma$ implies that the actual poverty reduction is greater than the one that would be observed under equiproportional growth, and consequently growth can be classified as relative pro-poor. Lastly, as Kakwani and Son (2008) show, we can say that growth was pro-poor in the absolute sense when $PEGR > \bar{\gamma} > \gamma$, where $\bar{\gamma} = \gamma(1 + \delta(\frac{1}{\eta} - \frac{1}{\eta^*}))$ and η^* is the neutral absolute growth elasticity of poverty which tells us the percentage change in poverty when the gains from growth are equally distributed among the population.

2.2.2 Measures derived without postulating the anonymity axiom

Pro-poor growth measures based on the anonymity axiom evaluate growth patterns by comparing the cross-section distributions of income without taking into account individuals' mobility within these distributions. Consequently, social evaluations based on anonymous measures are independent of the extent to which growth benefits the initially

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[9] This is defined as the area under the GIC up to the headcount index divided by the headcount measure, and it can be expressed as $\frac{1}{H}\int_0^H g(p)dp$.

[10] When P.is set equal to the Watts index of poverty, then the $PEGR = \frac{1}{H}\int_0^H g(p)dp$, where the term on the right hand side is the pro-poor growth index proposed by Ravallion and Chen (2003).

poor. This, however, is an issue that many would consider as relevant for assessing the pro-poorness of any growth pattern. To measure the pro-poorness of growth in Australia without postulating anonymity we use the measurement framework proposed by Grimm (2007). Within this framework, it is assumed that individuals can be followed over time such that the joint income distribution function $F(y_{t-1}, y_t)$ can be inferred for a fixed population. It can also be assumed that individuals can be ranked in ascending order according to some variable, Ω_{t-1}, reflecting their initial status at $t-1$.[11] Let $p(\Omega_{t-1})$ denote a variable informing about the absolute rank of individuals according to the indicator Ω_{t-1}. The income growth rate for the different positions within this rank can then be computed as

$$g(p(\Omega_{t-1})) = \frac{y_t(p(\Omega_{t-1}))}{y_{t-1}(p(\Omega_{t-1}))} - 1,$$

where $y(p(\Omega_{t-1}))$ denotes the income of the individual located in the p-th position of the ranking based on the Ω_{t-1} variable. Similarly, the absolute variation for each position is given by

$$v(p(\Omega_{t-1})) = y_t(p(\Omega_{t-1})) - y_{t-1}(p(\Omega_{t-1})).$$

Grimm (2007) proposes the mean growth rate ($MGRIP$) and the mean income variation ($MVIP$) of the initially poor as anonymous measures of pro-poor growth. These can be expressed in terms of the function $g(p(\Omega_{t-1}))$ and $v(p(\Omega_{t-1}))$ as follows

$$MGRIP = \frac{1}{H} \int_0^H g(p(\Omega_{t-1}))dp,$$

and

$$MVIP = \frac{1}{H} \int_0^H v(p(\Omega_{t-1}))dp,$$

where H indicates the percentage of individuals classified as initially most disadvantaged according to the indicator Ω_{t-1}. It is worth noting the differences between these measures

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[11]Grimm's original formulation is in terms of the initial income of individuals. However, the framework is still valid when Ω_{t-1} refers to any other welfare indicator.

and the measures consistent with the anonymity axiom. Growth evaluations based on the anonymous measures proposed by Kakwani and Son (2008) and Ravallion and Chen (2003) look at the income change experienced by those *positions* in the income distribution below some poverty threshold without taking into account whether the occupants of these positions before and after growth are the same or not. In contrast, both the $MGRIP$ and the $MVIP$ use information on $\{F(y_{t-1}, y_t), \Omega_{t-1}\}$ to describe transitions between $t-1$ and t by linking income growth to the initial conditions of individuals. Given a ranking of individuals at the initial period, $p(\Omega_{t-1})$, the $MGRIP$ and the $MVIP$ summarize the income change experienced by those characterized as initially poor according to Ω_{t-1}, omitting any information on those who were initially above the poverty threshold. Importantly, despite their focus on the initially conditions, non-anonymous pro-poor growth measures can be used to assess the level of pro-poorness of growth. Following Grimm (2007) we define growth as unambiguously poverty reducing when the $MGRIP > 0$, i.e., when the average income growth among the initially poor is positive. Also, growth can be deemed to be pro-poor in relative terms when growth benefits relatively more those who are initially poor, i.e., when $MGRIP$ is larger than the growth rate in the overall mean, γ. Lastly, growth can be characterized as absolute pro-poor when $MVIP > \Delta$.[12]

3   Data Sources and Definitions

We use data included in first eight waves of the HILDA Survey. This is a nationally representative survey that is particularly suitable for our analysis as it contains longitudinal and cross-sectional information that can be exploited to estimate anonymous and non-anonymous pro-poor growth measures. The HILDA survey began in 2001 with a sample of 7,682 households containing 19,914 people. Of these, 13,969 individuals who were above 15 years of age in 2001 responded to an individual questionnaire including multiple questions on socioeconomic variables. Subsequent waves of HILDA have collected information from members of the original sample and from other new members of their households related to them.[13] Information on all members of the responding households from each wave of HILDA is used for the cross-section analysis, whereas longitudinal results are based on the panel data derived from the 13,969 respondents interviewed in the

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[12]Differently to the anonymous pro-poor growth measures, to the best of our knowledge no formal relationship between the anonymous measures and the variation of a particular poverty measure has been established in the literature.

[13]For a detailed description of the HILDA sample see Wooden and Watson (2007).

first wave. Importantly, using the appropriate cross-sectional and longitudinal weights, this information can be used to study the changes in the Australian income distribution between the 2001 and 2008, as well as, the link between the initial conditions and income changes experienced by individuals over this period. To examine possible differences in the growth pattern within this period, in addition to the results for the 2001-2008 period, partial results for the 2001-2005 and 2005-2008 sub-periods are also discussed.

The unit of analysis we use in this paper is the individual. We assume individuals' income is a function of the total income of the household to which they belong to. Concretely, each individual is assigned the equivalent household income, defined as total income per adult equivalent, where the number of equivalent persons is computed using the parametric specification proposed by Buhmann *et al.* (1988) given by

$$e = N^\theta,$$

where N is the household size and θ is the measure of economics of scale within the household. Throughout the present analysis, a value for θ equal to 0.5 is assumed. Importantly, the main conclusions of the analysis are robust to the choice of this parameter.[14] The income variable considered in the analysis is household disposable income. This is defined as the sum of wages and salaries, business and investment income, private pensions, private transfers, and windfall income received by any household member. Further, our income variable includes the value of all public transfers provided by the Australian government, including pensions, parenting payments, scholarships, mobility and carer allowances, and other government benefits. The sum of these income components is reduced by personal income tax payments made by household members during the financial year. Finally, non-positive income values are excluded from the computations and all income values are expressed in 2008 Australian dollars using the consumer price index provided by the Australian Bureau of Statistics.

