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Abstract

The last 50 years have produced a series of revolutionary technological changes. These decades have also witnessed a truly revolutionary *systemic* change at the global level. The change started with step-wise internal liberalisations and deregulations in the major industrialised countries. The internal systemic changes have been synchronised with the consecutive waves of liberalisation of international economic relations. Trade liberalisations (cuts in tariff levels, progressive removal of many non-tariff barriers to trade) were followed by consecutive waves of liberalisation of capital flows to a large degree completing the process of globalisation.

Advancing globalisation seems to have been paralleled by the global economic growth becoming progressively slower and unstable.

Using the standard tools of time series econometrics (VEC, Granger non-causality testing, ARDL) the paper suggests that trade has not been driving global economic growth (or even that expanding trade may have slowed down global output growth). Large and persistent trade imbalances which have become typical since the mid-1970s are just one possible reason for trade no longer playing the positive role assigned to it in the trade theories. The second reason relates to the 'race-to-the-bottom' tendencies with respect to the wage rate which have developed under globalisation. These tendencies may have been responsible for the persistent shortage of aggregate demand at the global level and – consequently – weakening global output growth.

Keywords: world income, world trade, globalisation, wage-led growth, VEC, Granger causality

JEL classification: F43, F15, F16, O47, O49

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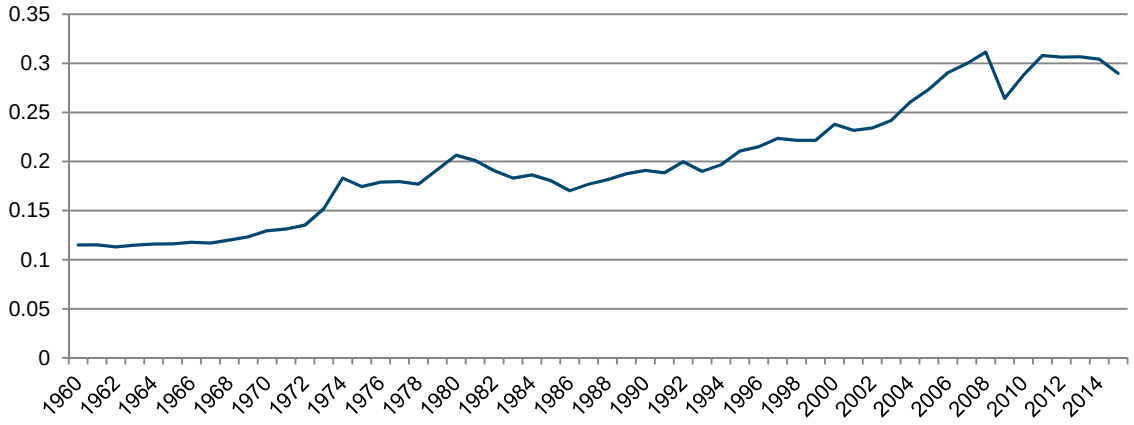
1. Introduction

For many decades international trade has been gaining in importance. The share of global exports of goods and non-factor services in global GDP, which stood at less than 12 per cent in the early 1960s, climbed to over 32 per cent in 2008 before falling – during the 2009 global crisis – below the 30 per cent mark. Since then the share has been rather stable at about 30%, though reportedly declining again in 2015 (see Figure 1).

Figure 1 / Share of global exports in global output



Source: World Development Indicators (August 2016 edition).

Many explanations have been put forward to account for the long-run tendency for the trade share to rise[1]. The phenomenon of world trade growing faster than world GDP can be seen as reflecting the progressing liberalisation of international trade (and of international flows of capital and ideas generally) as well as the continuing advances in transport and communication technologies. Technological progress combined with the tendencies to liberalise internationally (and internally) are certainly jointly responsible for the development of internationalised forms of production organisation, rising importance of production fragmentation, outsourcing etc.[2] The ongoing internationalisation of production inflates the values of international trade relative to final output.

Under the standard assumptions of the neoclassical trade theory, liberalisation of trade and reduced trade costs should be conducive not only to 'more trade', but to more gains from trade[3] – additional net output accruing to countries participating in trade (and thus to greater global output). 'Free trade – given

1 See e.g. Krugman (1995); Frankel and Romer (1999); Baier and Bergstrand (2001).

2 See e.g. Feenstra (1998); Helpman (2004).

3 Of course the idea that international trade adds to welfare dates back to the classical economists (remember Ricardo's concepts of comparative advantage).

the usual assumptions – necessarily makes available to the community as a whole a greater physical real income in the form of more of all commodities.'[4]

The 'new' theories of international trade and the new 'new' trade theories generally support the view that more trade should generate more output to the participating parties. However, academic opinions openly doubting the benefits to individual nations of freer trade (often hinting at the advantages of some levels of protectionism) are not quite rare, especially among students of the developing countries (starting from Bhagwati, 1958 to Stiglitz, 2001 or Thirlwall and Pacheco-Lopez, 2008 more recently). Interestingly, the 'Pope' of neoclassical trade theory himself expressed some heretical doubts about the doctrine he had long preached (Samuelson, 2004). On the other hand there has been no shortage of academic contributions defending the view that 'trade drives growth' (for example Frankel, 2008).

Are the conventional views on the positive role of free trade supported by the empirical evidence? There are numerous studies concerned with the evaluation of the role of trade for individual countries, or 'panels' of countries. However, the rich empirical literature on growth accounting is not unanimously supportive of the hypothesis endowing rising foreign trade with growth-enhancing abilities at the national level. Numerous econometric studies attempting to quantify the impacts of various factors on GDP growth rates (or on total factor productivity growth) across larger samples of countries typically do not produce generally accepted conclusions. From the empirical viewpoint the general case for the 'trade drives growth' thesis is rather weak at the national level[5]. This may not be a coincidence. Growth in some countries may indeed have been driven by their rising trade. But at the same time that same trade may have impeded growth in other (e.g. net importing) countries. Given the conflicting evidence on the trade–output links at the *national* level it may be impossible to draw, from that evidence, any definitive conclusions concerning the links between the developments in aggregate output and aggregate trade. To be able to assess the *global* consequences of trade expansion it may be necessary to study the developments in global aggregates: global trade and global output.

THE FACT: ACCELERATING GLOBAL TRADE HAS COINCIDED WITH DECELERATING GLOBAL OUTPUT GROWTH

It is an irony that the tremendous expansion of international trade of the world economy does not really seem to have been associated with an acceleration of world output growth. Actually, growth in per capita Gross Global Product (GGP) has *weakened* secularly – while its volatility has been increasing since the early 1970s (see Figure 1).

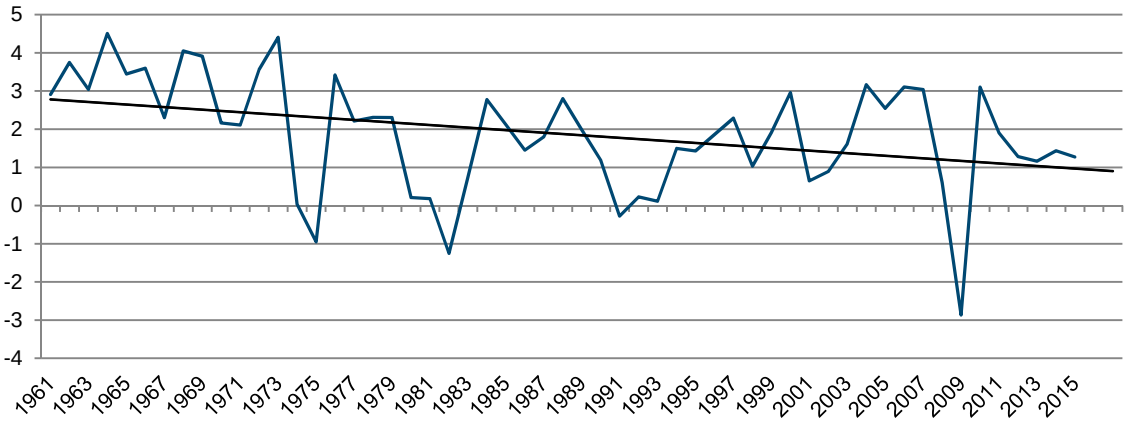
The secular global growth slowdown could be attributed to some 'exogenous' developments. However, it seems rather unlikely that the global growth slowdown reflects technological stagnation of some sort. If anything, the last 50 years have witnessed to an unprecedented wave of applied technological

[4] Viner (1937), quoted by Samuelson (1939).

