Chapter 2. Income dynamics and income mobility over the life course[1]

This chapter considers social mobility from an intra-generational perspective and analyses income mobility over the life course. The chapter explores to which extent levels of income inequality change when taking income mobility into account – so called "permanent inequality". It identifies the extent of income persistence at both ends of the income distribution in OECD countries and selected major emerging economies – "sticky floors" and "sticky ceilings". *The chapter provides evidence on trends in income mobility between the late 1990s and the early 2010s. It also analyses the structure of income changes and the role of unpredictable "income shocks" for explaining those changes, in particular at the bottom of the income distribution.*

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

Introduction

There is a large variation in the level of income inequality across OECD countries, with Gini coefficients ranging from 0.25 to 0.45. However, income indicators are typically measured at a particular point in time on an annual basis. Even if such indices are computed for a number of successive periods, they do not reflect individual trajectories and dynamics. Over time, both income values and individuals' positions on the income ladder are likely to change. That is why a society with a given level of income inequality where household incomes are mobile will not face the same challenges as a society with the same level of income inequality but where income positions are "stuck" over time. The purpose of the present income mobility analysis is to look at these individual income trajectories, i.e. income changes of a given person over time, in order to understand how they link with overall inequality and what this implies for policies.

To identify a "desirable" level of income mobility for a society is not straightforward (Jäntti and Jenkins, 2015). On one side, income mobility as such can be desirable from a social welfare point of view. A highly mobile society can be seen as a goal in itself, a sign of an open society and a fluid income distribution. A society where household incomes are mobile and where individuals have a high chance to move up through their efforts and capabilities may be socially preferable to a society where income positions are stuck over time. Ensuring that the poorest people do not persistently stay poor and enabling sufficient income mobility can help to prevent long spells of poverty and their damaging impact, for example in terms of social exclusion. In that sense, income mobility provides "a short way from rags to riches" (Jenderny, 2016). A society where people ranking in the top incomes are not persistently the same can be preferred to a society where there is no turnover among people ranking at the top.[2] Similarly, if inequality reflects discrimination against certain groups or the results of cultural, ethnic or family backgrounds, it is likely that income mobility can contribute to a more equal society.

On the other side, some aspects of income mobility are not desirable from a social welfare point of view. "Excessive" income mobility, in the sense of frequent and uncertain income changes, can also be associated with greater income insecurity. As people are generally averse to losses, stable disposable incomes can therefore be seen as a desirable outcome per se from a social policy point of view, and policy measures actually work in this direction, for example via insurance that in the case of unemployment compensates losses that are linked to former employment income levels.

The patterning of income mobility is an important aspect of how societies function. It describes the ability of people to move up or down the economic ladder, over the lifetime or within a more limited horizon of time, and their economic vulnerability. A better understanding of income changes – their sizes, persistence, drivers, and the role policy institutions play in the process – is key to improve the effectiveness of policies, foster more stable and resilient income paths and promote equal opportunities. Countries that exhibit similar levels of overall income mobility may contrast greatly in terms of the underlying forces driving mobility processes. A low level of income mobility may be a result of market inefficiency (lack of opportunity) in one country, while a result of generous welfare (stability) in another (Jäntti and Jenkins, 2015).

Income mobility describes the movements of a given individual through the distribution of income over time, by either relating one's current income to one's past income levels – which will be referred as absolute income mobility – or relating one's

current income position in the income distribution (for instance, a given income quintile) to one's past position – which will be referred to as positional income mobility.

The purpose of this chapter is to assess the size and forms of intra-generational income mobility. It concentrates on income changes over (working-age)[3] individuals' "life course", ranging from medium-term income mobility (four years) to longer-term income changes (nine years). The chapter first identifies how taking account of income mobility changes our assessment of existing levels of income inequality. It focusses in particular on the bottom and top of the income distribution, the two parts of the income distribution where there is the least mobility in terms of position in the income ladder. The chapter then analyses how income mobility evolved between the late 1990s and the early 2010s. It also examines positional mobility in some of the major emerging economies. Last, the chapter provides an analysis of the structure of income changes and disentangles the effects prevailing at country level into different components and drivers: benefits of overall economic growth, returns of experience, returns of unobserved individual characteristics and unpredictable income changes. The chapter highlights that "unequal mobility" can occur when unpredictable income changes combine with low levels of long-term (upward) income mobility and when this concerns mostly the most vulnerable population groups.

The following main findings emerge:

- There is no trade-off between inequality and income mobility. The most unequal countries do not have greater levels of mobility. And some among the most equal countries have large levels of income mobility.
- On average across OECD countries, in the early 2010s, 50% of individuals stay in the same income quintile over four years, and almost 40% over nine years – a figure that is relatively stable across countries. Income persistence is higher at the bottom of the distribution (almost 60%) and, in particular, at the top (70%). Sticky ceilings prevent those with high incomes from falling down the income distribution, while sticky floors prevent those with low income from moving upward.
- Compared to poorer and richer households, the middle class appears more mobile, as only 40% remain in their respective income position after four years (and 30% after nine years). For these households, even small absolute income changes can lead to a change of their income position. Such changes are not neutral in terms of well-being and life satisfaction, as people tend to pay considerable attention to their own income positions with respect to others.
- There is a trend towards more persistence of income positions today compared to the late 1990s. This translates into both lower chances to move upwards for those at the bottom and lower risks for those at the top to move downwards. Although overall income inequality increased since that time, it has not been compensated by greater income mobility.
- There are signs of a divide among the middle classes in many countries: for those closer to lower incomes and part of the "bottom 40%", the risk to further slide down over the life course has increased in many countries. At the same time, those closer to the middle and the more affluent members of the middle class today have somewhat lower risks to fall into low income and poverty. If this trend continues, there is a risk that the middle class may be fracturing.

- Income mobility in emerging economies is slightly higher than in a typical OECD country. There is, however, no sign of a trend towards greater mobility since the early 2000s – rather the opposite.
- Overall, individuals' income changes depend on four components: aggregated income growth, life-cycle effects, heterogeneous individual trends and unpredictable income changes. Measured over a four-year time period, unpredictable income changes ("shocks") matter most to explain income changes, and these are more frequent among individuals in the bottom of the income distribution.

2.1. Income mobility and inequality

Income inequality varies greatly across OECD countries (OECD, 2015a). Today, the Gini coefficient – a common measure of income inequality that scores 0 when everybody has identical incomes and 1 when all the income goes to only one person – stands at an average of 0.315 in the OECD countries, approaching 0.4 in the United States and Turkey and exceeding 0.45 in Chile and Mexico. Over the past three decades, income inequality has risen in most OECD countries, reaching in some cases historical highs.

However, having a widening gap between "the rich" and "the poor" from one date to another does not mean that "the rich" and "the poor" between these two dates are the same individuals. Between two extreme scenarios – one in which from one point in time to another the richest person became the poorest, and vice versa, one where the poorest remains the poorest and the richest the richest – many intermediate cases occur in reality. The degree and form of such mobility has concrete implications for our assessment of income inequality across countries.

The purpose of this section is to assess the level of inequality prevailing when incomes are averaged over a longer time frame than one year. In a nutshell, it shows that the current level of income mobility in OECD countries is not of sufficient size to offset the effects of an overall increase in income inequality.

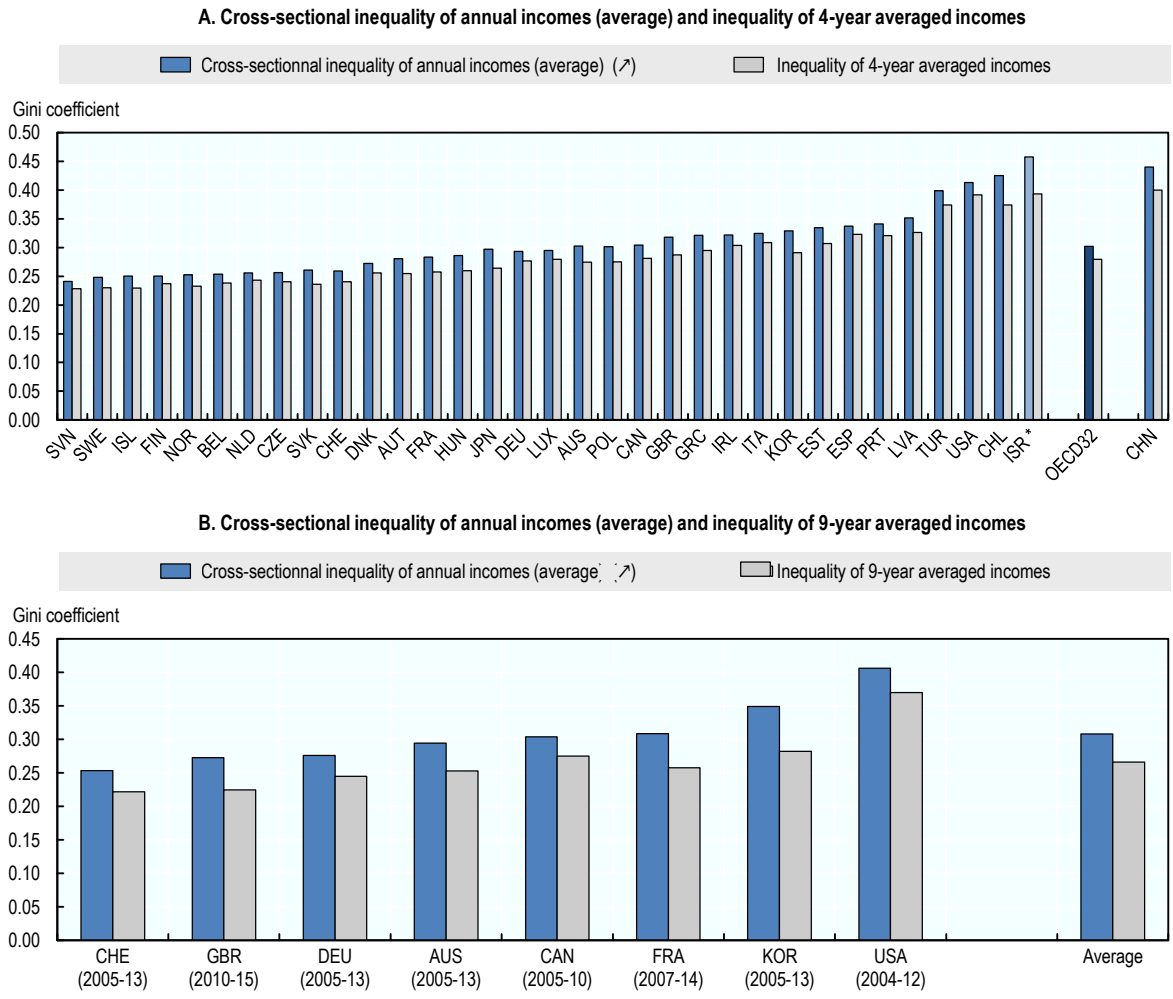
People's incomes change regularly, frequently and significantly. Inequality measures observed at one point in time therefore reflect only a snapshot of levels of inequality among individuals. If for example a significant share of low-income individuals manage to reach the lower middle class after some years, or if the richest people do not stay the richest on average over some years, then the cross-sectional measure of income inequality is partial, especially when comparing societies with different institutions and mobility patterns.

A measure of average incomes over a longer period is better reflecting individuals' welfare than an instant snapshot (Shorrocks, 1978; Fields, 2010). If one were to pool individuals' incomes over four years, the level of inequality would be lower, but only slightly. For example, the Gini coefficient of incomes pooled over four years in the beginning of the 2010s (2011-2014 for most countries) would be 2.3 points lower than the average of yearly inequality measures over the same period[4] (Figure 2.1, Panel A). On a longer time frame, here a decade, inequality is lowered on average by 3 to 7 points in countries for which data is available (Figure 2.1, Panel B). For the sake of comparison, the Gini coefficient increased by approximately 3 points between 1985 and 2015. The longer the time frame taken into account, the greater are the chances to observe income changes, and hence to capture a stronger impact of such changes on inequality. Some estimates on long durations (over ten years) suggest that inequality declines steadily as

the reference period is extended, although less and less after more than ten years. Permanent inequality would then converge and be about 30% lower than the level of inequality measured annually (Jenkins, 2011).

Figure 2.1. Cross-sectional inequality and "permanent" income inequality

Early 2010s or latest



* For Israel data refer to income before taxes.

Reading note: In the OECD on average, the Gini index of yearly incomes for the working-age population (18-65 years old) stood at 0.302 on average between 2011 and 2014. The Gini index of averaged 4-year incomes was slightly lower, at 0.279, indicating that income mobility decreased the level of inequality by 2.2 points.

Notes: Inequality is measured by the Gini coefficient, a standard measure of income inequality which takes values between 0 (where every person has the same income) and 1 (where all income goes to one person). In Panel A, data refer to 2011-14 for all countries except Australia, Germany, Ireland, Korea, Switzerland and Turkey (2010-13), Canada (2007-10) and Chile (2006-09). For the United States, as data is collected on a biannual basis, the result is based on the average between results for a 3 year- and a 5 year-panel. Data for China refer to the age 25-55 population and cover a period of 5 years. In Panel B, data refer to 2007-14 for France, to 2005-13 for Australia, Germany, Korea and Switzerland, 2004-12 for the United States and 2005-10 for Canada.

Source: OECD calculations based on the CNEF; EU-SILC; SRCV (France - 8 years); KHPS-JHPS (Japan), Panel Casen Survey (Chile), SILC (Turkey), Israeli Longitudinal Survey and Chan et al. (forthcoming) for China. See Annex 2.A1 for details on the data sources.

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While the ranking among countries is not altered when incomes are assessed over a four-year span, some important differences between countries can be observed. Income mobility lowers long-term inequality especially in Chile, Korea and Japan, in the United Kingdom, and in the Central Eastern and Baltic European countries. Income mobility lowers inequality less in Slovenia, the Netherlands, Finland and Spain (less than 1.5 Gini points over four years). In China, inequality is lowered to a greater extent than in most OECD countries.

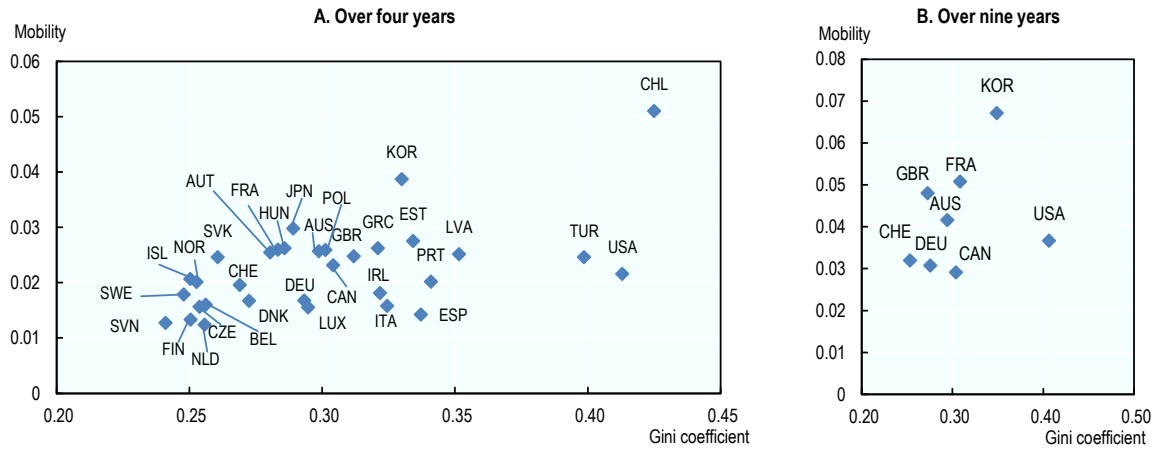
The reduction of inequality that stems from income mobility is somewhat greater in more unequal countries, but not to an extent that changes the overall ranking of countries regarding cross-sectional inequality. The difference between inequality of averaged ("permanent") incomes and the average of cross-sectional inequality is a proxy indicator of mobility and gives an idea of how much inequality is lowered by the passage of time. There is only a weak correlation, if at all, between this indicator of mobility and inequality (Figure 2.2).

The literature distinguishes opposing views on the link between inequality and income mobility. Some argue that wider inequality is the result of large-scale mobility processes. As such, inequality would not be an issue *per se*, as long as large mobility compensates for it (e.g. Friedman, 1962; 2009). Others suggest that a wider income distribution implies bigger steps to climb up, which income and social mobility do not compensate (e.g. Krugman, 1992; Aaberge et al., 2002; Jenkins, 2011).

An extensive literature has examined whether the higher level of inequality in the United States could be mitigated by a higher level of income mobility, in particular by comparing the United States and Europe (see Burkhauser and Couch, 2009, for a review) and found that greater inequality is weakly linked to greater intra-generational mobility. Aaberge and Mogstad (2014) found that there is only a slightly higher level of mobility in the United States than in Nordic countries, although inequality is much higher in the former. Such results are consistent with numerous findings in the literature. Gangl (2005), comparing European countries and the United States during the 1990s, notes that there is little difference in the country ranking once inequality is calculated for multi-period individual incomes and given there is not more income mobility in the United States than in Europe. A similar finding emerges from Chen (2009), who compares the United States, Canada, Great Britain and Germany during the 1990s. Alves and Martins (2012) focus on European countries in 2005-09 and conclude that income mobility does not substantially alter the income inequality ranking of EU countries, pointing to a significant fraction of permanent inequality in all EU countries. For China, Chan et al. (forthcoming) and Clement (2016) suggest that income is more unequally distributed but more mobile than in the United States, Germany and Great Britain.

Figure 2.2. Cross-sectional inequality and mobility in terms of Gini reduction

Gini coefficients for cross-sectional annual incomes and for averaged incomes (early 2010s or latest)



Note: Mobility is defined as the difference between the average of cross-sectional inequality and the inequality of the averaged ("permanent") incomes (Gini coefficients). Data refer to the working-age population (18-65). In Panel A, data refer to 2011-14 for all countries except Australia, Germany, Ireland, Korea, Switzerland and Turkey (2010-13), Canada (2007-10) and Chile (2006-09). For the United States, as data is collected on a biannual basis, the result is based on the average between results for a 3 year- and a 5 year- panel. In Panel B, data refer to 2007-14 for France, to 2005-13 for Australia, Germany, Korea, Switzerland, 2004-12 for the United States and 2005-10 for Canada.

Source: OECD Secretariat calculations based on CNEF, EU-SILC, SRCV (France, 8 years), KHPS-JHPS (Japan), SILC (Turkey) and Panel Casen Survey (Chile). See Annex 2.A1 for details on the data sources.

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2.2. Positional mobility: Sticky floors at the bottom, and sticky ceilings at the top

This section focuses on people's position in the income ladder and investigates income mobility by relating one's current income position in the income distribution to one's past income position. This is referred to as positional mobility. As individuals tend to value their well-being by comparison to the rest of the society, positional mobility matters. Falling behind others is generally perceived negatively, even when there is little change in real living standards, and moving ahead is perceived as desirable (see Box 2.1).

The relevance of positional mobility measures is rooted in a sociological approach to income mobility. How well individuals feel that they are doing in society is typically affected more by their relative position than by their absolute wealth or income (Duesenberry, 1949; Hirsch, 1995; Pavlopoulos et al., 2010). This is often pictured by the "keeping up with the Joneses" metaphor.[5] Evidence suggests that, while at any point in time, richer people tend to be happier than the poorer, the proportion of people reporting that they are happy does not increase with increases in society's average income (known as the Easterlin Paradox, Easterlin, 1973; 1995). This phenomenon is found to be exacerbated in more unequal countries (Cheung and Lucas, 2016).

Box 2.1. Is positional mobility a zero-sum game?

Mobility is often seen as a zero-sum game: if some people move up, others will have to move down. However, positional mobility deserves more attention for at least two reasons. First, the number of people moving down is not necessarily equal to the number of people moving up, nor is the magnitude of changes in individuals' income positions. Second, the outcome of these changes will not be treated similarly by policy makers, depending on whether it applies to those already in hardship, in the middle or at the top. As any individual moving up is counterbalanced by one or several moving down, a great variety of situations can occur within this "zero-sum game". An individual experiencing a strong upward positional mobility can for example be "compensated" (in terms of social welfare) by many individuals experiencing small positional losses or by a few experiencing strong symmetric downward mobility and stability among most of the remaining population.

Obtaining a better understanding of the distribution of gains and losses and their magnitude can also help to explain individual perceptions of overall well-being. For example, during recessions, smaller but more widespread income losses are preferred over larger losses concentrated on a few individuals (Wodon, 2001). The distribution of "winners" and "losers" translates into different concerns for policy makers, as one can suppose that in the latter case described above, the situation of those losing a lot will require either strong adaptation (in times of economic crisis) or support to benefit from the fruits of economic growth in economic upturns. Based on the nature of the income changes, policies can be envisaged to better share the brunt of economic and social changes, for example by providing support to re-skilling if a given sector is hurt, or by ensuring wide coverage of social insurance.

