The Evolution of the Productivity-Median Wage Gap in Canada, 1976-2019

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Abstract

The median wage is a key metric to assess developments in the standard of living of the population. Productivity gains are passed on to workers as real wage gains. But in recent decades the proportion of labour productivity gains that are being passed on to the typical or median worker has fallen in many advanced countries, a process known as decoupling. The article uses an accounting framework developed by the Centre for the Study of Living Standards to quantify the importance of the factors affecting the relationship between productivity and real median wages. It presents results for the 1976-2019 period in Canada. A key finding is that the annual gap between labour productivity growth and real hourly median wage growth fell from 1.36 percentage points per year in 1976-2000 to 0.46 points in 2000-2019. This was due to slower growth in wage inequality, the end of the decline of the labour share and an improvement in workers terms of trade. Productivity growth was relatively stable between periods. In the 1976-2000 period, the bargaining power of workers fell dramatically due to high unemployment, falling unionization rates and a rising import share. After 2000, these trends reversed or stabilized, improving the bargaining power of workers.

How does one assess developments in the standard of living of the population? Since labour income or wages is by far the most important source of income, trends in wages for the typical or median worker appears an obvious metric. Indeed, *The Economist* (April 10-16, 2021) concludes "It is right to judge economic progress by the purchasing power of median wages, not profits or share prices." In the long run, wages are determined by productivity growth. Productivity gains are passed on to workers as real wage gains. But in recent years the proportion of labour pro-

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ductivity gains that are being passed on to the typical or median worker has fallen in many advanced countries, a process known as decoupling.[2]

The Centre for the Study of Living Standards has developed an accounting framework or methodology to quantify the importance of the factors affecting the relationship between productivity and real median wage growth.

The main objective of this article is to update these estimates on decoupling in Canada and the factors behind it to 2019. The article also seeks to provide a narrative to explain the reasons for the gap between productivity and median wage growth over the 1976-2019 period and in particular why this gap fell from 1.36 percentage points per year in the pre-2000 period to 0.46 points in the post-2000 period.

The bargaining power of labour largely determines the ability of labour to share in the overall productivity gains of the economy (Summers and Stansbury, 2020). This bargaining power is affected by labour market conditions, as proxied by the unemployment rate, by the strength of collective bargaining institutions, as proxied by the unionization rates and by international trade developments related to globalization, as shown by the merchandize imports share of GDP. This article shows that after 2000 the average unemployment rate was lower, the unionization rate, after falling sharply in the 1976-2000 period, fell at much slower rate, and the imports share fell from its 2000 peak. These trends reversed the downward pressures on bargaining power of labour that existed in the last quarter of the 20th century that resulted in the emergence of a large gap between labour productivity and median wages growth,

This article has five sections. The first section briefly reviews the literature of the decoupling of productivity and median wage growth in Canada. The second section presents the accounting framework which underpins the analysis of the decoupling issue. The results are presented in section three with special attention to the large fall in the gap after 2000. Section four examines the reasons for this development, The fifth and final section concludes.[3]

Review of Empirical Estimates for Canada[4]

The productivity-wage gap has become an important object of study in economics, and estimates of its magnitude have been conducted in a number of countries. For Canada, Sharpe *et al.* (2008a) quantify this gap and develop the decomposition accounting approach used in this article. Median earnings barely grew from 1980 to 2005, increasing 0.01 per cent per year, av-

2 In this article the term productivity refers to labour productivity. The term median wages refer to real median wages unless otherwise specified.

3 See Appendixes 1 and 2 in Ashwell (2021) to compare our results with Uguccioni (2016) and Williams (2021), who also study Canada. Appendix 3 compares the trends identified in this article with those of the United States identified by Mishel and Bivens (2021). The Data Appendix available at http://www.csls.ca/ipm/41/IPM_41_Data_Appendix.xlsx contains all the data used in this report along with some supplemental series pertaining to wages and productivity.

4 For a review of estimate of decoupling for the United States, the U.K. and other countries, see (Ashwell, 2021)

erage earnings grew 0.36 per cent per year, while productivity grew 1.27 per cent per year. Increased mean-median inequality explained 28 per cent of the gap and the decline of the labour share explained 20 per cent. Increases in supplementary income explained a further 20 per cent and the loss in labour's terms of trade explained 33 per cent.

Uguccioni, Sharpe and Murray (2016) use the same methodology to update the numbers for productivity and wages to 2014. They find that productivity grows from 1976-2014 by 1.12 per cent per year while median earnings grew at 0.09 per cent per year, for a productivity-wage gap of 1.03. Fifty per cent of the gap can be explained by increased mean-median earnings inequality, 30 per cent by the decreasing labour share, and 20 per cent by labour's terms of trade.

Williams (2021) investigates the same essential question as the previous authors but modifies the approach slightly to account for recent debates about measurement and variable selection. Williams argues that depreciation and taxation costs must be accounted for when considering productivity and wage trends, and he develops measures of net productivity and net labour share to integrate these considerations to his analysis. Williams finds that before accounting for taxes and depreciation, labour productivity rises from 1961-2019 by 1.65 per cent per year, whereas it rises 1.47 per cent per year after including them.

Instead of median wages, Williams prefers average compensation measures to evaluate transmission of productivity gains to workers. He argues that this allows a clearer picture of how labour overall is faring, but does not provide insight as to the distribution of those gains among workers. Deflated using the CPI, average wages grew 1.59 per cent per year over the 1961-2019 period, and using Williams' preferred implicit consumption deflator they grew 1.73. The labour share of GDP before accounting for depreciation and taxes therefore decreases over the same period by 0.19 per cent per year, but after accounting for those factors and calculating labour's share of NDP it decreases just 0.01 per cent per year. Labour productivity growth advanced 1.67 per cent per year, while net productivity growth was 1.47 per cent. These growth rates imply that there was no decoupling between productivity and average wages (not median wages) over the last 60 years in Canada.

Accounting Approach to the Decomposition of the Productivity-Median Wage Gap

Basic models of the labour market predict that workers overall will be paid an amount roughly equal to the marginal economic value that they provide to employers. As workers generate more value, their compensation should therefore rise accordingly. "Productivity" measures the amount of value that workers provide their employers, in terms of dollars per hour worked. Workers are generally paid on a per hour basis, so growth in productivity should be equal to growth in hourly pay. We measure the growth of productivity in per cent change per year for a given period, and measure the growth in median hourly pay over the same period. Subtracting the rate of growth in wages from the rate of growth in productivity, we obtain the gap between

the two variables in percentage points. To understand this gap, we break it down into four components, also given in percentage points, which add up to the overall productivity-wage gap.[5]

The first component is the labour share. When productivity goes up, part of the benefits of that increase go to workers, and the other part of it goes to capital. Roughly speaking, capital is anything used in production other than the labour of workers. The proportion of economic benefits going to labour has historically been steadily around 50-60 per cent in Canada, with the other 40-50 per cent going to capital. These proportions are referred to as the labour share and the capital share, and while they have historically remained at similar levels, these shares do change over time. If a higher proportion of the benefits of productivity growth goes to capital, then the labour share becomes smaller, and workers obtain less than they normally would from the increased productivity, generating a productivity-pay growth gap.