For the non-anonymous pro-poor growth analysis, the link between poverty and income growth is studied using panel data for those individuals who were above 15 years of age when first interviewed in 2001. Two different approaches to the measurement of poverty are considered for the analysis. The first is the standard income-poverty approach in which income is the only relevant variable for defining individual's poverty condition. Results from this approach will be compared with those derived using the multidimensional poverty index recently developed by the Melbourne Institute of Applied Economic

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[14]Estimation results for alternative values of θ not presented here are available upon request.

and Social Research and the Brotherhood of St Laurence to measure poverty in Australia (Scutella *et al.* 2009a, 2009b). This measure recognizes the multidimensionality of disadvantage incorporating information on 21 indicators from seven different domains: material resources; employment; education and skills; health and disability; social; community; and personal safety. A summary measure of poverty is derived from these indicators using a 'sum-score' method. This variable takes values in the interval $[0, 7]$, where 0 corresponds to the highest level of social exclusion. A complete description of the poverty index and the different indicators is presented in the Appendix.

4 Results

4.1 Anonymous pro-poor growth measures

From 2001 to 2008, Australia witnessed strong and continuous economic growth. Based on HILDA data, figures on Table 1 suggest that mean and median income values grew more than 3.2 and 2.8 per cent per year during this period. Growth was particularly high between 2001 and 2005 where average income rose more than 3.6 per cent annually, whereas it slightly slowed down after 2005 with both mean and median values growing about 2.6 per cent. Changes in the mean and the median cannot be used to assess whether the distributional change was pro-poor as they are completely uninformative about the changes that took place at different parts of the distribution.

Table 1. Annual income growth in Australia between 2001 and 2008

Period	Mean		Median	
	Variation ($)	Growth rate (%)	Variation ($)	Growth rate (%)
2001-2008	1,370.68	3.25	1,042.47	2.87
2001-2005	1,491.51	3.69	1,048.77	3.01
2005-2008	1,209.59	2.66	1,034.08	2.68

Note: Estimates computed using cross-sectional enumerated person weights.
Source: Author's calculation using HILDA data.

Figure 1 presents our estimates of the Australia's GICs consistent with the anonymity axiom for the periods 2001-2008, 2001-2005, and 2005-2008.[15] Curves for the whole period

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[15] These and all the other estimates of pro-poor growth measures presented in this section were computed using the Distributive Analysis Stata Package developed by Abdelkrim and Duclos (2007).

and the two sub-periods are remarkably similar. The shape of the three curves indicates that growth affected the income of every position within the income distribution. In particular, the GICs are above zero in the whole domain which means that growth was positive over the whole distribution. Therefore, for a broad class of poverty measures and any poverty line, we can conclude that growth in Australia in the period 2001-2008 was pro-poor according to the poverty reducing definition. However, the sufficient conditions for relative and absolute pro-poor growth are clearly not met. For any period considered, the curves shown in Figure 1 suggest that growth was highly concentrated at the top end of the distribution with most of the bottom and middle positions growing less than the average. In fact, the GIC for 2001-2008 shows that the only positions that grew more than the mean in this period where those above the 90th percentile which implies that, for any relevant set of poverty lines, growth cannot be unambiguously characterized as relative or absolute pro-poor. For these definitions, therefore, we need to rely on partial results derived using specific combinations of poverty lines and poverty measures.

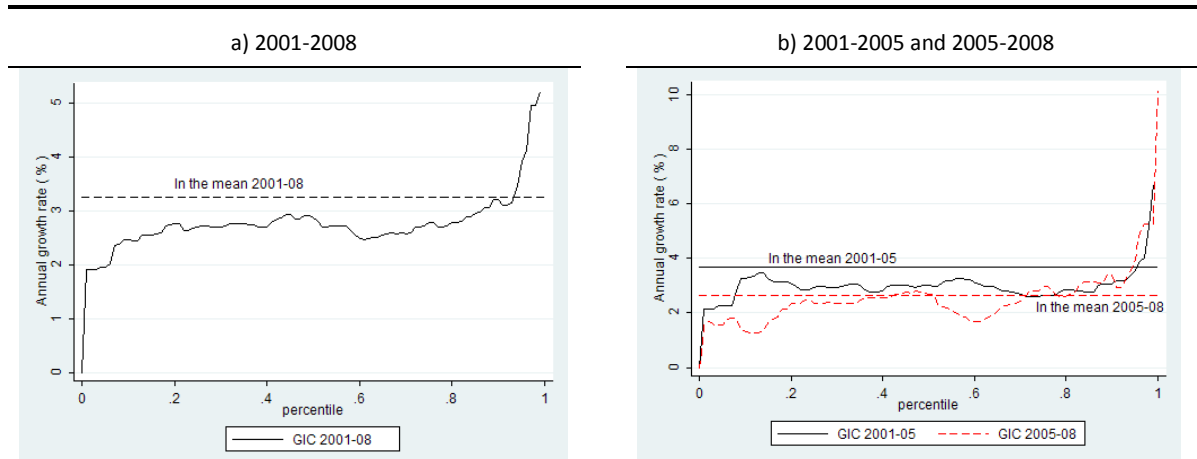**Figure 1.** Growth incidence curves for Australia, 2001-2008

Notes: Estimates computed using cross-sectional enumerated person weights
Source: Author's calculation using HILDA data.

Table 2 shows the estimates of the partial pro-poor growth measures consistent with the symmetry axiom for different additively decomposable poverty measures and a range of poverty lines. Concretely, we calculate the $PEGR$ for the Watts index and three well-known measures within the FGT_α class of poverty measures: the headcount index, the poverty gap ratio, and the severity of poverty. Note that these three measures differ in terms of the weight assigned to those incomes that fall well below the poverty line.

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In particular, pro-poor growth evaluations based on the severity index put more weight on the lowest incomes than the headcount measure, with the poverty gap ratio lying somewhere in between. Poverty thresholds are defined using various percentiles of the initial distribution so that the proportion of people identified as poor is known. Consistent

<table>
<tr><th rowspan="3">Threshold=
pth- income
percentile</th><th colspan="4">Poverty equivalent growth rate (PEGR)</th></tr>
<tr><th rowspan="2">Watts</th><th>Headcount</th><th>Poverty gap</th><th>Severity of</th></tr>
<tr><th>ratio</th><th>ratio</th><th>poverty</th></tr>
<tr><td colspan="5" align="center">2001-2008</td></tr>
<tr><td colspan="5" align="center">(annual growth in the mean=3.25 %)</td></tr>
<tr><td>5</td><td>1.53</td><td>2.04</td><td>1.63</td><td>1.56</td></tr>
<tr><td>10</td><td>1.88</td><td>2.21</td><td>1.77</td><td>1.50</td></tr>
<tr><td>15</td><td>2.08</td><td>2.24</td><td>1.82</td><td>1.54</td></tr>
<tr><td>20</td><td>2.22</td><td>2.19</td><td>1.82</td><td>1.58</td></tr>
<tr><td>50</td><td>2.55</td><td>2.38</td><td>1.79</td><td>1.57</td></tr>
<tr><td colspan="5" align="center">2001-2005</td></tr>
<tr><td colspan="5" align="center">(annual growth in the mean=3.69 %)</td></tr>
<tr><td>5</td><td>1.74</td><td>2.47</td><td>2.07</td><td>2.22</td></tr>
<tr><td>10</td><td>2.16</td><td>2.38</td><td>2.20</td><td>1.99</td></tr>
<tr><td>15</td><td>2.57</td><td>3.33</td><td>2.34</td><td>1.96</td></tr>
<tr><td>20</td><td>2.71</td><td>3.23</td><td>2.43</td><td>2.00</td></tr>
<tr><td>50</td><td>2.85</td><td>3.14</td><td>2.37</td><td>2.01</td></tr>
<tr><td colspan="5" align="center">2005-2008</td></tr>
<tr><td colspan="5" align="center">(annual growth in the mean=2.66 %)</td></tr>
<tr><td>5</td><td>1.28</td><td>1.26</td><td>0.85</td><td>0.56</td></tr>
<tr><td>10</td><td>1.47</td><td>1.20</td><td>1.02</td><td>0.70</td></tr>
<tr><td>15</td><td>1.41</td><td>1.21</td><td>0.93</td><td>0.75</td></tr>
<tr><td>20</td><td>1.54</td><td>1.57</td><td>0.92</td><td>0.75</td></tr>
<tr><td>50</td><td>2.13</td><td>1.76</td><td>1.01</td><td>0.76</td></tr>
</table>