[5] A comprehensive survey by Lewer and Van der Berg (2003) of over 100 studies concerned with the growth–trade connection did not come to a definitive conclusion. A later study by the same authors (Lewer and Van der Berg, 2007) is also inconclusive. As documented by Hillebrand et al. (2010), '... there is a troubling disconnect between the economic growth literature and the trade literature ...'. Classical studies such as Denison (1985) dismiss trade as the source of US longer-term economic growth. Econometric studies attempting to quantify the impacts of various factors on GDP growth rates (or on total factor productivity growth) across larger samples of countries typically do not produce generally accepted conclusions. For example, Rodrik et al. (2004) state that '... once institutions are controlled for, trade is almost always insignificant, and often enters the income equations with the 'wrong' (i.e. negative) sign ...'.

innovation which has been coupled with equally impressive global upgrading of 'human capital'. Also, the growth slowdown cannot be attributed to e.g. intensified shortages of exhaustible resources (such as energy carriers), or of the labour force. In actual fact, since the early 1980s unemployment has become high and persistent – at least in the OECD countries[6] while the continuing secular decline in commodities' terms of trade indicate that resources are becoming less scarce, not more[7]. As will be argued later on, the secular output growth stagnation cannot be blamed on the secularly weakening pace of labour productivity growth either.

Figure 2 / Growth rate of real per capita gross global product, 1961-2015



Source: World Development Indicators (August 2016 edition).

As the unfavourable supply-side developments are unlikely to have been responsible for the weakening speed of global output growth, one must consider other developments, of which the progressing liberalisation and resulting expansion of international trade is perhaps the most essential.

6 See e.g. Nickell et al. (2005).

7 See e.g. Mollick et al. (2008).

2. Evidence from Vector Error Correction econometric models for the years 1960-2012

Podkaminer (2014) examined the dynamic links between global trade (identified with the exports aggregated across the world) with global output. The econometrics involved boiled down to the application of the standard Vector Error Correction (VEC) methodology to the (natural logarithms) of the two time series in question, extending from 1960 through 2012. (The global exports and output were expressed in nominal terms, at current USD.)

The VEC methodology may 'work' provided the series under examination are (a) non-stationary (have unit roots); (b) are co-integrated. The satisfaction of both preliminary conditions was checked by means of the standard unit root tests and the Johansen tests respectively.

However, VECs for the periods starting in 1960 proved unstable[8] and also failed other customary (residual) tests. The failure was due to structural breaks dated at 1972-73. The VECs for the periods starting in 1974 satisfied the stability condition, but still failed the tests of the normality of residuals. The reason for this must be seen in the 'secondary' structural break dated at 1986-87.

The timing of the (statistically confirmed) structural breaks is consistent with the major events shaping the international economic order. The post-war economic stability period was finally terminated in 1973 as the Bretton Woods system with fixed exchange rates and managed private capital flows collapsed. During the ensuing instability period (1973-1987) two major oil price shocks hit the world economy with fits of very high inflation following in their wakes, additionally inflating the values of trade relative to the values of (the then depressed) GDP. Moreover, 1973-1987 was a period of great instability in exchange rates. Wild fluctuations in the US dollar exchange rates vs. the remaining major world currencies during that period may have disturbed the underlying relationship between changing trade and changing GDP. Throughout the period the creeping liberalisation of capital flows was followed by a series of severe sovereign debt crises (for instance in Latin America) with consequences for both global growth and trade. The Plaza Accord (1986) and especially the Louvre Accord (1987) effectively ended the global exchange rate disorder. These accords, coupled with the stabilisation (starting in 1987) of the Latin American foreign debt crisis, paved the way for a new phase in global trade and output developments.

The time series extending from 1987 to 2012 are, admittedly, quite short. The robustness of the VEC results for short time series may be problematic. Nonetheless, the VECs for that period (as for the shorter period 1987 through 2008) produced quite interesting findings shedding some light on the mutual links between the *value* of global trade and the *value* of global output (both items in logs).

[8] That is the inverse roots of their characteristic AR polynomials lie outside the unit circle.

As can be seen (Table 1) the logs of exports and output were cointegrated over the period 1987-2012. According to the upper panel in Table 1, there was a longer-run 'moving equilibrium' relationship between the two, given by the following expression:

$$X = 0.692 \bullet Y + 0.043 \bullet Trend + 6.408$$

The 'error correction' panel in Table 1 characterises the dynamics of the system consisting of the two 'incremental' variables: D(X) and D(Y). The dynamics involves the adjustments towards the equilibrium when X (exports) and Y (output) happen to lie outside the long-run equilibrium position (given by the equation above) and then by the 'history' of movements in both variables (represented by lagged increments in X and Y, i.e. in exports and output respectively).

The interesting thing about the error correction mechanism from Table 1 is that the regression coefficients for the lagged increments of exports D(X(-1)), D(X(-2)) and D(X(-4)) are all negative while the regression coefficients for the lagged increments of output D(Y(-1)), D(Y(-2)) and D(Y(-4)) are all positive. This suggests that positive increments to exports are likely to have negative consequences for the future increments in both exports and output while the positive increments in output are likely to be followed by the positive increments to both exports and output in the future.

The intuition about the qualitatively different consequences of 'innovations' (or 'shocks') to X and Y can be substantiated by means of the impulse response analysis. The conventional generalised impulse response schedules derived from the VEC from Table 1 suggest that while a positive 'shock' to global output tends to be followed by a positive response of global trade, a positive 'shock' to global trade tends to be followed by a *negative* response of global output. Moreover, the responses in question appear to be rather long-lasting (see Figure 3).

This finding indicates that an 'occasional' acceleration of exports (above the level consistent with the long-run equilibrium position) is likely to depress the output. Notice that an 'occasional' acceleration of output (above the level consistent with the long-run equilibrium position) is likely to enhance the increase in exports. Figuratively speaking, rising world output has pushed up world exports but the rising exports may have braked the growth of world output.

It is also interesting to note that the response of exports to a change in exports (X to X) is becoming negative after 2 periods similar to the effect on GDP of a change in exports (Y to X). The reason for this is following. The initial response of GDP to a change in exports is negative. Later on the negative effect on GDP affects, negatively, exports. That way, exports negatively affect themselves – upon a delay.

Table 1 / Vector Error Correction Estimates

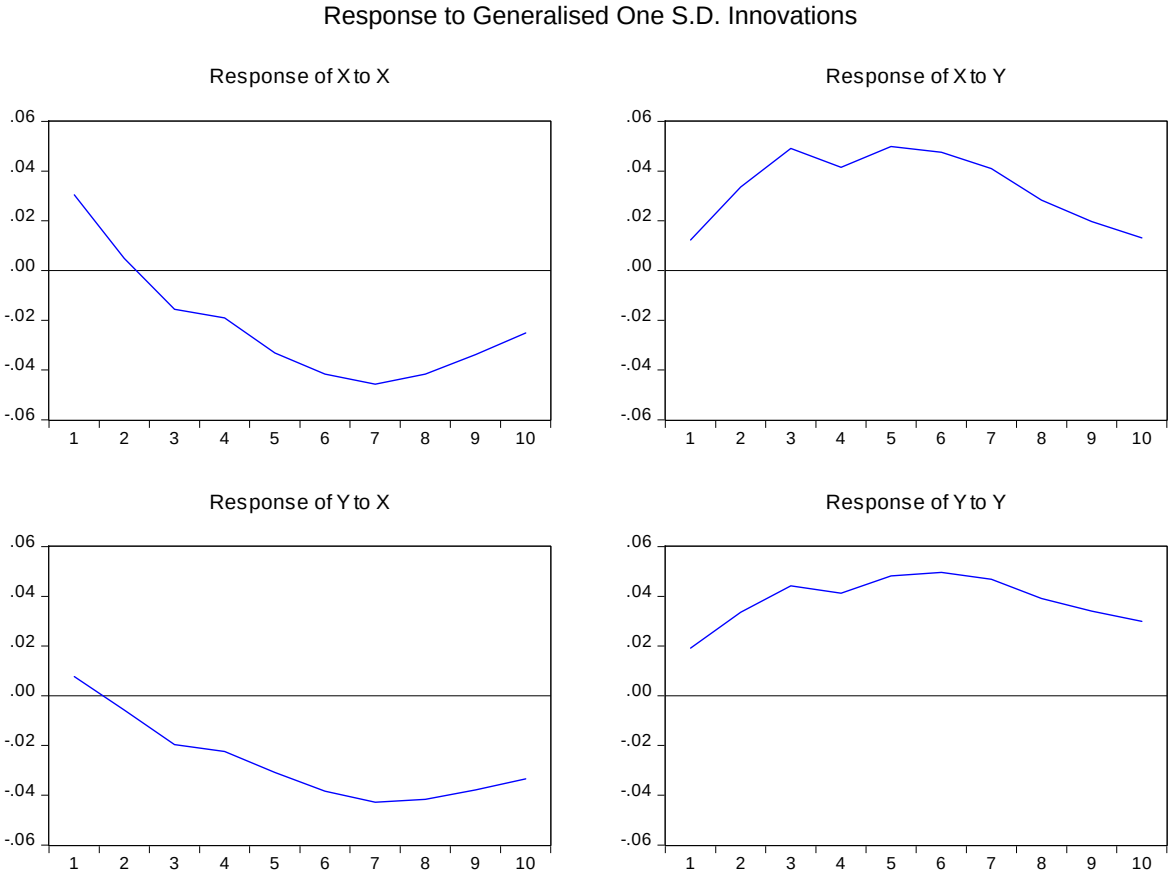
Sample: 1987 2012
Included observations: 26
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1
X(-1)	1.000000
Y(-1)	-0.692181
	(0.07796)
	[-8.87903]
@TREND(60)	-0.043009
	(0.00428)
	[-10.0554]
C	-6.407785

