Chapter 3.

A three-dimensional measure of inclusive growth in regions

This chapter proposes a measure of inclusive growth that integrates the income dimension with non-income outcomes, jobs and health, and takes into account the distribution of income among different household groups. Following the OECD inclusive growth framework, this summary measure of welfare – expressed in monetary terms and called multidimensional living standards – is applied to 209 OECD regions covering the period 2003-12. This is the first time that such data have been collected and analysed in this way at subnational level. The chapter describes levels and trends of multidimensional living standards in regions focusing on three aspects. It first looks at whether the different components of living standards reinforce each other in regions; second, it analyses whether economic growth in regions translates into higher multidimensional living standards; finally, the chapter explores whether living standards have followed different trends in metropolitan regions compared with the other parts of a country.

Introduction

The previous chapter provided an array of data to measure and compare income inequality and well-being outcomes in cities across OECD countries. It underlined that beyond gross domestic product (GDP) per capita there are other dimensions, such as jobs, education, health or environment, that allow people to participate in the society and contribute to economic growth. Understanding how economic growth translates into higher well-being requires new data and analytical tools to assess the outcomes that matter the most for people, together with their distribution across groups. Moreover, economic welfare and well-being outcomes can mutually reinforce each other, particularly in regions and cities (OECD, 2011); for example, efficient public transport may help connect people to job opportunities with a positive impact on the productivity of the labour force and at the same time have beneficial outcomes on the environment, health or time saved for personal activities. Having a comprehensive picture of how the different dimensions interact in a city can help policy makers design policy packages that leverage on the complementarities and work on the possible trade-off between pro-growth and pro-inclusiveness actions.

This chapter proposes a measure of inclusive growth that integrates the income dimension with non-income outcomes, jobs and health, and takes into account the distribution of income among different household groups. Following the OECD inclusive growth framework, this summary measure of welfare – expressed in monetary terms and called multidimensional living standards (henceforth MDLS) – is applied to 209 OECD regions covering the period 2003-12, expanding the results found at the national level (OECD, 2014a). This is the first time that such data have been collected and analysed in this way at subnational level. The measure of inclusive growth is used in this chapter to test three main aspects. First, whether regional growth in multidimensional living standards follows a different pattern from economic growth, if so reinforcing the relevance of using an array of measures beyond GDP per capita. Second, the analysis looks at whether income, jobs and health outcomes reinforce each other in a region, thus increasing the welfare of already income-rich regions and amplifying regional disparities within countries. Finally, the analysis looks at whether living standards have followed different trends in metropolitan regions compared with the other parts of a country.

Regional MDLS are computed by adding the disposable income for different household groups (i.e. income quintiles) in different regions to monetised values of health and jobs outcomes. The resulting equivalent income of each household group is subsequently aggregated at the level of each region using a generalised mean (Atkinson, 1970).[1] It should be noted that due to data unavailability at the city level, the MDLS are computed for regions. Future improvements of cross-country comparable variables for cities – for example extending the time series on income and inequalities computed in Chapter 2 and producing information on health – will allow this analysis to be applied to cities. In the meantime, the level of geography of regions, however, allows distinguishing between metropolitan (i.e. where most of the regional population lives in large cities) and non-metropolitan regions.[2]

The main findings from this analysis are:

- Regional disparities in MDLS are consistently starker than those in household disposable income only, reflecting that the different well-being dimensions considered amplify the concentration of prosperity or exclusion in regions.

- Growth of GDP per capita in regions does not always translate into higher living standards, highlighting the relevance of including additional measures for policy analysis on inclusive growth.
- Metropolitan regions have higher standards of living than other parts of their respective countries; on average, multidimensional living standards are about 30% higher in metropolitan regions than in non-metropolitan ones. At the same time, the economic crisis has taken a heavy toll in all regions, where living standards, on average, decreased in the period 2007-12, especially driven by declining household income and increasing unemployment rates. The existing process of convergence of non-metropolitan regions, which showed relatively higher growth of MDLS relative to metropolitan regions, has been stagnating since the economic crisis.

The computation of living standards in regions

The measurement framework of the OECD inclusive growth approach relies on computing MDLS, a welfare measure based on the equivalent income approach (OECD, 2014b). The equivalent income approach consists in measuring well-being in terms of an income metrics, but including other non-material dimensions (for example health or jobs) that are aggregated to the income measure by attributing to each of them a "shadow price" (Decancq, Fleurbaey and Schokkaert, 2015).

The index of MDLS considers three well-being dimensions, measured by household disposable income (income), the unemployment rate (jobs) and life expectancy at birth (health).[3] The unemployment and life expectancy indicators are converted into monetary units through shadow prices, which are used to compute the equivalent income of each person. Equivalent income is the level of income that would make an individual indifferent between his/her current situation and one where the other non-income dimensions were set at their respective benchmarks, for example maximum life expectancy and a situation without unemployment (Murtin et al., 2015). This method is applied to each income group in each region (Veneri and Murtin, 2016). Because of data constraints, the methodology relies on household income data pertaining to the quintiles of the distribution, and on the average unemployment and life expectancy pertaining to each region. Subsequently, the living standards of each income group are aggregated by region, using a generalised mean (Atkinson, 1970). Such aggregation can give a different importance to each group depending on the "aversion to inequality" chosen in the aggregation. The results shown in this report are obtained by using an inequality aversion parameter that reflects the median household welfare. The detailed methodology to compute MDLS in regions is described in Annex 3.A1.

