Institution: University of Cambridge
Unit of Assessment: UoA 19
Title of case study: Changing government economic measurement, spending and regulation
Period when the underpinning research was undertaken: March 2018 – November 2020

Details of staff conducting the underpinning research from the submitting unit:

Name(s):	**Role(s) (e.g. job title):**	**Period(s) employed by submitting HEI:**
Diane Coyle	Bennett Professor of Public Policy (2018)	05.03.2018 - present

Period when the claimed impact occurred: May 2018 – 31 July 2020
Is this case study continued from a case study submitted in 2014? N

1. Summary of the impact

Coyle's research at the University of Cambridge has changed the way that the UK government measures economic activity, distributes public money, and regulates digital markets. First, her research on the digital economy changed how GDP is measured. Second, this research underpinned her role on the government-commissioned Furman Panel and as a senior advisor for the Office of National Statistics (ONS). These contributions persuaded the UK Government to establish a Digital Markets Unit and the Competition and Markets Authority to investigate online advertising. Finally, her research has changed how and where government money is spent by changing how the Treasury makes cost-benefit calculations. In correcting a major geographical bias in government spending, this reform helps address the North-South economic imbalance.

2. Underpinning research

This case study reflects Coyle's most recent work on enabling government to better understand, measure and regulate the British economy. She has been involved in every step of the process: from the initial research set up in early 2018, through its translation into policy proposals, to monitoring implementation of government policy.

Coyle established and led these research projects at the Bennett Institute for Public Policy at the University of Cambridge (where she is co-Director). Her research in political economy and public policy poses theoretical and empirical challenges to conventional ways of estimating economic growth. Coyle conducted her research in collaboration with colleagues at the Institute (including several post-docs), and in partnership with Dr Marianne Sensier (Manchester University) [R1], Dr David Nguyen (National Institute of Economic and Social Research) [R2], and Professor Adrian Weller (Cambridge Engineering Department) [R6]. She contributed economic theory and empirical data to underpin proposals to shift government policy.

Coyle's projects are animated by three overarching questions:

1. **Are governments accurately accounting for the digital economy in official economic growth and productivity statistics?**

Coyle's work is central to the much debated 'productivity puzzle' in the UK. She has demonstrated that perceptions of low productivity may partly reflect a failure of conventional statistics to account for digitalisation and the changing nature of production [R2]. Her work reveals how new technologies are changing the distribution and value of economic activity, and shows that digitalisation may affect standard measures of GDP and productivity. Published first in [R3] and later in [R4], this work provided alternative telecommunications deflators to better capture changes in prices and volume of services. On the basis of her research, Coyle was invited to become a Co-Investigator and Research Lead for the Manchester-based ESRC Productivity Institute's research programme on 'Knowledge Capital', which was launched in 2020.

2. **How can digital technology be regulated to ensure it contributes to economic growth and the wider social good?**

Utilising the economic theory of multi-sided platforms, Coyle argued that the tools authorities use to assess competition in digital markets require revision, and that conventional merger and market guidance is inapplicable to the regulation of competition in the digital sector. She demonstrated that the likelihood of 'winner-take-most' outcomes in digital markets is a result of network effects. Therefore, competition assessments are critical to make sense of, and expand, the scope for new entrants to the market and to encourage innovation [R5]. Her work in this area also pointed to risks in policy applications of digital tools such as machine learning without careful thought about the policy targets being coded into the automated systems [R6].

3. **Do existing rules for assessing the value of governmental spending reinforce regional inequalities in public investment, and how might these be changed to address the problem?**

Coyle has built on her earlier research on the limitations of standard ways of measuring economic value, and applied it to one of the most important and contentious mechanisms in UK government for assessing the case for its activity and investments – the rules used to estimate 'value for money' (which are set out in the Treasury's Green Book). She co-authored (with Sensier) a paper [R1] which demonstrated the geographical bias associated with the application of these rules and the extent to which they are in tension with other government priorities, including 'levelling up' regional economic performance. The core argument and main findings of this paper have achieved major academic and policy impact in a short period of time.

3. References to the research

[R1] Coyle, D.and Sensier, M. (2020). The imperial treasury: Appraisal methodology and regional economic performance in the UK. *Regional Studies*, 54(3), 283-295. [DOI]

[R2] Coyle, D. and Nguyen, D. (2020). No plant, no problem? Factoryless manufacturing, economic measurement and national manufacturing policies. *Review of International Political Economy*. Early view. [DOI]

[R3] Abdirahman, M., Coyle, D., Heys, R. and Stewart, W. (2020). A comparison of approaches to deflating telecoms services output. *Economie et Statistique / Economics and Statistics*, 517-518-519, 103–122. [DOI]. [Link]

[R4] Coyle, D. (2020). National accounting: Old questions revisited, plus some new ones. *Economie et Statistique / Economics and Statistics*, 517-518-519, 5-7. [DOI]

[R5] Coyle, D. et al. (2019). Practical competition policy tools for digital platforms. *Antitrust Law Journal*, 82(3). [Link]

[R6] Coyle, D. and Weller, A. (2020). "Explaining" machine learning reveals policy challenges. *Science*, 368(6498), 1433-1434. [DOI]

Indicators of quality: [R1, R2, R3, R4, R5, R6] are articles in journals of international standing that have been through rigorous peer-review processes. The research was also supported through competitive external grants:

Diane Coyle, Co-Investigator and Theme Lead - Economic Statistics Centre of Excellence Award, Office of National Statistics, Phase 2, 5 March 2018 - 31 March 2022 - GBP77,000.

