Editorial - Special issue on replication

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Editorial

Special issue on replication

Replication is important. It is perhaps not as important in economics as it is in medicine – where life and death can depend on the accuracy of research findings, which are often implemented to the letter – but replication is key to the credibility of our field and the confidence in our research findings (Christensen and Miguel, 2018). Yet, replication papers are rare in economics, probably because they take a lot of effort with a low probability of publication. Replication is also hampered by inaccessible data. In 2013, *Energy Economics* followed the example of the journals of the *American Economic Association* in demanding that data and code be accessible to the reader. Unfortunately, we published only a few replication papers (De Vita and Trachanas, 2016; Pottier et al., 2014).[1] The step change in *replicability* did not lead to a step change in *replication*.

Energy Economics therefore decided to publish a special issue on replication. We particularly welcomed two types of papers, without excluding other forms of replication (Clemens, 2015). First, we invited replication of older but prominent research, papers that are frequently cited or used in policy making. This type of paper asks whether the old results stand up if newer data are added and methods are brought up to date, and if not why.

The second type of replication paper we would have liked to see takes a number of recent articles to check whether the results still hold if all the evidence is put together. For instance, different authors may have worked on the same data with different methods. Can the difference in findings be explained? Is there an objective way to distinguish between more and less credible results? In other cases, different authors may have used the same or similar methods for different data, for example, for different countries, different economic sectors, or different energy sources. What happens to the results if the data are pooled?

There was little uptake for the second type. Because replication does not end with this special issue, we have created "replication paper" as a new type of submission (Coffman et al., 2017). We hope that people will make use of the now considerable data archive of *Energy Economics*.

Fifty-seven papers were submitted to the special issue, of which twenty-four were accepted. One author of a replicated paper submitted a comment. There were a few submissions from authors who mistakenly think that special issue editors do not pay attention. Most rejections, however, were because the paper did not add much beyond a replication. The referees, unfamiliar with replication papers, to a person drew a clear distinction between a replication paper that confirms the technical competence of the original authors and a replication paper that adds value.

The paper by Bernstein and Parmeter (2017) is a good example. They take two old papers on returns to scale (Christensen and Greene, 1976; Nerlove, 1963)[2] that are frequently cited and used in class, and confirm (what we all knew) that the original authors are competent statisticians. They further show that Christensen, Greene and Nerlove would have reached the same conclusions had they known about econometric methods developed later; and that their results qualitatively and quantitatively hold for more recent data. Although Bernstein and Parmeter did not tell us something strictly new, it is good to know that the received wisdom is, indeed, correct.

Not all replications are successful. Henningsen et al. (2018) cannot replicate Kemfert (1998). They estimate substitution elasticities between energy, labour and capital for German industry. Alptekin et al. (2018) find that the Kalman Filter is a better way to estimate a time-varying demand function for natural gas than the rolling window approach by Altinay and Yalta (2016). Doko Tchatoka et al. (2018) show that the quantile-on-quantile regression results for oil price shocks and stock returns by Sim and Zhou (2015) do not hold if more countries and more recent years are added to the sample. Lei and Tsai (2017) find that the results by Davis and Wolfram (2012) and Hausman (2014) on market structure and plant ownership on nuclear safety change if later data are added. They and Hausman (2018) show that the results are sensitive to the interpretation and normalization of the data. Valitov (2018) cannot reproduce the standard errors of Viehmann (2011) and shows that the introduction of negative power prices has reduced risk premia. Mann and Sephton (2018) cannot reproduce Asafu-Adjaye (2000) and show that the relationship between energy use, energy prices and economic growth is not stable over time.

A number of papers revisit the Environmental Kuznets Curve. Sheldon (2017) shows that Holtz-Eakin and Selden (1995) may have been too optimistic in the medium run and too pessimistic in the long run. Both Leiva and Liu (2018) and Bruns et al. (2018) revisit Stern (1993), showing that the original results by and large hold with newer data, alternative specification and more recent methods. Agovino et al. (2018) revisit the four-country, two-century study by Gales et al. (2007), showing that the original study

[1] See also the Replication Wiki.

[2] Marc Nerlove was sorry that he can no longer review papers.

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could not find an Environmental Kuznets Curve in energy intensity because of inappropriate aggregation. Karakaya et al. (2017) investigated a related question, the convergence of per capita carbon dioxide emissions. They find that the conclusions of Strazicich and List (2003) are robust to new data and new methods.

Cook and Fosten (2018) look at two "rockets and feathers" papers, confirming the findings by Bachmeier and Griffin (2003) but showing that the results of Liu et al. (2010) are sensitive to specification. Filip et al. (2017) confirm the weak and varying relationship between food and fuel prices, found by Zhang et al. (2010), for a much wider range of indicators. Mastroeni et al. (2018) revisit a number of papers on the chaotic behaviour of energy prices, confirming some earlier results but not others.

A number of papers focus on oil. Joa et al. (2018) confirm that, for most economic sectors, the impact of oil price shocks is primarily through demand (Lee and Ni, 2002). Mavisakalyan and Tarverdi (2018) confirm the finding by Ross (2008) that oil production increases gender inequalities, and show that the result is different in traded and non-traded sectors. Kim and Vera (2018) successfully replicate and update Kilian (2009), disentangling demand and supply shocks in the crude oil market before and after the financial crisis. Ho et al. (2018) show that non-parametric copulas do better at describing co-movement in oil markets than the parametric copulas of Reboredo (2011). Holmes and Otero (2017) expand the analysis by Chang and Lee (2015) on the relationship between spot and future prices of oil, confirming some but not all of the earlier findings. Carnero and Pérez (2018) replicate Kristoufek (2014), showing that the earlier findings on leverage in energy futures are robust to distributional assumptions. Kristoufek (2018) confirms that Tabak and Cajueiro (2007) were right to argue that crude oil markets have become more efficient over time; and that this conclusion is robust to alternative estimators and, crucially in this case, newer data.

Racine (2017) is not a replication paper, but instead reviews recent software developments that allow for a tighter, error-preventing integration of data, analysis and write-up. Bruns et al. (2018) discuss the importance of pre-analysis plans to guard against perverse incentives in replication.

This special issue demonstrates two things. First, there is a supply of replication papers. Serious scholars are prepared to make the time and effort to take a piece of previous research, check whether it withstands scrutiny, and report their findings in a constructive and respectful manner. Second, referees are willing to review replication papers, and are able to tell quality and worthwhile replications from ones that are less so. Time will tell whether these replication papers are cited and count towards promotion.

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