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Labour productivity and industrial relations

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1 Introduction
This paper provides a brief overview of the meaning, effects and causes of labour productivity, and in particular its relationship to industrial relations.1 It is structured as follows. Section 2 explains the concept of productivity. Section 3 discusses reasons for its importance and Sections 4 and 5 look at the factors that increase or decrease labour productivity at the macro (economy-wide) and micro (workplace) levels respectively. Section 6 concludes.

2 What is productivity?
Productivity is the ratio between the quantity of goods and services produced (the output) and the quantity of inputs. There are three main measures of productivity: labour, capital and multi-factor productivity (defined in Box 1).

Box 1: Measures of productivity

1. Labour productivity — measures the ratio of output to labour input (e.g. widgets per worker or, more usefully, widgets per labour hour). If employees work harder to produce more widgets per hour, or work with more efficient machinery that enables them to produce more widgets per hour, then labour productivity will be higher. Labour productivity is related to the quantity of labour input, not its cost. (In this example a ‘widget’ might be a tonne of coal dug from the ground, a manufactured vehicle, or a plate of food served in a restaurant – anything that is output from a production process.)

2. Capital productivity — measures the ratio of output to capital input. A widget factory, which has two shifts of employees using the same equipment at different times, will have higher capital productivity than a widget factory that only has one shift of employees and therefore has the equipment idle for a larger amount of time.

3. Multi factor productivity (MFP) relates output to more than one input – typically, a weighted average of both capital and labour inputs. Reference is sometimes made to ‘total factor productivity’ which seeks to relate output to all inputs, but this is rarely used as capital and labour are considerably easier to measure than other inputs such as land.

When more than one item of output (e.g. tonnes of coal and bars of steel) is being measured, then some method must be used to weight the relative importance of each output. That will normally be done by using the relative values of the two items at a particular point in time (often the first year of observation). But subsequent changes in the values of those items are irrelevant for measuring productivity; all that is relevant, on the output side, is changes in the quantity of output. There is an example on calculating labour productivity in Appendix A.

1 My deep gratitude goes to Olav Muurlink and Katherine Ravenswood who undertook a significant part of the research underpinning this paper through their work on a project earlier in 2014 on New Zealand productivity.
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Measures of productivity are based on quantities, not prices. Productivity is not measured by the value of output, or the cost of input, or the amount of output not produced when there are no hours worked due to strikes. Debate is often complicated by confusion or sometimes obfuscation over the meaning of productivity. Reading the national accounts, where reference is made to ‘GDP per hour worked’, people may sometimes misinterpret this as meaning it incorporates a nominal (price-included) measure of GDP, rather than a real (price-excluding) measure. Because the national accounts use a real measure, productivity is expressed as an index there. Hence what is of interest in the national accounts is not the value of productivity at a particular point in time but how that value compares to other points in time.

There are considerable difficulties in measuring productivity. The optimal approach is to measure the physical quantity of output divided by the person-hours used to produce it. In national accounts these quantities are combined using weights that reflect the value of outputs at some point in time (that is, prices help to establish the weights for calculating productivity in a base year, but changes in prices have no direct impact on measures of productivity). Sometimes person-hours are not available and, particularly for older data, only output per employee is available. (This can be distorted by changes in part-time work or hours worked). For some historical international comparisons only real gross domestic product (GDP) per capita is available. (This is a poorer measure again, because it can also be distorted by changes in the employment rate or the age composition of the population.) Some measures of labour productivity (in the national accounts) are quality-adjusted, that is they seek to control for changes in the skill level of a workforce over time.

