Institution: King's College London

Unit of Assessment: 17 Business and Management Studies

Title of case study: Better Economic Data: Developing New Techniques to Measure the Economy More Accurately

Period when the underpinning research was undertaken: Aug 2013 – Dec 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:
Martin R. Weale	Professor of Economics	From 01/11/2016
Mary O'Mahony	Professor of Economics	From 01/05/2013
Jonathan Portes	Professor of Economics	From 01/01/2017
Augustin de Coulon	Senior Lecturer in Economics	From 01/09/2009

Period when the claimed impact occurred: 2016 – 2020

Is this case study continued from a case study submitted in 2014? N

1. Summary of the impact

Research from King's Business School is shaping the production of some of the most high-profile statistics published by the Office for National Statistics (ONS) and the Republic of Ireland Central Statistics Office (CSO). These statistics are fundamental for the public understanding of the economy and society because they reveal economic trends, help monitor and evaluate policies and lead to better policymaking. By improving these statistics, King's researchers have contributed to the work of the ONS by increasing the precision and granularity of their Gross Domestic Product (GDP) estimates; producing a new summary indicator of income growth that is sensitive to household income distribution; developing new measures of human capital; and informing new, improved measures of migration. Additionally, they have helped the CSO develop new measures of productivity growth.

2. Underpinning research

With the aim of improving the measurement of the economy, research from King's Business School has focused on five distinct areas of statistical analysis to address major knowledge gaps. By exploring the challenges associated with traditional models and using innovative new methodologies, King's researchers have been able to contribute to the creation of a series of new models in the following areas.

Gross domestic product and value-added tax turnover

The 2016 Bean Review of Economic Statistics suggested that data on firm turnover, collected in value-added tax (VAT) returns, should be used as the basis for producing short-term estimates of Gross Domestic Product (GDP) in place of the system of surveys currently used to collect turnover data.

The ONS has been using VAT data from the HMRC in the UK's National Accounts to calculate GDP since late 2017. It offers significant benefits for the ONS in terms of more granular data at a lower cost than surveys. Over time, the use of the VAT dataset as an administrative data source has added significantly to our understanding of the UK's economy. However, the use of a dataset such as VAT poses challenges in a production environment. A central challenge with VAT data is that the time period covered by the VAT system does not match well with the period over which we need to produce the official monthly and quarterly statistics. This issue is complex and far from easy to resolve, and relates to the concept of "staggers" around the timing of VAT returns, which complicates how aggregate estimates are derived. The initial use of VAT involved a simplified method, but the ONS was aware that this would potentially limit the use of VAT data and/or reduce the quality of the statistics produced.

In a significant contribution to the literature on 'temporal disaggregation' [1], King's researchers developed a novel statistical approach based on a 'state space model' for inferring seasonally adjusted data from industry VAT returns showing total turnover. The new approach addresses the identified problems of noise and overlaps in the data (because VAT data accrue gradually over a period of a year) to generate robust estimates for monthly seasonally adjusted industry data in real time. This improves the clarity and accessibility of short-term GDP estimates.

Distributional national accounts

The national accounts provide aggregate figures for the UK as a whole, bringing together information to provide a simple and understandable description of production, income, consumption, accumulation and wealth. However, these national accounts do not tell us anything about how this translates into individual financial well-being. Internationally, there is interest in developing distributional national accounts – data sets that reflect not just the aggregate income and expenditure of countries, but also show how it is distributed.

King's research [2] has shown how to produce an alternative summary indicator of income as a complement to GDP. This reflects the average of each household's experience of income growth rather than the growth in the income of the average household, and is responsive to the changes in the distribution of income between low- and high-earning households. Importantly, the new indicator requires a price index that is different from the standard price index used in ONS modelling to make this possible. The indicator can be easily explained to the public as representing the average of each household's experience of real income growth, giving equal weight to the income growth of poor and rich households.

Human capital

Human capital is the sum of all the knowledge, skills and experience of all the people in the UK. It is one of the so-called 'missing capitals'; alongside social capital and natural capital, these missing capitals cover important elements of our society and natural world that are currently not factored into the calculation of headline GDP.

King's research has addressed knowledge gaps in how to account appropriately for human capital stocks in the measurement of GDP, and has offered clear solutions. The research treated changes in human capital, based on lifetime incomes, as both an output of the education sector and an intangible investment with implications for measures of GDP [3]. Previous estimates implied adjustments that more than doubled GDP and were not regarded as plausible. By estimating the part of lifetime income attributable to education only among those in the labour force and treating the education of foreign students as an export service rather than investment, the new King's research suggested adjustments in formal measurement that are material but not large and are thus unlikely to be controversial.

