

The "Lump-of-Labor" Case Against Work-Sharing: Populist Fallacy or Marginalist Throwback?*

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The persistence of high rates of unemployment in Europe, coupled with longer average work hours among many workers in the predominantly English-speaking countries, has revived interest in policies to redistribute working time. A common reaction by mainstream economists to the idea of redistributing hours of work is to contend that proposals such as work-sharing, which are intended to spark job growth, are based on the mistaken belief that there is only a fixed amount of work to be done. That assumption is sometimes called the "lump-of-labor fallacy". Alternatively, the notion has been labelled a "lump-of-work" or "lump-of-output" fallacy.

The dismissive phrase has become an article of faith among many in the economics profession, despite the fact that advocates of reduced work time have, for more than a century, repeatedly disavowed the alleged belief in a fixed amount of work. Advocacy of work-time redistribution as a remedy for unemployment is based not on an *idée fixe* but on the defensible proposition that current work arrangements are less than ideal and that substantial improvement in the allocation of work is both desirable and practicable.

This chapter briefly examines the sources of the lump-of-labor claim and its role in scholarly and public policy debates regarding work-sharing. The closer look presented here shows the claim has never been an authoritative tenet of economic thought but has persisted as an uncritical relic of textbook lore, cobbled together from disconnected and incompatible fragments of archaic economic doctrine. To put it bluntly, the lump-of-labor fallacy is a counterfeit - the economists' equivalent to the Piltdown man hoax, which for four decades caused the skull of a modern man and the jawbone of an orangutan to be regarded as the missing link in human evolution.

As if to show that Gresham's law -- that bad money drives out good -- also governs economic discourse, the claim of a lump-of-labor fallacy has displaced genuine analysis regarding the complex relationship between the hours of work, employment and productivity. For example, S. J. Chapman's 1909 theory of the hours of labor, which was described by pre-eminent British economist J.R. Hicks as "the classical statement of the theory of hours in a free market" (1932: 102n.), is today rarely acknowledged by mainstream economists (Nyland 1989). Yet that theory suggests a compelling rationale, examined later in this chapter, for the redistribution of work time: shorter hours reduces fatigue, allows for greater efficiency and consequently lowers per unit costs. Those productivity gains provide a basis for employment growth beyond just the short term reallocation of existing work.

What difference could a lapse of scholarly memory make to policy? It is suggested here that the claim of fallacy has enforced a taboo that has effectively kept redistributing working time off the public policy agenda in Canada, the United States and the United Kingdom. Bosch (1998) has noted the unsatisfactory nature of the debate on working time, which "all too frequently becomes bogged down in quasireligious exchanges of articles of faith between

* From: Lonnie Golden and Deborah Figart (eds), *Working Time: International trends, theory and policy perspectives*, Routledge, 2000.

supporters and opponents of reduced working time"(1998: 1). The subtitle of a paper by Freeman (1998), "Work-Sharing to Full Employment: Serious Option or Populist Fallacy?" also hints at the stigmatization haunting the topic.

Moreover, deference to the illegitimate fallacy and the resulting eclipse of genuine theory may be facilitating the continuation of ill-considered policies that erect fixed employment cost barriers to the voluntary reduction of the hours of work -- with the unintended consequence of encouraging long hours of work and contributing to more precarious employment. Those perverse policy incentives may also be inflicting a more general slowdown of productivity growth, stifling employment and wage gains. Workable policy and voluntary responses to the regime of high fixed costs and long hours of work can be developed, but the stigma of a lump-of-labor fallacy discourages serious consideration of those options by policy makers.

One Lump or Two?