Table 2. Partial pro-poor growth measures for Australia, 2001-2008

Notes: All variables expressed in percentage . As discussed in Section 2, the PEGR is defined for a general class of additively decomposable poverty measures including the ones presented in this table. Robustness checks were conducted assuming alternative poverty indices within this class. These results, available upon request, yield equivalent conclusions about the growth pattern. Estimates derived using cross-sectional enumerated person weights.

Source: Author's calculation using HILDA data.

with the results from the GICs, we find that for any combination of thresholds and poverty measures the estimates are positive, which means that growth was poverty reducing. Interestingly, however, estimates in Table 2 suggest that, regardless the poverty line and the poverty index, the growth pattern in Australia between 2001 and 2008 cannot be

characterized as either relatively or absolutely pro-poor. In fact, for all the periods considered the $PEGRs$ are always below the actual growth rate of the mean.[16] Thus, for instance, for the period 2001-2008 and for a poverty line equal to the 10th percentile, the amount of equally distributed growth that would bring the actual reduction in poverty as measured by the headcount index is 2.21 per cent, more than one percentage point less than the actual growth rate. Further, the comparison across FGT_α poverty measures suggests that the pro-poorness of Australian growth falls as more weight is assigned to the poorest positions. This comes from the fact that the $PEGRs$ based on the severity index are in general below those for other indices, which means that the lowest incomes benefited from growth less than any other positions within the distribution.

4.2   Non-anonymous pro-poor growth measures

Anonymous pro-poor growth evaluations based on the cross-sectional comparison of marginal distributions do not provide any information on the gains experienced by those identified as initially poor. To obtain some insight on this issue we must turn to non-anonymous pro-poor growth measures. We study the link between poverty and income growth using the standard income indicator and a multidimensional measure of poverty. For both of these measures we present results for the periods 2001-2008 and 2001-2005. To control for measurement error in individuals' income we consider a two-year income average as our measure of income. Estimates for 2001-2008 are based on a sample with 8,700 individuals present at waves 1,2, 7 and 8 of HILDA for whom the 2001-2002 and 2007-2008 average incomes can be compared whereas results for 2001-2005 use information from 9,521 individuals observed at waves 1,2, 4 and 5 of the survey.

Table 3 shows the $MGRIP$ and the $MVIP$ computed for a set of thresholds used to identify the poorest individuals in the base year according to the two poverty measures. In particular, we consider thresholds set equal to different percentiles of the distributions of the poverty indicators. This table suggests that income gains among the initially poor were on average positive regardless of the definition of poverty considered. This implies that growth can be deemed to have been poverty reducing for both the unidimensional and the multidimensional approaches to poverty. However, evaluations based on the relative

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[16]From Kakwani and Son (2008) we know that the growth rate in the mean, γ, is always less than the threshold $\bar{\gamma}$ defined by these authors to characterize absolute pro-poor growth. Therefore, $PEGR < \gamma$ implies that growth was not absolute pro-poor either.

and absolute concepts of pro-poor growth depend on the definition of poverty adopted. As it is clear from Table 3, those who were on low-incomes particularly benefited from income growth. In fact, we find that for the periods 2001-2008 and 2001-2005 growth in Australia was relative pro-income poor as the average income growth rate of those who

Table 3. Anonymous partial pro-poor growth measures for Australia, 2001-2008

Threshold= pth-percentile of the poverty indicator in 2001	Mean annual variation (MVIP) and mean annual growth rate (MGRIP) of the initially poor							
	Individuals ranked by:				Individuals with age>25 in 2001 ranked by:			
	Income		Multidimensional poverty		Income		Multidimensional poverty	
	MVIP ($)	MGRIP (%)	MVIP ($)	MGRIP (%)	MVIP ($)	MGRIP (%)	MVIP ($)	MGRIP (%)
2001-2008 (annual growth in the mean=3.25 %; annual increase in the mean= $1,370.68)								
5	1,781.9	10.13	705.71	3.03	1,542.92	9.24	415.86	2.37
10	1,367.6	6.97	598.79	2.56	1,174.74	6.18	363.90	1.87
15	1,248.7	5.91	737.63	2.81	1,050.19	5.12	405.13	1.96
20	1,221.3	4.99	744.79	2.68	1,044.15	4.37	493.88	1.95
50	1,343.5	3.94	912.36	2.49	1,160.94	3.41	720.49	1.97
2001-2005 (annual growth in the mean=3.69 %; annual increase in the mean= $1,491.51)								
5	2,684.3	16.49	468.86	4.13	2,356.67	15.09	351.00	4.06
10	1,880.9	10.86	493.47	3.69	1,675.40	9.96	397.97	3.47
15	1,657.9	8.89	550.88	3.66	1,469.73	8.07	411.37	3.31
20	1,581.8	7.28	613.37	3.50	1,401.27	6.62	579.48	3.22
50	1,597.4	5.23	715.95	3.14	1,476.74	4.85	673.18	3.04

Notes: *MVIPs* and *MGRIPs* computed for the *p%* initially most poor in terms of income or multidimensional poverty.
All estimates computed using longitudinal responding person weights.

Source: Author's calculation using HILDA data.

were in low- income was above the growth rate in the mean no matter which threshold is used to identify the poor. Also, the absolute income gain of the income-poor between 2001 and 2005 was larger than that of the mean for all poverty lines, which implies that growth in this period can be also characterized as absolute pro-income poor. For the period 2001-2008 this result holds only for income poverty thresholds below the 10th percentile of the initial income distribution. Remarkably, we find that Australia's growth from 2001 to 2008 was clearly more pro-income poor than pro-multidimensionally poor. In fact, in contrast with the case of income-poverty, we find that growth in this period cannot be considered

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either relative or absolute pro-poor using a multidimensional measure of poverty. Thus, for any poverty threshold, both the average income gain and income growth rate of those identified as poor according to the multidimensional poverty measure are well below those of the mean. For instance, for the 10th per cent threshold, the mean growth rate among the most poor according to the this measure was 2.56 per cent, 0.7 and 4.4 percentage points less than the growth rate of the mean and of the income-poor, respectively. It was hypothesized that this difference in the benefits from growth between the income and the multidimensionally-poor could be explained by a larger presence of individuals at early stages of the income life-cycle among the former group. The figures on the right hand side of the table show the growth rates computed excluding all those individuals whore were below 25 years of age in 2001. The gap between the multidimensional and the income-poor seems to be unaffected by the exclusion of the youngest individuals. Therefore, to shed some light on the gap between these two groups we need to look at the differences in other demographic and socioeconomic characteristics. This analysis is described in the following section.