Immigration

The UK relies on survey data from the Annual Population Survey (APS) to produce estimates of its local area immigrant populations at higher frequencies than generated by the decennial Census. All sample surveys come with some level of uncertainty attached to their estimates, which can be particularly acute at local-area level where sample populations are smaller.

In addition, the ONS measures people moving into and out of the UK, long-term migration, short-term migration and non-UK residents' data, providing a picture of those entering and leaving the UK and covering all lengths of stay. To gain a clear picture of migration rates, the ONS has traditionally based its estimates of migration on the APS survey data; however, this approach has become less well suited to modern migration patterns.

By examining issues associated with the official UK measurement of immigration, King's research revealed major inconsistencies between immigration statistics collected using the International Passenger Survey (IPS) and those derived from National Insurance records [4]. Conducting a critical analysis of methodologies, the research found that the IPS, in particular, has a small sample and is ill-suited to capturing complex migration patterns [4]. Related research examined electoral roll data as a means of measuring the number of EU nationals in the UK [5]. This research exploited the fact that EU nationals (with the exception of Irish citizens) can vote in local elections

but not in national elections, and made it possible to produce new and more accurate estimates of EU migration into the UK.

Productivity

Productivity measures the efficiency with which an economy transforms inputs into outputs and is a key source of competitiveness and economic growth. It is a fundamental statistical measure for the evaluation of a country's performance, analysis of which poses many challenges.

King's research on productivity accounts specified methods of decomposing output growth into the growth of labour volume, labour quality, tangible capital and, more recently, intangible capital and productivity growth [6]. These methods increase the precision of measurements of the effect of intangible capital, including research development and workforce training, on productivity growth.

3. References to the research

The research has been partially supported by, and mediated through, the Economic Statistics Centre of Excellence (ESCoE), which is the research centre associated with the ONS. Items 1, 2 and 6 are published in high-quality peer-reviewed journals. Items 3, 4 and 5 are published in a refereed working paper series.

[1] Labonne, P., & Weale, M. R. (2020). Temporal Disaggregation of Overlapping Noisy Quarterly Data Using State Space Models: Estimation of Monthly Business Sector Output from Value Added Tax Data in the UK. Journal of the Royal Statistical Society, Series A, 183(3), 1211–1230. DOI:10.1111/rssa.12568

[2] Aitken, A., & Weale, M. R. (2020). A Democratic Measure of Household Income Growth: Theory and Application to the United Kingdom. Economica, 87(347), 589–610. DOI:10.1111/ecca.12329

[3] Corrado, C., O'Mahony, M., & Samek, L. (2020). Measuring Education Services using Lifetime Incomes. ESCoE Discussion Paper No 2020-02.

[4] Portes, J., & Forte, G. (2017). Macroeconomic Determinants of International Migration to the UK. IZA DP No 10802.

[5] De Coulon, A., Egyei, R., & Wadsworth, J. (2020). Immigration Stocks and Flows, APS and Electoral Register Data. ESCoE Discussion Paper No 2020-13.

[6] Niebel, T., O'Mahony, M., & Saam, M. (2017). The Contribution of Intangible Assets to Sectoral Productivity in the EU. The Review of Income and Wealth, 63(S1), S49–S67. DOI:10.1111/roiw.12248

4. Details of the impact

Their extensive body of research has enabled King's researchers to partner with key authorities in national statistics. As a result, their work has influenced the production of economic and migration statistics in both the UK and Ireland. It has had a substantial impact in changing the thinking and operational parameters of the nation's official statistical body, the ONS, with consequential benefits for the management of the world's fifth largest economy and public understanding and debate. This influence has extended beyond the UK to the Central Statistical Office (CSO) of the Irish Republic.

Improving the operational parameters of the ONS

Refining monthly GDP estimates

GDP is, along with inflation, the most widely used economic statistic. It plays a crucial role in the deliberations of the Bank of England's Monetary Policy Committee, for example, and affects the basis on which key policy decisions are made.

King's research estimating GDP from VAT turnover data was specifically commissioned by the ONS via its research body, ESCoE, to tackle a challenge they identified – namely, that the time period covered by the VAT system does not match well with the period over which official monthly and quarterly statistics need to be generated. This issue is complex and far from easy to resolve and relates to the concept of "staggers" around the timing of VAT returns, which complicates how aggregate estimates are derived. The initial use of VAT utilised a simplified method; however, the

ONS was aware this would potentially limit the use of VAT data and/or reduce the quality of the statistics produced.

The research represented the first systematic exploration of a key issue for the use of this data source and the resulting recommendations have been of high importance to developing ONS practice and policy. As noted by Jonathan Athow, Deputy National Statistician at the ONS *"a strong collaboration approach, underpinned by regular exchange of information between the researchers and ONS staff, have led to an improvement in the use of VAT data for official statistics"* [A].