The second component of the gap is called "labour's terms of trade", and it relates to price changes. Because of inflation, "real wages" and productivity must be calculated using constant dollar amounts which account for the differences in price changes over time. However, the prices of goods and services consumed by workers may not rise at the same speed as the prices of goods and services produced by workers. The adjustment of nominal wages must therefore be done either on the basis of consumer prices or producer prices.

The factor by which we multiply the nominal wage series in order to adjust for price changes is called a price index, which can be derived from the price levels in the economy as a whole, or from the price levels of goods and services consumed by workers. The first type of price index is called a GDP deflator, and the second is a measure of the prices of consumption goods, the most widely used example of which is the Consumer Price Index (CPI). To understand how workers' living standards are changing, we deflate their wages using the CPI since that deflator reflects the costs of living as experienced by workers. To deflate the output of the economy as a whole, we use the GDP deflator, because that deflator includes the prices of everything that is produced, rather than just the prices of goods and services which are consumed domestically. If the prices of consumer goods changes at a different rate than prices overall, there will be a gap between the growth of real wages from the point of view of workers and from the point of view of their employers. This difference can contribute to the overall gap between productivity and median real wages. The term we use for this component of the gap is "labour's terms of trade".

The third contributor to the productivity-wage gap is called the SLI/Self-employment component. This component is essentially the difference between the rates of growth of average compensation and average wages. The compensation measure is more exhaustive, as it includes supplementary labour income

5 For a formal presentation of the acoounting framework, see Ashwell (2021) and Sharpe *et al.* (2008).

(SLI) and an estimate of labour income for the self-employed, in addition to wages. SLI refers to compensation that employees receive from their employers beyond their regular wages, salaries and commissions, such as contributions to pension plans and to employment insurance. The labour component of self-employment income is estimated ("imputed") because there is no way of directly measuring how much of the income of the self-employed can be characterized as labour income as opposed to capital income, since these workers tend to invest both their time and their capital into their endeavors.

The final component is wage inequality, as proxied by the difference in growth rates of average and median wages. The average hourly wage is obtained by adding up wage income of all workers and dividing it by the number of total hours worked in a year. The median hourly wage is the wage received by the worker in the very middle of the wage distribution. Put another way, the median wage is the wage of the worker for whom the number of people who earn more is equal to the number of workers who earn less. If workers in the top of the distribution enjoy faster wage growth than everyone else, then the average wage will rise faster than the median wage.[6] The inequality component measures the difference between the rates of growth between median and average wages. With this fourth component in place, we can fully explain the gap between productivity and median hourly wages.[7]

Empirical Results[8]

The Labour Productivity and Median Wage levels

Chart 1 shows trends in the absolute levels of labour productivity, defined as real output per hour expressed in 2012 dollar, and real hourly median wages, also expressed in 2012 dollars, in Canada from 1976 to 2019. In 1976, the median wage in Canada was $16.40 per hour. Labour productivity was $37.60 per hour. In other words, the median worker received 43.5 pent cent of the amount of output produced in an hour of work.

By 2019, the median wage had grown to $17.40 and the level of labour productivity to $60.20. The median wage was now only 28.8 per cent of the average level of labour productivity. This development reflected the relative growth rates of the median wage and labour productivity over the period. Indeed, the median wage only increased 6 per cent from 1976 to 2019 while productivity was up by 60 per cent.

The median wage/productivity ratio will rise when the growth rate of the median wage exceeds that of the productivity growth. It will fall when the median wage advances less rapidly than productivity, as was the case in the 1976-2019 period. Equitable sharing of productivity gains for

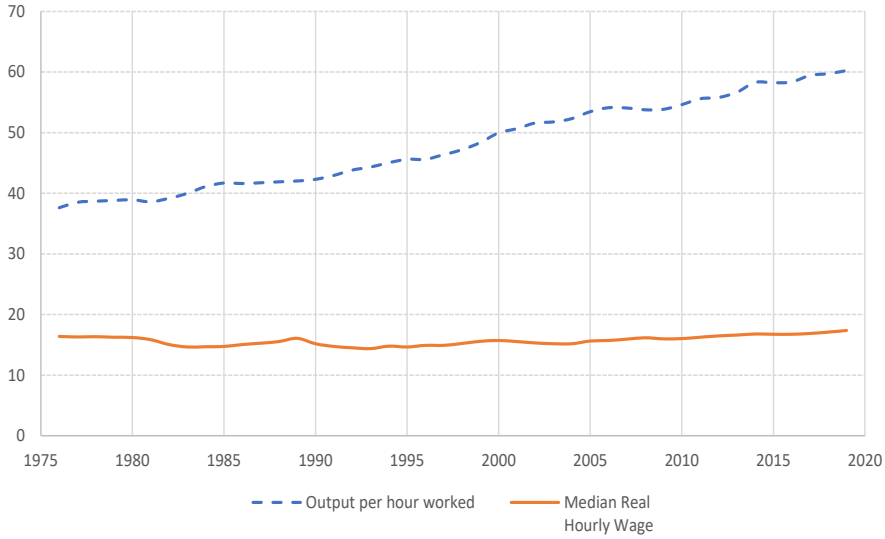
6 It is worth noting that if the poorest workers benefit faster than everyone else, then the same phenomenon is observed: faster growth in the average than in the median. For this reason it is important to dig deeper into how the benefits of productivity are distributed among workers as done in Ashwell (2021).