A customary practice of scholars is to introduce their work by situating it in relation to previous work in the field. It is noteworthy therefore when the author of an econometric study of working time reductions frames her findings not in relation to other econometric studies but as a retort to an amorphous popular belief. The first paragraph of Hunt's (1996) research paper, "Has Work-Sharing Worked in Germany?" exemplifies the claim of a lump-of-labor fallacy:

There is a wide-spread popular belief that unemployment can be reduced by reducing the number of hours worked per person. The reasoning is usually based on what is sometimes called the "lump of work fallacy": labor input is seen as fixed, and it is believed that if each worker works fewer hours, this work can be spread over more workers, and employment will rise. This is known as worksharing. However, if restrictions on hours make labor less attractive to employers, they will substitute to other inputs, and there will also be a scale effect reducing use of all inputs (1996: 1). Hunt's opening paragraph displays a number of rhetorical features that are characteristic of the lump-of-labor charge:

- the work-sharing concept is identified as a "wide-spread popular belief" -- implicitly contrasting it with more substantive expert knowledge.
- advocates of work-sharing are alleged to assume that the amount of work to be done is fixed -- no evidence is offered in support of the allegation, which is hedged by qualifiers such as "usually" and "sometimes".
- the concluding *coup de grace* relies on the use of technical jargon to suggest a rigorously "scientific" result opposite to what the naive popular belief might predict.

In a later version of the paper, Hunt dropped the reference to a lump-of-work fallacy but retained the allegation of a "widespread popular belief . . . based on the idea that labor input is fixed" (1999: 117). In yet another paper, Hunt reprised the assertion that "popular confidence in the ability of work-sharing to increase employment is based on the idea that the amount of work that needs to be done is fixed" (1998: 340).

Commenting on Hunt's 1998 article, Katz (1998) developed the same theme with minor variations. He referred to a vaguely attributed belief -- this time by "many individuals" -- that cuts in the work week can reduce unemployment (1998: 373). According to Katz, most advocates of that belief, which he referred to as the lump-of- output fallacy, implicitly assumed a fixed level of output and consequently an unchanged total number of hours of

work. Like Hunt, Katz concluded his tale with vague allusions to imperfect substitution and econometric estimates. Katz credited Layard *et al.* (1991) as his source for the expression, "lump-of-output fallacy."

In their explanation of the fallacy, Layard, *et al.* adhered to the convention that work-sharing advocates assume a fixed amount of work, but in other respects they presented quite a different argument from Hunt as to why work-sharing cannot alleviate unemployment (1991: 502-505). In the Layard version, the cut in hours initially might lower unemployment but only at the cost of increased inflation. If this were the case, they argued, there could be one of two sets of consequences. One possibility is that inflation would be tolerated -- in which case it would have been better to cut unemployment by expanding output through fiscal stimulation. Another is that government will act to curb inflation by allowing unemployment to rise back up to its prior level -- in which case everyone will end up worse off because output will have been lowered with no gain in employment.

In contrast to Hunt, who had explained the fallacy in terms of the microeconomic behavior of the firm, Layard *et al.* explained it as a failure to anticipate an eventual macroeconomic policy response from the government. In restating Layard's argument, Katz left it unclear whether the eventual spoiler of the expected employment gains was the firm or the state, "A reduction in the unemployment rate is likely to increase the bargaining power of incumbent workers and lead to wage increases that reduce the employment gains" (1998: 374).

Although the Hunt and Layard versions each offer partial explanations of why a work-sharing strategy may not be effective under different specified circumstances, they both digress from the conspicuous charge of fallacy. The differences between the two versions highlight their improvised and incomplete status. Neither version establishes why advocacy of work-sharing must, *necessarily*, rest on a belief in a fixed amount of work. Because that claim is unsubstantiated -- indeed, cannot be substantiated because it is incorrect -- the subsequent "explanations" of why such a belief is fallacious are gratuitous.

Surveying the various instances where the lump-of-labor fallacy is invoked, it becomes clear that the ad-hoc quality of explanation is yet another characteristic feature. Those who use the phrase and allege that work-sharing advocates assume a fixed amount of work seem to sense that there is something missing in the argument, so they tack on an explanation borrowed from somewhere else in the economists' bag of tricks. What is really missing, though, is evidence for the charge, a logic for the "implied" assumption and an authoritative source for the legendary fallacy.

Stalking the Elusive Fallacy

Although it has been described as one of the best-known fallacies in economics, "which first-year students are taught to refute" (Anon 1996), the lump-of-labor fallacy is omitted by most economics reference books. Three economics dictionaries that do include entries for the lump-of-labor fallacy are the *Oxford Dictionary of Economics*, the *Routledge Dictionary of Economics* and the *Canadian Dictionary of Business and Economics*. All three dictionaries define the fallacy as a belief in a fixed amount of work, but they diverge when it comes to explaining how it deviates from economic reality.

