

Business Indicators ♦ September 2005

Probing the Productivity Puzzle

2004 was a good year for the BC economy, but is the growth sustainable?

Generally speaking, 2004 was a good year for the British Columbia economy, which grew 3.9%¹, posting the strongest increase among the provinces for the first time since 1987, and exceeding the national average for the second year in a row. In per capita terms, real GDP growth (+2.7%) was second only to that in Saskatchewan (+3.5%) and nearly a percentage point higher than the national average.

Labour market indicators were robust, with job growth of 2.3%, a falling unemployment rate, and a booming market for housing and consumer durables. The business and personal sector both displayed confidence in the economy by boosting their spending significantly during 2004.

These are all very positive developments, but what are the long-term prospects for the BC economy? Was 2004 a “flash in the pan”, or has the stage now been set for sustained growth in British Columbia?

Productivity improvements key to sustainable economic growth

One year of very strong growth—even several years of sustained growth—is not necessarily enough to firmly establish the province as the leading economy within Confederation. Economic growth can only result from increased use of labour, increased use of capital, or an improvement

in productivity. If an economy is growing primarily because it is using more labour or capital inputs², the long-term potential for expansion will be constrained by the availability of ever-increasing amounts of these inputs. If, on the other hand, the growth originates in better or more efficient productive processes, the potential for long-term economic growth is much greater. In a world of limited resources, the capacity for sustained growth thus depends on an economy's ability to produce goods and services more efficiently—that is, by improving its productivity over time.

An examination of productivity change in BC over time can help shed some light on the question of whether or not the province is on track for long-term economic growth. Comparing productivity trends in BC with those in other strong-growth Canadian economies will also give an indication of how the province stacks up relative to other leading economies in Canada.

Measuring productivity change

Ideally, a productivity measure should take into account both the labour and capital inputs consumed in production. However, assessing the value of capital inputs can be a challenging task, and labour productivity is often used as a proxy measure of total productivity change. Labour productivity is calculated as the ratio of total output per unit of labour used in production. Labour inputs are typically measured in terms of

¹ All GDP figures quoted in this article are expressed in real terms—i.e., using chained 1997 dollars. Real GDP figures for the period before 1997 are BC Stats estimates; from 1997 on, the source of the information is Statistics Canada.

² The amount of material inputs or purchased services used in production does not explicitly affect productivity, since these costs are deducted from the value of output when deriving GDP, which is a measure of the value added to the economy by labour and capital.

total hours worked. Output is measured using real Gross Domestic Product (GDP).

The advantage to using this estimate is ease of calculation. The disadvantage is that changes in labour productivity over time include both a capital and a technological (or efficiency) component, and it is not possible to disentangle the two.

Because productivity *change* is one of the key factors explaining economic growth (or decline), most analysts focus on productivity indexes, which illustrate the cumulative change in productivity over time. In some cases, when making comparisons among industries or across jurisdictions, it may also be useful to look at productivity *levels*, which can shed light on the relative efficiency with which labour and/or capital are used in different jurisdictions or industries.

About these estimates

The productivity estimates presented in this paper are preliminary, and were prepared by BC Stats using information provided by Statistics Canada. In some cases where complete data was not available for all provinces, estimates of GDP or hours worked have been derived based on related indicators.

Productivity estimates were prepared for all provinces, but most of the comparisons made in this paper have been restricted to BC, Alberta and Canada. While developments in Ontario are also of interest, in many cases that province represents such a large share of the national total that trends over time are very similar to the national average.

A Caveat

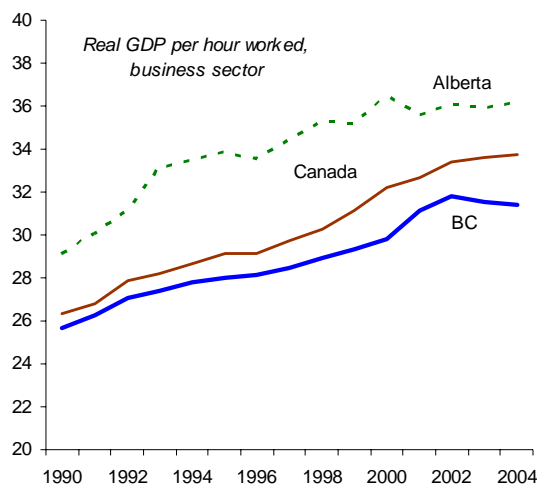
Because capital inputs are not explicitly taken into account when measuring labour productivity, variations in productivity levels may reflect the intrinsic nature of an industry rather than the efficiency with which it utilizes resources. For example, labour productivity is very high in the elec-