2.2.1. Moving up and down the income ladder

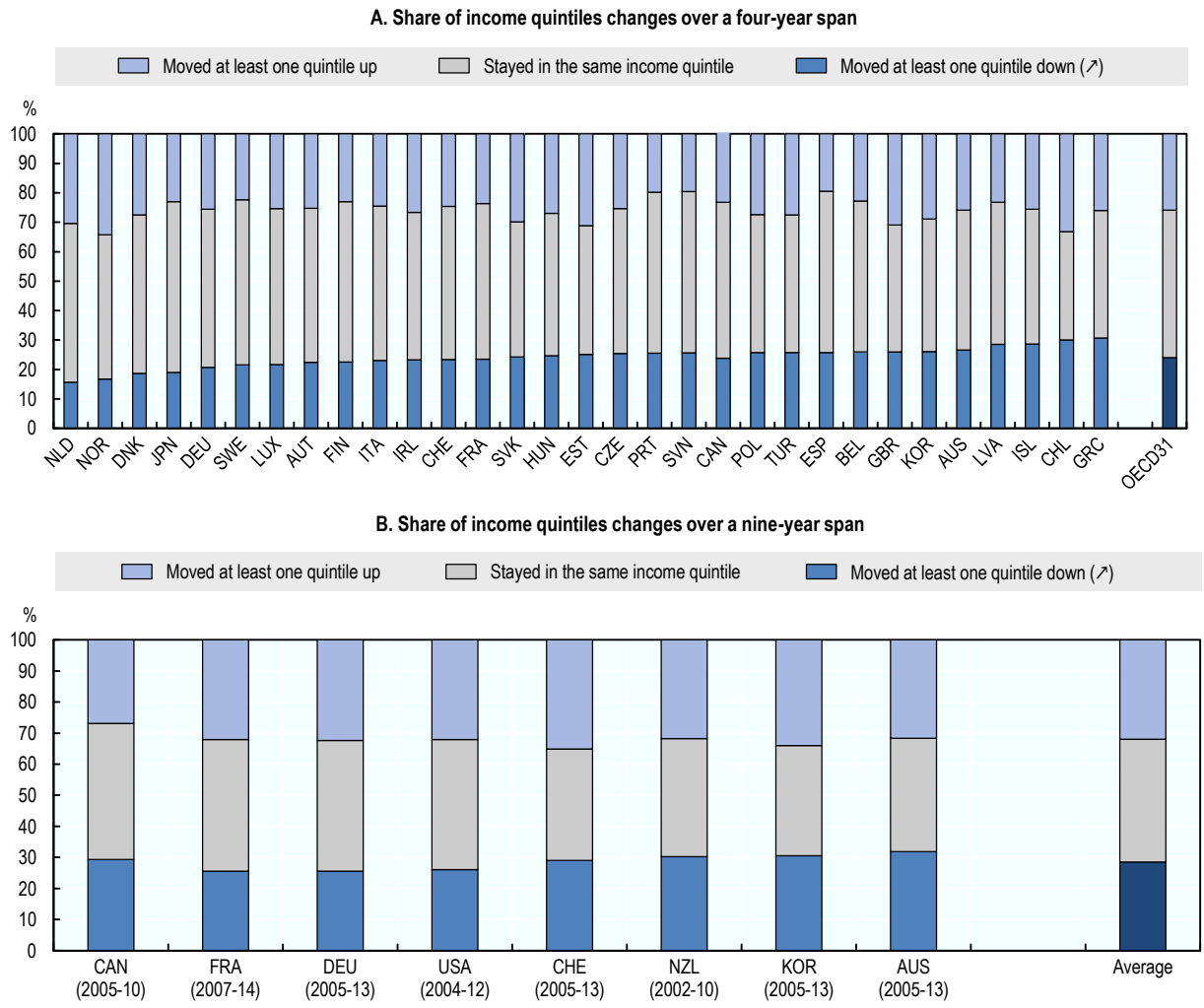
A simple way to summarise the extent of mobility is by analysing the association between an individual's initial position in the income distribution in a given year and the position some years later (four or nine here). On average across OECD countries, half of individuals stayed in the same income quintile[6] over four years; 26% moved one quintile up, and 24% moved one quintile down. With a longer time frame of nine years, the movements are larger: some 38% of people stayed in the same income quintile, 32% moved at least one quintile up, and 30% moved at least one quintile down (Figure 2.3).

The share of those staying in the same income quintile is broadly similar across countries. The countries with the least income mobility include Finland, Spain, the Netherlands and Sweden, with about 55% people staying in the same income quintile over four years. The most mobile countries, as measured by positional mobility, are Korea, the United Kingdom, Turkey and Greece, where only 40% to 44% of individuals stayed in the same quintile over four years. Among countries for which longer run data are available, France, Germany and the United States have lower levels of changes in income position, while Korea and Australia have higher ones.

Across countries, there is not necessarily a perfect balance between upward and downward movements. In the Netherlands for example, 30% of the population went at least one quintile up and 16% at least one quintile down between 2011 and 2014. A reason for this gap is either that mobility is not at the same level and/or that mobility occurs at different places in the income distribution. By contrast, in the United Kingdom and Korea, the share of people moving to an upper income quintile is the same (30%) but the share of people moving down is about ten points higher, around 25%, picturing a case combining large income gains for some with large income losses for others.

Figure 2.3. Share of income quintiles changes over time

Early 2010s or latest



Note: Data refer to the working-age population (18-65). In Panel A, data refer to 2011-14 for all countries except Australia, Germany, Ireland, Korea, Switzerland and Turkey (2010-13), Canada (2007-10) and Chile (2006-09). For the United States, as data is collected on a biannual basis, the result is based on the average between results for a 3 year- and a 5 year-panel. In Panel B, data refer to 2007-14 for France, to 2005-13 for Australia, Germany, Korea and Switzerland, 2004-12 for the United States and 2005-10 for Canada.

Source: OECD Secretariat calculations based on the CNEF, EU-SILC, SRCV (France), KHPS-JHPS (Japan), SILC (Turkey) and Panel Casen Survey (Chile). See Annex 2.A1 for details on the data sources.

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2.2.2. The starting position in the income ladder shapes income mobility

Mobility prospects are not equally shared throughout the income ladder. There is much more persistence at both ends of the income distribution. The vast majority of those starting at the *bottom* (first income quintile) have low prospects to move up the income distribution over time: on average, 57% remain in their position four years later, and 41% nine years later (Figure 2.4, Panels A and B). That said, large *absolute* income changes often occur at the bottom of the income distribution, with many people experiencing income increases. However, these increases are often insufficient to allow individuals to move up the income ladder significantly.

There is even more persistence at the *top* of the income distribution, with 68% of the people belonging to the richest quintile of the population staying there over four years, and 53% after nine years. A greater persistence at the top than at the bottom is also often reported in the literature (Kopszcuck et al., 2010; Alves and Martins, 2012). Symmetrically to the situation at the bottom, the top income group is a group where large absolute income changes can occur – however, again, they do not necessarily translate into significant re-ranking in the income ladder – hence, the high persistence also at the top.

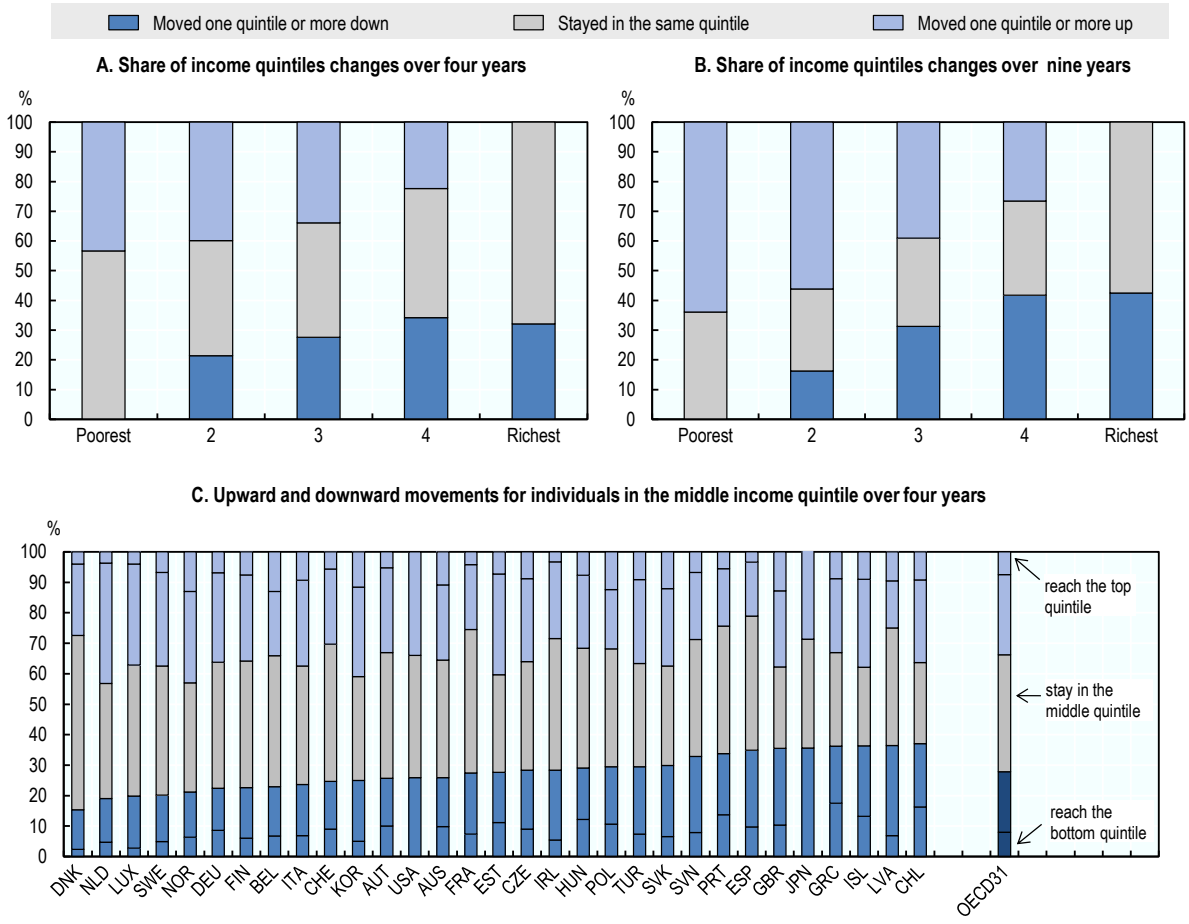
Compared to poorer and richer households, the middle class (working age adults in the 60% of people in the middle of the income distribution) is more mobile in terms of income positions. On average, only a minority remain in their respective income quintile: some 40% after four years, and 30% after nine years. The middle class is an income group where absolute income changes are smaller than at the bottom or the top of the income distribution. However, as incomes are generally much more concentrated in the middle of the distribution, even a small income change (in absolute terms) can lead to a change of income quintiles. Such positional change is not neutral in terms of well-being and life satisfaction, as people tend to pay considerable attention to their own income positions with respect to others.

When focussing on people around the median income (the third income quintile) as a reference, upward and downward mobility differs across countries (Figure 2.4, Panel C). Four country groups can be distinguished:

- In some countries, both the chances to move upward and the risks to move downward for those around the median are large (Chile, Iceland, Greece and the United Kingdom).
- By contrast, in another subset of countries, the chances for both upward and downward mobility are low, and the main scenario is stability within the quintile (Denmark, Germany and Switzerland).
- Others combine higher chances for upward mobility with lower risks for downward mobility for middle-income households (the other Nordic countries, the Netherlands and Luxembourg)
- Finally, and perhaps the most undesirable feature, in some countries (Slovenia, Portugal, Spain, France, Ireland), there are larger chances to move downward, and smaller chances to move upward. Chapter 3 expands further on the drivers of income changes at different points of the income distribution.

Figure 2.4. Positional income mobility by initial income quintile

Early 2010s or latest



Reading note: In the OECD on average, over four years, 57% of working-age individuals in the first income quintile stayed in the same income quintile and 43% moved up. Data refer to the working-age population (18-65). In Panel A, data refer to 2011-14 for all countries except Australia, Switzerland, Germany, Ireland, Turkey and the United Kingdom (2010-13). For the United States, as data is collected on a biannual basis, the result is based on the average between the results for a 3 year- and a 5 year-panel. In Panel B, data refer to 2006-14 for France, to 2005-13 for Australia, Germany, Korea and Switzerland, and to 2004-12 for the United States.

Source: OECD Secretariat calculations based on the CNEF, EU-SILC, SRCV (France) and KHPS-JHPS (Japan). See Annex 2.A1 for details on the data sources.

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2.2.3. Sticky floors: Persistence in the bottom quintile

Persistence of low incomes can have long-lasting impacts on material deprivation, health and labour-market performance (via stress, cognitive skills, skills deprecation). At the same time, low persistence at the bottom of the income distribution can generate other challenges for policy makers, for example recurrence of low-income spells, or increased exclusion of those permanently at the very lowest parts of the bottom (Fouarge and Layte, 2005). A better understanding of the persistence of low income – the sticky floor phenomenon – can inform policies to alleviate poverty in a given country through the

right channels – for example, by focussing measures on long-lasting poverty or recurrent spells of poverty.[7]

The persistence of low incomes measured over four years is especially high in Sweden, Luxembourg, the Netherlands and Finland – around 70% – as well as in Slovenia, Portugal and Spain (around 65%, Figure 2.5). When measured over a longer time period, the United States has the largest share of low-income people stuck at the bottom. Long-term unemployment is one main explanation for the strong low-income persistence. Escaping situations of low income is mostly driven by transitions from unemployment towards employment (Chapter 3). But it can also be explained by significant low-wage persistence for those at work, as for example in the Netherlands (Pavlopoulos et al., 2012; Chapter 3).

The persistence of low incomes is lowest in Chile, the United Kingdom, Japan, Denmark and Greece when measured over four years, and in Korea when measured over nine years. The mobility of low incomes might be explained on one side by relatively low unemployment levels, allowing quicker returns to employment (such as in Japan, Denmark and the United Kingdom) and larger chances to escape low pay (Pavlopoulos et al., 2012; Plum, 2016), and, on the other side, by strongly asset-tested assistance benefits (in the case of the United Kingdom and Korea), implying that temporarily jobless people may receive no or low benefit payments.

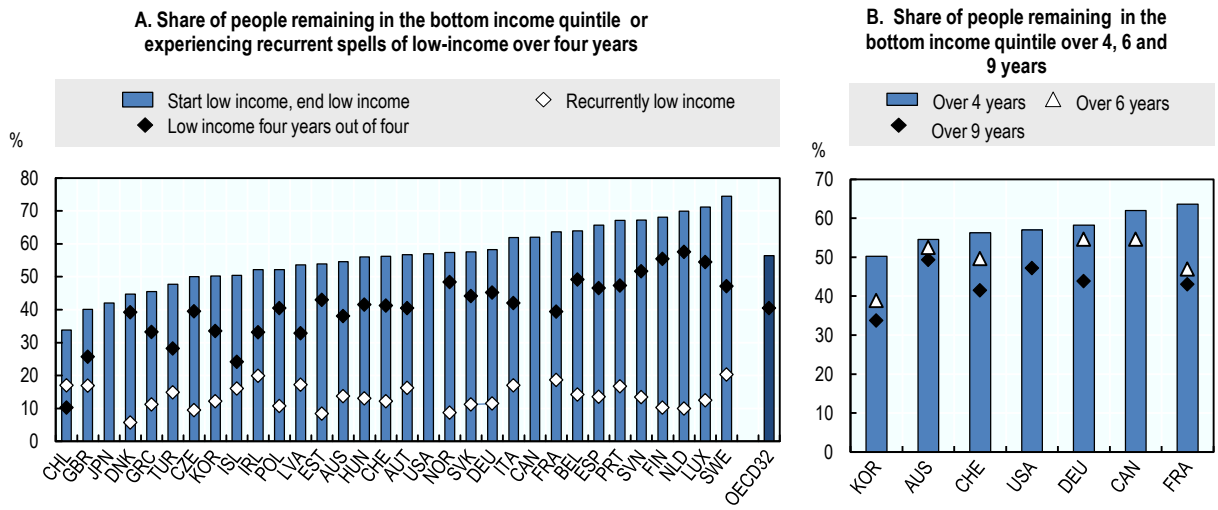
In countries with a low persistence of low incomes, the challenge may nevertheless be the *recurrence* of low-income spells, if increases in people's income are not stable over time and they fall back into poverty (Figure 2.5, Panel A). This is for example the case in Chile, where a large share of poverty was found to be transient or recurrent, and explained by a relatively flat income distribution at the bottom (Neilson et al., 2008). As regards the United Kingdom, the contrast with other countries (for example, Denmark) with similar levels of persistence in low incomes is explained by a much larger share of the population experiencing recurrent low-income spells over four years (Shildrick et al., 2010; Fouarge and Layte, 2005), and a broader tendency for people to remain stuck at the bottom in Denmark (during the whole four-year period, see Figure 2.5, Panel A).

The relation between inequality and the persistence of low incomes is therefore not straightforward. Low-income persistence can be large among the most equal countries, such as Finland, the Netherlands, Norway or Sweden,[8] as well as in more unequal countries, such as in southern Europe. The welfare implications can be different in the two cases of low- and high-inequality regimes. Low-income persistence can be a threat to social cohesion, especially in highly unequal countries. A high level of inequality can make the height of the step to climb up appear too high to individuals who are stuck at the bottom.

The persistence of low income is driven by a complex web of factors. Long–term unemployment, a lack of skills and segmentation of the labour market leading to poorly paid employment and lower prospects to move ahead are associated with the persistence of low income. However, other factors also enter into play. For example, low-earners might be lifted out of poverty because of their partner's income. Factors associated with greater labour market instability might also create more churning and instability at the bottom of the income distribution, and therefore be more associated with low low-income persistence. Chapter 3 investigates the drivers of income changes at the individual level, in particular in terms of income sources and links with employment transitions, taxes and benefits.

Figure 2.5. Sticky floors: Persistence in the bottom income quintile

Percentage of people of working-age remaining in the bottom income quintiles over four, six and nine years (early 2010s or latest)



Note: The figures represent the likelihood for an average individual in the lowest quintile to stay in the same income group after four years; to experience both spells of low-income and non-low income (recurrence) and to experience only low-income throughout the period. Data refer to the working-age population (18-65).Data refer to 2011-14 for all countries except Australia, Germany, Ireland, Korea, Switzerland, Turkey and the United Kingdom (2010-13) , Canada (2007-10) and Chile (2006-09). For the United States (2008-12), as data is collected on a biannual basis, the result is based on the average between results for a 3 year- and a 5 year-panel.

Source: OECD Secretariat calculations based on CNEF, EU-SILC, SRCV (France), KHPS-JHPS (Japan), SILC (Turkey) and Panel Casen Survey (Chile). See Annex 2.A1 for details on the data sources.