Improvements in the productivity of a particular factor of production do not necessarily represent changes in that factor’s contribution to production. For example, labour productivity is crucially influenced by the technology with which labour works, a result of managerial decisions rather than the effort applied by workers.²

Productivity is a concept that is not widely understood, including by workplace managers, who often mean something else when they answer questions about productivity (for example, in the 1995 Australian Workplace Industrial Relations Survey).³ Labour productivity is not directly changed by movements in the value of either the output (its price) or of the input (the hourly wage). So if the price of the product goes up, that does not mean labour productivity has gone up. If the wage (whether in the form of a base rate of pay, penalty rate or overtime premium) paid to the workers producing it goes up, that does not mean that labour productivity has gone down.

It does not follow that changes in prices or wages have no indirect impact on productivity, but that does not always go the way preconceptions might lead. For example, if the price of labour, the wage, goes up, then firms may have an incentive to re-organise firm production and invest in labour-saving technology. The introduction of labour saving equipment will mean that less labour is required to produce the same output. Factors such as the introduction of new technology, improvements in education and training of the workforce, an increase in non-labour inputs relative to labour and labour-saving devices, can improve labour productivity.⁴

⁴ ABS (2008), Feature article: a spotlight on quarterly labour productivity, Australian Economic Indicators, cat. no. 1350.0
A more unusual example comes from mining. High mineral prices made it profitable for mining companies to dig deeper to get to iron ore or coal. The amount of labour needed to produce a tonne of ore increased, because workers were removing more rock to get to the ore, and so labour productivity fell. In the mining industry, labour productivity slumped by over half (Figure 1), in no small part because of rising commodity prices which led both to higher profits and to lower-grade (and hence lower-productivity) ore bodies becoming more attractive to mine.

**Figure 1: Indexes of Labour Productivity in Mining, and Non-rural Commodity Prices, 1989–90 to 2012–13**

![Graph showing labor productivity and commodity prices](source)

Eventually, of course, commodity prices fell. An illustration of the confusion over the meaning of productivity was shown in a survey that asked members of the Australian Mines and Metals Association (AMMA) questions regarding factors affecting productivity; the report claimed that "the fall in commodity prices was… the most decisive factor in limiting improvements in labour productivity of all the factors listed" (emphasis added). Yet as discussed above, falling commodity prices would lead to higher productivity. Presumably respondents were thinking of profitability while answering in relation to productivity. It is important not to confuse prices and quantities when talking about productivity.

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3 The significance of productivity

Productivity is important because it provides the foundation for increases in living standards. Higher productivity means greater output per worker, and the greater value from that output can be shared between workers (in the form of higher wages) and employers (in the form of profits). By contrast, some argue that higher productivity is needed to remain competitive in the world. This is much less relevant. It is true that productivity is one of the influences on competitiveness. However, competitiveness is also influenced by such factors as quality, costs, delivery time and exchange rates. Variations in exchange rates alone have a far bigger impact than variations in productivity in explaining whether Australia has become more or less price competitive.

This is illustrated by Figure 2, which shows the extent to which variations in national price competitiveness between Australia and the USA from 1983 onwards arise from movements in productivity and in exchange rates (that is, it shows the impact on relative prices of Australian goods in relation to US goods and services as a result of those two factors).

Figure 2: Influences of exchange rates and relative labour productivity growth on USA/AUS price competitiveness


The upper (thick) line shows that, from year to year, differences in labour productivity growth between Australia and the USA had a slight impact on national competitiveness. The lower (dashed) line shows that movements in the exchange rate had, by comparison, a very large impact.

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7 e.g. Lydon, J, Dydon, D & Bradley, C (2014), *Compete to prosper: Improving Australia’s competitiveness*. Melbourne, McKinsey Australia.

8 e.g. Krugman (1994), p11.
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on national competitiveness (a rising AUD made Australian exports more expensive and so less ‘competitive’ on world markets). So productivity has an influence on competitiveness (as does the size of wage increases relative to those in our trading partners), but that is minor compared to the influence of exchange rate movements. The significance of productivity pales further when account is also taken of the influence of such factors as design, quality, reliability, networks and delivery time on competitiveness.

