3.4 Annex

SP Energy Networks 2015–2023 Business Plan

Ongoing efficiency gains

Reckon

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SP ENERGY NETWORKS

Historical data comparable to RIIO-ED1 ongoing efficiency gains

Summary

1. This report, commissioned by SP Energy Networks, reviews historical data on productivity (derived from National Accounts data) that might be used as a comparator for the ongoing efficiency indices that Ofgem has asked SP Energy Networks to submit as part of its business plan for the RIIO-ED1 price control period (which runs until March 2023).

Ongoing efficiency indices in RIIO-ED1

2. Ofgem's business plan template for the RIIO-ED1 electricity distribution price control requires DNOs to propose indices representing ongoing efficiency gains over the next 10 years, in respect of six expenditure categories related to the activities of electricity distribution network operators.

3. For the purpose of price control calculations, the ongoing efficiency indices are to be used in conjunction with real price effect indices, in order to adjust forecasts of expenditure that are provided separately in constant prices and before the effect of ongoing efficiency gains. Real price effect indices relate to nine categories of unit costs for inputs to the activities of distribution network operators.

4. The ongoing efficiency indices are a measure of anticipated productivity gains; ongoing efficiency indices have the effect of adjusting the volume of inputs required for each activity, whilst the real price effect indices adjust the prices of these inputs.

5. Ongoing efficiency indices will be applied to data that are already corrected for any "catch-up" efficiency assumptions: they are intended to reflect factors that affect costs over time for a hypothetical business that would be efficient at all times.

6. Ofgem's stated approach to validate estimates of ongoing efficiency indices is to compare them with measures of productivity growth for UK economic sectors, derived from National Accounts data. We agree with Ofgem that a good data source from which to derive such estimates is the EU KLEMS dataset available from http://www.euklems.net/.

Risks in comparing ongoing efficiency indices on historical productivity data

7. The body of this report discusses the risks that arise when comparing measures of historical productivity gains with the ongoing efficiency indices submitted as part of RIIO-ED1 business plans.

8. Some of the potential biases that we have identified would tend to lead to measures of productivity gains for UK economic sectors which are greater than plausibly achievable ongoing efficiency gains for activities of electricity distribution network operators. These include:

   (a) Data for UK economic sectors are aggregates over sectors, which, at any one time, will comprise efficient and less efficient companies. Thus, reported productivity gains in UK economic sectors include an element of average catch-up, whereas there is no such catch-up element in the ongoing efficiency indices.

   (b) Ongoing efficiency indices apply to all costs, including purchased-in services, materials and energy and the relevant outputs are network investments and network operation services which are akin to gross output. Thus, the relevant comparator measures of productivity are gross output measures, which are systematically lower than value-added measures. Much of the available data for UK economic sector is on a value-added basis; in particular the latest EU KLEMS data are only available on a value-added basis.

   (c) Capital inputs are excluded from the application of ongoing efficiency indices. In many UK economic sectors reductions in other inputs (or disproportionate growth in outputs) has been achieved through capital substitution. For each of the specified expenditure categories for electricity distribution network operators, the relevant capital would be in the form of tools, software, etc. Given the likely increases in investment and grid management activities due to low-carbon objectives, there is a risk that the relevant capital employed per unit of relevant output will tend to fall, and therefore that the partial measures of productivity gains most relevant to ongoing efficiency indices will be lower than comparable total factor productivity measures for UK economic sectors.

(d) Research shows that sharp falls in reported productivity in 2008–2009 might not be fully explained by ordinary spare capacity or labour hoarding features in a recession. Given that an intrinsic loss of efficiency is unlikely (new technologies or working practices do not get de-invented), it is possible that the explanation of this productivity puzzle rests in part on the sudden unwinding of accumulated defects in the data, perhaps in difficult areas such as the measurement of output quality, labour quality or services from capital. If this is the explanation, then the productivity gains in UK economic sector up to 2007 have in all likelihood been overstated.

9. Against these, there are features that might cause some measures of productivity gains for UK economic sectors to be understated, and which explain instances of negative productivity gains in the data which would probably not apply to ongoing efficiency gains for notionally efficient activities of electricity distribution network operators. These include:

(a) Spare capacity due to falls in demand or other market fluctuations could explain temporary bleeps (although they do not appear to explain the full magnitude of the recent falls in reported productivity). Whilst sharp and unexpected falls in demand for capital expenditure activities of electricity distribution network operators are, in principle, possible, we think that it is unlikely to be appropriate to take such effects into account in the context of a business plan for a period where electricity distribution network operators are expected to invest in smart grids and other projects related to low-carbon objectives.

(b) The macro-economic data shows continued growth in capital employed in the face of falling demand in many sectors, particularly in recent years, which leads to measured falls in productivity. It is possible that the investment is being undertaken in new products or services (for which there is no demand yet), so that timing mismatch between capital and outputs might be distorting productivity data. Such a mismatch is less likely to occur in respect of the six areas of activity to which ongoing efficiency indices would apply (since the outputs for these six areas of activity are well defined and might not permit much product innovation).

How to compare productivity measures and ongoing efficiency indices

10. Because of these biases, and also because of the volatility of sector data, we think that it would be a fallacy to pick any particular productivity measure or comparator sector as “the best data available” and base ongoing efficiency indices on that.

11. Instead, it is preferable to validate ongoing efficiency gains assumptions against a wider range of available data, by reporting productivity growth data across all sectors of the economy, and to take account within that validation exercises of the differences between different productivity measures for UK economic sectors and the ongoing

efficiency indices relevant to the activities of electricity distribution network operators.

Application to SP Energy Networks' assumptions

12. SP Energy Networks has told us that it is considering using ongoing efficiency gains of 1 per cent a year across all expenditure categories in its RIIO-ED1 business plan submissions due in July.

13. This assumption is more demanding than Ofgem's own recent assumptions for gas distributors. It represents a significantly more demanding target than the average performance of the UK economy or most UK comparator sectors, when measured on a gross output basis.

14. We have found no meaningful comparator data against which a figure of 1 per cent a year in ongoing efficiency gains (excluding any element of catch-up) can be argued to be too low.

Risks in the choice of comparable productivity measures

15. This section outlines issues that are relevant to the choice of a productivity measure to compare with the RIIO-ED1 ongoing efficiency indices.

Total and partial measures of productivity

16. All productivity measures capture the increase in output volumes from a production process that is not explained by increases in input volumes — or equivalently the reduction in input volumes that would have occurred at constant output volumes.

17. Productivity measures can be categorised between partial and total factor productivity measures, as follows:

(a) Total factor productivity measures try to take account of all inputs to the production process.

(b) Partial productivity measures focus on a sub-set of inputs (e.g. labour) and do not use data about the volume of other inputs (e.g. capital).

18. Some past studies refer to partial productivity measures focused on all inputs except capital, which are then adjusted for "capital substitution" or modified to be "at constant capital".[1] Under the classification set out above, these productivity measures are total factor productivity measures, because they take full account of changes in all inputs to the production process.

