

Measuring the globalization of health services:

A possible index of openness of country health sectors to trade?

Richard Smith, Health Economics Group, School of Medicine, Health Policy & Practice, University of East Anglia, Norwich, NR4 7TJ. E-mail: Richard.Smith@uea.ac.uk

ABSTRACT

Globalisation is a key challenge facing health policy-makers. A significant aspect of this is trade in health services. However, little is currently known about how trade in health services will affect the health of populations and national economies. A key determinant of the impact of trade in health services will be the general economic and trade context of the country concerned. One specific aspect of this is the ‘openness’ of a country’s health sector to trade; yet there is little, if anything, currently known about the most appropriate methods to assess openness of the *health* sector.

This paper reviews current methodologies used to measure openness in other sectors, and explores their applicability to measuring openness of the health sector. The paper suggests that the ‘Trade Restrictiveness Index’ (TRI) approach appears to offer the most fruitful way to construct an index of openness for the health sector. This methodology, and issues involved in adapting it for measuring openness in health services trade, is therefore outlined in more detail. The methodology is then applied to the UK to generate a TRI for the UK as a working example. The paper concludes with a series of developmental issues on which the views of HESG would be most appreciated.

1. Introduction

Globalization is a key challenge facing health policy-makers (1,2). Whilst effects on health from, for example, cross-border flows of infectious disease, are important aspects of globalization, a significant challenge concerns the globalization of the health sector itself: direct trade in health-related goods, services and people (patients and professionals) (3,4). The health sector has been relatively unaffected by globalization directly, as it remains a predominantly service-oriented sector. Most trade liberalization has concerned the movement of 'goods', and to a lesser degree people, since these can be 'stored' and therefore transported (5). However, while services overall account for only around 20% of global trade (on a Balance of Payments basis), this sector is the fastest growing (6,7). Much of this increase has resulted from changes in technology, making e-commerce and telemedicine a technical possibility, easier travel making movement of patients and professionals feasible, and transnational corporations making ownership and management of health care facilities more fluid (8).

A recent, critical, development in international legislation concerning trade and health services has been the World Trade Organization (WTO) negotiations aimed at the further liberalization of trade in services: the General Agreement on Trade in Services (GATS). The pace of development, and binding nature, of GATS commitments has created a fresh imperative to establish how health services will be affected by international trade (9,10). One fundamental aspect in the assessment of how greater liberalization of the health sector may affect national health and wealth is whether the rather intuitive notion of 'openness' (where 'openness' is used synonymously with 'liberalized') can be captured empirically, and with sufficient rigour to be useful in analyses (11). Having such a measure would, for example, enable one to assess the degree to which liberalization may be correlated with changes in health, GDP and inflation.

Given that national health sectors have tended to remain relatively ‘closed’ systems, there are no readily available methodologies for this assessment ‘off the shelf’. However, as international trade in goods has a significant history, and trade in other services has progressed over recent years, there are a number of indicators that may possibly be adapted. This paper focuses on reviewing these existing indicators, and from this outlines a proposed methodology for measuring openness in the health sector.

2. Measuring openness to trade: a review of existing methodologies

The fundamental issue with respect to measuring openness is to reconcile the vast array of tariffs, quotas, licenses, prohibitions, exchange controls, trade promotion activities, bi-lateral and multi-lateral trade policies etc to forge a view on the overall trade orientation of a country/sector. Although this difficulty is reflected in the range of ways in which trade openness has been assessed, there remain two broad approaches: (i) those using readily measurable factors, such as exchange rates; or (ii) those constructing a composite index through combining information on, for example, tariff rates, non-tariff barriers and wider social factors.

2.1. Readily measurable factors

Readily measurable factors may be dichotomized in to those which: (i) measure *trade volume* (the proportion of trade actually observed) or *trade restriction* (establish what barriers are in place to constrain trade occurring) (12); and (ii) measure *trade incidence* (direct observation of policy instruments) or *outcome* (deviation of actual outcome from the outcome that would have occurred without the trade barrier – a comparative static approach) (13). These categorizations thus form a matrix within which different measures may be located, as illustrated in table 1. Each entry is reviewed briefly below.

