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**INEQUALITY: A HIDDEN COST OF MARKET POWER**

-- Working paper by the Secretariat --

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**ABSTRACT**

This paper explores the impact of competition on inequality by developing a new model to illustrate how higher profits from market power, and associated higher prices, could influence the distribution of wealth and income. We analyse data from eight OECD countries – Canada, France, Germany, Korea, Japan, Spain, the United Kingdom and the United States. Under this particular model, for an average country in the sample, market power increases the wealth of the richest 10% by between 12% and 21% for a range of reasonable assumptions about savings behaviour, while it reduces the income of the poorest 20% by between 14% and 19%. The results contribute to the economic literature on the origins of inequality, suggesting that competition may help to reduce economic inequality.

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## 1. Introduction

1. While some degree of inequality is necessary for the operation of a market economy –by creating rewards for effort, achievement and innovation– recent economic research finds stagnation in median wages and an increased disparity between the incomes of different groups of the population.<sup>1</sup> Understanding the contributing factors to inequality is important, if policymakers wish to reverse these tendencies. While there is much dispute about the origins of these tendencies, traditional explanations include a reduction in fiscal transfers from rich to poor, differences in human capital value or differences in demand for different types of workers. Increasingly, market power has also been identified as contributing to some extent to increased inequality. This has been noted by Ennis and Kim (2016), Furman and Orszag (2015), Rognlie (2015), Baker and Salop (2015), Creedy and Dixon (1999) and Comanor and Smiley (1975).

2. For the purpose of this work, market power is defined as the ability to drive prices and returns above competitive levels. The existence of market power has a dual effect on the income distribution, not only generating higher economic profits<sup>2</sup> for business owners, but also imposing higher prices on consumers. The increased margins charged to customers as a result of market power will disproportionately harm the poor who will pay more for goods without receiving a counter-balancing share of increased profits. The wealthy, while paying more for goods, will at the same time receive higher profits from market power, due to their generally higher ownership of the stream of corporate profits and capital gains.

3. Further discussion of the role of market power in the distribution of wealth is exemplified by Baker and Salop (2015), who examine how competition law enforcement can complement other policy responses to concerns about rising inequality. Furman and Orszag (2015) identify mechanisms that may create a relationship between lack of competition and inequality. Another way in which competition can deliver benefits is by reducing the prices of goods consumed mostly by the poor (Hausman and Sidak, 2004), as there is some evidence that poorer consumers are more exposed to monopolisation. In particular, building on work by Creedy and Dixon (1999), Urzua (2013) shows how Mexican consumers from different income categories and from different parts of the country were exposed to monopoly power. They found that “the welfare losses due to the exercise of monopoly power are not only significant, but also regressive”.

4. While mechanisms by which market power can affect inequality are increasingly posited, the extent to which they may account for inequality is still open question. Little research has focused on the potential size of market power’s impact on inequality, with the exception of a study for the United States by Comanor and Smiley (1975), whose model has been updated and extended to other countries by Ennis and Kim (2016). The Comanor and Smiley (1975) model and assumed parameters for calibration have been suggested to contain substantial limits, though in our view the paper still provides a useful basis to obtain a notion of the dimension of the effect. Nonetheless, there is little analysis of the effects of competition on income or wealth distribution overall using more recent approaches.

5. Our paper helps to fill that gap by proposing a new steady-state model built up from fundamental economic relationships and addressing certain limitations that existed in prior work. By making a comparative static analysis between two different scenarios, one with existing levels of market power and another with competition enhanced, we model the potential impacts of market power on wealth distributions for eight OECD countries: Canada, France, Germany, Korea, Japan, Spain, the United Kingdom and the United States. The countries were selected to ensure coverage of a large share of the world’s wealth, in light of data availability. The wealth distribution data comes from the OECD Wealth Database or, in the two cases where the reported data are not at the required level of detail, from commonly cited alternative sources.<sup>3</sup>

6. While this paper focuses on the benefits of increasing competition, it does not suggest that all sources of economic market power should be eliminated. Some degree of product market power is desirable to provide sustained incentives to innovate. Patents, trademarks and brand differentiation, for example, often involve creation of market power accompanied by a positive impact on incentive to innovate. Similarly, some degree of market power is an essential spur to investment, which is why competition laws generally do not prohibit market power as such but rather its “abuse” to restrict competition. Indeed, some market power illegitimately arises from abusive behaviour by dominant companies or from cartels (illegal agreements between firms not to compete). Similarly, policy makers may be able to eliminate the scope for market power arising from government regulations that protect companies from competition.

7. Some observers may suggest that market power cannot play a significant role in creating inequality, as the effects of market power themselves may be modest. Indeed, only if market power is economically significant can it reasonably have major effects on inequality. There are reasons to consider the overall effects of illegitimate or undesirable market power as significant. Much anti-competitive behaviour by firms is hidden, because it is illegal. However, the business activities of discovered cartels already show a broad range of affected sectors. Accounting for both prosecuted and undiscovered cartels with a 20% discovery rate, and assuming comparable economic commerce of discovered and undiscovered cartels, Ennis (2014) suggests an estimate of the size of commerce affected by international cartels, between 1990 to 2013, at USD 48.5 trillion, while the mark-up found on typical discovered cartels is around 10% to 30%.<sup>4</sup> Annualised over 24 years, this suggests about USD 2 trillion in cartel commerce per year, and anti-competitive price increases from cartels of USD 200-600 billion.

8. Similarly, it is very hard to estimate the total rents accruing to firms protected from competition by unnecessary anticompetitive regulation. However, a study carried out by OECD (Wofl et al., 2010) found evidence that less restrictive product market regulations may have a significant impact on growth. In particular, the study estimates that reducing barriers to entrepreneurship (such as barriers to entry and antitrust exemptions) to a level consistent with the currently observed best practices among OECD members would allow an average OECD country to obtain a 0.35% to 0.4% higher annual growth rate of GDP per capita. Consequently, it seems reasonable to suppose that a significant proportion of the market power effect arises from ‘illegitimate’ or ‘excessive’ market power originating in sources that could perhaps be reduced through more effective competition policy.

9. Finally, while many modern commentators seek to distance competition law and policy from distributional concerns, it is worth noting that the origins of antitrust law lie very much in concerns about the concentration of wealth. In the United States, the antitrust laws were introduced explicitly to counter monopolisation of the economy not because of concerns about ‘efficiency’ but rather about undue political influence stemming from the wealth of the owners of the “trusts” (Baker and Salop, 2015). The results of this paper will add quantitative information to the debate over appropriate standards for evaluating competition law cases and weighing competition against innovation, with consumer surplus standards having more attractive features than total surplus standards for evaluating competition policies, because profits have much more unequal distributional consequences than consumption. The choice over which standard to adopt is important because it can have a direct result on competition law case outcomes and policies towards innovation.

10. This paper proceeds as follows: Section 2 derives and explains the steady state model that underlies the analysis, Section 3 discusses the data that can be fit to this model, Section 4 presents the results for all the countries in the analysis, Section 5 concludes and provides directions for future work.

## 2. Model

11. The dynamic steady-state model that we propose is highly stylised, and intended to capture the most essential factors for the question at hand, but does not characterise all relevant phenomena. Based on actual income, wealth and consumption expenditure distributions, it models the potential effect that higher prices would have on different groups of the population.

12. For this purpose, we make a comparative static analysis between two alternative steady states: the first is the current state where business owners have market power and which is characterised by observed distributions of wealth, income and consumption expenditures; the second is a hypothetical steady state where markets are competitive and distributions of wealth, income and consumption expenditures are implied by the model and the reduction in mark-ups. We do not suggest that the economies examined are actually in steady state, but that the approach is a reasonable approximation to capture the essential features needed to compare situations with more or less competition.

### 2.1 Assumptions

13. The use of our steady-state model to measure the redistributive effect of market power implies four primary assumptions:

1. Market power for each country can be approximated by the difference between the average mark-up (across all sectors) in the country and a minimum mark-up that reflects the best-practices of most competitive economies.<sup>5</sup> The method is further explained below and is designed to recognise that a significant level of mark-up is needed to cover necessary returns on investment and legitimate sources of market power such as patents and trademarks.
2. The marginal propensity to save ( $s'$ ) from increased income arising from lower prices is constant across wealth groups. This assumption simplifies the solution to the model, but does not prevent the average saving rate from varying across wealth groups.<sup>6</sup> The assumption is a conservative one since accommodating a higher marginal propensity to save for the wealthier will only increase the magnitude of the redistributive effects that we identify.
3. Market power gains are distributed in proportion to the current net wealth distribution (later referred to as  $f_i$ ). This reflects the observations that corporate income and capital gains are distributed via business ownership, so that those with the largest wealth shares (whether in the form of corporate shares, bonds, pension fund entitlements, dwellings, land or others) will, in proportion, receive the largest share of the profits.<sup>7</sup>
4. The price of different baskets of goods will be inflated by market power in an equal percentage. This implies that products for the poor and products for the wealthy will be equally affected by market power.<sup>8</sup> To the extent that the poor are more exposed to monopolisation, the model provides conservative, lower-bound estimates.

14. Under these assumptions, we denote  $Y$  the total income in the economy,  $F$  net wealth assets,  $C$  the aggregate consumption expenditure,  $W$  the labour income and  $R$  the capital income. All variables are nominal and we will use the superscripts  $m$  and  $c$  to refer to the observed values in the monopolistic and competitive steady states, respectively. In addition, we consider  $g$  the economic growth rate,  $\bar{s}$  the average saving rate of the economy,  $s'$  the marginal propensity to save,  $\alpha_L$  and  $\alpha_k$  the shares of labour and capital income in the monopolistic steady state, and  $\mu$  the mark-up, defined as the price over estimated marginal cost.

15. As we want to isolate the redistributive effect of market power, we consider that the only impact of monopolies is to raise prices, while output remains constant. Thus, the difference between aggregate income, consumption expenditures and wealth in the monopolistic and competitive equilibrium is driven by the price increase. Given that under competition the aggregate price is equal to marginal cost, the following relations hold:

$$F^m = \mu F^c, \quad Y^m = \mu Y^c, \quad C^m = \mu C^c. \quad (1)$$

16. While efficiency effects are outside the scope of the model, in reality we would also expect market power to reduce aggregate output, resulting in a deadweight loss. It is not clear though how deadweight loss affects inequality, since both business owners and consumers are harmed by lost transactions. Still, we should expect efficiency effects to impact particularly the poorest groups of the population, since the households that reduce consumption are those with lowest willingness to pay and that cannot afford monopoly prices. Likewise, supply contractions can be created by regulatory barriers that restrict the entry of small and medium enterprises, while reinforcing the market share of the largest incumbents.

## 2.2 National income identity

17. The national income identity defines aggregate output as the sum of income from labour and capital:

$$Y^j = W + R^j, \quad \text{where } j = c, m. \quad (2)$$

18. Note that the change in price when we move to the competitive steady state does not affect labour income, which we assume remains constant across the two steady states. In fact, if market power increased prices and wages in the same proportion, the redistributive effect of market power would likely be negligible, since workers and business owners would be affected in the same way. We also do not know *a priori* how capital income is affected by market power, since doubling prices does not necessarily double the return on capital. However, we can use the fact that  $Y^m = \mu Y^c$  to obtain a relation between  $R^c$  and  $R^m$ :

$$Y^c = W + \underbrace{\frac{1 - \mu}{\mu} W + \frac{R^m}{\mu}}_{R^c}. \quad (3)$$

19. Using lower case letters to describe the shares of wealth and income of a particular population group, the income earned by a population group  $i$  is, in each steady state, given by the following equations:

$$y_i^m Y^m = W_i + f_i^m R^m \quad (4)$$

$$y_i^c Y^c = W_i + f_i^c \left[ \frac{1 - \mu}{\mu} W + \frac{R^m}{\mu} \right]. \quad (5)$$

20. In the two equations above,  $W_i$  is the labour income earned by each population group, whose nominal level is not affected by market power (just as aggregate labour income). Subtracting equation (5) from equation (4) and using the equalities in (1) and (2) (see Annex A2 for a complete derivation), we get:

$$y_i^m - y_i^c = (\mu - 1)(f_i^m - y_i^m) + (1 - \mu \alpha_L)(f_i^m - f_i^c). \quad (6)$$

21. Equation (6) implicitly defines income and wealth shares variations unleashed by market power, as a function of observable income and wealth shares, the mark-up and the income share of labour.

