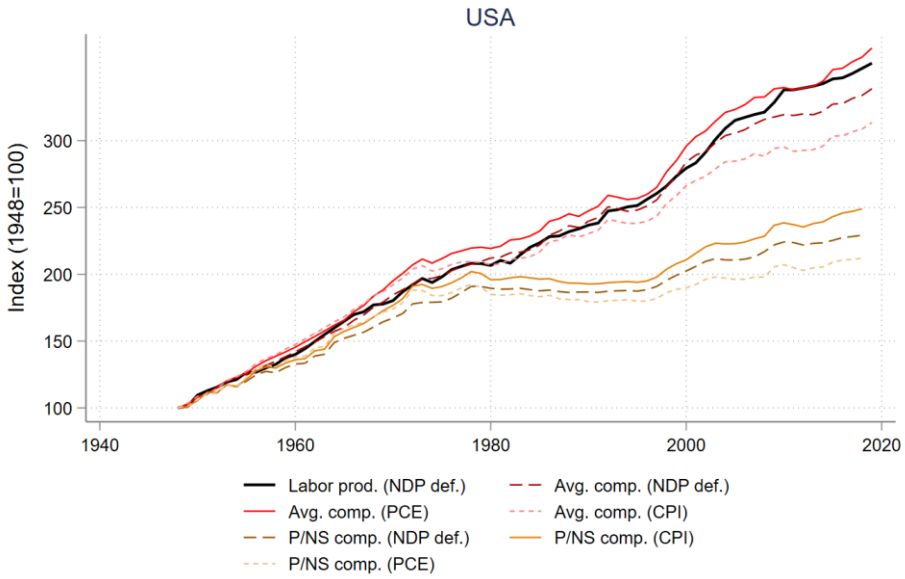
Appendix to Greenspon, Stansbury, and Summers (2021).

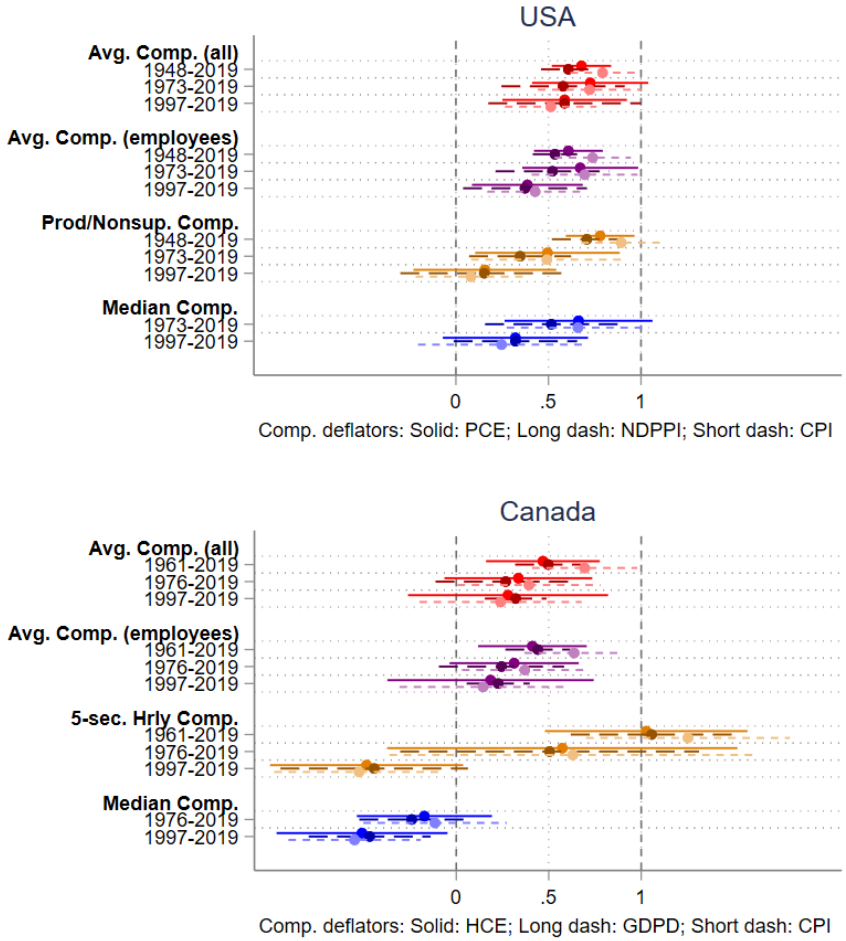
Additional Charts and Tables

Appendix Chart 1: Productivity and compensation in the US, 1948-2019



Notes: this figure replicates Chart 1 in the main paper, but indexes the US series for productivity, average compensation of all employed persons, and for average compensation of production/nonsupervisory workers, to 1948. Price deflators are in parentheses. Canadian data is not presented here because it extends back only to 1961.

