

Changing times: Incentive regulation, corporate reorganisations, and productivity in the Great Britain's gas networks.

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The gas industry in Great Britain has recorded a number of organisational changes in line with ongoing regulatory reforms in the energy sector to foster competition in the industry and due to the corporate decisions of privately owned gas companies, following privatisation. Initially, British Gas (BG) was responsible for all aspects of natural gas supply, including exploration and production, transmission, distribution, and customer sales and service following its privatisation. However, incentive regulation has been employed as an effective way of improving the efficiency in the gas transmission and distribution networks owing to the absence of competitive pressures in these segments, thereby providing a mechanism for promoting cost saving, service quality, resource use efficiency and environmental quality. With the restructuring of BG and subsequent demergers in the industry, there are currently eight gas distribution networks which maintain and operate the local gas networks that carried gas from the National Transmission System (NTS) to different homes and businesses all over the GB while National Grid Gas remains both the System Operator and Transmission Owner for the gas NTS.

We undertake two separate productivity analyses using a non-parametric data envelopment analysis (DEA) approach in order to examine the implicit effects of these two major changes that have happened in the industry, the change in regulation and the changes in ownership structure. In the first analysis, our paper examines the productivity growth of gas transmission and distribution networks in Great Britain over the period 2006/07-2018/19 and how changes in incentive regulation have impacted the measured TFP. Given that quality standards from

regulators warrant some adjustment to industry productivity growth, we measure the effect of regulation from the perspective of quality of service and environmental targets using different models for the TFP analysis. We find a negative underlying TFP growth of -1.6% p.a. for gas transmission over the sample period (2006/07-2018/19) in the baseline model. Although, this is reversed to a positive growth once quality variables are included. For gas distribution, we actually find that productivity regress at -6.2% p.a. over the sample period (2006/07-2018/19), with the negative TFP trend observed across all the models, despite the inclusion of quality variables. This is driven by sharp increase in distribution capex figures from £317 million in 2016/2017 to £1.24 billion (2012/2013 prices) in 2018/2019.

In the second analysis, we construct a combined single series for distribution and transmission using financial data from 1995/1996-2020/2021 to uncover how corporate reorganisations have impacted measured productivity. More importantly, the analysis enables us to obtain a fresh insight about the productivity performance of the industry in the years before and after regulatory restructuring, when the industry went from being a single integrated transmission and distribution network to the disintegrated networks of today. We find a slightly higher TFP growth of 1% using corporate accounts over the 25 years. The period before the final separation of transmission and distribution networks has a positive productivity growth of 6.3% p.a. compared to the post-restructuring era with negative productivity growth of -2.4% p.a.

In general, we observe that the slowing of productivity growth in the gas networks in GB coincides with decreasing levels of outputs, particularly in terms of units of gas distributed and transmitted in the face of falling gas demand in recent years. Also, other outputs such as network length and number of customers have been experiencing a steady rise at the same time. Arguably, this is a recipe for slowdown in productivity by posing challenging conditions for productivity growth in the industry.

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