### 2.3 Consumption function

22. Next, we describe aggregate consumption expenditure using a linear consumption function with an independent term (autonomous consumption) and a constant marginal propensity to save, whose functional form can be derived from a linear expenditure model:<sup>9</sup>

$$C^j = \bar{C}^j + (1 - s')Y^j, \quad j = c, m. \quad (7)$$

23. The particular functional form of the consumption function in equation (7) implies the following relation between the marginal propensity to save  $s'$  and the average saving rate of the economy  $\bar{s}$ :

$$\bar{s} = s' - \frac{\bar{C}}{Y}, \quad \text{where } \bar{s} = \frac{Y^m - C^m}{Y^m}. \quad (8)$$

24. The relation in equation (8) reflects the fact that, as long as autonomous consumption is positive, the average saving rate is lower than the marginal propensity to save, which is line with empirical evidence. Nonetheless, this relation also imposes that the ratio of autonomous consumption to income remains sufficiently small that the average saving rate is not negative.

25. Defining  $c_i$  as the consumption share of a particular population group, the consumption expenditure of any population group can be described by the following equations:

$$c_i^c C^c = \bar{C}_i^c + (1 - s')y_i^c Y^c \quad (9)$$

$$c_i^m C^m = \bar{C}_i^m + (1 - s')y_i^m Y^m, \quad \text{where } \bar{C}_i^m = \mu \bar{C}_i^c \quad (10)$$

where  $\bar{C}_i^c$  and  $\bar{C}_i^m$  are independent terms specific to the population group. Note that despite the simplifying assumption that all population groups react identically to a variation in income, the incorporation of group-specific independent terms allows average saving rates to vary across population groups, which is consistent with empirical evidence. Still, by equation (1), the average saving rate of the economy remains the same in the monopolistic and competitive scenarios, since market power affects consumption expenditure and income in the same proportion. Multiplying equation (9) by  $\mu$  and subtracting it from equation (10), it is possible to show that (see Annex A3 for a complete derivation):

$$c_i^m - c_i^c = \frac{1 - s'}{1 - \bar{s}} (y_i^m - y_i^c). \quad (11)$$

26. Equation (11) describes how consumption shares react to a change in income share, an effect that intuitively depends on the saving behaviour characterised by the marginal propensity to save and the average saving rate.

## 2.4 Wealth dynamics

27. Finally, we describe aggregate wealth in steady state as the product of savings (aggregate income minus aggregate consumption expenditure) and a multiplier  $\frac{1}{g}$ , where  $g$  can be interpreted as the growth rate of the economy:

$$F^j = \frac{Y^j - C^j}{g}, \quad j = c, m, \quad (12)$$

28. Equation (12) can be easily derived as the solution of a standard difference equation for wealth, by considering that in equilibrium wealth grows at the constant rate  $g$ .<sup>10</sup> Moreover, in equilibrium, the same relation must be true for any particular population group:

$$f_i^c F^c = \frac{y_i^c Y^c - c_i^c C^c}{g} \quad (13)$$

$$f_i^m F^m = \frac{y_i^m Y^m - c_i^m C^m}{g}. \quad (14)$$

29. Multiplying all terms of equation (13) by  $\mu$  and subtracting it from equation (14), one can show that (see Annex A4 for a complete derivation):

$$f_i^m - f_i^c = \frac{1}{\bar{s}}(y_i^m - y_i^c) - \frac{1 - \bar{s}}{\bar{s}}(c_i^m - c_i^c). \quad (15)$$

## 2.5 Solving the model

30. The system of equations (6), (11) and (15) characterise the equilibrium dynamics of wealth, income and consumption shares. Solving the system with respect to  $f_i^c$  and  $y_i^c$ , we obtain our final measure of the redistributive effect of market power on wealth and income (see Annex A5 for a complete derivation):

$$f_i^c = f_i^m + \frac{\frac{s'}{\bar{s}}(\mu - 1)}{1 - \frac{s'}{\bar{s}}(1 - \mu\alpha_L)}(y_i^m - f_i^m) \quad (16)$$

$$y_i^c = y_i^m + \frac{\mu - 1}{1 - \frac{s'}{\bar{s}}(1 - \mu\alpha_L)}(y_i^m - f_i^m). \quad (17)$$

31. Equations (16) and (17) provide the simple result that the redistributive effects of market power on wealth and income depend on a few key variables that can be either observed or estimated: a market-power indicator (mark-up); the income share of labour; the ratio between the average saving rate and the marginal propensity to save; and the observed difference between income and wealth shares in the presence of market power.

32. If the marginal propensity to save were to equal the average saving rate, which is certainly a lower bound, equations (16) and (17) simplify to:

$$f_i^c - f_i^m = y_i^c - y_i^m = \frac{L}{\alpha_L}(y_i^m - f_i^m), \quad (18)$$

where L is the Lerner index.<sup>11</sup>

33. This simple model has the advantage of deriving measures of the redistributive effects of market power from observed data that vary across countries and of having a steady-state solution emerging from dynamic relationships. These features distinguish the model from that used in the first paper known to have calibrated the impact of market power on wealth distributions, namely Comanor and Smiley (1975). While the new methodology has valuable improvements over this model and that of Ennis and Kim (2016) which followed the same methodology as Comanor and Smiley, the impact of market power remains substantial.

### 3. Data

34. This section describes the variables and data used to calibrate the model and their underlying sources. The eight countries considered have been selected both because of data availability and to ensure geographic breadth. To the extent possible, data sources have been used that are common across these countries to ensure comparability. Data sources are listed in Table 1 (Annex A1).

#### 3.1 Market power indicator

35. The extent of market power is measured using mark-ups on average cost reported by Høj et al. (2007), who used the method developed by Roeger (1995)<sup>12</sup> adapted from Hall (1988) to estimate sector-specific mark-ups for 17 countries, using the OECD-STAN database. The method includes a return on capital that is excluded from the calculation of the mark-up. The data used for these estimates covers the period 1975-2002 and is not purported to represent current mark-ups but rather average mark-ups over that time period in which wealth stocks have been built up. Mark-ups therefore may have changed since then, and the countries with higher mark-ups in these data are not necessarily those with the highest mark-ups now. Arguably, though, these historical mark-ups, which are certainly among the most detailed estimates available, would have played a role in establishing today's wealth distribution.

36. Mark-ups are imperfect measures of competition, and the estimation method used by Høj et al. is recognised as providing only a first-order approximation. Measurement problems are also observed when working with input and output measures at the sectoral level. Nonetheless, mark-ups are commonly used to measure the strength of competition (Bresnahan, 1989, Schmalensee, 1989). Macroeconomic research in particular often relies on mark-up information to examine the impact of competition on economy wide factors, such as Aghion et al. (2005), Griffiths et al. (2006) and Thum-Thysen and Canton (2015). The figures used are in line with those of other authors (e.g., Griffiths et al., 2006) but have the feature of sector disaggregation.

37. While the mark-ups estimated by Høj et al. (2007) could be directly introduced into the model to measure the total impact of market power on the distribution of wealth, we do not believe that a complete eradication of mark-ups is a viable or desirable policy objective, as some sources of market power include beneficial factors, such as product differentiation and intellectual property rights. Instead, we attempt to compare actual mark-ups with the lowest sector specific mark-ups observed across countries, in order to estimate an unexplained or excess mark-up. The model can then simulate the effect of market power by calculating the wealth distribution that would exist if the excess mark-up does not exist.

38. The estimates of excess mark-up by country are calculated, for each sector, as the difference between the actual mark-up and the lowest observed mark-up across all countries in the sample. To illustrate, in the sector of wholesale and retail trade and repairs, the mark-up observed in the UK is 16% and the minimum mark-up (found in Germany) is 12%. The UK excess mark-up for that sector is then calculated as the difference, i.e. 4.0%. Weighting across sectors by output, the average level of the excess mark-up in the UK is 3.9%, with the relevant average for other countries varying depending on the differences in sector mark-ups and output weights. The average mark-ups by country (across sectors) are shown in Figure 1 (Annex A1) and the exact numbers are provided in Annex A6, ranging between 3.9% and 10.6%.

39. This method of estimating market power focuses on finding likely cross-country differences in mark-ups, but it is not claimed to serve as a definitive measure of market power for any individual country. Moreover, these measures are not claimed to serve as a current indicator but instead as an approximation of long-run differences of market power across countries. It is possible that our estimates of excess mark-ups may exceed reported values on corporate profits, because not all profits are captured in corporate profit measures (e.g., partnership income from investment funds or professional service firms) and because a share of profit may be taken in income. Higher than minimal mark-ups, or the excess mark-up, may then be transferred into higher returns to shareholders (and profits), but also potentially into higher income for managers and other employees (e.g., from managerial profit-taking or collective bargaining that extracts part of a monopoly rent). Indeed, in some companies with high profits, such as financial firms, a great part of the income goes to a small, high-earning percentage of the employees, as shown in Denk et al. (2015).

### 3.2 *Wealth and income shares*

40. The difference between a population group's share of total income and its share of total wealth is  $y_i - f_i$ . This difference drives the accumulation of gains from market power for those with a share of business ownership (wealth) that exceeds their share of income, i.e., for  $f_i > y_i$ . In contrast, for those with shares of income that exceed their share of business profits,  $f_i < y_i$ , the impact of market power will be a net loss in both wealth and income. Intuitively, market power generates a transfer effect from consumers (in proportion to the income they earn) to business owners (in proportion to the wealth or capital they hold). This means that the families that lose the most from market power, in absolute as opposed to percentage terms, are likely to be those with a substantial income but low business ownership; this appears consistent with the observation that a "squeezed middle class" has experienced a sustained drop in real income.

41. Table 2 (Annex A1) presents summary statistics related to wealth, consumption expenditure and income by class, in the 8 countries of analysis. These are descriptive statistics, from previously identified sources or imputed from these sources. The less well-off groups are presented by quintile while the wealthiest groups are subdivided into smaller populations, including the top percentile (most wealthy 1%). Among the 8 countries studied here, wealth asset ownership of the top 1 percentile ranges from 6% to 37% of total wealth, while asset ownership of the bottom 80 percentiles ranges from 12% to 43% of total. We use wealth asset ownership by wealth group as our indicator of business ownership. The top percentile groups, particularly the 95<sup>th</sup>-99<sup>th</sup> percentile and the top 1 percentile have an income share of total income that is generally much lower than their percentage of wealth.

42. These findings support the point that the wealthiest households may receive disproportionately more of the profits from market power than others, while not being equally affected by price increases as other groups. Having said this, the impact of competition on earnings is not unambiguous. Some work in labour economics finds that even some lower-skilled workers may share in supra-competitive rents earned by firms, as discussed in Furman and Orszag (2015). This effect is not considered in the model used here, but may be particularly important in heavily unionised sectors or for workers who can influence their own pay (such as CEOs and executive teams within weak corporate governance structures). In such cases, the

profit transfers that are the basis of the model would be both to business asset owners and to those workers that are in a position to capture the rents earned by the business.

### 3.3 *Income share of labour*

43. The income share of labour corresponds to the fraction of total income or output that is earned from labour, usually in the form of wages. The specific measure we use is adjusted for self-employment, whose remuneration is not defined as wages, but which should still be considered as a part of labour income. The data was collected from the Ameco database and it is reported in Krämer (2011). The values are quite stable across countries and they range between 0.62 and 0.7.

### 3.4 *Marginal propensity to save over average saving rate*

44. The marginal propensity to save ( $s'$ ) is the proportion of a marginal increase in household income that is used for saving or, in other words, that is not allocated for consumption. Thus, the marginal propensity to save corresponds to 1 minus the marginal propensity to consume (MPC). The average saving rate ( $\bar{s}$ ) is the share of the total income that is saved by the household, that is, it corresponds to the ratio of savings to income.

45. The ratio of the marginal propensity to save (MPS) to the average saving rate is one of the key parameters of our model. The ratio influences the scale of the impact that market power has on inequality. To ensure that we use the best available evidence for this parameter, we therefore surveyed the literature on savings rates (see annex A7 for more detail).

46. The issue here is the effect of a permanent and unanticipated reduction of market power on consumption and savings. Reputable studies of permanent and unanticipated changes in income are summarised in Annex A7. Among the studies considered, the average  $s'$  is 0.16 but this varies across different countries and ranges between 0.11 and 0.23.