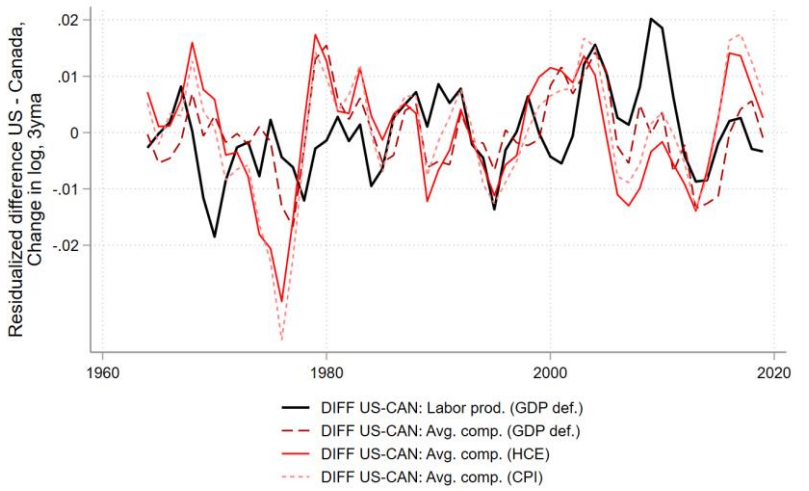
Appendix Figure 2: Coefficient on compensation-productivity regressions, including compensation series with different price deflators



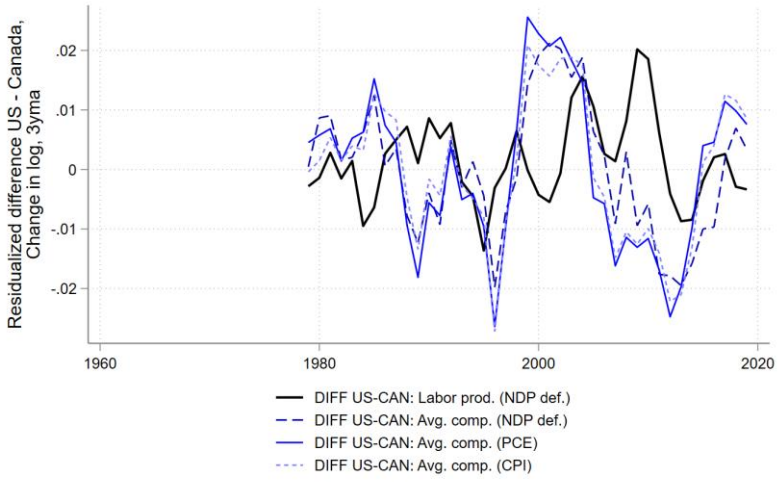
Notes: this figure replicates Figure 2 in the main paper, but includes coefficient estimates and confidence intervals for compensation deflated by the NDP/GDP price deflator (for US/Canada respectively), illustrated with long dashes, and by the CPI, illustrated with short dashes.

Appendix Figure 3: US Canada differentials: cyclically-adjusted productivity growth and compensation growth