[1] For example Reckon LLP (2011) "Productivity and unit cost change in UK regulated network industries and other UK sectors: initial analysis for Network Rail's periodic review" and CEPA 92012) "Scope for improvement in the efficiency of Network Rail's expenditure on support and operations: supplementary analysis of productivity and unit cost change"; both published by the Office of Rail Regulation.

Gross output and value added measures of productivity

19. Another dimension over which productivity measures can be classified is by reference to the way in which output is defined:

(a) A gross-output measure of productivity gains defines output as the goods or services created for consumption or onward use. With such a measure, the inputs include capital, labour, energy, materials and services.

(b) A value-added measure of productivity gains defines output as the process of transforming energy, materials and services (intermediate inputs) into goods or services for consumption or onward use. With such a measure of output, the only relevant inputs are capital and labour, since energy, materials and services have already been taken into account in the definition of the output volume.

20. Ofgem's document on electricity distribution ongoing efficiency indices draws a parallel with recent Ofgem decisions about price controls for gas distribution networks. In its decisions about gas distribution, Ofgem relied primarily on the following productivity measures as comparators:

(a) Value-added measures of productivity gains for the construction industry, in respect of capital expenditure categories.

(b) Gross-output measures of productivity gains across most sectors of the economy, in respect of operating expenditure categories.

21. Ofgem used averages over the period covered by the EU KLEMS dataset, 1980–2007.

Risks in the choice of comparator industries

22. This section outlines issues that are relevant to the choice of comparator sectors to use in comparisons with RIIO-ED1 ongoing efficiency indices.

Volatility of sector-specific data: example of construction

23. Issues related to data volatility also need to be examined to inform the selection of comparator sectors.

24. A good example is provided by the construction sector, which was relied upon by Ofgem for gas distribution. Construction has similarities to many of the relevant activities of electricity and gas distribution network operators. Given the way in which ongoing efficiency indices are applied to all expenditure (not just to labour and capital), the most relevant measure to be taken from the construction sector as a comparator would have been a productivity measure based on gross output. In the construction sector, close to half of the input costs are intermediate inputs, therefore a gross-output measure of total factor productivity gains is expected to be a little over half the corresponding value-added measure.

25. Using data for the period 1970–2007, the annualised value-added total factor productivity gain was 0.7 per cent, and the gross output figure was about 0.4 per cent.

Using the whole of the data in the most recently available EU KLEMS dataset, covering 1980–2009, the annualised value-added total factor productivity gain is 0.9 per cent. But this is an average of completely different trends in different parts of the period: according to the data, there was a sharp fall in productivity in the last three years (minus 4.8 per cent annualised), and even over the past 10 years the productivity has fallen. Against that, strong productivity gains were made in the 1980s and 1990s.

Implications for the choice of comparator sectors

26. Any selection of particular sectors as comparators is exposed to the risk that similarities between activities are only superficial.

27. In addition to that, the type of volatility described above illustrates a high risk that market fluctuations are having a significant impact on productivity. For example, it might be the case that an economic recession triggers falls in productivity in the construction sector due to lower demand and a sharp increase in spare capacity, but there is no similar market process affecting the construction-like activities of electricity distributors. But, if anything, one might expect distributors' costs to fall when there is spare capacity elsewhere in the construction sector, although that might best be seen as an input price fluctuation.

28. For these reasons, it would be fallacious to seek "ideal" comparators for each ongoing efficiency index. This would place excessive reliance on apparent similarity, and would also expose the analysis to excessive amounts of volatility.

29. Instead we think that a broader look across all sectors the economy is a more legitimate way of using historical productivity data to inform the RIIO-ED1 ongoing efficiency indices.

Role of the ongoing efficiency indices in the business plans

30. Ofgem has asked the 14 electricity distribution services providers (DNOs) in England, Wales and Scotland to provide business plans for the period until 2023. Business plans are to follow a Microsoft Excel template prescribed by Ofgem.

31. This paper provides information relevant to the data in an input data table of indices in the section about ongoing efficiency on the worksheet about real price effects (RPEs) and efficiency. There is an index value for each expenditure category and for each year. The expenditure categories are:

    (a) Load related capex.

    (b) Non-load related capex - asset replacement.

    (c) Non-load related capex - other.

    (d) Faults.

    (e) Tree cutting.

(f) Controllable opex.

32. In the draft business plan spreadsheets that we have seen, the ongoing efficiency index numbers are used only to calculate £ million ongoing efficiency figures by multiplying, for each of the six expenditure categories, the index number less 1 by the sum of three numbers:

(a) Non-variant costs (excluding RPEs).

(b) Non-variant costs RPEs (which reflect the effect of differences in price movements between RPI and each of nine input cost categories).

(c) Total variant costs (including RPEs).

33. We have assumed that the calculated £ million ongoing efficiency figures are intended to enter the calculation of price limits as adjustments to expenditure figures.

Ofgem's views about the relevance of productivity data for UK economic sectors

34. Ofgem has said (March 2013 document on "tools for cost assessment"):

> 4.30. We intend to use the EU KLEMS dataset to derive trends in productivity for industry sectors in the UK. We will analyse historical trends in sectors comparable to the energy industry, and the industry as a whole, to derive an assumption. We will also consider both total and partial factor productivity measures. We note responses that raised concerns that the EU KLEMS dataset is out of date as it only contains data to 2007. We note that a more recent update means that some data in the EU KLEMS dataset is now available to 2010. We will also investigate further sources of data that may be available. We expect DNOs to do the same in evidencing the ongoing efficiency assumptions they include in their business plans.
>
> 4.31. We will cross check our separate analysis of RPEs and ongoing efficiency with indices that combine the two effects, for example indices that reflect unit cost trends. …
>
> 4.38. We still consider that the EU KLEMS database is a useful source of information on productivity trends in the UK. The use of the EU KLEMS dataset does not however preclude the analysis of other information in relation to productivity. We encourage DNOs to evidence other sources of information if they consider this dataset unsuitable. We expect DNOs to include within their business plans an assumption for ongoing efficiency and to evidence how this assumption has been derived.
>
> 4.39. It is not clear to us, at this time, why there would be substantial differences in the potential for productivity improvements between the DNOs and the GDNs. As stated in our recent decision on the ongoing efficiency assumption for GDNs, we did not specifically isolate the impact of comparative competition and therefore our view is that the evidence used to derive the assumption for GDNs is equally valid for DNOs.
>
> 4.40. We emphasise that the ongoing efficiency assumption represents the productivity improvements that even the most efficient DNO should be able to achieve. It is therefore separate from our assessment of the efficiency of DNOs costs which is discussed elsewhere in this annex.

35. Ofgem refers to its work on the price control for gas distribution networks. In its December 2012 final proposals for these networks, Ofgem said:

> 3.3. Specifically, as at IP, we draw the following conclusions from the comparator sector data set out in Table 2.1 below:
>
> A one per cent improvement in opex efficiency based on partial factor productivity measures (ie labour, and labour and intermediate inputs) for the industry averages (which range from 2.8 to 0.5 per cent p.a.). Our assumption of one per cent is also in line with network company assumptions.
>
> A 0.7 per cent improvement in capex and repex efficiency which is at the top-end of the estimates for total factor productivity (TFP) for construction, our principal comparator, but below the average TFP for other industries.