Diane Coyle, Principal Investigator - Valuing Data, Nuffield Foundation - 2019-2020 - GBP68,632.

4. Details of the impact

The impact documented in this case arises from the compelling answers provided by Coyle to the research questions outlined above. This has resulted in: 1) a substantive change to the way in which the UK government measures GDP, taking fuller account of the contribution of digitalisation; 2) incorporation of Coyle's advice in new approaches to, and institutional innovations affecting, the regulation of the UK's digital economy; and 3) the provision of evidence that changed the allocation of government spending. We evidence each of these contributions below.

1. **Coyle's research altered how GDP is measured in the UK by demonstrating how and why government currently underestimates productivity gains associated with the digital economy.**

Research that Coyle conducted on telecommunications service pricing [R4] led directly to a change in how GDP is calculated within the UK's National Accounts. This alteration is estimated to add 0.2% per annum to the UK's GDP [E1, p. 6, Figure 1], increasing growth in 2018-19 from 1.3% to 1.5% GDP, a difference of GBP4 billion.

From 2018 to 2020, Coyle and a small group of ONS statisticians collaborated on research into telecommunications pricing. Coyle provided the understanding of the pace of digital change in this instance and its relationship to prices. Directly referencing Coyle's research as its justification [E1(a), p. 4], ONS altered its thinking about the pricing of units of output for communications services. This analysis, and the new price index based on it - which ONS devised in response [E1(b)] - showed that the value people get from the data they use is higher than previously estimated. This will be reflected in the UK's future GDP figures. It indicates an acceptance in the ONS that GDP in the UK is higher than estimated on average over the past decade, and has been growing faster more recently [E1(b)]. ONS announced in November 2020 that it is incorporating these findings into modifications being made to the ONS's Blue Book, their published record of the UK National Accounts [E1(a)].

The Deputy Chief Economist at ONS testifies to the unusual speed with which the ONS adopted Coyle's work on telecommunications pricing:

"The UK will include a new telecoms deflator into the National Accounts in either 2020 or 2021, dependent on other development activity. This is a remarkably fast timetable for a change of this kind to be brought into the Accounts and reflects the quality of the initial research, particularly how this was tailored to user need, and helped to bridge an existing gap between academic economists and the measurement community." [E2]

2. **Coyle provided the guidance which informed the UK government's introduction of new processes for the development of competition policy and regulatory strategies in the context of the digital economy.**

Coyle's research influenced the UK government's decision to initiate and invest in new competition policy and regulation for the digital sector [R5] [R6]. She was consulted on the decision to initiate these processes, and about the form that they should take. The Competition and Market Authority (CMA) was immediately receptive to her work on challenges posed by digital business models [R5]. The CMA consulted Coyle in deciding to establish a Digital Markets Unit to consider competition policies, and invited her to join the CMA's academic advisory board [E3]. She also participated in high-level policy discussions that informed their wider thinking about competition policy and regulation (March 2020 [E4, p. 2-3]), and which resulted in a new market enquiry into online advertising.

Other parts of the UK government also drew upon Coyle's expertise on issues around competition and regulation. The Chief Economist at the Bank of England explains that Coyle's work on digital competition and measurement directly informed thinking in the Bank of England and in the Industrial Strategy Council, with the latter using Coyle's productivity and telecommunications price measures in their evaluation framework [E5]. In June 2018, the Department for Business, Energy and Strategy invited her to join a group of academic experts to inform the Government's review of competition law, specifically on antitrust enforcement, enterprise, and regulatory reform [E4, p. 7], with research in [R5] being immediately relevant.

Coyle was one of five appointed expert members of the Treasury's Digital Competition Expert Panel (the Furman Panel). Her specific contribution to its influential final report came via her research on the challenges posed by digital business models [E6, p.89]. The Panel Chair and its final report affirm Coyle's important role [E7] [E4, p.5]. Its recommendations for regulation and competition in a digital economy received widespread policy attention in the UK and internationally. The British Government [E8, p. 8-9] announced in March 2020 that it would fully implement the Panel's recommendations, setting aside funding for a Digital Markets Unit in the 2020 Spending Review, a direct outcome of the Furman Panel recommendations [E4, p. 21]. Its remit is to "*begin to operationalise the key elements of the UK's regime to unlock competition in digital markets*" [E9, p. 92] – an idea which Coyle has pioneered in her research [R5].

Coyle's findings in this area have also had an impact outside the UK. A key mechanism for governments to become informed of her research was Coyle's participation in high-level international forums, including the G7 Finance Ministers' meeting (Canada, June 2018), and the Canadian government-funded Working Group on the Modern Economy within the Canada-UK Policy Forum, where she provided expert advice on data issues and the digital economy [E4, p. 15-16].