Error Correction:	D(X)	D(Y)
CointEq1	-1.273799	-0.729405
	(0.19126)	(0.12039)
	[-6.65991]	[-6.05890]
D(X(-1))	-0.065993	-0.028092
	(0.15914)	(0.10016)
	[-0.41470]	[-0.28046]
D(X(-2))	-0.075854	-0.060298
	(0.15625)	(0.09835)
	[-0.48545]	[-0.61310]
D(X(-3))	0.723844	0.434211
	(0.16535)	(0.10407)
	[4.37770]	[4.17215]
D(X(-4))	-0.124325	-0.092090
	(0.18650)	(0.11739)
	[-0.66661]	[-0.78448]
D(Y(-1))	1.088336	0.734389
	(0.24444)	(0.15386)
	[4.45238]	[4.77323]
D(Y(-2))	0.801133	0.465337
	(0.28349)	(0.17843)
	[2.82600]	[2.60791]
D(Y(-3))	-0.699411	-0.395994
	(0.28619)	(0.18013)
	[-2.44388]	[-2.19834]
D(Y(-4))	0.857970	0.620811
	(0.28579)	(0.17988)
	[3.00213]	[3.45123]
C	-0.075968	-0.048202
	(0.02473)	(0.01556)
	[-3.07216]	[-3.09693]
U	-0.288406	-0.109932
	(0.03621)	(0.02279)
	[-7.96382]	[-4.82282]
R-squared	0.933193	0.907940
Adj. R-squared	0.888655	0.846567
Sum sq. resids	0.013880	0.005499
S.E. equation	0.030419	0.019147
F-statistic	20.95272	14.79373
Log likelihood	61.06774	73.10450
Akaike AIC	-3.851365	-4.777269
Schwarz SC	-3.319093	-4.244998
Mean dependent	0.084227	0.061615
S.D. dependent	0.091162	0.048880
Determinant resid covariance (dof adj.)		2.84E-07
Determinant resid covariance		9.45E-08
Log likelihood		136.4811
Akaike information criterion		-8.575471
Schwarz criterion		-7.365763

Remarks: X is the natural log of global exports value, Y is the natural log of global output value, D is the difference operator, U is the dummy variable equal 1 for 2009. The model satisfies all customary (cointergration, residual and stability) tests. Table 1 differs slightly from Table 3 in Podkaminer (2014) (Table 1 has been estimated with the current updates of the WDI data for 1987-2012).

Figure 3 / Generalised impulse responses for the VEC from Table 1

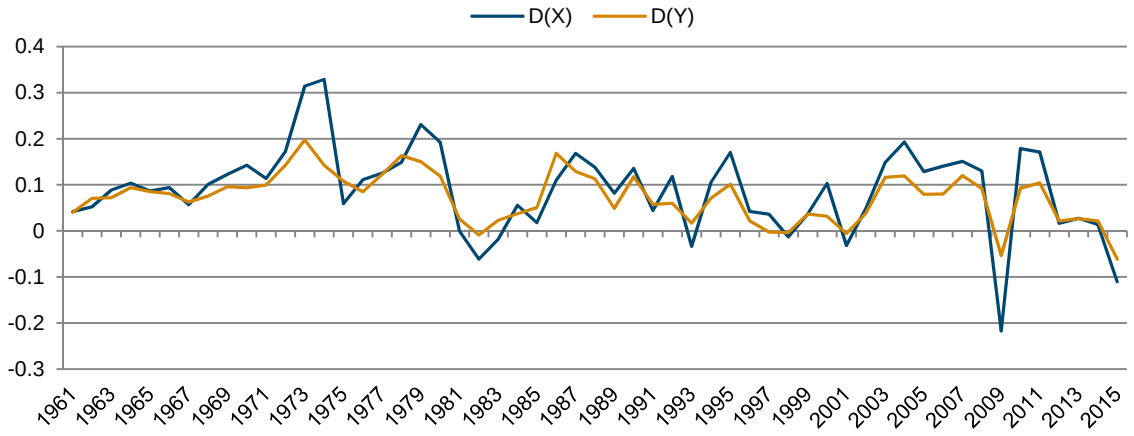


Note: X stands for global exports, Y for global output.

3. Evidence from Vector Error Correction econometric models for the years 1987-2014

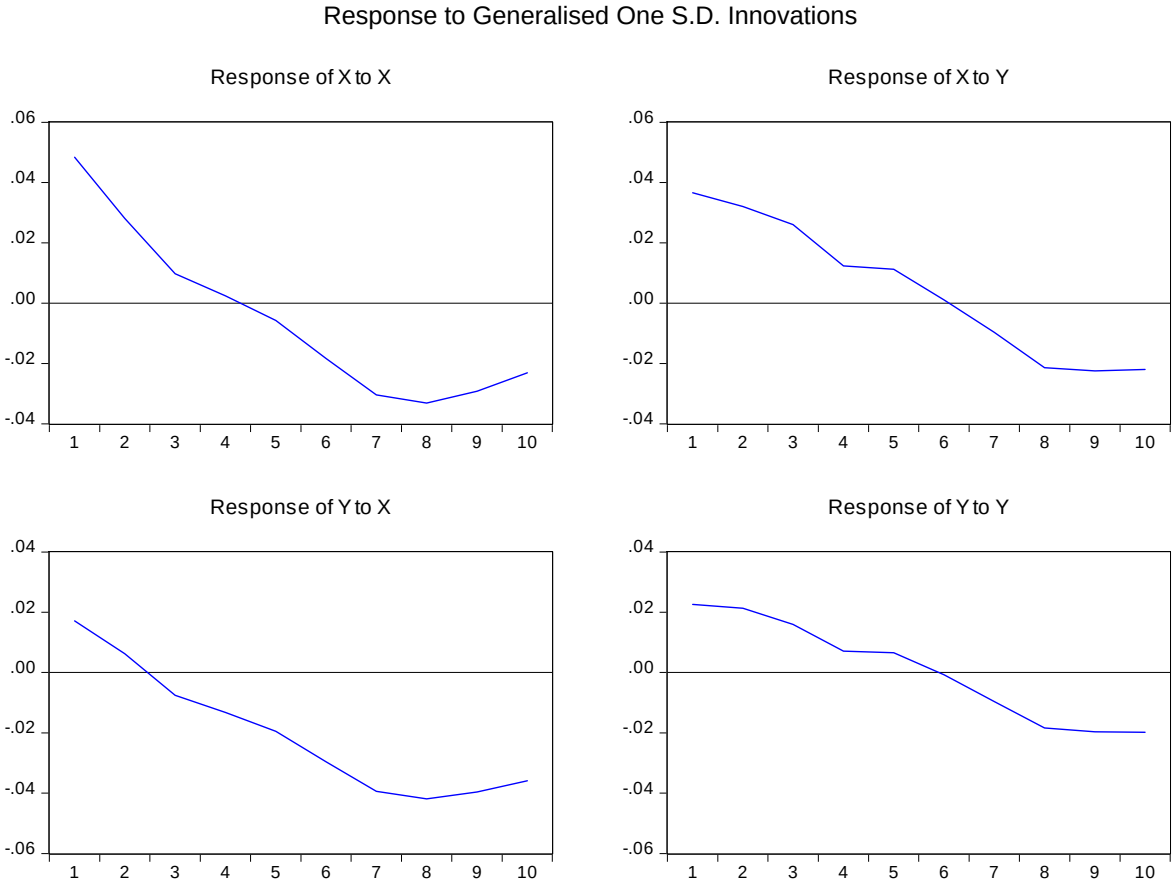
Currently (August 2016) WDI provides data on global exports and global output for also for the years 2013-2015. But the data for 2015 seem to be rather provisional (or else they suggest that that year may be marking another 'structural break', see Figure 4).