36. Table 2.1 in that Ofgem document shows averages over the period 1970 to 2007 of the following estimates:

    (a) Annual growth in a value-added measure of total factor productivity.

    (b) Annual growth in a value-added measure of labour productivity adjusted to model a hypothesis of constant capital per unit of value added.

    (c) Annual growth in a gross-output measure of total factor productivity.

    (d) Annual growth in a gross-output measure of labour and intermediate inputs productivity adjusted to model a hypothesis of constant capital per unit of gross output.

    (e) Annual growth in a gross-output measure of labour and intermediate inputs productivity.

37. These estimates are given for:

    (a) Construction.

    (b) Unweighted averages of selected industries, which (based on earlier Ofgem documents) include construction, banking and insurance, garages and fuel retail, transport and storage, and the manufacture of chemicals and drugs, electrical equipment, and vehicles.

    (c) An unweighted average and a weighted average of all industries except real estate, administration, education, health and social services.

38. The figures relied upon by Ofgem from its table 2.1 are as follows:

    (a) Both value-added measures for construction are 0.7 per cent. Ofgem refers to this for its choice of ongoing efficiency for capital expenditure.

    (b) The gross-output measure of labour and intermediate inputs productivity for the averages across sectors range from 0.8 per cent to 1.1 per cent. Ofgem refers to these for its choice of ongoing efficiency for operating expenditure.

39. A notable feature of the data in Ofgem's table 2.1 is that the gross-output measures are generally lower than the value-added measures. For construction, the highest gross-output measure is 0.4 per cent. For the averages across sectors, value-added figures are between 1.1 per cent and 2.8 per cent.

40. There is no visible explanation of Ofgem's rationale for choosing value-added measures for capital expenditure and gross-ouput measures for operating expenditure.

Sources of data on productivity gains in the UK

EU KLEMS datasets

41. EU KLEMS refers to a series of datasets published by academics, based on National Statistics and other research, available from the website http://www.euklems.net/.

42. The focus of the EU KLEMS databases is to provide value and volume data for output and for capital (K), labour (L), energy (E), materials (M) and services (S) in order to calculate measures of productivity growth.

43. The EU KLEMS project was initially funded by EU institutions, and this phase resulted in data up to calendar year 2007 on the ISIC revision 3 industry classification (similar to NACE revision 1).

44. The project has then been continued in respect of some countries, including the UK, using the newer ISIC revision 4 industry classification (similar to NACE revision 2).

45. The extension of the EU KLEMS project in respect of UK data uses a more limited scope than the original EU KLEMS project. The new datasets provides information to calculate measures of productivity growth based on value added, but not measures of productivity growth based on gross output.

46. At the time of writing, data covering this reduced scope are available for the UK up to 2009. Data for a much smaller number of variables, not including any productivity measures, or volumes of labour or capital, are also available for 2010.

ONS productivity datasets

47. The Office of National Statistics publishes regular datasets on economic activity, including labour productivity measures based on value added.

48. The advantage of the EU KLEMS database over the raw ONS datasets is that:

    (a) The EU KLEMS database includes estimates of volumes of services from capital, enabling the calculation of total factor productivity measures, or the adjustment of partial productivity measures to control for changes in capital.

    (b) The EU KLEMS database includes estimates of labour volume which are intended to take better account of factors such as skills mix.

49. Against this, the advantages of the raw ONS datasets are:

(a) They are an official source, rather than the result of academic research.

(b) They are published more quickly after the event.

50. We have focussed our quantitative analysis on the EU KLEMS dataset. The results that we have obtained from the EU KLEMS dataset appear consistent with the pattern of data in ONS sources, including in respect of the apparent sharp reduction in productivity in recent years, and therefore we think that the relevant issues are best described and understood on the basis of the EU KLEMS dataset.

Comparability of productivity measures

Value-added and gross-output measures

51. Productivity refers to an increase in the quantity of production (output) per unit of capital, labour and/or other inputs.

52. There are two main productivity measures, defined by the way in which production is defined and measured:

(a) For a productivity measure based on gross output, production is defined by reference to goods and services delivered. The inputs are capital, labour, energy, materials and services.

(b) For a productivity measure based on value added, production is defined as the act of transforming energy, materials and services into goods or services. In that context, the inputs for the productivity calculation are restricted to labour and capital, because energy, materials and services are taken into account in measuring the amount of transformation activity delivered.

Algebraic relations between productivity measures

Gross output

53. Gross output relates to the goods or services produced by a firm or sector. For a firm, the value of gross output is its turnover.

Labour

54. Labour refers to human work in production activities. The value of labour comprises the wages and social security contributions of employees, and the estimated labour element of the profits of self-employed people.

Intermediate inputs

55. Intermediate inputs are all the inputs other than labour that are consumed by the production process (not inputs that are merely used without being consumed: these are capital). Intermediate inputs are comprised of energy, materials and services.

56. For a firm, the combined value of labour and intermediate inputs is its operating expenditure (operating cost less amortisation charges).

Capital

57. The services from capital (or capital in short) represent the contribution to the production process made by durable assets.

58. The value of the capital input is value added less labour compensation. For a firm, the value of the capital input is essentially its cashflow from operations: that is to say, earnings before interest, amortisation and taxes on profit. This will not normally correspond to any accounting profitability measure, or to any combination of capital expenditure, renewals expenditure, the estimated cost of capital or amortisation.

Value added

59. Value added is defined as gross output less intermediate inputs.

60. Provided that all nationally produced natural resources (such as energy or materials) are treated as the output of a sector (e.g. mining), then the aggregate of value added over the economy, plus VAT and other taxes, is the gross domestic product (output measure of GDP). This is the total output from the economy seen as a whole, including exports, net of imports, measured in purchasers (tax-inclusive) prices.

61. Value added is also the sum of the value of labour and the value of capital, which on aggregate over the economy can be reconciled with the income measure of GDP as wages plus rents plus profits plus VAT and other taxes.

62. At the level of an individual firm, this notion of value added is not a significant accounting measure.

Productivity

63. All the measures outlined above are in financial terms. To estimate productivity or economic growth, it is necessary to convert them into volume terms. This can be done by two equivalent methods:

(a) Applying notional constant prices to the underlying volume data. For example, the change in the volume of labour input can be calculated from a weighted average of changes in hours worked by different types of labour (e.g. by skill level) in which the weights are shares of value (i.e. proportions of total labour cost).

(b) Using the most appropriate deflator to convert values into volumes. For example, value added volumes for the whole economy can be calculated from GDP in current prices by using the GDP deflator to convert it into constant prices (i.e. volumes).

64. The EU KLEMS methodology paper provides a good discussion of the methods it used to calculate the volume series reported in its database.[2]

[2] Timmer, Marcel et al. (2007) EU KLEMS Growth and Productivity Accounts, Version 1.0, Part I Methodology (available from http://www.euklems.net/data/EUKLEMS_Growth_and_Productivity_Accounts_Part_I_Methodology.pdf)

65. Productivity growth is the difference between input volume growth and output volume growth in a production process, and is defined to be positive when the relevant output grows faster than the relevant input.

