

List of Corrections to Chris Cook's article for BBC News, published 25th September 2018.

<https://www.bbc.co.uk/news/uk-45625724>

Title:

IEA Brexit report based on dubious maths

The title is misleading. The report was not based on the number in question, as the report itself states. As will be made clear in the rest of this response, the IEA rejects the allegation of "dubious maths".

Much has been written in the past few months about the Institute of Economic Affairs, the right-wing think tank.

The IEA is not a right-wing think tank (as was stated in the first version of Mr Cook's report). It is a free market economics think tank, as has been made clear to both the BBC and Mr Cook in the past.

Today, we got a curious example. The IEA's new report on Brexit has a lot that others will pick over. But there is one point I would like to dwell on. It repeats a claim in this report that shows how much extra growth we could get from deregulation.

The report makes no case for deregulation. Rather it talks about pro-competitive regulation throughout, and the removal of Anti-Competitive Market Distortions (ACMDs).

This is the work of its lead author on trade and economics, Shanker Singham.

This is a body of work that has been undertaken over at least the last five years by a team of academic economists and competition experts, notably Prof. U. Srinivasa Rangan (Luksic Chair of Global Studies, Babson College), Robert Bradley (PhD candidate, Northeastern University), Alden Abbot (General Counsel of the Federal Trade Commission), and Shanker Singham.

The report today says: "Preliminary results suggest that a 30% reduction in these sorts of distortions between key trading partners by 2034 could increase... GDP... by up to 7.25%, compared to where it would otherwise have been." This growth, shared among us and our putative new deregulating trade partners, would be a lot.

Again, the emphasis on deregulation is misleading. The report suggests pro-competitive regulation.

Hence the IEA's last report on this theme - Freedom to Flourish - had this as a key finding.

Contrary to this assertion, just as this finding is not central to the Plan A+ report, it was not central to Freedom to Flourish either. The central theme of the latter was that the UK would limit its independent trade and regulatory policy without regulatory autonomy. That is true regardless of the number.

There are a lot of curiosities in its reasoning about how trade agreements might work...

The IEA's International Trade and Competition Unit's treatment of trade policy is mainstream, as is borne out by the approval of its Advisory Council, consisting of Sir Lockwood Smith, former Trade Minister of New Zealand, Alan Oxley, former GATT Council Chair and chief Australian trade negotiator; Peter Allgeier, former Deputy US Trade Representative and US Ambassador to the WTO; Eduardo Perez-Motta, former Mexican Ambassador to the WTO and former Chairman of the Competition Commission; John Weekes, Canada's former chief trade negotiator, former chief NAFTA negotiator, and former WTO General Council Chairman, amongst others.

...but I will focus for now on the maths: if you chase down the footnotes, the GDP projection seems to rest on a 2016 report published by the Legatum Institute.

The 2016 report referenced is an introduction to Anti-Competitive Market Distortions and the distortion index by Singham, Rangan, Bradley and Kiniry, which was intended, as the title suggests, to be an introduction to an ongoing body of work. As an introduction it has been updated, the model and regressions refined.

The lead author? One Mr S Singham. It is, on the face of it, an imposing piece of statistical analysis. There's just one problem - its conclusions cannot bear any weight.

This statement rests on the analysis that follows it, which is fundamentally flawed. If the argument is how the report's authors have dealt with mathematical modelling, it is not clear how Mr Cook can prove his case, because he cannot have applied the methodology as they have developed it, nor is he in possession of the datasets. The relevant paper, for which a working paper has also not yet been published, will be peer reviewed and published in an academic journal, which is specifically why we refer to the results as preliminary.

This is not a question of politics or economics, but maths.

First, this work breaks all the rules of basic data hygiene and model designs. The peculiar way the model is fitted together means it could never produce a reliable or stable output that could be relied upon.

We spent a significant amount of time identifying the correct variables, and identifying the appropriate subcategories and pillars. All our choices are backed up by the economic literature. It is simply impossible for Mr Cook to comment about this without applying the same methodology and dataset, neither of which he has used.

Second, the model's whole weight sits on assumptions that are odd or indefensible.

We have justified all of the chosen variables, subcategories, pillars and equations in the model based on the economic literature.

For example, all else being equal, it assumes making it cheaper to lay people off will lead to a rise in health spending and a rise in domestic banks' supply of credit. That, in turn will lead to a rise in output.

It is simply not true that the model assumes the causative relationship he asserts.

But also: the IEA's maths relies - in a fundamental way - on a misunderstanding of how GDP is calculated and what drives health spending.

We are surprised by this accusation, because our model for understanding changes in log of GDP per capita is based on the standard Solow Growth Model, which is well understood by professional economists and named after a Nobel Prize-winning economist.

That matters, because it creates what statisticians call "endogeneity" in the model: there is a sort-of feedback in the model that can skew results and - falsely - suggest results are more certain than they are.

We are well aware of potential endogeneity problems, and we spent a significant amount of time ensuring that we minimised the risk of endogeneity by using a twostep regression.