Figure 4 / D(X) and D(Y) 1961-2015



The estimated VEC for the period 1987-2014 shares many similarities with that from Table 1. The VEC for 1987-2014 yields impulse response schedules not dissimilar from those from Figure 3 (see Figure 5). The conclusions on the effects of 'innovations' to exports and output reached above apply correspondingly. In particular observe that the response of Y to an impulse to X is negative (since the second year).

Figure 5 / Generalised impulse responses for the VEC for 1987-2014



Note: X stands for global exports, Y for global output.

4. Cross-checking: the Granger non-causality tests

The Johansen cointegration tests suggest that X and Y are cointegrated (and this hypothesis is also confirmed by the selected VEC estimates for 1987-2012 and 1987-2014). Because of the unexpected conclusions following the estimated VECs it may be desirable to perform a further cross-checking. Granger non-causality tests may be used for this purpose. Specifically, it is well known that if two time series are cointegrated then there is Granger causality running from at least one series to the other (or, of course, running in both directions).[9] Thus, if Granger non-causality tests with respect to the items considered are not rejected (i.e. there is evidence of non-causality) then the VEC estimates (and the conclusions drawn from them) would be rather problematic.

It appears that the hypothesis on the (short-term) Granger non-causality running from D(Y) to D(X) is rejected (its testing probability is 0.0375). However the hypothesis on Granger non-causality from D(X) to D(Y) cannot be rejected (its probability is 0.2360).

Testing Granger non-causality with respect to the levels X and Y (which are non-stationary) requires the application of a more complex approach (Toda and Yamamoto, 1995)[10]. It appears that the hypothesis on Granger non-causality running from X to Y cannot be rejected (its probability is 0.2141). However, the hypothesis on Granger non-causality running from Y to X is rejected at 5% level (p=0.0956).

Concluding, Granger non-causality test do not disprove the hypothesis on X and Y being cointegrated and tied together in a VEC model.

Moreover, it is interesting to note that the Granger tests suggest that while D(Y) 'causes' D(X) and Y 'causes' X, the reverse is not true. In other words, the Granger tests indicate that global output determines global exports (both in the short and long run) but do not suggest that global exports may have 'driven' the global output.

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[9] Granger causality is understood as follows: Assume one considers two *stationary* time series W and Z.W is said to Granger cause Z if Z can be better predicted using the histories of both W and Z than it can by using the history of Z alone. The same applies to W being Granger caused by Z. Absence of Granger causality can be tested by estimating the Vector Autoregression (VAR) model with two equations:
$Z_t = a_0 + a_1Z_{t-1}+...+a_pZ_{t-p}+b_1W_{t-1}+...+b_pW_{t-p} + u_t$
$W_t = c_0 + c_1Z_{t-1}+...+c_pZ_{t-p}+d_1W_{t-1}+...+d_pW_{t-p} + v_t$
The parameters 'a' and 'b' remain to be estimated; u and v are error terms. H_o: $b_1=b_2=\ldots b_p=0$ is a test that W does *not* Granger cause Z. Similarly, H_o: $c_1=c_2=...c_p=0$ is a test that Z does *not* Granger cause W. Testing H_o is in terms of the usual Wald test statistics. The results may (and often do) depend on the number of lags (p) taken. That number can be selected on the basis of so-called information criteria (such as Schwartz's or Akaike) and paying attention to the additional properties of the VAR model (its stability and absence of residual autocorrelation).

[10] The Toda-Yamamoto procedure proceeds in steps. The first is the selection of the lag length (p) for the VAR (in levels, not in their first differences). The selection is guided by the information criteria (Schwartz etc.) and the properties of the VAR (stability, absence of residual autocorrelation). The second step requires the determination of the order of integration of the original series considered (e.g. via ADF tests). Suppose the maximum of these orders is m (i.e. one of the series is integrated of order m, the other is integrated of order not greater than m). Third, the VAR (in levels) with (p+m) lags is estimated. Finally, one runs the standard Wald test that the coefficients of *only* the first p lagged values of W are zero in the equation for Z and does the same for the coefficients of the lagged values of Z in the equation for W. Rejection of the null implies rejection of Granger *non*-causality (i.e. delivers evidence of Granger causality). The probabilities reported in below were derived from the auxiliary VARs with m=1.

5. Granger non-causality tests with alternative measures of global output and global exports

The world output and trade variables so far used in the analysis are both expressed in current US dollars. The world-level totals Y and X represent the logarithms of the sums of national outputs (and trades) converted into US dollars at the available official (or somehow assessed by the World Bank staff, when necessary) *current* exchange rates. Thus the conclusions suggested by the analysis are in fact about the developments in (log) *values* of output and exports, not in their (log) *volumes*. Analyses conducted with the time series of real world output and real exports may have possibly produced different conclusions. However, the calculation of the volumes would require deep studies on meaningful price deflators – especially for the world trade, still a task for the future. Feenstra (1994) illustrates some of the difficulties involved in the measurement of price indices for the US trade. Calculating meaningful price deflators for the world trade must be incomparably more difficult. It is the opinion of the present author that the WDI price deflators (which are based on constant US dollars) for world output (and even more so for world trade) may be rather unreliable. (One reason for this is the fact that the deflators for the world exports implied by the WDI data differ, quite substantially, from the WDI deflators for the world imports. In principle, the two deflators should be expected to be equal to each other).

The second, and related, problem is about the usage of the (current) exchange rates for the assessment of outputs of individual countries in any given year. It is quite obvious that this cannot adequately reflect the relative levels of real incomes of countries at vastly different levels of development (which is the case here). As is well known there are persistent gaps between purchasing power parities and exchange rates – and thus between income levels measured at exchange rates and at purchasing power parities. Even complete international economic integration (e.g. through intensified and barrier-free international trade) would not necessarily reduce the gaps in question (Podkaminer, 2013a). Thus, the application of (current) purchasing power parities may have produced an alternative – and arguably better – measure of *nominal* world output, at least theoretically.[11] However, in this case it would be quite logical to expect that the trade data be measured at purchasing power parities as well. But the purchasing power parities for international trade have not been available so far.[12]

Further research on the global trade–global output nexus, using alternative (possibly more relevant) measures of trade and output, should certainly be encouraged.

Bearing in mind the reservations concerning the adequacy of the available alternative measures for global trade and global output, it may be worth conducting simple Granger non-causality tests involving: (1) global output and global exports measured at *constant* 2010 USD; (2) global output measured at

[11] Available sets of purchasing power parities differ on very many counts. The concepts underlying the calculation of purchasing power parities supplied by different institutions (e.g. by the World Bank, or Eurostat) are largely a matter of conventions, not necessarily shared universally. There is no single 'objective' prescription for the calculation of the parities. Of course, also the practices of dealing with various specific issues (such as the assessment of relative prices of various non-market services) do differ.

[12] The international comparison projects which supply the overall (GDP) purchasing power parities for individual counties assume that the *partial* purchasing power parities for the 'net exports aggregate' of GDP are equal to the respective exchange rates.

constant 2010 USD Purchasing Power Parities and global exports measured at constant 2010 USD. (All items come from WDI, the August 2016 edition.)

Table 2 reports the outcomes of testing for Granger non-causality between the global output and global exports (and increments thereof), alternatively measured. As can be seen, in the short run Granger causality is bi-directional (though the evidence on causality running from D(Y) to D(X) is much stronger than on causality running in the opposite direction). In the long run the causality runs from Y to X but not in the opposite direction: output (however measured) turns out to be a good 'leading indicator' for exports but exports are not a good 'leading indicator' for output.

Table 2 / Probabilities of Granger non-causality with alternative definitions of Y and X

Hypothesis	Probability	Hypothesis	Probability
D(X*) doesn't G-cause D(Y*)	0.0455	D(X*) doesn't G-cause D(Y**)	0.0583
D(Y*) doesn't G-cause D(X*)	0.0062	D(Y**) doesn't G-cause D(X*)	0.0297
X*doesn't G-cause Y*	0.43671	X*doesn't G-cause Y**	0.26341
Y* doesn't G-cause X*	0.05891	Y** doesn't G-cause X*	0.02461

X* is the natural log of global exports valued at constant 2010 USD, Y* is the natural log of global output valued at constant 2010 USD, Y** is the natural log of global output valued at constant 2010 PPP USD;
1) The probability derived through the Toda-Yamamoto procedure.