47. With respect to the average saving rate, we use data collected by national statistical offices for recent decades. The average of these savings rates is 0.11, and ranges between 0.08 and 0.12, with the exception of France whose saving rate was around 0.17. The average ratio between the marginal propensity to save (MPS) and the average saving rate for the four countries for which we were able to obtain estimates was 1.9, though this varied from 1.5 to 2.4. In order to capture a lower bound on the impact, we use a ratio of 1 of the MPS to the average savings rate. We then use two ratios that are closer to the calculated averages (1.5 and 2).

## 4. Results

48. The main results are presented graphically in Figure 2 (Annex A1) and show the impact of market power.<sup>13</sup> Each bar represents a share of wealth by population group. For each wealth group, actual wealth shares are in the bar on the left and shares absent market power are in the bar on the right. The range of results that is derived from different ratios of marginal propensity to save over average saving rate is indicated by a vertical line. The underlying data are provided in Table 3 (Annex A1).

49. Overall, Figure 2 suggests that, in this model and for the countries studied, redistribution from eliminating market power would occur mainly from the wealthiest 10% of the population to the bottom 80%. Table 4 (Annex A1) summarises the percentage of wealth affected by the existence of market power across countries for the wealthiest 10%. For an average country in the sample, 12% to 21% of the wealth of the richest 10% of households (by wealth) reflects the presence of market power. This result is calculated by calibrating the ratio of the marginal propensity to save over the average saving rate between 1.5 and 2, the values of the ratio most consistent with the available data. Table 4 also reports a lower bound value for

the unlikely scenario in which the marginal propensity to save is equal to the average saving rate. In that case the wealth attributed to market power would be 6%, showing a non-trivial share of wealth even under the most conservative assumption for the ratio. The differences in the impact of market power across countries arise from the differences in the distribution of wealth and income, observed mark-ups and income shares of labour.

50. An alternative measure of how market power influences wealth distribution, which does not involve the assumption of a full elimination in market power, is the impact of a reduction in mark-ups by 1%, as shown in Figure 3 (Annex A1). As an example, the figure shows that a 1% reduction in mark-ups increases the wealth of the poorest 20% of the UK population by 0.19 percentage points. Their wealth therefore increases from 0.87% to 1.06% (an increase of approximately 22%). This marginal effect can be used as a ready reckoner to estimate the possible impact of reducing or eliminating anti-competitive market power for a given economy-wide price change. The extent to which middle income earners are squeezed by market power varies substantially across countries, as can be seen by focusing on the 20<sup>th</sup> to 80<sup>th</sup> percentiles.

51. In addition to looking at the impact on wealth, we also show in Table 5 (Annex A1) how market power affects the income shares of the population groups in each country, while Table 6 (Annex A1) summarises the percentage change in the income of the poorest 20% for all countries. In an average country in the sample, for a range of reasonable assumptions about saving behaviour, the income of the poorest 20% of households is expected to rise by between 14% and 19% in the absence of market power (11% in the unlikely lower-bound scenario).<sup>14</sup> We note that these income effects are particularly meaningful for the poorest households, which often hold close-to-zero or even negative levels of wealth.

52. Finally, Figure 4 (Annex A1) shows the redistribution of income resulting from a reduction in mark-ups by 1%.<sup>15</sup> Taking again the case of the United Kingdom, Figure 4 shows that a 1% reduction in mark-ups increases the income of the poorest 20% of the UK population by 0.12 percentage points. Their income therefore increases from 7.8% to 7.92% (an increase of approximately 2%).

## 5. Conclusions

53. Market power may contribute substantially to wealth inequality, augmenting wealth of the richest 10% of the population by 12% to 21% for an average country in the sample. The magnitude of the impact depends on the choice of key model parameters relating to saving behaviour and, even in an unlikely lower bound estimation would be 6%. Market power may also depress the income of the poorest 20% of the population by between 14% and 19% for an average country in the sample.

54. Sources of market power vary, and many are generally considered legitimate such as intellectual property protection for products, processes or brands. But violations of competition law, government-created barriers to entry or natural monopolies may be significant sources of market power. Policies that enhance competition –by reducing anti-competitive regulation or trade barriers, empowering consumer choice, fighting illegal cartels, empowering consumers through market studies, preventing mergers that create market power, or the abuse of market power– can therefore help reduce inequality.

55. Future research is needed to better understand these results. First, extending the analysis to developing countries would be interesting. This should be possible as data measuring inequality are rapidly becoming more easily available. Second, more work is needed to understand the likely scale of different sources of market power, ideally divided into at least three categories: legally obtained without government help, legally obtained with government help (e.g. due to competition-restricting regulations) and illegally obtained market power. Such figures would provide an underpinning for one of the key variables for this analysis. Third, relaxing the steady-state assumptions and developing a more complete model that includes

variables on tax and inheritance would provide additional insight and realism. Fourth, using econometric techniques to regress wealth on measures of market power would be of substantial value, allowing one to conduct statistical inference and to obtain confidence intervals for these figures.

56. The results are nonetheless illustrative. They are based on a model, with accompanying variable and parameter estimates, in which the particular assumptions made are stated clearly and in which reasons and sources are provided for these conclusions. Alternative models and assumptions may yield different results. This research illustrates a mechanism by which market power can contribute to unequal economic outcomes. If this mechanism is correct, government action to reduce illegitimate market power can be an important component of a strategy for inclusive growth.

57. Importantly, we do not suggest that competition law and policy should specifically target inequality. Instead, we suggest that reduced inequality is a beneficial by-product of government actions and policies to reduce illegitimate market power. The analysis in this paper contributes to the debate on what standards to use when evaluating competition law cases or considering trade-offs between competition and innovation. In their seminal paper on horizontal mergers, Farrell and Shapiro's (1990) central conclusion is that if a total welfare standard is used for reviewing horizontal mergers, then under reasonable conditions, price-raising and profitable mergers necessarily increase total welfare. Implicit in their central result is that higher consumer prices may be counter-balanced for consumers by the fact that profits from such higher prices are distributed to shareholders. The analysis here suggests that the beneficiaries from higher profits from mergers may on average account for a rather small percentage of the population, selected from among the top 10% or less of the population, raising doubts about whether a total welfare standard is socially desirable, given the highly unequal distribution of a key factor of that standard, corporate profits, with the vast majority of citizens potentially being worse off as a result of such a merger. A consumer welfare standard avoids this pitfall. This analysis may thus contribute to the debate about whether consumer surplus or total surplus standards should be used.

58. The decision over which standard to use has a profound impact on the extent that effects of innovation are weighed into policy making, particularly as innovations tend to generate total welfare gains that include a large element of profit from intellectual property, as suggested by Shapiro (2012) and Katz and Shelanski (2005). Following this paper, more research would be valuable on this point.

59. This paper helps to reinforce the value of an alternative to standard policy solutions. To the extent that policymakers seek to reduce inequality in the distribution of wealth (or income), they often consider traditional tax and redistribution policies, even though these have potentially large impacts on incentives to earn and spend. Feldstein's (1999) calculation suggests deadweight losses for high earners of 3.76 times the marginal tax revenue gained from higher tax rates and overall deadweight losses of twice the marginal tax revenue.<sup>16</sup> As a result, there are potentially significant benefits for economies that reduce inequality through proactive policies that prevent illegitimate market power from regressively redistributing income and wealth in the first place. Distortions of competitive market outcomes might for example be pre-empted by investing in vigorous competition law enforcement and by removing regulations that protect companies from competition. Similarly, a competitive impact assessment might identify new rules and regulations that would increase inequality. Ultimately, this paper suggests that the standard redistribution policies ignore the potential role of competition policy in enhancing equality, which is a particularly worrisome omission because of pro-competitive policies' attractive productivity and incentive features compared to alternatives. As a result, policymakers who focus on reducing inequality may wish to emphasise and enhance economic policies that favour competition.

## Notes

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- <sup>1</sup> See, for example, Piketty (2014), Piketty and Saez (2012), OECD (2015) and Summers (2014).
- <sup>2</sup> That is, returns above the market return, which should be competed down to the cost of capital.
- <sup>3</sup> For Korea and Japan, the sources are listed in Table 1. Other sources such as CSFB report higher estimates of wealth and financial wealth for the top 1% in these two countries in particular.
- <sup>4</sup> The key assumption for this calculation is that commerce in discovered cartels is one fifth of total cartel commerce, which follows if one fifth of cartels are discovered. There is an active debate about the extent to which active cartels are discovered and prosecuted.
- <sup>5</sup> On the one hand, low mark-ups may indicate a declining industry with uneconomic return on capital. On the other hand, the lowest mark-ups in an industry may already be expected to include some market power, to the extent that sector-wide perfect competition is rare.
- <sup>6</sup> This assumption can be relaxed to yield marginal propensities to save that vary across wealth classes, but we note that this adjustment would actually imply higher shares of marginal savings for the highest wealth classes, further increasing the strength of the results reported below. The assumption is thus conservative, even if an over-simplification.
- <sup>7</sup> Market power may potentially be shared with employees, including lesser paid workers. If the workers, notably, receive a substantial increase in their incomes as a result of market power, the distribution of profits will not go not only to those with substantial net wealth but also those without, thus weakening the result of this paper. While this point is important to consider, to the extent that union negotiating power has declined over time, and that top management pay has substantially outpaced inflation, redistribution via labour income, to the extent it occurs, may be accruing increasingly to the wealthiest workers (i.e., management).
- <sup>8</sup> While the population of the top wealth decile and top consumption decile are not perfectly overlapping, the authors believe there is a high correlation between consumption shares of the income for those persons in the  $x^{\text{th}}$  wealth decile and those in the  $x^{\text{th}}$  income decile. This approximation is used because data on the consumption shares of the top wealth decile was unavailable to the authors at the time of writing. Note that for Korea, Japan and the U.S., the consumption of the top 1 percentile had to be calibrated based on consumption shares in known countries. Note: this footnote does not seem to belong to the place where it is in the main text.
- <sup>9</sup> In the linear expenditure model, households' utility from consumption and saving is described by the following equation:  $U(C, S) = (1 - s')\ln(C - a) + s'\ln(S)$ . The maximisation of this utility function subject to the budget constrains yields the consumption function presented in equation (7).
- <sup>10</sup> Consider that the dynamics of wealth are described by the difference equation  $F_{t+1} = F_t + Y_t - C_t$ . That is, the wealth accumulated in any period of time is equal to the wealth held in the previous period plus aggregate savings. Then, assuming that the economy grows at the exogenous growth rate  $g$ , the equilibrium solution of the difference equation is given by  $F_{t+1} = F_t(1 + g)$  and, in steady state, equation (12) holds.
- <sup>11</sup> The Lerner index is equal to  $\frac{P-MC}{P}$ , where  $P$  is the price and  $MC$  the marginal cost.
- <sup>12</sup> Prior work using Roeger's approach has included Oliveira Martins et al. (1996)
- <sup>13</sup> The data from Japan have a different source which is listed in Table 1.

- <sup>14</sup> The income variations observed for the bottom quintiles of the population may actually exceed the price change percentage from reduced market power. This follows from the fact that wealth is an endogenous variable in the proposed model, meaning that the real income increase from absence of market power enables the bottom quintile of the population to save more and subsequently receive extra returns on wealth. As an illustrative example, in a country where prices fall by 1% as a result of pro-competitive policies, a household that initially does not hold wealth obtains an immediate raise in real income by 1%, allowing it to save more, accumulate wealth and raise future real income.
- <sup>15</sup> Note that the figures for the top 10% in Japan are not comparable to those for other countries, perhaps suggesting that the data sources used, which are the most commonly cited, lead to a comparative under-reporting of wealth assets for the highest brackets compared to other countries.
- <sup>16</sup> See Feldstein (1999) which estimates for high-earning couples a \$3.76 deadweight loss for each additional \$1.00 in income tax revenue and that across all earners, the effect is about a \$2.00 for each additional \$1.00 in income tax revenue.