Table 1. Summary of classification of indicators of trade policy openness

	TRADE VOLUME	TRADE RESTRICTION
INCIDENCE	<ul style="list-style-type: none">• Not applicable	<ul style="list-style-type: none">• Average tariffs• NTB frequency• Bilateral payment arrangements
OUTCOME	<ul style="list-style-type: none">• Trade shares	<ul style="list-style-type: none">• Exchange rates

2.2.1. Trade shares

This is the simplest measure, calculated as the sum of exports plus imports divided by GDP – where the higher the ratio the more open the country is deemed to be (14). The premise is that the more an economy trades overseas (as a proportion of overall trade) the more open to trade it is (15). Its appeal is simplicity and applicability. However, the critical weakness is that it measures trade *volume* rather than *policy* (e.g. trade may be low but policy liberal). Further, the effect of ‘openness’ tends to disappear once geographical, demographic and institutional factors are added (16-19)¹. An additional problem in the measurement of trade openness in services is that much of this trade is less substantive and clearly measurable in volume terms, and one is thus more likely to be looking to generate an index of policy stance toward trade.

2.1.2. Tariffs and related measures

Tariffs are the most direct indicator of trade restrictions, typically measured as the ratio of tariff revenues (duties) to import values (where a higher ratio means more trade restriction) (21-24). In addition, the licensing, prohibition and quota control of imports is also a means by which many countries control imports. Such non-tariff barriers (NTBs) are measured as the ‘import-weighted percent of tariff code lines covered by the various forms of NTB as a percentage of all

¹ The ‘structure-adjusted trade intensity measure’ allows for structural features in regression analyses (e.g. trade intensity as a function of population and GDP per capita), where residuals ‘measure’ openness (how far a country’s trade intensity exceeds or falls short of that expected given its size and composition) (20).

tariff code lines within the aggregate' (25). Another alternative is to use duties applied to exports and imports, where the rate of export/import duty is measured as the ratio of export/import revenue to the value of exports/imports. Again, these are relatively easy to identify and measure, but have several weaknesses. For instance, there can be a wide divergence between official tariff rates and those actually imposed and collected (26,27), other forms of taxes (which nonetheless may impact on the price of imports and exports) are ignored and NTB ratios group disparate types of NTB together – quotas, licenses, health regulations etc – which may have very different effects on imports (26,27). They will also not be readily applicable to trade in (health) services, which are mostly affected by more numerous and complex NTBs.

2.1.3. Bilateral payment arrangements (BPAs)

BPAs are sometimes used as a general indicator of the trade *orientation* of a country, as they describe the method of settlement of trade balances between two countries. However, these have become less common and thus less able to be used in recent years (28). However, one may argue that such arrangements between countries may become more important again with WTO, as this is signing up to multilateral deal indicating general trade orientation of country. In effect, this may suggest using WTO membership and/or the GATS commitments themselves as measures of openness (and is indeed a method that has recently been used (29)).

2.1.4. Exchange rates

The most common measure is the black market exchange rate, which is deemed to show the success of the rationing function of prices in the foreign exchange market. That is, the higher the black market premium, the more restrictive trade is (15,27,30). However, there are

considerable difficulties here in controlling for confounding factors, such as inflation, external debt and greater bureaucracy, all of which are also significant determinants of the black market exchange rate. An alternative is to divide the purchasing-power-parity (PPP) exchange rate by the official currency exchange rate. Assuming that trade restrictions result in higher prices (an overvalued currency, relative to PPP, requiring import controls) then, *ceterus paribus*, the inverse of the price level, adjusted for the level of GDP per capita, may be a measure of openness (31). However, overvaluation can also be caused by factors other than import controls, such as foreign aid availability.

2.2. Composite indices of trade orientation

One ‘meta-problem’ with these measures is that, in addition to being largely uncorrelated, they have little or no theoretical (or empirical) guidance to suggest which measure is the superior, for what purpose or why. To address this, a set of alternative measures construct a ‘composite’ index utilising all relevant information concerning the measurement of a country’s openness to trade. The three most influential of these ‘indices of trade orientation’ are reviewed briefly here.

2.2.1. Dollar (32)

Dollar constructs two indices of openness (termed ‘outward orientations’ in the paper): (i) real exchange rate *distortion* (the ratio of actual relative price levels (RPL) to predicted relative price levels (RPL*) averaged over a 10 year period); and (ii) real exchange rate *variability* (the coefficient of variation of the annual observations of RPL/RPL* for each country over the 10 year period). The intuition is that openness is a function of a low level of ‘protection’ (and thus an exchange rate favourable to exporters) and incentives that are stable over time (and thus little variability). Overall openness is based on a weighted average of these two indices.