Coyle was the only UK expert at a September 2020 event with Vice President of the European Commission, Margarethe Vestager, and she advised on the EU's draft Digital Services Act. In the United States, she had direct input into the thinking of an influential Congressional figure, Senator Mark Warner. In Autumn 2019, Senator Warner introduced a bipartisan bill to encourage competition in social media (the DASHBOARD Act). His senior advisor consulted Coyle about the content of the bill, seeking to incorporate her insights into the different approaches being pursued by different countries [E4, p. 17-19].

Moreover, her research has been an important point of reference for policy discussions at the Bank for International Settlements (BIS). A BIS senior economist confirmed the influence of her research on digital competition on its Innovation and Digital Economy unit [E10]. The Bank's General Manager referenced Coyle in order to explain the value of data in a digital economy in a speech at the 55th South East Asian Central Banks Governors' Conference and High-level Seminar in November 2019 [E11].

3. **Coyle's research directly informed a change to how the UK Treasury calculates investment appraisals – a major institutional corrective to the ingrained tendency for London and the South East to receive disproportionate levels of central state spending.**

Coyle's research with Sensier applied her long-standing critique of standard ways of measuring economic value to the specific issue of the UK government's rules for estimating 'value for money' in future investments (which are set out in the Treasury's Green Book). A highly influential paper they authored [R1] provided compelling evidence about the geographical consequences of the current rules, and made a powerful argument for a new method of calculating 'value for money' in the context of the UK government's 'levelling up' agenda. They demonstrated better ways to calibrate the regional distribution effects of new public spending and to incorporate a more strategic understanding of economic activity across the UK. Their paper was discussed in Whitehall immediately after the 2019 general election, as a debate about the geographical skewing of public funding was getting underway. A review of the Green Book was published on 25 November 2020, revising the government's approach to cost-benefit analysis to mitigate against geographical biases [E12].

The Head of the Treasury's Green Book Review has testified that this paper:

"… *raised a number of important questions about the methods employed in Government appraisal and importantly, how these are both perceived externally and implemented in practice. The paper contributed to the Chancellor's decision to commission an internal review of the Green Book, and has clearly influenced many of the stakeholders that we have engaged with, internally and externally.*" [E7]

In addition to engaging closely with the evidence it supplied, the Review team invited Coyle to speak to them directly. The influence of her thinking in this area was confirmed when Chancellor of the Exchequer Rishi Sunak cited her work on this issue during his appearance (15 July 2020) before the Treasury Committee's enquiry into the Green Book Review [E8, p. 39], and stressed the importance of evidence supplied by external experts like Coyle.

Her impact was registered in media coverage – referenced in *The Times, The Financial Times* and *The Sunday Times* – and reflected in her invitation to explain the importance of these changes on BBC Radio 4's *Today* programme [E8]. The *Financial Times* reported that the research published in [R1] provided the "intellectual foundations" for a change in government thinking about how investment allocations are calculated [E8, p. 30].

Taken together, the findings that Coyle distilled from her research programme at the University of Cambridge have influenced how various governments and authorities understand and calibrate the digital economy. In the UK, her work has had a major impact on the calculation of GDP, on the development of new policies and tools for regulating digital markets, and on a major alteration to how the Treasury calculates 'value for money' from public investments.

5. Sources to corroborate the impact

[E1] ONS Press Releases: (a) ONS. (November 2020). *Producing an alternative approach to GDP using experimental double deflation estimates.* [Link]; (b) ONS. (July 2020). *Improvements to the measurement of UK GDP: an update on progress.* [Link]

[E2] Testimonial: Deputy Chief Economist, Office for National Statistics, 30 January 2020.

[E3] Testimonial: Chief Economic Adviser at the UK Competition and Markets Authority, 3 January 2020.

[E4] Invitations and thank you letters: recognising Coyle's repeated contribution to government meetings.

[E5] Testimonial: Chief Economist at the Bank of England, 15 January 2020.

[E6] Report: HM Treasury. Digital Competition Expert Panel. (2019). *Unlocking digital potential: Report of the Digital Competition Expert Panel.* [The Furman Review]. [Link]

[E7] Testimonial: Head of the Green Book Review, HM Treasury, 20 October 2020.

[E8] Media coverage: Coyle's contribution to UK government decision-making (*Business Insider*, *the Guardian*, *Sky News*, *PaRR*, *Open Innovation Team*, *The Economist*, *Financial Times*, *Reuters*, *The Times* and *The Sunday Times, BBC Radio 4 Today Programme, Parliament Live TV*).

[E9] Report: HM Treasury. (November 2020). *Spending review 2020.* [Link]

[E10] Testimonial: Senior Economist, Bank of International Settlements, 16 October 2020.

[E11] Keynote speech: Carstens, A. (2019). *Data, technology and policy coordination.* (given at the 55th SEACEN Governors' Conference and High-level Seminar: *Data and technology: embracing innovation*, Singapore, 14 November 2019). [Link]

[E12] Report: HM Treasury. (November 2020). *Green Book review 2020: Findings and response.* [Link]