tric power industry, where relatively little labour, but a huge investment in capital equipment and infrastructure, is required to produce its output. In contrast, the personal services industry relies almost exclusively on labour inputs with relatively little use of capital equipment. In this industry, the ratio of output per hour worked will be much lower, since labour is the primary factor used in production. In other words, a lower level of labour productivity doesn't necessarily mean that one industry is less efficient than another; it may simply reflect the type of product or service that is being generated.

Overall productivity lower in BC

BC's productivity record during the last decade and a half has been less than stellar. In 1990, the province's real GDP per hour worked in the business sector³ was \$25.70. This was less than the national average (\$26.30) and lower than in Quebec (\$26.40), Ontario (\$27.00) and Alberta (\$29.20).

GDP per hour worked in the business sector is below the national average



Data Source: BC Stats

³ Productivity data are for the business sector, which excludes education, hospitals, and public administration, as well as imputed rental income for owner-occupied housing.

Last year, despite catapulting to the front of the pack in terms of economic growth, labour productivity in the province declined, and BC's ranking slipped to sixth place among the provinces. Real GDP per hour worked in BC was \$31.40, well below the national average (\$33.70). Only Manitoba and the Atlantic provinces (excluding Newfoundland) had lower overall productivity levels. Alberta remained firmly ensconced in first place, although Ontario has been making gains, and productivity in that province is approaching the level in Alberta.

Lower overall productivity could be a reflection of the province's industrial structure and natural resource endowment rather than the efficiency with which it uses labour and capital inputs. Economies which have a concentration of highly capitalized industries, or industries that are experiencing rapid technological or process changes, will by definition have higher overall labour productivity levels. These industries may have sprung up in order to facilitate the extraction and utilization of natural resources found in certain regions of the country, or be suppliers to industries that are usually located near large population centres.

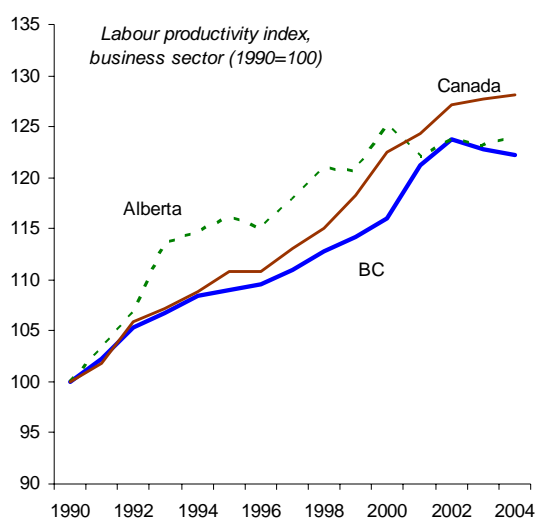
This means that, while the relatively low overall productivity level in BC is cause for some concern, it may not be possible, given the endowment of natural resources in this province, to increase overall productivity to the levels seen in some parts of the country. Factors such as the rising importance of lower-productivity service industries, and the extent to which the economy depends on the business sector to supply goods and services also play a pivotal role in determining overall productivity levels.

Productivity growth stalls

How does the province stack up in terms of productivity growth over time? There too the situation is somewhat discouraging.

During the early 1990s, productivity gains in BC were similar to those at the national level, but since then the province has fallen back and long-run growth in BC has been below average, with productivity declining during the last two years. British Columbia is not alone in seeing slower productivity growth: there has also been a levelling off at the national level and in Alberta where, despite strong growth during the 1990s, the cumulative increase has also been less than the national average.