7 For an algebraic presentation of the framework, see Ashwell (2021) and Sharpe *et al.* (2008).

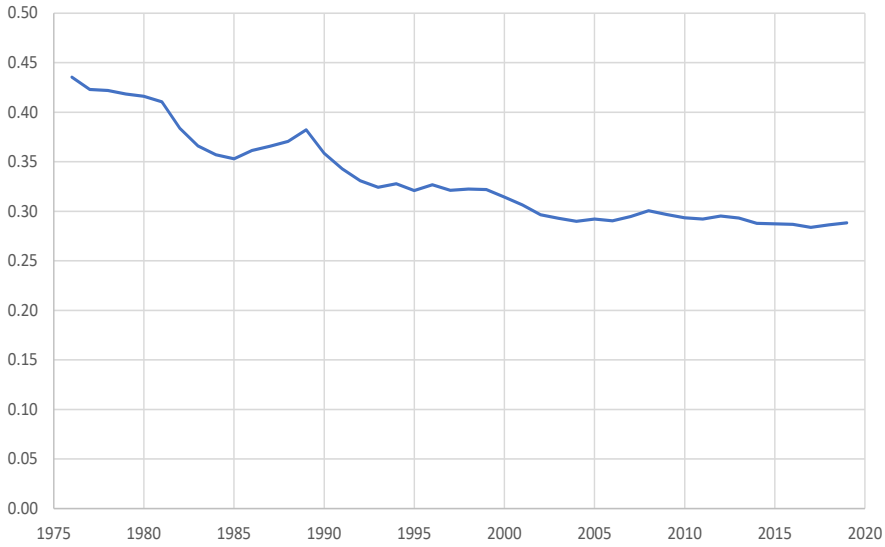
8 See the online Appendix for data sources and variable definitions.

Chart 1: Median Real Wage and Labour Productivity in Canada, 1976-2019

Panel A: Absolute Level in 2012 dollars



Panel B: Relative level (median real wage to output per hour)



Source: Statistics Canada, See Data Appendix T3 and T10 for more details.

workers is defined as the same growth rates of median wages and productivity. Equitable sharing of productivity growth does not mean that workers receive the total value of the output they produce.

It can be noted that the absolute level of the median wage can rise even when the median wage/productivity ratio is falling,

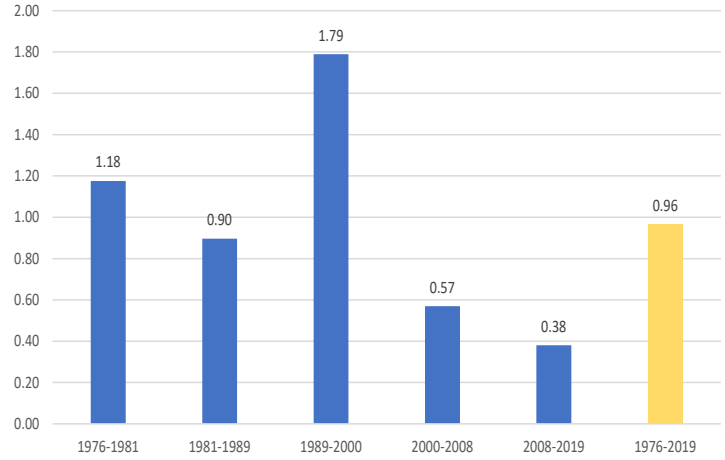
The focus of this article is on the gap in growth rates of the median wage and productivity. It is this growth rate differential that determines the path of the median wage/productivity ratio.

The Productivity Median-Wage Gap Growth, 1976-2019

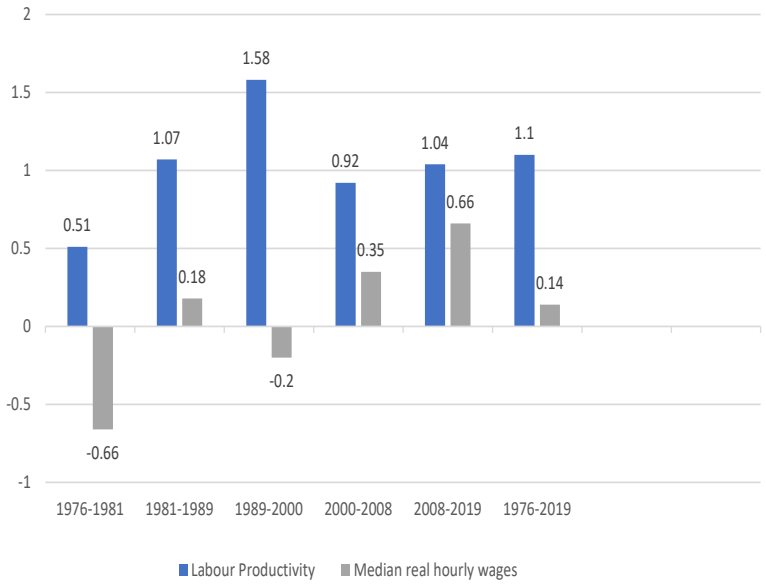
Panel A of Chart 2 shows the gap between growth in productivity and median wages in Canada for the overall 1976-2019 period, for four cyclically neutral peak-

Chart 2: Productivity Gap and Median-Wage Growth, 1976-2019 and Sub-periods

Panel A: Productivity-median hourly wage gap (percentage outputs per year)



Panel B: Productivity and median wages, (average annual rate of change)



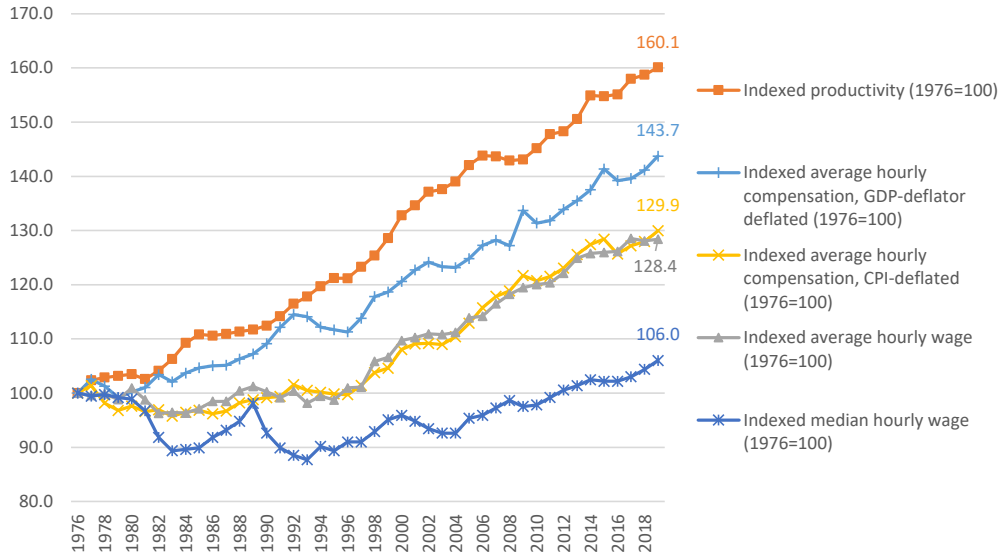
Source: Center for the Study of Living Standards (CSLS).

to-peak business cycles (1981-1989, 1989-2000, 2000-2008, 2008-2019) and for the incomplete business cycle at the start of the period of data availability (1976-1981). Panel B shows the growth rate for productivity and median wages.[9]

Chart 3 shows the time series between 1976 and 2019 for labour productivity and real median wages and three other series that can be used used to identify the factors

9 See Appendix Table 1 for the growth rates for the components of the gap for all periods. Appendix Table 2 for the absolute contributions of the components to the gap in all periods, and Appendix 3 for the relative contributions. See Appendix Chart 1 for the labour shares, Appendix Chart 2 for the labour terms of trade, Appendix Chart 3 for the difference between total compensation and wage, and Appendix Chart 4 for the inequality component as expressed by the ratio of average to median wages.