4.3 Accounting for the difference between the income-poor and the multidimensionally-poor

Results from the previous section suggest that on average those who were in low-income benefited from growth more than those who were poor in multiple dimensions. Interestingly, we find that differences between these two groups are not only limited to mean values. Figure 3 shows the gap in the benefits from growth between the two groups across the whole distribution for the period 2001-2008. In particular, the results correspond to the case where poor groups are identified using a poverty threshold equal to the 15th percentile of each poverty index in 2001.[17] Clearly, Australian economic growth in this period was unambiguously more pro-income poor than pro-multidimensionally-poor. In fact, the curves for the income-poor stochastically dominate those of the multidimensionally-poor, although in the case of annual variations the difference is only significant up to the median value. The gap in growth rates is particularly large at the bottom and the top end of the distribution, where the difference between the two groups is above 4 per cent.

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[17]All the results presented in this section correspond to the 15 percent cut-off. Robustness checks carried out using the 5, 10, 20, 25, and 30th percentiles as thresholds yield similar results available upon request.

Figure 3. Differences in income gains: income vs. multidimensionally-poor

| Annual variation | Annual growth rate |
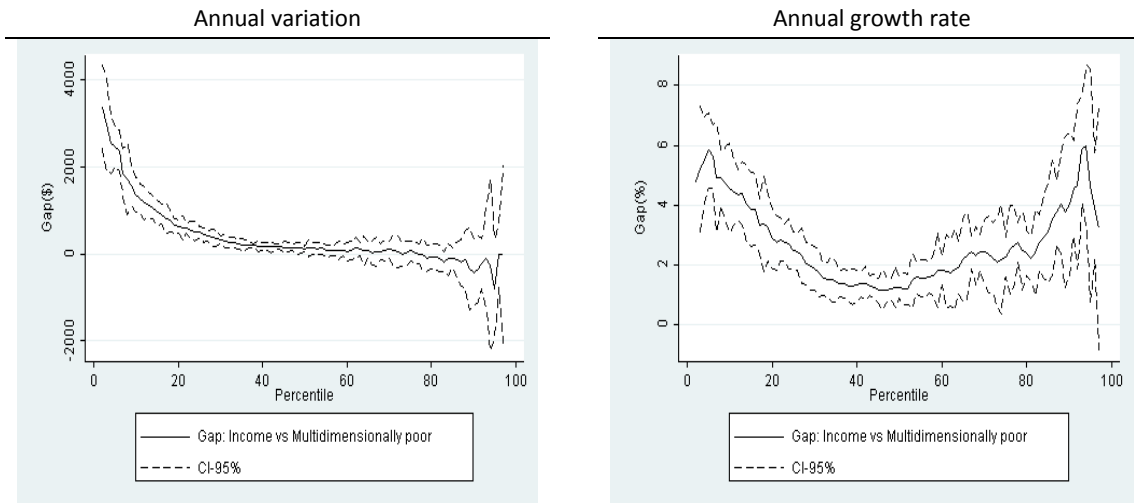
Note: The graphs show the differences in the inverse distribution function of the benefits from growth between the income and the multidimensionally -poor for the period 2001-2008. Poor groups defined using thresholds equal to the 15th percentile of each poverty index in 2001. Dashed lines show the bootstrapped confidence intervals based on 1,000 replications. All estimates computed using longitudinal responding person weights.

Source: Author's calculation using HILDA data.

Understanding the growth gap between the two groups of poor is important for various reasons. First, it will help us to understand why poverty definitions differ as regards their capacity to identify those individuals who are less likely to participate and benefit from economic growth. Most importantly, understanding the differences between the multidimensional and the income-poverty measures is crucial to determine the non-income dimensions that are key for identifying low-growth groups and that are therefore expected to have a critical role in shaping pro-poor growth evaluations. Table 4 presents the characteristics of the poor in 2001 as well as the average annual growth rates experienced by specific demographic groups between 2001 and 2008. We find that those identified as poor according the multidimensional poverty index in 2001 are on average more than 7 years younger than those in the income-poor group. Remarkably, despite of being a younger population, the multidimensionally-poor have worse health conditions than low-income people. Thus, the incidence of people with poor general, physical, and mental health is respectively about 15, 5, and 19 percentage points larger among those who are poor in multiple dimensions. Also, the proportion of individuals that report some type of disability or long-term health condition in this group is 10 percentage points larger than in the income-poor group. Those who are identified as poor by the multidimensional poverty index have lower educational attainment than those who were on low-income: the

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incidence of individuals with less than Year 12 among the income-poor is about five points lower than among those who are poor in multiple dimensions (71 versus 76 per cent).

As the figures on income growth rates in the right column of Table 4 show, people with poor health, disabilities, and lower educational attainment experienced little income growth compared to other groups. The higher prevalence of these individuals among the multidimensionally-poor could therefore account for the growth gap of this group. To check the validity of this hypothesis we will make use of conterfactual analysis. In particular, we follow the Oaxaca-Blinder and DiNardo-Fortin-Lemieux approaches to investigate the role of observed characteristics in explaining differences in the distribution of income gains between the multidimensionally and the income-poor. Let G_{MP} and G_{IP} denote the groups with the poorest 15th per cent as defined by the multidimensional and the income poverty indices in 2001, respectively. Let $F_{MP}(g)$ and $F_{IP}(g)$ be the distribution of growth rates (or absolute variations) among these groups. The well-know regression based approach first proposed by Oaxaca (1973) and Blinder (1973) allows us to decompose differences in mean growth rates observed between the two groups of poor people. For each individual i we assume that the income growth rate follows the model

$$g_i = x_i\beta + e_i,$$

where x_i is a $1xk$ vector of covariates, β is the vector of parameters, and e_i is the error term satisfying $E(e_i|x_i) = 0$. Let b_{MP} and b_{IP} be OLS estimates of β derived using observations from the G_{MP} and G_{IP} groups. Let $\bar{x}_{IP}b_{MP}$ denote the counterfactual value of the mean growth rate among the multidimensionally-poor if those were given the observed characteristics of the income-poor. Then, the difference between the mean growth rate of the of the multidimensionally-poor, g_{MP}, and the average growth rate of the income-poor, g_{IP}, can be expressed as

$$g_{IP} - g_{MP} = \bar{x}_{IP}(b_{IP} - b_{MP}) + (\bar{x}_{IP} - \bar{x}_{MP})b_{MP},$$

where the first term on the right-hand side captures the part of the gap caused by differences in coefficients, while the second term measures the expected change in the mean growth rate due to the shift in observed characteristics between the two groups (*explained* effect).