The *Oxford Dictionary of Economics* claims that the lump-of-labor view "ignores the possibility that the demand for labour may depend on the relation between wage rates and the value of work to employers" (Black 1997: 281). The Routledge volume points out that the view "suggests that macroeconomic policy is limited in its ability to stimulate an economy" (Rutherford 1992: 276). The *Canadian Dictionary of Business and Economics* avers that the fallacy "ignores the possibilities for new consumer wants and new industries in stimulating growth and creating more jobs" (Crane 1993: 385). All three entries associate the lump-of-labor fallacy with proposals for shorter hours of work. None of them explains why such proposals imply a belief in a fixed amount of work. Nor does any of them cite an authority for the oddly-named fallacy.

With the notable exception of Samuelson's famous introductory textbook, *Economics* (see Samuelson and Nordhaus 1998: 239-240), contemporary economics textbooks omit discussion of the lump-of-labor fallacy. An introductory economics textbook widely used in the 1920s, 1930s and 1940s, Bye's *Principles of Economics*, dutifully featured an exposition of the fallacy (1927: 48-51). Neither Bye nor Samuelson presented evidence for the charge of a belief in a fixed amount of work and their respective explanations of its economic consequences differed. The longevity of Bye's textbook, first published in 1924, and Samuelson's, which was a staple in first year courses from the 1950s through the 1970s lends credence to the description of the lump-of-labor fallacy as something first-year students were taught to refute. Evidently, though, students were only taught to refute the fallacy as alleged, not to question the authenticity or cogency of the allegation.

Not a Simple Sum in Arithmetic

The claim of a lump-of-labor fallacy can be traced back to the 1890s -- a time of widespread agitation in England and the United States for the eight-hour day -- when the phrase appeared in an article about piece-work by David Schloss (1891a):

The basis of this belief, which is in a large measure responsible for the unpopularity of piece-work, is that noteworthy fallacy to which I desire to direct attention under the name of 'the theory of the Lump of Labour.'

In accordance with this theory it is held that there is a certain fixed amount of work to be done, and that it is best in the interests of the workmen that each shall take care not to do too much work, in order that thus the Lump of Labour may be spread out thin over the whole body of work-people (1891a: 324).¹ In an earlier article, Schloss (1891b) had used the same expression, "the lump of labour", not in connection with a reputed theory or fallacy but simply as a rustic specimen of working class slang. From the perspective of its current usage, the most interesting thing about Schloss's seminal discussion of "the theory of the Lump of Labour" is that he avowed it had *nothing to do* with the question of the length of the working day (1891a: 325). Schloss himself expressed sympathy toward proposals for an eight-hour day, which he held to be both economically and socially desirable.

No mention of a lump of labor occurs in any of the prominent articles or books of the day addressing the issue of the eight-hour day, such as *The Eight-Hours Day* by Sidney Webb and Harold Cox or John Rae's *Eight-Hours for Work* (Webb and Cox 1891; Rae 1894). In the latter book, though, Rae vigorously attacked the idea that shorter hours could offer a cure for

¹ Schloss's article on piece-work was reprinted in his *Methods of Industrial Remuneration* (1894). In a review of the French translation of the book, F.Y. Edgeworth (1902) referred to Schloss as the expositor of the fallacy.

unemployment. Rae's full argument stands in ironic contrast with those of contemporary opponents of shorter work time. Rae strongly supported the call for an eight-hour day on the grounds that it would make industry more efficient. His argument against shorter hours *as a cure for unemployment* was based primarily on his conviction that shorter hours would result in the same (or lesser) number of workers performing the same (or greater) amount of work in a shorter time (1894: 181). His sharp polemic against an alleged economic fallacy was a secondary theme that echoed a venerable employers' complaint, which held that workers, and especially trade unions, conspired to restrict work effort:

(...) and (2nd) from yielding to the gross but evidently very seductive economic fallacy, which leads so many persons to think that they will all increase the wealth they individually enjoy by all diminishing the wealth they individually produce, and to look for a great absorption of the unemployed to flow from a general restriction of production, the very thing which in reality would have the opposite effect of reducing the demand for labour, and throwing multitudes more out of employ (1894: 181).