Chart 3: Productivity, Median Average Wages (CPI deflated), and Compensation (GDP deflated), 1976=100



Source: Statistics Canada, see Data Appendix for details.

explaining the productivity-median wages gap. These series are labour compensation deflated by the GDP deflator, labour compensation deflated by the CPI, and average wages. The overall gap for the complete 1976-2019 period was 0.96 percentage points.

Based on the accounting framework presented earlier in the article, growing inequality between average and median worker wages accounted for 48 per cent of this gap, while a decrease in labour's terms of trade and in the labour share of GDP each account for roughly 25 per cent. Differences between the growth rate of supplementary labour income and the labour component of self-employed income and wage income account for the remaining part of the gap.

Change in the Productivity-Median Wage Gap Between 1976-2000 and 2000-2019

The size of gap between labour productivity growth and median wage growth in Canada in the first two decades of the 21st century was one third that of the last quarter of the 20th century: 0.46 percentage versus 1.36 points. The median worker has still not been fully benefiting from labour productivity growth, but he or she is doing much better. In 1976-2000, median wage growth was negative, resulting in the median worker receiving no benefit from labour productivity growth of 1.19 per cent per year. In contrast, in 2000-2019 median pay grew 0.53 per cent per year, slightly more than half the rate of productivity growth (0.99 per cent). In the 2013-2019 period the situation improved further, with median wage growth rising to three quarters of productivity growth.

This section provides an in-depth examination of the relative improvement in median pay relative to productivity first from an accounting perspective and then

Table 1: Basic trends (per cent annual growth)

Factors	1976-2000	2000-2019	Difference between periods	Percentage contributions
A. Labour productivity	1.19	0.99	-0.2	22.2
B. Labour share of nominal GDP	-0.4	-0.06	0.34	-37.8
C. Average real hourly compensation (GDP deflator)	0.78	0.93	0.15	-16.7
D. Average real hourly compensation (CPI deflator)	0.32	0.98	0.66	-73.3
E. Average real hourly wages	0.39	0.83	0.44	-48.9
F. Median real hourly wages	-0.17	0.53	0.7	-77.8
G. Productivity– median wage gap	1.36	0.46	-0.9	100
A. Real output per hour worked, constant 2012 dollars. Source: Statistics Canada, see Data Appendix T1 for details				
B. Total nominal labour compensation divided by total nominal GDP. Growth rate here shows change in that fraction. Total labour compensation includes imputed labour income for self-employed. Source: Statistics Canada, see Data Appendix T5 for details				
C. Total labour compensation (including imputed labour income of self-employed and SLI) divided by total hours worked, deflated with implicit GDP deflator. Source: Statistics Canada, see Data Appendix T6 for details				
D. Total labour compensation (including imputed labour income of self-employed and SLI) divided by total hours worked, deflated with CPI. Source: Statistics Canada, see Data Appendix T6 for details				
E. Average annual income from wages, salaries and commissions (excl. self-employed), divided by average hours worked (PA, incl. self-employed), deflated with CPI. Source: Statistics Canada, see Data Appendix T10 for details				
F. Median annual income from wages, salaries and commissions (excl. self-employed), divided by median hours worked, deflated with CPI. Source: Statistics Canada, see Data Appendix T10 for details				
G. Labour productivity (A) minus median hourly wages (E)				

Sources: The Centre for the Study of Living Standards (CSLS).

in terms of the fundamental factors driving the relationship. The growth rates of the components of the productivity-median wage relationship in 1976-2000, 2000-2019 and between the periods are first discussed, and the contribution of the four components of the decomposition examined. Developments in Canada between the two periods are compared with those in the United States and the United Kingdom.

1976-2000

From 1976 to 2000, labour productivity, defined as output per hour worked in the total economy advanced at a 1.19 per cent average annual rate (Table 1). In contrast, real hourly median wages actually fell 0.17 per cent per year. This resulted in a 1.36 percentage point annual gap between the growth rates of productivity and median pay. Three factors contribute roughly equally to this gap. First, the labour share of nominal income fell from 69.5 per cent of gross value added in 1976 to 63.1 per cent in 2000, a 0.40 per cent average annual rate of decline. This development accounts for 0.40 points or 30 per cent of the gap (Table 2 and 3).

Second, wage inequality rose as real hourly average wages grew 0.39 per cent per year, compared to -0.17 per cent for median wages, a difference of 0.56 points or 41 per cent of the total 1.36 point gap.

Third, the CPI rose at a much faster rate than the GDP deflator in 1976-2000, 4.78 per cent per year versus 4.30 per cent, a difference of 0.46 per cent per year. This meant that the consumer wage rose more slowly than the producer wage. Average hourly compensation deflated by the CPI rose 0.32 per cent per year compared to 0.78 per cent for average hourly compensation deflated by the GDP deflator. The difference of 0.46 points accounted for 34

10 The fourth factor, non-wage labour market income, made only a very small contribution to the gap. This

Table 2: Explanatory Factors for Productivity-Median Wage Gap (percentage points)

Factors	1976-2000	2000-2019	Difference between periods	Percentage Contributions
	(A)	(B)	(C)=(B)-(A)	(D)=(C)/-0.90*100
A. Inequality	0.56	0.3	-0.26	28.9
B. Labour's share of income	0.4	0.06	-0.34	37.8
C. Labour's terms of trade	0.46	-0.05	-0.51	56.7
D. SLI/Self-employment	-0.06	0.14	0.2	-22.2
G. Sum of factors	1.36	0.46	-0.9	100
A. Average real hourly wages (E) minus Median real hourly wages (F)				
B. Total nominal labour compensation divided by total nominal GDP (C)				
C. Average real hourly compensation deflated with GDP deflator (C) minus Average real hourly compensation deflated using CPI (D)				
D. Average real hourly compensation (D) minus average real hourly wage (E)				
G. Sum of all factors				

Sources: The Centre for the Study of Living Standards (CSLS).