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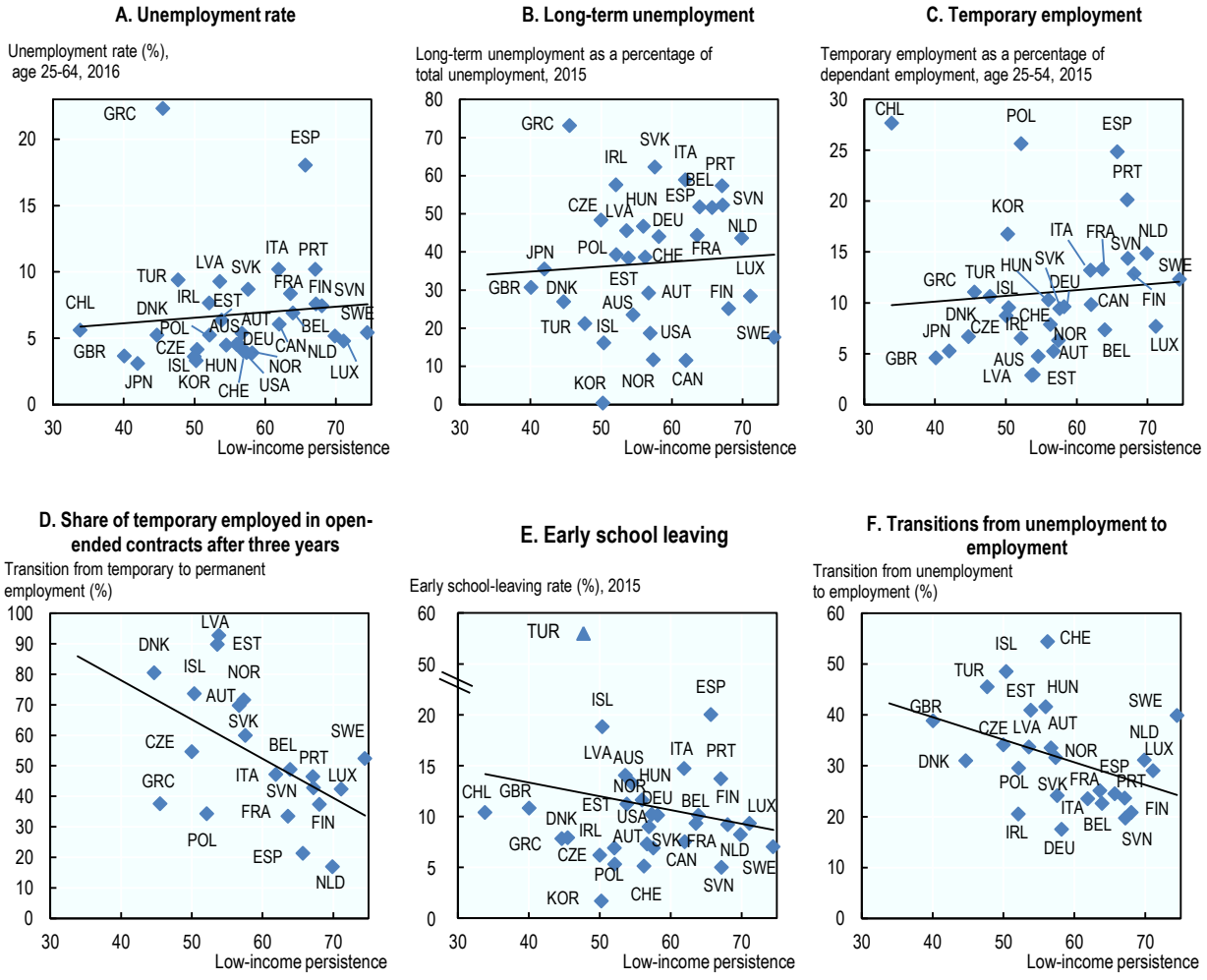
The set of factors driving the persistence of low income varies across countries (see Figure 2.6). In Slovenia, Portugal and Italy, the high persistence of low income is related to high levels of long-term unemployment (Panels A and B). Among factors associated with a higher upward mobility of low incomes, labour market transitions, such as exits from unemployment (Panel F) and, in particular, transitions from temporary to open-ended contracts (Panel D), are strongly correlated with the share of low-income persistence. In Denmark, for instance, the low level of low-income persistence goes in pair with a high transition rate from temporary to permanent contracts, while the inverse is the case in the Netherlands and Spain.

Figure 2.6. Persistence of low income: Link with economic drivers

Percentages, early 2010s or latest



Note: Transitions from unemployment to employment refers to the share of the working-age population unemployed or inactive during a given year and employed one year later. Data refer to the working-age population (18-65). Persistence is measured over the latest 4-year spell available for the country.

Source: OECD Secretariat calculations based on the EU-LFS, CNEF, EU-SILC, SILC (Turkey) and Panel Casen Survey (Chile). See Annex 2.A1 for details on the data sources.

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2.2.4. Sticky ceilings: Persistence in the top quintile

Rising income inequalities have often been associated with the surge of top incomes; these tend to be more volatile than those of the rest of the population, especially at the very top of the distribution (Förster et al., 2014). Less is known, however, about whether this surge of top incomes is accruing to the same individuals, or whether it associated with some individuals outperforming those at the top and replacing them, i.e. to what extent the income distribution is stratified or mobile in its upper part.

A society with low mobility at the top is more likely to lack fairness in terms of political representation. Elite groups at the top of the income ladder have often been considered as exerting considerable influence over policy-making – in a word, the "winner takes all" rather than "median voter" paradigm. Policy preferences differ among income groups, and more affluent income groups tend to influence the outcome of the electoral process, independently of their numerical weight, and they are over-represented in policy-making institutions (Bartels, 2016; Giger and Nelson, 2012; Leigh, 2009). [9] Jenderny (2016) and Cormeo (2006) note that the persistence of top incomes is creating bias in the media. In such a context, adding time persistence in the most affluent groups implies a stronger concentration of political power. Sticky ceilings can also negatively impact the economic performance of societies. "Opportunity hoarding" can occur when the higher education system or the labour market are distorted in favour of upper income classes, reducing the number of places open to those from less fortunate backgrounds and thus resulting in a less competitive economy (Reeves, 2017).

The analysis of sticky ceilings in this section is limited to top income quintiles and deciles. This is a quite wide definition of top incomes, going much beyond the top 1% (or 0.1%) top-income studies often refer to, and including parts of the affluent middle class. Persistence in the top quintile can therefore also be interpreted as a synonym of income stability in the upper part of the income distribution, which is desired by most middle-class people (Pew, 2015). Chapter 3 examines in more detail the determinants of exits from top incomes, and shows that labour-market events, such as losing a job, can lead to income decreases large enough to create a shift in income quintile in some countries, while in some others, the safety nets at play help to cushion incomes and maintain a living standard until a job is found.

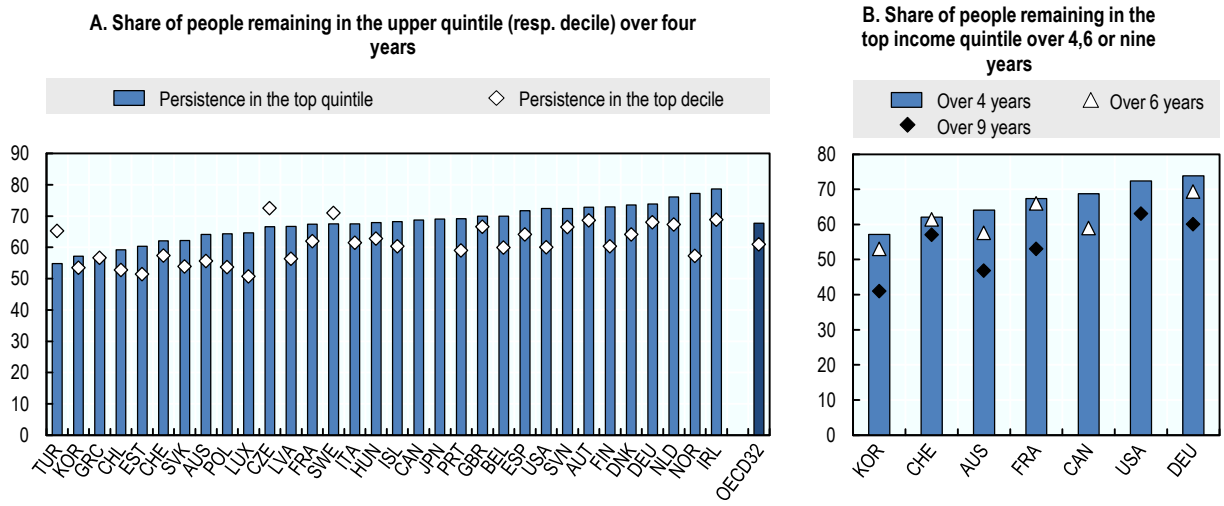
A consistent finding across time and countries is that there is a greater persistence in the top income quintile than in the bottom income quintile. On average across OECD countries, 68% of individuals in the top income group remain in the same group over four years, and 57% over a longer period of a decade (Figure 2.7). This is consistent with results from the literature, documented for example by Chen (2009), Jenderny (2016), Saez and Veall (2005), Landais (2008) and Auten et al. (2013).

Countries with the largest persistence of top incomes in the upper quintile over four years include Ireland, Norway, Netherlands and Germany (above 75%, Figure 2.7). Aaberge et al. (2013) for Norway, Jäntti et al. (2010) for Finland, Jenderny (2016) for Germany, who focus on the top 1% of the income distribution, conclude that there was little mobility at the very top of the income distribution. [10]

Countries with the least persistence in the top income quintile include Turkey, Korea, Greece, Japan and Chile, with 55% to 60% of individuals in the top income quintile remaining there over four years. Over nine years, the persistence in the top income quintile is the largest in the United States (63%), while 40% of individuals in the top quintiles remained there in Korea. Persistence in the upper income quintile remains roughly at the same levels in Switzerland, France or the United States when the time frame is extended from four to six or nine years. It decreases more markedly in Germany and in Korea.

Figure 2.7. Sticky ceiling at the top: Persistence in the upper income quintile

Early 2010s or latest



Note: The figures represent the likelihood for an average individual in the top quintile to stay in the same income group after four (resp. nine) years. Data refer to the working-age population (18-65). Data based on a 4-year panel refer to 2011-14 for all countries except Australia, Germany, Ireland, Korea, Switzerland, Turkey and the United Kingdom (2010-13), Canada (2007-10) and Chile (2006-09). For the United States, as data is collected on a biannual basis, the result is based on the average between results for a 3 year- and a 5 year-panel. Data based on 9-year panels refer to 2007-15 for France, to 2005-13 for Australia, Germany, Korea and Switzerland, and 2004-12 for the United States. Data based on the 6-year panel for Canada refer to 2005-10.

Source: OECD Secretariat calculations based on the EU-LFS, CNEF, EU-SILC, SRCV (France), KHPS-JHPS (Japan), SILC (Turkey) and Panel Casen Survey (Chile). See Annex 2.A1 for details on the data sources.

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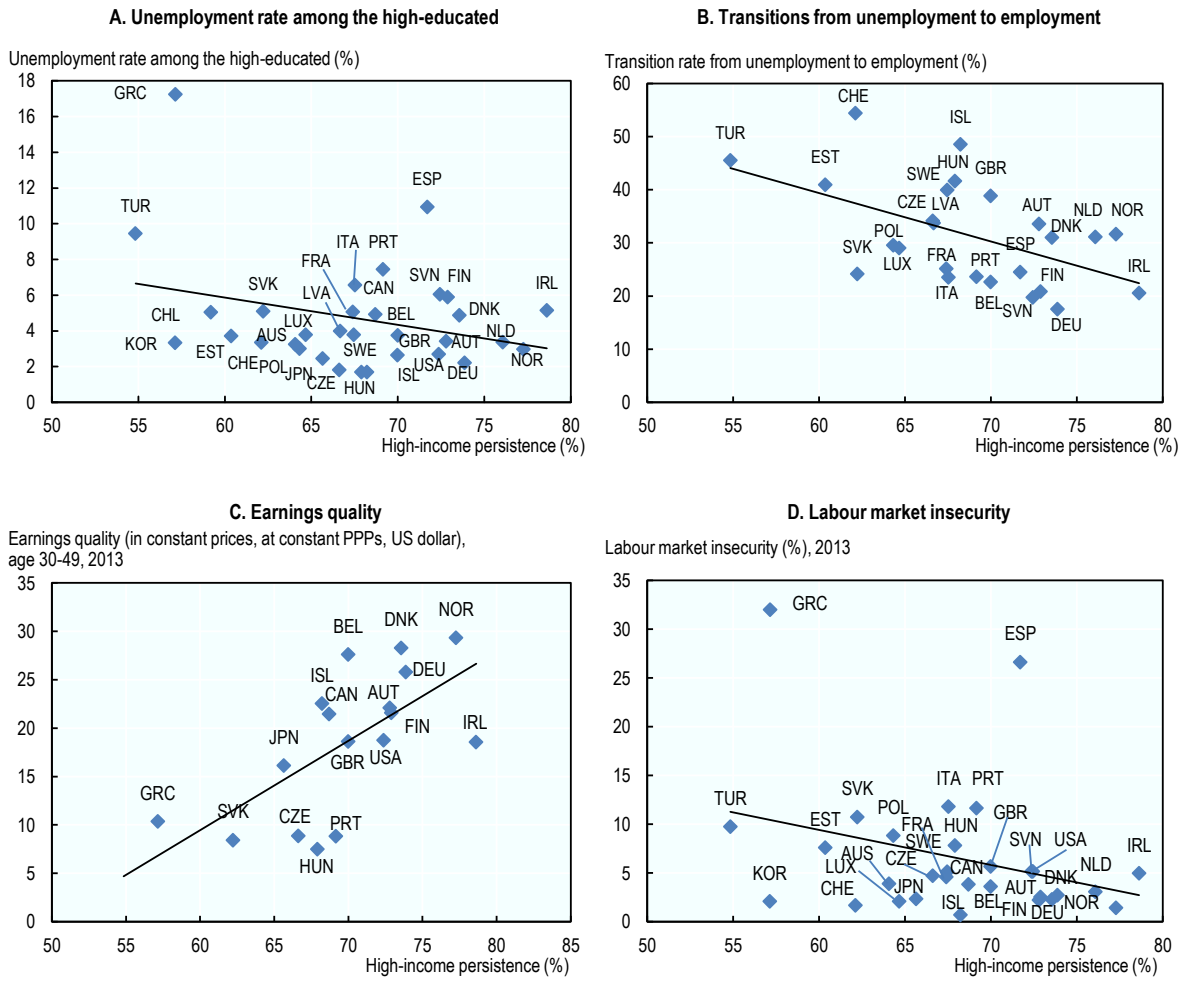
Income persistence at the top is associated with different economic variables. A low prevalence of unemployment, especially among the most educated and high transition rates from unemployment into employment are associated with higher persistence in the upper income quintile (Figure 2.8, Panels A and B). High income persistence can also result from strong labour market segmentation, where insiders are better protected relatively to other workers. Persistence of top incomes is also associated with a greater stability on the labour market, in particular earnings quality (Panel C) and negatively associated with labour market insecurity (Panel D). Chapter 3 investigates the drivers of income changes by income quintile, in particular in terms of income sources and link with employment transitions, taxes and benefits.

Figure 2.8. Persistence at the top of the income distribution: Link with economic drivers

Percentages, early 2010s or latest



Note: Transitions from unemployment to employment refers to the share of the working-age population unemployed or inactive during a given year, and employed one year later. Data refer to the working-age population (18-65). Persistence refers to the latest four-year spell available

Source: OECD Secretariat calculations based on the EU-LFS, CNEF, EU-SILC, SRCV (France), KHPS-JHPS (Japan), SILC (Turkey) and Panel Casen Survey for Chile; *OECD Job Quality Database*, http://www.oecd.org/statistics/job-quality.htm. See Annex 2.A1 for details on the data sources.

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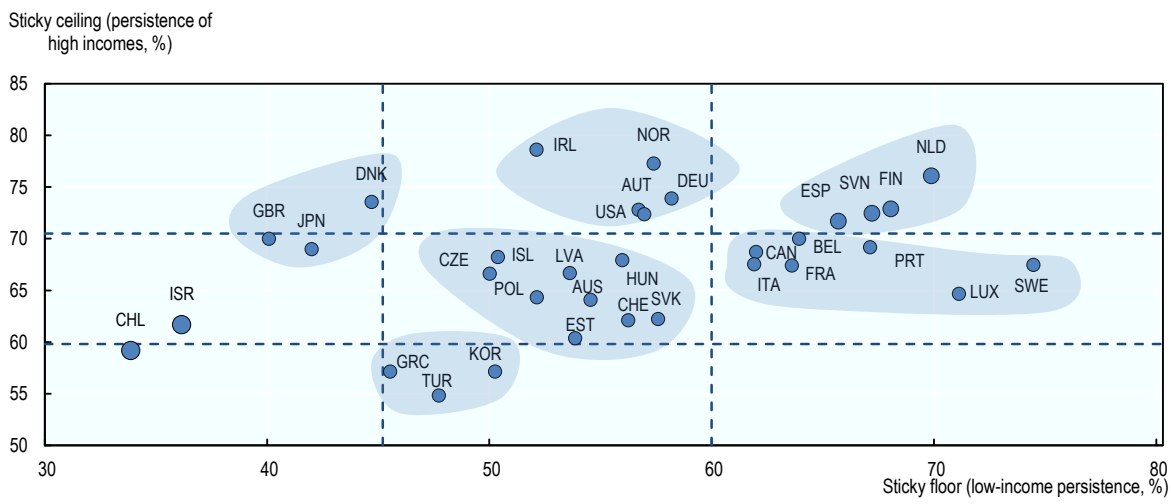
2.2.5. Sticky ceilings and sticky floors interact in various ways

There is no automatic combination of persistence at the bottom and at the top of the income distribution. Several country patterns emerge, suggesting different challenges to address for policies. A mapping of the different scenarios of income persistence at the bottom and at the top of the income distribution can be considered along the following groups, depending on the level of persistence at the top and at the bottom (Figure 2.9):

1. Norway, Germany, Austria, the United States and Ireland combine high sticky ceilings at the top of the income distribution with average levels of mobility at the bottom compared to other countries.
2. In Spain, Slovenia, Finland and the Netherlands, there is stickiness both at the top and the bottom of the income distribution.
3. In Belgium, Canada, France, Italy, Luxembourg, Portugal and Sweden, sticky floors at the bottom are combined with an average level of stickiness at the top of the income distribution.
4. In Turkey, Korea, Greece and Chile, the challenges are different, with neither sticky floors nor sticky ceilings, but signs of large positional mobility over four years.
5. In the United Kingdom, Denmark and Japan, there is larger mobility at the bottom, but there is some sticky ceiling at the top.
6. In the remaining countries (except Chile), the situation stands at the average of the cardinal points mentioned above.
7. Chile and Israel stand out with a very specific pattern of high mobility at the top and at the bottom. This is partly to be related to the income distribution in these countries, with incomes highly concentrated at the very top.

Figure 2.9. Sticky floors at the bottom and sticky ceilings at the top: Persistence in the bottom and top income quintile

Percentages (early 2010s or latest)



Note: The figures represent the share of individuals in the lowest (resp. highest) income quintile staying in the same income group after four years. Data refer to the working-age population (18-65). Data refer to 2011-14 for all countries except Switzerland (2009-12), Germany, Ireland, Japan and the United Kingdom (2010-13), Turkey (2008-11), Canada (2007-10) and Chile (2006-09). For the United States, as data is collected on a biannual basis, the result is based on the average between results for a 3 year- and a 5 year-panel.

Source: OECD Secretariat calculations based on the CNEF, EU-SILC, KHPS-JHPS (Japan), SILC (Turkey) and Panel Casen Survey (Chile); Israeli Longitudinal Survey. See Annex 2.A1 for details on the data sources.

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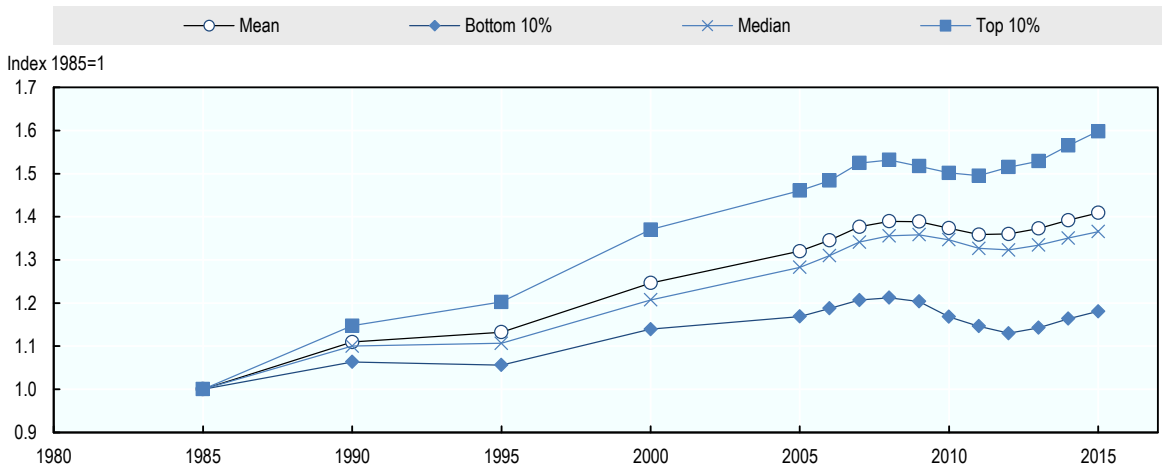
2.3. Changes in income mobility since the 1990s

Concerns that mobility prospects have been stagnating or even decreasing over time gained ground in the public debate (see Chapter 1). This section documents evidence of lower mobility in the income distribution in the 2010s compared to the late 1990s on the basis of two different methods. Additional evidence of weaker individual upward trajectories by age, cohort and education level confirms this pattern.

Several explanatory factors can be put forward to illustrate the social and economic changes at stake for income distribution trends since the 1990s. Changes in the labour markets have resulted in more common use of non-standard work, in particular temporary contracts (OECD, 2015a). Job tenure has increased on average, but mainly due to the ageing of the population (OECD, forthcoming-a). Technological change and digitalisation redesigned the content of jobs. Trade union and collective bargaining coverage have weakened (OECD, 2017c). Assortative mating increased: in two-thirds of OECD countries, female employment rates increased more among women whose husbands were in the top earnings deciles than among those at the bottom of the distribution (OECD, 2017d). Redistribution by taxes and transfers has weakened over time since 2010, particularly among jobless households (OECD, 2011; Causa and Hermansen, 2017). Due to the combination of these factors, the income distribution has widened since the 1990s (Figure 2.10).