Productivity is more important, as mentioned, in terms of its link to potential living standards. In particular, higher labour productivity means greater output per worker, and the greater value from that output can be shared between workers (in the form of higher wages) and employers (as higher profits).

While higher labour productivity creates the potential for higher wages, it does not follow that it will lead to higher wages. At the aggregate level, if this were to happen, the relative shares of wages and profits in national income would remain broadly constant (assuming no major change in the government share of national income). However, since the 1980s this has not occurred. That is, in a number of countries (albeit to varying degrees) including Australia, the relative share of income going to capital (profits) has increased and that going to labour (wages) has declined, leading to what has been called the ‘decoupling’ of wages and productivity and debate over the implications of this ‘decoupling’. 9

4 What increases or decreases labour productivity at the macro (economy-wide) level?

Factors that affect productivity can be considered as operating at the macro (economy-wide) or the micro (workplace) level.

Matters at the macro level include issues like: the geography of suppliers and markets; the nature of product markets including the extent of producer competition; education and skill levels; the relative cost of capital and labour; business cycles; and climate and the physical environment. Significant parts of trans-Tasman or trans-Pacific gaps in labour productivity are due to differences in economies of scale, geographic isolation or industrial structure. 10 Technology and innovations within it are critically important. 11 Indeed, several observers (including private sector economist

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Ric Simes and Professor John Quiggin) have argued that the debate on productivity would be improved if we instead used a different term, ‘technological progress’—‘that is, the introduction of technological innovations such as new products and improved production technologies’. So another part of that trans-Tasman productivity gap is explained by differences in capital-intensity—that is, capital invested per worker. The skills (obtained through education and training) to be able to design, maintain and use technology are also therefore important.

Labour productivity is influenced by the relative costs of labour and capital. If labour is relatively cheap compared to capital, then firms are more likely to employ labour than capital. This will impede labour productivity growth. Countries with low wages have low labour productivity. For example, in a developing country such as China, it is expected that as wages increase, labour productivity must rise in response, which may lead more labour-intensive industries to relocate to lower cost countries. Further, in an Australian context, when the centralised prices and incomes Accord of the 1980s caused a drop in real award wages, there was a sharp drop-off in labour productivity growth. (At the time, changes in minimum wages in awards largely drove changes in actual wages for most workers.)

Low minimum wages may allow inefficient employers to remain in business and facilitate a ‘low cost, low skill “equilibrium”’. In the short to medium term, how much higher minimum wages would lead to higher productivity might be constrained by how much low-wage employers are willing to invest in training and technology, a result of a ‘free rider’ problem in coordination of training. The relationship is unclear, however, as there is some evidence that wage compression

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increases training\(^\text{20}\) and that the introduction of the UK national minimum wage may have increased (or at least not decreased) training.\(^\text{21}\)

The business cycle also matters. In the shorter run, labour productivity is very sensitive to movements in the business cycle.\(^\text{22}\) When economic activity starts to decline, firms tend to hoard labour, reducing labour productivity. This is because there are high costs involved in retrenching and rehiring and firms do not want to lose skilled employees.\(^\text{23}\)

Policy reforms might have an effect, but the issue is controversial. Australia experienced one brief surge in productivity growth in part of the 1990s. A view at the time, associated with the Productivity Commission, was that microeconomic reforms were a key driver of that surge.\(^\text{24}\) After that, however, productivity growth slowed substantially, suggesting the reforms provided no permanent impetus to productivity growth. John Quiggin argued that the higher productivity growth rate achieved in Australia in just one growth cycle was probably a statistical illusion anyway. That is, it was not a signal that reforms had delivered a ‘new economy’ that could produce permanently higher productivity growth rates, but rather, a blip caused by overestimation and, most importantly, an unsustainable increase in work intensity that was subsequently wound back, at least partly.\(^\text{25}\)

Finally, in addition to economic factors, labour productivity may be affected by environmental factors and is forecast to be reduced during increasing periods of high humidity and heat caused by climate change.\(^\text{26}\) Therefore, when thinking about policies that affect long-term productivity growth, our attention also needs to go to matters that some do not think of as being ‘economic’.

