

Reply to the Second Referee Report
on
“Openness to International Trade and
Economic Growth: A Cross-Country
Empirical Investigation”
by Bülent Ulaşan

I would firstly like to thank the anonymous referee for reading and reviewing my paper. It is, however, disappointing to see that the referee recommends rejecting my paper without solid criticism and comments. My responses are as follows:

- On the contrary to the referee report, the current paper offers some new insights on the openness-growth nexus. The novelties of the paper with respect to the previous literature can be summarized as follows:
 - This paper analyses the openness-growth link over a much longer time period (1960-2000) whereas previous studies mainly focus on the 1970-1990 period. This enables us to better account for both trade policy stance and growth dynamics in the long run.
 - A myriad of openness measures have been suggested in the empirical work, and this raises “proxy uncertainty”, an important layer of model uncertainty. This paper addresses this problem and employs many openness variables instead of relying on a few ones. In other words, the paper attempts to show which one fits the data better.
 - The paper includes the development of new openness measures directly addressing trade policy and arguably better capturing trade policy stance than existing proxies for openness (I will return this issue below).

- Whether black market premium (BMP) is a proxy for openness or reflects the macroeconomic imbalances is a debated topic in the literature. Dedicating a separate section, this paper empirically investigates this question and concludes that it is very likely that the statistically significant association between BMP and growth indicates the negative relationship between growth and macroeconomic imbalances rather than its trade restrictive effect on growth.
- The present paper confirms the findings of previous studies concluding positive and statistically significant association between trade volume and growth. However, the paper shows that this result is mainly driven by a few outlying countries. Instead of dropping outliers, the paper estimates the trade-growth relationship by using Iteratively Reweighted Least Squares (IRLS), giving relatively less weight to outlying observations and conclude that except real openness and trade with OECD, all trade shares are positively and significantly associated with growth.
- Implication of this finding is twofold: First, it provides more robust evidence on the trade-growth nexus than the previous research (although trade shares as a proxy for trade openness are problematic measures). Second, one important insight of previous literature was suggested by Alcalá and Ciccone (2004). These authors argue that real openness defined as the ratio of trade volume relative to GDP at purchasing power parity (PPP) is a better measure of openness with respect to current openness, measured in nominal prices in the presence of trade-driven productivity gains. However, as seen in Table 4, the IRLS regression results show that the coefficient of real openness is not only less than the coefficient of current openness but also is statistically insignificant.
- Outliers are an important econometric problem in the cross-country growth studies because cross-country work is based on small samples. This implies that we should make sure that our results reflect the tendencies of a majority of data not those of a minority of observations if we want to reach useful generalizations about growth, as Temple (2000) points out. Unfortunately, existing studies do not pay attention to this problem sufficiently and rarely carry out outlier checking. The paper provides more robust findings in this respect as the effects of outliers on the regression results are accounted for.
- Finally, on the contrary to many previous cross-country growth studies, the current paper finds no evidence that openness is di-

rectly and robustly correlated with economic growth in the long run. The main finding of this paper is robust to alternative measures of openness and none of them is robustly correlated with long-run economic growth, except the own-weighted tariff rates on intermediate inputs and capital goods. The coefficient estimate of this variable is found to be negative, but weakly significant.

- The referee also claim that estimating a large number of cross-country growth regressions by using many openness measures gives the impression that the author does not really know what the best method to measure trade openness is. Regrettably, it is perplexing and very difficult to follow this comment.
 - Firstly, due to the obvious reasons such as lack of good quality data, complex nature of trade policy, disagreements on the definition of openness, measuring openness is a challenging task and as acknowledged by many authors (see, for instance, Pritchett (1996), Harrison (1996), Rodrik and Rodríguez (2000), Harrison and Rodríguez-Clare (2010)), the previous literature on the topic fails to produce a satisfactory openness measure. Therefore, many openness measures have been suggested in the literature and they have their own merits and disadvantages. The existence of many empirical proxies for openness clearly raises “proxy uncertainty” and in order to address this problem, I classify the existing measures under the four broad categories, namely trade volumes, direct trade policy barriers, deviation measures, subjective indexes and then empirically test them in the paper. Among these proxy variables, the most problematic one is trade volumes, conventionally expressed as the fraction of exports plus imports to GDP since a country’s trade volume is also function of other factors (such as world demand, distance from trading centres, transportation cost) as well as trade policy. That is why direct trade policy measures such as tariff rate, non-tariff barriers (NTBs) and BMP are ideal measures for understanding the relationship between openness and growth.
 - However, the most important problem while testing openness-growth nexus by using a single policy measure is that these measures do not pick up differences in trade policy barriers across countries. To simplify the discussion, I will follow the example given by Warner (2003). Suppose that world consists of 100 countries and we have good quality and comparable time series data