66. The output measures that can be used for sector-level measures of productivity growth are gross outputs and value added. The input measures can be any combination of labour, capital, and, if the chosen output measure is gross output, intermediate inputs or its component parts (energy, materials, services). But these intermediate inputs are not relevant inputs if output is measured as value added since their contribution to production has already been netted off the value added output measure.

67. Combining several input measures gives multi-factor productivity measures. If all relevant inputs are included then the term total factor productivity is used. Total factor productivity can thus be measured using value added or gross output as the output measure.

68. For the economy as a whole, measurements usually focus on value added measures rather than gross output measures, since gross output aggregated over the economy as a whole has little economic significance. The headline productivity measures on the value added basis are labour productivity (i.e. economic growth relative to changes in volume of labour) and total factor productivity (i.e. economic growth relative to the combined change in volume of labour and capital).

Value added TFP growth

69. Value added total factor productivity growth is defined as:

$$g(TFP_{VA}) = g(VA) - shareK_{VA} * g(K) - shareL_{VA} * g(L)$$

where

$g(TFP_{VA})$ is the increase in total factor productivity based on value added

$g(VA)$ is the increase in value added at constant prices

$g(K)$ is the growth in the volume of services from capital

$g(L)$ is the growth in the volume of labour

$shareL_{VA}$ is the share of value added which is accounted for by labour

$shareK_{VA}$ is the share of value added which is accounted for by capital

Gross output TFP growth

70. It is possible to define a concept of total factor productivity based on gross output as:

$$g(TFP_{GO}) = g(GO) - shareK_{GO} * g(K) - shareL_{GO} * g(L) - shareII_{GO} * g(II)$$

where

$g(TFP_{GO})$ is the increase in total factor productivity based on gross output

$g(GO)$ is the increase in gross output at constant prices

$g(K)$ is the growth in the volume of services from capital

$g(L)$ is the growth in the volume of labour

$g(II)$ is the growth in the volume of intermediate inputs, namely energy, materials and services

$shareL_{GO}$ is the share of gross output which is accounted for by labour

$shareK_{GO}$ is the share of gross output which is accounted for by capital

$shareII_{GO}$ is the share of gross output which is accounted for by intermediate inputs

71. For the same reasons as outlined above, this measure is dependent on the level of vertical integration, and the whole economy figure has no significance for growth accounting or macroeconomics.

Relevant expenditure categories in the business plans

72. Table 1 shows the categorisation of expenditure defined by Ofgem for use in the efficiency gains section of business plans.

Table 1 Business plan requirements: expenditure categories for efficiency gains

Load related capex
Non-load related capex - asset replacement
Non-load related capex - other
Faults
Tree cutting
Controllable opex

Relevant input categories in the business plans

73. Table 2 shows the categorisation of input costs defined by Ofgem for use in the efficiency gains section of business plans.

Table 2 Business plan requirements: input cost categories for efficiency gains

General Labour (capex)
General Labour (opex)
Specialist Labour (capex)
Specialist Labour (opex)
Materials (capex)
Materials (opex)
Equipment/Plant
Transport
Other

74. Faults expenditure may contain both "opex" and "capex" cost elements. The tree cutting and controllable operating expenditure categories may not contain "capex" cost elements. Capital expenditure categories may not contain "opex" cost elements.

Known biases between productivity measures and RIIO-ED1 ongoing efficiency gains

75. This report presents some data relating to historical productivity gains in the UK economy as a whole and for some specified sectors within it. The purpose of this data is to help validate assumptions concerning ongoing efficiency indices submitted as part of RIIO-ED1 business plans.

76. Ongoing efficiency indices will be applied to data that are already corrected for any "catch-up" efficiency assumptions: they are intended to reflect factors that affect costs over time for a hypothetical business that would be efficient at all times.

77. The historical productivity gains examined within this report, and elsewhere, are not calculated on the same basis. For a start, they do not refer to a hypothetical efficient electricity distribution business and refer to historical periods rather than the future.

78. This section considers several potential biases that could affect the degree to which historical productivity trends can be used to validate the level of ongoing efficiency indices.

Reasons historical data might lead imply overly high efficiency assumptions

79. We have identified a number of potential biases that would tend to lead to measures of historical productivity gains for UK economic sectors which are greater than plausibly achievable ongoing efficiency gains for activities of electricity distribution network operators. These include:

(a) The data for UK economic sectors, such as those used in the EU KLEMS dataset, are aggregates over sectors, which, at any one time, will comprise of many different companies with some efficient and some less efficient companies. Whilst we would expect firms to be largely efficient in a competitive market – since inefficient firms should not be able to compete – the reality of sectors is likely to be more complicated than this. Thus, average reported productivity gains in UK economic sectors include an element of productivity gain that could be considered catch-up. There is no such catch-up element in the ongoing efficiency indices, as Ofgem considers that they apply to a notional efficient operator for the relevant activity, not to an average operator.

(b) Ongoing efficiency indices apply to all costs, including purchased-in services, materials and energy; not just to labour costs. The relevant outputs for the ongoing efficiency indices are network investments and network operation services which are akin to gross output. Thus, the relevant comparator measures of productivity are gross output measures, not value-added measures. Much of the available data for UK economic sector is on a value-added basis; in particular the latest EU KLEMS data are only available on a value-added basis. Gross-output measures of productivity gains are systematically lower than value-added measures.

(c) Capital inputs are excluded from the application of ongoing efficiency indices. In many UK economic sectors, and in the UK economy as a whole, reductions in other inputs (or disproportionate growth in outputs) has been achieved through capital substitution — an increase in the volume of capital inputs that is faster than growth in gross output or value added volumes. For each of the specified expenditure categories for electricity distribution network operators, the relevant capital would be in the form of tools, software, etc. — investment in network assets like circuits and substations are essentially irrelevant for this analysis (these capital assets help provide services to customers, they do not help deliver the relevant six categories of activity with which we are concerned here). Given the likely increases in investment and grid management activities due to low-carbon objectives, there is a risk that the relevant capital employed per unit of relevant output will tend to fall, and therefore that the partial measures of productivity gains most relevant to ongoing efficiency indices will be lower than comparable total factor productivity measures for UK economic sectors.

(d) Research shows that sharp falls in reported productivity in 2008–2009 might not be fully explained by ordinary spare capacity or labour hoarding features in a recession. Given that an intrinsic loss of efficiency is unlikely (new technologies or working practices do not get de-invented), it is possible that the explanation of this productivity puzzle rests in part on the sudden unwinding of accumulated defects in the data, perhaps in difficult areas such as the measurement of output quality, labour quality or services from capital. If this is the explanation, then the productivity gains in UK economic sector up to 2007 have in all likelihood been overstated.