All indicators refer to the OECD large regions (Territorial Level 2, TL2), which generally correspond to the first tier of subnational government in each country. Life expectancy data and unemployment rates at regional level are available on a yearly basis via the *OECD Regional Database*.[4] Levels and distribution of disposable household income in regions are available for 26 countries via the *OECD Regional Database* only for one point in time (circa 2012). Given the dynamic nature of inclusive growth, indicators over time of the distribution of household disposable income within regions, were estimated for 15 OECD countries through a dedicated household-level data calculation for several points in time between 2003 and 2012 (Royuela, Veneri and Ramos, 2014). The countries considered in the analysis are Belgium, Canada, Chile, the

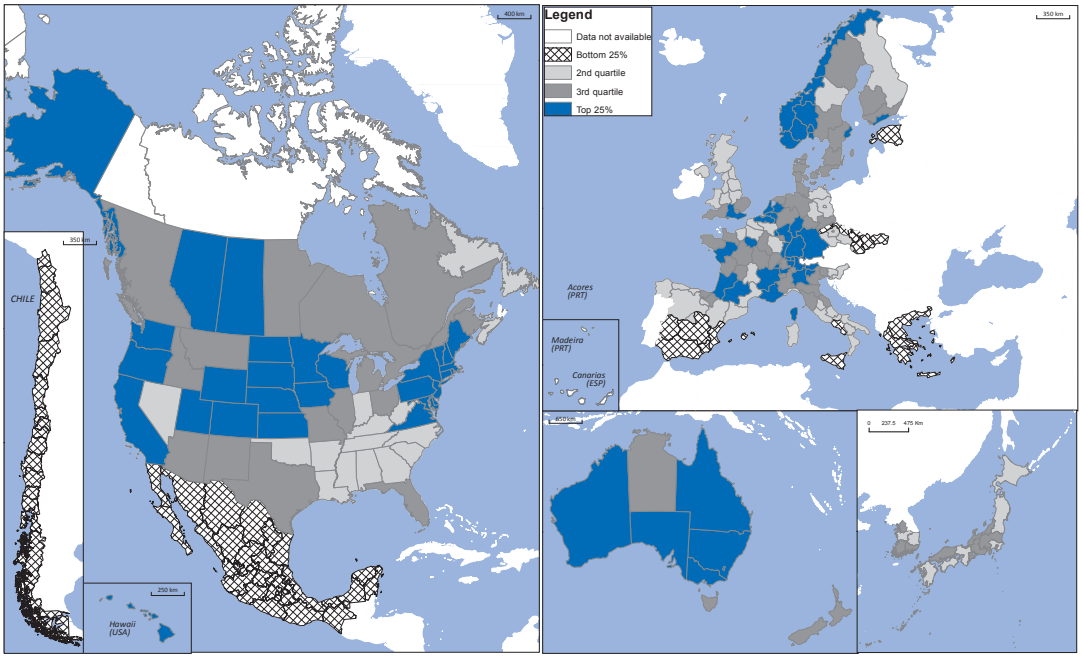
Czech Republic, Estonia, Finland, France, Greece, Italy, Korea, Luxembourg, Mexico, Spain, the United Kingdom and the United States.[5]

Evidence on living standards across regions

Large regional disparities exist in the multidimensional living standards within the same country. Considering all OECD countries together, regions from Australia, Canada, north and Central Europe have high MDLS, while MDLS in southern European and Latin American regions are at the bottom of the distribution (Figure 3.1). Moreover, living conditions among regions diverged in several countries in the period 2003-12, with some regions growing in income, jobs and health outcomes and others declining. In about half of the regions performing at the top of the MDLS scale, gains in living standards have been faster for people at the bottom part of the income distribution.

Figure 3.1. **The distribution of multidimensional living standards, OECD TL2 regions**

Around 2012 or latest available year



Source: Veneri, P. and F. Murtin (2016), "Where is inclusive growth happening? Mapping multi-dimensional living standards in OECD regions", http://dx.doi.org/10.1787/5jm3nptzwsxq-en.

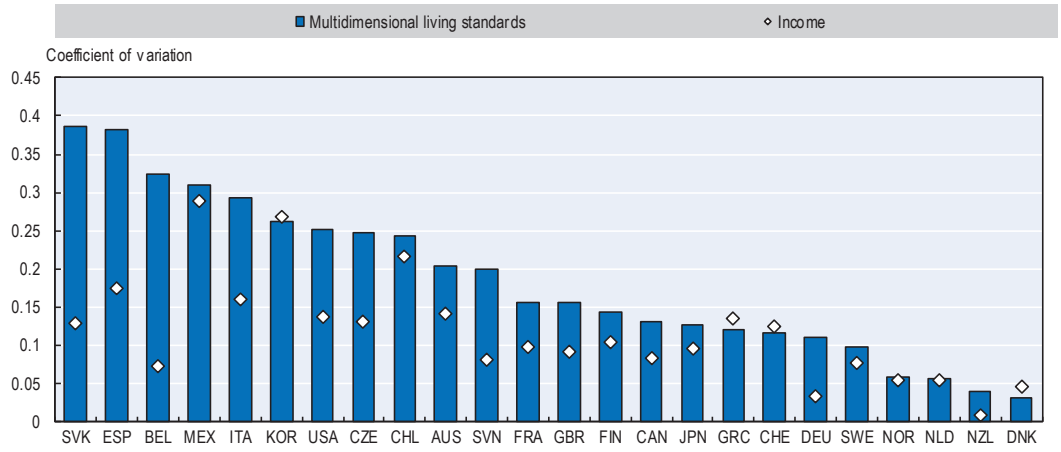
Regional differences in multidimensional living standards are consistently starker than those in disposable income only