Productivity growth has stalled



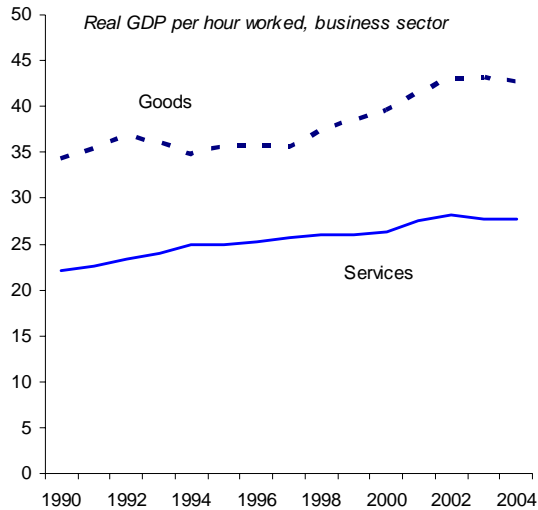
Data Source: BC Stats

Lower productivity endemic throughout the BC economy

It may be useful to look at how the province compares to other regions on an industry by industry basis rather than focussing on overall productivity in order to determine the reasons for BC's relatively lacklustre productivity growth. Delving more deeply into the sources of productivity growth in BC, it becomes obvious that lower productivity, and lower productivity growth, is endemic throughout the BC economy. Many of the major industries in the province started the 1990s with below-average productivity levels, and productivity growth in many of these industries was below the national average between 1990 and

2004. This was particularly true in the service sector—the source of most of BC’s economic growth in recent years. One reason for lower productivity growth in BC thus appears to be that some key BC industries have not kept pace with their competitors in other parts of the country.

Productivity is lower in service industries, which generate two-thirds of total GDP in the business sector



Data Source: BC Stats

BC’s greater service-sector orientation contributes to lower overall productivity

BC has one of the most service-oriented economies in the country. Roughly three-quarters of the province’s GDP originates in the service sector, more than in any other province except Nova Scotia, where services make up a similar share of total output. In BC, services comprise about two-thirds of total GDP in the business sector.

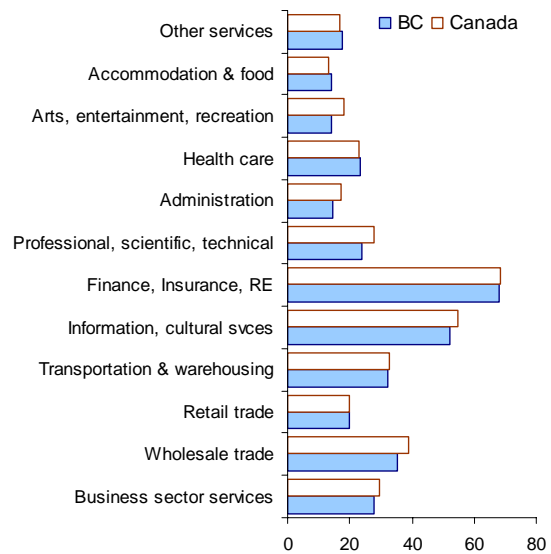
Productivity tends to be somewhat lower in the service industries than in the goods sector. This is partly related to the nature of many service industries, which are more likely to rely on skilled (or unskilled) labour inputs, rather than capital equipment. Technological advances are thus less likely to result in productivity improvements, since in many labour-intensive service in-

dustries, these can only occur if people are working harder or “smarter”.

Lower productivity and productivity growth in many service industries

In 1990, output per worker hour in business sector services was lower in BC than in other competing economies. Despite productivity improvements in some industries during the 1990s, the situation had not changed significantly by 2004, when productivity in the service sector was below the Canadian average in all but three industries: accommodation & food services, health care and other services. In retail trade, GDP per hour worked was virtually the same as the national average.

GDP per hour worked below Canadian average in most service industries



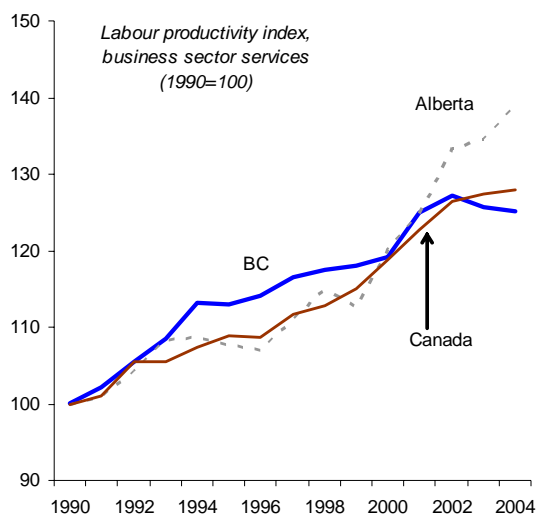
GDP per hour worked in 2004, business services, \$1997 chained