In contrast to the Oaxaca-Blinder decomposition, the DiNardo, Fortin, and Lemieux (1996)-DFL thereafter- reweighting approach permits evaluation of the contribution of covariates to differentials across the whole distribution instead of focusing only on the mean. Each individual observation is drawn from a common joint density function $f(g, x, G)$,

Table 4. Characterization of the initially poor

Characteristics in 2001	Income- poor		Multidimensionally- poor		Annual income growth rate 2001-08 (%)
	Mean	Std. Error	Mean	Std. Error	
Age	53.20	0.542	45.21	0.524	
Dummy: Age <35	0.22	0.012	0.29	0.013	2.35
Dummy: Age 35-65	0.42	0.013	0.53	0.016	2.16
Dummy: Age >65	0.34	0.015	0.16	0.014	0.31
Sex					
Dummy: Female	0.62	0.013	0.58	0.016	2.11
Dummy: Male	0.37	0.014	0.41	0.014	1.87
Health					
Dummy: Poor general health	0.34	0.012	0.49	0.012	1.79
Dummy: Good general health	0.65	0.013	0.50	0.013	2.15
Dummy: Poor physical health	0.37	0.013	0.42	0.016	1.07
Dummy: Good physical health	0.62	0.014	0.57	0.014	2.28
Dummy: Poor mental health	0.28	0.013	0.47	0.012	1.95
Dummy: Good mental health	0.71	0.013	0.52	0.017	2.09
Dummy: Long-term condition of or disability	0.40	0.014	0.50	0.017	1.12
Dummy: No long-term condition of or disability	0.59	0.016	0.49	0.015	2.26
Educational attainment					
Dummy: Bachelor and above	0.06	0.006	0.04	0.007	2.55
Dummy: Between Year 12 and Diploma	0.22	0.012	0.20	0.015	1.96
Dummy: Less than Year 12	0.71	0.012	0.76	0.013	1.90
Dummy: Non-poor English proficiency	0.95	0.006	0.96	0.006	0.97
Dummy: Poor English proficiency	0.05	0.006	0.04	0.006	2.02
Labour status					
Dummy: Employed	0.18	0.010	0.22	0.014	1.92
Dummy: Unemployed	0.08	0.007	0.14	0.012	3.11
Dummy: Not in the labour force-full time student	0.06	0.007	0.08	0.009	4.99
Dummy: Not in the labour force	0.68	0.013	0.54	0.016	1.45

Notes: Income-poor and multimensionally-poor groups defined using the 15th percentile of each poverty index in 2001 as poverty threshold. For the definition of the categories, see Table A1 in the appendix. Average annual growth rates for the different categories computed using all the observation in the panel. All estimates computed using longitudinal responding person weights.

Source: Author's calculation using HILDA data.

where g, x, and G refer to income growth rate, observed characteristics, and group membership, respectively. The marginal distribution of growth rates for group G_{MP} is then given by

$$f_{G_{MP}}(g) = \int_{\Omega_x} f(g|x, G_{MP}) \, f_x(x|G_{MP}) dx,$$

where Ω_x is the domain of individual attributes and

$$f_x(x|G_{MP}) = \int_{\Omega_g} f(g, x|G_{MP}) dg,$$

with Ω_g being the domain of annual growth rates. The counterfactual distribution for group G_{MP} is defined as the distribution of income gains that would prevail assuming group G_{MP} had the same observed characteristics of group G_{IP}. Following DFL, this can be expressed as

$$f_{G_{MP}}^{G_{IP}}(g) = \int_{\Omega_x} f(g|x, G_{MP}) \, f_x(x|G_{IP}) dx = \int_{\Omega_x} f(g|x, G_{MP}) \, \Psi_x(x) \, f_x(x|G_{MP}) dx,$$

where $\Psi_x(x)$ is the 'reweighting' function given by

$$\Psi_x(x) = \frac{f_x(x|G_{IP})}{f_x(x|G_{MP})} = \frac{P(G = G_{MP})}{P(G = G_{IP})} \frac{P(G = G_{IP}|x)}{P(G = G_{MP}|x)},$$

where the last equality holds from Bayes' rule. The first ratio is just the relative frequency of each group, which is constant and can therefore be ignored for the reweighting process. For the second term, following DFL, we estimate a probit model for the probability of belonging to each group G_{IP} and G_{MP}, given characteristics x. The counterfactual distribution function $F_{G_{MP}}^{G_{IP}}(g)$ can then be used to decompose the differences in the distribution of income gains between both groups as follows

$$F_{IP}(g) - F_{MP}(g) = [F_{IP}(g) - F_{G_{MP}}^{G_{IP}}(g)] + [F_{G_{MP}}^{G_{IP}}(g) - F_{MP}(g)].$$

The second term of the equation represents the *explained* part of the gap which can be attributed to differences in the distribution of observed characteristics between the two groups. In contrast to the Oaxaca-Blinder approach, this decomposition can be used to

evaluate the contribution of covariates to explain differences across the whole distribution. Thus, the differential at any percentile p can be decomposed as

$$p_{IP}(g) - p_{MP}(g) = [p_{IP}(g) - p_{G_{MP}}^{G_{IP}}(g)] + [p_{G_{MP}}^{G_{IP}}(g) - p_{MP}(g)].$$

To determine to contribution of each covariate (or set of covariates) to explain the overall gap we apply a Shapley-type decomposition procedure (see Shorrocks 1999 and Sastre and Trannoy 2002). Widely used in inequality decomposition analysis, this decomposition identifies the contribution of each factor with the expected marginal effect on the explained gap of eliminating the covariate when computing the conterfactual estimates. Let $K = (1, ..., j, ..., k)$ be the set of covariates, and let $S \subset K$ denote any possible subset of covariates. The Shapley contribution of characteristic j is given by

$$Sh_j = \frac{\sum\limits_{S \subset K, \, j \in S} \frac{(s-1)!(k-1)!}{k!} [e(S) - e(S \setminus \{j\})]}{e(K)} \qquad with \quad \sum_{j=1}^{k} Sh_j = 1$$

where s is the size of the subset, and $e(\cdot)$ is the explained effect that depends on the particular set of covariates used to derive the counterfactual estimate.[18]

The OLS and the probit regressions used for the counterfactual analysis include, as explanatory variables, multiple socioeconomic variables that are expected to influence individuals' ability to benefit from economic growth.[19] We group the covariates into five categories. The first one includes demographic information about the household where the individual lived in 2001, including the age and sex of the head; type of family expressed with dummy variables for couples with kids, couples with no children, lone-parent households with and without dependent children, singles, and other family types; and thirteen dummy variables for the major statistical regions reported in HILDA.[20] Details

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[18]For both the Oaxaca-Blinder and the DFL regression decompositions, $e(S)$ is obtained setting all the other coefficients but those of the covariates in S equal to zero.

[19]Notice the aim of this analysis is to evaluate the contribution of the differences in the distribution of observed characteristics between the two poor groups to explain the growth gap. The econometric specifications are simply thought to identify the statistical association between individuals' characteristics and benefits from growth. Issues of endogeneity and selection bias were not addressed which implies that no causal relationship can be assessed from our results.