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## ANNEX A1. TABLES AND FIGURES

Table 1. Data sources

Datasets	Canada	France	Germany	Spain	UK	USA	Korea	Japan	
Total wealth shares	OECD Datasets: Wealth Distribution Database						Leipziger et al (1992)	National Survey of Family Income and Expenditure, 1994	
Consumption shares	Canada Survey of Household Spending 2013	Eurostat: Mean Consumption Expenditure by Income Quintiles 2010				USA Consumer Expenditure Survey, 2013	Statistics Korea: income and consumption 2014	Family Income and Expenditure Survey 2013, Japan	
Income shares	Canada Market, total and after-tax income of individuals 2011	Eurostat: Distribution of Income by Quantiles 2014				USA Consumer Expenditure Survey, 2013	Statistics Korea: income and consumption 2014	Family Income and Expenditure Survey 2013, Japan	
Income share of labour	Ameco's Adjusted wage share in selected OECD-Countries, 1990-2008 in Krämer (2011)								
Average saving rates	Statistics Canada	INSEE France	Deutsche Bundesbank	Eurostat	Office for National Statistics	U.S. Bureau of Economics Analysis	Statistics Korea	Statistics Bureau of Japan	
Marginal propensity to save	Literature sources in Annex A1.								
Mark-ups	Høj, J. et al (2007).								

Source: OECD.

**Table 2. Summary data: distribution of net worth, income and consumption expenditures (all units in percentages)**

Canada				France			
Percentile	Net worth	Income	Consumption expenditures	Percentile	Net worth	Income	Consumption expenditures
Bottom 20	0.4	4.4	7.9	Bottom 20	0.3	9.0	9.9
21 - 40	4.1	9.7	12.1	21 - 40	2.4	13.5	13.9
41 - 60	10.0	15.4	16.9	41 - 60	10.9	17.2	18.3
61 - 80	19.7	23.3	23.6	61 - 80	20.7	21.7	23.9
81 - 90	17.5	16.6	15.3	81 - 90	17.2	13.8	12.7
91 - 95	13.4	10.8	9.6	91 - 95	13.2	8.9	9.4
96 - 99	19.9	13.1	11.3	96 - 99	18.0	10.1	9.1
Top 1	14.9	6.8	3.2	Top 1	17.3	5.7	2.8

Germany				Japan			
Percentile	Net worth	Income	Consumption expenditures	Percentile	Net worth	Income	Consumption expenditures
Bottom 20	-0.1	7.5	8.6	Bottom 20	2.0	10.8	11.8
21 - 40	1.4	13.5	13.1	21 - 40	6.6	15.1	16.3
41 - 60	6.3	17.6	17.8	41 - 60	12.8	18.3	18.6
61 - 80	17.5	23.0	23.9	61 - 80	21.7	23.2	22.7
81 - 90	17.0	14.7	14.7	81 - 90	17.2	14.4	13.9
91 - 95	13.6	8.9	9.6	91 - 95	16.9	5.7	6.6
96 - 99	21.1	9.4	9.5	96 - 99	16.6	8.3	7.6
Top 1	23.3	5.3	2.9	Top 1	6.2	4.3	2.5

Korea				Spain			
Percentile	Net worth	Income	Consumption expenditures	Percentile	Net worth	Income	Consumption expenditures
Bottom 20	1.8	6.8	9.9	Bottom 20	1.7	6.0	10.1
21 - 40	5.6	13.3	15.9	21 - 40	7.3	12.2	14.4
41 - 60	11.5	18.2	19.9	41 - 60	12.8	17.3	18.7
61 - 80	21.0	23.9	23.2	61 - 80	20.1	24.0	23.2
81 - 90	17.0	15.4	13.9	81 - 90	15.7	15.9	15.1
91 - 95	12.2	7.8	7.0	91 - 95	12.4	10.0	8.1
96 - 99	16.7	9.6	7.8	96 - 99	15.5	10.4	7.6
Top 1	14.2	5.0	2.6	Top 1	14.6	4.3	2.7

United Kingdom				United States			
Percentile	Net worth	Income	Consumption expenditures	Percentile	Net worth	Income	Consumption expenditures
Bottom 20	0.9	7.8	10.9	Bottom 20	-0.9	3.7	8.9
21 - 40	4.8	12.8	13.6	21 - 40	0.9	9.5	12.5
41 - 60	11.8	17.1	18.2	41 - 60	3.1	15.3	17.0
61 - 80	20.7	23.0	22.6	61 - 80	9.1	23.7	22.6
81 - 90	16.6	15.0	12.9	81 - 90	10.9	17.2	15.5
91 - 95	12.2	9.2	9.4	91 - 95	12.1	11.7	10.2
96 - 99	16.4	9.8	9.4	96 - 99	28.0	12.5	10.0
Top 1	16.8	5.3	3.0	Top 1	36.8	6.5	3.3

Source: OECD compilations.

**Table 3. Impact of market power on wealth shares (all units in percentages)**

Canada					France				
Percentile	Current wealth share	Wealth share absent market power			Percentile	Current wealth share	Wealth share absent market power		
		$s' = \bar{s}$	$s' = 1.5 \bar{s}$	$s' = 2 \bar{s}$			$s' = \bar{s}$	$s' = 1.5 \bar{s}$	$s' = 2 \bar{s}$
Bottom 20	0.41	0.89	1.34	2.20	Bottom 20	0.33	1.53	2.57	4.30
21 - 40	4.08	4.75	5.39	6.59	21 - 40	2.44	3.97	5.30	7.50
41 - 60	10.03	10.67	11.28	12.43	41 - 60	10.87	11.74	12.50	13.76
61 - 80	19.75	20.18	20.58	21.35	61 - 80	20.73	20.86	20.98	21.17
81 - 90	17.51	17.40	17.29	17.08	81 - 90	17.15	16.69	16.28	15.62
91 - 95	13.40	13.09	12.79	12.24	91 - 95	13.18	12.59	12.07	11.22
96 - 99	19.89	19.07	18.29	16.84	96 - 99	18.04	16.94	15.98	14.40
Top 1	14.93	13.96	13.02	11.28	Top 1	17.27	15.67	14.28	11.98

Germany					Japan				
Percentile	Current wealth share	Wealth share absent market power			Percentile	Current wealth share	Wealth share absent market power		
		$s' = \bar{s}$	$s' = 1.5 \bar{s}$	$s' = 2 \bar{s}$			$s' = \bar{s}$	$s' = 1.5 \bar{s}$	$s' = 2 \bar{s}$
Bottom 20	-0.08	1.20	2.38	4.43	Bottom 20	2.01	2.78	3.51	4.90
21 - 40	1.38	3.43	5.31	8.60	21 - 40	6.61	7.35	8.06	9.40
41 - 60	6.27	8.19	9.94	13.02	41 - 60	12.84	13.32	13.77	14.64
61 - 80	17.52	18.45	19.29	20.78	61 - 80	21.66	21.80	21.93	22.17
81 - 90	17.01	16.62	16.26	15.63	81 - 90	17.15	16.91	16.68	16.24
91 - 95	13.56	12.77	12.05	10.79	91 - 95	16.94	15.96	15.01	13.23
96 - 99	21.07	19.09	17.29	14.12	96 - 99	16.63	15.90	15.20	13.88
Top 1	23.28	20.23	17.45	12.57	Top 1	6.15	5.99	5.84	5.54

Korea					Spain				
Percentile	Current wealth share	Wealth share absent market power			Percentile	Current wealth share	Wealth share absent market power		
		$s' = \bar{s}$	$s' = 1.5 \bar{s}$	$s' = 2 \bar{s}$			$s' = \bar{s}$	$s' = 1.5 \bar{s}$	$s' = 2 \bar{s}$
Bottom 20	1.80	2.62	3.33	4.50	Bottom 20	1.69	2.36	2.99	4.16
21 - 40	5.60	6.87	7.96	9.78	21 - 40	7.34	8.09	8.81	10.12
41 - 60	11.50	12.60	13.55	15.13	41 - 60	12.82	13.52	14.18	15.39
61 - 80	21.00	21.47	21.88	22.56	61 - 80	20.06	20.67	21.25	22.32
81 - 90	17.00	16.74	16.52	16.15	81 - 90	15.66	15.70	15.73	15.80
91 - 95	12.20	11.48	10.85	9.81	91 - 95	12.35	11.99	11.64	11.01
96 - 99	16.70	15.54	14.53	12.86	96 - 99	15.52	14.73	13.98	12.59
Top 1	14.20	12.69	11.38	9.22	Top 1	14.55	12.96	11.46	8.68

United Kingdom					United States				
Percentile	Current wealth share	Wealth share absent market power			Percentile	Current wealth share	Wealth share absent market power		
		$s' = \bar{s}$	$s' = 1.5 \bar{s}$	$s' = 2 \bar{s}$			$s' = \bar{s}$	$s' = 1.5 \bar{s}$	$s' = 2 \bar{s}$
Bottom 20	0.87	1.25	1.58	2.10	Bottom 20	-0.92	-0.51	-0.13	0.55
21 - 40	4.76	5.20	5.58	6.19	21 - 40	0.90	1.65	2.35	3.63
41 - 60	11.76	12.05	12.31	12.71	41 - 60	3.13	4.20	5.20	7.01
61 - 80	20.70	20.83	20.94	21.11	61 - 80	9.14	10.42	11.62	13.78
81 - 90	16.61	16.52	16.45	16.33	81 - 90	10.86	11.41	11.93	12.86
91 - 95	12.15	11.99	11.85	11.63	91 - 95	12.08	12.04	12.01	11.96
96 - 99	16.39	16.03	15.72	15.22	96 - 99	27.95	26.60	25.33	23.04
Top 1	16.75	16.12	15.58	14.71	Top 1	36.85	34.18	31.69	27.18

Source: OECD calculations.

**Table 4. Impact of market power on the wealth of the richest 10% of households (all units in percentages)**

Country	Current wealth share of top 10%	Wealth share of top 10% without market power			Rate of change in wealth (-)		
		$s' = \bar{s}$	$s' = 1.5 \bar{s}$	$s' = 2 \bar{s}$	$s' = \bar{s}$	$s' = 1.5 \bar{s}$	$s' = 2 \bar{s}$
Canada	48.2	46.1	44.1	40.4	4.4	8.5	16.3
France	48.5	45.2	42.3	37.6	6.8	12.7	22.5
Germany	57.9	52.1	46.8	37.5	10.0	19.2	35.3
Japan	39.7	37.8	36.0	32.6	4.7	9.3	17.8
Korea	43.1	39.7	36.8	31.9	7.9	14.7	26.0
Spain	42.4	39.7	37.1	32.3	6.5	12.6	23.9
United Kingdom	45.3	44.1	43.1	41.6	2.6	4.8	8.3
United States	76.9	72.8	69.0	62.2	5.3	10.2	19.1
Average	50.3	47.2	44.4	39.5	6.0	11.5	21.1

Source: OECD calculations; see Table 3.

Table 5. Impact of market power on income shares (all units in percentages)

Canada					France				
Percentile	Current income share	Income share absent market power			Percentile	Current income share	Income share absent market power		
		$s' = \bar{s}$	$s' = 1.5 \bar{s}$	$s' = 2 \bar{s}$			$s' = \bar{s}$	$s' = 1.5 \bar{s}$	$s' = 2 \bar{s}$
Bottom 20	4.39	4.87	5.01	5.28	Bottom 20	9.00	10.20	10.50	10.98
21 - 40	9.68	10.35	10.56	10.94	21 - 40	13.50	15.03	15.41	16.03
41 - 60	15.37	16.01	16.21	16.57	41 - 60	17.20	18.08	18.29	18.65
61 - 80	23.31	23.74	23.87	24.11	61 - 80	21.70	21.83	21.87	21.92
81 - 90	16.56	16.45	16.41	16.35	81 - 90	13.80	13.34	13.22	13.03
91 - 95	10.80	10.49	10.39	10.22	91 - 95	8.90	8.31	8.16	7.92
96 - 99	13.09	12.27	12.02	11.56	96 - 99	10.10	9.00	8.73	8.28
Top 1	6.80	5.83	5.53	4.98	Top 1	5.70	4.10	3.70	3.05

Germany					Japan				
Percentile	Current income share	Income share absent market power			Percentile	Current income share	Income share absent market power		
		$s' = \bar{s}$	$s' = 1.5 \bar{s}$	$s' = 2 \bar{s}$			$s' = \bar{s}$	$s' = 1.5 \bar{s}$	$s' = 2 \bar{s}$
Bottom 20	7.50	8.79	9.14	9.76	Bottom 20	10.78	11.55	11.78	12.23
21 - 40	13.50	15.56	16.12	17.11	21 - 40	15.09	15.83	16.06	16.49
41 - 60	17.60	19.52	20.05	20.97	41 - 60	18.30	18.78	18.93	19.21
61 - 80	23.00	23.93	24.18	24.63	61 - 80	23.21	23.34	23.38	23.46
81 - 90	14.70	14.31	14.20	14.01	81 - 90	14.37	14.13	14.05	13.91
91 - 95	8.90	8.11	7.89	7.51	91 - 95	5.66	4.68	4.37	3.80
96 - 99	9.40	7.42	6.88	5.93	96 - 99	8.28	7.55	7.33	6.91
Top 1	5.30	2.25	1.42	-0.05	Top 1	4.30	4.14	4.09	4.00