5 What increases or decreases labour productivity at the micro (workplace) level?

What workplace factors influence productivity? Some of these relate to workplace industrial relations (IR), and some simply are a function of decisions of management that are outside the traditional framework of ‘industrial relations’. These issues help us appreciate the relative contribution of IR matters to productivity.


Workplace influences include product innovation; product choice; workplace economies of scale; exporting; the quantity, quality and age of workplace equipment; how appropriate technologies are; how well-engineered work flows are; how effective inventory control or marketing strategies are; quality control procedures; and management information systems. Management and luck are directly, and often exclusively, responsible for these factors, unless some form of employee voice (discussed below) is in place. Workplace training practices will also have an important impact on productivity.

Then there are some factors that come within the purview of industrial relations. Work organisation—that includes how equipment is used, the layout of a workplace, the extent of downtime, the flexibility in the use of labour—is inherently important in shaping workplace productivity.

Labour flexibility, 'like beauty or taste', can 'mean all things to all people' and is a 'catch-call for improving labour productivity'. Employers and employees may interpret the term flexibility differently. For example, flexibility for employees—when companies change work practices or working time to better suit worker needs—may be associated with improved firm performance via measures such as better employee morale, reduced absenteeism and turnover, and a larger and higher quality talent pool, and many employers see these as positively affecting productivity.

Flexibility by employees may take the form of numerical or functional flexibility. Functional flexibility—the ability of management to deploy labour to different tasks—typically increases labour productivity, as it means the same worker is able to undertake more activities and, most likely, generate more output. Still, if it results in increased work intensity there will be limits to the gains that can accrue. Eventually, however, employers find that increases in work intensity or working hours become unsustainable, with resistance potentially manifested in absenteeism, quits, losses in loyalty, problems in quality of output, even possibly sabotage.

The situation is even more ambiguous for numerical flexibility—that is, the employer’s capacity to adjust the quantity of labour inputs. On the one hand, if ‘quiet’ periods for labour are reduced, an employer can avoid falls in labour productivity in those periods, especially where employees want...
casual work. On the other hand, insecurity and uncertainty associated with casual work are likely to have negative impacts on morale, commitment and retention; training and skill development may also be reduced.35

Research on the relationship between pay systems and productivity suggests that a link exists,36 but with some important complicating factors. A positive relationship depends on there being strong ties between individual effort, measured productivity and pay, without intervening factors. These factors may include the potential for short cuts, health and safety problems, and restrictions on output, multiskilling or cooperation37—as well as the critical role of perceived fairness.38 Significant conflict between individual and organisational objectives in incentive schemes became starkly evident, and massively debilitating, during the global financial crisis.39

A key question in this context is that of employee voice. There is mounting evidence that employee voice, or say over workplace matters, has a positive impact on economic performance.40 When managers seek to create ‘bundles’ of productivity-enhancing human resource management measures, sometimes known as ‘high performance work systems’, employee voice is critical to making that work.41 Both direct and indirect participation by employees in decision-making lead to


lower absenteeism, lower labour turnover, higher morale and employee satisfaction, as well as higher productivity and improved work organisation. Russell Lansbury gave an earlier talk and paper on that topic in this series, so I do not delve into it more deeply here.

One critical point that emerges in research over profit sharing, share ownership, productivity sharing and other forms of variable pay is that consultation over the introduction of schemes, and employee say over decisions once the schemes are in place, are key determinants of success. (For example, an incentive scheme that is introduced with input from employees is more likely to be understood and agreed by employees and produce behavioural changes that management wishes to see.) Unionism is a common mechanism by which employees seek to obtain voice, but here the results are more ambiguous, with the evidence suggesting that the direction and size of the net effect depends on circumstances, in particular the degree of cooperation involving both parties, for example whether management has facilitated joint decision-making. Diversity and equity amongst employees and amongst boards, appears to improve organisational performance; it probably benefits productivity, though most studies do not explicitly examine that separately.