Previous OECD work highlighted that disparities among regions can be wider than across countries and the gaps between regions in many dimensions, such as GDP per capita, household income, safety and air pollution, are widening (OECD, 2016). Since 2003, regional disparities in MDLS increased in 8 out of the 15 countries where data availability allowed changes to be measured. When considering together income, income inequality, jobs and health, regional disparities are almost always higher than those in disposable income only. In Belgium, Germany, Italy, the Netherlands, Slovenia,

the Slovak Republic and Spain, for example, the regional gap in multidimensional living standards, measured by the coefficient of variation, is at least twice the regional difference in just income (Figure 3.2).[6] This suggests that well-being outcomes tend to amplify the differences observed in terms of household income levels, i.e. people living in regions with high levels of income are also likely to have better jobs and health outcomes, on average. Policies that tackle together the different dimensions of well-being can thus have a positive impact on economic prosperity. Only in Denmark, Greece, Korea and Switzerland were regional disparities higher in income than in MDLS, implying that regional inequalities in the various well-being outcomes tend to offset each other in these countries (Figure 3.2).

Figure 3.2. **Regional disparities in multidimensional living standards and in household disposable income, 2012**

Coefficient of variation (higher values = larger disparities)



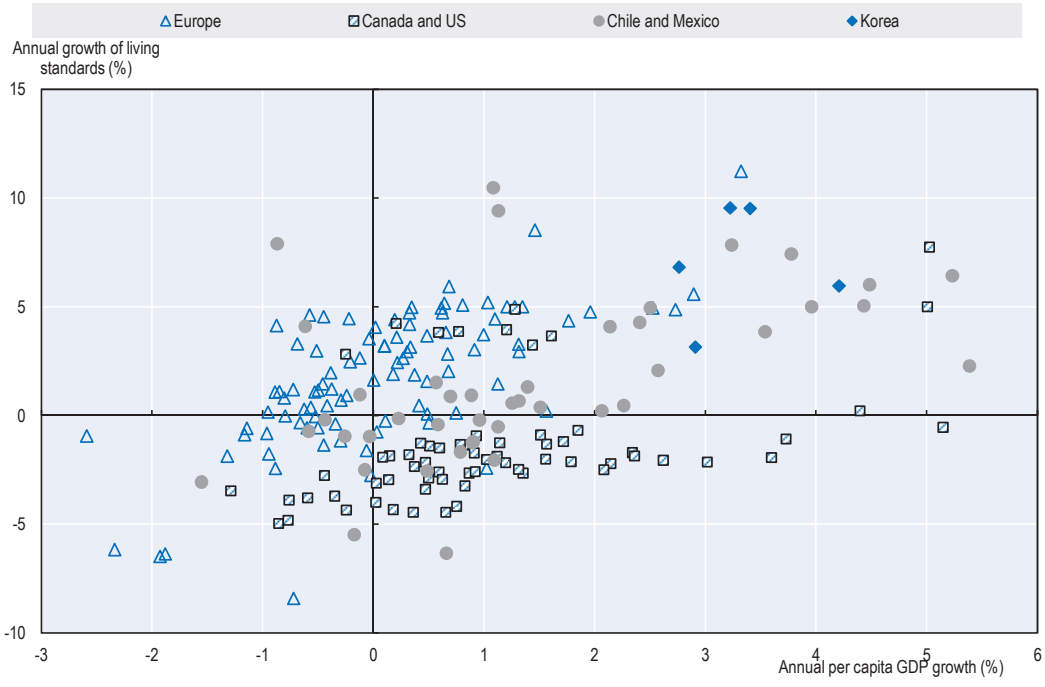
Source: OECD calculations based on OECD (2015c), *OECD Regional Well-being Database* and national income surveys, http://dx.doi.org/10.1787/region-data-en.

Growth of GDP per capita in regions does not always translate into higher living standards

During the period between 2003 and 2012, MDLS increased in more than half of all regions, but declined in several others. Growth in MDLS experienced by regions varied considerably within the same country. For instance, in Chile, France, Mexico and the United States, regions experiencing relatively strong increases in MDLS coexisted with others recording a decline. This resulted in higher regional disparities in overall living standards within these countries. Income, jobs, health and inequality contributed differently to changes in MDLS. For example, higher growth of household income explained most of the improvement in MDLS in the top-performing regions in Canada, Chile, Estonia, Finland and France. Higher growth of longevity was the main driving factor in Belgium, Italy and the United Kingdom. In the Moravia-Silesia region in the Czech Republic, on the other hand, the fall in MDLS mainly reflected the higher risk of unemployment. A similar heterogeneity characterises the regions with the worst performance in terms of changes of MDLS in their respective countries. Generally, lower MDLS in Spanish and Greek regions were mostly driven by declining income and rising unemployment rates and inequality.

While growth in GDP per capita is positively correlated with changes in living standards when considering all regions in the period 2003-12,[7] the two variables differ considerably in many cases, suggesting that growth in GDP per capita in regions does not necessarily translate into higher living standards (Figure 3.3).[8] For example, the region of Helsinki in Finland and the state of Chihuahua in Mexico recorded approximately the same annual growth in GDP per capita (0.66 and 0.69, respectively), but differed significantly in the trends of MDLS, showing an improvement and a decline, respectively. Some regions showed increases in living standards while GDP per capita was declining (e.g. Tarapacá, Mexico; Franche-Comté, France). In many European regions, GDP per capita declined between 2003 and 2012; however, most of those regions recorded gains in MDLS, due to improvements in longevity or a reduction in income inequality. In other European regions – especially where the economic crisis hit the hardest, such as in Greece and Spain – a decline in GDP per capita was accompanied by a parallel decline in MDLS (Figure 3.3). In these latter regions, the decrease in MDLS has been fostered by a sharp increase in unemployment rates. The correlation between the growth of MDLS and of GDP per capita in regions was much stronger during the years preceding the economic crisis of 2008. These findings highlight the relevance of adopting multidimensional measures to guide policy analysis on inclusive growth in regions and cities.