Table 3: Explanatory Factors for Productivity-Median Wage Gap (percentages)

Factors	1976-2000	2000-2019	Difference between Periods
Inequality	41.3	65.9	24.6
Labour's share of income	29.5	13.2	-16.3
Labour's terms of trade	33.9	-10.4	-44.3
SLI/Self-employment	-4.7	31.4	36.1

Sources: The Centre for the Study of Living Standards (CSLS).

per cent of the gap between productivity and median pay growth.[10]

2000-2019

After 2000, the productivity-median wage growth gap fell by two thirds (0.90 points) from 1.36 points to 0.46 points. All three factors that made large positive contribution to the gap in 1976-2000 made smaller contributions, or even negative contributions in 2000-2019 (Table 2). After falling significantly in the last quarter of the 20th century, the labour share stabilized in the first two decades of the 21st century of income more or less stabilized (63.1 per cent in 2000 versus 62.4 per cent in 2019). This factor now only contributed 0.06 percentage points or 13 per cent to the much smaller productivity-median wage gap of 0.46 percentage points.

Wage inequality continued to grow after 2000, but the pace was around one half that of the pre-2000 period. Median wages lagged average wages by 0.30 points from 2000 to 2019 (0.53 per cent versus 0.83 per cent), down from 0.56 points in 1976-2000. This represented about two thirds of the 0.46 point productivity-median wage gap.

In contrast to the pre-2000 period when the CPI inflation exceeded that of the GDP deflator, after 2000 CPI growth was 0.05 percentage points less that GDP deflator growth (1.88 per cent versus 1.93 per cent). This means that average hourly compensation deflated by the CPI rose 0.05 percentage points more per year compared to av-

factor encompasses supplementary labour income and the labour component of self-employed income and is included in total labour compensation. Its rate of growth is reflected in the difference between compensation growth and wage growth. As wage growth exceeded compensation growth (0.39 per cent per year versus 0.32 per cent) in 1976-2000, non-wage income grew at a slower rate year than wage income. This factor actually reduced the productivity-median wage gap by 0.07 percentage points or 5 per cent.

erage hourly compensation deflated by the GDP deflator (0.98 per cent versus 0.93 per cent). Instead of contributing significantly to the gap as it did in 1976-2000, labour's terms of trade, defined as the ratio of the trends in CPI inflation to overall economy inflation as expressed by the GDP deflator, improved after 2000 and reduced the productivity-median wage gap.

The fourth factor, non-wage labour market income, which had reduced the gap slightly in 1976-2000, now made a moderate absolute contribution to the gap in 2000-2019, and an important relative contribution. As noted, its rate of growth is reflected in the difference between compensation and wage growth. Compensation growth exceeded wage growth in 2000-2019 (0.98 per cent per year versus 0.83 per cent) since non-wage income such as employer contributions to social programs such as CPP outpaced the growth of wage income. This factor actually boosted the productivity-median wage gap by 0.14 percentage points or 31 per cent,

Change between 1976-2000 and 2000-2019

The explanation for the fall in the gap between productivity and median wage growth in Canada between 1976-2000 and 2000-2019 can be approached from two perspectives, first developments in the two variables themselves and second developments in the variables affecting median wages, as discussed above.

Two developments directly explain the fall in the gap by 0.90 points from 1.36 points to 0.46 points after 2000, slower productivity growth and much faster median wage growth. After advancing at 1.19 per cent per year in 1976-2000, labour productivity growth fell off to 0.99 per cent in 2000-2019 a fall on 0.20 points, or 22 per cent of the fall in the gap. The more dramatic development was the turnaround in median wages. After falling 0.17 per cent per year in 1976-2000, median wages advanced at a 0.57 per cent average annual rate in 2000-2019, an improvement of 0.70 percentage points, or 78 per cent of the fall in the gap,

As was discussed for the 1976-2000 and 2000-2019 periods, four factors mediate the difference between the growth rates of productivity and median wages, the labour share, labour's terms of trade, wage inequality and non-wage income. To understand changes between periods one looks at the changes in the absolute contributions of these four factors to the change in the gap (Table 2). The largest contribution to the fall in the gap was made by labour's term of trade, which has fallen significantly in the pre-2000 period and then slightly improved after 2000. This factor experienced a 0.51 point turnaround between periods and thus accounted for 57 per cent of the change in the gap, The relative stabilization of the labour's share after 2000, after falling before 2000 contributed 0.26 points to the fall in the gap or 38 per cent. Even though wage inequality was still rising after 2000, it was advancing at a slower pace. This change in growth rates between periods meant that the contribution of this factor fell 0.26 points, accounting for 29 per cent of the 0.90 point fall in the gap, the final factor is the growth of non-wage income, after making a negative contribution to the gap in 1976-2000 and a positive contribution in 2000-2019, the difference between these two contributions was

Table 4: The Progressive Positive Improvement of the Economic Situation of the Median Worker in Canada (average annual per cent or percentage point change)

Year & change	Median Wage (%)	Prod-Median Wage Gap	Median wage/ Prod Growth (%)
1976-2000	-0.17	1.36	-14
2000-2019	0.53	0.46	54
change	0.7	-0.9	68
2000-2008	0.35	0.57	38
2008-2019	0.66	0.38	63
Change	0.31	-0.19	25
2008-2013	0.55	0.5	52
2013-2019	0.75	0.28	73
Change	0.2	-0.22	21

Sources: CSLS estimates based Appendix Table 1.

0.20 points. Unlike the other factors that were working in the same direction to reduce the gap 0.90 points between periods, this factor worked to increase the gap.

Developments Since 2000 in Canada

Just as the gap between productivity and median wage growth fell, and sharing of productivity gains for the median worker improved, between the 1976-2000 and 2000-2019 periods in Canada, the same trends are observed after 2000 in the 2000-2008 and 2008-2019 subperiods (Appendix Table 1). The gap between productivity and median wage gap growth fell from 0.57 points in 2000-2008 to 0.38 points in 2008-2019 due largely to the virtual end the upward trend in wage inequality with the pick-up in median wage growth (0.66 per cent versus 0.35 per cent). The share of productivity gains going to the median worker rose from 38 per cent to 63 per cent.

A disaggregation of the 2008-2019 period into 2008-2013 and 2013-2019 sub-periods shows a continued improvement of the economic situation of the median worker in the more recent sub-period. The gap between productivity and median wage growth fell from 0.50 points in 2008-2013 to 0.28 points in 2013-2019 due largely to the virtual end of the upward trend in wage inequality with the pick-up in median wage growth (0.75 per cent versus 0.55 per cent). The share of productivity gains going to the median worker rose from 52 per cent to 73 per cent between period.