on trade policy and other growth variables for all countries. Let's divide the countries into four groups with equal size, that is each group consists of 25 countries. The countries in the first group have no tariffs, no NTBs and no BMP, i.e., they are completely open to international trade. The second group countries impose very high tariffs on their imports with zero NTBs and BMP. In the third group, tariff rates and BMP are zero, but these countries restrict their trade regimes through NTBs. Finally, the fourth group has neither tariffs nor NTBs but experiences high BMP. As can be seen, the first group countries are the only open countries. Groups 2, 3 and 4 are different only in the form of protection, but they all are obviously closed to international trade. In such a world, does openness affect economic growth positively? In order to answer this question empirically, one should compare the growth performance of first group with the growth performance of the other three groups. However, testing openness-growth connection by using a single trade policy measure clearly reduces the test power and may lead misleading results. For instance, running a well-specified cross-country growth regression including the only tariff rate as an openness measure, clearly shows the marginal effect of tariffs on growth, not the effect of openness since such a regression consider the only second group as closed to international trade. In this respect, one could suggest inserting all three measures in the regression simultaneously and hence testing both joint and individual significance (I also consider this option in the paper). But, this is not an ideal solution because such a regression specification includes unnecessarily too many parameters to be estimated.

- Therefore, the best way to measure trade openness is aggregation of different type of trade policy measures with reasonable weights. In this paper, given the available data I attempt to construct such a variable, arguably better captures all aspects of trade policy with respect to other openness indicators. In my view, this is an important novelty of the paper, as noted previously.
- All these issues are clearly discussed and expressed in the introduction (page 3) and also in the relevant parts of the paper. That is why it seems to me very difficult and unreasonable for a reader to get an impression that the author does not know the best way to measure openness because he simply tried all openness measures in the literature and reported a large number of cross-country growth regression.

- Of course, one could find the paper lengthy as it displays too many cross-country growth regressions, and complain about its current structure in terms of fluency and coherence (although the referee finds the paper well-written and easily readable). However, it is one thing to complain about the length and structure of the paper, another thing is to say that the paper gives an impression that the author does not know measuring openness.
- The referee finds the single cross-country growth regression is out-of-date and so inappropriate for empirical research. Although it is not explicitly stated, the referee also implies that the panel data model with 10-year averages over the sample period is more appealing and contemporary method than single cross-country growth regression. I have some points here:
 - First of all, while reviewing an empirical paper, simply saying that “the econometric method or estimation technique is not appropriate” is not academically good criticism because the reviewer is also responsible to explain how that method leads to misleading or biased results.
 - It is true that many cross-country growth studies have been based on dynamic panel data models with fixed effects during the last decade. However, panel data approach to cross-country growth regression is as old as the single cross-country growth regression in the empirical cross-country growth literature. A few years after the publication of the seminal paper by Mankiw, Romer and Weil (1992, MRW), which analytically derives the basic cross-country growth specification for the subsequent empirical research, Islam (1995) adapts the MRW specification for panel data model (with fixed effects). Similarly, a considerable part of the previous studies investigating openness-growth connection across countries employed panel data methods. Harrison (1996), Vamvakidis (1999), Wacziarg (2001), Greenaway et al. (2002), Yanikkaya (2003), Dollar and Kraay (2003) are some examples and cited in the paper amongst others. On the other hand, some studies on the topic, such as Frankel and Romer (1999), Easterly and Levine (2003), Dollar and Kraay (2003), Alcalá and Ciccone (2004), Rodrik et al. (2004) investigate the relationship between trade openness and growth by using income-level regression. Therefore, I do not agree with the referee’s statement that previous papers on the openness-growth nexus are quite old and employ only a single cross-sectional

model.

- On the contrary to the referee report, single cross-country growth regression is potentially useful tool in order to highlight causes of growth differentials and to assess the effectiveness of government policies, say trade openness across countries since variation across countries (between variations) over the whole sample period is accounted for. Of course, the single cross-country growth regressions are subject to well-known econometric problems, namely parameter heterogeneity, outliers, measurement error, omitted variable, simultaneity and model uncertainty, and hence the findings of this studies has been often controversial in terms of robustness. However, due to the obvious reasons, alternative approaches such as panel growth studies and income-level regressions are also, more or less suffer from the same econometric problems.
- It is possible to classify the existing cross-country growth regressions under three main categories: i) the single cross-sectional regression; ii) the panel data model and; iii) the income-level regression. In my opinion, these three approaches are useful statistical tools and they are indeed complementary, rather than being alternatives. Even though carrying out a cross-country growth study by using these methods together and then comparing the findings are the most consistent and illuminating strategy, choosing one of these approaches basically depends on the researcher's preferences and needs. In the end, we should use the all empirical evidence derived from these three approaches.
- It is, however, fair to say that the single cross-country growth regression is superior than the other two in one important conceptual respect: The single cross-country growth regression over 30- or 40-year period is a more appealing way to draw inferences for long-run growth dynamics with respect to panel data model analysing growth over the shorter time spans (generally, 5-or 10-year period). In this point, it is worth recalling that the baseline cross-country growth specification is derived from the log-linearization (Taylor expansion) of output per worker around its steady-state solution in the neoclassical growth model. This implies that the time interval which growth and all right-hand-side (RHS) variables averaged over, should be sufficiently long in order to reflect the long-run growth dynamics. Of course, one could argue that it is possible to capture the long-run growth outcome from the cross-country income-level regression. However, the most

important disadvantages of income-level regression is that this approach explicitly requires that all countries in the sample in their steady-states (as argued by Ulaşan (2012)). Another important drawback is that testing the impact of macroeconomic policies, say for instance trade openness in income-level regressions may not be appropriate because the explanatory variables should be persistent over time such as institutional quality, geography, population heterogeneity, cultural affiliates (see, Rodrik et al. (2004) and Gundlach (2007), for a discussion).