Figure 3.3. **Growth in GDP per capita and multidimensional living standards in OECD regions, 2003-12**



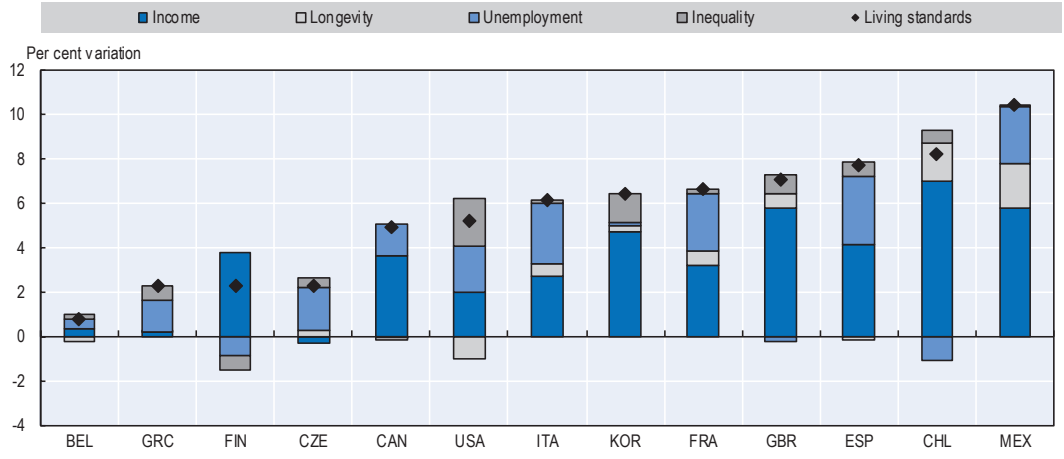
Source: Adapted from Veneri, P. and F. Murtin (2016), "Where is inclusive growth happening? Mapping multi-dimensional living standards in OECD regions", http://dx.doi.org/10.1787/5jm3nptzwsxq-en.

The growth of MDLS during the period under consideration happened with large disparities within the regions of the same country. Gaps in the growth rates of MDLS between the top- and the bottom-performing regions are particularly high in Mexico, Chile and Spain (Figure 3.4). In most of the countries considered, the growth of

household income was the major driver of differences in MDLS growth between the top- and bottom-performing regions. Changes in the unemployment rate and in income inequality also contributed significantly, while the Czech Republic is the only country where income growth reduced such a gap. The contribution of the change in the unemployment rate was particularly high in Greece, France, the Czech Republic, Spain and the United States, while changes in income inequality had an important role in Korea and Mexico. On the other hand, and as expected given the short time span considered, changes in longevity played a minor role in driving regional disparities in living standards. Empirical analyses on the correlates of the different components of MDLS growth show that higher income growth and a larger reduction of income inequality were relatively higher in regions with higher access to broadband services. On the other hand, the contribution of life expectancy to the growth of MDLS was, on average, higher in regions with higher voter turnouts and a higher number of doctors per capita (Veneri and Murtin, 2016).

Figure 3.4. **Differences in the growth of multidimensional living standards and the contribution of each underlying component between the fastest and slowest growing regions, 2003-12**

Contribution of each component expressed in equivalent income



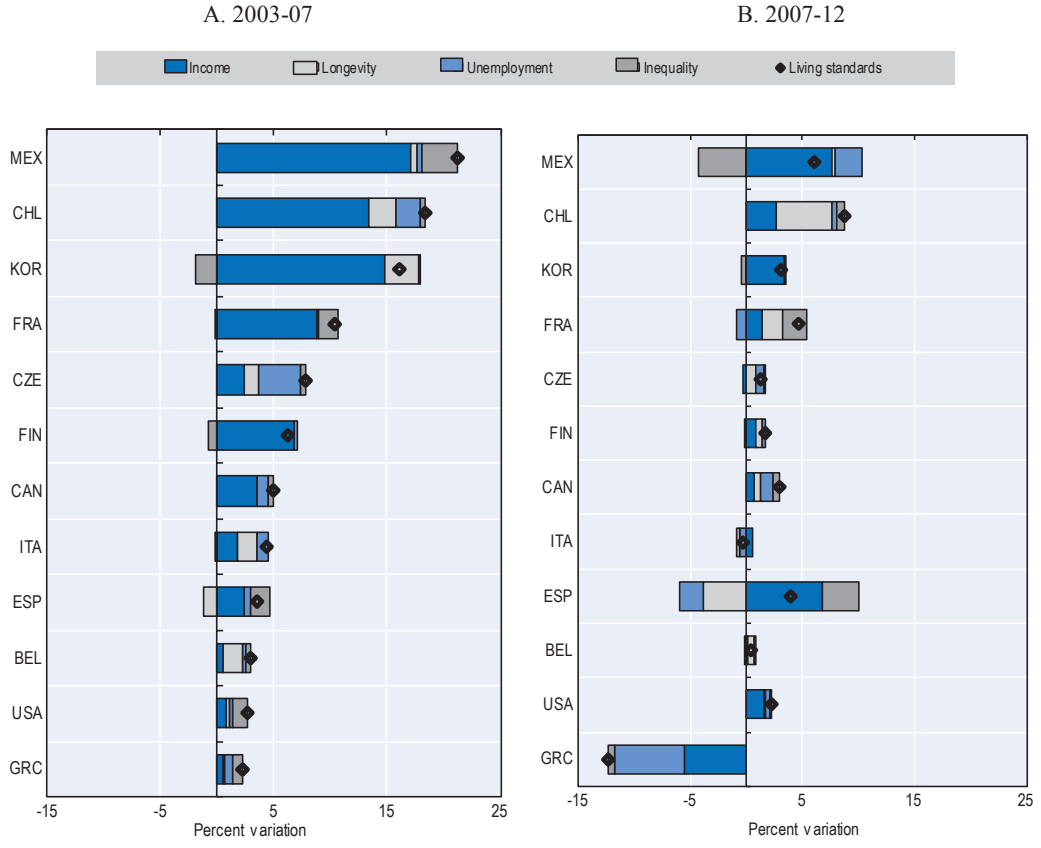
Source: Adapted from Veneri, P. and F. Murtin (2016), "Where is inclusive growth happening? Mapping multi-dimensional living standards in OECD regions", http://dx.doi.org/10.1787/5jm3nptzwsxq-en.