In summary, a comparison of the economic situation of the median worker in Canada shows a progressive improvement over time (Table 4). Between the last quarter of the 20th century and the most recent 2013-2019 sub-period, the rate of growth of median pay has risen from -0.17 per cent per year to 0.75 per cent, the productivity-median wage gap, although still positive has shrunk from 1.46 points to 0.28 points, and the proportion of productivity growth that the median worker received has shifted from nothing (-14 per cent) to 73 per cent.

Comparison with Developments in the United States

The fall in the gap between productivity and median wage growth identified in Canada after 2000 has also been observed

Table 5: A Comparison of the Evolution of the Productivity Median Wage Gaps in Canada, US and UK

Countries	Pre-2000			Post-2000			Change between periods		
	Productivity (A)	Median wage (B)	Gap (C)	Productivity (D)	Median Wage (E)	Gap (F)	Productivity (G)=(D)-(A)	Median Wage (H)=(E)-(B)	Gap (I)=(F)-(C)
US-Mishel (1973-2000)	1.49	0.13	1.36	1.5	0.41	1.09	0.01	0.28	-0.27
GSS (1976-2000)	1.2	0	1.2	1.5	0.7	0.8	0.3	0.7	-0.4
UK (1981-1996 and 2007-2019)	2.38	1.51	0.87	0.2	0.17	0.03	-2.18	-1.34	-0.84
Canada	1.19	-0.17	1.36	0.99	0.53	0.46	-0.2	0.7	-0.9

Note: GSS (Greenspon, Stansbary and Summers) .

in the United States, although to a smaller degree than in Canada, and also in the United Kingdom (Table 5).

Mishel and Bivens (2021)) report that the gap in the United States from 1973 to 2000 was 1.36 points, based on annual gross productivity growth of 1.49 per cent and media wage growth of 0.13 per cent. These growth rates are similar to those in Canada. In the 2000-2019 period, US productivity growth was virtually unchanged at 1.50 per cent, and median wage growth picked up to 0.41 per cent, reducing the growth gap to 1.09 points, This means that the fall in the gap between periods was 0.27 points in the United States about one third of the 0.90 fall in Canada. This smaller fall reflected the much weaker pick-up in median wage growth in the United States than in Canada and the failure of productivity growth to fall off after 2000, as it did in Canada.

Greenspon, Stansbury and Summers (2021) finds results comparable to those of Mishel and Bivens. For the 1976-2000 period, they report labour productivity growth of 1.20 per cent per year with no change in median wages over the period, resulting in a growth gap on 1.20 points per year. In the 2000-2019 period, productivity growth accelerated to 1.50 per cent per year, but median wages picked up even more to 0.70 per cent, with a reduction in the gap to 0.80 points with a fall in the gap of 0.40 points between periods,

As in Canada. the median worker in the United States has failed to fully benefit from labour productivity growth since the 1970s, but the gap has fallen after 2000. According to Mishel and Bivens, the median worker was receiving only 9 per cent of productivity growth in the 1973-2000, a share that rose to 27 per cent after 2000. With stronger median wage growth after 2000, Greenspan, Stanbury and Summers find a much greater sharing of productivity gains for the median worker, from none in 1976-2000 to 50 per cent in 2000-2019. It is interesting to note that around 50 per cent of productivity growth went to the median worker in Canada after 2000. While this represents an obvious improvement over the pre-2000 situation in both countries, it falls well short of the full sharing of the benefits of productivity growth.

Mishel and Bivens (2021:Table 1) use the

same framework to decompose the factors explaining the divergence between productivity growth and median wages for the United States that this article uses for Canada. They find that in the 1973-2000 period it was the large increase in wage inequality that accounted for the lion's share of the gap (o.6 points of x per cent), with no contribution from a falling labour share. After 2000 the contributions of the two factors were similar. The fall in the gap between periods can be explained by the slower pace of increase of wage inequality.in the post-2000 period as well as the virtual end of faster consumer prices growth relative to producer prices.[11]

Comparisons with Developments in the UK

In the most recent study on decoupling in the UK (Teichgräber and Van Reenen, 2021), the pre-2000 and post-2000 productivity-median wage gap comparisons requires an analysis of the 1981-1996 and 2007-2019 periods.[12] In the first period labour productivity advanced at a 2.38 per cent per year, compared to 1.51 per cent for median wage growth, a gap on 0.87 points. In the second period, productivity growth collapsed to 0.21 per cent year, but median wage growth also fell to 0.17 per cent. A gap of only 0.04 points. In other words, the gap between productivity and median wage growth fell 0.84 points between periods. But the median worker was enjoying much fast wage growth in the first period when wage growth was strong even though he or she was only receiving 63 per cent of productivity gains, compared to the 81 per cent in the second period when wage growth was virtually non-existent. This is explained by the simple fact that 63 per cent of 2.48 is much greater than 83 per cent of 0.21. It is thus both the magnitude of the productivity growth rate and the sharing of this growth rate that determines the rate of growth of median wages. In the UK the problem for workers in the 21st century (or at least since 2007) has been the collapse of labour productivity growth (Oulton, 2019). In contract, in Canada and the United States, the problem has been the continued unequal sharing of the benefits of productivity growth.

Explaining the Progressive Relative Improvement of Median Wages in Canada[13]

This article has shown that the median worker in Canada fared very poorly during the last quarter of the 20th century, with the median wage falling despite pos-

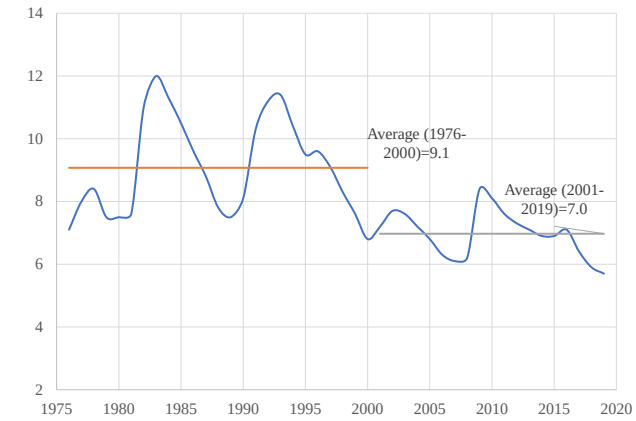
11 Like Canada, the productivity-median wage gap has fallen in the United States since 2000. Between the 2000-2007 and 2007-2017 periods, the annual gap fell from 1.73 points to 0.74 points (Mishel and Bivens, 2021: Table 1). But the reasons for this development differ fundamentally between countries. As was noted earlier in Canada the fall in the gap between these periods was driven by the pick-up in median wages. In contrast, in the United States almost all the decline was caused by the massive fall-off in labour productivity growth from 2.19 per cent in 2000-2007 to 1.11 per cent. In 2007-2019. Median wage growth in the United States was actually slower in 2007-2019 than in 2000-2007 (0.33 per cent versus 0.65 per cent.