Korea					Spain				
Percentile	Current income share	Income share absent market power			Percentile	Current income share	Income share absent market power		
		$s' = \bar{s}$	$s' = 1.5 \bar{s}$	$s' = 2 \bar{s}$			$s' = \bar{s}$	$s' = 1.5 \bar{s}$	$s' = 2 \bar{s}$
Bottom 20	6.79	7.61	7.81	8.14	Bottom 20	6.00	6.67	6.87	7.23
21 - 40	13.33	14.59	14.90	15.41	21 - 40	12.20	12.96	13.18	13.59
41 - 60	18.21	19.31	19.58	20.03	41 - 60	17.30	18.00	18.20	18.58
61 - 80	23.88	24.35	24.47	24.66	61 - 80	24.00	24.61	24.79	25.13
81 - 90	15.43	15.17	15.11	15.01	81 - 90	15.90	15.94	15.95	15.97
91 - 95	7.78	7.06	6.88	6.59	91 - 95	10.00	9.63	9.53	9.33
96 - 99	9.59	8.43	8.14	7.67	96 - 99	10.40	9.60	9.37	8.93
Top 1	4.99	3.48	3.11	2.50	Top 1	4.30	2.71	2.23	1.36

United Kingdom					United States				
Percentile	Current income share	Income share absent market power			Percentile	Current income share	Income share absent market power		
		$s' = \bar{s}$	$s' = 1.5 \bar{s}$	$s' = 2 \bar{s}$			$s' = \bar{s}$	$s' = 1.5 \bar{s}$	$s' = 2 \bar{s}$
Bottom 20	7.80	8.18	8.27	8.42	Bottom 20	3.69	4.09	4.21	4.42
21 - 40	12.80	13.25	13.35	13.52	21 - 40	9.45	10.20	10.42	10.81
41 - 60	17.10	17.40	17.47	17.58	41 - 60	15.31	16.38	16.69	17.25
61 - 80	23.00	23.13	23.16	23.21	61 - 80	23.69	24.97	25.34	26.01
81 - 90	15.00	14.91	14.89	14.86	81 - 90	17.15	17.70	17.86	18.15
91 - 95	9.20	9.04	9.00	8.94	91 - 95	11.70	11.67	11.66	11.64
96 - 99	9.80	9.43	9.35	9.21	96 - 99	12.53	11.17	10.78	10.07
Top 1	5.30	4.67	4.52	4.28	Top 1	6.51	3.85	3.08	1.68

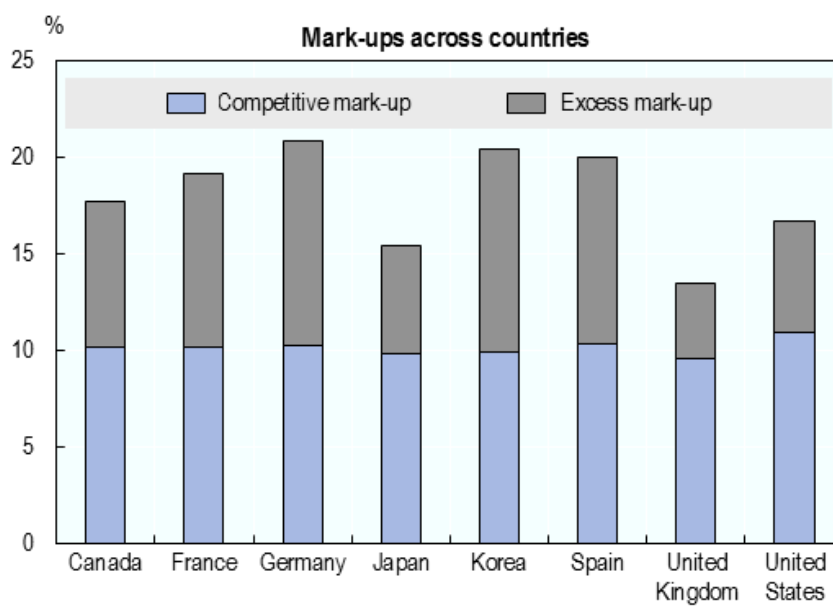
Source: OECD calculations.

**Table 6. Impact of market power on the income of the poorest 20% of households (all units in percentages)**

Country	Current income share of bottom 20%	Income share of bottom 20% without market power			Rate of change in income		
		$s' = \bar{s}$	$s' = 1.5 \bar{s}$	$s' = 2 \bar{s}$	$s' = \bar{s}$	$s' = 1.5 \bar{s}$	$s' = 2 \bar{s}$
Canada	4.4	4.9	5.0	5.3	10.9	14.2	20.3
France	9.0	10.2	10.5	11.0	13.3	16.6	22.1
Germany	7.5	8.8	9.1	9.8	17.1	21.8	30.1
Japan	10.8	11.5	11.8	12.2	7.1	9.3	13.4
Korea	6.8	7.6	7.8	8.1	12.0	15.0	19.9
Spain	6.0	6.7	6.9	7.2	11.2	14.5	20.6
United Kingdom	7.8	8.2	8.3	8.4	4.9	6.1	7.9
United States	3.7	4.1	4.2	4.4	11.0	14.1	19.9
Average	7.0	7.7	7.9	8.3	10.9	14.0	19.3

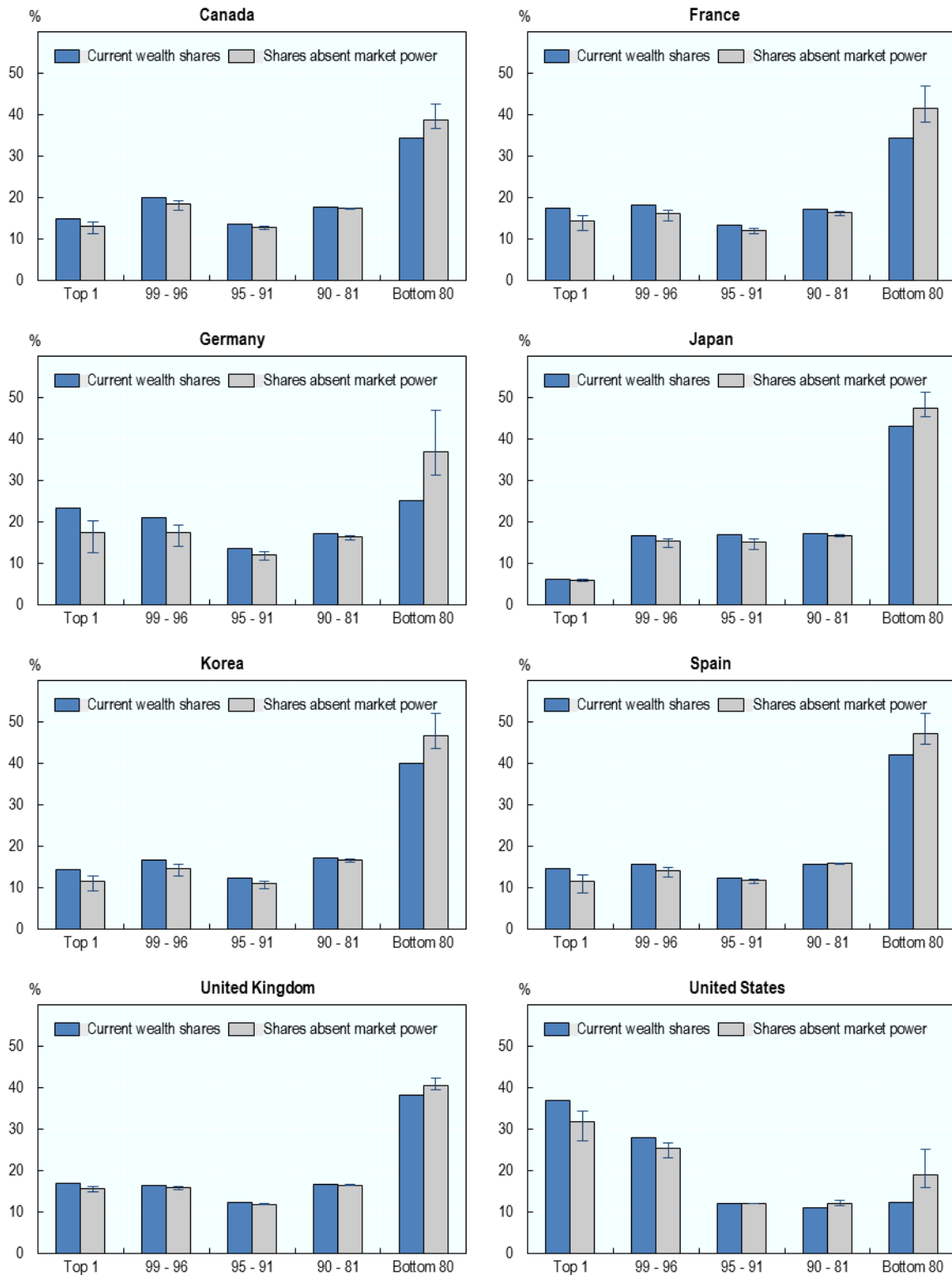
Source: OECD calculations; see Table 5.

Figure 1. Mark-ups across countries



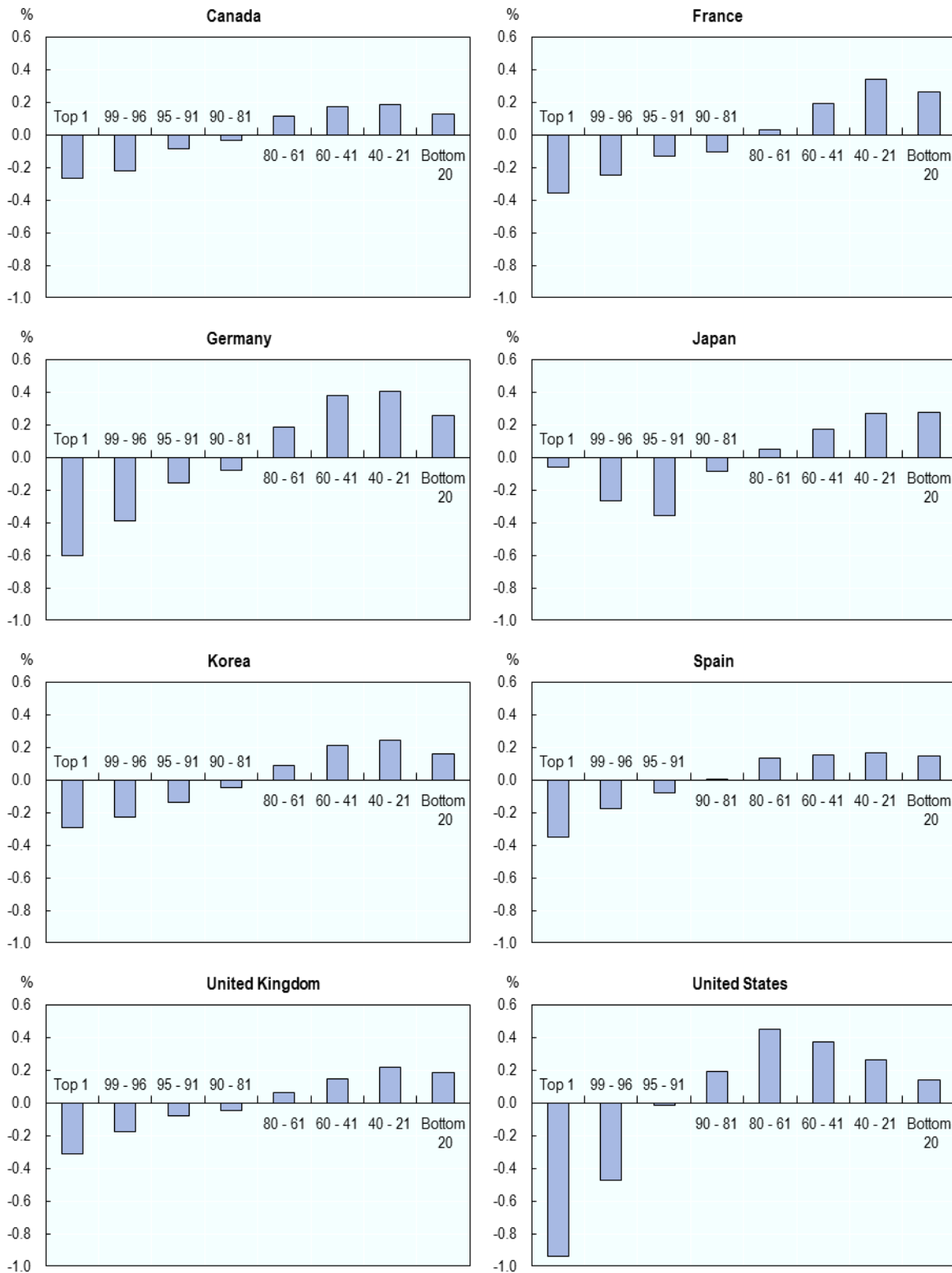
Source: OECD calculations as shown in Annex A6, based on Høj et al. (2007).