[20]These are Sydney, other regions of New South Wales, Melbourne, other areas of Victoria, Brisbane, rest of Queensland, Adelaide, other regions of South Australia, Perth, rest of Western Australia, Tasmania, Northern Territory, and Australian Capital Territory.

on the initial socioeconomic conditions of the household are considered in a separate category. We include an indicator variable to identify those individuals living in an area which falls into the lowest 20 per cent most disadvantaged areas in Australia as measured by the index of relative socioeconomic disadvantage for areas (SEIFA); type of housing tenure with dummy variables for owners, renters, and rent-free households; and a dummy variable to indicate whether the individual belongs to a jobless household. Demographic characteristics of individuals in 2001 including age, sex, and an indicator variable identifying those with indigenous backgrounds are grouped in a third category. Information on individuals' initial labour statuses, educational attainment, and English skills are considered in a separate group. This includes dummies for people working part-time, full-time, unemployed, long-term unemployed, full-time students, and other individuals out of the labour force; indicator variables for those with graduate or postgraduate education, bachelor or advanced diploma, certificate I, II, III or IV, Year 12 or less but still engaged in education,and those with Year 12 or less who were not in education; and a dummy variable taking value one for those who speak a language other than English at home and report that they do not speak English well or does not speak English at all. Lastly, the health category includes details on disabilities and the general, physical, and mental health status of the individual. In particular, for the three health dimensions we define five dummies, one for each of the five quintiles of the corresponding health index reported in HILDA.[21] The presence of disabilities is captured by an indicator variable that activates when the individual reports a long-term health condition or disability that restricts everyday activities for at least six months. The results of the regressions used for the analysis are presented in the Appendix.[22]

Table 5 shows the results of the counterfactual analysis for the case of the annual growth rates. Results for annual variations are quite similar and yield similar conclusions, so they are not discussed here for the sake of brevity. It is clear from this table that differences in observed characteristics contribute to explain why those who were poor according to multidimensional index benefited less from growth than those in low-income. Thus, for the mean, results from the Oaxaca-Blinder decomposition suggest that the

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[21]The general, physical, and mental health indices take values between 0 and 100 and are based on the SF-36 Health Survey included in HILDA.

[22]The results of the multiple regressions run to evaluate the contribution of each group of characteristics are not presented in the Appendix, but are available upon request.

Table 5. Oaxaca-Blinder and DiNardo-Fortin-Lemieux counterfactual decompositions

	Annual income growth rate, 2001-2008				
	Income-poor (%)	Multidimensionally-poor (%)	Raw gap	Multidimensionally-poor counterfactual (%)	Explained gap
Oaxaca-Blinder					
Mean	5.91	2.81	3.10	3.63	0.82
	(0.375)	(0.163)	(0 .520)	(0.618)	(0.052)
DiNardo-Fortin-Lemieux					
Mean	5.91	2.81	3.10	3.25	0.45
	(0.375)	(0.163)	(0 .520)	(0.312)	(0.118)
Percentile:					
10th	-1.81	-6.31	4.57	-3.77	2.54
	(0.072)	(0.535)	(0.820)	(0.293)	(0.332)
20th	0.06	-2.82	2.88	-1.09	1.73
	(0.251)	(0.934)	(0.403)	(0.362)	(0.498)
50th	3.32	2.06	1.26	1.90	-0.15
	(0.177)	(0.183)	(0.237)	(0.534)	(0.439)
80th	11.05	8.60	2.45	7.52	-1.08
	(0.401)	(0.562)	(0.298)	(0.626)	(0.496)

	Shapley contributions of observed characteristics to the explained gap in mean growth rates			
	Oaxaca-Blinder		*DiNardo-Fortin-Lemieux*	
Group of covariates	Marginal effect	Shapley value (%)	Marginal effect	Shapley value (%)
Household: demographics	0.04	4.87	0.05	11.11
	(0.198)	(5.00)	(0.08)	(28.81)
Household: socioeconomic	0.19	23.17	0.16	35.55
	(0.141)	(4.55)	(0.09)	(13.95)
Individual: demographics	-0.15	-18.29	-0.20	-44.44
	(0.078)	(4.59)	(0.151)	(12.71)
Individual: labour status and skills	-0.06	-7.31	-0.05	-11.11
	(0.365)	(6.38)	(0.135)	(52.81)
Individual: health and disability	0.80	97.56	0.49	108.89
	(0.340)	(5.94)	(0.176)	(20.22)
Total	0.82	100.00	0.45	100.00

Notes : Income and multimensionally-poor groups defined using poverty thresholds equal to the 15th percentile of each poverty index in 2001. For a description of the groups of covariates considered to estimate the Shapley contribution see the main text. Standard errors in parentheses derived using bootstrap with 1,000 replications. All estimates computed using longitudinal responding person weights.

Source: Author's calculation using HILDA data.

average growth rate of the multidimensionally-poor would increase about 30 per cent (from 2.81 to 3.63) if the distribution of characteristics of the income-poor was assumed.[23] This implies that differences in characteristics account for more than one quarter of the gap in mean growth rates. Figures from the DFL decomposition indicate that the effect of characteristics is not uniform over the whole distribution. Counterfactual estimates for the 10th and 20th percentiles show that the contribution of characteristics is particularly large at the bottom of the distribution, where differences in characteristics account for more than 50 per cent of the gap between the two sets of poor people. In contrast, we find that characteristics cannot explain the observed gap in the middle and upper parts of the distribution. Indeed, the gap at the median and the 80th percentile increases when compositional differences are taken into account. The Shapley contributions of each group of covariates to the explained gap in mean are presented in the bottom part of the table. Interestingly, both the Oaxaca-Blinder and DFL methodologies point to differences in health conditions and the incidence of disability as the most explicative factor for the gap between the multidimensionally and the income-poor. Thus, differences in the distribution of health and the larger incidence of people with disabilities or long-term health condition among those who were poor in multiple dimensions jointly account for 98-108 per cent of the explained difference between the average growth rate of this group and that of the income-poor. The initial socioeconomic conditions of the household is the second most important factor with a contribution that is between 23 and 35 per cent, depending on the decomposition method adopted. The Shapley value of the demographic characteristics of individuals is negative, which means that the gap in mean growth rates between the two groups widens once differences in age, sex, and indigenous background are controlled for. This could be explained by the larger prevalence of individuals above 65 years of age who had little income growth among the income-poor relative to the multidimensionally-poor (see Table 4).[24] Finally, the Shapley contribution of the initial labour status and skills is also negative but statistically insignificant. In this case, from the figures in Table 4 we know that the income-poor population has higher educational attainment than those who

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[23]Note this conterfactual exercise provides an estimate of the income gains of the multidimensionally-poor assuming the characteristics of the income-poor. This implies that differences in returns between these two groups are weigthed by the characteristics of the income-poor. To check the robustness of the results we also estimated the alternative decomposition which weights differences in returns by the characteristics of the multidimensionally-poor. The results of this exercise, available upon request, are consistent with the ones presented here.

[24]The incidence of people with indigenous background is slightly higher among the multidimensionally-poor (3.1 versus 2.3 percent).

were poor in multiple dimensions. However, this effect could be more than offset by the larger prevalence among the income-poor of individuals who were out of the labour force and benefited relatively little from growth.

Conclusions

In first decade of the XXI century Australia consolidated its position as a high-growth economy in the developed world. In the period 2000-2009, Australia experienced one of the largest output growth rates among OECD, only overtaken by a group of countries with lower initial income including Turkey, Hungary, Greece, the Czech Republic, Korea, Poland, and the Slovak Republic. Recent evidence suggests, however, that the benefits from growth in Australia were not evenly distributed. In the last decade Australia witnessed an increase in income inequality and the share of income held by those at the top of the income distribution (ABS, 2011). These results are consistent with the upward trend in income differences and relative income poverty documented earlier in the literature (Wilkins 2007, Saunders and Hill 2008). To date much has been written about the Australian economic miracle, however, yet little is known on the extent to which the strong economic growth has been pro-poor or not. Our aim in this paper was to fill this gap.