Figure 2.10. Widening income distribution: Real income trends at the bottom, middle and top of the income distribution since the 1980s

OECD-17



Note: Income refers to real household disposable income. OECD-17 refers to the unweighted average of the 17 OECD countries for which data are available: Canada, Denmark, Finland, France, Germany, Greece, Israel, Italy, Japan, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Sweden, the United Kingdom and the United States. Some data points have been interpolated or use the value from the closest available year.

Source: *OECD Income Distribution Database*, http://oe.cd/idd

StatLink http://dx.doi.org/10.1787/888933753531

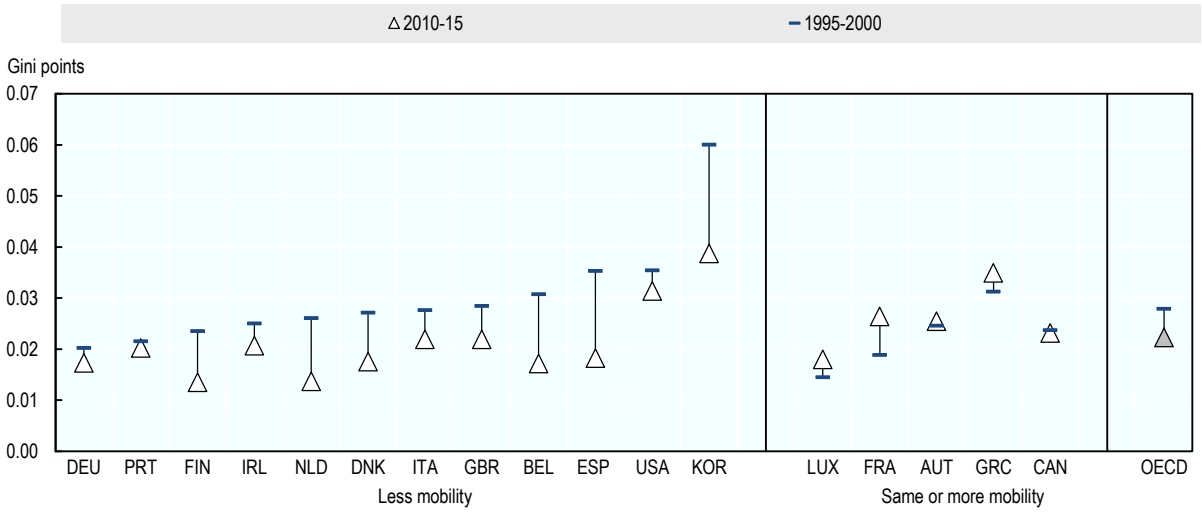
How have these distributional changes been mirrored by trends in income mobility? Collection of longitudinal income data is recent in most countries, and there are only scarce data sources allowing long- term comparisons (Annex 2.A1).[11] Furthermore, few cross-national studies address this issue. Burkhauser et al (2009) reviewed the existing literature and found "no evidence of greater mobility over time". Burkhauser and Couch (2009) provide an overview of recent national studies and found that mobility in terms of wages, earnings or incomes was broadly constant over time, or possibly slightly declining in the United States. Gernandt (2009) found evidence of a decrease of wage mobility in Germany between the 1990s and the mid-2000s. Aaberge et al. (2013), focussing on mobility of the top 1% in Norway, concluded that there had been a steady increase in top income mobility since the 1990s. Jäntti et al (2010) found evidence of a decline of mobility at the top in Finland. Jenkins (2011) found that mobility has been broadly stable in the United Kingdom. A decrease in mobility in Korea since the 1990s has been documented by Oh and Choi (2014) and An and Bosworth (2013).

2.3.1. A lower equalising impact of mobility over time

Section 2.1 highlighted how the passage of time contributes to smooth long-term incomes: the inequality of individual incomes pooled over a pluri-annual window is lower than the average of cross-sectional inequality. This is, however, less the case today than in the 1990s: income mobility has decreased. While the difference between long-term and cross-sectional Gini coefficients stood at 2.6 Gini points in the 1990s, it stands now at 2.1 (see Figure 2.11). This appears to be a change of limited magnitude on average, but it can reach higher levels in specific countries, in particular in Korea, Spain, Belgium, the Netherlands, Denmark and Finland, where the passage of time had a much stronger impact in cushioning cross-sectional inequality in the 1990s than estimated today.

Figure 2.11. Differences in income mobility between the late 1990s and the early 2010s

Difference between the cross-sectional inequality and inequality of permanent incomes over four years



Note: The figures represent the difference between the average of cross-sectional Gini coefficients during each period and the Gini coefficient of the four-year averaged incomes (as Figure 2.1) during the late 1990s and the early 2010s. Data refer to the working-age population (18-65). Data for the late 1990s refer to 1997-2000 for all countries except Korea (1998-2001) . Data for the late 2010 refer to 2011-14 for all countries except Germany, Korea, Ireland and the United Kingdom (2010-13). For the United States, as data is collected on a biannual basis, the results for four year averages are based on the averages between 3 year- and 5 year-panels.

Source: OECD Secretariat calculations. Data for the late 1990s refer to ECHP for all countries except Germany, and the United Kingdom (CNEF). Data for the 2010s refer to CNEF and EU-SILC. See Annex 2.A1 for details on the data sources.

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2.3.2. Income mobility has declined since the 1990s

The lower level of income mobility today compared to the late 1990s is also visible in positional mobility. There are lower chances to move upward for those at the bottom, and lower risks to move downward for those at the top. The trend towards more stickiness in the income distribution is confirmed by two approaches:

- The first approach is based on the analysis of longitudinal data available for the 1990s compared with similar data for the 2010s.
- The second approach consists in estimating persistence at the top and at the bottom of the income distribution over a wider and continuous time range (early 1990s to early 2010s) based on pseudo-panel estimates.

People in a given income class are more likely to remain in that class today. Estimates from longitudinal data available (first approach) show that in the late 1990s, 53% of individuals in the bottom income quintile stayed there over four years, as opposed to 58% in the latest data available (Figure 2.12). 39% of individuals starting in the middle of the income distribution (quintiles 2 to 4) stayed in the same income quintile in the 1990s, compared to 42% in the 2010s. And 65% of individuals in the upper income quintile stayed there, as opposed to 70% in the latest data. These results still hold when

controlling for the composition by age and education of the population and for economic growth (see Annex 2.A2).

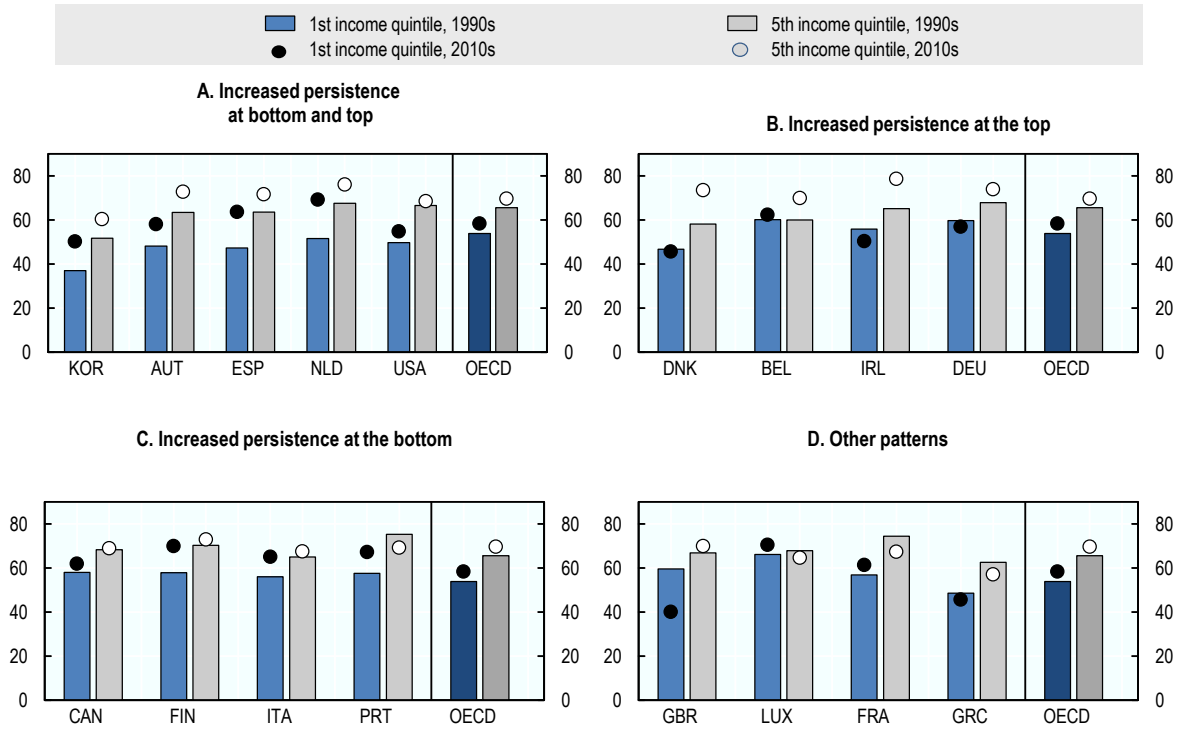
Income persistence has increased both at the top and bottom of the income distribution in Korea, Austria, Spain, the Netherlands and the United States. It has increased more at the top in Denmark, Belgium, Ireland and Germany; and more at the bottom in Canada, Finland, Italy and Portugal. Jäntti et al. (2010), focussing on mobility of the top 1% incomes in Finland, also concluded that mobility decreased since the early 1990s. Focussing on Canadian income data, Saez and Veall (2005) concluded that income mobility has not increased in recent years in Canada, and that the surge in annual income concentration is associated with a similar increase in permanent income inequality. The United Kingdom stands out very specifically in this pattern, with a sharp decline of income persistence at the bottom. This may partly be explained by the lower unemployment rate and policy reforms introduced in the system of cash-benefits and tax credits during the 1990s and early 2000 (such as the Working Families Tax Credit and the Child Tax Credit), and the introduction of a national minimum wage, in line with a "making work pay" strategy (Jenkins, 2011). However, the reduction in low-income persistence has also been accompanied by an increased recurrence of poverty spells in the United Kingdom (Fouarge and Layte, 2005; Jenkins, 2011).

Due to the scarcity of longitudinal income data in the past, there is no opportunity to test whether this result holds for other points in time with a similar methodology. However, complementary information can be found through the use of the second approach, namely the pseudo-panel technique (see Box 2.2). This is based on cross-sectional data, which are much more widely available. It allows estimating transition matrices at the price of some hypothesis. The results are less robust than proper longitudinal data, but the time frame is longer.

When extending to a broader time range with the pseudo-panel approach, the trends are similar to those obtained with longitudinal income data; however, the levels differ. Compared to the 1990s, mobility decreased: the chances to move up from the bottom quintile of the distribution decreased in most OECD countries (Figure 2.13). Someone in the lowest income quintile had on average a 60% chance to move up to a higher quintile within the coming years in the 1990s; today, this chance has fallen to approximately 40%. As for the top quintile, the persistence was around 44% in the 1990s, against 57% today.

Figure 2.12. Trends in income persistence in the bottom and top quintile of the income distribution

Share of individuals staying in the same income quintile over 4 years during the late 1990s and the early 2010s



Note: The figure compares the share of individuals in the lowest income quintile (resp. in the upper income quintile) staying in the same income quintile after four years (as Figure 2.8) during the late 1990s and the early 2010s. Data refer to the working-age population (18-65). Data for the late 1990s refer to 1997-2000 for all countries except Korea (1998-2001). Data for the late 2010 refer to 2011-14 for all countries except Germany, the United Kingdom and Ireland (2010-13), and to 2004-07 for Korea. For the United States, as data is collected on a biannual basis, the results for four year averages are based on the averages between 3 year- and 5 year-panels.

Source: OECD Secretariat calculations. Data for the late 1990s are based on the ECHP for all countries except Germany, the United Kingdom and Korea (CNEF). Data for the early 2010s are based on the CNEF, EU-SILC and SRCV. See Annex 2.A1 for details on the data sources.

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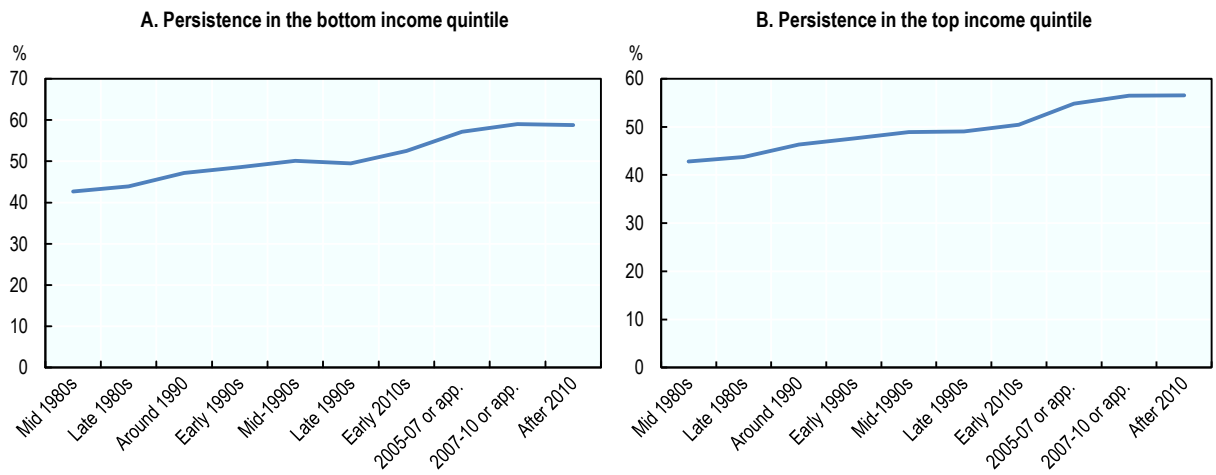
Figure 2.13. Trends in persistence at the bottom and at the top of the income distribution

Low-and high-income persistence over two to five years since the mid-1980s in selected OECD countries



Note: Income position estimates are based here on the pseudo-panel method. This method implies greater methodological assumptions than longitudinal methods and presents greater uncertainty. As a result, mobility estimates for OECD countries differ from other figures presented in other sections. See Box 2.2 and Annex 2.A3 for further details. Trends are available for 21 OECD countries including: Austria, Canada, Czech Republic, Germany, Denmark, Spain, Finland, France, Greece, Hungary, Ireland, Italy, Luxembourg, Mexico, the Netherlands, Norway, Poland, Slovenia, Slovak Republic, United Kingdom and the United States.

Source: OECD estimates based on *Luxembourg Income Study (LIS) Database*, http://www.lisdatacenter.org.

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As regards mobility trends for middle-income households, there are signs of a middle-class divide between the lower and the upper middle classes since the 1990s. The risk of working-age individuals from the lower-middle income group (second quintile) to fall into the lowest income quintile has slightly increased on average (by 0.3 points) and the probability to reach the top quintile has decreased (by 0.8 points, see Table 2.1). By contrast, those from the middle and upper-middle class are slightly less vulnerable today than during the late 1990s to fall to the bottom (by more than 1 point). This pattern of an increasing divide is particularly pronounced in Austria, Spain, Portugal and the United Kingdom where the probability to fall into the bottom quintile increased by 3 points or more for the lower-middle class (see Annex 2.A2).

As regards upward mobility, the shift towards more persistence at the top is partly explained by less chance of people moving from the lower and middle-income quintiles (first three quintiles) to the top income quintiles. This is especially the case in Ireland, Austria, Denmark, Spain and Portugal (see Annex 2.A2).

Box 2.2. Pseudo panel techniques: Estimates of positional mobility based on cross-sectional data

Estimating income persistence and positional mobility at the top and the bottom of the income distribution requires the use of longitudinal income data, i.e. income surveys tracking the same individuals over time. However, such data are not frequently available across countries and time (see Annex 2.A1). To cope with this limitation, pseudo-panel methods aim to make use of cross-sectional information (information collected by people at a single point in time, without following them for several years). This technique is often used to estimate income growth and inequality changes (Ferreira et al., 2012; OECD, 2017a). This method is used in this section and the following to obtain a complementary measure of income mobility in more countries and for a broader time range than with longitudinal data alone. The model is used to measure transitions in and out of the bottom and top income quintiles (separately).

This approach relies on the methodology proposed by Dang et al. (2014) and Dang and Lanjouw (2013) and is described in Annex 2.A3. The underlying assumption of pseudo-panel techniques is to consider that individuals can be tracked over time based on their invariant characteristics (education, birth cohort and gender, for example) by looking at other individuals with the same invariant characteristics. The income of each individual in older data (t0) and recent data (t1) is decomposed into the share of income explained by the time invariant characteristic (gender, education and cohort) plus a residual. The probability for the incomes to be jointly in the first quintiles in both periods (respectively in the fifth quintiles for both periods) is estimated by relying on a hypothesis on the distribution of residuals (normal bivariate distribution).

This method has some limitations: time-invariant characteristics are often scarce and imprecise; the estimates rely on a strong assumption on the distribution of the residuals; and the method supposes that the population is constant, and does not reflect the effect of migration, which can be problematic, especially when used on long-term trends.

Table 2.1. Probability to belong to the bottom and top income quintile four years later, by initial income quintile

OECD-14 average, late 1990s versus 2010s

	Probability to belong to the bottom quintile four years later (%)			Probability to belong to the top income quintile four years later (%)		
Initial income quintile	Late 1990s	Early 2010s	Difference	Late 1990s	Early 2010s	Difference
Poorest	53.4	57.4	4.0	4.1	3.6	-0.6
Q2	**21.8**	**22.1**	**0.3**	**4.4**	**3.7**	**-0.8**
Q3	9.6	8.3	-1.3	8.8	7.8	-1.0
Q4	5.3	4.2	-1.1	23.0	23.9	0.9
Richest	3.1	2.1	-1.1	65.7	69.7	4.1

Note: This table compares transition matrices on average on 14 OECD countries over four years in the late 1990s (1994-1997 to 1997-2000) and the early 2010s (2010-2013 to 2011-2014). Each line gives the percentage of working-age individual in the income quintile belonging to the income quintile of the corresponding column four years later. The third bloc on the right shows the difference between the percentage in the 2010s and the 1990s. OECD-14 refers to the average among: Austria, Belgium, Germany, Denmark, Spain, France, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, the United Kingdom and the United States.

Source: OECD Secretariat calculations based on EU-SILC, ECHP and CNEF.

2.3.3. Mobility over the life cycle for different cohorts: Signs of lower upward mobility

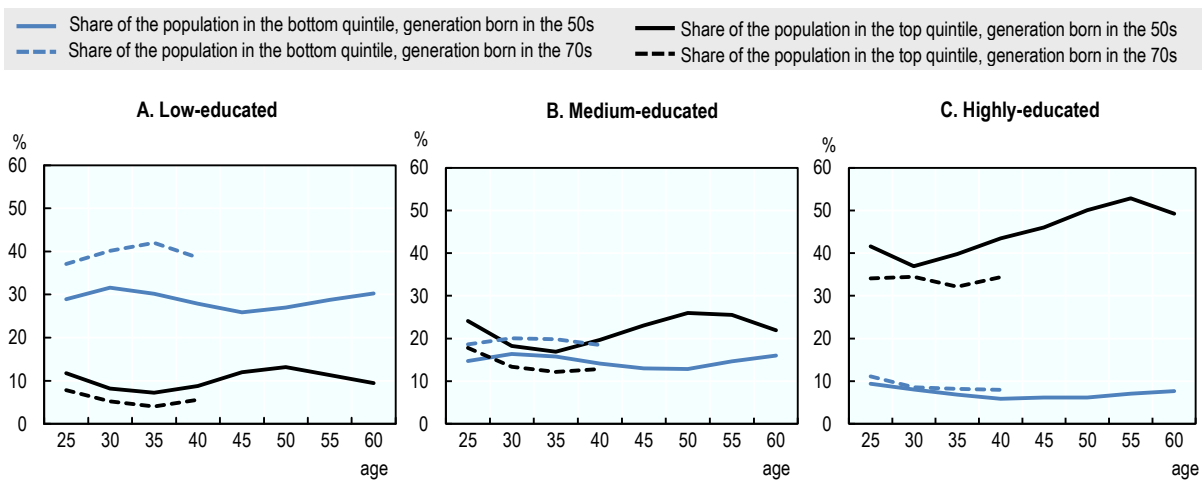
What lies behind the lower mobility at both ends of the income distribution since the 1990s? Some insights can be gained by grouping individuals within birth cohorts and education level and by comparing their income positions across cohorts. On average, until the generations born in the 1960s, each cohort has enjoyed higher incomes than previous ones at the same age. This trend reversed for the generations born in the 1960s and the 1970s (OECD, 2017a). When disentangling these trends across different income groups, it turns out that there is less upward mobility over the life course for the younger cohorts than there was for the older cohorts.