The 2008 economic crisis had spatially asymmetric effects on the average living standards of different regions. Figure 3.5 highlights a clear difference between average growth rates of MDLS in the period before and after 2007. Between 2007 and 2012, even the regions that had previously experienced the highest growth of MDLS recorded a general stagnation of MDLS and its underlying components. European regions recorded the sharpest falls in MDLS after the start of the crisis, with Greece recording lower MDLS in all of its regions. In most regions, the stagnation of MDLS was driven by stagnant household income and higher unemployment rates. The top-performing region in Chile and Korea improved their MDLS, though such improvements were not matched by gains in GDP per capita.

Changes in living standards have been unequal for different income groups. The results above refer to the median household, i.e. the value that cuts the income distribution into two equal parts, which generally speaking represents the income of the

"middle class".[9] When focusing on the bottom 20% of the income distribution (by increasing the inequality aversion parameter),[10] a slightly higher growth of living standards can be observed in Estonia and in the top-performing regions of Belgium, Chile, Italy, Korea and the United Kingdom. At the same time, the decrease in MDLS in the best-performing region in Greece was worse for the bottom 20% of the population than for the median household. Similarly, in Finland and France, the lower end of the income distribution had a smaller improvement in MDLS than the middle class.

Figure 3.5. **Changes in multidimensional living standards in each country's top-performing regions and relative contributions of its components, pre- and post-economic crisis**



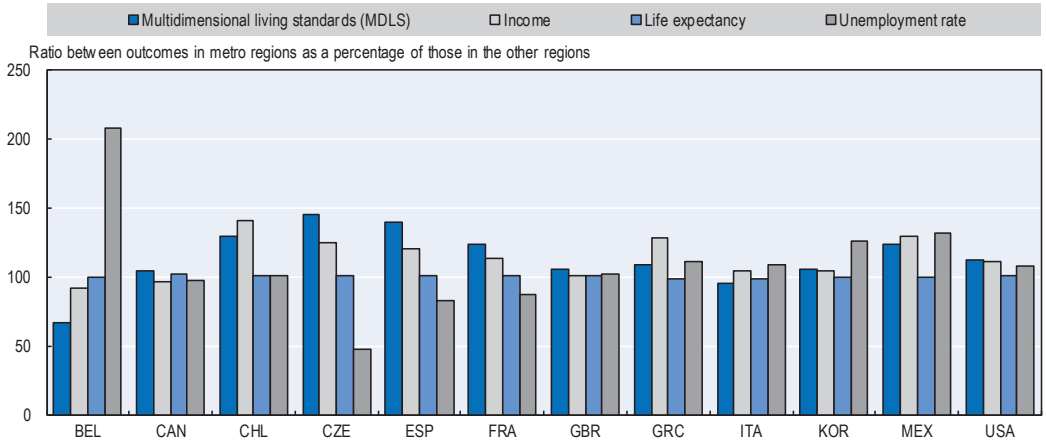
Source: Adapted from Veneri, P. and F. Murtin (2016), "Where is inclusive growth happening? Mapping multi-dimensional living standards in OECD regions", http://dx.doi.org/10.1787/5jm3nptzwsxq-en.

Metropolitan regions enjoy higher living standards than the other parts of a country

Multidimensional living standards are, on average, higher in metropolitan regions, where they exceed their non-metropolitan counterparts by around 30% on average for the countries considered here. The higher average household disposable income in metropolitan regions is the main driver of the gap in MDLS between the two types of regions. Although the income gap may be partially offset by higher living costs in metropolitan areas,[11] the findings are consistent with the evidence provided in Chapter 2 and with previous results that income and wages tend to increase with city size (D'Costa and Overman, 2014). In turn, higher wages reflect higher productivity in cities, due to the

concentration of the most talented workers and most productive firms in cities, and the agglomeration advantages emerging when economic agents are clustered in space (Behrens, Duranton and Robert-Nicoud, 2014). The unemployment rate is, on average, lower in metropolitan regions when all regions are pooled together. However, there are large differences across countries, with Belgium, Greece, Italy, Korea, Mexico and the United States showing higher unemployment rates in metropolitan regions than elsewhere (Figure 3.6). On the other hand, the difference between life expectancy at birth in metropolitan and non-metropolitan regions is not statistically significant.[12] The number of years one is expected to live is relatively similar between the two types of regions in practically all countries considered.