Rae summarized his analysis of the eight-hour day and the unemployed with the conclusion that "the most trusted and popular argument in favour of the eight hours day constitutes really its only serious practical danger" (1894: 216).

The bulwark of Rae's argument was his demonstration that the redistribution of work time was not "a simple sum in arithmetic" (Rae 1894: 179). Although this part of his argument was compelling, it was not original. The same point had been eloquently presented several years earlier by Francis Amasa Walker (1890: 808). Walker had confined his case to disputing only the more simplistic slogans of eight-hour day agitators. Rae, however, tried to stretch the rebuttal to cover the economically sophisticated arguments of shorter hours advocates such as Sidney Webb and Harold Cox (1891: 103-115). Rae curtly dismissed Webb and Cox's analysis, expressing incredulity that the unemployed should "obtain employment from capital which only comes into being as the result of their employment" (Rae 1894: 215).

Rae's dismissal of Webb and Cox was both feeble and bizarre. At face value, it was nothing more than a blunt reaffirmation of the discredited wages-fund doctrine of classical political economy, which held that wages could only be paid out of a preexisting fund of circulating capital that was fixed in the short term (on the wages-fund doctrine and controversy, see McNulty 1980: 76-80, 111-117). Even Rae's conclusion that reductions in work time combined with restrictions on work effort would result in more, rather than less unemployment was subsequently shown by Beardsley to rely on the wages-fund doctrine and its underlying assumption that the relative shares of wages, profit and rent are immutable (1895: 452-455).

Rae's reversion to the wages-fund doctrine was as much an enigma as it was an anachronism. In an earlier book, he had described the doctrine as "dead and buried" in its original form and "little more than a stately truism" in its revised, more flexible formulation (1891: 491). Adding to the heap of self-contradiction, Rae's polemic against the restriction of work effort revolved around yet another version of the wages-fund doctrine. John Wilson (1871) had been explicit twenty years earlier when he berated a "Unionist reading of the Wage-fund theory." In Wilson's account, the trade unions put this theory into action through "the enforcement of all sorts of arbitrary restrictions on the combined workmen with the avowed object of securing that the work to be done shall be divided among as many (Unionist) hands as possible" (1871: 243).

Rae's attempt to show that reducing the hours of work would not relieve unemployment thus relied on variously affirming and denying the self-same doctrine, depending on where he was in the course of the argument and who was presumed to be speaking. Given the equivocal nature of Rae's argument, it is not surprising that it never become solidly established as economic theory. But his conclusion evidently appealed to the prejudices of employers associations and newspaper editorialists in the early 1900s, in whose hands Rae's extraordinary inconsistency even lent itself to a "salami tactics" of isolating and refuting -- with distinctly different arguments -- one facet after another of the case for the eight-hour day.

The lump-of-labor case against shorter work time thus emerged as a hodgepodge of borrowed working-class slang, middle-class prejudice and archaic economic doctrine. The original expression had nothing to do with working time. It was grafted to an argument against shorter hours as a remedy for unemployment that was Byzantine in its self-contradictions. Most bewildering and disheartening is that this odd collection of remnants has eclipsed the coherent and formerly acclaimed theory of hours presented in 1909 by Sir Sydney Chapman.

S.J. Chapman's Theory of the Hours of Labor

Chapman revisited the issue of the hours of labor in his presidential address -- delivered in Winnipeg, Manitoba -- to the British Association for the Advancement of Science, Section on Economic Science and Statistics (1909). That analysis came to be considered the "classical statement of the theory of 'hours' in a free market" (Hicks 1932: 102n.; Nyland 1989). Arthur Pigou restated Chapman's argument in *Economics of Welfare* (Pigou 1952; 462-469). Alfred Marshall referred to Chapman's analysis as authoritative, as did Lionel Robbins (Marshall 1961: 695; Robbins 1929: 25). Concluding his footnote reference to Chapman and Pigou, Hicks declared, "There is very little that needs to be added to the conclusions of these authorities." Very little, perhaps, other than the strange occurrence that although Chapman's argument has never been challenged, economists today are oblivious to its major conclusions. Most are unaware not only of the theory's authoritative status but even of its existence.