Reasons historical data might lead imply overly low efficiency assumptions

80. Against these, there are features of the historical productivity data that might cause some measures of productivity gains for UK economic sectors to be understated, and which explain instances of negative productivity gains in the data which would probably not apply to ongoing efficiency gains for notionally efficient activities of electricity distribution network operators. These include:

(a) Spare capacity due to falls in demand or other market fluctuations could explain temporary bleeps (although they do not appear to explain the full magnitude of the recent falls in reported productivity). Whilst sharp and unexpected falls in demand for capital expenditure activities of electricity distribution network operators are, in principle, possible, we think that it is unlikely to be appropriate to take such effects into account in the context of a business plan for a period where electricity distribution network operators are expected to invest in smart grids and other projects related to low-carbon objectives.

(b) The macro-economic data shows continued growth in capital employed in the face of falling demand in many sectors, particularly in recent years, which leads to measured falls in productivity. It is possible that the investment is being undertaken in new products or services (for which there is no demand yet), so that atiming mismatch between capital and outputs might be distorting productivity data. Such a mismatch is less likely to occur in respect of the six areas of activity to which ongoing efficiency indices would apply (since the outputs for these six areas of activity are well defined and might not permit much product innovation).

Data for comparable measures of productivity from EU KLEMS

81. This section provides graphs and tables summarising the information that we have taken from the EU KLEMS data. The majority of the graphs and data are taken from the 2012 UK update of the EU KLEMS. As such, all but one of the graphs and tables produced below concern value added total productivity growth.

82. We include one graph on average gross output TFP growth from an older release of EU KLEMS in figure 8.

Figure 1 Average value added total factor productivity growth by sector 1980–2009

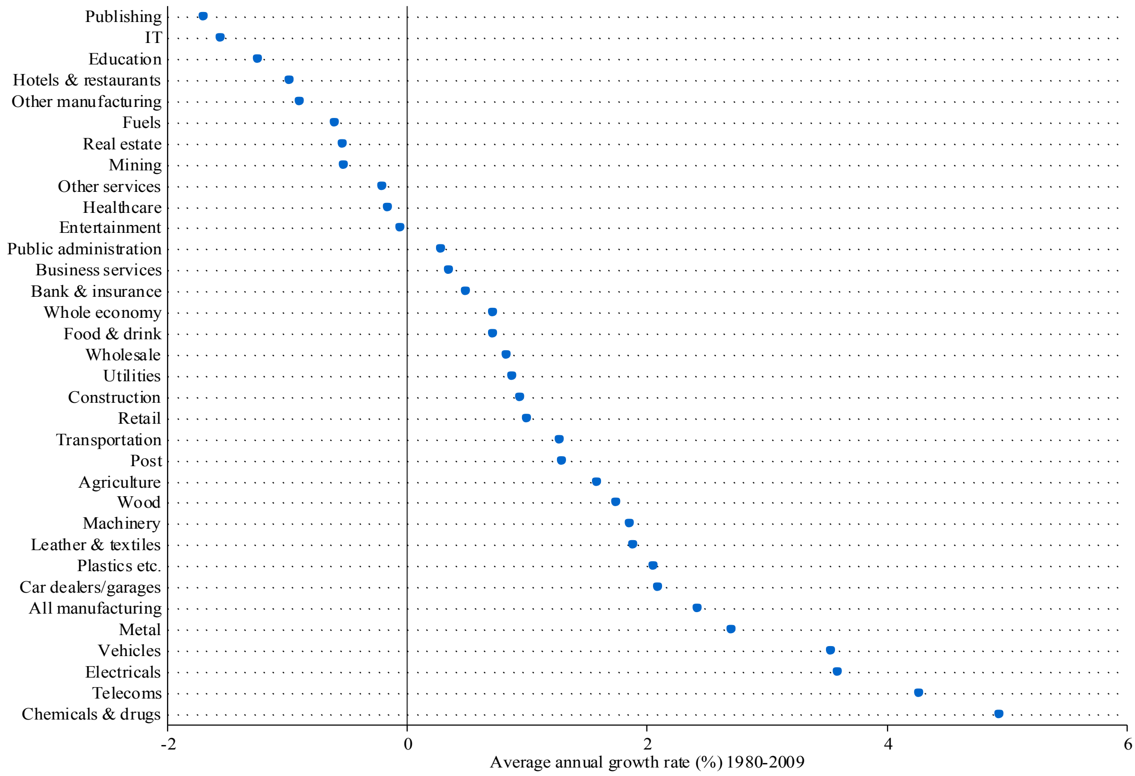


Figure 2 Average value added total factor productivity growth by sector 1994–2009

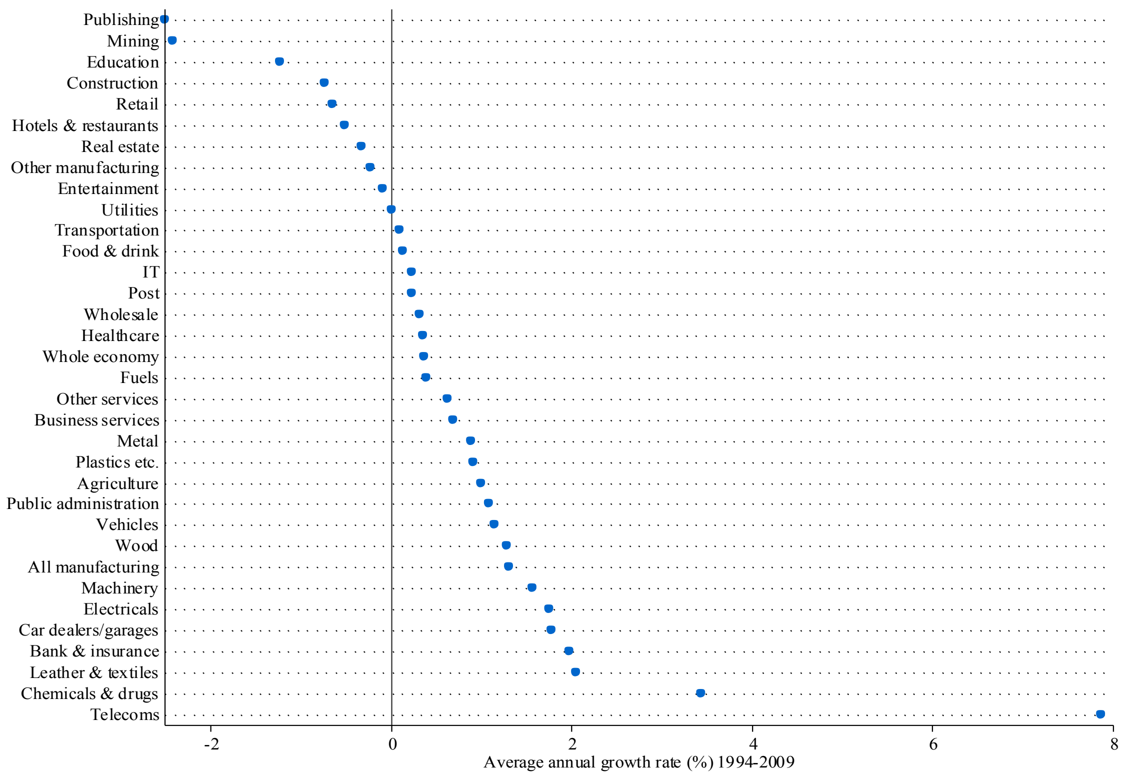


Figure 3 Average value added total factor productivity growth by sector 2006–2009