Panel A: Average compensation

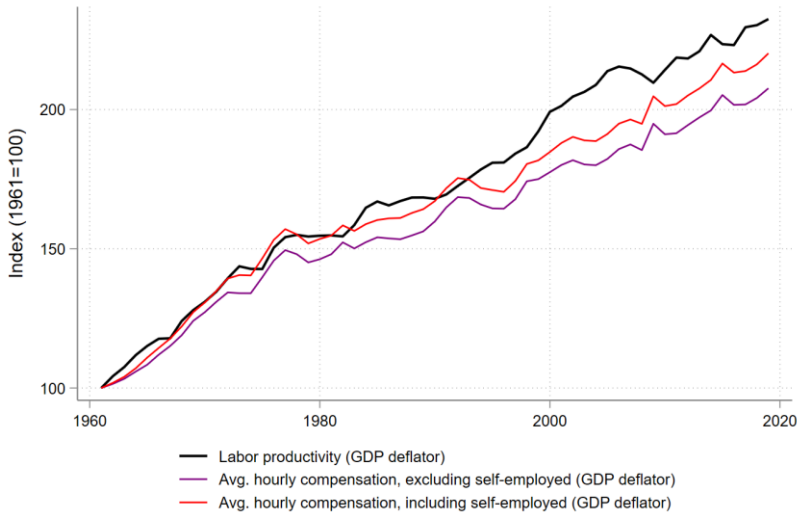


Panel B: Median compensation

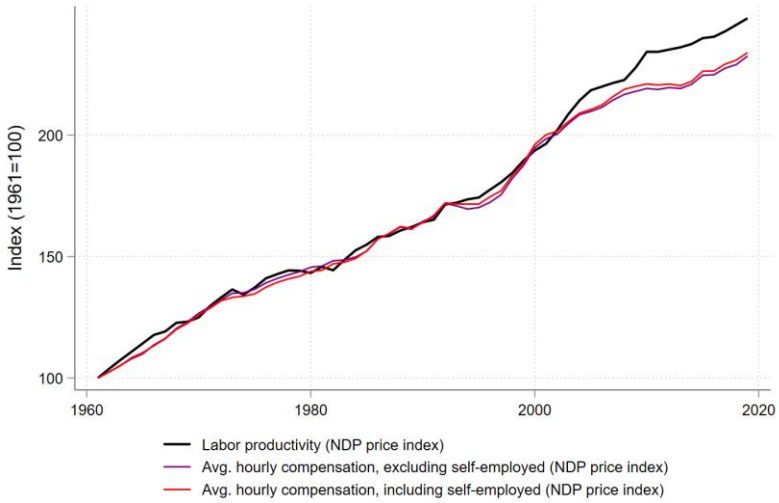


Notes: this figure illustrates the US-Canada difference between cyclically-adjusted productivity and compensation measures over time. Cyclical adjustment is carried out by regressing the 3-year moving average of the change in log of (productivity, average compensation, or median compensation) on the 3-year moving average of the unemployment rate, lagged unemployment rate, and a constant.

Appendix Figure 4: Average hourly compensation with and without the self-employed, 1961-2019
Panel A: Canada



Panel B: USA



Notes: this figure illustrates the increase in average hourly compensation with and without the self-employed in the US and in Canada since 1961.

Appendix Table 1: Compound annual growth rates of productivity and compensation measures by period

Panel A: Canada

Measure	Labor prod.	Average compensation			Average compensation of employees			Median compensation			5-sector hourly compensation		
Deflator	**GDP**	**GDP**	**HCE**	**CPI**	**GDP**	**HCE**	**CPI**	**GDP**	**HCE**	**CPI**	**GDP**	**HCE**	**CPI**
1961-2019	1.5%	1.4%	1.6%	1.5%	1.3%	1.5%	1.4%	-	-	-	0.8%	1.1%	1.0%
2008-2019	0.8%	1.1%	1.1%	0.8%	1.0%	1.0%	0.7%	1.1%	1.1%	0.8%	0.3%	0.3%	0.0%
2000-2008	0.8%	0.7%	1.9%	1.2%	0.5%	1.7%	1.1%	-0.1%	1.1%	0.4%	0.2%	1.4%	0.7%
1989-2000	1.5%	1.1%	0.9%	0.8%	1.2%	1.0%	0.9%	0.3%	0.2%	0.1%	0.7%	0.5%	0.4%
1981-1989	1.1%	0.7%	0.3%	0.3%	0.7%	0.3%	0.2%	0.7%	0.3%	0.2%	0.6%	0.2%	0.1%
1973-1981	0.9%	1.2%	1.3%	1.4%	1.2%	1.4%	1.4%	-	-	-	0.8%	0.9%	1.0%
1961-1973	3.1%	2.9%	3.8%	3.9%	2.5%	3.4%	3.5%	-	-	-	2.1%	3.0%	3.1%