Pro-poor growth analysis contributes to our understanding of the distributional effects of growth by providing insights that cannot be derived from the analysis of standard inequality and poverty measures. Thus, while inequality and poverty measures are concerned with the differences in the income distribution and the income gap of those who are below some threshold, respectively, pro-poor growth measures evaluate the impact of growth on poverty reduction by looking at the extent to which growth benefits the poor. In this paper we have investigated the pro-poorness of Australian growth using anonymous and non-anonymous pro-poor growth measures. These two approaches complement each other in that they focus on different aspects of the distributional change associated to economic growth. Growth assessments consistent with the anonymity axiom evaluate the distributional impact of growth looking only at the income change experienced by the bottom positions of the income parade without taking into account whether these positions are occupied by the same individuals or not. In contrast, non-anonymous evaluations focus on the mobility aspect of growth looking exclusively at the income change experimented by those who were initially poor. An important issue that arises in this type of evaluation is how to identify those initially in poverty. We compare the results based

on the standard income-poverty with those derived using a multidimensional definition of poverty that embraces multiple non-income attributes.

Results for the anonymous measures suggest that Australian growth in the last decade was pro-poor only according to the poverty reducing definition of pro-poorness. This is the weakest concept of pro-poor growth as it identifies as pro-poor every growth pattern that increases the income of the poor, regardless of how the benefits from growth are distributed among the different positions in the income distribution. However, the growth incidence curves based on HILDA data show that Australia's growth between 2001 and 2008 was highly concentrated at the top of the income distribution. In fact, while the bottom positions were the ones that experienced the lowest income gain, the only positions that grew more than the mean were those above the 90th percentile. As a consequence, Australia's growth in the last decade was not pro-poor according to any concept that implies a particular bias of growth in favor of the poor.

We exploit the longitudinal information in HILDA to study the effect of growth on those who were initially poor. Our results based on non-anonymous measures indicate that the pro-poorness of growth in this case critically depends on the definition of poverty considered. Thus, while there exists high income mobility, with those initially in the low-income group growing more than those with high incomes, the income gain of those identified as poor according to the multidimensional poverty measure was far below that of the mean. Therefore, we can conclude that growth was more pro-income-poor than pro-multidimensionally poor. We use counterfactual analysis to assess the extent to which this result is due to differences in the distribution of demographic and socioeconomic characteristics between the two groups of poor. Interestingly, we find that differences in the distribution of health and the larger incidence of people with disabilities or long-term health condition among those who were poor in multiple dimensions explain why growth was less pro-multidimensionally poor. Indeed, the average annual growth rate of those who were poor according to the multidimensional measure would increase about 16-30 per cent if the health distribution of the income-poor was assumed. This highlights the sensitivity of non-anonymous growth evaluations to the way poverty is defined, in particular, to whether the definition of the poor incorporates information about the health dimension of well-being or not.

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Appendix

4.4 The index of multidimensional poverty

The poverty index proposed in Scutella *et al.* (2009a,2009b) combines information on twenty-one indicators from seven different domains: material resources; employment; education and skills; health and disability; social; community; and personal safety. Table A.1 presents a description of the indicators included in each domain. For any individual i the measure of social exclusion, x_i^S, is defined as seven minus the weighted sum of the level of social exclusion experienced within each domain, x_{id}, where every domain is assigned equal weight:

$$x_i^S = 7 - \sum_{d=1}^{7} x_{id}.$$

The level of exclusion in any domain is given by the actual proportion of indicators within the domain in which the individual is deprived, which can expressed as follows

$$x_{id} = \frac{\sum_{k=1}^{K_d} x_{id}^k}{K_d},$$

where x_{id}^k is a binary indicator taking value 1 when the individual is deprived in the indicator k of social exclusion included in the domain d, and K_d refers to the total number of indicators for domain d.

Table A1. Index of multidimensional poverty

Domain	Indicator
Material resources	a) *Income poverty*: it takes value 1 when individual's annual equivalent Income is less than 60% of the median income.
	b) *Financial hardship*: it is present when respondents report that at least three of the following circumstances occurred along the financial year: could not pay electricity, gas or telephone bills on time; could not pay the mortgage or rent on time; pawned or sold something; went without meals; unable to heat the home; asked for financial help from friends or family; and/or asked for help from welfare or community organization.
Employment	c) *Long-term unemployed*: it activates when the individual has been unemployed for the preceding twelve months.
	d) *Unemployed*: it takes value 1 when the respondent is long-term unemployed or is not currently employed and has looked for work within the last four weeks, and was available to start work in the last week.
	e) *Marginally attached*: this indicator is present when the respondent is either long-term unemployed, unemployed, or the person is not employed and is either (i) looking for work and, while not available to start within one week, is available within four weeks; or (ii) available to start work within four weeks but is not looking for work because of the belief that he or she is unlikely to find work.
	f) *Underemployed*: this indicator is present when the person is long-term unemployed, unemployed, marginally attached or is currently employed part-time (usual weekly hours of employment in all jobs are less than 35) and hours per week usually worked in all jobs are less than the hours the individual would like to work, having regard to the effect this would have on income.
	g) *Household joblessness*: it takes value 1 when a person resides in a household where no member is in paid employment and at least one member is of 'working age' (defined to be 15-64 years).
Health and disability	h) *Poor general health*: based on the 0-100 general health index derived from the SF-36 Health Survey included in HILDA. This indicator activates when the index for the person is below 50.[1]
	i) *Poor physical health*: based on the 0-100 physical health index derived from the SF-36 Health Survey included in HILDA. This indicator activates when the index for the person is below 50.
	j) *Poor mental health*: based on the 0-100 mental health index derived from the SF-36 Health Survey included in HILDA. This indicator activates when the index for the person is below 50.
	k) *Has a long term health condition or disability*: this indicator takes value 1 when an individual reports a long-term health condition, impairment or disability that restricts everyday activities, and has lasted or is likely to last for six months or more.
	l) *Household has a disabled child*: this indicator activates if any children under 15 years of age in the household have a disability.

Table A1. Index of multidimensional poverty *(Continued)*

Education and skills	a) *Poor English proficiency*: this is defined to be present if the individual speaks a language other than English at home and reports that he or she does not speak English well or does not speak English at all.
	b) *Low level of formal education*: this indicator activates in a situation in which an individual is not currently studying full-time and has a highest educational qualification of less than high school completion.
	c) *Little or no work experience*: a person is defined to have low work experience if he or she has spent fewer than three years in paid employment.
Social	d) *Lack of social support*: it is present when an index of social support derived using information reported in HILDA is below 30. The index builds on ten questions on how much support individuals receive from other people, and it ranges from 0 to 70, where 70 indicates the highest level of support.[2]
Community	e) *Neighborhood quality is poor*: it is present when the reported satisfaction with the neighborhood is below 5 on a 0-10 scale, where 0 indicates the largest level of dissatisfaction.
	f) *Not feeling part of the community*: it takes value 1 when the respondent's satisfaction with 'feeling part of the community' is below 5 on a 0-10 scale where 0 indicates the lowest level of satisfaction.
	g) *Low civic participation*: it is present when the individual is not a member of any sporting, hobby, or community- based club or association.
	h) *Not voluntary activity*: it equals 1 when the individual spends no time on volunteer or charity work in a typical week and is not in paid employment or studying (full-time of part-time).
Personal safety	i) *Low personal safety*: this indicator activates when the reported level of satisfaction with 'how safe you feel' is below 5 on a 0-10 scale, where 0 means completely dissatisfied.