Unlike Rae, Chapman saw no particular danger in workers' views -- "fallacious or otherwise" -- about the mechanics of distribution (Chapman: 365). On the contrary, Chapman suggested that such attitudes probably had protected workers "against the injurious consequences of short-sightedness."

Chapman began his discussion of the hours of labor by reviewing the mass of evidence that reductions in the hours of work had not led to proportionate declines in output. Chapman attributed the phenomenon to the fact that as production methods become more intensive, workers require more leisure time to fully recover from the fatigue of work. He emphasized that in modern industry fatigue was increasingly psychological, resulting from the demands of modern industry for specialization and mental concentration as well as from the workers' attitude toward leisure rather than from the strictly physiological demands of the work. When the hours of labour were reduced, the better-rested workers were often able to produce as much or more in the shorter hours than they had previously in longer hours.

The total value of the output from standard working days of different lengths would thus initially increase as the day became longer but eventually the total output -- not only the output per hour -- would decline as the standard day became too long to allow the worker to

recover sufficiently from fatigue. Beyond a certain point, each additional hour of work would continue to add a quantum of output to the current day's total output but only at the expense of reducing the next day's hourly pace. What that point was, Chapman maintained, depended on the intensity of the specific production methods and thus would vary in response to changes in those methods.

Having established the idea of an optimal length of standard working day that would maximize output, Chapman next turned to the questions of whether such an optimal length would likely be established by the workings of a free market and whether the optimal length of day for output coincided with the optimal length from the perspective of the workers' welfare. His conclusions in both cases were negative.

From the perspective of the employer, Chapman argued, the optimal length of day for output could only be achieved if all employers acted in enlightened accord. This is because the maintenance of the long-term optimum would always require some short-term restraint. A single employer could never be entirely certain of reaping the benefit of that restraint. Another firm could always potentially offer a small wage premium and hire away the first firm's well-rested workers. For employers, the optimal output worktime would thus be a form of investment without equity:

The reforming employer would run the risk of paying the whole cost of the labour value created by shorter hours and getting little in return; other employers might secure and exhaust the new labour value and no permanent good would be effected (1909: 361).

From the perspective of the worker, the optimal length of day could, for all practical purposes, be considered to be shorter than the optimal length of the day for output. Chapman considered three elements in assessing the optimal day for the worker:

- the wage, which Chapman assumed for the purpose of analysis to exactly equal the worker's marginal productivity;
- the marginal value of leisure, which Chapman assumed to vary in response to changes in the level of wages; and
- the disutility of work, which Chapman assumed to also be a function of the length of the working day -- during some intermediate period of the working day, Chapman assumed that work could often be experienced as pleasurable.

Chapman maintained that in forming their ideal of a working day, workers' would disregard the effects of changes in work time on efficiency, and hence on wages. As a consequence they would tend to prefer a working day longer than would be prudent in the long run, even though it would not be as long as that preferred by employers acting competitively. Thus the exclusive concern of both employers and workers with immediate self-interest would bias the preferences of each toward longer than optimal hours (1909: 367).

In the two decades following Chapman's address, his demonstration of market failure in the determination of working time led to systematic empirical study of the relationship between fatigue and work intensity. According to Nyland (1989), however, attention to the question of work intensity faded during the 1930s and after, largely because "the fact that worktime had both a temporal and intensive character made it difficult to utilise marginal productivity theory to determine the return on various factors of production" (1989: 33). As a simplifying abstraction, economists assumed that the given working day was of optimal length. Eventually, the hypothetical -- and *antithetical* -- status of that assumption came to be

overlooked. Economists negligently reverted to a pre-Chapman faith that unencumbered market forces would spontaneously lead to the establishment of an optimal length of work time.