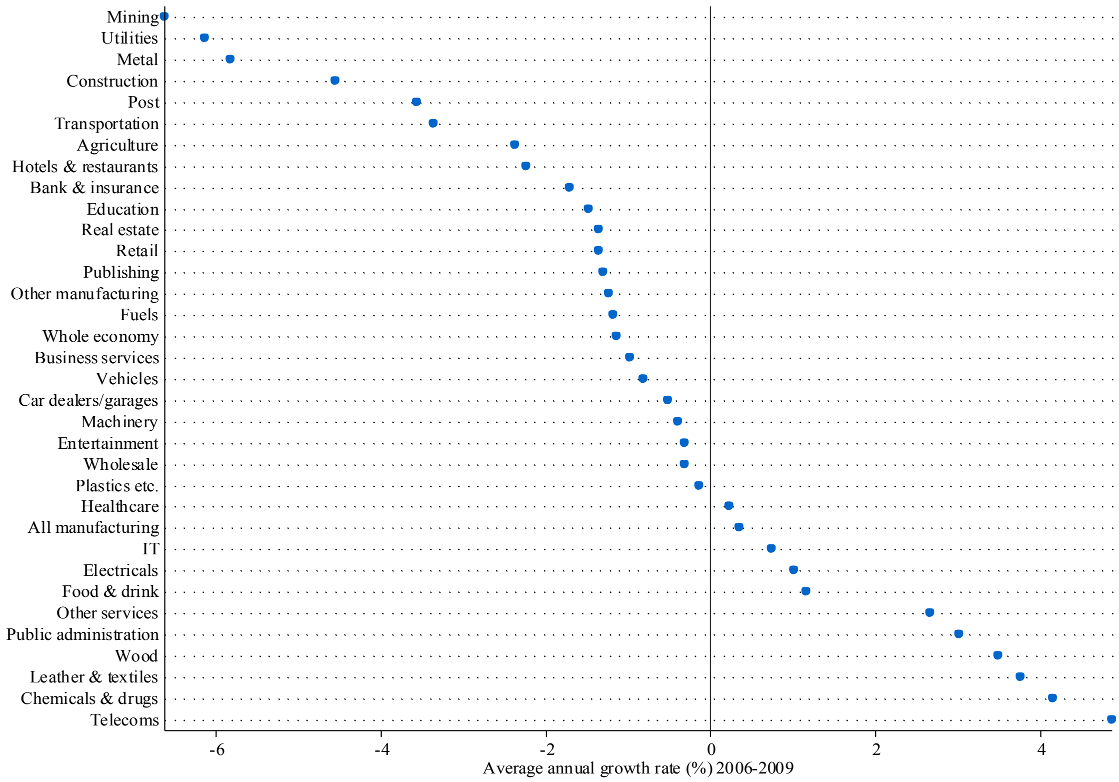


Figure 4 Average value added total factor productivity growth by sector 1980–2007

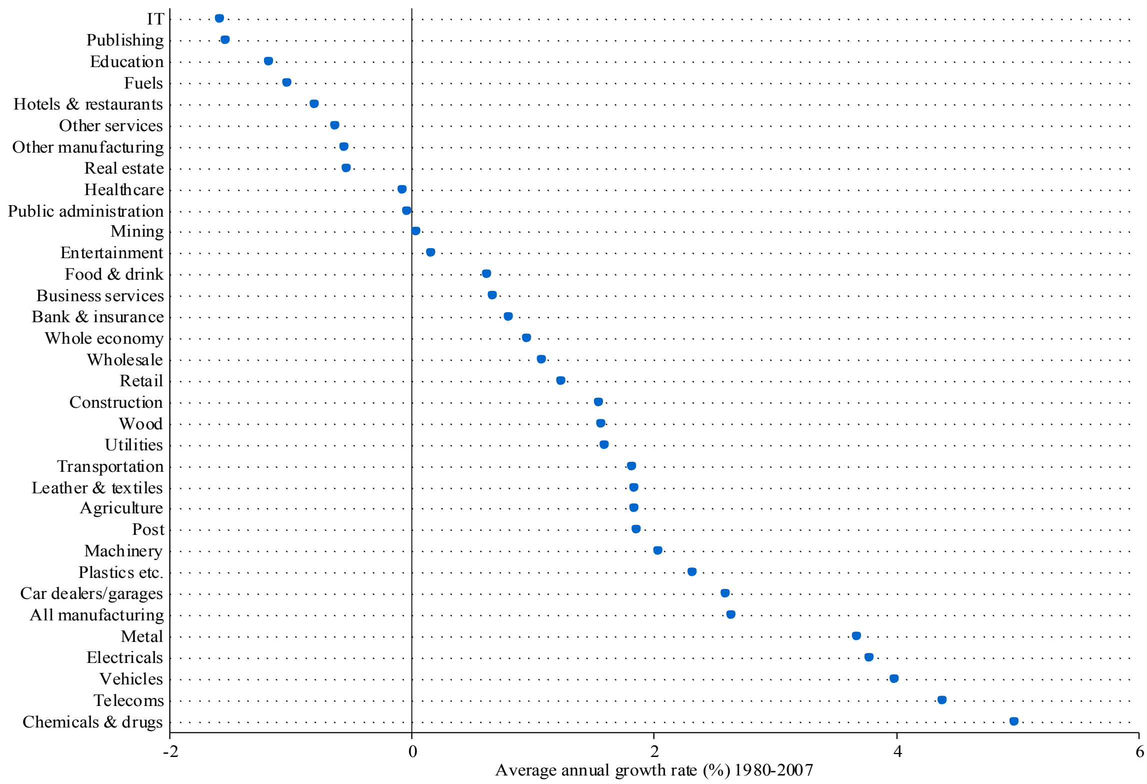
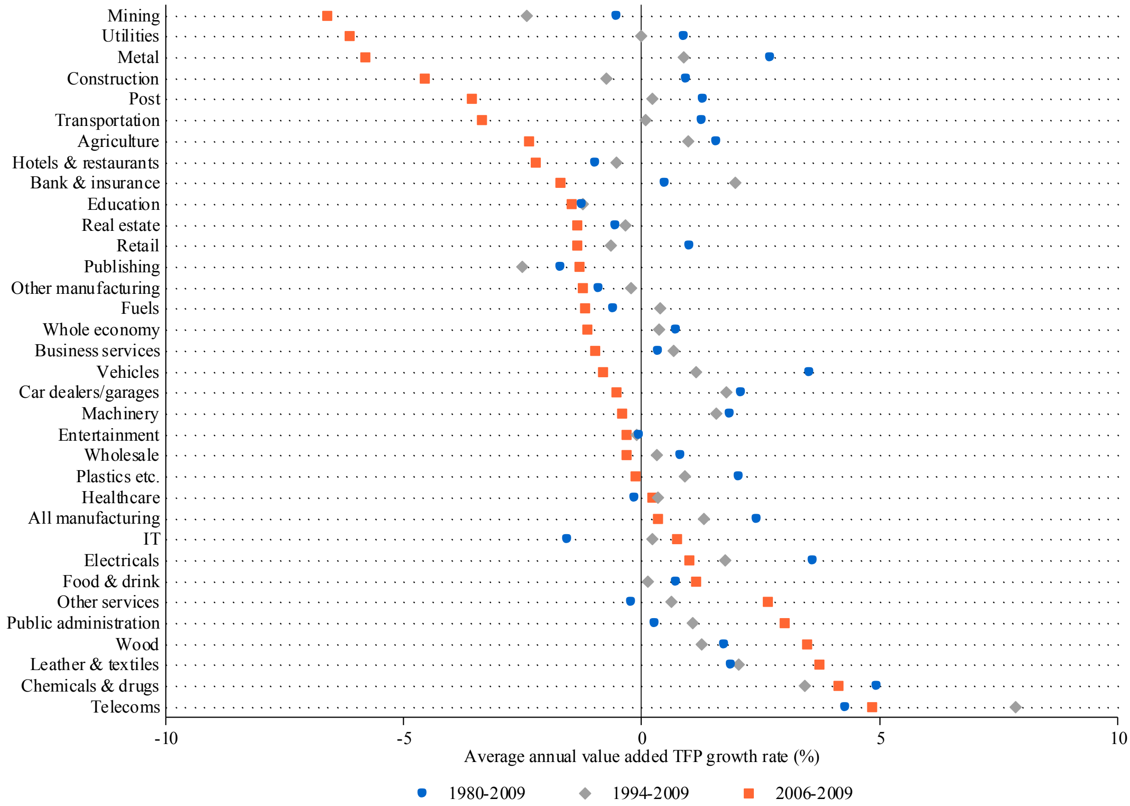