For the low-educated, there is less upward mobility for the generation born in the 1970s when compared to those born in the 1950s. 28% of the low-educated born in the 1950s were part of the bottom income quintile at age 40, compared to 38% of those aged 40 in the 2010s (Figure 2.14, Panel A). This trend is especially pronounced in France and Germany for example (see Annex 2.A4).

Also for those with a middle-level occupation, upward mobility decreased and downward mobility decreased when comparing the 1950s generation with the 1970s generation (Figure 2.14, Panel B).

Figure 2.14. Income quintiles over life by birth cohort and education level

Share of individuals in the bottom (resp. top) income quintile at a given age for two cohorts (OECD countries)



Note: 38% of the low-educated born in the 1970s were in the bottom income quintile at age 40; this was the case of 27% of those born in the 1950s at the same age. 34% of the high-educated born in the 1970s were in the top income quintile at age 40; this was the case of 42% of those born in the 1950s at the same age. The OECD average refers to the OECD-29 average.

Source: OECD Secretariat calculations based on *Luxembourg Income Study (LIS) Database*, http://www.lisdatacenter.org.

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High-educated individuals form a large share of the highest income quintiles. The older people grow, the more likely they are to belong to the highest income quintile, indicating upward mobility across age. Comparing across generations, this pattern has however somewhat weakened. Among the highly-educated born in the 1950s, 43% were part of the top income quintile at age 40. This is the case of only 34% of those born in the 1970s. This pattern is particularly pronounced in Spain for example (see Annex 2.A4).

2.4. Emerging economies: More income mobility overall

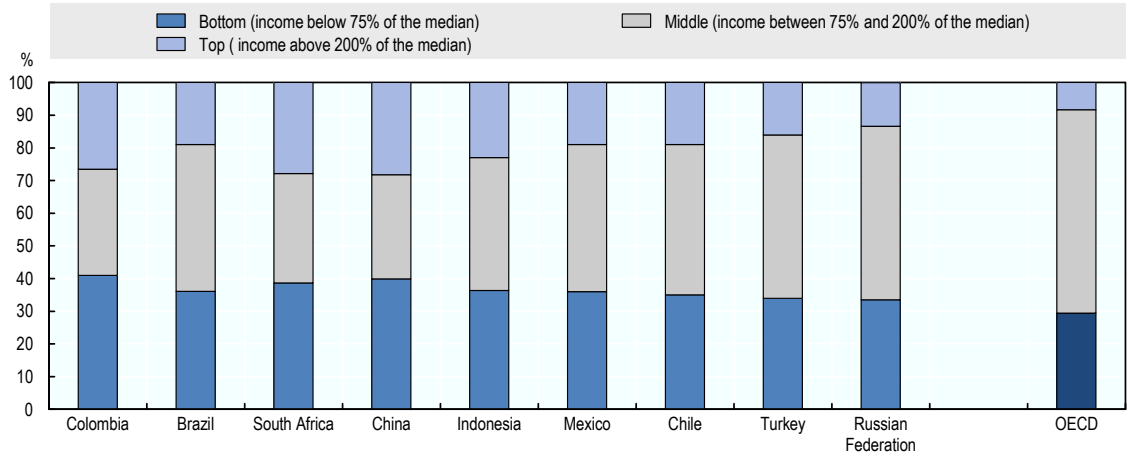
This section looks at positional income mobility in some of the major emerging economies, Brazil, China, Colombia, Indonesia, Mexico, the Russian Federation and South Africa. The patterns of income distribution in emerging economies differ from those prevailing in most OECD countries in several ways. First, income inequality is generally higher in emerging economies than in most OECD countries (OECD, 2015a; OECD, forthcoming-b). Second, in contrast to the OECD area, not all emerging countries have experienced an increase in income inequality over the past two to three decades. Brazil, for instance, has achieved a reduction in income inequality since the early 2000s. On the other hand, China, Indonesia and South Africa have become more unequal over time, and now stand at a level well above the OECD average, though inequality trends in China seem to have stabilised recently. Third, the size of the middle-income class (people with income between 75% and 200% of the median) is significantly smaller in the emerging economies than in most OECD countries. The upper class is often twice as large as in OECD countries (OECD, forthcoming-b; OECD, forthcoming-c).

Some of the economic factors behind high income inequality in the emerging economies differ from those at work in most OECD countries. Persistently large geographical differences in economic performances play a particularly important role. Inequality also tends to be closely intertwined with other key drivers, namely ethnic disparities, alongside disparities in educational outcomes and in labour market conditions. The share of informal employment is often large in emerging economies, which strongly shapes labour market outcomes and job quality (OECD, 2015b; Lopez-Calva and Ortiz-Juarez, 2014).

In recent years, most emerging economies have strengthened their social protection systems and intensified redistribution measures in order to address concerns about high levels of poverty and inequality (OECD, forthcoming-b). In some countries, this has allowed stronger (absolute) upward mobility of the lowest income classes and the emergence of a “new middle class” (Figure 2.15, OECD, forthcoming c).

Based on these specific features, income mobility can be expected to follow different patterns in emerging economies than in the OECD area. In this section, the analysis focusses on the share of people remaining in the bottom and top income quintiles. In OECD countries, the first quintile often overlaps with income poverty, and the fifth quintile is much broader than the top of the income distribution, covering parts of the affluent middle class. In emerging economies, the picture is different. Given the shape of the income distribution, the bottom quintile corresponds broadly to extreme poverty, while poverty would cover at least the first two quintiles of the population.

Figure 2.15. Population share by type of income class in selected emerging economies



Note: the "Bottom" group covers the part of the population living with an income below 75% of the median income; the "Middle" group covers the part of the population living with and income between 75% and 200% of the median and the "Top" group covers the population with an income above 200% the median income.

Source: OECD, forthcoming-c, OECD Secretariat calculations based on *Luxembourg Income Study (LIS) Database*, http://www.lisdatacenter.org.

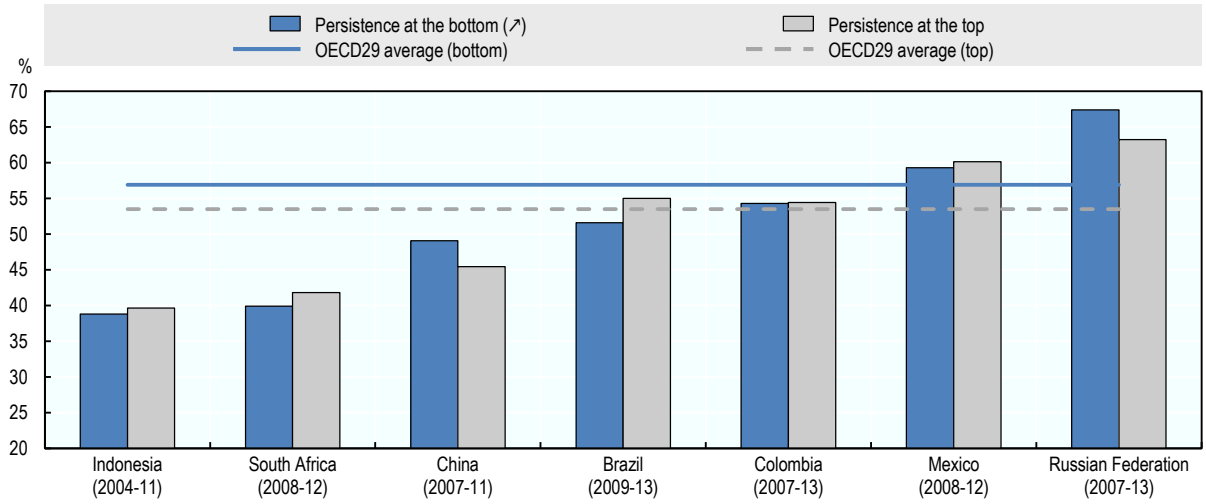
StatLink http://dx.doi.org/10.1787/888933753626

Overall, there is more mobility (less persistence) at the top and especially at the bottom of the income distribution in emerging economies than in OECD countries (Figure 2.16). Among emerging countries, there is overall less mobility in the Russian Federation, Mexico and Colombia, where approximately 55% to 65% of those in the bottom quintile (resp. top quintile) remain in the same income group. In Mexico, the decline in extreme poverty is likely to have led to higher income levels for the whole population at the bottom, but to little re-ranking in the population (because many of those in the bottom quintile remained so). The same pattern holds for Colombia. Evidence based on tax data in Mexico also suggests little mobility among the top incomes between 2009 and 2012 (Sandoval, 2015).

Indonesia, South Africa, China and, to some extent, Brazil appear as more mobile societies within this set of countries. There are accordingly more chances to move up to the middle part of the distribution when in the first income quintile. Results based on longitudinal income data in South Africa tend nevertheless to suggest that mobility at the top is in practice lower than suggested by pseudo-panel estimates (with around 68% of individuals in the upper quintile remaining there for the whole population (NIDS, 2013; Finn et al., 2013). Upward mobility in Indonesia appears to be the highest within the selected countries. This would suggest that Indonesia has a mobility pattern with less stratification than in the other countries, and greater chances to move up for a part of the population.[12] Over time, mobility has also slightly declined in emerging economies, with more persistence at the top and the bottom than in the early 2000s observed in Mexico, Colombia and the Russian Federation (see Annex 2.A3). Clément (2016) reaches a similar conclusion for China.[13]

Figure 2.16. Sticky floors at the bottom and sticky ceilings at the top in selected emerging economies

Persistence in the bottom and top income quintiles of the income distribution, percentages



Note: Income position estimates are based here on pseudo-panel methods. This method implies greater methodological assumptions than longitudinal methods and presents greater uncertainty. As a result, mobility estimates for OECD countries differ from other figures presented in other sections. See Box 2.2 and Annex 2.A3 for further details.

Source: OECD Secretariat estimates based on the *Luxembourg Income Study (LIS) Database*, http://www.lisdatacenter.org.

StatLink http://dx.doi.org/10.1787/888933753645

2.5. Patterns of income changes and their mapping across countries

Individual income changes occur via different channels: the trickle-down of overall economic growth, returns on experience and investment in education, or returns on unobserved individual characteristics or unpredictable income changes ("shocks"). These channels further vary depending on institutions and policies. For example, economies that are growing strongly may have policies in place that lead to income growth being shared by a large part of the population, with a premium for the most educated. Purely market-oriented economies can be expected to lead to greater income volatility and more frequent unpredictable income changes (Gangl, 2005). The following section maps the role of the different channels leading to *absolute* income changes in order to disentangle the different processes at stake. It isolates country patterns regarding income mobility during four-year panels measured between 2008 and 2014.

2.5.1. The structure of income changes

Overall income inequality consists of a permanent income inequality component and a dynamic income component. The *permanent* income inequality component measures how much society is stratified, i.e. the share of inequality that is permanent. It is proxied by the inequality of incomes averaged over the whole period.[14] This part is described in Section 2.1 (Figure 2.1). It represents a large part of income inequality but by nature does not weigh on income changes. The *dynamic* income component can be decomposed into four components, two of them being common to all citizens, and two of them being individual, following Gangl (2005). The technical details of the model are provided in Box 2.3:

1. The two dynamic components (Type 1) *common to all citizens* of a given country measure how much the fruits of economic growth are shared (real income growth effect, 1.a in Table 2.2) and how much people tend to become richer as they age in a given country (lifecycle effect, 1.b in Table 2.2). The first component, the impact of real income growth (1a), is shown to be of limited magnitude compared to the individual effects mentioned below; the second component (1b) plays a bigger role in the structure of income changes, especially in some countries (see below). Both effects are significant.
2. The two dynamic, *individual-specific components* (Type 2) capture the variety of individual trajectories, once the two effects mentioned above are controlled for. These components correspond to an individual income trend (2.a in Table 2.2) and unpredictable shocks (2.b in Table 2.2). The individual income trend captures the part of income changes that depend on individual characteristics (2a), such as education, initial position in the income ladder or unobserved characteristics. This part is relatively limited according to the current estimates, likely because of the short duration of the panels (four years). Unpredictable income shocks (2b) are not randomly distributed. Their frequency and magnitude can be associated with some variables indicating a greater economic vulnerability. According to the estimates discussed below, this effect dominates the structure of income changes in the current estimates. Gangl (2005) found a higher role of individual trends in the structure of income changes.

Table 2.2. Variance decomposition of log incomes by component of income change

Four-year income trajectories observed between 2008 and 2014 or latest

	Inequality proxy		Permanent inequality proxy		Type 1 - Dynamic components common to individuals in a given country				Type 2 - Individual-specific dynamic components			
			Variance of permanent incomes		Real income growth effect		Life-cycle effect		Variance of individual trends		Variance of unpredictable income shocks	
					(1a)		(1b)		(2a)		(2b)	
Australia	○	0.359	◐	0.265	○	0.007	◐	0.075	○	0.000	◐	0.094
Austria	◐	0.435	◐	0.291	○	0.021	◐	0.280	○	0.001	●	0.146
Belgium	○	0.248	○	0.198	○	0.004	◐	0.165	○	0.001	○	0.050
Chile	●	0.681		0..405	◐	-0.015	○	0.011	◐	0.007	●	0.200
Czech Rep.	○	0.225	○	0.188	○	0.005	◐	0.117	○	0.000	○	0.036
Denmark	○	0.267	○	0.201	○	0.004	◐	0.097	◐	0.002	○	0.048
Estonia	◐	0.475	●	0.356	○	0.032	◐	0.093	◐	0.002	◐	0.110
Finland	○	0.24	○	0.197	○	0.008	◐	0.099	◐	0.002	○	0.034
France	○	0.255	○	0.209	○	0.004	◐	0.157	○	0.001	○	0.046
Germany	○	0.319	◐	0.260	○	0.006	◐	0.077	○	0.000	○	0.057
Greece	◐	0.523	●	0.363	●	-0.098	○	-0.044	●	0.012	●	0.164
Hungary	○	0.286	○	0.217	○	-0.001	◐	0.080	○	0.000	○	0.069
Iceland	○	0.232	○	0.164	◐	-0.008	◐	0.093	○	0.001	○	0.065
Ireland	○	0.360	◐	0.289	●	-0.040	◐	0.163	◐	0.002	○	0.072
Italy	◐	0.456	●	0.373	◐	-0.018	◐	0.094	○	0.001	○	0.083
Japan	○	0.37	◐	0.250	○	0.008	●	2.260	○	0.000	◐	0.121
Korea	◐	0.464	◐	0.325	○	0.046	○	0.051	◐	0.003	◐	0.135
Latvia	◐	0.509	●	0.415	○	0.008	○	0.013	○	0.001	◐	0.096
Luxembourg	○	0.285	○	0.241	○	0.004	◐	0.155	○	0.000	○	0.046
Netherlands	○	0.277	○	0.228	◐	-0.009	◐	0.156	○	0.000	○	0.046
Norway	◐	0.416	◐	0.274	○	0.027	○	0.061	◐	0.003	◐	0.128
Poland	○	0.341	◐	0.272	○	0.027	◐	0.135	◐	0.002	○	0.067
Portugal	◐	0.464	●	0.377	●	-0.039	○	0.059	◐	0.002	○	0.085
Slovak Rep.	○	0.304	○	0.237	○	0.029	◐	0.161	◐	0.002	○	0.067
Slovenia	○	0.228	○	0.197	◐	-0.014	◐	0.093	○	0.000	○	0.030
Spain	◐	0.518	●	0.417	●	-0.034	○	-0.025	◐	0.002	◐	0.098
Sweden	○	0.328	○	0.237	○	0.024	○	0.055	◐	0.002	○	0.079
Switzerland	○	0.253	○	0.191	○	0.009	○	-0.003	○	0.000	○	0.059
Turkey	●	0.581	●	0.487	○	0.042	◐	0.189	◐	0.002	◐	0.093
United Kingdom	○	0.358	◐	0.262	○	0.012	○	0.046	○	0.001	◐	0.094
United States	●	0.591	●	0.569	○	0.001	◐	0.076	○	0.001	●	0.163
OECD		**0.358**		**0.275**		**0.002**		**0.163**		**0.002**		**0.080**

Country rank with respect to the income component:
High ● Medium ◐ Low ○

Note: See Box 2.3 for the detailed methodology based on Gangl (2005). The variance of log incomes is a proxy of income inequality. Columns 3, 6 and 7 display the variance of the components . Columns 4 and 5 are common to individuals in a given country, and therefore constant by country (no variance). They do not contribute to overall inequality. Coefficients of the regression of the variable on log-incomes are shown instead. The variance the components does not add up to the variance of log incomes because covariance terms are omitted. Data refer to four-year average spans observed between 2008 and 2014 for all countries except Australia (2006-13), Switzerland (2005-12), Germany (2008-13), the United Kingdom (2009-13), Ireland (2009-13), Japan (2008-13), Korea (2000-07), Turkey (2008-11) and the United States (2001-12). For the United States, as data is collected on a biannual basis, the result is based on the results for a 5-year-panel.

Source: OECD Secretariat calculations based on the CNEF, EU-SILC, SRCV (France), KHPS-JHPS (Japan), CASEN (Chile) and SILC (Turkey). See Annex 2.A1 for details on the data sources.

The taxonomy of countries based on these estimations is displayed in Table 2.3. Country-specific patterns of mobility suggest that income changes are related to the structure of social welfare systems. Countries can be grouped along their degree of "permanent" social stratification and the size of income shocks experienced by individuals. As a general feature, there is an opposition between the two extreme states of "stratified society – numerous unpredictable income shocks" versus "low stratification – less numerous unpredictable income shocks" (Table 2.3):

- Greece, Spain, Latvia, Estonia, Korea and the United States fit as the group of countries with a significant social stratification combined with numerous unpredictable income shocks.
- Turkey, Portugal and Italy share similarly a large social stratification, but a lower degree of unpredictable income shocks.
- Austria, Japan, Norway, the United Kingdom and Australia share a large amount of unpredictable income shocks, but a lower degree of social stratification.
- At the opposite end of the spectrum, the Czech Republic, Slovenia, Finland, Belgium, France, Denmark and the Netherlands have in common a low degree of social stratification and rare unpredictable income changes.
- Germany and Luxembourg share the same scarcity of income shocks, but have a lower degree of social stratification (permanent income inequality).
- Iceland and Switzerland are homogenous regarding social stratification, but have an intermediate degree of income shocks.
- Hungary, Slovakia, Sweden, Poland and Ireland stand as an intermediate group of countries.

A more detailed analysis of the structure of income changes in each country can be made by comparing the magnitude of each component to the OECD average.

Table 2.3. Patterns of income mobility across countries: Synthesis

		Social stratification (permanent income inequality in overall inequality)		
		Stratified	Intermediate	Less stratified
Unpredictable income shocks (Component 2b)	Low		Germany Luxembourg	Czech Rep., Slovenia, Finland, Belgium, France, Denmark, the Netherlands
	Intermediate	Turkey, Portugal, Italy	Hungary, Poland, Ireland, Slovak Rep., Sweden	Iceland, Switzerland
	High	Greece, Spain Latvia, Estonia, Korea United States	 Austria, Japan, Norway United Kingdom Australia	

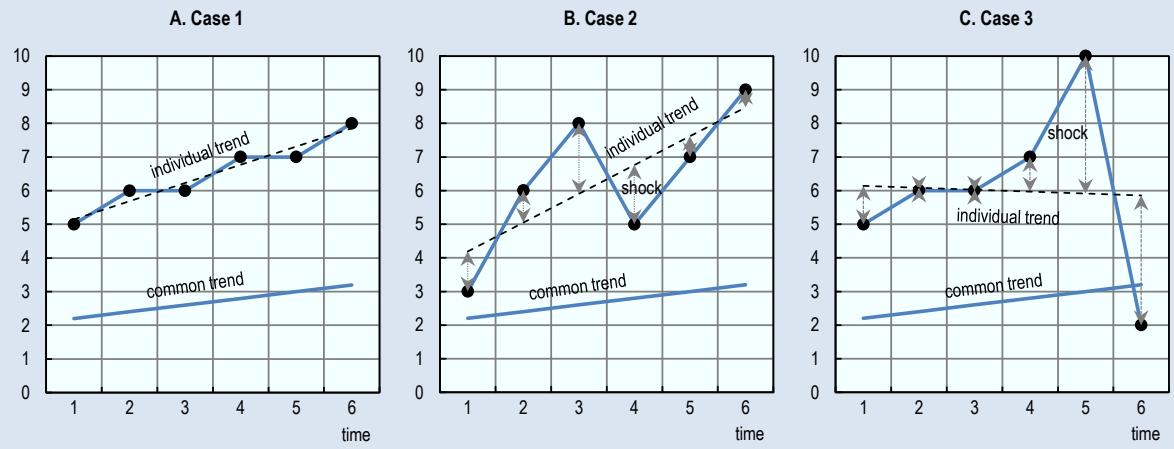
Note: The assessment of the size of an impact (low / medium / high) is based on terciles partitioning of the overall distribution across countries.