6. A digression: slowdown in output growth unlikely to have been caused by the weakening labour productivity

The Granger non-causality analyses of previous sections suggest that the global exports growth does not drive the global output growth. The suggestions derived from the VEC analyses go even further. Their implication is that the growth of exports may have slowed down the global output growth. A further implication is that the secular output growth stagnation may have had something to do with the progressing globalisation. Such stagnation is believed to have engulfed the developed parts of the global economy. However, globalisation is not generally seen as being responsible for secular growth stagnation. The view, rather commonly shared by the mainstream, is that the current stagnation set in around 2008, as the global financial crisis released forces that have since been preventing the resumption of fast economic growth allegedly characterising the earlier decades.[13] The mainstream opinions do differ on many counts. But they seem to be sharing the belief that the 'monetary factors' (e.g. pertaining to the 'zero lower band') are at least co-responsible for the present (post-2008) predicament. Moreover, they all tend to emphasise the need for 'difficult but uncontroversial reforms' (i.e. further 'structural reforms of the supply side') as the primary way of ending the stagnation. Gordon (2015) may be the most vocal representative of the 'supply-siders'. He goes as far as to blame the stagnation on the slower growth (since 2004) in potential output 'emanating from the behavior of productivity'.

Checking the hypothesis on the causal links between labour productivity improvements and output growth may be done by means of Granger non-causality tests. Such tests have been conducted with the AMECO (Eurostat) data from 1960 through 2015 and 1991 through 2015 for 22 OECD countries; for West Germany (years 1960 through 1991), for unified Germany (years 1991-2015), and also for Central and East European new EU member states (years 1995 through 2015). The results for the 22 countries for the years 1960 through 2015 are in Figures 6 and 7. (The results for other countries and periods are quite similar.)[14]

It turns out that, generally, productivity does not 'cause' output. Much more often the causation seems to be running in the opposite direction: from output (or its growth rate) to productivity (or its growth rate). This finding, though inconsistent with the 'mainstream' ideas on the sources of long-term economic growth, is reminiscent of the classical Kaldor-Verdoorn Law (Verdoorn, 1949; Kaldor, 1966; McCombie et al., 2002). The progressive slowdown in output growth on the global level, initiated in the mid-1970s (amid the wholesale change of economic policy paradigms), may have been mirrored by the progressive

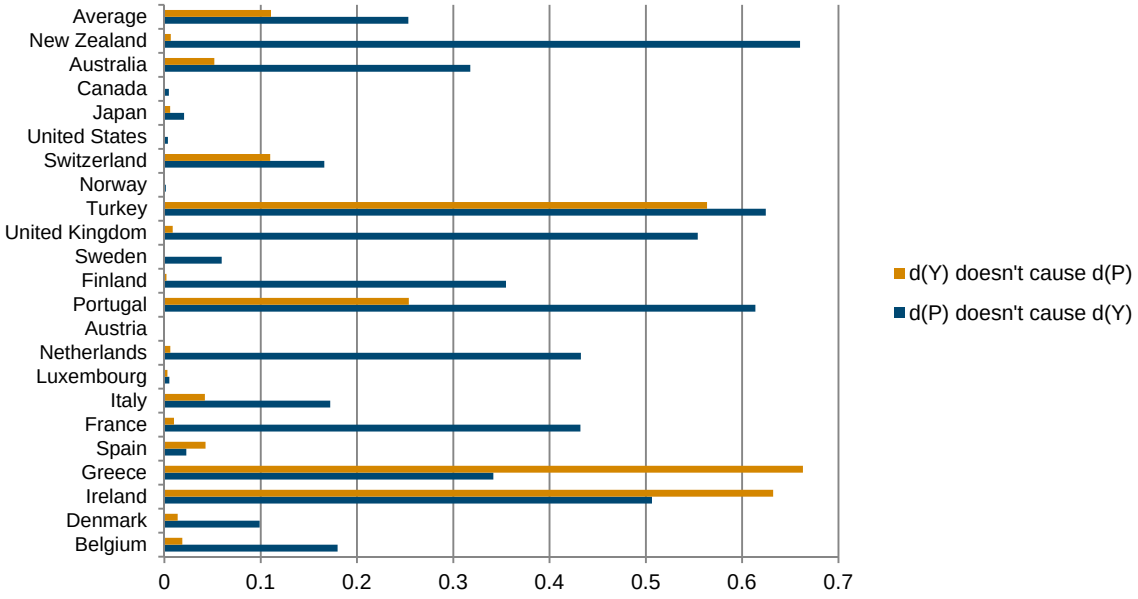
[13] See e.g. the recent review of popular views by Canuto et al. (2014), or a more extensive presentation of the opinions held by the prominent representatives of 'economic science', collected in a VOX volume edited by Teulings and Baldwin (2014).

[14] WDI does not report labour productivity indices for the global economy (nor for individual countries). It is still possible that 'productivity drives output growth' in developing countries (and globally). But that hypothesis cannot yet be tested.

slowdown in productivity growth (and that despite the indisputable acceleration of technological progress).

Figure 6 / Probabilities of Granger non-causality (based on chi-sq stat.)

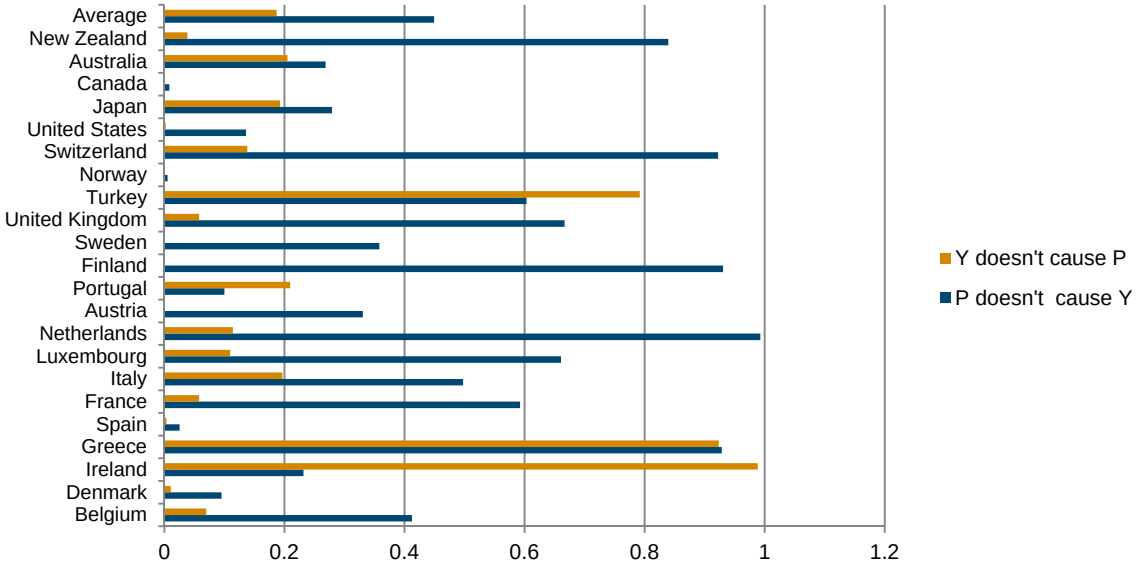
Years 1960-2015



Remark: P is labour productivity (real GDP per employed person); Y is real GDP per capita.

Figure 7 / Probabilities of Granger non-causality (based on chi-sq stat.)

Years 1960-2015



Remark: P is labour productivity (real GDP per employed person); Y is real GDP per capita. The probabilities are derived through the Toda-Yamamoto procedure.

A number of commentators and researchers have pondered on the ongoing productivity growth slowdown. Given the (apparent) acceleration of technological progress and the rather obvious advances in applied research and innovation activities, the labour productivity growth slowdown is considered a paradox. The solutions to the paradox sometimes forwarded suggest that output (and productivity) have been systematically underestimated by the statistics (e.g. Mokyr, 2014, or Feldstein, 2015). Others tend to disagree with the mismeasurement thesis without yet offering a coherent solution to the paradox (e.g. Byrne et al., 2016).

A simple explanation is implied by our estimates. Namely, the growth of productivity is weakening because economic growth has been weakening secularly – since about the mid-1970s. But why has output growth been weakening secularly? That is a different question to which we will return now. The implied answer to that question (Podkaminer, 2014, 2015a) is that the changes in the economic policy paradigms – and in particular the globalisation itself – and not to any ‘adverse’ technological developments may have contributed to the secular stagnation.