Figure 3.6. **Ratio between average outcomes in metropolitan and non-metropolitan regions: Multidimensional living standards and its components, 2012**



Source: Authors' calculations based on OECD (2015b), *OECD Regional Statistics* (database), http://dx.doi.org/10.1787/region-data-en.

Box 3.1. **How do we define metropolitan regions?**

In this chapter, regions in OECD countries represent the first administrative tier of subnational government, according to the OECD territorial level classification (Territorial Level 2 in the *OECD Regional Database*). According to this classification there are 391 OECD regions, which are officially established in member countries, for example regions in France and Italy, states in Mexico and the United States, etc. Internationally comparable data on these regions can be found in the *OECD Regional Database*.

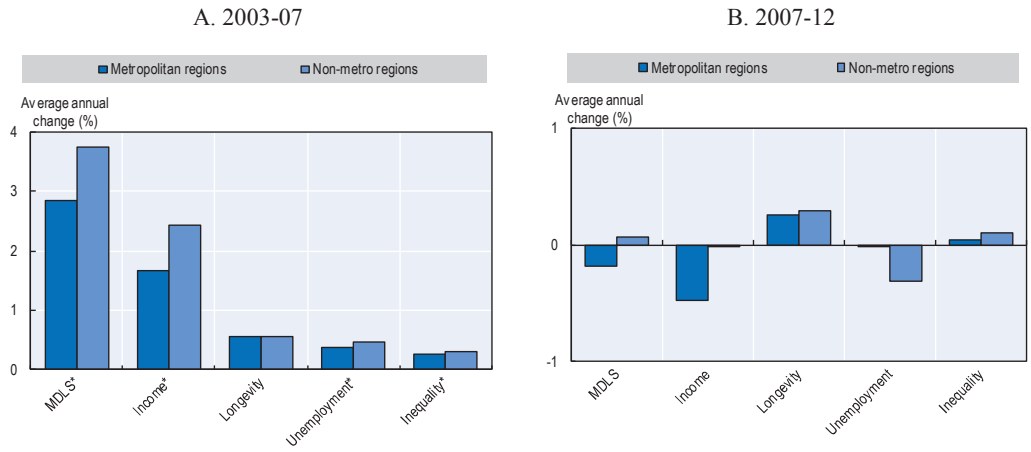
While each region may include one or more cities of different population sizes, for the sake of simplicity, regions are classified into two categories, i.e. metropolitan and non-metropolitan. Metropolitan regions are those where the highest share of the population lives in large functional urban areas (with a population above 1.5 million people) with respect to the share of the population living in smaller functional urban areas or in non-urban locations. All other regions are considered as non-metropolitan regions.

Sources: OECD (2016), *OECD Regions at a Glance,* http://dx.doi.org/10.1787/reg_glance-2016-en; OECD (2012), *Redefining "Urban": A New Way to Measure Metropolitan Areas,* http://dx.doi.org/10.1787/9789264174108-en.

During the period 2003-12, MDLS barely changed in metropolitan regions (-0.03%), while they increased by around 1.3% per year in non-metropolitan regions. A similar pattern is observed for income, which increased less in metropolitan regions than elsewhere. On the other hand, the contribution of health and jobs to the growth of MDLS was not significantly different across the two types of regions in the decade 2003-12.

The economic crisis affected the patterns of growth of MDLS in all types of regions. Before the crisis, all components of MDLS were registering positive changes (Figure 3.7). Non-metropolitan regions showed relatively higher growth rates of income and a higher reduction in unemployment rates, suggesting that a process of regional convergence was in place during those years. After 2007, such convergence was no longer occurring and MDLS deteriorated in all regions, driven by stagnating income and rising unemployment rates.

Figure 3.7. **Changes in multidimensional living standards and its dimensions in metropolitan and non-metropolitan regions, pre- and post-economic crisis**



Notes: MDLS: multidimensional living standards. For the non-income dimensions (longevity, unemployment and inequality) of MDLS, the figure does not show the direct change of their respective indicators (life expectancy, unemployment rates and the differences across income quintiles, respectively), but the contribution that changes in those indicators made in terms of change of MDLS (through shadow prices).

* = statistically significant at 90%.

Source: Authors' calculations based on OECD (2015b), *OECD Regional Statistics* (database), http://dx.doi.org/10.1787/region-data-en.

Conclusions

Multidimensional living standards provide a measure of welfare improvements that accounts for both levels and distributions of different well-being outcomes (OECD, 2014a; 2014b). Such a measure allows identifying the contribution of each dimension – income, jobs, health – to the overall change in living standards and can help policy makers identify existing trade-offs and synergies between different sectoral policies.

This chapter provided novel evidence on the levels and trends of MDLS at the regional level for a subset of OECD countries. It showed that regional disparities have been widening in many countries, often at a higher rate than disparities in income. The findings underline the relevance of monitoring different aspects of living conditions in

regions and cities. Many of the important interactions among sectoral policies are place-specific and hence comprehensive measures of well-being can help identify the strengths and challenges regions face.