Mr Cook has also suggested that, in using health expenditure in particular, we are regressing GDP on GDP (an endogeneity problem). However, actual healthcare expenditure itself was not used as an instrumental variable in the main equation. As we show in our Legatum Institute paper, meanwhile, the healthcare per capita data is a fitted variable drawn from our equation two on page 25, which is optimised on the basis of various policy variables.

Third, there is another issue, too, to which a reasonable answer may exist, but I am yet to get it.

Good statisticians build fair and properly specified models all the time that fail to get robust evidence of things that we know are definitely true. But Mr Singham's models, despite their fundamental flaws, got wonderfully clear results that match his priors.

The implication is that we designed a model and cherry-picked data to fit our prior assumptions. This is simply not true.

Somewhat suspicious, I sought to replicate parts of his analysis, using the sources

he cites. I will cut to the chase: I could not duplicate his results.

This is not surprising, because he has neither used the methodology nor has the data.

If you are curious, you can see my attempt here, which shows which inputs I use, my treatment of them and the result. [Update: I am grateful to Marios Richards, who replicated my replication and suggested a fix which changed the first of the numbers below - but not the overall findings.]

We have looked at his attempt and there are a number of crucial differences. One is that he uses a different methodology (he doesn't use two stage least squared regressions). Another is that he uses different data. As we pointed out earlier on, through equations 1 to 3, we use a number of different variables published from a number of different sources; he only uses World Bank and UNCTAD data. He therefore uses significantly fewer indicators than we do. It is simply not true to claim, as Mr Cook does, that we rely only on World Bank and UNCTAD data.

For example:

- **Mr Singham says this model explains more than 90% of the difference between countries' growth rates. That is extraordinarily high: a model that gets almost everything right. I get about 80%.**

We note that the original version of the article stated that he only found 40%, and that this has been corrected to 80%. This is not a small point or an "update" (as is claimed by Mr Cook) but a massive correction and should be acknowledged as such. Indeed, the fact that Mr Cook now find that a model explains 80% of the difference in growth rates, using a simplified version of our methodology, actually validates our approach.

- **When Mr Singham runs the model, it gives the (obviously true) finding that education is positively linked to growth. When I run the model, it does not find this.**

This underlines the point that Mr Cook is not running the correct model, using the correct methodology, or the correct data. This explains his different results.

- **When Mr Singham runs the model, it links a higher domestic supply of credit to higher growth. My back-engineering of this model shows the opposite.**

The same point applies here.

The issue here is that when I run this model it gives bananas results.

This is not surprising, since he is using the wrong methodology and data.

When he runs it, it gives clear and elegant results which are all of the right scale.

This is curious.

We do not agree that this is curious. This is a reflection of the time and work that has gone into the methodology and the data we use.

I have asked Mr Singham for his data. I am also quite curious about the indices he produced which do the final piece of linking of deregulation to growth, but it is impossible to piece together their dataset from the outside. Mr Singham says he is intending to publish work in journals, so has declined to share his data.

We would not normally share data in the middle of a piece of work. It is normal to do this through the peer review process associated with our publications.

I have asked for Mr Singham's scripts which show his working - like the ones I published. In most statistical work, you keep these so others may audit your work. I have also sent him my results and asked if he can explain the issue. I await a reply.

It is wholly possible that there is something wrong with my working which explains these differences.

Yes, this is indeed the case.

My inability to replicate is not the last word. But that is why you share scripts. (And, bluntly, even if they can generate these results, the botched model makes the results unusable.)

The botched model here is the one that Mr Cook himself has generated with the wrong methodology and the wrong data, rather than the one we have actually used.

Mr Singham also told me: "The report of 2016 is quite dated, and we are further refining the techniques used so it is not correct that this... was used in our estimates more recently."

But the issue is not that this report is dated. It is the maths. And, in today's paper, there is no other relevant reference given.

Indeed, check the report produced today. The IEA has a footnote on its modelling - footnote 28. When you go to the bottom of the page, there is no footnote 28. It goes straight from footnote 27 to footnote 29.

This is the only valid point in Mr Cook's article, which has been corrected, with the footnote provided here.ⁱ

I should be clear: there are clearly regulations that reduce growth. In some cases, we think that's a reasonable price to pay for a valued protection. In other cases, they cost money and harm consumers and/or producers.

We also desperately need people to start thinking about what our industrial strategy should be after Brexit. And it is a good thing to have think tanks that supply a small-state philosophy to clash with their peers from other perspectives. But they need to do their homework.

This is an allegation of incompetence which we obviously reject.

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ⁱ Singham, S. A., Tylecote, R. and Hewson, V., 2018. "Freedom to Flourish - UK regulatory autonomy, recognition, and a productive economy", Institute of Economic Affairs, London. Available at: https://iea.org.uk/wp-content/uploads/2018/07/DP91_Freedom-toflourish_web-002.pdf Singham, S.A., Kiniry, M., Rangan, U.S., and Bradley, R., 2016. "Introduction to Anti-Competitive Market Distortions and the Distortions Index", Legatum Institute, London. Available at: <https://www.li.com/activities/publications/introduction-to-anti-competitive-marketdistortions-and-the-distortions-index>