7. Why is faster growth in trade associated with slower growth in output?

The phenomenal rise in international trade has been the most obvious effect of globalisation. Now, according to the classical, neoclassical and contemporary theories of international trade, 'more trade' (and especially more free trade) should bring output gains. Why are such positive effects not revealed by our analysis?

There may be two major reasons.

Firstly, it may be argued that rising world trade could have been productive on the global scale if growth in individual countries had been at least approximately externally balanced most of the time – and not only sporadically, in response to the severe payments or exchange rate crises. The negative output effects of rising trade may have emerged under the huge and persistent trade imbalances that have developed under progressing globalisation. Such imbalances, sustained for longer periods by capital flows increasingly divorced from real economic fundamentals, may have acted as brakes on sustained output growth in both the persistent deficit and the persistent surplus countries. Under a different international economic order, somehow enforcing more balanced trade among nations – with major nations not allowed to compensate deficient domestic demand with huge trade surpluses that destabilise their partners – global trade may assume the positive role assigned to it by the trade theory. The classical Bretton Woods system was an example of such international arrangements limiting persistent and large trade imbalances.

Secondly, the expanding internationalisation of production[15] (which has been made possible by the liberalisation of trade and capital flows) seems to be generating, or at least supporting, the tendency for the **global** wage shares to decline – and thus for the **global** profit shares to rise (Podkaminer, 2013b). This development may be closely related to the development of inequality on the global level (see e.g. Freeman 2009). While the impact of globalisation on global inequality remains a controversial issue (see e.g. UNCTAD, 2012 for a recent survey of views), there is also a possibility of a reverse impact: from higher inequality to slower growth. The global shift in income distribution from wages to profits can account for the weakening of global growth because such a shift raises the overall saving propensity – without necessarily raising the propensity to invest (Podkaminer, 2013b). The tendency for the slowdown of growth of global output could then be an end effect of both developments: rising global profit share/profitability and falling propensity to invest.[16]

Concluding, it remains true that output of some individual countries may heavily rely on the expansion of their exports. Moreover, productivity growth (and growth of potential output) in many cases may critically

[15] Feenstra (1998) characterises the process as 'integration of trade and disintegration of production in the global economy'.

[16] In terms of the Bhaduri-Marglin (1990) classification, global growth would then be characterised as 'wage-led' rather than 'profit-led'.

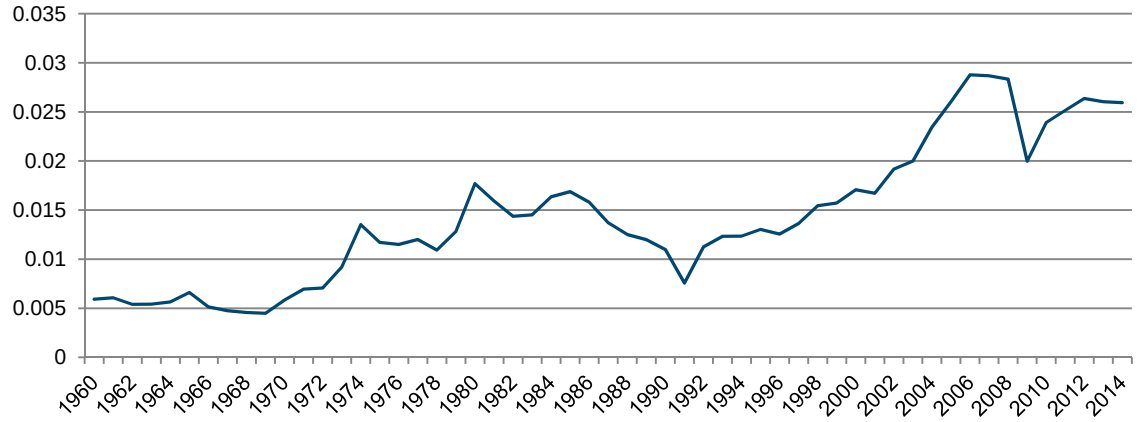
depend on rising imports of capital goods and intermediate inputs. It is equally true that rising net exports may contribute substantially to overall GDP growth in some nations. But rising net exports may well be achieved at the cost of overall GDP growth stagnation. This is the case in Germany where high trade surpluses (achieved through the sustained repression of wages and domestic demand) have been associated with secularly anaemic GDP growth (Laski and Podkaminer, 2012). Moreover, it must be remembered that for each country relying for GDP growth on the improvement of net exports there must be some other countries whose net exports necessarily contract – thus depressing their GDP growth. The existence of a club of countries following the 'export-led' growth paths (with persistent trade surpluses) implies the existence of a club of 'import-fed' countries (with persistent trade deficits) whose GDP growth must sooner or later be held back by the latter's indebtedness. The global economy – being an autarchic system – cannot follow the export-led growth path- if this is combined with sustained trade imbalances.

8. Global trade imbalances: an attempt at quantification

It is not obvious how one should measure the degree of trade imbalance on the global scale.

The simplest measure could be defined as the sum of trade surpluses across all countries of the world as a proxy for global imbalances. As can be seen (Figure 8) the so defined trade imbalance which was rather low relative to the global output in the 1960s rose afterward very strongly (until the early 1980s) and then again in the 1990s (until 2005).

Figure 8 / Ratio of global trade surplus to global output, 1960-2014



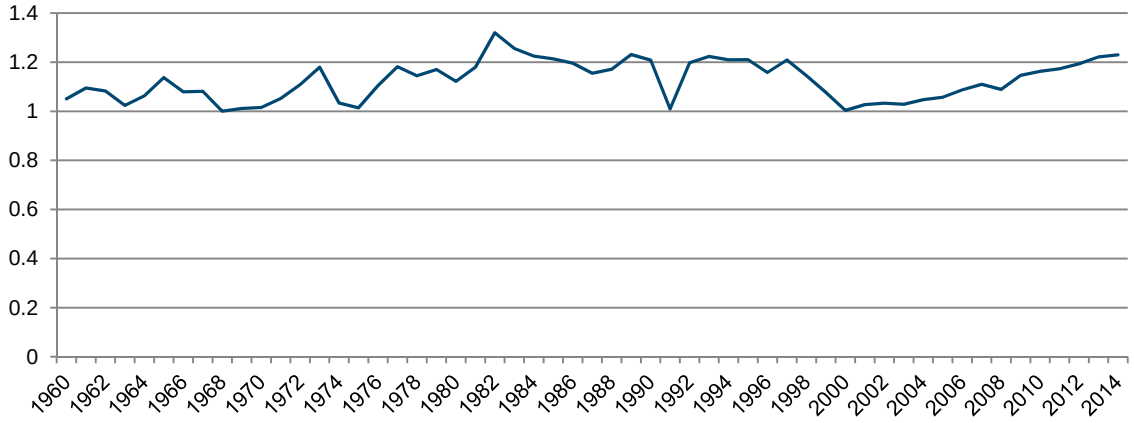
Source: Own calculations based on WDI (August 2016 edition).

In principle the global trade surplus should be equal to the global trade deficit (the latter defined as the sum of trade deficits across all countries of the world). Unfortunately, this is not the case. The global trade surplus equalled the global trade deficit only on three occasions since 1970 (see Figure 9). Since 2000 the gap between the two measures of global imbalance has been on the rise.

The 'true' levels of global trade imbalance are likely to be closer to the global surpluses rather than the global deficits – but their actual magnitudes remain unknown. It follows that models seeking to quantify the links between exports, trade imbalance and output (all at the global level) may fail to capture the 'actual truth'.[17]

[17] Of course the mismatch between the global surplus and global deficit may be a purely statistical problem. But the scale and persistence of the mismatch may suggest that there is more to it than simply errors and omissions in statistical reporting.

Figure 9 / Ratio of global trade surplus to global trade deficit



Source: Own calculations based on WDI (August 2016 edition).

9. The trade imbalance seems to be exogenous

Table 9 reports the probabilities of Granger non-causality between the natural logs of global exports (X), global output (Y) and global trade surplus (all measured at current USD) derived from the properly specified 3-variable VAR models. (The log of global trade surplus is denoted as B).