12 Growth rates are also available for the 1997-2007 period, which overlaps both centuries.

13 For a review of the literature on the factors affecting wages, see Ashwell (2021).

14 See the articles in Banting, St Hilaire, Sharpe (2001) for discussion of economic conditions in Canada bin the 1980s and 1990s.

Chart 4: Unemployment Rate in Canada, 1976-2019



Source: Statistics Canada.

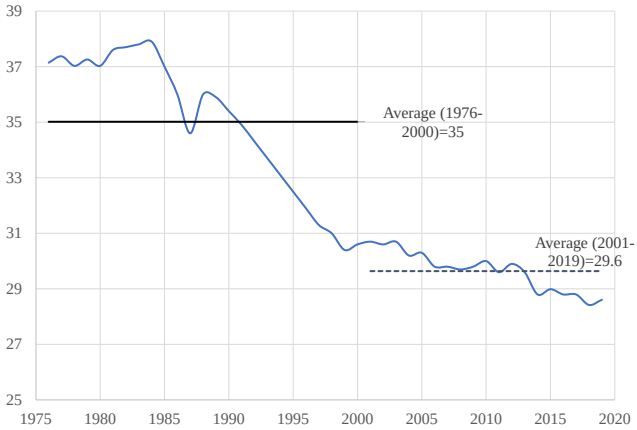
itive productivity growth.[14] The situation has progressively improved during the first two decades of the 21st century, although by the latter part of the period the median worker was still not receiving the full benefits of productivity growth. What explains this relative improvement?

At a general level, it is bargaining power that determines the proportion of productivity growth or gains that goes to workers (Summers and Stansbury, 2020; Dufour and Russell, 2015). Wage growth depends on both the rate of productivity growth and bargaining power so the latter is not the only story to explain wage growth. Weak productivity growth leads to weak wage growth even though bargaining power may remain unchanged, as has been seen in the UK in the 2007-2019 period. But in Canada productivity growth actually fell off after 2000 (0.99 per cent per year in 2000-2019 versus 1.19 per cent in 1976-2000) so stronger median wage growth is not due to an improved productivity performance. This means that the fall in the productivity-median wage gap in Canada is due to higher growth of the median wage reflecting improved bargaining power of the median worker.

Worker bargaining power is affected by demand and supply conditions in the labour market. Three key determinants of these conditions are the tightness of the labour market, as captured, for example, by unemployment rate, the collective bargaining power of workers as represented by the unionization rate, and globalization as shown by the import share.[15] Mishel and Bivens (2021) show that these three factors account for most of the gap between productivity and median wage growth in the United States over the 1979-2019 period. This article will show that developments on these three factors can account for the 0.90 point fall in the gap in the productivity-median wage growth in Canada between 1976-2000 and 2000-2019.

15 The nature of technological change may also be a factor affecting bargaining power, particularly for low-level skill groups who are affected by skill-biased technological change.

Chart 5: Unionization Rates in Canada, 1976-2019



Source: Statistics Canada.

Labour market tightness

There are many measures of the degree of tightness in the labour market, but the most widely used is the official unemployment.[16] Chart 4 shows the evolution of the unemployment rate in Canada from 1976 to 2019. The downward trend after 2000 is readily apparent. The unemployment rate averaged 9.1 per cent from 1976 to 2000, then fell 2.1 points to average 7.0 per cent in 2001-2019. The recessions in the early 1980s and early 1990s resulted in large spikes in the unemployment rate, which took many years to unwind. The recession in 2008-2009 saw a much smaller run-up in the unemployment rate. In the second half of the 2010s the unemployment rate was fell below 7 per cent, reaching a low of 5.5 per cent in 2019. A key explanation for this improvement in macroeconomic conditions has been the transition from a regime of high real interest rates in the 1980s and 1990s to much lower rates in the 2000s and 2010s.

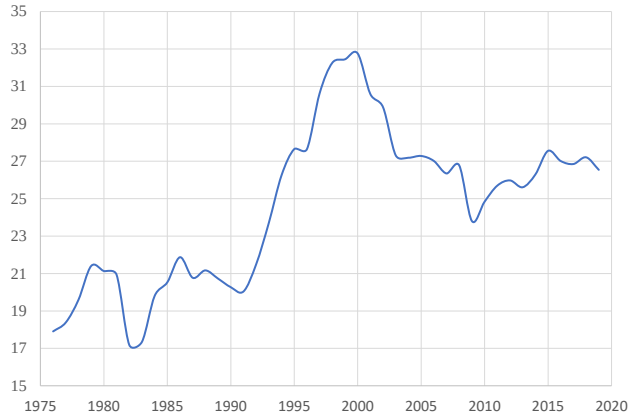
The high unemployment rate of the last quarter of the 20th century thus contributed to the inability of workers to maintain their purchasing power, with the median wage falling in real terms, despite productivity growth of over 1 per cent per year. The lower unemployment rate after 2000 allowed the workers to obtain higher wages, although still below the pace of productivity advance. Only in the second half of the 2010s when the unemployment rate fell below 7 per cent did median wage growth begin to approach productivity growth (0.75 per cent per year versus 1.03 per cent in 2013-2019).

Collective bargaining power

The rate of unionization is a well known measure of collective bargaining power. Chart 5 shows the evolution of the unionization rate in Canada from 1976 to 2019. The downward trend is readily apparent, especially before 2000. The unionization rate averaged 35.0 per cent per cent from

16 Additional measures of slack in the labour market are job vacancies and labour underutilization measures that include discouraged worker and involuntary part-time workers. These measures are strongly correlated with the unemployment rate.

Chart 6: Merchandise Imports as Share of GDP in Canada, 1976-2019



Source: Statistics Canada

1976 to 2000, then fell 5 points to average 29.6 per cent in 2001-2019. There was a strong union movement in Canada in the 1950s, 1960s and 1970s. For a variety of reasons union fortunes started to fall in the mid-1980s, with the unionization rate plummeting from 38 per cent in 1984 to 30.5 per cent in 2000.[17] Since 2000, there has been a continued downward trend although at a much slower pace with the unionization rate, down a further 3 points to 28 per cent by 2019.

The sharply falling unionization rate in pre-2000 period is consistent with the inability of the median worker to maintain his or her purchasing power.[18] The much smaller declines in the unionization rate after 2000 means the effect of deunionization, such as the adoption of two-tier wage schemes on pay increases, were less allowing, more opportunity for median real wage growth.