Figure 2. Impact of market power on wealth distribution



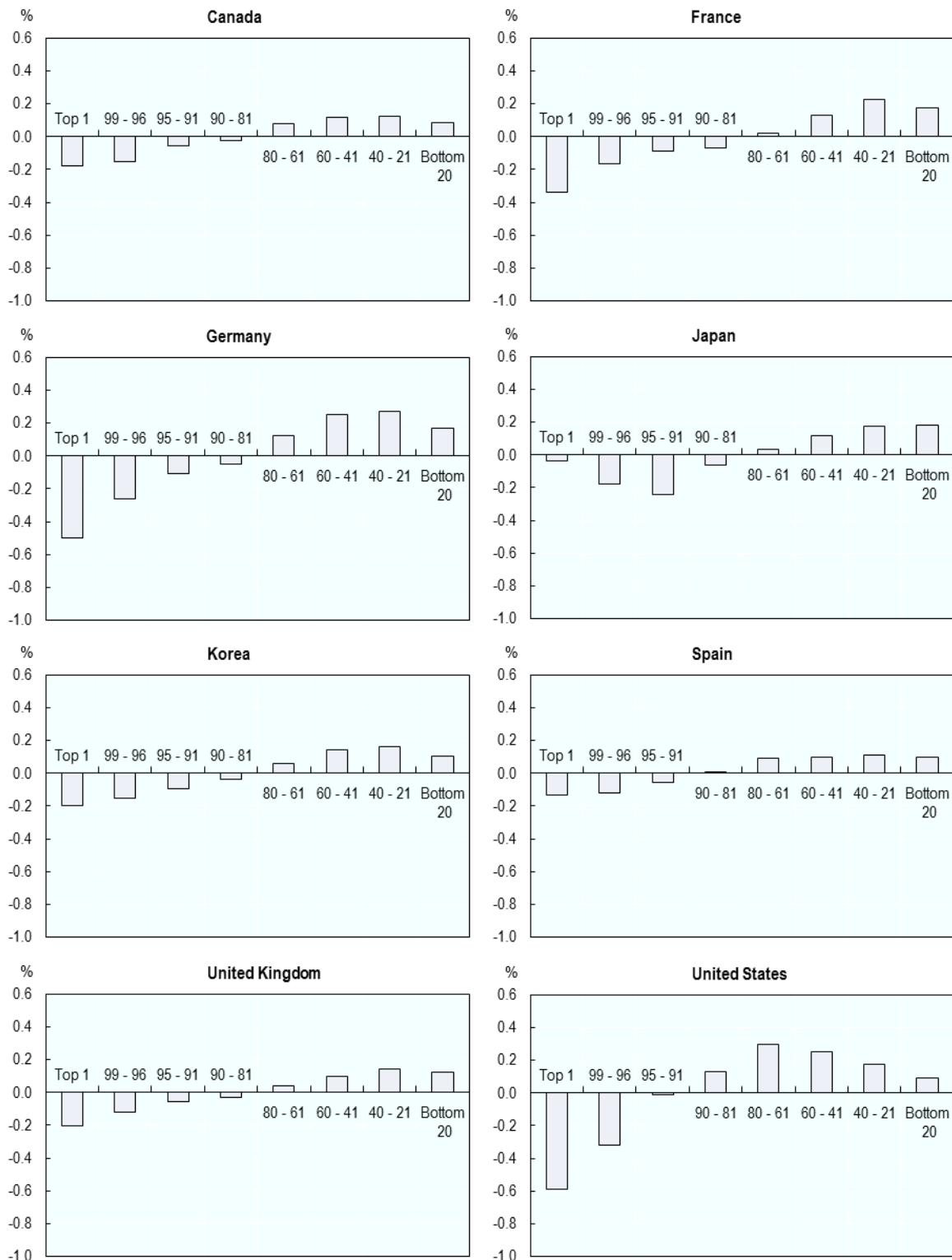
Source: OECD calculations, results shown in Table 3.

Figure 3. Variation in wealth shares from a 1% mark-up reduction



Source: OECD calculations.

Figure 4. Variation in income shares from a 1% mark-up reduction



Source: OECD calculations.

### ANNEX A2. DERIVATION OF EQUATION (6)

Subtracting equation (5) from equation (4):

$$y_i^m Y^m - y_i^c Y^c = W_i + f_i^m R^m - W_i - f_i^c \left[ \frac{1-\mu}{\mu} W + \frac{R^m}{\mu} \right].$$

Eliminating  $W_i$ :

$$y_i^m Y^m - y_i^c Y^c = f_i^m R^m - f_i^c \left[ \frac{1-\mu}{\mu} W + \frac{R^m}{\mu} \right].$$

Removing  $f_i^c W$  from the last term and using equation (1) to replace  $Y^c$  with  $\frac{Y^m}{\mu}$ :

$$y_i^m Y^m - y_i^c \frac{Y^m}{\mu} = f_i^m R^m + f_i^c W - f_i^c \frac{1}{\mu} (W + R^m).$$

Using equation (2) for  $j = m$  (i.e.  $Y^m = W + R^m$ ):

$$y_i^m Y^m - y_i^c \frac{Y^m}{\mu} = f_i^m (Y^m - W) + f_i^c W - f_i^c \frac{Y^m}{\mu}.$$

Multiplying all terms by  $\mu$  and dividing by  $Y^m$ :

$$\mu y_i^m - y_i^c = \mu f_i^m \left( 1 - \frac{W}{Y^m} \right) + \mu f_i^c \frac{W}{Y^m} - f_i^c.$$

Defining the labour share of income,  $\frac{W}{Y^m}$ , as  $\alpha_L$ :

$$\mu y_i^m - y_i^c = \mu(1 - \alpha_L) f_i^m + \mu \alpha_L f_i^c - f_i^c.$$

Rearranging the terms:

$$y_i^m - y_i^c = (1 - \mu) y_i^m + \mu(1 - \alpha_L) f_i^m - (1 - \mu \alpha_L) f_i^c.$$

Adding and subtracting  $(1 - \mu) f_i^m$  to the right-hand side of the previous equation:

$$y_i^m - y_i^c = (1 - \mu) y_i^m - (1 - \mu) f_i^m + (1 - \mu + \mu(1 - \alpha_L)) f_i^m - (1 - \mu \alpha_L) f_i^c.$$

Simplifying the third term from the right-hand side of the last equation:

$$y_i^m - y_i^c = (1 - \mu) y_i^m - (1 - \mu) f_i^m + (1 - \mu \alpha_L) f_i^m - (1 - \mu \alpha_L) f_i^c.$$

Finally, rearranging:

$$y_i^m - y_i^c = (\mu - 1)(f_i^m - y_i^m) + (1 - \mu \alpha_L)(f_i^m - f_i^c).$$

### ANNEX A3. DERIVATION OF EQUATION (11)

Multiplying equation (9) by  $\mu$  and subtracting it from equation (10):

$$c_i^m C^m - c_i^c \mu C^c = \bar{C}_i^m - \mu \bar{C}_i^c + (1 - s') y_i^m Y^m - (1 - s') y_i^c \mu Y^c.$$

Taking into account that, as follows from equation (1), aggregate nominal variables under market power are equal to the nominal variables under competition times the mark-up:

$$c_i^m C^m - c_i^c C^m = \bar{C}_i^m - \mu \bar{C}_i^c + (1 - s') y_i^m Y^m - (1 - s') y_i^c Y^m.$$

Likewise, because real autonomous consumption is not affected by income or wealth, its value is constant in steady state. Therefore, the same relation between nominal autonomous consumption under competition and market power holds  $\bar{C}_i^m - \mu \bar{C}_i^c$ :

$$c_i^m C^m - c_i^c C^m = \bar{C}_i^m - \bar{C}_i^m + (1 - s') y_i^m Y^m - (1 - s') y_i^c Y^m.$$

Isolating the common factors:

$$(c_i^m - c_i^c) C^m = (1 - s') (y_i^m - y_i^c) Y^m.$$

Dividing both sides of the equation by  $C^m$ :

$$(c_i^m - c_i^c) = (1 - s') (y_i^m - y_i^c) \frac{Y^m}{C^m}.$$

Using the fact that, by definition,  $1 - \bar{s} = \frac{C^m}{Y^m}$ :

$$(c_i^m - c_i^c) = (1 - s') (y_i^m - y_i^c) \frac{Y^m}{(1 - \bar{s}) Y^m}.$$

Rearranging the terms:

$$(c_i^m - c_i^c) = \frac{1 - s'}{1 - \bar{s}} (y_i^m - y_i^c).$$

## ANNEX A4. DERIVATION OF EQUATION (15)

Multiplying all terms of equation (13) by  $\mu$  and subtracting them from equation (14), one can show that:

$$f_i^m F^m - f_i^c \mu F^c = \frac{y_i^m Y^m - y_i^c \mu Y^c - c_i^m C^m + c_i^c \mu C^c}{g}.$$

Using the relations described in equation (1):

$$f_i^m F^m - f_i^c F^m = \frac{y_i^m Y^m - y_i^c Y^m - c_i^m C^m + c_i^c C^m}{g}.$$

Isolating the common factors:

$$(f_i^m - f_i^c) F^m = \frac{(y_i^m - y_i^c) Y^m - (c_i^m - c_i^c) C^m}{g}.$$

Rearranging and using the equilibrium solution of wealth dynamics in equation (12):

$$f_i^m - f_i^c = \frac{(y_i^m - y_i^c) Y^m - (c_i^m - c_i^c) C^m}{Y^m - C^m}.$$

Substituting  $C^m$  by  $(1 - \bar{s}) Y^m$ :

$$f_i^m - f_i^c = \frac{(y_i^m - y_i^c) Y^m - (c_i^m - c_i^c)(1 - \bar{s}) Y^m}{Y^m - (1 - \bar{s}) Y^m}.$$

Dividing all terms of the right-hand side of the equation by  $Y^m$ :

$$f_i^m - f_i^c = \frac{(y_i^m - y_i^c) - (c_i^m - c_i^c)(1 - \bar{s})}{1 - (1 - \bar{s})}.$$

Finally, simplifying the last expression:

$$f_i^m - f_i^c = \frac{1}{\bar{s}} (y_i^m - y_i^c) - \frac{1 - \bar{s}}{\bar{s}} (c_i^m - c_i^c).$$

**ANNEX A5. DERIVATION OF EQUATIONS (16) AND (17)**

Introducing the right-hand side of equation (11) into equation (15)

$$f_i^m - f_i^c = \frac{1}{\bar{s}}(y_i^m - y_i^c) - \frac{1 - \bar{s}}{\bar{s}} \frac{1 - s'}{1 - \bar{s}}(y_i^m - y_i^c).$$

Simplifying the expression:

$$f_i^m - f_i^c = \frac{s'}{\bar{s}}(y_i^m - y_i^c).$$

Introducing the previous result into equation (6)

$$y_i^m - y_i^c = (\mu - 1)(f_i^m - y_i^m) + (1 - \mu\alpha_L) \frac{s'}{\bar{s}}(y_i^m - y_i^c).$$

Rearranging the terms, we obtain equation (17):

$$y_i^m - y_i^c = \frac{\mu - 1}{1 - \frac{s'}{\bar{s}}(1 - \mu\alpha_L)}(f_i^m - y_i^m).$$

Finally, combining equation (17) and the previous result  $f_i^m - f_i^c = \frac{s'}{\bar{s}}(y_i^m - y_i^c)$ , one gets equation (16):

$$f_i^m - f_i^c = \frac{\frac{s'}{\bar{s}}(\mu - 1)}{1 - \frac{s'}{\bar{s}}(1 - \mu\alpha_L)}(f_i^m - y_i^m).$$

**ANNEX A6. ESTIMATING COMPETITIVE MARK-UPS**

In this annex we set out the methodology for estimating a competitive mark-up against which to compare estimated actual mark-ups. We discuss the use of mark-ups in the literature and the theoretical foundations for focusing on mark-ups when considering redistributive effects of market power.