Its obvious strengths are that it is based on easily accessible data, and is simply to construct and use. However, that is also its weakness. For instance, it is insensitive to the *form* of trade restriction, such that economies combining import restrictions with export taxes will appear to be less protected than those with import restrictions alone, and countries combining import restrictions with export subsidies will appear less open than countries who do not.

2.2.2. *Sachs and Warner (33)*

This index combines information on tariffs, quota coverage, black market premia, social organisation and existence of export marketing boards to form a binary indicator – a zero-one dummy for use in econometric analyses – where a value of 1 represents a country as open and 0 as not². A country is assigned a value of 0 (i.e. closed) if: it had average tariff rates higher than 40%; its nontariff barriers covered, on average, more than 40% of imports; it had a socialist economic system; it had a state monopoly of major exports; and its black market premium exceeded 20% during either the decade of the 1970s or the decade of the 1980s.

The rationale for these elements is that they represent the means by which policy makers may close their economy to international trade (and introducing them as separate indicies in econometric analysis would lead to high collinearity). The strength of the index is that it takes a more ‘policy oriented’ view of measuring openness (30). However, there are several important limitations to this index. For instance, the main strength of the index appears to result from a combination of the black market premium and state monopoly variables, and econometrically little would be lost by reducing the index to a combination of these two variables.

Further, one element of the index is whether there is a ‘socialist economic system’, which has a negative impact on openness. Whilst this direction of relationship may be true, it raises an important concern with respect to health services as many ‘non-socialist’ countries will nevertheless have a form of ‘socialist’ health insurance; that for population health protection and security some element of socialist organization and ‘strong’ government is generally agreed to be critical. This is likely to make the index either inappropriate or unfeasible.

2.2.3. Anderson and Neary (22)

This Trade Restrictiveness Index (TRI) is a theoretically-based index of trade policy which aggregates trade restrictions whilst holding the level of real income constant³. The TRI is thus equal to the uniform deflator which, applied to domestic prices distorted by trade policy, is just as inefficient as the given trade distortion structure. As an inverse figure it thus measures the degree of openness to trade. The advantages of this measure are that it is: (i) a welfare-based measure, reflecting a standard cost-of-living deflator used in consumer theory (the uniform deflator that, when applied to the new prices allows the old level of utility to be maintained with the old level of expenditure, or income). The TRI is the deflator which deflates distorted trade prices at their new level to maintain the old level of utility for the representative consumer whilst respecting general equilibrium conditions; (ii) based within the general equilibrium framework, rather than a partial equilibrium framework, and thus reflects the interaction of factors in a more realistic and theoretically tractable manner; and (iii) combines information on tariffs, quotas, taxes and subsidies. More practically, this means that the TRI can be operationalised using the relatively common CGE (computable general equilibrium) macro-economic modeling approach (in essence combining the index with an appropriate – and often

² Others have tried similar approaches. E.g. The Heritage Foundation constructed an index of health policy which

existing – general equilibrium model of trade) (34-37). This also then allows for considerable ‘comparative static’ analysis of the actual with the predicted level of trade intensity, prices, etc.

This index shows considerable promise for development and refinement as an index of health sector openness for three reasons. First, it is the only measure to have as its theoretical base the concept of the welfare-effect of trade – where the index takes *real income* as its reference (i.e. finding a uniform tariff that yields the same real income as the original differentiated tariff structure). Second, just as the MTRI adapts the TRI to take volume of *trade* as the starting point, one might consider a version being constructed that takes volume of *health* as its reference point, rather than real income. Third, the general approach allows one to encompass the most relevant policy restrictions to the sector in question.

2.3. Measuring openness to trade in services

In recent years there have been a number of attempts made to specifically measure trade in services, both in total, across country and across sectors (for an overview of studies see 38,39). Studies have used a variety of means to assess restrictiveness. For example, Hoekman (40) suggests that financial data on gross operating margins may indicate the effect of government policies on competition. In an earlier paper, Hoekman (41) constructed frequency ratios to measure openness based upon country GATS commitments, where this is defined as the fraction of possible commitments that were made. Of course, this may be biased as it assumes that an absence of positive country commitments indicates the presence of restrictions (42). Other studies have sought to construct price-impact measurements of trade restriction (43,44), or quality-impact measurements (45). In these cases, a model of the determination of price or

classifies countries in to five categories according to the level of tariffs and other (perceived) distortions (33).

quantity is estimated, and the trade restrictiveness index included to assess the effect of trade barriers on the price or quantity of a service. However, because this modeling is necessarily sector specific, these techniques have limited use for cross-sector or cross-country analyses. For this, a more general model is required, such as the 'gravity model', which relates bilateral trade volumes positively to the incomes of trading partners and negatively to the geographical distance between them (46,47). However, this approach applies to total trade rather than individual sectors. An alternative is the CGE model which provides a framework for cross-sector and cross-country analyses, and it has begun to be applied in the case of services (48-51).