Data Source: BC Stats

Some service industries that began the 1990s with a competitive advantage (including transportation & warehousing, finance, insurance & real estate and arts, entertainment & recreation) lost ground relative to the rest of Canada during the study period. As a result, overall productivity growth in BC’s service sector was lower than in other parts of the country. This has left BC at a

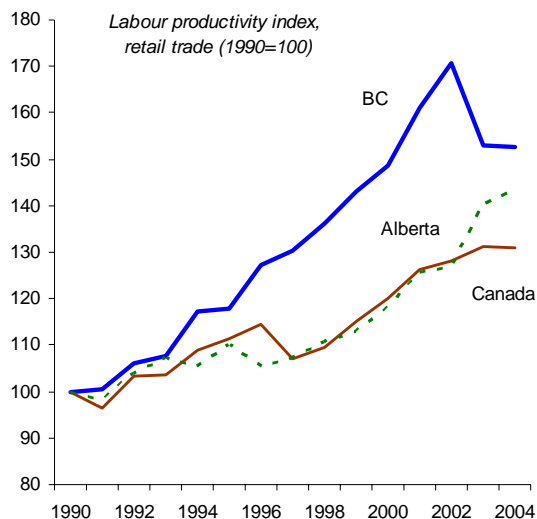
disadvantage compared to other regions of Canada.

Productivity growth in business sector services falls behind national average



Data Source: BC Stats

BC retailers making more efficient use of labour



Data Source: BC Stats

Although productivity growth in BC has been lower than the Canadian average in most service industries, some have made significant gains. The most notable of these is retail trade, where productivity has increased substantially more than the national

average. However, to a certain degree BC retailers have been playing catch-up with the rest of Canada, and in recent years productivity growth has begun to peter out. Output per hour in this industry is now equal to the national average. This is quite a big improvement. In 1990, the average GDP per hour worked in retail trade was only 85% of the Canadian level.

Productivity also increased significantly in information & cultural services and accommodation & food services between 1990 and 2004. However, productivity growth in information & cultural services lagged behind the national average.

The accommodation & food services industry, with its dependence on tourism revenues, is highly volatile, and one of the first to be affected by upturns and slowdowns in the economy. A large productivity decline in BC between 1990 and 1991 was partly due to a slow adjustment of hours worked as the industry's output shrank. Real GDP in accommodation and food services fell in every province between 1990 and 1991, but in BC, both employment and the number of hours worked increased. However, the industry has experienced modest productivity growth during most of the period since 1990.

Large year to year fluctuations in productivity do not necessarily mean that there has been a fundamental shift in an industry. The data series used to calculate productivity can be volatile, with some unexplained fluctuations. Longer-term trends in the data are more meaningful.

Average or below-average growth in most other service industries

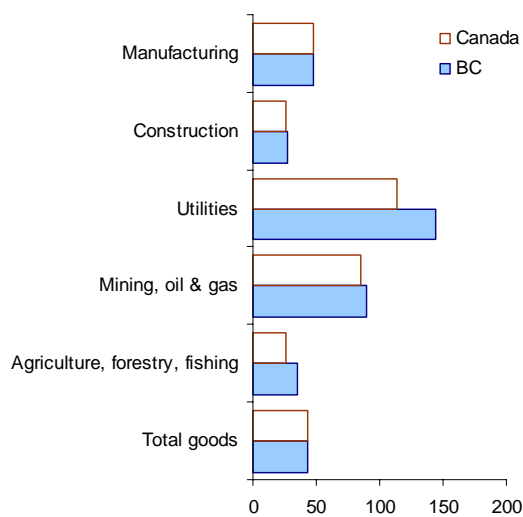
Productivity growth in most other service industries has been weak. BC's transportation & warehousing industry, where output per hour worked was significantly higher than the Canadian average in 1990, has not been able to keep pace with productivity

improvements in the rest of the country. Many other service industries, including professional scientific & technical services and information & cultural services, were unable to benefit from the type of productivity growth that occurred in Alberta or Ontario.

Productivity rising in some goods industries

As a whole, productivity levels are higher, and have increased more in the province's goods-producing industries than in the service sector. GDP per hour worked in many of the province's goods-producing industries was above the national average in 2004. However, the comparative advantage that BC had in 1990 has been eroded. Labour productivity in some of BC's key goods-producing industries has improved but productivity gains in many of these industries have not been as great as in other parts of Canada.