**Methodology**

We obtained estimates of the price mark-up over average cost for 18 sectors across 17 countries from Høj et al. (2007). We drop Luxembourg as an outlier due to its small size. See Table A6.1 below.

**Table A6.1. Mark-ups estimates: industry detail**

	AUT	BEL	CAN	DEU	DNK	ESP	FIN	FRA	GBR	ITA	JPN	KOR	LUX	NLD	NOR	SWE	USA
<b>All manufacturing<sup>2</sup></b>	<b>0.15</b>	<b>0.10</b>	<b>0.15</b>	<b>0.13</b>	<b>0.11</b>	<b>0.14</b>	<b>0.18</b>	<b>0.12</b>	<b>0.11</b>	<b>0.15</b>	<b>0.09</b>	<b>0.12</b>	<b>0.07</b>	<b>0.13</b>	<b>0.13</b>	<b>0.11</b>	<b>0.12</b>
<i>Fragmented-Low R&amp;D industries<sup>2</sup>:</i>	<b>0.16</b>	<b>0.11</b>	<b>0.19</b>	<b>0.14</b>	<b>0.13</b>	<b>0.16</b>	<b>0.21</b>	<b>0.12</b>	<b>0.12</b>	<b>0.18</b>	<b>0.08</b>	<b>0.12</b>	<b>0.04</b>	<b>0.16</b>	<b>0.13</b>	<b>0.10</b>	<b>0.13</b>
Textiles, wearing apparel, leather	0.13	0.05	0.13	0.14	0.12	0.13	0.14	0.09	0.10	0.16	0.06	0.12		0.14	0.12		0.09
Wood and wood products	0.10	0.12	0.25	0.14	0.18	0.16	0.19	0.05	0.16	0.22	0.05	0.13	-0.03	0.08	0.11		0.19
Pulp, paper, printing and publishing	0.19	0.14	0.20	0.19	0.10	0.18	0.23	0.13	0.12	0.18	0.10	0.11	0.10	0.20	0.14		0.13
Other non-metallic mineral products	0.24	0.17	0.22	0.19	0.17	0.19	0.24	0.16	0.16	0.22	0.15	0.18	0.03	0.20	0.14	0.05	0.17
Fabricated metal products	0.13		0.13	0.07			0.16			0.19	0.01	0.10	0.03	0.11	0.13	0.12	0.12
<i>Segmented-Low R&amp;D industries<sup>2</sup>:</i>	<b>0.17</b>	<b>0.09</b>	<b>0.14</b>	<b>0.13</b>	<b>0.08</b>	<b>0.13</b>	<b>0.13</b>	<b>0.14</b>	<b>0.11</b>	<b>0.13</b>	<b>0.08</b>	<b>0.09</b>	<b>0.12</b>	<b>0.13</b>	<b>0.14</b>	<b>0.11</b>	<b>0.09</b>
Food, beverages and tobacco	0.13	0.09	0.13	0.12	0.08	0.13	0.10	0.14	0.11	0.14	0.07	0.05	0.13	0.12	0.08	0.08	0.09
Basic metals	0.25		0.17	0.18			0.18			0.10	0.10	0.14	0.11	0.24	0.27	0.16	0.08
<i>Fragmented-High R&amp;D industries<sup>2</sup>:</i>	<b>0.16</b>	<b>0.12</b>	<b>0.13</b>	<b>0.13</b>	<b>0.11</b>	<b>0.15</b>	<b>0.17</b>	<b>0.17</b>	<b>0.12</b>	<b>0.16</b>	<b>0.09</b>	<b>0.11</b>	<b>0.06</b>	<b>0.13</b>	<b>0.09</b>	<b>0.13</b>	<b>0.10</b>
Machinery and equipment	0.19	0.20	0.16	0.13	0.09		0.17	0.19	0.12	0.15	0.08	0.11	0.08	0.15	0.09	0.13	
Other manufacturing and recycling	0.09	0.06	0.08	0.16	0.15	0.15	0.17	0.13	0.13	0.17	0.11	0.11	-0.05	0.10	0.09		0.10
<i>Segmented-High R&amp;D industries<sup>2</sup>:</i>	<b>0.13</b>	<b>0.09</b>	<b>0.12</b>	<b>0.13</b>	<b>0.11</b>	<b>0.14</b>	<b>0.18</b>	<b>0.12</b>	<b>0.11</b>	<b>0.14</b>	<b>0.10</b>	<b>0.13</b>	<b>0.03</b>	<b>0.12</b>	<b>0.14</b>	<b>0.12</b>	<b>0.13</b>
Chemical, plastics, rubber and fuel products	0.11	0.09	0.12	0.16	0.11	0.17	0.15	0.11	0.12	0.13	0.10	0.14	0.03	0.13	0.18	0.15	0.15
Electrical and optical equipment	0.15		0.14	0.13	0.12		0.22	0.15	0.13	0.17	0.13	0.12		0.09	0.12	0.12	
Transport equipment	0.14	0.09	0.13	0.09	0.08	0.11	0.17	0.11	0.07	0.14	0.08	0.11	0.02	0.09	0.11	0.08	0.10
<b>Non-manufacturing<sup>1,2</sup></b>	<b>0.28</b>	<b>0.20</b>	<b>0.20</b>	<b>0.25</b>	<b>0.25</b>		<b>0.27</b>	<b>0.26</b>	<b>0.16</b>	<b>0.38</b>	<b>0.26</b>	<b>0.32</b>	<b>0.22</b>	<b>0.24</b>	<b>0.26</b>	<b>0.17</b>	<b>0.19</b>
Electricity, gas and water supply	0.34	0.23	0.35	0.37	0.41		0.37	0.27	0.15	0.30	0.46	0.32		0.19	0.48		0.20
Wholesale and retail trade, repairs	0.28		0.16	0.12	0.28		0.25	0.25	0.16	0.45			0.24	0.30	0.24		0.14
Transport and storage	0.14		0.26	0.13	0.18		0.33	0.22	0.10		0.17			0.21	0.27	0.18	0.16
Post and telecommunications	0.20		0.35	0.38	0.24		0.36	0.40	0.21		0.32			0.26	0.29		0.28
Financial intermediation	0.37		0.14	0.18	0.35		0.34	0.20	0.21	0.32	0.27		0.21	0.33	0.34		0.25
Business services	0.27			0.44	0.20		0.19	0.28			0.16		0.19	0.12	0.16	0.14	0.20

(1) Non-manufacturing excludes construction, real estate activities and personal services.  
 (2) Averages using sectoral production as weights. Weights are country-specific.  
 (3) Unweighted average.

Source: OECD STAN database and Secretariat calculations.

By comparing the mark-ups across different countries, we identified the lowest, most competitive mark-up in each sector. For each sector we then calculate the difference between a country's mark-up and the lowest observed mark-up. For example, in the sector of wholesale and retail trade and repairs, the lowest mark-up (found in Germany) is 12% while Canada has a mark-up of 16% in that sector. This leads us to identify that Canada faces a 4% excess mark-up in that sector. We average these excess mark-ups across sectors to find Canada's average excess mark-up (which is 9.67%). We also calculate a weighted average excess mark-up for each country by using the OECD's STAN database to identify a country specific weight for each sector in each country (this reduces the excess mark-up in Canada to 7.58%).

In notation, the observed mark-up in sector  $o$  and country  $n$  (with whatever market power exists in a sector) is  $\mu_{o,n}^m$ . The minimum (most competitive) mark-up found across all countries  $n$  (from  $n=1$  to  $N$ ) for sector  $o$  is:

$$u_o^c = \min\{u_{o,1}^m, u_{o,2}^m, \dots, u_{o,N}^m\}.$$

That is, we take the most competitive mark-up for a sector to be the minimum observed for that sector across all countries in the sample. To the extent that a fully competitive situation is unlikely, except for commodity products, this minimum observed mark-up is a conservative (i.e., high) estimate of the competitive mark-up. The excess mark-up for a given sector  $o$  in a given country  $n$  is the difference between the observed mark-up for sector  $o$  in country  $n$  and the minimum mark-up for sector  $o$  in all countries:

$$\mu_{o,n}^e = \mu_{o,n}^m - \mu_o^c.$$

To arrive at a figure representing a country's overall excess mark-up, we weight the excess mark-up for each sector by the size of that sector ( $e_{o,n}$ ) in that country's economy, yielding a weighted excess mark-up of:

$$\mu_n^e = \sum_{o=1}^O e_{o,n} \mu_{o,n}^e.$$

Since we use differences in the sector mark-ups between countries, we are able to ensure that the results are not driven by the variations in mark-ups across sectors. For example if mark-ups on average cost are higher in sectors with high fixed costs (e.g., telecoms) or lower in generally unprofitable sectors (airlines), we expect this would not be of a character to affect our overall results in a substantial way. What matters fundamentally for our results is whether mark-ups on average cost in the telecom sector in Canada are higher or lower than mark-ups on average cost in the telecom sector in Germany.

## Results

**Table A6.2. Impact of market power on mark-ups and prices (all units in percentages)**

Country	Average mark-up ( $\mu^m$ )	Minimum mark-up ( $\mu^c$ )	Excess mark-up ( $\mu^m - \mu^c$ )	Impact of market power on prices ( $\alpha$ )
Canada	17.7	10.1	7.6	8.4
France	19.2	10.2	9.0	10.0
Germany	20.9	10.3	10.6	11.8
Japan	15.5	9.9	5.6	6.2
Korea	20.5	10.0	10.5	11.7
Spain	20.0	10.4	9.6	10.7
United Kingdom	13.5	9.6	3.9	4.3
United States	16.7	11.0	5.7	6.4
<b>Average</b>	18.0	10.2	7.8	8.7

Source: OECD calculations, based on sector weights from STAN Database and sector-specific mark-ups calculated in Høj, J. *et al.* (2007).

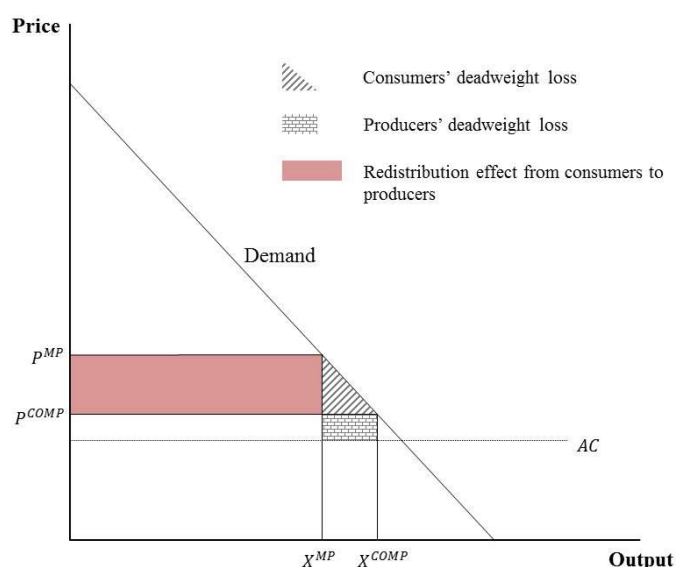
## Use of mark-ups in the literature

The European Commission (Thum-Thysen & Canton, 2015) identifies mark-ups as important indicators for measuring real frictions in goods markets and in capturing product market competition (Griffith and Harrison 2004). They report that according to Aghion (2002) mark-ups are a robust measure of competition and should be preferred to other indicators such as the Herfindahl index of market concentration (Griffith and Harrison 2004). They argue that country- and sector-specific mark-up estimates therefore provide valuable quantitative information about competition and rigidities in goods markets and changes in these mark-ups may be associated with reform measures (see also Blanchard and Giavazzi 2001 and Melitz 2003).