Most of the studies have, however, used in their analyses some variant on the TRI. This is no doubt because restrictions on trade in services encompass a multitude of policies significantly different to the restrictions relevant to trade in goods. For instance, tariffs are leveled on goods, whereas services trade is effected more by regulations in the form of, for example, citizenship requirements, residency requirements, forms of establishment of business structures, levels of investment, requirements for local partners and recognition of foreign qualifications. In this case it is clear that a multi-factorial index will be required to assess openness.

It is worth noting, however, at this stage that the TRI as used by many of these studies differs from that proposed by Anderson & Neary, whose TRI takes a *general equilibrium* approach, which gives an economically meaningful measure of the importance of interventions *given* an initial characterization of them (e.g. in terms of tariff equivalents). Of course, in services there is a lack of an initial characterization of interventions, leading to the three-stage approach adopted by these papers with respect to assessing a TRI for services: (i) use basic information

³ A variant, where import volume is held constant rather than income, is termed the 'Mercantilist TRI' (MTRI).

and judgments to generate a TRI (see below); (ii) use econometric techniques to estimate the effects of this TRI on some intermediate economic measure to enable estimation of a ‘tax equivalent’, or ‘productivity equivalent’, of the interventions; and (iii) use a CGE model to generate the counterfactual on the direct and indirect economic measures (52). Nonetheless, despite this difference, the general approach of the TRI, in comparison to other techniques described here, remains fundamentally the same.

3. Constructing an index of openness for the health sector: a proposed methodology

Although the TRI approach seems most appropriate to utilise in health it requires a unique application. This is not least because of the uncertainty concerning the status of many public health care systems under GATS, given Article (I.3) which states that GATS excludes “services in the exercise of governmental authority”; further defined as being a service which is supplied neither on a commercial basis nor in competition with one or more service suppliers (53). There has been much debate about what this actually covers, although it seems that the range of public-private mix in most health systems means that it is reasonable to assume that GATS would formally encompass (at least a part of) most health systems (and, of course, trade can, and does, also take place outside of GATS) (54). It is therefore important that the impact of trade liberalisation is assessed appropriately, and here the suggested methodology is illustrated.

3.1. Details of trade restrictions of relevance

One first needs to collect details of regulations and other policies affecting services in the health sector, ideally from systematic surveys of government/firms, but also by inference from other documents (45,55). GATS offers a useful framework for identifying and differentiating restrictions that may be of relevance, and may itself be a good source of information (29,56).

Here the UK is taken as a working example, with a predominantly public health care system paid for by taxation. For the secondary (hospital) care sub-sector, trade is theoretically possible in each of the four GATS modes, and possible restrictions in this market are thus outlined. In mode 1, cross-border supply, the service crosses the border although not the provider or patient, such as consultation conducted using video technology. Possible restrictions include requirements for the establishment of local operations in addition to the foreign supplied service, recognition of qualifications of the distance service provider and availability/controls on the technology being used. In mode 2, consumption abroad, the patient travels to obtain services in another country (a patient coming to the country being an export and vice-versa). Possible restrictions include the portability of health insurance (restricting funds to pay for services abroad), visa requirements and waiting lists. In mode 3, commercial presence, the service is provided within the country but by a hospital financed and/or controlled by an overseas investor. Possible restrictions include limiting the establishment of foreign firms through minimum/maximum level of investment in a hospital, joint venture/partnership requirements and requirements for proportions of local/foreign employment. In mode 4, temporary movement of service providers, the health professional moves temporarily to another country to provide health services there. Possible restrictions include visa requirements, limits on overall numbers admitted to the country and recognition of qualifications.