The Lump-of-L Model: An Imperfect Substitute

A production function describes mathematically the transformation of economic inputs - such as labor, machinery and raw materials - into outputs. Economists who criticize work-sharing sometimes represent the "best-case scenario" for work-sharing by a model of the production function in which labor services, L , equal the number of workers, N , times the average hours worked by each worker, H (see, for example, Hoel 1985; Hart 1987; Freeman 1998; Katz 1998).² The model is written as $L = f(NH)$. According to the critics, the assumptions underlying the model are that hours per worker and numbers of workers are perfect substitutes, hourly wages are constant, there are no fixed costs of employment, workers are homogenous and productivity is unaffected by the length of work time. It is easy to show that the stated assumptions are unrealistic and to conclude from that demonstration that the employment effects of a reduction in work time would certainly be considerably less than anticipated by the model and could often be negative.

However, there is also an unstated and ultimately damning assumption at the core of the demonstration. It is an assumption made by the critics of work-sharing, not by its advocates. As mentioned earlier, mainstream neoclassical economists in the 1930s abstracted from the question of work intensity central to Chapman's theory of hours. That simplifying abstraction, and the failure of economists to consistently think back from their abstractions to a more realistic form, led eventually to the implicit assumption that free labor markets would establish an optimal working day or week. Movement away from that presumed optimum could then be assumed to generate suboptimal outcomes for both output and welfare. The model where workers and hours are perfect substitutes thus represents the "best case scenario" only if we also assume -contrary to theory and much evidence, but in accord with the simplifying abstraction of the neoclassical economists -- that the given working time arrangements are optimal both for output and for the welfare of the currently employed.

Advocates of shorter work time do not assume that current working time arrangements are optimal. Thus they expect that policy efforts to redistribute working time can improve productivity and the welfare of the currently employed as well as create new jobs. Those expectations are more likely to be based on observation of current conditions in the labor market than they are on an understanding of Chapman's theory of hours. However, unlike the simplifying abstraction of the neoclassical economists, those observations are consistent with Chapman's theory.

If we assume, following Chapman, that for any given interval (day, week, year or lifetime) there is some hypothetical length of work time that would optimize total output per worker (O) and another, lesser length that would optimize hourly productivity (P), then current average hours of work (H) must occupy one of five positions in relation to those two optima:

- 1) greater than the output optimum ($P < O < H$)
- 2) equal to the output optimum ($P < H = O$)
- 3) between the output optimum and the productivity optimum ($P < H < O$)

² See, however, Feldstein (1967), who described and criticized the model more generally as the *traditional* specification of the production function for labor.

- 4) equal to the productivity optimum ($P = H < O$)
- 5) less than the productivity optimum ($H < P < O$)

For purposes of analysis, the second case, where current hours of work equal the output optimum, can be merged with the third case where current hours lie between the output and productivity optima. Table 1, on the following page, summarizes the net employment effects implied by a reduction in work time for the four remaining scenarios, now labeled A through D.

Table 1: Projected net employment effect of a reduction in work time

Scenario	Initial condition	Redistributed	Unit labor cost	Demand induced
A	$P < O < H$	None	Lower	Gain
B	$P < H \leq O$	Gain (less than C)	Lower	Gain (less than A)
C=f(NH)	$P = H \leq O$	Gain	No change	None
D	$H < P < O$	Gain (Loss) ³	Higher	Loss

According to table 1, scenario C -- the perfect substitute model -- is not the only one that offers grounds for expecting a positive employment effect. Furthermore, there is nothing in the analysis to suggest that scenario C would necessarily create more jobs in total than either scenario A or scenario B. It would, hypothetically, *redistribute* more work time from hours to employment. However both A and B also imply labor cost savings and thus the potential to create additional jobs through the effect those lower costs would have on the demand for labor. That reduction in unit cost could translate into either:

- a wage increase, partially compensating for lost income from reduced work time;
- product price cuts, which could be expected to result in a greater quantity of product demand and therefore a demand-induced employment gain; or
- some intermediate mix of wage increases and price cuts.