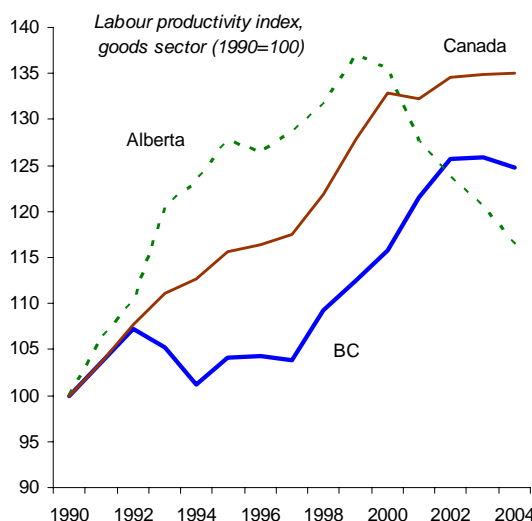
GDP per hour worked in many goods industries exceeds the national average, but the gap is shrinking



GDP per hour worked in 2004, goods industries, \$1997

Data Source: BC Stats

In the goods sector, productivity began to pick up in the late 1990s, but the province has yet to regain lost ground



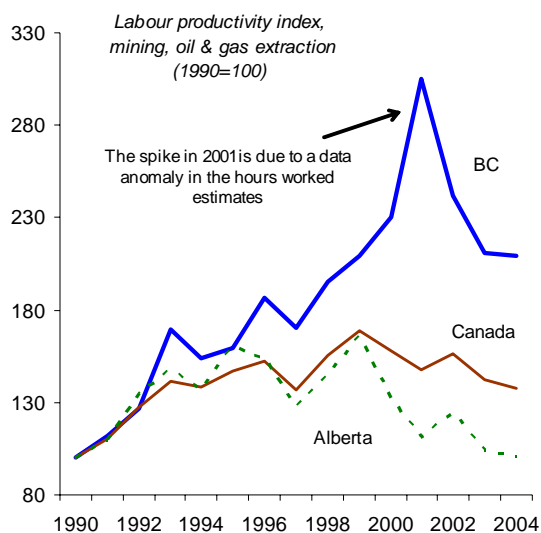
Data Source: BC Stats

In 1990, GDP per hour worked in primary industries such as agriculture, logging, fishing and hunting was twice the national average. This reflects the importance of the logging industry, since logging output per hour worked tends to be higher than in industries such as agriculture or fishing.

However, the BC advantage has been shrinking as productivity growth in these primary industries has not been as strong as in the country as a whole. By 2004, the differential was just 37%. There is some good news, however. BC's fishing and trapping industry has made some significant productivity improvements during the last decade and a half. The extent to which investment in capital, rather than more effective use of labour inputs, has played a role in this is unknown.

The mining, oil and gas extraction industry has seen some ups and downs, but also ended the period with a significant upturn in labour productivity. This is largely due to the influence of a growing oil and gas extraction sector. Labour productivity in this industry has more than doubled since 1990.

Productivity soars in mining, oil & gas extraction



Data Source: BC Stats

British Columbia's utilities and construction industries recorded solid productivity growth during the period since 1990, but again, the productivity gains were not as strong as in all of Canada. However, output per worker hour in utilities remains higher than the national average, largely due to the importance of hydroelectric power generation in BC, which is very capital-intensive.

In the construction industry, the province started the 1990s with below-average productivity levels. Robust productivity growth during the period since then has brought GDP per hour worked in construction up to just over the national average.

However, the situation in manufacturing is not quite as rosy. Output per hour worked in manufacturing was well above the national average in 1990, but that is no longer the case. It is now lower than in either Alberta or Ontario.

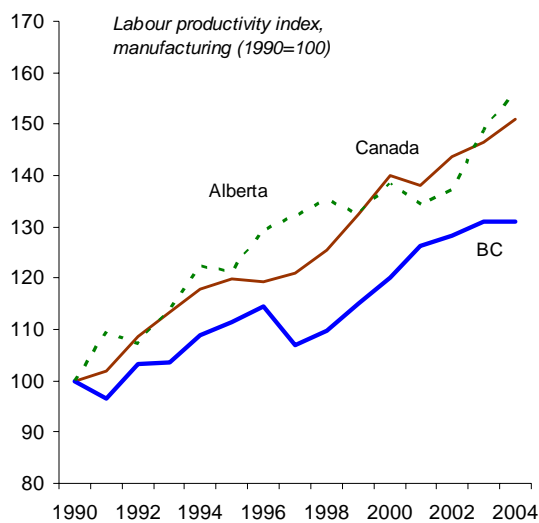
This is partly due to the fact that some of the manufacturing industries with the highest GDP per hour-worked ratios are ones which are less developed in BC: petroleum and coal products, chemicals and

transportation equipment. These industries require heavy investment in capital equipment in order to produce their products and rely less on labour inputs.