Notes: 1) For more information on the general, physical and mental health indices see Ware et al. (2000).
2) See Scutella et al. (2009b).

Source: Author's description based on the information provided in Scutella et al. (2009a, 2009b).

4.5 Counterfactual analysis: regressions

Table A2. *Oaxaca-Blinder OLS regressions*

| Characteristics in 2001 | Dependent variable: Annual income growth, 2001-08 | | | |
| | Income-poor | | Multidimensionally-poor | |
	Coef.	Std. error	Coef.	Std. error
Household: Demographics				
Age of the head	-0.18	0.11	-0.03	0.11
Age of the head-square	0.0004	0.001	0.0009	0.001
Female headed	-0.087	0.62	1.03	0.61
Couple with kids	-1.33	0.92	1.54	0.83
Lone parent -dependent kids	-0.85	1.02	0.97	0.94
Lone parent -without dependent kids	-0.13	0.69	1.17	0.81
Single person	-0.88	1.50	-1.52	1.23
Regional dummies	Yes		Yes	
Household: Socioeconomic				
Bottom 20%- SEIFA index	-0.06	0.70	0.19	0.78
Jobless household	1.04	0.76	4.28	0.69
Private renter	-1.94	0.76	-0.61	0.71
Public housing	-2.52	0.84	-1.87	0.92
Other housing situation	-2.32	2.88	-0.05	1.34
Individual: Demographics				
Age	0.02	0.11	-0.17	0.11
Age- square	-0.0005	0.0012	0.0007	0.0012
Female	0.41	0.62	1.12	0.61
Indigenous background	-1.01	1.71	-1.12	1.53
Individual: Labor status and skills				
Working part time	-2.73	2.60	0.26	2.32
Unemployed (not long-term)	-2.35	1.34	0.60	1.21
Long-term unemployed	-4.17	1.62	-0.08	1.34
Not in labor force-studying	-5.63	1.83	-2.26	1.47
Not in labor force-not studying	-4.95	1.82	-0.53	1.68
Bachelor	0.84	1.83	-1.44	1.08
Certificate	-1.93	1.76	-4.44	2.12
Under Year 12- studying	4.37	2.39	-2.42	2.47
Under Year 12- not studying	-2.07	1.66	-6.20	1.94
Poor-English proficiency	-1.46	1.19	-1.37	1.53
Individual: Health and disability				
Bottom quintile: general health	0.27	0.99	-0.05	0.86
Bottom quintile: physical health	-1.07	0.83	-2.22	1.01
Bottom quintile: mental health	1.34	0.82	-1.46	0.83
Disability or long-term health condition	-0.40	0.62	-1.45	0.64
Intercept	18.03	3.64	13.30	3.92
Sample (individuals)	1,280		1,193	
F-stat. [Prob > F]	6.37 [0.000]		4.57 [0.000]	
R^2	0.21		0.22	

Notes: i) Poor groups defined using as thresholds the 15th percentile of each poverty index in 2001. The reference category is a male living in the statistical region of Adelaide in a male headed household with a couple without kids where at least one adult works, home-owner, with no indigenous background, working full-time, with post-graduate education, good English, non-poor health and without disabilities. Estimates of the regional dummies and the indicator variables for the other quintiles of the health indices not shown to save space and are available upon request.

ii) For a detailed description of the SEIFA index see ABS (2006). The definition of the different categories can be found in Table A1 in the appendix.

Source: Author's calculation using HILDA data.

Table A3. *DiNardo-Fortin-Lemieux probit regressions for the probability of being income and multidimensionally-poor*

Characteristics in 2001	Dependent variable: [income-poor=1; Otherwise=0]		Dependent variable: [multidimensionally-poor=1; Otherwise=0]	
	Coef.	Std. error	Coef.	Std. error
Household: Demographics				
Age of the head	-0.02	0.021	0.03	0.026
Age of the head-square	0.0001	0.0002	-0.0002	0.0002
Female headed	0.06	0.097	0.04	0.145
Couple with kids	0.07	0.135	0.04	0.216
Lone parent -dependent kids	0.16	0.158	0.09	0.253
Lone parent -without dependent	0.70	0.126	-0.39	0.167
Single person	-0.13	0.238	0.51	0.363
Regional dummies	Yes		Yes	
Household: Socioeconomic				
Bottom 10%- SEIFA index	0.07	0.127	-0.23	0.192
Jobless household	1.01	0.126	-0.57	0.187
Private renter	-0.07	0.111	0.37	0.176
Public housing	0.45	0.176	-0.43	0.247
Other housing situation	0.11	0.195	-0.28	0.281
Individual: Demographics				
Age	-0.05	0.026	0.04	0.033
Age- square	0.0008	0.0003	-0.0008	0.0003
Female	0.26	0.101	-0.19	0.150
Indigenous background	-0.41	0.309	-0.21	0.432
Individual: Labor status and skills				
Working part time	0.02	0.317	-0.18	0.495
Unemployed (not long-term)	-0.45	0.236	1.12	0.380
Long-term unemployed	-0.26	0.291	2.02	0.512
Not in labor force-studying	0.03	0.295	0.73	0.426
Not in labor force-not studying	-0.27	0.174	0.62	0.257
Bachelor	-0.28	0.305	0.18	0.471
Certificate	-0.25	0.301	0.23	0.452
Under Year 12- studying	-0.58	0.399	0.82	0.652
Under Year 12- not studying	-0.57	0.281	0.71	0.435
Poor-English proficiency	0.14	0.301	-0.37	0.418
Individual: Health and disability				
Bottom quintile: general health	-0.43	0.147	0.98	0.206
Bottom quintile: physical health	-0.58	0.151	1.26	0.214
Bottom quintile: mental health	-0.62	0.144	1.21	0.201
Disability or long-term health condition	-0.12	0.107	0.25	0.158
Intercept	2.30	0.641	-3.91	0.958
Sample (individuals)	1,280		1,193	
Wald Chi2(31) [Prob > Chi2]	311.77 [0.000]		286.43 [0.000]	
Pseudo R^2	0.31		0.23	

Notes: i) Poor groups defined using as thresholds the 15th percentile of each poverty index in 2001. The reference category is a male living in the statistical region of Adelaide in a male headed household with a couple without kids where at least one adult works, home-owner, with no indigenous background, working full-time, with post-graduate education, good English, non-poor health and without disabilities. Estimates of the regional dummies and the indicator variables for the other quintiles of the health indices not shown to save space and are available upon request.

  ii) For a detailed description of the SEIFA index see ABS (2006). The definition of the different categories can be found in Table A1 in the appendix.
Source: Author's calculation using HILDA data.