Extending the measurement of multidimensional living standards to subnational regions brings about some methodological issues that should be mentioned for future improvements and the possibility of applying the same measures to cities. First, the method transforms non-monetary variables (unemployment and life expectancy) into monetary values by computing shadow prices that express people's preferences through life satisfaction. At this stage, the shadow prices are the same for the entire country and potential differences across regions are not considered because of limited data on subjective well-being (life satisfaction) at the subnational level. Second, the estimation of shadow prices at the regional level could include well-being dimensions beyond income, jobs and health that are particularly relevant locally, such as environment, access to services and safety outcomes. These extensions are left out of this chapter, but represent promising issues for further work in this area. Finally, future availability of data at the city level, such as historical series on income, income inequality and life expectancy, starting from the variables developed in this chapter and Chapter 2, will allow the measurement of multidimensional living standards to the geography of cities to be extended.

Notes

1. For illustrative purposes, the results shown by the OECD at national level are obtained by aggregating the equivalent income of different groups of population in ways that give more weight to households in the first and fifth (median) decile of income in each country (OECD, 2014a).
2. See Box 3.1 for the definition of regions.
3. This choice of well-being dimensions derives from empirical analyses on the main determinants of people's life satisfaction (Boarini et al., 2012) and considerations on data availability.
4. In the case of Chile, Korea and the United States, where life expectancy data are not available every year, the missing points between observations were linearly interpolated in order to maximise the time span considered in the computation of MDLS.
5. In addition to the 15 countries, MDLS in regions were estimated for the year 2012 in Australia, Denmark, Germany, Japan, the Netherlands, New Zealand, Norway, the Slovak Republic, Slovenia, Sweden and Switzerland. More details on the sources of data and the waves of national income surveys used for obtaining income indicators over time can be found in Royuela, Veneri and Ramos (2014).
6. The coefficient of variation is the most used indicator in research on measuring regional disparities. It has the advantage of not being too sensitive to the units of measure and the number of regions. It is computed as the ratio between the standard

deviation and the mean of each variable. Higher values of the coefficient of variations indicate larger regional disparities.

7. The limited availability of income distribution data at regional level restricts the time span covered in this analysis. Such a period generally ranges between 2003 and 2012, except for Belgium (2003-10), Canada (2004-11), Chile (2003-13), the Czech Republic and Mexico (2004-12), Korea (2004-13), the United Kingdom (2010-13), and the United States (2003-11).

8. Changes in GDP per capita and in MDLS had a correlation coefficient of 0.43 (obtained on all the regions without the outliers), in line with that found at the national level (0.40) (OECD, 2014a).

9. The indicator of MDLS is computed by aggregating the equivalent income of various quintiles of the population by using an aversion to inequality factor that tends to approximate the conditions of the median households (τ=1.2).

10. In order to give more weight to the bottom 20% of the income distribution, the aversion to inequality parameter was set to 50.

11. Due to lack of data, differences in prices between metropolitan and non-metropolitan regions are not considered. Previous studies have shown that spatial differences in prices can dramatically affect the real income available to urban and rural people (Jolliffe, 2006; World Bank, 2015).

12. Results refer to 15 OECD countries: Belgium, Canada, Chile, the Czech Republic, Estonia, Finland, France, Greece, Italy, Korea, Luxembourg, Mexico, Spain, the United Kingdom and the United States.

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Annex 3.A1. Methodology to compute multidimensional living standards in OECD regions

Identification of shadow prices of well-being dimensions: Income, jobs, health

There are several approaches to compute shadow prices (Veneri and Murtin, 2016). The approach used here consists in identifying shadow prices through life satisfaction regressions. Based on this approach, the first step consists in running life satisfaction regressions at country level (panel), as follows:

$$Life_Sat_{j,t} = a_j + b_t + \alpha log y_{j,t} + \beta^1 Life_expt_{j,t} + \beta^2 U_{j,t} + \varepsilon, \qquad [1]$$

where a_j, b_t, α, β_1 and β_2 are coefficients to be estimated. $y_{j,t}$, $Life_expt_{j,t}$ and $U_{j,t}$ are the disposable household income, the average number of years of life expectancy and the unemployment rate in country j at time t, respectively. Regressions are run at country level in order to reduce the influence of measurement errors and unobserved heterogeneity that can affect the results of micro-level analyses (Murtin et al., 2015).

From equation [1], the shadow price of an additional year of life expectancy is the (subjective) income necessary to maintain life satisfaction constant. Such a shadow price is obtained as follows:

$$p_{j,i}^{life_expt} = y_{j,i}\left[1 - \exp\left(-\frac{\beta^1}{\alpha}\right)\right] \qquad [2]$$

Similarly, the shadow price of a decrease of 1 percentage point of the unemployment rate is the subjective income necessary to maintain life satisfaction constant, which is obtained as follows:

$$p_{j,i}^{U} = y_{j,i}\left[1 - \exp\left(-\frac{\beta^2}{\alpha}\right)\right] \qquad [3]$$

The identification of shadow prices as in equations [1] and [2] is not exactly replicable using regional data. As data on life satisfaction are not available at subnational level for most countries, equation [1] cannot be estimated with regional data directly. As a solution to this limitation, the shadow prices used in this work are those of Murtin et al. (2015), which are based on a panel of OECD countries. More specifically, the parameters α, $\beta 1$ and $\beta 2$ have been estimated to be 3.538, 0.192 and -0.063, respectively. Consequently, the shadow price of an additional year of life expectancy is 5.3% of household income, while the shadow price of a decrease of 1 percentage point in the unemployment rate is 1.8% of household income.