Globalization

Globalization can have myriad impacts on the bargaining power of labour through various channels.[19] A well-used indicator of

17 For an analysis of this decline, see (Morissette, Schellenberg, Johnson, 2005).

18 Dufour and Russell (2015) find union membership to be positively correlated with productivity-wage transmission in Canada at the 10 per cent significance level, and Card *et al.* (2004) show evidence that the decline in unionization in the United States and UK has contributed to higher income inequality in those countries. Mishel and Bivens (2021) argue that policy-driven erosions of bargaining power are the primary causes of workers' .

19 For example, Autor *et al.* (2020) and Schwellnus *et al.* (2017) have documented, how globalization has allowed successful firms to become dominant at a scale which was previously impossible and become so-called "superstar firms". This dominance can translate into monopsony power, meaning that large firms responsible for employing large shares of employees in a particular market have disproportionate power in that market. The scale of these firms can also translate into monopoly power in the product market, meaning they can raise consumer prices and obtain higher profits for capital in the form of monopoly rents, and thus reduce the labour share in that industry (Autor, Katz, Kearney, 2006). Autor *et al.* (2006) and Goldin and Katz (2007) propose the "skills-biased technological change" theory whereby technological changes and automation have led to higher demand for highly-skilled labour and lower demand for workers in the middle and bottom of the earnings distribution, thus increasing inequality. The increasing globalization of production in general and manufacturing in particular has also been proposed as a contributor to rising within-country inequality (Katz Murphy, 1992). Helpman (2016) summarizes the relevant literature on this hypothesis and finds that globalization and trade have had a "significant, yet modest" impact on wage inequality.

globalization is the import share, showing inability to capture the full gains of productivity. Chart 6 shows the evolution of the share of merchandise imports in GDP in Canada from 1976 to 2019. In the pre-2000 period this share was on a strong upward trend, rising from 17 per cent in 1976 to 32 per cent in 2000, with the lion's share of the increase taking place after 1990. After the 2000 peak the import share fell and by 2019 was at 27 per cent, still well above the pre-1990 level.

The jump in the import share from 1990 to 2000 was due to the implementation of the Canada-US Free Trade Agreement (FTA) starting in 1990 and the North American Free Trade Agreement (NAFTA) starting in 1994. These agreements boosted Canada's trade with the United States and Mexico, giving employers the opportunity to relocate production facilities in the country that minimizes labour costs while maintaining market access to all three countries. A number of manufacturers relocated production from Canada to lower-wage locations in the U.S. South and Mexico. The threat of relocation in the manufacturing sector also reduced the bargaining power of workers in wage negotiations and had negative spillover effects on wages in other sectors. The fall in the growth rate of median wages from 0.18 per cent per year in the 1981-1989 period to -0.20 per cent in 1989-2000 is consistent with this reduction in worker bargaining power. By the 2000s after firms had time to adjust to the new trade regimes, some of the downward pressure on wages from lower trade barriers may have dissipated. This is consistent with the pick-up in median wage growth to 0.35 per cent per year in 2000-2008, a turnaround of 0.55 points from 1989-2000.

In addition to the implementation of the FTA and NAFTA in the 1990s, the accession of China to the WTO lead to increased imports from China. The rise in the China's share of total Canadian imports was limited in the 1990s, from 1.8 per cent of total imports in 1990 to 3.4 per cent in 2000 (Murray, 2017:Table x) so this development accounted for little of the overall rise in the import share of GDP in the 1990s. The globalization associated with increase imports from China was concentrated in the first decade of the 21st century when imports from China rose from 3.5 per cent of total Canadian imports in 2000 to 13 per cent in 2010. Since then, the share has exhibited limited further progress at 14 per cent in 2015. This leveling off the negative effect of China trade on bargaining power of Canadian workers with the stabilization of the China import share in the 2010s is consistent with the pick-up of median wage growth to 0.66 per cent in 2008-2019 from 0.35 per cent in 2000-2008.

Conclusion

Reprising the quotation from *The Economist* at the beginning of this article that it is the median wage, not profit or share price, that is to be used to judge economic progress of an economy or society, one must conclude that progress in Canada over the 1976-2019 has been meager. Both profits and share prices have done well, but the median wage has advanced at only 0.14 per cent per year despite labour productivity growth of 1.10 per cent per year. About one half of this gap of 0.96 points between productivity and median wage growth is

due to growing wage inequality, as manifested by faster growth of average versus median wages, with one quarter due to the fall in labour share of income and a second quarter arising from the fall in labour's terms of trade, as reflected in the faster increase in the CPI compared to the GDP deflator. The median worker's limited economic progress reflects their weak bargaining power to obtain wage increases from employers, compared to workers in the top half of the wage distribution who did considerably better. This weak bargaining power of the median worker in turn reflects a number of factors, especially high unemployment, falling unionization rates, and globalization leading to increased competition from imports.

Despite this dismal overall assessment of the economic progress of Canadians over the last near half century, a more nuanced picture emerges when the period is broken into sub-periods. In particular, the first two decades of the 21st century have experienced much more economic progress, with the median wage advancing 0.46 per cent per year compared to a fall of 0.17 per cent per year in the last quarter of the 21st century. With productivity growth relatively stable between periods at around 1 per cent, the pick-up in median wages reduced the gap between productivity and median wage growth by two thirds from 1.36 points to 0.46 points between 1976-2000 and 2000-2019. Since 2000, the median worker has received about one half of the gains from productivity growth, still very far from a full and equitable sharing, but a dramatic turnaround from the pre-2000 period when the median worker received no benefit from productivity growth. In the 1976-2000 period, the bargaining power of workers fell dramatically due to high unemployment, falling unionization rates and a rising import share. After 2000, these trends reversed or stabilized, improving the bargaining power of workers.

The situation of the median worker looks even better the closer one approaches the present. Median wage growth was higher over the 2008-2019 business cycle than over the 2000-2008 cycle (0.66 per cent per years versus 0.35 per cent). It was also higher during the second part of the most recent business cycle than the first half (0.75 per cent in 2013-2019 versus 0.55 per cent in 2008-2013. Indeed, in this most recent period the worker median was receiving nearly three quarters of the benefits of productivity growth. It is no coincidence than during this most recent period labour demand was strong, with the unemployment rate falling below 7 per cent and reaching a low of 5.5 per cent in 2019, the first time since the 1960s that a rate this low had been achieved.

A fully employed economy characterized by strong demand for the skills of workers in the bottom half of the wage distribution is the key to ensure that the median worker receives an equitable share of the real income benefits generated productivity growth. The current situation of robust labour demand and widespread labour shortages, as evidenced by the record numbers of job openings, has boosted median wage growth If this situation continues in the years to come, the economic progress in the Canadian economy and society will significantly outpace the dismal overall performance recorded over the 1976-2019 period, especially the 1976-2000 period.

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