Figure 5 Comparison of average value added total factor productivity growth rates by different averaging periods



83. Figures 6–7 below demonstrate how the average annual rate of value added total factor productivity growth varies depending on the length of time being averaged over. The x axis shows the number of years, looking back from 2009, the average annual growth rate has been calculated for. For example, when year is 30 this represents an average over the full period. We produce graphs for the whole economy and the construction sector.

Figure 6 Different averaging periods from 1980–2009 for annual value added TFP growth for the whole economy

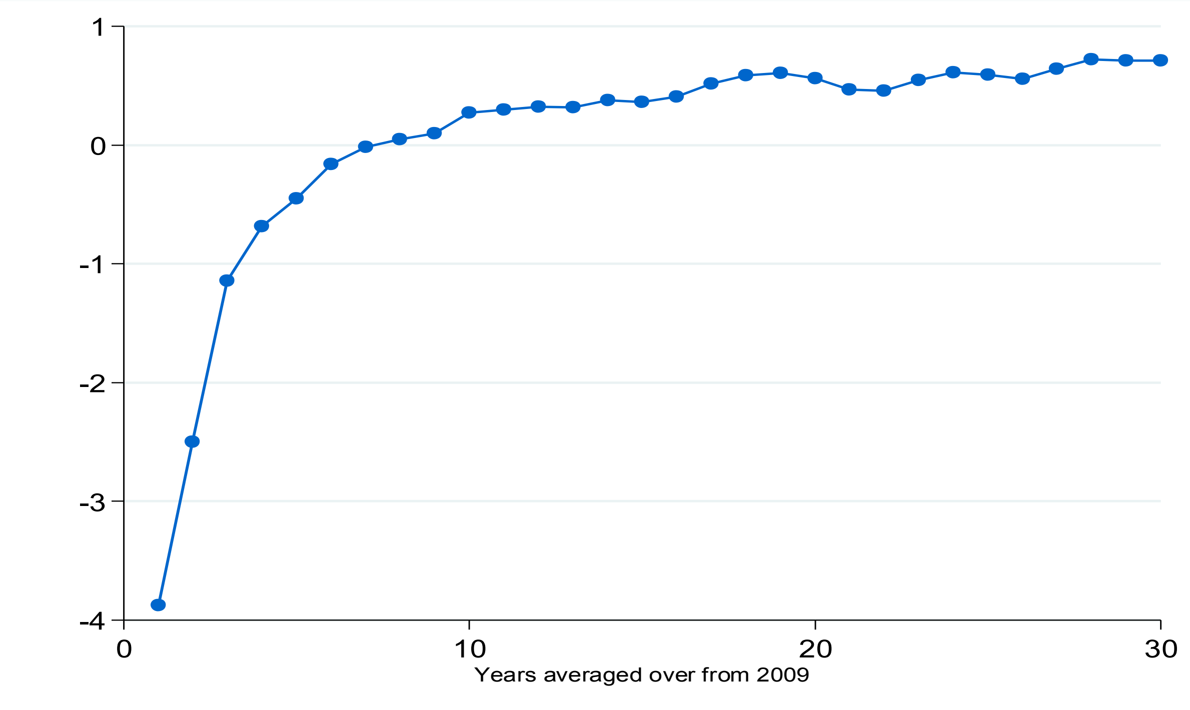


Figure 7 Different averaging periods from 1980–2009 for annual value added TFP growth for the construction sector