Panel B: USA

Measure	Labor prod.	Average compensation			Average compensation of employees			Median compensation			Production/nonsupervisory compensation*		
Deflator	**NDP**	**NDP**	**PCE**	**CPI**	**NDP**	**PCE**	**CPI**	**NDP**	**PCE**	**CPI**	**NDP**	**PCE**	**CPI**
1961-2019	1.6%	1.5%	1.6%	1.3%	1.5%	1.6%	1.3%	-	-	-	1.0%	1.1%	0.7%
2008-2019	1.0%	0.6%	1.0%	0.8%	0.6%	0.9%	0.7%	0.3%	0.6%	0.4%	0.6%	0.9%	0.7%
2000-2008	1.8%	1.3%	1.5%	1.0%	1.4%	1.5%	1.0%	0.8%	0.9%	0.5%	0.9%	1.0%	0.5%
1989-2000	1.6%	1.7%	1.8%	1.4%	1.8%	1.8%	1.5%	0.7%	0.8%	0.4%	0.7%	0.8%	0.4%
1981-1989	1.3%	1.2%	1.2%	1.2%	1.4%	1.4%	1.3%	0.4%	0.4%	0.4%	-0.1%	-0.2%	-0.2%
1973-1981	0.8%	1.0%	0.6%	0.1%	1.0%	0.6%	0.1%	0.9%	0.4%	-0.1%	0.7%	0.2%	-0.2%
1961-1973	2.6%	2.5%	2.9%	2.6%	2.4%	2.8%	2.5%	-	-	-	2.5%	2.9%	2.6%

*Growth rates for production/ non-supervisory worker typical compensation calculated up to 2018 due to data availability

Note: Table replicates Table 1 in main paper, but focusing on different periods (with periods selected to correspond to Williams 2021)

Appendix Table 2: USA
Coefficients from regressions of compensation on productivity, 5 year moving averages

Period	1948-2019			1973-2019			1997-2019		
Specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Comp. deflator	GDP	HCE	CPI	GDP	HCE	CPI	GDP	HCE	CPI
Dep. Var.: Average Hourly Compensation, all employed persons, from national accounts, 5yma									
Labor productivity	0.65***	0.69***	0.86***	0.59***	0.75***	0.73***	0.59***	0.60***	0.47***
	(0.08)	(0.09)	(0.09)	(0.15)	(0.12)	(0.11)	(0.11)	(0.11)	(0.09)
Dep. Var.: Average Hourly Compensation, employees, from national accounts, 5yma									
Labor productivity	0.60***	0.65***	0.82***	0.58***	0.73***	0.72***	0.47***	0.48***	0.35***
	(0.07)	(0.09)	(0.09)	(0.16)	(0.13)	(0.14)	(0.12)	(0.10)	(0.09)
Dep. Var.: Compensation of Production and Nonsupervisory Workers, hourly, 5yma									
Labor productivity	0.67***	0.71***	0.88***	0.16	0.31*	0.30	0.06	0.07	-0.07
	(0.13)	(0.12)	(0.13)	(0.11)	(0.18)	(0.19)	(0.10)	(0.11)	(0.12)
Dep. Var.: Median Hourly Compensation, 5yma									
Labor productivity	-	-	-	0.38*	0.54**	0.53**	0.34*	0.35	0.22
	-	-	-	(0.20)	(0.22)	(0.21)	(0.18)	(0.21)	(0.24)
Obs.	67	67	67	42	42	42	18	18	18

Note: Each cell contains the coefficient estimate on hourly labor productivity (change in log, 5y trailing moving average) from a regression of the change in log compensation (5yma) on the change in log net hourly labor productivity (5yma), controlling for the current and 1-year lagged value of unemployment (5yma) and a constant, using annual data. Newey-West (HAC) standard errors (6-year lag) are listed below each coefficient estimate in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

Appendix Table 3: Canada
Coefficients from regressions of compensation on productivity, 5 year moving averages