Table 3 / Probabilities of Granger non-causality between exports, output and trade imbalance

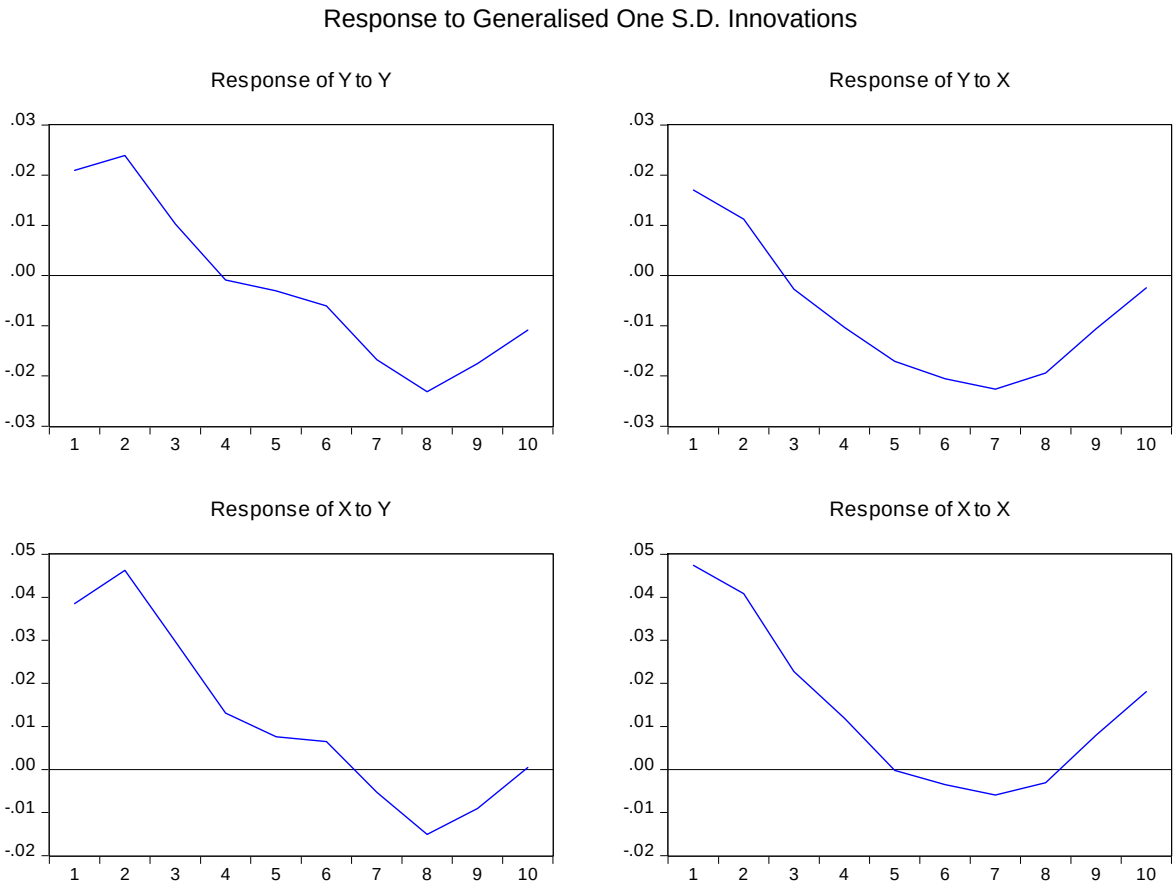
D(B) doesn't Granger cause D(Y)	0.8326	B doesn't Granger cause Y	0.2084
D(X) doesn't Granger cause D(Y)	0.0827	X doesn't Granger cause Y	0.0156
D(B) and D(X) don't Granger cause D(Y)	0.0626	B and X don't Granger cause Y	0.0487
D(Y) doesn't Granger cause D(B)	0.8656	Y doesn't Granger cause B	0.4493
D(X) doesn't Granger cause D(B)	0.5296	X doesn't Granger cause B	0.0904
D(Y) and D(X) don't Granger cause D(B)	0.4539	Y and X don't Granger cause B	0.1009
D(Y) doesn't Granger cause D(X)	0.0377	Y doesn't Granger cause X	0.0154
D(B) doesn't Granger cause D(X)	0.3301	B doesn't Granger cause X	0.1752
D(Y) and D(B) don't Granger cause D(X)	0.0086	Y and B don't Granger cause X	0.0451

The patterns of Granger non-causality between D(X) and D(Y) (as well as between X and Y) are the same as in the 2-variable VARs (see Table 2). Interestingly, the global trade balance variables D(B) and B appear to be ‘exogenous’. The hypotheses on D(B) not being Granger caused by either D(Y) or D(X) – or jointly by D(X) and D(Y) – are not rejected. The same can be said with respect to B.

Also, D(B) alone does not Granger cause D(X) or D(Y) and B does Granger cause X or Y. However, D(B) and D(Y) jointly Granger cause D(X) and B and Y jointly Granger cause X; and B and X jointly Granger cause Y.

The exogeneity of B transpires also from the VEC modelling allowing for free variables: X, Y and B. This prompts the estimation of the bi-variate VEC with the two endogenous variables (X and Y) as well as the endogenous d(B) variable. The resulting VEC, allowing for the dynamics of global trade imbalances, yields impulse response schedules (Figure 10) which are qualitatively not quite dissimilar to the schedules derived from the VEC not allowing for the dynamics of global imbalances, especially as concerns the response of output to a ‘shock’ to exports (see Figure 5).

Figure 10 / Impulse response functions derived from the bi-variate VEC with the exogenous D(B)



Note: X stands for global exports, Y for global output.

10. Impacts of trade imbalances possibly negative: evidence from the ARDL model

The Autoregressive Distributed Lags approach developed by Pesaran et al (2001) can be applied for checking the presence of a long-term relationship between time series. This approach can be applied for checking whether the log of global output stands in a definite long-term relation to the logs of global exports and global trade surplus.

The application of the ARDL method yields the 'best' model linking Y to X and B (Table 4).

Table 4 / ARDL output

Dependent Variable: Y
Method: ARDL

Sample: 1987 2014
Included observations: 28
Maximum dependent lags: 4 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (4 lags, automatic): X B
Fixed regressors: C
Number of models evaluated: 100
Selected Model: ARDL(1, 1, 1)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
Y(-1)	0.752326	0.171542	4.385671	0.0002
X	0.612926	0.068568	8.939010	0.0000
X(-1)	-0.424553	0.136812	-3.103180	0.0052
B	-0.090344	0.035970	-2.511631	0.0199
B(-1)	0.080364	0.039974	2.010401	0.0568
C	2.412990	1.467062	1.644776	0.1142

R-squared	0.998928	Mean dependent var	31.25959
Adjusted R-squared	0.998685	S.D. dependent var	0.456183
S.E. of regression	0.016545	Akaike info criterion	-5.178016
Sum squared resid	0.006022	Schwarz criterion	-4.892543
Log likelihood	78.49222	Hannan-Quinn criter.	-5.090744
F-statistic	4100.667	Durbin-Watson stat	1.660325
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model selection.

The ARDL model from Table 4 satisfies all usual residual and stability tests. Moreover, the Pesaran's F-statistics for that model equals 5.78: more than 5.0 which would be necessary for the rejection (at 1% significance) of hypothesis on the absence of the long-term relationship between Y, X and B. In other words, the evidence is very strong that Y, X, and B stand in a long-term relationship, as detailed in Table 4.

The ARDL from Table 4 can be transformed into the cointegrating and long-term forms (see Table 5). The long-term form runs as follows:

$$Y = 0.7606 \bullet X - 0.0403 \bullet B + 9.743$$

According to this form the global output depends positively on global exports (although the 'marginal productivity' of exports is declining) but negatively on the trade imbalance. However, the impact of trade imbalance is highly uncertain (the t-statistics for the regression coefficient is very low).

The short-term dynamics is represented by the ARDL's cointegrating form (the upper panel in Table 5). The regression coefficients for this form have high t-statistics. The coefficient for the short-term error-correction term is negative (as it should be).

Table 5 / ARDL Cointegrating and Long-Run Form

Dependent Variable: D(Y)
Selected Model: ARDL(1, 1, 1)

Sample: 1987 2014
Included observations: 28

Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(X)	0.612926	0.047512	12.900373	0.0000
D(B)	-0.090344	0.030353	-2.976391	0.0070
CointEq(-1)	-0.247674	0.047918	-5.168725	0.0000
Cointeq = Y - (0.7606*X -0.0403*B + 9.7426)				
Long-Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
X	0.760568	0.144228	5.273376	0.0000
B	-0.040292	0.113233	-0.355834	0.7254
C	9.742602	1.377561	7.072355	0.0000

Interestingly, the coefficient linking D(B) to D(Y) is quite big in absolute terms – but negative. This suggests that in the short run the widening global trade imbalance has a negative effect on global output growth.