There are some encouraging developments. The manufacturing industry was particularly hard-hit by the economic slowdown in the early 1990s, but recent productivity growth in this industry brought output per hour worked back up to the national average in 2004.

Since the mid-1990s, productivity gains have been particularly significant in the wood products and computer & electronics industries. Both of these industries have faced significant challenges in recent years. In particular, the softwood lumber dispute with the United States has provided the impetus for many lumber mills in the province to retool their operations, and increased productivity has allowed them to ride out the higher costs arising from the implementation of punishing duties.

Strong growth in the manufacturing sector



Data Source: BC Stats

Can the productivity puzzle be solved?

Lower productivity, and slower than average productivity growth over the longer run pose challenges for the BC economy, since without productivity gains, long-term economic growth may be difficult to achieve. However, there are no quick and easy solutions to this problem. BC's current economic structure is not only a product of its endowment of natural resources, but also its cultural and social development.

BC's slow productivity growth during the last decade and a half is partly due to the important role of services in the economy. Significant productivity gains were realized in a number of goods-producing industries, most notably mining, oil & gas extraction. However, BC has lost some of its comparative advantage relative to other provinces during the last decade and a half, and generally speaking, productivity growth has lagged behind the national average.

The fact that the business sector is a smaller part of the total economy in BC than in other provinces may have contributed to its relatively poor productivity performance. The business sector accounts for the lion's share of total output in all of the fastest-growing economies. In Alberta, for example, about 83% of total GDP originates in the business sector. The ratio in Ontario is 82% and in Quebec, it is 80%, the same as the national average. The share in BC is lower, at 77%.

This doesn't directly affect the productivity measures, since only GDP and hours worked in the business sector are included in productivity measures. However, the fact that a relatively larger share of the workforce is devoted to producing goods and services that are traded in the marketplace may have some relevance, since there are greater pressures to be competitive in the business sector than is the case in the public sector. With proportionally more people working for organizations that must either compete successfully, or become unviable,

the workforce as a whole in other provinces may be more attuned to the importance of the marketplace and this may promote productivity growth.

The relatively large role played by the public sector in BC's economy, and its possible effect on the characteristics of the province's workforce may be difficult to change, even if there were a desire to do so.

Unit labour costs in BC—the ratio of wages to total output—are higher than the Canadian average for almost all of the major industry groups. This means that companies in BC may have less money to invest in new capital equipment than their counterparts in other provinces, since a larger portion of their revenue must be allocated to paying their wage bill.

Some industries also have structural impediments that make them slow to adjust their use of labour in response to downturns in the economy. In terms of productivity, this means that the effect of slowdowns on productivity levels may be amplified.

BC is not the only province to face challenges in the area of productivity. Some of the shine is coming off in Alberta, which has benefited from strong GDP and productivity growth during the last decade and a half. However, in recent years, many of the gains have been in business sector services, which pose the same problems for long-term growth in that province as in BC. Alberta's goods-producing industries also face challenges, as the strong productivity gains that occurred during the 1990s have begun to taper off.

Appendix 1:

The business sector

When measuring productivity, some industries are usually excluded from the mix. These industries are those which are in the public sector, such as public administration, health care and hospitals—industries for which GDP estimates are largely based on labour inputs, so by definition there can be little or no productivity change over time. Additionally, a significant share of total economic output (about 11% in BC) is an estimation of the imputed rental value of owner-occupied housing. There are good reasons for including this estimate in GDP, but since it is an imputation and there is no associated employment, this industry has been excluded from the productivity estimates presented in this paper. What's left is the business sector—all the goods and service industries except those indicated above. Both the GDP and hours worked figures have been adjusted accordingly.

Hours worked versus employment

Employment figures on their own do not adequately measure labour input, since they do not represent the actual amount of effort that is expended to produce the output of an industry or economy. All other things being equal, two part time employees, each working half days, produce the same output as one full-time employee. However, a simple job count would not take this into account. Therefore the labour input measures used to calculate productivity are actual hours worked.