Although it is not in the scope of this paper (and instead discussed elsewhere), many of the most controversial public policies in industrial relations, like laws promoting individual contracting or collective bargaining overall make little difference to productivity. What matters most is not what public policy-makers do but what happens at the workplace.

6 Conclusions

While there is support for better economic outcomes, there is no similar consensus about the distribution of income and wealth. Policies aimed at shifting resources or power from one group to another are often couched in terms of their benefits for the economy and productivity, but often make little difference to productivity.

In any specific organisation, workplace industrial relations practices can make a difference to productivity. The decisions management makes and the relationship it has with employees and unions will shape what happens in the workplace and can have a notable effect on productivity. It is workplace parties, not political parties, who ultimately determine how IR influences productivity.

Appendix A: An example of calculating labour productivity growth across two different products

Suppose you have two workplaces, A and B. In year 1, Workplace A digs up 100 million tonnes of coal a year using 20 workers for an average of 1000 hours per year, i.e. 20,000 worker hours. The labour productivity at Workplace A in year 1 is 100 million divided by 20,000 = 5,000 tonnes per worker hour. (To keep it simple, our example only concerns labour productivity.)

In year 1, Workplace B produces 1000 cars per year, using 10 workers for an average of 1000 hours per year, i.e. 10,000 worker hours. The productivity at Workplace B in year 1 is 1000 cars divided by 10,000 = 0.1 cars per worker hour.

Now suppose the price of coal doubles, but the output of coal, and the number of coal miners at Workplace A are both unchanged. Then productivity at Workplace A is still 50,000 tones per worker hour.

Also suppose that the price of cars is unchanged, but with new technology, output at Workplace B doubles while the number of worker hours goes up by just 33.3% (to 13,330). Then your productivity at Workplace B is now 2000 divided by 13,330 = 0.15 cars per worker hour (i.e. it is 50% higher).

So it could be the case that profits at Workplace A have grown by more than profits at Workplace B. (We don’t know for sure because we don’t know anything about costs such as wages in either workplace.) Yet productivity in workplace B has clearly increased by more than in Workplace A.

But now suppose you want to track changes in productivity across time in the company. You own two very different workplaces producing very different things. How do you measure company changes in productivity over time?

You do that by creating an index that gives weight to the importance of production in the two workplaces. To do this, you need to know how much each product is worth.

Suppose coal sells for $100 per tonne, and a car sells for $5,000,000 each (they’re big cars). Then the total value of your production of coal is $10 billion, while the total value of your production of cars is $5 billion. So those values give you your weights. They tell you that you should weight production in the coal workplace at two thirds of the total, and production in the car workplace at one third.

Next we put these production levels into indexes, and for each product we set production in year 1 = 100. So, in year 2, production in the coal workplace is still 100, but production in the cars workplace is now 200 (it has doubled). How much has production in your company risen by? You weight the two workplaces in the ratio of two thirds: one third, so the answer is (100 x two thirds) plus (200 x one third) = 133.3.

Now, how much has the amount of labour input gone up by? In total, from 30,000 in year 1 (that’s 20,000 in A + 10,000 in B) to 33,330 in year 2 (still 20,000 in A, now 13,330 in B). So labour input has gone up by 11.1%. So an index of labour input has gone up from 100.0 in year 1 to 111.1 in year 2.

And productivity? It is the index of the quantity of production divided by the index of employment x 100. So productivity also has an index value of 100 in year 1. In year 2, it is equal to 133.3/111.1 x 100 = 120.0. So the average increase in productivity in the company is 20%.

Note that the doubling of coal prices has had no direct impact on your measurement of productivity. It’s the fact that changes in output were greater than changes in labour input that have led to your increase in productivity.