The plausibility of scenarios A and B can be tested by supplying estimates for the variables. In his analysis of long-term productivity trends, Denison (1962) estimated the optimum output week to be close to the level of average weekly hours performed in 1929, 48.6 hours. He further suggested that small reductions in work time below that level would be partially offset by gains in productivity until a point of maximum hourly productivity was reached, which he projected to be 33.9 hours. Below that point, he suggested, a further reduction in work time would result in a more than proportionate fall in output. About 60 percent of workers in Canada and the US currently work weekly hours in the range between Denison's estimated productivity optimum of 33.9 hours and his output optimum of 48.6 hours (Statistics Canada 1997; US Bureau of Labor Statistics 1999). Table 2, below, integrates Denison's estimates into the projections of net employment effects.

Table 2: Estimates for O and P

Scenario	Denison estimates	Redistributed	Unit labor cost	Demand induced
A	$P < O = 48.6 < H$	None	Lower	Gain
B	$33.9 < H \leq 48.6$	Gain (less than C)	Lower	Gain (less than A)
C=f(NH)	$P = 33.9 = H \leq O$	Gain	No change	None
D	$H < P = 33.9 < O$	Gain (Loss)	Higher	Loss

The estimates presented in table 2 can be used to project the changes in total output and hourly output per worker that may be expected to result from a given reduction in work time.³ Using Denison's estimates, for example, a 10 percent reduction in the average work

³ The estimates in this section are based on linear interpolation of values between the two optima. That is, given an output optimum, defined as one unit per hour at O hours per week, and a productivity optimum at P

week for full-time workers, from 42 to 37.8 hours, would result in a 5.6 percent loss of output per worker. Output in the reduced work time would be partially offset by a 4.9 percent gain in hourly productivity. To maintain the same total output as before the change would require that full-time employment be expanded by 5.9 percent. That is not to say overall employment would expand by that amount, because the change would represent a reduction in work time mainly for those who currently are working more than 37.8 hours per week and not across the entire workforce. Nor would the change necessarily induce a large drop in the nominal unemployment rate, since a considerable proportion of the newly created full-time employment might be filled by augmenting the hours of people currently working only part-time.⁴ The productivity gains would be large enough to cover the growth in fixed employment costs resulting from expanded employment and provide for a moderate wage increase to partially offset income lost from reduced hours of work.

Since the 1960s economists have warned that reducing the hours of work would increase labor costs, given the presence of fixed costs of employment (see Oi 1962; Ehrenberg 1971; Hart 1987). Such an increase in labor costs, it is often feared, could lead to negative employment effects from shorter work time. While it is true that with fixed costs a reduction in hours would raise the average *hourly* cost of labor, the hourly cost is not the relevant point of reference for labor costs -- the cost per unit of output is (Pfeffer 1998). If hourly productivity increases more than hourly labor costs, the net result is a decrease in unit labor costs. Again using the above example, if we assume that 20 percent of total labor costs are fixed per person costs, the 5.9 percent expansion in full-time employment would translate into a 1.2 percent rise in the hourly labor cost -- less than a quarter of the estimated 4.9 percent productivity gain.

There is one catch. The hourly cost increases would occur immediately while the productivity adjustment could only be realized over time. Furthermore, the larger the projected productivity gains, the longer would be the period of adjustment needed to achieve them. If we assumed that the gains would be forthcoming instantaneously, the case for shorter hours would appear deceptively strong. However if we acknowledge, with Chapman, that the productivity gains take time to present themselves, the presence of high fixed costs of employment significantly increases the investment required to make the transition. How long it would take to pay back that investment would depend on the ratio of fixed costs to variable costs, the timing and size of wage increases, the size of the productivity gains and the time it takes to achieve them.

Fixed employment costs thus do impose a formidable hurdle to reducing working time. But the hurdle does not result from increased unit labor costs, it reflects the cost of adjustment and the risk inherent in investing in potentially mobile workers. Those barriers could be reduced or overcome, either by government action to convert currently fixed costs to variable costs, as suggested by Golden (1992), or by labor- management cooperation to

hours ($O > P$), the output for any H hours, located between O and P , is calculated as: $O - \frac{((O-H-1)/2+1)(O-H)}{(O-P)}$. For example, given the Denison estimates for O and P , the estimated output at 42 hours would be $48.6 - \frac{((48.6-33.9-1)/2+1)(48.6-42)}{48.6-33.9} = 46.89$ or 96.5 percent of the optimal output at 48.6 hours. The estimated output at 37.8 hours would be $48.6 - \frac{((48.6-33.9-1)/2+1)(48.6-37.8)}{48.6-33.9} = 44.27$ or 91.1 percent of the optimal output.