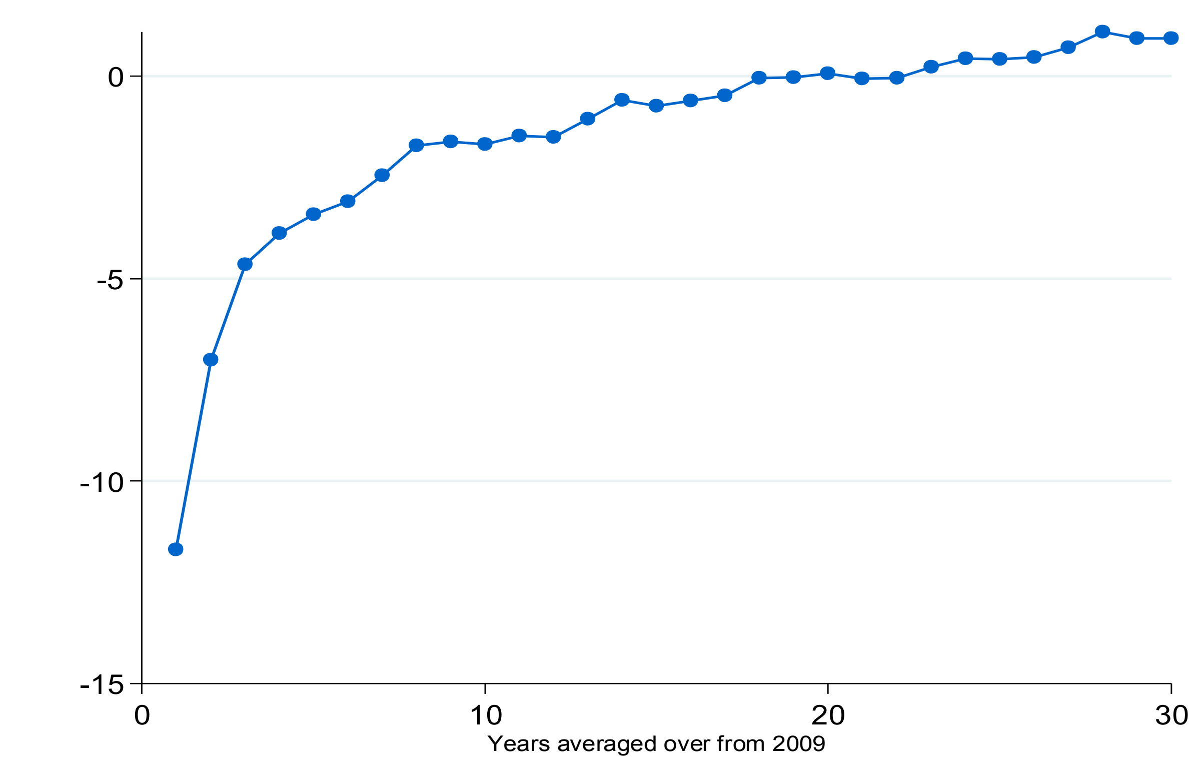
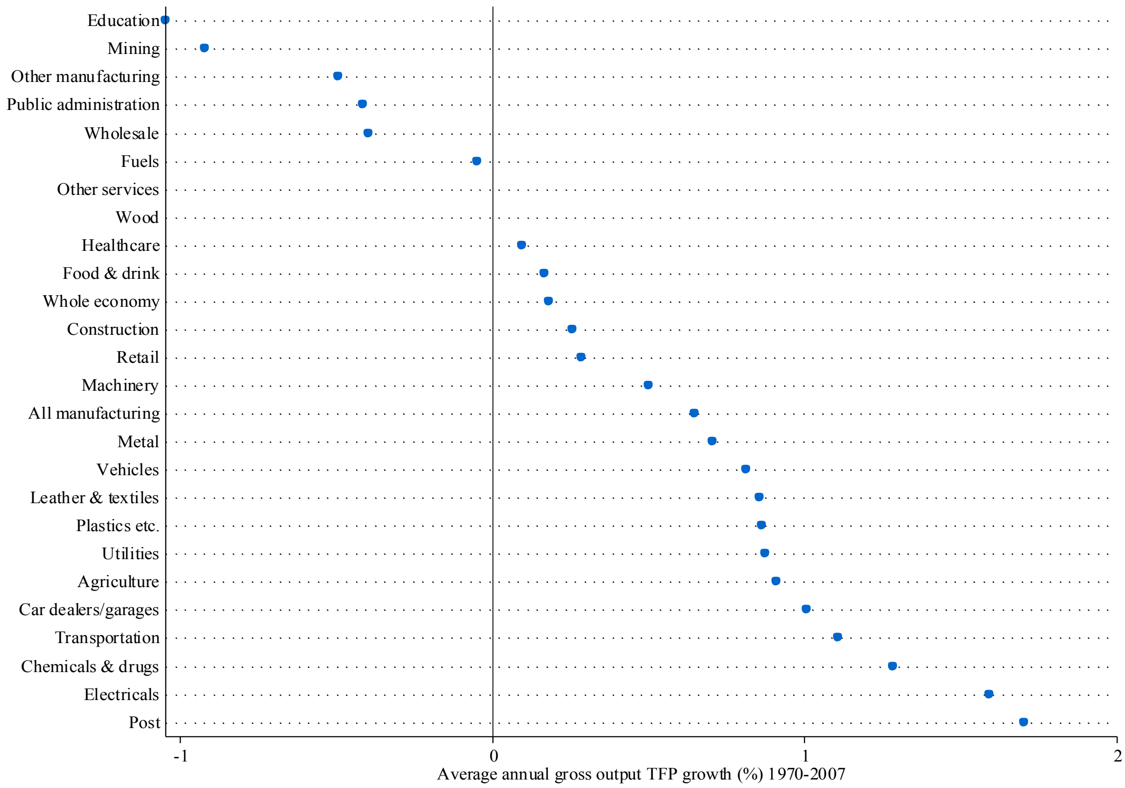


Figure 8 Average gross output total factor productivity growth by sector 1970–2007



84. Headline value-added total factor productivity estimates from the latest EU KLEMS dataset:

	Share of economy 2009	Ongoing efficiency 2006–2009	Ongoing efficiency 1994–2009	Ongoing efficiency 1980–2009	Ongoing efficiency 1980–2007
Agriculture	0.6%	-2.4%	1.0%	1.5%	1.8%
Bank & insurance	10.1%	-1.7%	1.9%	0.5%	0.8%
Business services	11.8%	-1.0%	0.7%	0.3%	0.7%
Car dealers/garages	1.7%	-0.5%	1.7%	2.0%	2.5%
Chemicals & drugs	1.7%	4.0%	3.3%	4.7%	4.7%
Construction	7.0%	-4.8%	-0.7%	0.9%	1.5%
Education	6.8%	-1.6%	-1.3%	-1.3%	-1.2%
Electricals	1.0%	1.0%	1.7%	3.5%	3.6%
Entertainment	1.5%	-0.3%	-0.1%	-0.1%	0.1%

	Share of economy 2009	Ongoing efficiency 2006–2009	Ongoing efficiency 1994–2009	Ongoing efficiency 1980–2009	Ongoing efficiency 1980–2007
Food & drink	1.8%	1.1%	0.1%	0.7%	0.6%
Fuels	0.1%	-1.5%	0.3%	-0.6%	-1.0%
Healthcare	7.9%	0.2%	0.3%	-0.2%	-0.1%
Hotels & restaurants	2.8%	-2.3%	-0.5%	-1.0%	-0.8%
IT	2.6%	0.7%	0.1%	-1.8%	-1.8%
Leather & textiles	0.3%	3.6%	2.0%	1.8%	1.8%
Machinery	0.7%	-0.5%	1.5%	1.8%	1.9%
Metal	1.3%	-6.2%	0.9%	2.6%	3.5%
Mining	2.1%	-7.1%	-2.5%	-0.5%	0.0%
Other manufacturing	0.7%	-1.3%	-0.2%	-0.9%	-0.6%
Other services	1.4%	2.6%	0.6%	-0.2%	-0.6%
Plastics etc.	0.7%	-0.1%	0.9%	2.0%	2.3%
Post	0.7%	-4.1%	-1.3%	0.2%	0.7%
Public administration	5.4%	2.9%	1.1%	0.3%	0.0%
Publishing	1.7%	-1.3%	-2.6%	-1.8%	-1.6%
Real estate	7.2%	-1.4%	-0.3%	-0.5%	-0.5%
Retail	5.4%	-1.4%	-0.7%	1.0%	1.2%
Telecoms	1.9%	4.6%	7.3%	4.1%	4.2%
Transportation	4.2%	-3.5%	0.1%	1.2%	1.8%
Utilities	2.9%	-6.5%	0.0%	0.9%	1.6%
Vehicles	0.8%	-1.3%	1.0%	3.3%	3.8%
Wholesale	3.9%	-0.3%	0.3%	0.8%	1.1%
Wood	0.9%	3.4%	1.3%	1.7%	1.5%
Whole economy	100.0%	-1.2%	0.4%	0.7%	0.9%