The global role of large-imbalance countries

The large trade-imbalance countries include Germany, Japan and China (the notorious trade surplus countries) and the USA and UK (the notorious trade deficit countries). The question worth asking is whether the performance of these countries has impacted the performance of the rest of the world systematically. This question was examined in Podkaminer (2015b) with the WDI data on real GDP of these (and many other) countries, the GDP of respective 'rest-of-the-world' and the respective real exchange rates (covering the period 1960-2012). It turned out that the evidence on systematic relationships ('cointegration') between the country's real GDP and the real GDP of the rest of the world is rather weak for the USA, UK and Germany. Cointegration is more likely with respect to Japan and China. However, the long-run relationship between the two items appears to be 'adversarial' for China (see Table 6). China's and the global output (outside China) have been substitutes rather than complements, at least in the longer run. China's GDP gains are achieved at the expense of GDP losses of the rest-of-the world. The mechanism at work here is rather easy to understand: China's large and persistent trade surpluses are large and persistent trade deficits of the rest of the world. China's surpluses crowd out domestic output and employment in the rest of the world.

Table 6 / ARDL Cointegrating and Long-Run Form[18]

Dependent Variable: D(YCh)
Selected Model: ARDL(3, 2)

Sample: 1960 2012
Included observations: 50

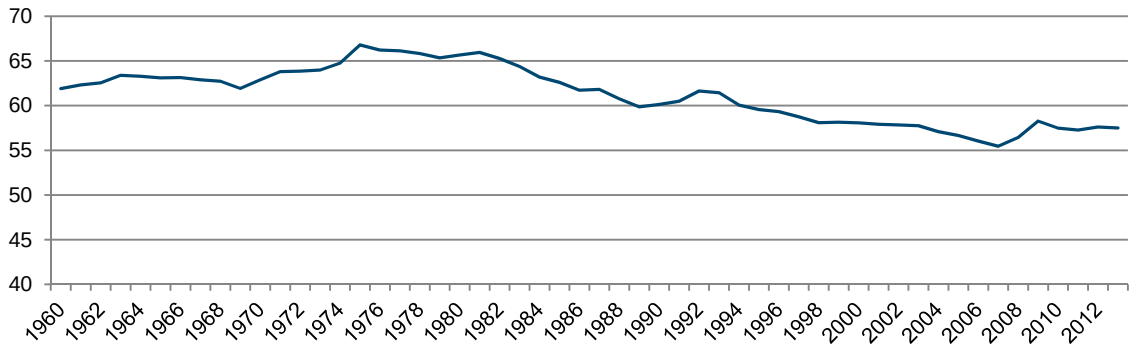
Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
$D(Y_{Ch}(-1))$	0.501230	0.109149	4.592160	0.0000
$D(Y_{Ch}(-2))$	-0.154123	0.083773	-1.839780	0.0729
$D(W_{Ch})$	-0.109007	0.309658	-0.352023	0.7266
$D(W_{Ch}(-1))$	0.652006	0.355815	1.832432	0.0740
C	10.838150	2.451524	4.420984	0.0001
CointEq(-1)	-0.368620	0.083652	-4.406600	0.0001
Cointeq = Y_{Ch} - (-1.4357* W_{Ch} + 0.0576*@TREND)				
Long-Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
W_{Ch}	-1.435734	0.261232	-5.496006	0.0000
@TREND	0.057622	0.003334	17.282934	0.0000

[18] Y_{Ch} is China's real GDP, W_{Ch} is the real GDP of the rest-of-the-world (both at constant USD).

11. Globalisation-driven 'race to the bottom' as a determinant of global deficiency of aggregate demand

Since mid-1970s there has been the tendency for rising income inequality in major countries.[19]. (The data on *global* income distribution are rather patchy and otherwise difficult to interpret). But there is rather little doubt that inequality (e.g. in Europe) has been on the rise (see e.g. Bonesmo Fredriksen, 2012). The rise in inequality mirrors the rather universal fall in the GDP wage shares (and also the persistence of fairly high unemployment). In Western Europe (as also in most other OECD) countries the GDP wage share is now much lower than 50 years ago (see Figure 11).[20]

Figure 11 / Unadjusted GDP wage share for the euro area (12 countries)



Source: AMECO.

There is little doubt that the suppression of wages must have been assisted by progressing globalisation. Advancing liberalisation of trade and capital flows, coupled with impressive gains in transportation and communication technologies, has been supporting the internationalisation of production of which outsourcing to the low-cost (e.g. low-wage) production sites is the essential component. Countries wishing to attract investment capital (or keep it within the domestic borders) are forced to engage in the 'race to the bottom' as far as wages (but also business taxes) are concerned.

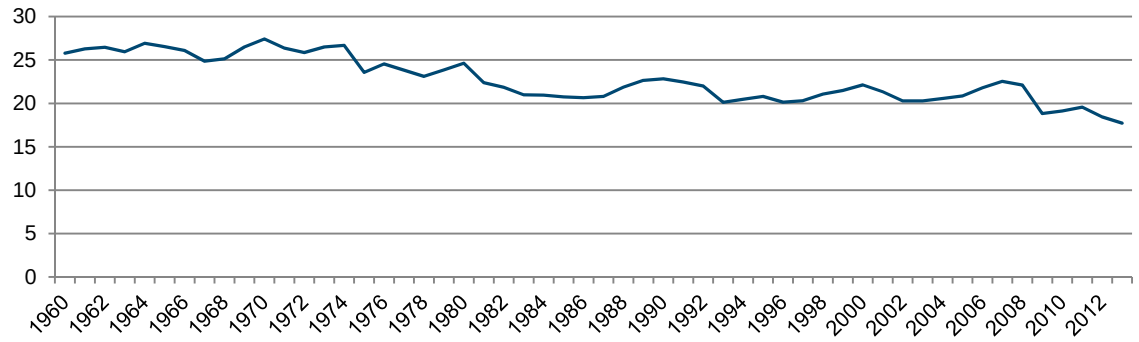
Falling GDP wage shares (and thus rising GDP shares of profits) would not have had negative consequences for aggregate demand had they strengthened gross fixed capital formation. But this has

19 See e.g. ILO (2015), UNCTAD (2012), Freeman (2009).

20 According to ILO (2015) the US wage share fell from 57.1% in 1995 to 55.7% in 2009. The Japanese and German wage shares fell from 54.8% and 54% to 53.2% and 51.1%, respectively. Surprisingly, the wage share is reported to have fallen also in China: from 60% in 1995 to 48% in 2008. Apparently, China – long enjoying the advantages of having cheap labour – is induced now to defend its position vis-à-vis Vietnam, Myanmar and other places with even lower wage rates.

happened. In actual fact the falling wage rates implying the rising profit shares (and therefore improving profitability) have been paralleled by weakening investment (see Figure 12).[21]

Figure 12 / Gross fixed capital formation as a share of GDP for the euro area (12 countries)



Source: AMECO.

The developments actually observed: the falling wage shares coupled with the secular stagnation of output suggest that growth is 'wage-led' and not 'profit-led' (according to the nomenclature proposed by Bhaduri and Marglin, 1990). As the globalisation (and international trade in particular) plays the essential role in suppressing wages globally, trade must bear at least a part of the responsibility for that unlucky outcome.

Concluding remarks

The conclusions reached in this study remain to be complemented by other, more detailed, studies. For example, one may wish to develop (and then apply) alternative measures of real output and real trade than currently available. Attempts may also be made to come to reliable measures of global trade imbalances. Then one may try to account for the impacts of trade in goods as distinct from trade in services, or for trade in raw materials (such as energy carriers). Unfortunately, the data on many developments worthy of examination are either missing or rather unreliable. This applies e.g. to the data on global trade in energy carrier, with total exports (the sums of quantities exported reported by individual countries) diverging, often radically, from total imports (the sums of quantities imported reported by individual countries).

The conclusions reached in this study, though clearly provisional, may – nevertheless – be considered relevant for the discussion of the basic paradigms of the international economic order. These conclusions suggest that globalisation – and liberalised trade in particular – have long ceased to serve the needs of the global economy. The basic paradigms of the international economic order need to be changed. The reformed international order should be capable of enforcing more balanced trade among nations. The major trading nations must not be allowed to compensate deficient domestic demand (and wages) with huge trade surpluses that destabilise their partners. Under the reformed world economic order the expansion of global trade could then be expected to support global growth. Of course, the basic paradigms of domestic macroeconomic policy-making in major countries would have to be overhauled too if these countries were to follow the externally balanced growth paths (Laski and Podkaminer, 2012).

[21] Falling GDP wage shares and the ensuing rise in income inequality must be expected to raise the private sector's propensity to save. But rising propensity to save coupled with falling propensity to invest must result in falling rate of growth of output.

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