⁴ The conversion of some part-time positions to full time may be expected, as a secondary effect, to contribute a small further rise in productivity and hence reduce slightly the short-term employment gains (but potentially expand the long term gains).

phase in work-time reductions with wage increases keyed to productivity gains. In looking for ways to surmount the barriers to adjustment, it is important to understand that the magnitude of those fixed employment costs is not an artifact of the free market.

The Injurious Consequences of Short-Sightedness

Ninety years ago, when he warned against the injurious consequences of shortsightedness, Chapman had in mind the short-sightedness of employers acting selfishly and the short-sightedness of workers who neglected the effects of long hours both on their immediate enjoyment of life and on their long-term earning capacity. Today, there is growing evidence that rather than correcting for the short-sightedness of employers and workers, public policy may be making matters worse by offering perverse incentives that favor longer hours of work and precarious employment.

Although fixed employment costs are sometimes portrayed as immutable barriers to shorter work time, they are "fixed" only in the relative sense that in the short term they are less responsive to changes in work hours than are variable costs. Fixed costs vary considerably over the long run. As has been noted in public consultations in both Canada and the United States, much of the growth in fixed labor costs can be traced to government policies (Osberg 1997; US National Commission for Manpower Policy 1978). Osberg pointed out that in Canada the design of federal payroll taxes, which require contributions on income only up to an amount somewhat below the median income level, along with tax exemptions for employer-paid fringe benefits, encourage firms to increase overtime hours rather than hire new employees (1997: 155-156).

In Canada, during the period from 1976 to 1995, there has been a polarization of the hours of work away from a standard 35-to-40 hour week. In 1995, 54 percent of the work force put in between 35 and 40 hours a week, compared to 65 percent in 1976 (Statistics Canada 1997). During roughly the same period, payroll taxes doubled as a percentage of GDP, from 3 percent in 1970 to 6.3 percent in 1992 (Picot *et al.* 1995: Table 4, 3.13). Because of upper limits on the amount of earnings subject to taxation, the impact of this increase fell disproportionately on those earning median incomes. By targeting the highest rates of payroll tax close to the median income level, policy makers may also have been inadvertently targeting the median arrangements for hours of work -- the standard 35-to-40 hour week.

Policy needs to pay attention not only to the presence of fixed costs but to the trend and history of their growth. Golden (1992) found that the growth of fixed labor costs in the post-war US economy tended to lengthen the average workweek, reduce aggregate employment and raise the incidence of layoffs. Furthermore, an unintentional policy bias in favor of long hours may lead to employment losses both immediately and in the long term. The immediate loss comes from providing perverse incentives to employers that maldistribute the available work. Ironically, the full extent of short-term employment losses may be concealed statistically by the proliferation of part-time and precarious employment. The long-term effect may be to impair productivity growth and thus to inhibit the demand driven expansion of employment and augmentation of wages. Ultimately, unemployment, underemployment and overwork themselves add to the cost of social supports and medical services thus contributing to an upward spiral of the fixed component of employment costs.

Conclusion

The character of the lump-of-labor case against work-sharing may be summed up by contrasting mainstream economists' longstanding trepidations toward reducing the hours of work with their usually confident embrace of other labor saving innovations, such as computers, machinery or power technology. Strange as it may seem, the reduction of work time is a labor-saving device, albeit a uniquely worker-friendly one.

Over the long run, the way that shorter work time creates jobs is no different from that of any other aid to efficiency, whether it be a mechanical loom or a silicon chip. In the past, reducing the hours of work has created jobs by lowering the costs of production and thus by making the products of industry more affordable to consumers. Unlike other labor saving devices, though, limiting the hours of work can also create jobs in the short term by redressing current imbalances in the distribution of work. Also unlike other labor saving devices, progressively reducing the hours of work makes a priceless good, free time, directly available to workers in ever greater abundance. The claim of a lump-of-labor fallacy is an unwarranted rationalization that obstructs serious discussion of the benefits of shortening work time.

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