Source: See Table 2.2 for the detailed estimates of the components.

Box 2.3. Decomposition of income changes

We follow Gangl (2005) for the main decomposition used in this section. The overall idea is illustrated in Figure 2.17. The individual income trajectory over time is decomposed into a slope common to all individuals (black bold line, corresponding to component 1), an individual slope (dark blue dashed line, corresponding to component 2a) and individual residuals (corresponding to component 2b). Similar decompositions can be found for example in Nichols (2008; 2010), Nichols and Rehm (2014), and Chan et al. (forthcoming).

Figure 2.17. Illustration of the decomposition of income changes



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Income levels (transformed by a logarithmic scale) are decomposed into a permanent income component and a dynamic component which itself covers 1a) real income growth effect, 1b) life-cycle effect, 2a) heterogeneous income trend and 2b) transitory income shocks (Gangl, 2005):

$$y_{it} = u_i + v_{it} = b\ year + g\ \hat{a}ge_i + u_i + b_i\ year + e_{it} \qquad (1)$$

Where Y_{it} is the log of incomes, u_i is the individual fixed effect, b and g are the coefficients describing respectively country-level aggregated income growth (1a) and returns to ageing (1b). b_i describes individual fixed effects (2a) and e_{it} corresponds to individual income shocks (2b).

The estimation is performed in two steps, at country level (one estimation per country). u_i, $\underline{b}$ and g are estimated through a standard fixed effect model, and b_i and e_{it} are estimated at individual level.

The results are analysed through a decomposition showing the impact of each component relative to the variance of the log-incomes. The variance of log incomes is treated as analogous to an inequality measure (entropy Atkinson index). For comparison, the Gini index, commonly used to measure inequality, is also an Atkinson index with a coefficient set at 2, i.e. less adverse to inequality at the bottom. The variance of each component does not add up to the variance of y_{it}, because of possible covariance effects between the components, which are ignored here. By nature, component (2) is common to all individuals in a country, and does not contribute to inequality. It is therefore not included in the overall inequality decomposition. Estimations are computed on four-year panels, which is a short duration to isolate proper permanent income dynamics. This is nevertheless the most convenient duration to compare a wide number of countries. The results of the estimation are provided in Table 2.2.

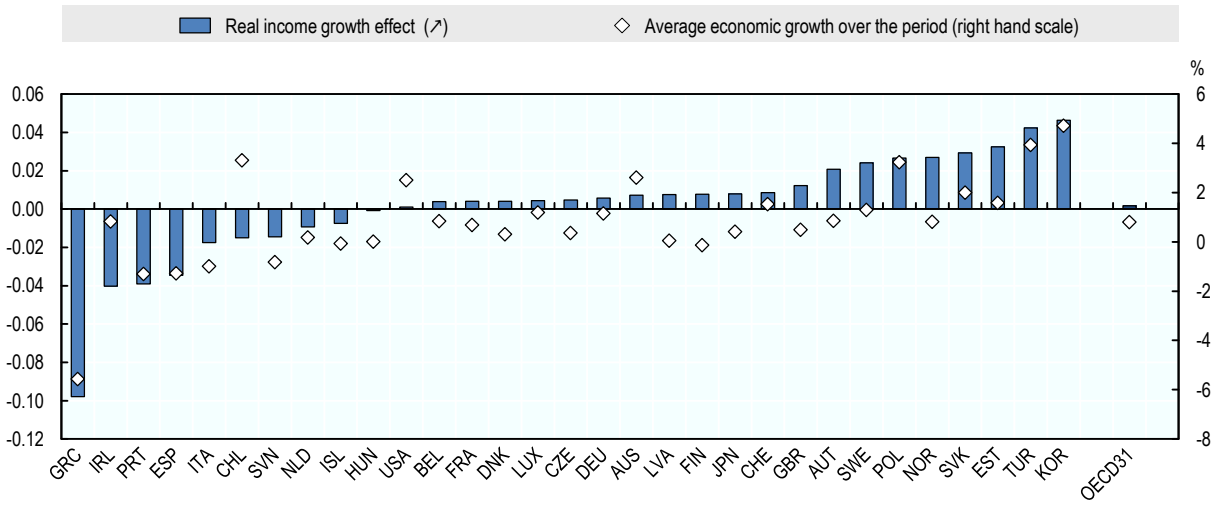
2.5.3. Real income growth effects on individual income mobility

The first common component of income changes (component 1a in Table 2.2) pertains to the real income growth effect, i.e. the part of individual income changes driven by economic growth and *shared* across all individuals, or groups of individuals. As income gains/losses are more frequent in times of economic growth/downturns, individual income trajectories are partly driven by such economic conditions. While all individual incomes do not react identically to economic growth, one can nevertheless expect a certain common impact of growth on income changes.

The part of individual income change driven by economic growth is significant but limited (Table 2.2 and Figure 2.18). It shows how much of economic growth "trickles down" to household incomes. In the countries strongly impacted by the crisis, such as Greece, Ireland, Portugal, Spain and Italy, all incomes were *on average* negatively impacted. In countries with positive economic growth over recent years, such as Korea, Turkey and Estonia, there is a positive impact on average on income changes.

Figure 2.18. Real income growth effect and economic growth

Real income growth effect coefficient (component 2a) and average economic growth, four-year income trajectories observed between 2008-14 or latest



Note: Data refer to four-year average spans observed between 2008 and 2014 for all countries except Australia (2006-13), Switzerland (2005-12), Germany (2008-13), the United Kingdom (2009-13), Ireland (2009-13), Japan (2008-13), Korea (2000-07), Turkey (2008-11) and the United States (2001-12). For the United States, as data is collected on a biannual basis, the result is based on the results for a 5-year-panel.

Source: OECD Secretariat calculations based on *OECD National Accounts Database* and results shown in Table 2.2.

StatLink http://dx.doi.org/10.1787/888933753683

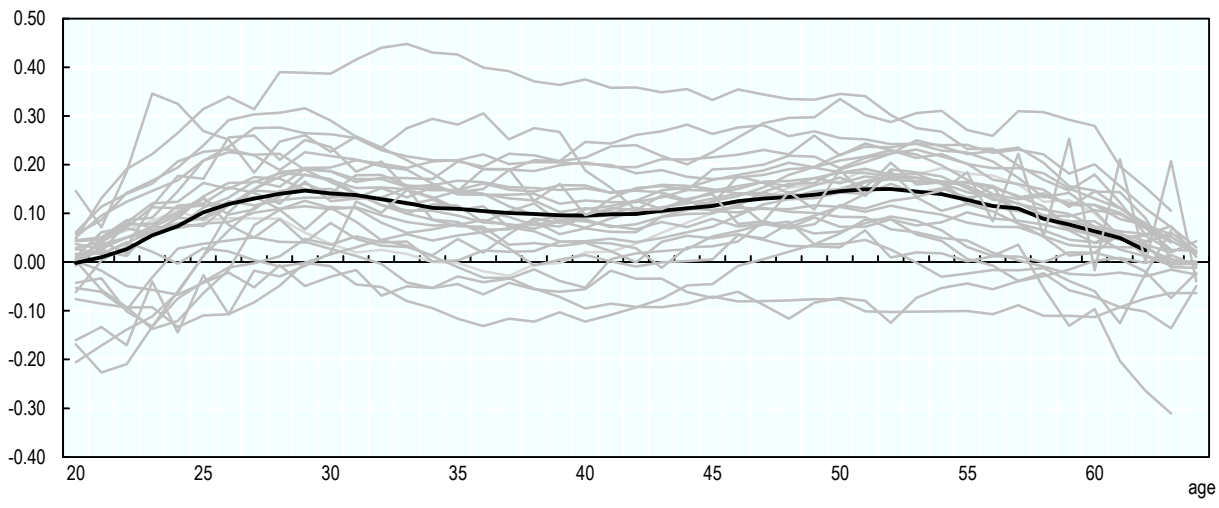
2.5.5. Life cycle effects on income mobility

The second effect common to all individuals is age-specific (component 1b in Table 2.2). This effect captures the impact of age on income changes at country level, with young people as a reference group. Compared to the younger age-cohort, individual equivalised disposable income peaks around age 30 and around age 55. Before 30, income increases slightly with age, as young people enter the labour market (Figure 2.19). Between age 30 and 42, a small decrease in disposable income takes place, probably due to the combined effect of increasing labour incomes in households and the increasing number of children.[15] From age 55, incomes decline on average with gradual exits from the labour market. On top of this aggregated life-cycle impact of age, considerable individual variation in income changes *across* individuals occurs, and adds up to this effect.

Figure 2.19. Life-cycle effect: Impact of age on log incomes

Average of estimates (black line) and country-specific estimates (grey lines) of the parameters of age-specific income components (1b) in the regression of log incomes

Four-year income trajectories observed between 2008-14 or latest



Note: Data are smoothed by a 3-year moving average. Grey lines are displayed to give an idea of the country dispersion around the OECD average. See Box 2.3 for methodological details. Data refer to four-year average spans observed between 2008 and 2014 for all countries except Australia (2006-13), Switzerland (2005-12), Germany (2008-13), the United Kingdom (2009-13), Ireland (2009-13), Korea (2000-07) and Turkey (2008-11) and the United States (2001-12). For the United States, as data is collected on a biannual basis, the result is based on the results for a 5-year-panel.

Source: OECD Secretariat calculations based on the CNEF, EU-SILC, SRCV (France) and SILC (Turkey). See Annex 2.A1 for details on the data sources.

StatLink http://dx.doi.org/10.1787/888933753702

2.5.7. Individual-specific income changes and income shocks

Individual income changes cumulate on top of aggregate income changes driven by economic growth and age. Individual income changes are built around two components.

- The first component of income mobility – *individual permanent income trends (component 2a)* – is structural and predictable for individuals. This refers to people's income changes given their initial conditions: those with a high level of education (observable), or greater motivation for work (unobservable), for example, can expect greater income mobility. Its variance is especially marked for younger cohorts, describing the variety of income trajectories followed by individuals in their early careers.
- The second component of income mobility pertains to *individual transitory income shocks (component 2b)*, which are non-predictable (Gangl, 2005; Nichols, 2008; 2010). Some of these shocks are transitory and will have less impact on permanent incomes and well-being. Other shocks, however, might have a long-lasting impact. This can be the case of a job loss or a divorce. Inversely, a person can have a positive income shock, for example, upon getting a job or if a partner changes jobs for a better one or an adult child leaves the parental home.

2.5.4.1. Individual income trends

Individual income trends can be summarized through common patterns shared across population subgroups (typically age and initial income quintiles). A very limited part of total income inequality is driven by individual predictable income changes. This is probably because the model is estimated on a limited duration (four years), which complicates the identification of proper individual trends and unpredictable income shocks.

Income growth – net of overall real income growth and of the life-cycle factor – is on average higher among the most educated. Moreover, the variation around the average is lower among the most educated, highlighting a greater homogeneity of individual income trends than among the least educated.

Differences by initial income position in individual income trends can also be identified. There is, in most countries, slightly higher income growth among individuals in the bottom income quintiles. This is consistent with the catch-up effect of low-income individuals, i.e. low-income individuals experiencing stronger income growth than high-income individuals on average. However, the *variance* of individual trends is also larger at the bottom of the income distribution, showing that there is more diversity among individual income trends for low-income individuals. The economic catch-up prevailing for low-income individuals *on average* does not hold for all of them – a result confirming the large persistence of low income discussed in Section 2.2: while some low-income individuals will experience strong income growth and exit the bottom quintile, others will stay persistently at the bottom.

2.5.4.2. Individual income shocks: unequal income changes at the bottom

Under the assumption of risk aversion, individuals prefer, all other things being equal, regular incomes to highly volatile incomes: to compensate a dollar lost requires more than a dollar gained (Osberg, 2015; Pew, 2015).[16] The implications of income shocks on welfare are that individual income shocks are not necessarily neutral to individual well-being. In the case of positive income shocks, economic agents favour regular to

irregular income growth; in the case of negative income shocks, a negative impact on income can be expected even if it is only transitory.

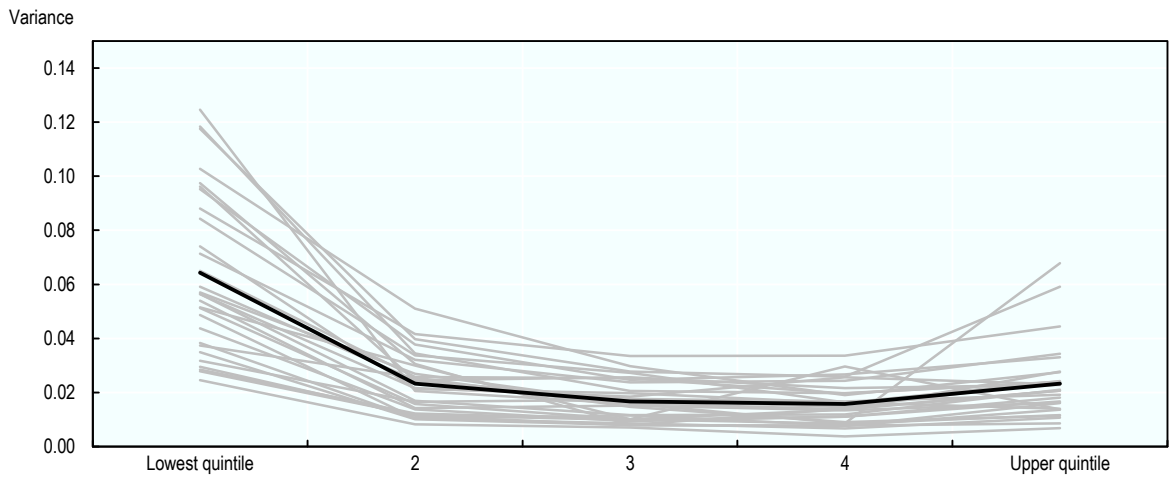
Insurance mechanisms can help to cope with negative income shocks. People can be expected to have savings on which they rely during hard times; they can apply to a loan from the bank and get the amount of money necessary to manage, or safety nets that can partially cushion some of the income risks. But these mechanisms are not functioning perfectly, especially for some parts of the population. For example, people with low incomes will have barriers to borrowing money, and greater difficulties to save. Safety nets are sometimes fragmented and do not necessarily cover all of those in need (e.g. limited social protection for the self-employed). Last, the share of individuals living in a single household is rising in many countries. This limits the cushioning impact of other household members' incomes for more numerous individuals.

On average, over four years 6% to 20% of total income inequality corresponds to unpredictable income shocks. This is slightly lower than estimates from Gangl (2005) on previous data sets covering the 1990s and Buchinsky and Hunt (1999) on wages. As for individual income trends, the variance of unpredictable income shocks is especially large among individuals in the bottom income quintile, highlighting again a greater diversity of income trajectories among low-income individuals (Figure 2.20, Gernant, 2009). As mentioned earlier, with a limited duration of observation (four years here), it is challenging to disentangle unpredictable income shocks from individual income trajectories. However, the results tend to suggest that individuals at the bottom face unequal mobility patterns, as they are likely to be heavily exposed to large unpredictable income shocks.

Figure 2.20. Variance of unpredictable income shocks by initial income quintile

OECD average (black line) and country-specific estimates (grey lines) of the variance of income shocks (2b)

Four-year income trajectories observed between 2008-14 or latest



Note: Grey lines are displayed to give an idea of the country dispersion around the OECD average. Data refer to four-year average spans observed between 2008 and 2014 for all countries except Australia (2006-13), Switzerland (2005-12), Germany (2008-13), the United Kingdom (2009-13), Ireland (2009-13), Korea (2000-07), Turkey (2008-11) and the United States (2001-12). For the United States, as data is collected on a biannual basis, the result is based on the results for a 5-year-panel.

Source: OECD Secretariat calculations based on the CNEF, EU-SILC, SRCV (France) and SILC (Turkey). See Annex 2.A1 for details on the data sources.

StatLink http://dx.doi.org/10.1787/888933753721

2.6. Conclusion

This chapter provides a comparison of income changes and income mobility over a wide range of countries, for different time frames – a few years or a decade. It shows that income mobility lowers inequality but does in general not alter the ranking of countries according to their inequality levels – in other words, there is not more income mobility in more unequal countries. This is because there is little positional mobility at both ends of the income distribution: despite large absolute income changes occurring at both ends of the income distribution, the least well-off are likely to stay so, and the affluent are even more likely to stay so: about 60% of those in the bottom quintile remain in that quintile, and that is the case of 70% of those in the top quintile.

Data sources to measure the trends in mobility over time are scarce, but the data at hand indicate that there is more persistence today than there was two decades ago, even when controlling for the level of economic growth. This is due to both lower chances to move upward for those at the bottom, and lower chances to move downward from the top. For lower-middle income groups, there is a somewhat higher risk today to fall into the bottom quintile compared to the 1990s.

Emerging economies have larger social groups at both ends and a smaller middle class than OECD countries. Compared to most OECD economies, there is more mobility at the top and especially at the bottom of the income distribution in emerging economies. There is no sign of a trend toward greater mobility in the emerging economies since the early 2000s despite higher growth rates than in most OECD countries.

The chapter also highlights that individual income changes can be associated with different drivers: the benefits of overall economic growth, the returns on experience, the returns on unobserved individual characteristics and unpredictable income changes. Overall, country-level factors, such as the benefits of economic growth or life-cycle effects, have a weak but significant impact. Individual factors are strong and matter more among the worst-off, generating uncertainty and greater variability of incomes. Mobility patterns differ across countries, suggesting that income mobility channels vary depending on institutions and policies.

Notes

1. This chapter benefitted from the support of Joaquin Prieto-Suarez, London School of Economics (analysis for Chile), and Ricky Kanabar, Institute for Social and Economic Research (analysis for the United Kingdom).

2. For example, if high incomes go along with political power, then a lack of mobility at the top might also be symptomatic of a greater concentration of power.

3. The analysis focuses on the working-age population (18-65), because in this age group income fluctuations depend on factors such as labour market status, child birth or changing household composition, while incomes among the elderly population rely heavily on public and private transfers and mobility depends on very different factors, such as changes in pension policies or the death of a partner.

4. This chapter focusses on equivalised household disposable income – the most suitable aggregate to reflect the standards of living and proxy for economic well-being. It takes into account the pooling of resources within the household rather than considering individuals as single, economic agents.

5. Solnick and Hemenway (1998) experimented with behaviours related to absolute and relative income positions. Half of the respondents said they would prefer a world in which they have 50% less real income, so long as they have a high income position. Evidence from brain imaging techniques found that the activity in reward-related brain areas is not only positively correlated with higher absolute incomes but also negatively correlated with lower relative incomes (Dohmen et al., 2011).

6. While the study focusses on working-age individuals, income quintiles are calculated on the overall population in this chapter. Indeed, in their own self-assessment working-age individuals are more likely to refer themselves to the whole population as a benchmark, including in particular the elderly. Second, this approach is consistent with similar indicators such as the poverty rate, which is based on a threshold covering the whole population, even though some indicators, such as working-age poverty or in-work poverty, refer only to the working-age population.

7. For example, in the case of Chile, Neilson et al. (2008) underline that from a policy perspective, the significant number of people who remain poor after five years gives support to social programmes such as Chile Solidario, which focus on the extremely poor. However, their finding that a significant part of the population is likely to move down the income distribution highlights that poverty reduction strategies will have to pay attention not only to those who are currently poor, but also to non-poor vulnerable households who are at risk of falling into poverty at some point in the future.

8. Several explanations have been put forward to explain relatively high low-income persistence in these countries. In Finland, high poverty traps brought by some features of the Finnish tax/benefit system imply weak work incentives and tend to perpetuate low employment rates, especially among elderly male workers (OECD, 2016). In Sweden, the gap between earned and benefit income has widened since the 1990s (lowering of replacement rates in unemployment and sickness insurance) and the introduction of the earned income tax credit in 2007 gradually increased the gap between benefits and work income (OECD, 2017b).

9. For example, Bartels (2016) shows that, "in terms of federal government policy, the affluent are far better represented than the poor" in the United States. Giger et al.

(2012) document a general trend of under-representation of the preferences of relatively poor citizens both by parties and by governments across Western democracies, although large cross-national differences exist.

10. Mobility over such a thin part of the population is beyond the scope of this report, as this would require the use of tax data in a longitudinal approach. However, measures of persistence in the upper income decile provide some additional information. Results (not shown) suggest that in countries with the highest top quintile persistence the persistence in the highest decile is more moderated.

11. In Europe, most longitudinal income data from the 1990s rely on the ECHP survey, whose weaknesses have been widely documented (see Burkhauser and Lilliard, 2005). This section relies on these data and crosses the results with estimates from other data sources to ensure that the weaknesses of the survey are controlled for.