Høj (2007) looks at the level of profit mark-ups in different sectors and their relationship with indicators of product market regulation and examines whether more pro-competitive policies are related to stronger competition pressures as measured by lower mark-ups. They find a significant and positive correlation between product market regulations that can be characterised as less conducive to competition, such as removing trade barriers, facilitating market access or easing residency and nationality requirements for professional services, and mark-ups. However, Høj (2007) also cautions that mark-ups are an imperfect measure of competition and the estimation method used is only a first-order approximation to them.

### Theoretical foundations: What is the redistributive effect of market power?

When producers exert market power over consumers, two economic effects are observed: (1) a deadweight loss in social welfare due to efficiency reasons and (2) a net redistribution of welfare from consumers to producers (see figure below).



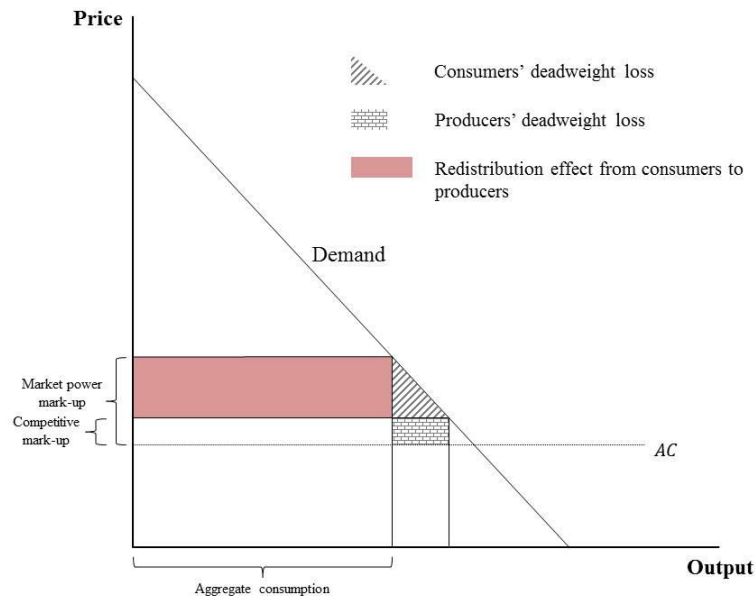
The deadweight loss results from the fact that market power constrains the total amount of output, imposing costs over all agents who would benefit with the additional transactions. On the one hand, where there is market power, consumers do not buy units of a good that they would be willing to purchase if the price was set at the competitive level. On the other hand, producers do not sell units of a good for which the competitive price would exceed the production cost. Therefore, the deadweight loss is shared by consumers and producers and leads to a net reduction of social welfare (which is why it is the common argument in favour of competition policy).

In contrast, the infra-marginal redistribution effect does not result from an output variation, but from the price increase that occurs because of market power. Indeed, when producers increase prices above the competitive level, the extra revenue they earn for the output sold comes directly from consumers who pay the higher price. Thus, while the redistribution effect has no net impact on social welfare, it leads to a transfer from consumers to producers, and therefore changes the distribution of wealth in the economy. This is the effect we want to measure to assess the impact of market power on the distribution of wealth.

### How to measure the redistributive effect of market power using mark-ups?

In order to measure the total redistribution effect, we use mark-ups calculated from actual data (which reflect the existence of market-power), and we estimate the mark-ups that would

hypothetically be observed in a competitive scenario, using the methodology previously described. Note that the “competitive mark-up” estimates are positive, reflecting the competitive rate of return that is required to cover the opportunity cost of capital. Then, from the “market-power mark-ups” and the “competitive mark-ups”, we obtain the price increase that is attributable to market power, which when multiplied by the aggregate consumption, gives the size of the redistribution effect (see figure below).



Naturally, the value estimated for the redistribution effect depends on our estimations of the “competitive mark-ups”. However, because these are estimated using the minimum mark-ups observed across countries, if anything they are overestimated (since no country is likely to have any sector level mark-ups below the competitive level). If competitive mark-ups are, in fact, overestimated, then the price change attributed to market-power is underestimated and the redistribution effect is also underestimated, meaning that our results are conservative.

### Why not calculate the redistributive effect using excess profits?

Excess profits may appear to be another good measure of market power, as they reflect the extra gain earned by producers relative to the competitive scenario. Nonetheless, they are not quite as good a measure of the redistributive effect of market power. This is because they include revenue losses from constrained output that are not redistributed to any other economic agent. In other words, excess profits are equal to the redistribution effect of market power minus producer’s deadweight loss, the last of which corresponds to an efficiency cost of market power.

In conclusion, if it is our aim to measure the redistributive impact of market power, we should focus on the redistribution effect that results from price variations. If it were our goal to measure the efficiency costs of market power, we should look at the deadweight loss which results from output changes. However, because excess profits combine the redistribution effect and part of the deadweight loss, they are not our preferred variable to study redistribution individually.

## ANNEX A7. THE MARGINAL PROPENSITY TO SAVE

The ratio of the marginal propensity to save to the average savings rate is a key parameter of the model to examine the effects of market power. Table A7.1 sets out the results of our literature survey of estimates of the marginal propensity to save (MPS) from a permanent shock in income. Table A7.2 sets out estimates of the average saving rate from countries with an estimate of MPS, and calculates the value of the ratio where possible. It identifies the ratio for the average country as 1.9.

**Table A7.1. Marginal propensity to save (MPS) from a permanent shock in income**

Data	Source and Link	MPS (%)	MPS (range)
<b>United States.</b> Household data from the Consumer Expenditure Survey, Survey of Consumer Finances and Panel Study of Income Dynamics. The MPS range was extracted from the first column in Table 9. The central value corresponds to the average of all reported figures.	Dynan, K. E., J. Skinner and S. P. Zeldes (2004), "Do the rich save more?", <i>Journal of Political Economy</i> , Vol. 112, No. 2, pp. 397-444. <a href="http://www.jstor.org/stable/pdf/10.1086/381475.pdf?acceptTC=true">http://www.jstor.org/stable/pdf/10.1086/381475.pdf?acceptTC=true</a>	14	[7-25]
<b>United States.</b> Data collected from lottery players in Massachusetts in the 80s. For the authors' preferred specification, the MPS is estimated at 16% (Table 6 – the authors appear to discard lower values obtained with other specifications). Excluding retirement accounts, the estimate is 18%. Also, a calibration of their life-cycle model suggests an MPS around 15%.	Imbens, G. W., D. B. Rubin and B. I. Sacerdote (2001), "Estimating the effect of unearned income on labor earnings, savings, and consumption: evidence from a survey of lottery players", <i>The American Economic Review</i> , Vol. 91, No. 4, pp. 778-794. <a href="http://www.jstor.org/stable/pdf/2677812.pdf?acceptTC=true">http://www.jstor.org/stable/pdf/2677812.pdf?acceptTC=true</a>	16	[15-18]
<b>United Kingdom.</b> This paper uses micro data to estimate permanent income as a function of human capital, which is then used to estimate the marginal propensity to save out of permanent shocks. Average MPS found is 18% and, among all specifications, it ranges between 5% and 30%.	Miles, D. (1997), "A Household Level Study of the Determinants of Incomes and Consumption", <i>The Economic Journal</i> , Vol. 107, No. 440, pp. 1-25. <a href="http://www.jstor.org/stable/pdf/2235268.pdf">http://www.jstor.org/stable/pdf/2235268.pdf</a>	18	[5-30]
<b>United States.</b> Friedman's estimation of the MPC out of a permanent income, using annual per capita data for the period 1905 to 1951 (excluding war years).	Smyth, D. J. (1993), "Towards a theory of saving", In J. H. Gapinski (Ed.), <i>The economics of saving</i> (pp. 67-69), New York: Springer Science + Business Media. <a href="https://books.google.fr/books?id=A23xCAAQBAJ&amp;dq=marginal+propensity+to+consume+estimate+permanent&amp;source=gbs_navlinks_s">https://books.google.fr/books?id=A23xCAAQBAJ&amp;dq=marginal+propensity+to+consume+estimate+permanent&amp;source=gbs_navlinks_s</a>	12	[12]
<b>United States.</b> Aggregate data on disposable income and savings between 1959 and 1969 (most recent period available in the paper). The central figure corresponds to the average of reported estimates (Table 1-4).	Leabo, D. A. (1971), "The declining marginal propensity to save", <i>Business Economics</i> , Vol. 6, No. 3, pp. 25-29. <a href="http://www.jstor.org/stable/pdf/23480238.pdf?acceptTC=true">http://www.jstor.org/stable/pdf/23480238.pdf?acceptTC=true</a>	12	[8-21]
<b>International.</b> Annual data on personal saving and personal disposable income for 22 countries over the period 1953-1960 from the yearbooks of National Account Statistics of the United Nations	Friend, I. and P. Taubman (1966), "The aggregate propensity to save: some concepts and their application to international data", <i>The Review of Economics and Statistics</i> , Vol. 48, No. 2, pp. 113-123.	17.5	[15-20]

Statistical Office. Under the authors' preferred methodology, the estimate of the MPS out of a permanent shock is in the neighbourhood of 15% to 20%. The central figure corresponds to the average between the two.	<a href="http://www.jstor.org/stable/pdf/1924628.pdf">http://www.jstor.org/stable/pdf/1924628.pdf</a>		
<b>United States.</b> Personal savings data from the US Office of Business Economics and financial assets data from the Security Exchange Commission. The range and central estimate of the MPS from normal income was collected from Table 1.	Taubman, P. (1968), "A time series analysis of three measures of the same conceptual series", <i>The Review of Economics and Statistics</i> , Vol. 50, No. 1, pp. 125-129. <a href="http://www.jstor.org/stable/pdf/1927065.pdf?acceptTC=true">http://www.jstor.org/stable/pdf/1927065.pdf?acceptTC=true</a>	13	[7-20]
<b>Canada.</b> This paper extends the analysis in Dynan et al. (2004) to Canada. The MPS found ranges between 6% and 30%.	Alan, S. and K. Atalay (2015), "Do the Rich Save More? Evidence from Canada", <i>Review of Income and Wealth</i> , Vol. 61, No. 4, pp. 739-758. <a href="http://onlinelibrary.wiley.com/doi/10.1111/roiw.12131/abstract">http://onlinelibrary.wiley.com/doi/10.1111/roiw.12131/abstract</a>	18	[6-30]
<b>United States.</b> Consumption and wealth data from 1955 to 1991. The MPS estimates were collected from Table 2: the central value corresponds to the whole sample period, while the MPS range includes estimates for alternative time periods.	Stein, Sheldon H. and F. Song (1998), "The textbook consumption function: a recent empirical irregularity, a comment", <i>The American Economist</i> , Vol. 42, No. 1, pp. 112-118. <a href="http://www.jstor.org/stable/pdf/25604133.pdf?acceptTC=true">http://www.jstor.org/stable/pdf/25604133.pdf?acceptTC=true</a>	19	[19-34]
<b>Germany.</b> This paper uses a differences-in-differences method to compare the saving behaviour of natives and immigrants in Germany, before and after a reform that eased citizenship requirements. The MPS of natives is between 17.7% and 18.3%, while the one of immigrants is 7 to 11 percentage points higher.	Piracha, M. and Y. Zhu (2008), "Precautionary Savings by Natives and Immigrants in Germany", <i>Department of Economics Discussions Papers</i> , KDPE 0821, University of Kent. <a href="https://www.kent.ac.uk/economics/documents/research/papers/2008/0821.pdf">https://www.kent.ac.uk/economics/documents/research/papers/2008/0821.pdf</a>	18	[17.7-18.3]
Theoretical model calibrated. Under most simulated results, the MPS ranges between 8% and 25% and the average value is 21% (Table 1).	Carroll, C. D. (2009), "Precautionary saving and the marginal propensity to consume out of permanent income", NBER Working Paper, No. 8233. <a href="http://www.nber.org/papers/w8233.pdf">http://www.nber.org/papers/w8233.pdf</a>	21	[8-25]
<b>Average from all sources</b>	-	<b>16.2</b>	<b>[10.9-23]</b>

Table A7.2. Ratio of the marginal propensity to save to the average saving rate

Country	Average Saving Rate (national statistic offices)(years in parentheses)	Marginal propensity to save (see table A7.1 above)	Ratio
Canada	7.5 (1981-2016)	18	2.4
Germany	11.9 (1960-2016)	18	1.5
United Kingdom	8.4 (1955-2016)	18	2.1
United States	8.3 (1969-2016)	14.3	1.7
<b>Average</b>	<b>9.0</b>	<b>17.1</b>	<b>1.9</b>