In some ways, although mode 3 may be of more importance in trade volume and/or value terms, mode 4 is more fundamental to services trade more generally as services require far more human than capital resources (comprising some 80% of recurrent costs) (4,8). It is a moot point whether increased openness to trade will increase the overall supply of human resources, or simply lead to 'brain drain' from poor to rich and thus compound the problem of current

shortages in health service personnel. However, this is a discussion of the likely benefits of trade *per se*, and beyond the remit of this current paper, although is discussed elsewhere (4).

3.2. Development of index of openness

This step requires: (i) scoring the degree of restrictiveness for each type of restriction, according to the magnitude of its impact on trade, on a 0 (least restrictive) to 1 (most restrictive) scale; and (ii) weighting of each restriction to reflect its overall ‘economic significance’ in restricting trade in that sector (44,55). The final index is thus a weighted average of the scope and importance of the elements considered (52). This exercise requires subjective judgments to be made of the trade context of the country concerned⁴. In the example here, the weights result from following the framework provided by Chanda & Smith (57)⁵, and are provided in table 2 (note: because we are measuring restrictiveness, openness is the inverse of the scores presented in this table)⁶.

In table 2 each mode is list separately and, for illustrative purposes, three restrictions within each mode are listed. Within these several ‘levels’ of restriction are provided which drive the scoring system. The second column, ‘score’, provides the impact factor of each restriction on the 0 (no restriction) to 1 (total restriction) scale⁷.

⁴ An alternative is to apply factor analysis to the assembled data to identify those barriers that vary most independently and apply the largest weights to these (44,58). However, this purely statistical technique is not necessarily an improvement on judgment (52).

⁵ This framework assists countries in identifying and collating information relevant to the assessment of the state/ impact of trade in health services. The comprehensive nature of this framework means that much of the data that may be required to inform a TRI approach could be collected as a part of this.

⁶ Note that separate indexes have been constructed for each mode of supply. This is not necessary, but may be desirable as the provision of services through different modes is likely to have different costs. Thus, differences in restrictions applying to each mode can influence the pattern, as well as the volume, of trade.

⁷ It is important when determining these scores to consider the *actual* restrictive impact rather than just stated legal requirements.

Table 2: Index system for measuring openness

MODE & RESTRICTION	SCORE	WEIGHT
Mode 1		0.10
<i>Require establishment of local operations</i>		0.02
Local presence/partnership required	1.00	
No restrictions	0.00	
<i>Recognition of qualifications</i>		0.02
Non-recognition of foreign qualifications	1.00	
Recognitions, but required to pass 'equivalence exam'	0.40	
Full recognition	0.00	
<i>Control/level of technology</i>		0.06
Telecommunications technology low level	0.80	
Government control of technology	0.40	
Private provision of high level technology	0.00	
Mode 2		0.30
<i>Portability of health insurance</i>		0.14
Public and private insurance accepted	0.00	
Reciprocal with public insurance schemes only	0.60	
Private insurance only	0.60	
No arrangements	1.00	
<i>Visa requirements</i>		0.08
Limit of length of visa	0.30	
Subject to recognition of qualifications	0.20	
No restriction	0.00	
<i>Waiting lists/times</i>		0.08
Extra time faced by foreign patients	0.80	
Domestic times apply	0.35	
Fast-track for foreign patients	0.00	
Mode 3		0.40
<i>Minimum/maximum level of investment</i>		0.15
No foreign equity permitted	1.00	
<50% equity permitted	0.50	
50% to 75% equity permitted	0.25	
No restriction	0.00	
<i>Joint venture/partnership requirements</i>		0.13
Entry allowed only through joint venture	0.60	
No restrictions	0.00	
<i>Requirements for proportions of local employment</i>		0.12
Staff must be >90% local	0.95	
Staff must be >50% local	0.65	
Staff must be >25% local	0.40	
No restriction	0.00	
Mode 4		0.20
<i>Visa requirements</i>		0.04
Limit of length of visa	0.30	
Subject to recognition of qualifications	0.20	
No restriction	0.00	
<i>Limits on overall numbers admitted to the country</i>		0.10
No admission permitted	1.00	
Restricted to 10% workforce	0.75	
Unrestricted	0.00	
<i>Recognition of qualifications</i>		0.06
Non-recognition of foreign qualifications	0.75	
Recognitions, but required to pass 'equivalence exam'	0.30	
Full recognition	0.00	

The third column provides the relative weights to reflect the overall importance of each restriction category in restricting trade⁸. For instance, it is generally considered that restrictions on foreign direct investment (mode 3) are more restrictive, and a greater cost to efficiency, than restrictions on the movement of health professionals (mode 4) and so receives a higher weighting. These weights sum to 1 across the different categories.