12. However, the data reflect a longer time period than for other countries, which is likely to overestimate income movements and mobility compared to other countries.

13. The data used in this chapter does not allow time-series comparisons for China, Indonesia and South Africa.

14. To illustrate this component, one might think about runners in the starting bloc before a race. The permanent component would measure how they differ from each other based on their characteristics at that time, before the race starts.

15. Disposable income is equivalised to reflect the pooling of resources within household. The equivalence scale applied in this report is the square root of the household size. An increasing household size can therefore lower disposable incomes.

16. The reasons behind this preference can be explained by the cost of transferring income from one period to another one, or the cost of borrowing (Aaberge and Mogstad, 2014). Access to credit, for example, is not perfect for individuals (in particular the worst-off). The cost of uncertainty regarding future incomes is also related to a household's propensity to plan and household decision-making, which might be severely affected by unpredictable income fluctuations. Households might respond to sudden income gains or losses by consuming either too little or too much relative to their average standard of living over some extended period of time (Blundell and Preston, 1998; Gangl, 2005).

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Annex 2.A1. Available data sources to measure income mobility

Chapter 2 and Chapter 3 use longitudinal data, i.e. repeated measures over time for a consistent group of people. Such data is less common than the usual cross-sectional panel data. Moreover, not all such surveys follow individuals over a long time period. Burkhauser and Couch (2009) provide a detailed review of the comparability issues and caveats of longitudinal income data.

Using panel data presents some challenges. On top of the usual measurement caveats, panel data suffer from possible attrition bias (people stopping their participation in the survey before it ends). They are also costly. That is why they are often based on smaller sample sizes than cross-sectional data. For these reasons, they often do not permit to investigate the same level of detail as cross-sectional data. Nevertheless, progress has been made over the last decades, and most OECD countries now have some longitudinal income surveys in place. International comparison remains nevertheless delicate, as most of these sources are not systematically harmonised.

The chapter mainly relies on two internationally comparable data sources, i.e. the EU-SILC and the CNEF. The Eurostat European Statistics on Incomes and Living Conditions Survey (EU-SILC) provides data built on a common basis for all European countries (including non-EU countries such as Iceland, Norway, Switzerland and Turkey), though on a very limited time basis (four-year duration). Such data is collected as from 2005 onwards (See Table 2.A1.1). Before this, during the 1990s, information was collected in 14 European countries through the European Community Household Panel (ECHP). A major disadvantage of the ECHP source is that there are signs of large attrition rates (Burkhauser and Lilliard, 2005; Burkhauser and Couch, 2009), and its results should be considered with caution. This survey remains nevertheless the unique source of longitudinal income data for many European countries during the 1990s.

The Cross-National Equivalent File (CNEF) provided by Ohio State University (Frick et al., 2007) is a precious tool to broaden the analysis to non-European countries, as it harmonises national longitudinal income datasets from seven countries, four of them being non-European: the Panel Survey of Income Dynamics (PSID) in the United States, collected from 1968; the Australian Household, Income and Labour Dynamics (HILDA) in Australia, since the 2000s; the Canadian Survey of Labour and Income Dynamics (SLID), between 1992 and 2010; the Korean Labour Panel Study (KLIPS) from 1998 to 2013; the Swiss Household Panel, SHP, since 1998; the German Socio-Economic Panel (GSOEP) in Germany since the early 1990s; and the Socio-Economic Panel Survey (BHPS) in the United Kingdom, since the early 1990s and until 2005, and the Understanding Society Panel (UK-HLS) from 2009/10 onwards.

For some countries, several data sources are available: France is covered both by the EU-SILC and SRCV (*Statistiques sur les Revenus et les Conditions de Vie*), tracking incomes and living conditions for nine-year rotating panels between 2003 and 2014; the United Kingdom is covered both by the EU-SILC and UK-HLS (CNEF) and SILC. In order to get more recent estimates, UK-HLS analysis of Chapter 2 has been used outside of the CNEF framework based on data files produced on the basis of the methodologies suggested by Bardasi et al. (2012) and Knies (2017). Chapter 3 analyses are however based on the UK-SILC results, for a better alignment of labour-market and household definitions.

For the countries not covered by the SILC or CNEF, national data sources have been used to widen the scope of countries available: the survey KHPS (Keio Household Panel

Survey), integrated since the latest waves with the JHPS (Japanese Household Panel Survey), allows to cover Japan between 2008 and 2014. For Chile, Panel Casen 2006-09 has been used. Data for China are based on the CFPS (Chinese Family Panel Survey), providing data for 2010-2012-2014, and the results are based on computations from Chan et al. (forthcoming). Data for New Zealand are based on the SoFIE (Survey of Family, Income, and Employment), based on computations from Carter et al. (2014).

Table 2.A1.1. Availability of major longitudinal income data sources

	Cross-National Equivalent File (CNEF)															
	Australia (HILDA)	Switzerland (SHP)	Germany (GSOEP)	United Kingdom (BHPS Understanding Society)	Korea (KLIPS)	United States (PSID)	Canada (SLID)	EU countries + Norway, Switzerland, Iceland (EU-SILC)	Turkey SILC -Turkey	EU-15 countries (ECHP)	Japan (KHPS-JHPS)	France (SCRV)	Chile Casen Panel	China (CFPS)	New Zealand (SOFIE)	South Africa (NIDS)
1991			X	X		X										
1992			X	X		X	*X*									
1993			X	X		X	*X*									
1994			X	X		X	*X*			*X*						
1995			X	X		X	*X*			*X*						
1996			X	X		X	*X*			*X*			*X*			
1997			X	X			*X*			*X*						
1998		X	X	X		X	*X*			*X*						
1999	X	X	X	X			*X*			*X*						
2000	X	X	X	X	X	X	*X*			*X*						
2001	X	X	X	X	X		X			X			X			
2002	X	X	X	X	X	X	X			X					X	
2003	X	X	X	X	X		X								X	
2004	X	X	X	X	X	X	X				X	X			X	
2005	X	X	X	X	X		X	X			X	X			X	
2006	X	X	X	X	X	X	X	X			X	X	XX		X	
2007	X	X	X	X	X		X	X			X	X(b)	X		X	
2008	X	X	X	X	X	X	X	X	X		X	X	X		X	X
2009	X	X	X		X		X	X	X		X	X	X		X	
2010	X	X	X	X	X	X	X	X	X		X	X		X	X	X
2011	X	X	X	X	X			X	X		X	X				
2012	X	X	X	X	X	X		X	X		X	X		X		X
2013	X	X	X	X	X			X	X		X	X				
2014				X		X		X			X	X		X		X
2015				X				X				X				

Notes: A black cross means that the data is available to the OECD; light grey means that data exist but are not directly available.
Chile, (2006): overlap of two surveys: Panel CASEN 1996-2006 and Panel CASEN 2006-09.
(b) stands for break in series.

Annex 2.A2. Changes in income mobility since the 1990s – detailed results

This annex documents the transition matrices by income quintile during the late 1990s and the early 2010s. Table 2.A2.1 provides descriptive statistics based on the latest four-year panel available in the 1990s and the 2010s. Table 2.A2.2 provides estimates based on logistic regressions controlling for education level, age group, country and average economic growth for two sets of four-year panels ranging between 1994-97 and 1998-2001 for the late 1990s and 2008-11 and 2011-14 for the early 2010s.

Table 2.A2.1. Share of individuals staying in the same income quintile over four years

Percentage, late 1990s and early 2010s

	First quintile (poorest)		Q2		Q3		Q4		Fifth quintile (richest)	
	1990	2010	1990	2010	1990	2010	1990	2010	1990	2010
Austria	48.2	56.7	42.5	39.2	34.0	41.3	38.0	47.4	63.4	71.9
Belgium	60.2	63.9	40.9	39.4	37.3	43.0	41.7	37.8	60.1	70.0
Denmark	46.7	44.7	39.6	37.6	33.5	57.2	34.7	52.8	58.2	74.1
Finland	57.9	68.1	43.5	40.1	42.6	41.5	45.7	48.3	70.3	72.3
France	56.9	63.6	45.1	41.6	43.0	47.1	49.4	45.9	74.4	67.8
Germany	59.7	57.9	42.0	42.6	37.3	41.4	45.6	50.0	67.9	73.5
Greece	48.6	45.5	34.4	42.2	34.8	30.8	38.0	41.3	62.6	55.3
Ireland	55.8	52.1	37.3	37.7	33.7	43.2	37.3	39.9	65.2	76.7
Italy	56.1	61.9	41.4	46.7	35.6	38.8	41.2	47.9	65.0	65.5
Korea	37.0	50.3	29.7	43.2	27.7	34.1	28.5	37.4	51.8	60.4
Luxembourg	66.1	71.1	47.9	45.2	42.4	43.0	48.9	40.8	67.9	65.4
Netherlands	51.6	69.9	42.7	38.6	38.4	37.7	44.3	47.7	67.6	73.7
Portugal	57.6	67.1	37.4	43.5	40.1	41.9	48.2	49.6	75.2	69.7
Spain	47.3	65.7	34.8	43.9	32.6	44.0	37.1	47.4	63.6	71.6
United Kingdom	59.5	40.1	39.5	31.7	38.5	26.7	41.9	41.4	66.8	70.5
United States	51.3	53.6	38.1	41.3	38.6	41.8	46.8	50.0	66.0	68.6
OECD-16	**53.8**	**58.3**	**39.8**	**40.9**	**36.9**	**40.8**	**41.7**	**45.3**	**65.4**	**69.2**

Note: The figure compares the share of individuals staying in the same income quintile after four years during the late 1990s and the early 2010s. Data refer to the working-age population (18-65). Data for the late 1990s refer to 1997-2000 for all countries except Korea (1998-2001). Data for the late 2010s refer to 2011-14 for all countries except Germany, the United Kingdom, Korea and Ireland (2010-13). For the United States, as data is collected on a biannual basis, the results for four-year averages are based on the averages between 3 year- and 5 year-panels.

Source: OECD Secretariat calculations. Data for the late 1990s are based on the ECHP for all countries except Germany, the United Kingdom and Korea (CNEF). Data for the early 2010s are based on the CNEF, EU-SILC and SRCV. See Annex 2.A1 for details on the data sources.

Table 2.A2.2. Estimated likelihood to stay in the same income quintile controlling by age, education, country and economic growth

		Q1	Q2	Q3	Q4	Q5
1990s	**Predicted**	**0.500**	**0.394**	**0.358**	**0.400**	**0.642**
	Lower bound	0.504	0.389	0.354	0.396	0.638
	Upper bound	0.515	0.399	0.363	0.405	0.646
2010s	**Predicted**	**0.572**	**0.416**	**0.407**	**0.470**	**0.722**
	Lower bound	0.557	0.402	0.394	0.457	0.712
	Upper bound	0.588	0.429	0.42	0.482	0.732

Note: Estimated likelihood to stay in the same income quintile in the 1990s versus the 2010s, by initial income quintile, controlled by age group, economic growth, education and country.

Source: OECD Secretariat calculations. Data for the late 1990s are based on the ECHP for all countries except Germany, the United Kingdom, the United States and Korea (CNEF). Data for the early 2010s are based on the CNEF, EU-SILC and SRCV. See Annex 2.A1 for details on the data sources.

Table 2.A2.3. Probability to belong to the bottom and top income quintile four years later, by initial income quintile

Late 1990s average versus early 2010s average

	Initial income quintile	Probability to belong to the bottom quintile four years later			Probability to belong to the top income quintile four years later		
		Late 1990s	Early 2010s	Difference	Late 1990s	Early 2010s	Difference
OECD	Poorest	53.4	57.4	4.0	4.1	3.6	-0.6
	Q2	21.8	22.1	0.3	4.4	3.7	-0.8
	Q3	9.6	8.3	-1.3	8.8	7.8	-1.0
	Q4	5.3	4.2	-1.1	23.0	23.9	0.9
	Richest	3.1	2.1	-1.1	65.7	69.7	4.1
Austria	Poorest	50.8	60.6	9.8	4.1	4.6	0.5
	Q2	19.8	24.0	4.2	4.6	6.5	1.9
	Q3	10.8	7.4	-3.4	10.2	7.5	-2.7
	Q4	7.6	5.7	-1.9	24.6	24.4	-0.2
	Richest	3.5	1.9	-1.6	60.5	69.9	9.3
Belgium	Poorest	56.7	63.9	7.2	6.1	1.3	-4.7
	Q2	23.2	24.7	1.6	5.2	4.3	-1.0
	Q3	9.2	6.9	-2.3	10.9	12.1	1.2
	Q4	5.0	4.5	-0.5	23.2	23.4	0.2
	Richest	4.7	1.2	-3.6	59.0	68.7	9.8
Denmark	Poorest	46.8	38.2	-8.6	6.1	6.6	0.6
	Q2	21.5	19.3	-2.2	6.1	3.3	-2.8
	Q3	8.4	2.2	-6.2	11.1	8.1	-3.0
	Q4	7.6	5.7	-1.9	25.0	22.9	-2.0
	Richest	6.0	2.1	-3.9	57.7	75.6	17.9
France	Poorest	58.2	60.5	2.2	2.5	2.9	0.4
	Q2	20.8	21.7	0.9	2.0	3.1	1.2
	Q3	8.5	7.4	-1.1	4.8	5.9	1.2
	Q4	4.4	4.1	-0.3	21.9	20.6	-1.3
	Richest	3.4	3.1	-0.4	72.1	68.7	-3.4
Germany	Poorest	58.1	57.3	-0.9	3.4	7.2	3.8
	Q2	21.6	17.6	-4.1	3.0	2.1	-0.9
	Q3	11.4	7.1	-4.3	6.8	7.5	0.7
	Q4	7.1	3.0	-4.1	21.8	25.0	3.1
	Richest	4.9	1.4	-3.5	66.7	74.1	7.4
Greece	Poorest	49.2	44.1	-5.1	3.8	6.0	2.2
	Q2	25.3	24.5	-0.8	4.6	3.8	-0.8
	Q3	11.2	15.5	4.3	10.1	11.3	1.2
	Q4	5.6	5.8	0.3	23.2	23.5	0.4
	Richest	2.7	2.8	0.1	63.1	63.4	0.3
Ireland	Poorest	55.9	54.2	-1.7	2.4	1.9	-0.5
	Q2	23.5	22.3	-1.2	3.8	2.3	-1.5
	Q3	9.7	14.2	4.5	11.6	4.9	-6.7
	Q4	5.7	5.3	-0.4	26.6	17.8	-8.8
	Richest	2.0	2.3	0.3	64.9	74.8	9.9
Italy	Poorest	53.6	63.0	9.4	4.2	1.9	-2.4
	Q2	23.0	22.9	-0.1	5.6	3.5	-2.2
	Q3	11.0	7.6	-3.4	9.5	9.3	-0.3
	Q4	4.9	3.9	-1.0	24.0	24.1	0.1
	Richest	2.6	1.9	-0.7	62.7	66.8	4.1

	Initial income quintile	Probability to belong to the bottom quintile four years later			Probability to belong to the top income quintile four years later		
		Late 1990s	Early 2010s	Difference	Late 1990s	Early 2010s	Difference
Luxembourg	Poorest	62.3	64.2	1.9	1.2	1.8	0.5
	Q2	16.8	15.1	-1.7	2.4	2.0	-0.4
	Q3	6.7	5.7	-1.1	7.5	6.0	-1.6
	Q4	1.2	2.5	1.3	26.2	27.7	1.5
	Richest	1.1	2.5	1.4	70.7	67.0	-3.7
Netherlands	Poorest	52.5	60.9	8.4	6.6	1.5	-5.0
	Q2	16.7	16.6	-0.1	5.0	3.6	-1.4
	Q3	8.9	5.2	-3.8	8.3	5.1	-3.2
	Q4	4.7	2.1	-2.6	23.7	33.0	9.3
	Richest	2.7	1.6	-1.1	69.5	74.3	4.8
Portugal	Poorest	54.5	63.1	8.6	2.3	2.2	-0.1
	Q2	22.0	25.1	3.1	4.4	4.6	0.2
	Q3	8.6	10.7	2.2	8.5	7.2	-1.3
	Q4	4.2	4.9	0.7	20.9	15.6	-5.3
	Richest	1.4	2.7	1.3	73.7	69.2	-4.4
Spain	Poorest	48.4	60.5	12.1	4.5	1.3	-3.2
	Q2	22.3	25.1	2.8	5.7	2.9	-2.7
	Q3	10.8	8.8	-1.9	9.4	5.6	-3.8
	Q4	7.3	3.1	-4.2	19.9	20.0	0.1
	Richest	2.9	1.5	-1.5	63.4	71.9	8.5
United Kingdom	Poorest	55.9	44.7	-11.3	4.2	6.6	2.4
	Q2	20.9	24.8	3.9	4.8	6.9	2.1
	Q3	7.5	10.0	2.5	9.7	10.8	1.0
	Q4	4.6	5.9	1.3	23.7	27.6	3.9
	Richest	3.6	2.0	-1.6	67.0	66.9	-0.2
United States	Poorest	46.4	52.3	5.8	7.0	2.5	-4.5
	Q2	24.7	21.1	-3.6	5.1	3.0	-2.1
	Q3	8.7	10.8	2.2	8.8	8.2	-0.7
	Q4	3.6	6.2	2.6	22.8	29.4	6.5
	Richest	2.6	3.4	0.8	62.3	68.3	6.1

Note: This table compares transition matrices over four years in the late 1990s (1994-97 to 1997-2000 averages) and the early 2010s (2010-13 to 2011-14 average). Each line gives the percentage of working-age individuals belonging to the bottom (resp top) income quintile four years later.

Source: OECD Secretariat calculations based on EU-SILC, ECHP and CNEF.

Annex 2.A3. Methodology to estimate Income mobility with pseudo-panels

This Annex outlines the methodology proposed by Dang et al. (2014) to estimate transition matrices with pseudo-panels. In particular, it focuses on the parametric version of their method and on the subsequent extension by Dang and Lanjouw (2013). While this model is used by Dang et al. (2014) to estimate the probability that people move in and out of poverty using income data from repeated cross-sections, the same model is applied in this chapter to measure transitions in and out of the first and top income quintiles.

Consider the case of two repeated cross-sections and assume that the underlying population being sampled in both rounds is the same. In what follows, the superscripts A and B are used to refer to individuals from the first and the second cross-section respectively.

Using observations from Cross-section A, one can estimate the following model of individual earnings in Period 1, containing *only time-invariant covariates* on the right-hand side:[1]

$$\boldsymbol{y_{i,1}^{A} = \beta_1' x_{i,1}^{A} + \varepsilon_{i,1}^{A}} \qquad [1]$$

and obtain estimates for βt=1, $\varepsilon^{A}_{i,t=1}$, and for the standard deviation of the error terms σε1.

The same model can be estimated for Period 2, using observations from Cross-section B:

$$\boldsymbol{y_{i,2}^{B} = \beta_2' x_{i,2}^{B} + \varepsilon_{i,2}^{B}} \qquad [2]$$

Assuming that $\varepsilon^{A}_{i,1}$ and $\varepsilon^{B}_{i,2}$ have a bivariate normal distribution with non-negative correlation coefficient ρ and standard deviations σε1 and σε2, the percentage of workers from Cross-section B who are in the first income quintile in both the first and the second period (persistence at the bottom) can be estimated as follows:

$$\hat{P}(\tilde{y}_{i1}^{B} < q_{1,t=1} and\ y_{i2}^{B} < q_{1,t=2}) = \Phi\left[\frac{q_{1,t=1} - \widehat{\beta_1'} x_{i,t=2}^{B}}{\widehat{\sigma}_{\varepsilon_1}}, \frac{q_{1,t=2} - \widehat{\beta_2'} x_{i,t=2}^{B}}{\widehat{\sigma}_{\varepsilon_2}}, \hat{\rho}\right] \qquad [3]$$

The same way, the percentage of Cross section B workers who are in the last income quintile in both the first and the second period (persistence at the top) can be estimated as:

$$\hat{P}(\tilde{y}_{i1}^{B} < q_{4,t=1} and\ y_{i2}^{B} < q_{4,t=2}) = \Phi\left[\frac{q_{4,t=1} - \widehat{\beta_1'} x_{i,t=2}^{B}}{\widehat{\sigma}_{\varepsilon_1}}, \frac{q_{4,t=2} - \widehat{\beta_2'} x_{i,t=2}^{B}}{\widehat{\sigma}_{\varepsilon_2}}, \hat{\rho}\right] \qquad [4]$$

Dividing these unconditional probabilities by the percentage of workers who start out in the first (last) income quintile generates the conditional probabilities of staying in this quintile, which are used in the main analysis.

The main challenge in implementing this model is estimating $\widehat{\rho}$, since repeated cross-sections do not contain observations for the same individuals over time; it is therefore impossible to estimate the serial correlation of individual shocks.