Period	1961-2019			1976-2019			1997-2019		
Specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Comp. deflator	GDP	HCE	CPI	GDP	HCE	CPI	GDP	HCE	CPI
Dep. Var.: Average Hourly Compensation, all employed persons, from national accounts, change in log, 5yma									
Labor productivity	0.55***	0.56***	0.81***	0.23	0.28	0.33	-0.08	0.37**	0.10
	(0.09)	(0.21)	(0.18)	(0.19)	(0.20)	(0.19)	(0.21)	(0.16)	(0.14)
Dep. Var.: Average Hourly Compensation, employees, from national accounts, change in log, 5yma									
Labor productivity	0.48***	0.49**	0.74***	0.19	0.24	0.29	-0.20	0.25	-0.02
	(0.08)	(0.20)	(0.17)	(0.18)	(0.19)	(0.18)	(0.21)	(0.18)	(0.16)
Dep. Var.: Compensation of Hourly-Paid Workers in Five Sectors, change in log, 5yma									
Labor productivity	0.96***	0.96***	1.21***	0.39	0.44	0.49	-0.73*	-0.28	-0.55**
	(0.15)	(0.22)	(0.21)	(0.33)	(0.39)	(0.42)	(0.39)	(0.19)	(0.23)
Dep. Var.: Median Hourly Compensation, employees, survey-based, change in log, 5yma									
Labor productivity	-	-	-	-0.42***	-0.37**	-0.32*	-1.10***	-0.65***	-0.92***
	-	-	-	(0.12)	(0.16)	(0.18)	(0.18)	(0.18)	(0.14)
Obs.	54	54	54	39	39	39	18	18	18

Note: Each cell contains the coefficient estimate on hourly labor productivity (change in log, 5y trailing moving average) from a regression of the change in log compensation (5yma) on the change in log net hourly labor productivity (5yma), controlling for the current and 1-year lagged value of unemployment (5yma) and a constant, using annual data. Newey-West (HAC) standard errors (6-year lag) are listed below each coefficient estimate in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

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Appendix Table 4: USA-Canada differential
Coefficients from regressions of the US-Canada difference in compensation growth on the US-Canada difference in productivity growth, 3 year moving averages

Period	1961-2019			1976-2019		
Specification	(1)	(2)	(3)	(4)	(5)	(6)
Comp. deflator	GDP/NDP	HCE/PCE	CPI	GDP/NDP	HCE/PCE	CPI
Dep. Var.: US-Canada difference in change in log of Average Hourly Compensation, all employed persons, 3yma						
Labor productivity	0.27**	0.17	0.48***	0.28	0.08	0.28*
	(0.12)	(0.15)	(0.15)	(0.19)	(0.16)	(0.16)
Dep. Var.: US-Canada difference in change in log of Average Hourly Compensation, employees, 3yma						
Labor productivity	0.26**	0.16	0.47***	0.30	0.10	0.31*
	(0.13)	(0.13)	(0.14)	(0.22)	(0.16)	(0.17)
Dep. Var.: US-Canada difference in change in log of Median Hourly Compensation, employees, 3yma						
Labor productivity				0.10	-0.10	0.11
				(0.28)	(0.23)	(0.23)
Obs.	56	56	56	41	41	41

Note: Each column regresses the 3-year trailing moving average of the US-Canada difference between the change in log of real hourly compensation in each country on the 3-year trailing moving average of the US-Canada difference between the change in log of net hourly labor productivity in each country, 3-year trailing moving average of the US-Canada difference in unemployment and its 1-year lag, and a constant. Newey-West (HAC) standard errors (6-year lag) are listed below each coefficient estimate in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

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Appendix Table 5: P-values from Wald tests for structural breaks in main regressions

Compensation measure		1997	2000	2008
Canada	Average compensation, all employed persons (1961-2019)	.705	.905	.360
	Average compensation, employees (1961-2019)	.479	.800	.360
	Typical compensation (5 sector hourly wage) (1961-2019)	.000	.000	.195
	Median compensation (1976-2019)	.048	.033	.012
USA	Average compensation, all employed persons (1961-2019)	.105	.103	.060
	Average compensation, employees (1961-2019)	.330	.310	.403
	Typical compensation (production/nonsupervisory employees) (1961-2019)	.000	.000	.000
	Median compensation (1973-2019)	.062	.074	.036

Note: All deflated by HCE (Canada) or PCE (USA). P-values reported to 3 decimal places. Structural break tests are run using our baseline regression specification, as laid out in expression (2) (and with regression coefficients reported in Tables 2 and 3 in the main paper). Years 1997, 2000, 2008, represent years for which a structural break is tested.