Computing regional equivalent income and multi-dimensional living standards

Once shadow prices are estimated, it is possible to compute the "equivalent income" (or "monetised well-being") of different groups of people within each region. This phase accounts for the distributional aspect of living standards through the measurement of equivalent income by social groups, separately. Social groups are identified, for each region, by taking the quintiles of the distribution of household disposable income. Thus, equivalent income by income quintile is computed by applying the following formula:

$$Y_d^* = y_d - U^b * p^u - \Delta\ Life_expt * p^{life_expt} \qquad [4]$$

where y_d is the mean of the d-th quintile of household disposable income; p^u and p^{life_expt} are the shadow prices allowing jobs and health outcomes to be converted to monetary terms; Δ *Life_expt* is the difference in the number of years of life expectancy between the region with the highest life expectancy (Madrid, Spain with 84.2 years of life expectancy at birth) and the i-th region; U^b is the benchmark unemployment rate, which is set to zero.

Finally, multidimensional living standards are obtained, for each region, by aggregating the equivalent incomes of each quintile using a social welfare function. Aggregation of individual outcomes has been widely debated in social welfare theory, one issue being that different choices of aggregation reflect different views about inequality. Consistent with the OECD approach to measure inclusive growth at the national level, the function chosen to aggregate the equivalent income for the different quintiles is Atkinson's general mean (Atkinson, 1970), which is defined as follows:

$$MDLS_i = \left(\frac{1}{5}\sum_d^5 Y_{d,i}^{1-\tau}\right)^{\frac{1}{1-\tau}} \qquad [5]$$

where $MDLS_i$ is the multidimensional living standards of the i-th region, $Y_{d,i}$ is the equivalent income of the d-th quintile in the i-th region as computed in [4] and τ is a parameter that reflects the society's aversion to inequality. The way inequality enters into the computation of MDLS depends on the choice of τ. When it is equal to zero, equation [5] coincides with the simple average income, as in a pure welfarist approach. Higher values of τ reflect a higher aversion to inequality. In this chapter, the calculation of regional MDLS was carried out by setting τ=1.2, which implicitly takes the median income as the reference group (i.e. the measure of multidimensional living standards obtained when setting the inequality-aversion parameter at 1.2 are reflective of the median household welfare; see Annex 3.A2 for details). Other choices on the parameter τ could be made, to attribute more weight to other segments of the population. On the whole, an increase of MDLS can be driven by an improvement of one or more of the outcomes considered in this framework (i.e. income, health or jobs) but also by reduced inequality.

References

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Annex 3.A2.
Calibration of the aversion to inequality parameter

This annex identifies the value of the parameter of aversion to inequality (τ) to be used in the Atkinson function when aggregating the equivalent income of the different income groups. Note that at the regional level income groups are identified by looking at the quintiles of the distribution of household disposable income within each region.

By changing the value of τ we implicitly assign a different weight to a certain part of the income distribution. In order to identify τ so as to target a specific income group, it is necessary to compute income standards by using many values of the parameter within a certain interval and to select the value that yields the level of income standards which is the closest to the level of income of the reference group.

The first step is to define the Atkinson function to compute the income standards:

$$IS_i = \left(\frac{1}{5}\sum_d^5 y_{d,i}^{1-\tau}\right)^{\frac{1}{1-\tau}} \qquad (1),$$

where IS_i is the income standards of the i-th region, $y_{d,i}$ is the disposable household income of the d-th quintile in the i-th region and τ is the parameter that reflects the society's aversion to inequality. By definition, the aversion to inequality increases as τ increases. In other words, by increasing τ the function will yield a lower income.

The income groups which show the closest value of τ are the median household, the bottom 40% and the bottom 20%, which are identified with the 50th, 40th and 20th percentiles of the income distribution, respectively.

Table 3.A2.1 reports the mean values of the τ parameter for two target groups, namely the median household and the bottom 40%, both for the whole sample of regions and by country. Regions are considered twice – one point for the first and the last year available, respectively – for a total of 418 observations (209 OECD TL2 regions).

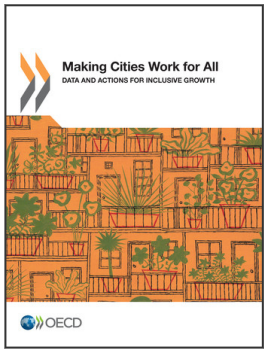
The values of the τ parameter by country show that regions in Chile, the Czech Republic, France and Mexico have, on average, substantially higher parameters than in the other regions when the median household is the reference income group. On the other hand, when the bottom 40% is taken into account, there is a higher variability across regions in the values of the τ parameters, with Czech Republic, Finland and France having the highest values, on average.

When the target group is the bottom 20%, then by construction τ is equal to the higher bound of the possible values, since information on the income distribution within regions is given by quintile and the lowest percentile available corresponds to the households identified in the bottom 20% of household income. As a consequence, and for consistency with the inclusive growth framework at the national level, when the target group is the bottom 20% of income, τ is set to the value of 50.

Table 3.A2.1. **Aversion to inequality by country**

Mean aversion to inequality (τ) parameter according to the targeted income group

Country	Median household	Bottom 40%
Belgium	1.16	2.07
Canada	1.04	1.63
Chile	1.33	2.06
Czech Republic	1.26	2.43
Estonia	1.04	1.84
Finland	1.07	2.31
France	1.26	2.35
Greece	1.04	1.72
Italy	1.06	1.85
Korea	1.05	1.56
Luxembourg	1.08	2.29
Mexico	1.39	2.21
Spain	1.06	1.67
United Kingdom	1.14	2.08
United States	1.04	1.51
Mean	1.16	1.90
Standard deviation	0.19	0.39



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