Dang et al. (2014) get around this issue by assuming a minimum and a maximum value for $\hat{\rho}$, to obtain lower and upper bound estimates (rather than point estimates) of mobility. To implement this approach, one possibility is to calibrate the minimum and maximum bounds on the basis of actual panel-data from previous time-periods or from sufficiently similar contexts. In the absence of these, Dang et al. (2014) suggest using the extreme values of ρ = 0 (no serial correlation) and ρ = 1 (perfect correlation). This

approach proves to be quite successful in their validation exercise, as estimates of mobility obtained with true panels are generally within these estimated bounds. The main drawback of this procedure is that the bounds can be quite large. Moreover, it is not clear whether policy makers should target the lower or the upper bound of estimated mobility. The former approach has been applied in a recent World Bank publication on income mobility in Latin America (Ferreira et al., 2012), where the authors assume ρ = 1 and obtain a conservative (lower-bound) estimate of mobility. Ferreira et al. (2012) argue that this assumption provides a better assessment of "true" mobility since, by assuming perfect correlation of the error terms over time, the lower-bound estimate is "purged" of classical measurement error. Moreover, assuming perfect serial correlation in individual specific shocks brings out more clearly the effect of economic growth on overall poverty. As the present analysis has a strong focus on positional mobility and on the uncertainty and risks faced by individuals, this approach is not suitable for our purposes.

In a follow-up study, Dang and Lanjouw (2013) outline a cohort-based approach that can be used to estimate $\widehat{\rho}$ directly to obtain point estimates of mobility. For a sufficiently large sample, like that of a typical household survey, this can be done by estimating the following dynamic income model for various age cohorts:[2]

$$\overline{y}_{c,2} = \delta' \overline{y}_{c,1} + \overline{\eta}_{c,2} \qquad [5]$$

Where $\overline{y}_{c,t}$ is the average of y in Cohort c and Period t = 1, 2.

From the estimation of [5], one can obtain a consistent estimate of δ and of the cohort level correlation coefficient, $\widehat{\rho}$, which can be used to approximate the individual-level correlation coefficient $\widehat{\rho}$.

$$\hat{\rho}_{y_{i,1}y_{i,2}} \approx \hat{\rho}_{y_{c,1}y_{c,2}} = \frac{cov(\overline{y}_{c,1}, \overline{y}_{c,2})}{\sqrt{var(\overline{y}_{c,1})var(\overline{y}_{c,2})}} \qquad [6]$$

Finally, in order to estimate [3] and [4], one needs to obtain the partial correlation coefficient ρ, which captures the serial correlation in income conditional on the control variables (i.e. the serial correlation in the model residuals). As shown by Dang and Lanjouw (2013), ρ can be obtained as follows:

$$\hat{\rho} = \frac{\hat{\rho}_{y_{i,1}y_{i,2}}\sqrt{var(y_{i1})var(y_{i2})} - \hat{\beta}_1' var(x_i)\hat{\beta}_2'}{\hat{\sigma}_{\varepsilon_1}\hat{\sigma}_{\varepsilon_2}} \qquad [7]$$

Estimates are based on the *LIS database* (http://www.lisdatacenter.org/). Data availability over the long run and by country is shown in Table 2.A3.1. Gaps are linearly interpolated to cope with missing years.

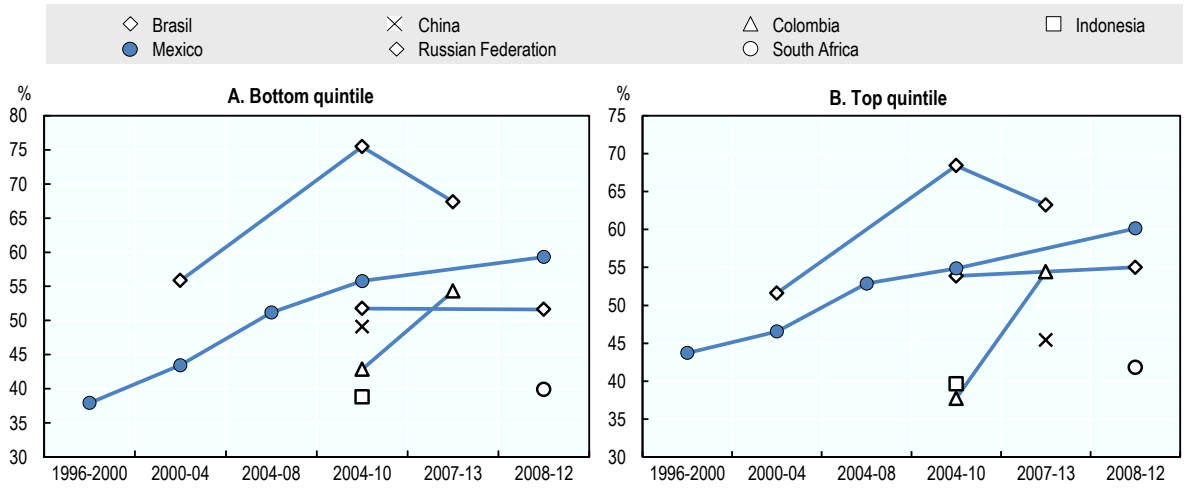
Table 2.A3.1. Data availability for pseudo-panel estimates by year and country

	Mid-1980s	Late 1980s	Around 1990	Early 1990s	Mid-1990s	Late 1990s	Early 2000s	Pre-crisis	Crisis period	Latest data / post crisis
OECD countries										
Austria			1987-94		1995-97		2000-04	2004-07		2010-13
Australia	1985-89								2008-10	
Belgium	1985-88		1988-92	1992-95	1995-97	1997-2000				
Canada	1981-87	1987-91		1991-94	1994-97	1998-2000	2000-04	2004-07	2007-10	
Czech Rep.					1992-6	1996-2002	2002-04	2004-07	2007-10	2010-13
Denmark			1987-92	1992-95		1995-2000		2004-07	2007-10	2010-13
Estonia							2000-04	2004-07	2007-10	2010-13
Finland		1987-91		1991-95		1995-2000	2000-04	2004-07	2007-10	2010-13
France	1984-89			1989-94		1994-2000	2000-05		2005-10	
Germany	1984-89		1989-94			1994-2000		2004-07	2007-10	2010-13
Greece						1995-2000	2000-04	2004-07	2007-10	2010-13
Hungary				1991-94		1994-99	1999-2005	2005-07	2007-09	2009-12
Iceland								2004-07	2007-10	
Ireland			1987-94			1996-2000	2000-04	2004-07	2007-10	
Israel			1986-92		1992-97	1997-2001	2001-05	2005-07	2007-10	2010-12
Italy	1986-87	1987-89	1989-91	1991-93	1993-95	1995-98		2004-08	2008-10	2010-14
Luxembourg	1985-91			1991-94	1994-97	1997-2000	2000-04	2004-07	2007-10	2010-13
Mexico		1984-89	1989-92	1992-94	1994-96	1998-2000	2000-02	2004-08	2008-10	2010-12
Netherlands	1983-87	1987-90		1990-93	1993-97		1999-2004	2004-07	2007-10	2010-13
Norway		1986-91		1991-2005		1995-2000	2000-04	2004-07	2007-10	2010-13
Poland		1986-92		1992-95		1995-99	1999-2004	2004-07	2007-10	2010-13
Spain		1980-85		1990-95		1995-2000	2000-04	2004-07	2007-10	2010-13
Sweden				1992-95		1995-2000	2000-05			
Slovak Rep.						1996-2004		2004-07	2007-10	2010-13
Slovenia						1997-99	1999-2004	2004-07	2007-10	2010-13
Switzerland					1992-2000		2000-02		2007-10	2010-13
United Kingdom							1999-2004	2004-07	2007-10	2010-13
United States		1986-91		1991-94	1994-97	1997-2000	2000-04	2004-07	2007-10	2010-13
OECD Key partners										
Brazil									2006-09	2011-13
Colombia									2007-10	2010-13
Russia							2000-04	2004-07	2007-10	2010-13
South Africa									2008-10	2010-12

Source: OECD Secretariat calculations based on the *Luxembourg Income Study (LIS) Database*, http://www.lisdatacenter.org.

Figure 2.A3.1 shows the figures for income persistence in the lower and upper quintile in emerging economies. There are signs of increased persistence in Mexico, Colombia and the Russian Federation.

Figure 2.A3.1. Trends in income persistence at the bottom and at the top in emerging economies



Source: OECD Secretariat calculations based on the *Luxembourg Income Study (LIS) Database*, http://www.lisdatacenter.org.

Annex 2.A4. Distribution of the population by income quintile over life: Differences between the cohorts born in 1950 and 1970

Figure 2.A4.1. Distribution of the population by income quintiles at age 40

By birth cohort and education level

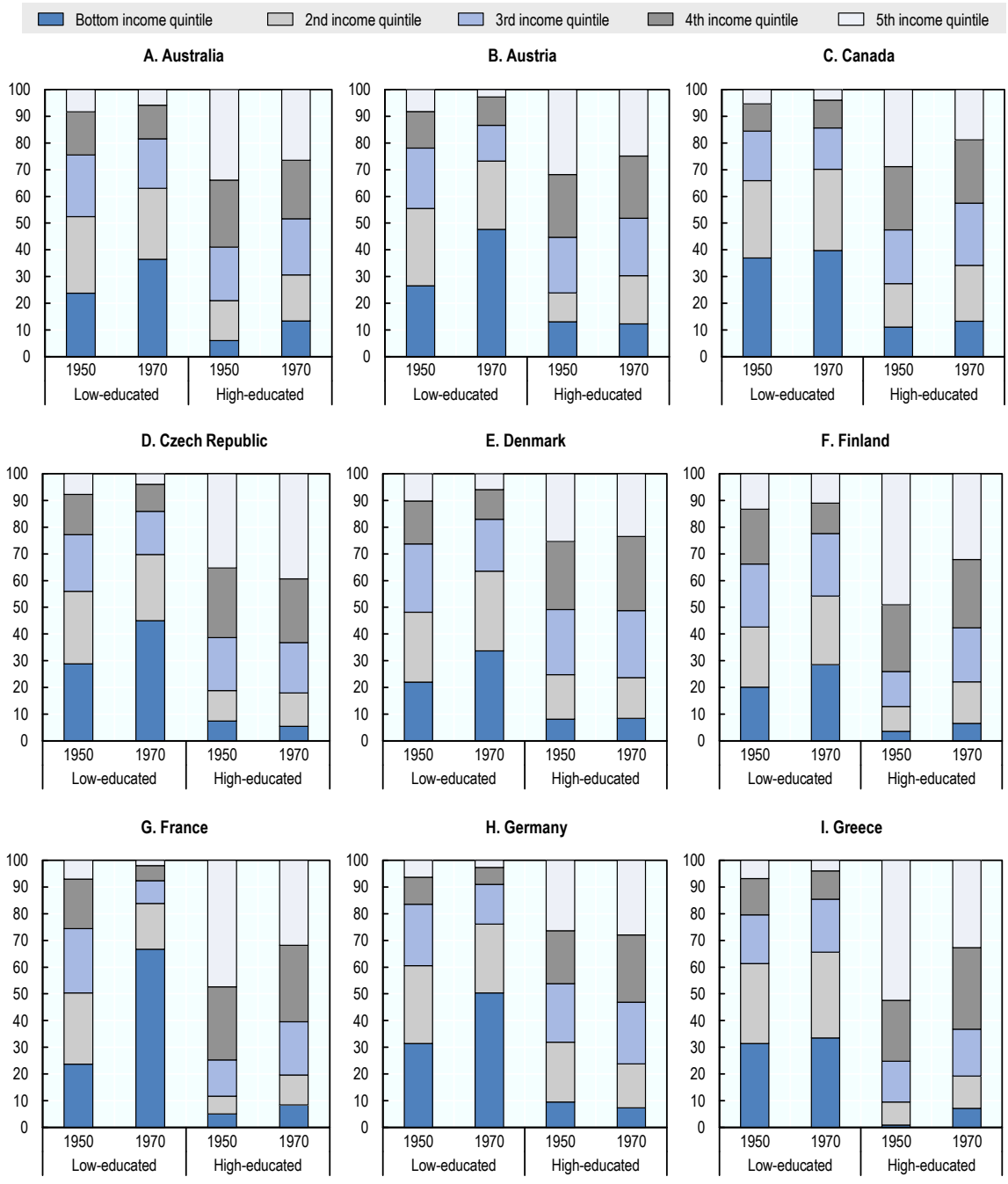


Figure 2.A4.1. Distribution of the population by income quintiles at age 40 *(cont.)*

By birth cohort and education level, percentages

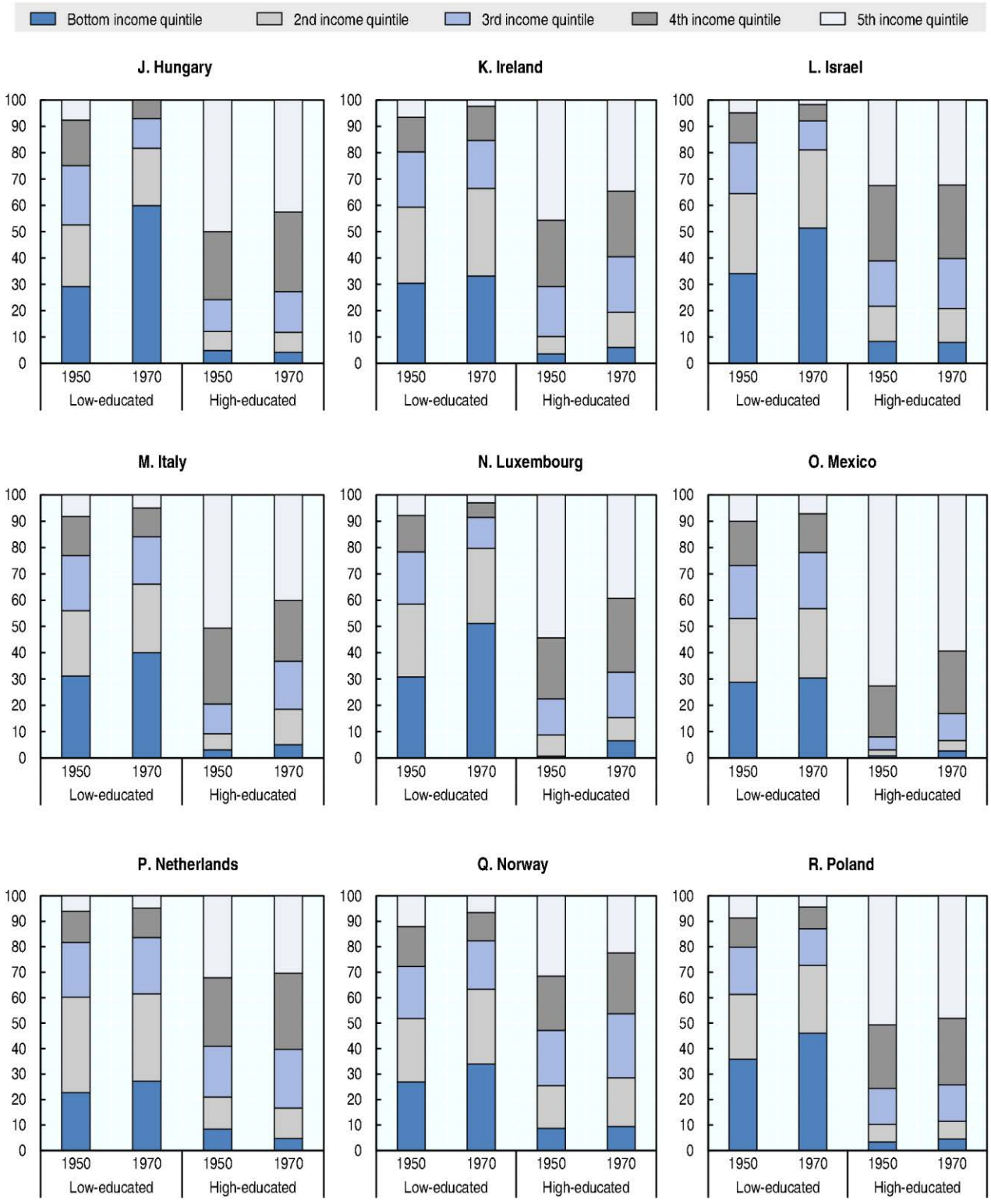
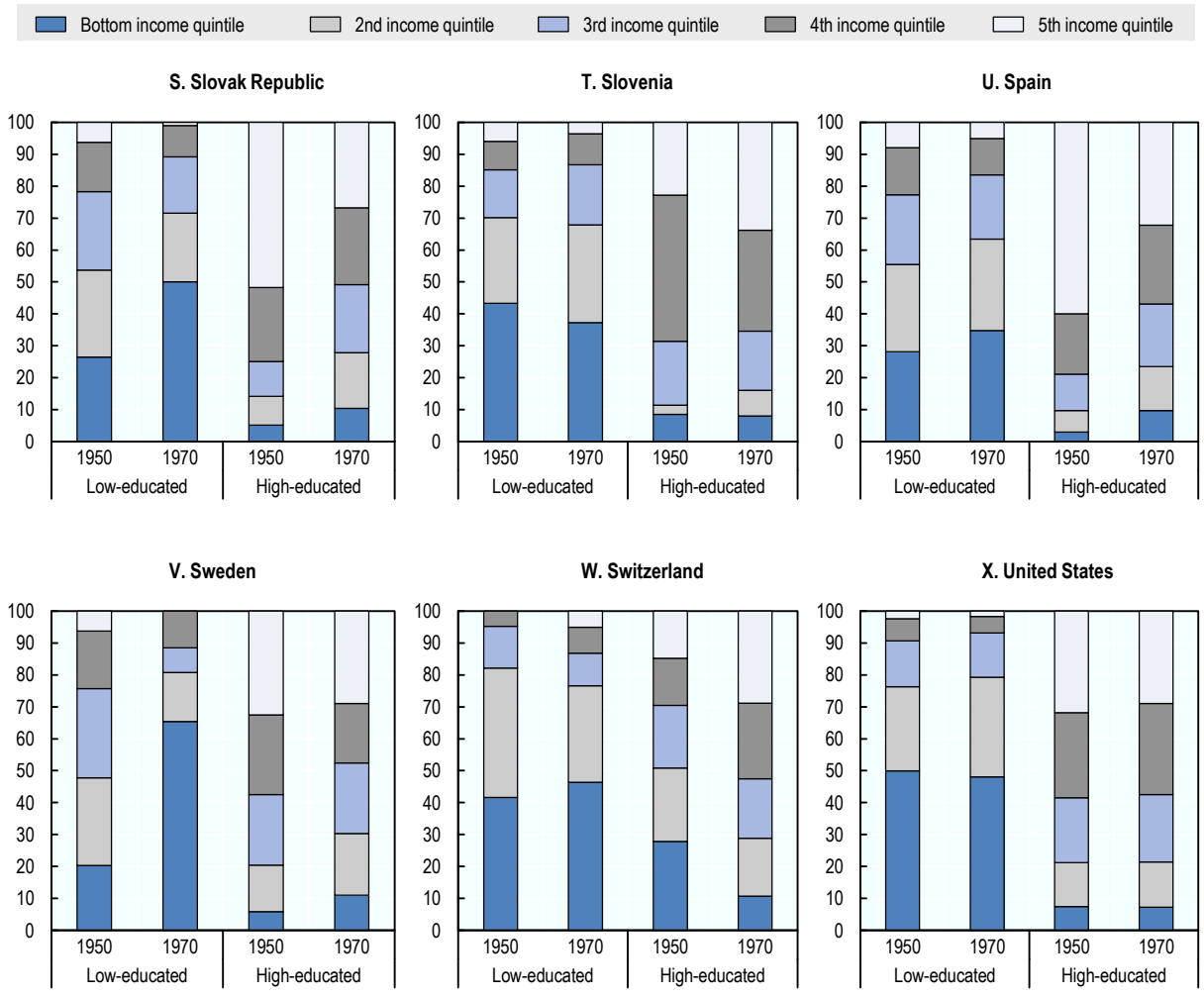


Figure 2.A4.1. Distribution of the population by income quintiles at age 40 *(cont.)*

By birth cohort and education level, percentages



Note: Quintiles are defined on the working age-population for a given year. 1970 and 1950 refer to the birth cohorts born during the 1970s and 1950s respectively.

Source: OECD Secretariat calculations based on *Luxembourg Income Study (LIS) Database*, http://www.lisdatacenter.org.

Annex Notes

1. The set of covariates includes individuals' gender, year of birth and education level.
2. As pointed out by Dang and Lanjouw (2013), there is no consensus in the literature on how large the sample size should be to obtain precise estimates of Monte Carlo simulations. Verbeek and Nijman (1992) suggest that cohort sizes of 100 to 200 are sufficient, while recent work by Devereux (2007) points to an ideal cohort size of 2 000 or more observations.

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