Appendix Table 6: US states in BEA regions

Region	States
New England	Connecticut, Rhode Island, Massachusetts, Vermont, New Hampshire, Maine
Mideast	Pennsylvania, Maryland, Delaware, New Jersey, New York, District of Columbia
Great Lakes	Wisconsin, Illinois, Indiana, Ohio, Michigan
Plains	North Dakota, South Dakota, Minnesota, Nebraska, Kansas, Missouri, Iowa
Rocky Mountain	Montana, Idaho, Wyoming, Colorado, Utah
Far West	Washington, Oregon, California, Nevada
Southwest	Arizona, New Mexico, Texas, Oklahoma
Southeast	Arkansas, Louisiana, Mississippi, Alabama, Florida, Georgia, Tennessee, Kentucky, West Virginia, Virginia, North Carolina, South Carolina

Data

USA data

- Net labor productivity per hour, total economy:
  - Net Domestic Product (BEA NIPA Table 1.7.5), divided by Total Hours, Total Economy (from total economy productivity data set available on request from BLS), and deflated by the NDP price index (BEA NIPA Table 1.7.4).
- Average compensation per hour, total economy:
  - Average Hourly Compensation, Total Economy (from total economy productivity data set available on request from BLS).
- Average employee compensation per hour:
  - Total compensation of employees (BEA NIPA Table 6.2) divided by total hours worked by employees (BEA NIPA Table 6.9).
- Median compensation per hour, total economy:
  - Data obtained from EPI who calculated it as follows: Nominal median hourly wages, estimated using microdata from the CPS-ORG, multiplied by ratio of real compensation to wages. Real compensation/wage ratio was calculated by obtaining nominal compensation/wage ratio from BEA NIPA data and deflating the insurance component by the PCE medical care index and the rest of the series by the PCE. Further details in Bivens and Mishel (2015).
- Average compensation per hour, production and non-supervisory workers:
  - Data obtained from EPI who calculated it as follows: Average hourly earnings for production/nonsupervisory workers from BLS CES since 1964, estimated pre-1964 using average hourly earnings for production workers, multiplied by real compensation/wage ratio calculated as described for the median compensation series. Further details in Bivens and Mishel (2015).
- Unemployment rate:
  - Unemployment rate ages 25-54, Bureau of Labor Statistics.

Canada data

- Net labor productivity per hour, total economy (since 1961)
  - Constructed as total economy net domestic product divided by total hours worked for all jobs (from the productivity accounts), where total economy net domestic product is measured as income-based GDP minus consumption of fixed capital, deflated by the GDP deflator.[1]
  - Calculated from annual averages of quarterly data in Statistics Canada Table: 36-10-0103-01
- Average compensation per hour, total economy (since 1961)
  - Constructed as total compensation divided by total hours worked, combined from two series:
    - 1997-2019 compensation and hours worked data for all workers (including self-employed) is from Statistics Canada Productivity Accounts (Table 36-10-0480-01)

[1] We use the GDP deflator because Statistics Canada does not produce a price deflator for Net Domestic Product (Williams 2021).

        - 1961-1996 compensation and hours worked data for all workers (including self-employed) is from Statistics Canada Productivity Accounts (Table 36-10-0303-01). The annual growth rates from this data are used to backcast levels for 1961-1996 from the 1997 level in the more recent dataset from 1997-2019.
- Average employee compensation per hour, total economy (since 1961)
    - 1961-2019 Total compensation: Annual averages of Compensation of employees series from the quarterly income-based GDP data tables in National Accounts, Statistics Canada Table 36-10-0103-01.
    - Total compensation for employees is then divided by total hours worked for employees from the Productivity Accounts, which is combined from two series:
        - 1997-2019 total hours worked data for employees series is from Statistics Canada Productivity Accounts (Table 36-10-0489-01)
        - 1961-1996 total hours worked data for employees series is from Statistics Canada Productivity Accounts (Table 36-10-0303-01). As above, the annual growth rates from this data are used to backcast levels for 1961-1996 from the 1997 level in the more recent dataset from 1997-2019.
- Typical compensation: Hourly workers in 5 sectors (since 1961)
    - This composite wage is constructed as a weighted average of the average hourly compensation of workers paid by the hour in each of 5 industries: manufacturing, mining (including oil/gas), construction, laundries, and hotels and restaurants. The weights for each industry in each year are its share of the total number of hourly wage-earners in the 5 industries multiplied by the ratio of average weekly hours worked in the industry to (unweighted) average weekly hours across all 5 industries.[2]

$$CompositeWage_t = \sum_{i=1}^{5} \overline{Wage}_{it} \left(\frac{\overline{Hours}_{it}}{AvgHours_t} \right) \left(\frac{Emp_{it}}{TotEmp_t} \right)$$