- By controlling for unobserved time-constant country-specific characteristics, dynamic panel data models with fixed effects have undoubtedly improved the findings of cross-country growth literature in terms of robustness. The system generalized method of moments is particularly useful in this respect since dealing with the problem of weak instrument, this estimator mitigates the endogeneity bias stemming not only from time-invariant omitted variables but also from simultaneity and measurement error. However the panel data approaches to growth regressions bring their own problems. Since these problems are available elsewhere (see, for instance, Ulaşan (2012), amongst others), I will just emphasise a few important ones: First, the validity of internal instruments is highly questionable (as pointed out in the paper, p.6); second, the RHS variables should exhibit some variation over time as the panel data model with fixed effect is based on the within-country variation. Many growth variables (such as some openness measures) are, however, measured at less frequent time intervals, sometimes at only one point in time and do not change much over time or move on only one direction. In such cases, the only available variation for regression is between-country variation and thus empirical analysis has to be carried out by cross-sectional data (as in the case of many cross-country growth regressions in the paper). Finally and more importantly, as I have already mentioned above, it is very likely that panel studies with 5-year or 10-year averages employ the growth information in the short and medium run and clearly prone to business cycle effects.
- Therefore, due to these problems, I do not find panel data models as a more appealing way compared to single cross-country growth regression to investigate the long-run relationship between growth and openness. Since these problems with the other drawbacks have been well-recognised and widely-known in the literature, I

do not need to explain why I prefer to employ the single cross-country growth regression in the paper.

- The referee raises a concern that in some specifications the averages over the sample period of the RHS variables do not exactly match the growth rate on the LHS such as the regression specification in the column 5 of Table 5.
 - It is true that the common practice in the literature is inserting all RHS variables, except the initial level of income, into the regression as period averages since these variables are theoretically considered as constant over the sample period and exogenous. In the present paper, given the available data, I follow this approach as possible as. As noted previously, many growth variables are measured at less frequent time intervals (such as school enrollment rates), sometimes at only one point in time (for example, ethnolinguistic fragmentation index). Therefore, inevitably, measuring explanatory variables as averages over whole sample period is not always possible. Of course, this is less problematic for the variables changing slowly or persistent over time, such as institutional quality, ethnolinguistic characteristics, cultural affiliations, and geography with respect to the variables varying over the time, for instance trade volume or tariff rates. Despite the fact that data problems have been widely acknowledged in the empirical cross-country growth literature, the referee’s criticism on the issue is a little bit confusing and may wrongly give the impression that the author runs cross-country growth regressions improperly.
 - In Table 5, I display the results of some cross-country growth regression of 1960-2000 growth on the tariffs. For this purpose, I employ three different measure of tariffs: first, own-weighted tariff rates imports of intermediate inputs and capital goods (OWTI) over the 1983-1985 period from Barro and Lee (1994) data set; second, the collected import duties as a ratio of imports over the 1970-1998 period; and third, unweighted average tariff rate over the 1990-2000 period. The last variable is provided by Wacziarg and Welch (2008) and originally is based on the World Bank World Development Indicators (WB WDI). As argued in the paper, the first two variables as a measure of tariffs have a problem of downward biased due to the fact that high tariffs may depress the imports. If the restrictive effects of tariff are very high, then unweighted administrative tariff is a better proxy than the tariff

revenues or OWTI to measure a country's average level of protection through tariffs. Therefore, while investigating tariff-growth connection, I also employ the unweighted tariff rate as well as OWTI and tariff revenues as a share of imports. As noted above, the data source of unweighted tariff is the WB WDI and the data set covers 1980-2004 period. However, unfortunately for many countries data are missing in the 1980s and the proper data on this variable are available over only 1990-2004 period. Of course, it would be better if we had better data for a longer time span, but it is highly likely that 1990-2000 period averages include some useful information on tariff protection across countries and there is no reason for why we should not use this measure, especially in the absence of better data. Nevertheless, while revising the paper, I am planing to extend this variable for the 1980s after same adjustment on the data, yet even if this is done, the variable still covers 1980-2000 period, not whole sample period.

- I am aware of that the trade model in Section 3.3 is simple in many aspects and I clearly express and discuss this in the paper, as noted by the referee. However, I also emphasize that the most important reason for this is the lack of data on bilateral trade across countries over the period 1960-2000. More to the point, I argue that the estimated residuals from that model are arguably a more reliable indicator for openness than the simple actual trade ratios.

Once again I would like to express my thanks to the anonymous referee for reviewing my paper. Of course, as a referee, (s)he has a right to recommend rejection of the paper. However, as a writer spending a considerable amount of time and effort while writing this paper, I would have expected more substantive comments and feedback.

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