The findings are currently used to decide on the best methods to deal with the existing issues with VAT data, with the intention of using these methods for the regular production of estimates of monthly GDP. The use of the technique should reduce businesses' reporting burden and deliver more accurate data accounting for about GBP500 billion of economic activity annually.

Contributing to the development of distributional national accounts

There is currently strong public interest in indicators of financial well-being and, in particular, the need to address the failure of the conventional measure of GDP growth to account for changes in the distribution of income. As such, the ONS has worked to improve their calculations in this area.

King's research, again commissioned by the ESCoE, has contributed to the development of distributional national accounts, providing a new indicator of aggregate income growth that treats each household's experience equally, to be used by the ONS [2]. This contrasts with existing measures, which give greater weight to the growth experience of high-income households.

The rapid development of the new indicator has been facilitated by King's research, which "*clearly sets down the theoretical and practical issues that need to be addressed*" [A]. Athow of the ONS explains that "*without this work our plans to develop distributional National Accounts would take longer, and perhaps would not be possible*" [A].

Developing new measures of human capital

King's research [3] has provided valuable inputs to the ONS work on human capital, which is at the core of the ONS's 'beyond GDP' agenda. An accurate measurement of human capital is essential to understand and expand the ONS's role as a driver of inclusive economic growth.

King's collaboration with the ONS 'Well-being Team', responsible for producing the estimates of Human Capital Services (HCS), began when O'Mahony was appointed as an ONS Fellow in 2015. O'Mahony subsequently produced an evaluation report on the existing HCS measures. A series of joint projects with ESCoE followed. These involved extending HCS to include dimensions such as health and regional mobility and developing a framework for incorporating HCS in national accounts, as requested by key government users [3].

As a result of this work, ESCoE requested O'Mahony to evaluate various estimates of exports in services generated by university education of foreign students. This work resulted in recommendations to the ONS on changing the methods and data sources to improve measures of education exports in the national accounts. As stated by Athow, "*it marks a useful contribution on this path, and links to our wider developments as set out in our public workplan*" [A].

Informing immigration statistics

King's research on migration has had two major strands of impact on the work of the ONS.

First, analytical research [4] resulted directly in a major work programme by the ONS to investigate the discrepancies between immigration statistics collected using the IPS and the National Insurance records. The work led to significant revisions to the published data and, in August 2019, to the quality assurance arm of the Statistics Authority withdrawing the National Statistics designation from the published long-term immigration statistics.

National Statistics designation is an indicator of the quality and reliability of published statistics, and King's work reduced misguided reliance on data that would otherwise have misinformed policy. Indeed, these statistics are among the most high-profile and politically significant, and form the basis for the government's target to reduce net migration: by making them more robust, policymaking is improved.

Ed Humpherson, Director General for Regulation at the Office for Statistics Regulation, considers this *"one of the most material and important decisions made in [his] time as head of regulation, and has been heavily influenced by Professor Portes' analysis"* [B].

Secondly, King's research [5] led the ONS to review its estimates of numbers of migrants from the EU, which were traditionally based on methodologies that were becoming less suited to measuring modern migration patterns. Athow of the ONS stated that *"this work's value is helping us understand and explore the way in which this data source could potentially be used in the future as part of our transformation work"* [A].

Producing new productivity estimates for Ireland's Central Statistical Office

Reliable productivity estimates at the industry level are important for a country such as Ireland, which depends highly on multinational corporations. Not only is this information critical for policy makers: these figures are also essential for anyone who uses statistics to inform their decision-making. O'Mahony has also been working with statisticians in Ireland's CSO to develop and publish productivity accounts [6].

O'Mahony has had significant engagement with the CSO team to advise on how to improve methods and data sources. According to Michael Connolly, Head of National Accounts Integration, *"O'Mahony's expertise and insights were extremely helpful in providing alternative approaches for certain areas of the project where we had encountered difficulty"* [C]. Based on her recommendations, a first set of productivity estimates were produced in 2016 with further publications planned. Her contributions are also acknowledged in the 'Productivity in Ireland 2017' report, published by the CSO [D].

5. Sources to corroborate the impact

[A] Testimonial from: Jonathan Athow, Deputy National Statistician at the Office for National Statistics, 15th July 2020.

[B] Testimonial from: Ed Humpherson, Director-General for Regulation at the UK Statistics Authority, 6th September 2019.

[C] Testimonial from: Michael Connolly, Head of National Accounts Integration and LCU at the Central Statistical Office in the Irish Republic, 11th April 2017.

[D] Central Statistics Office of Ireland (2019). *Productivity in Ireland 2017.*