Where $\overline{Wage}_{it}$ is the average hourly wage and $\overline{Hours}_{it}$ is the average weekly working hours in sector i in year t, as reported in the SEPH (and precursors) data

    - The hourly compensation of hourly-rated workers in each of these 5 industries is taken from the average hourly wage in each industry, from the Statistics Canada Survey of Employment, Payrolls and Hours (and precursors),[3] multiplied by the average ratio of total compensation to wages and salaries in the entire economy (calculated from the income-based GDP accounts).

[2] Note also: the 1961-71 annual data for these three measures (hourly wage, number of wage earners, average hours) for each industry *i* in each year *t* were calculated as the average of 4 monthly observations per year, the 'middle month' of each quarter (i.e. February, May, August, and November)

[3] Specifically: we use the Survey of Employment, Payrolls and Man-hours for 1961-1982. The data from this survey and from the Statistics Canada Survey of Employment, Payrolls and Hours were supplemented with information on employment counts from the monthly publications *Employment earnings and hours* (for 1970-1971) *and Man-Hours and Hourly Earnings* (for 1961-1970). We do not use the data provided in these surveys for hourly-rated earnings in transportation, because the industry is not consistently defined over the whole period. Dataset with detailed sources is available upon request.

    - This measure is then adjusted for non-wage compensation through multiplying the wage/salary compensation measure by the average real compensation/wage ratio. For Canada, this is calculated as total compensation of employees divided by wages and salaries compensation as reported in Statistics Canada Table 36-10-0103-01. This is deflated by the HCE.
- Median compensation (since 1976)
    - This is constructed using Median annual wage and salary income as reported in Statistics Canada Table 11-10-0239-01. This is calculated by Statistics Canada from three surveys).[4] It is then multiplied by average ratio of total compensation to wages and salaries (calculated from the income-based GDP accounts) and divided by our estimate of annual average hours worked, which is 52 x median hours worked weekly.[5]
    - This measure is also adjusted for non-wage compensation, through the same method as described above for typical compensation in Canada.
    - An alternative measure available since 1997 is the median hourly wage rate from the Labour Force Survey, as tabulated in Statistics Canada Table 14-10-0340-01.
- Unemployment rate
    - For 1976 on, the unemployment rate is for ages 15 and over and from Statistics Canada Table 14-10-0327-01
    - For 1961-1975, the unemployment rate is for ages 14 and over and from Historical Statistics of Canada, Series D223-235.

Deflators

For Canada, three different price indices are used to deflate nominal compensation measures:

- Consumer Price Index (CPI), from Statistics Canada Table 18-10-0005-01
- Household final consumption expenditure deflator (HCE), from Statistics Canada Table 36-10-0130-01
- GDP deflator, from Statistics Canada Table 36-10-0130-01

Similarly, for the US three different price indices are used to deflate nominal compensation measures:

- Consumer Price Index (CPI): BLS CPI-U series before 1978 (CPI for All Urban Consumers); BLS CPI-U-RS since 1978 (CPI Research Series Using Current Methods).
- PCE: Personal consumption expenditures price index (BEA NIPA Table 2.3.4).
- NDP deflator: Net Domestic Product price index (BEA NIPA Table 1.7.4).

[4] These three surveys are the Survey of Consumer Finances (SCF) from 1976 to 1992, a combination of the SCF and the Survey of Labour and Income Dynamics (SLID) from 1993 to 1997, the SLID from 1998 to 2011 and the Canadian Income Survey (CIS) beginning in 2012 (according to footnote 3 on StatCan Table 11-10-0239-01)

[5] Median weekly hours worked is defined as the median value of 'usual hours worked in all jobs' as calculated from the Labour Force Survey microdata.