The interpretation is that a health sector with a score of 0 in this example would be judged to be completely open to international trade, and a sector with a score of 0.7718⁹ would be completely closed. Thus, the lower the score the more open to trade the sector. This allows comparison between countries, as well as tracking changes in openness over time (for example, 55). Applying this to the example of UK secondary care sector yields the profile in table 3.

Table 3: Illustrative profile of openness for the UK

MODE & RESTRICTION	INDEX
Mode 1	0.008
Require establishment of local operations – no restrictions	0.000
Recognition of qualifications – require ‘equivalence exam’	0.008
Control/level of technology – high level technology	0.000
Mode 2	0.128
Portability of health insurance – reciprocal public	0.084
Visa requirements – subject to recognition of qualifications	0.016
Waiting lists/times – domestic times apply	0.028
Mode 3	0.000
Minimum/maximum level of investment – no restriction	0.000
Joint venture/partnership requirements – no restrictions	0.000
Required proportion of local employment – no restriction	0.000
Mode 4	0.026
Visa requirements – subject to recognition of qualifications	0.008
Limit on numbers admitted to the country – unrestricted	0.000
Recognition of qualifications – require ‘equivalence exam’	0.018
TOTAL INDEX	0.162

⁸ It is worth bearing in mind that a system of no weighting is the same as giving equal weights to each restriction. In the example here, this would imply a weight of 0.083 for each of the 12 restrictions.

⁹ From table 2: $(0.02*1) + (0.02*1) + (0.06*0.8) + (0.14*1) + (0.08*0.3) + (0.08*0.8) + (0.15*1) + (0.13*0.6) + (0.12*0.95) + (0.04*0.3) + (0.10*1) + (0.06*0.75) = 0.02 + 0.02 + 0.048 + 0.14 + 0.024 + 0.064 + 0.15 + 0.078 + 0.114 + 0.012 + 0.10 + 0.045 = 0.7718$.

The score of 0.162 suggests that the UK secondary care sector is significantly open to international trade. Decomposing this, there appears to be no restriction to trade under mode 3, whereas the highest level of trade restriction (lowest level of openness) is in mode 2.

3.3. Use index in econometric analyses

This index may then be incorporated within econometric models as an explanatory variable with cross-sectional (panel) data and/or longitudinal (time series) analyses (56,59,60). The dependent variable usually estimated in models applied in other services sectors is a price or quality differential (52). However, within the health sector it is likely that a range of different dependent variables may be of concern. For instance, how increased openness to trade influences access to services, or health outcomes, such as mortality, or DALYs (Disability Adjusted Life Years – a measure combining mortality and morbidity). For example, an index constructed for a number of countries would enable one to construct a model taking the form

$$\text{MORT} = f\{\text{constant, GDP, POP, UNEMP, NOPHY, PATAA, \$TINPAT, OPEN}\}$$

where: MORT = mortality rate; GDP = Gross Domestic Product (national income); POP = population dependency ratio (proxying the ‘ageing effect’); UNEMP = unemployment rate (proxying poverty); NOPHY = number of practising physicians per capita (proxying level of health services); PATAA = proportion of public ambulatory healthcare expenditure of total ambulatory healthcare expenditure (proxying level of health services); \$TINPAT = total expenditure per capita on inpatient healthcare (proxying level of health services); and OPEN = openness index (as calculated above).

Using this base model, it would then be possible to conduct panel data analysis of pooled cross-section time-series data using either, or all, of ordinary least-squares (OLS), fixed effects or random effects models (typically used in such analyses, with variation between methods the result of how assumptions concerning the error term) (61,62). Such a model would, controlling for the effects of, for example, aging and the level of health services, infer the effect on mortality from the level of openness of the health sector to trade. The coefficient on the variable OPEN would indicate whether the effect was a positive one or not (whether increased restrictiveness (index closer to 1) would increase mortality) and, if so, the relative magnitude of openness as a contributory factor in this increase compared with the other factors (63). Obviously, analyses can be expanded to encompass different dependent variables (such as sector size, access to services or sector-specific inflation) and incorporate different independent factors, such as the AIDS adult prevalence rate, as deemed appropriate. One may also undertake longitudinal analyses to assess the relative change in dependent variables brought about by changes in openness, or integrate the index in to a boarder macro-economic model of the economy as a whole (50,63-65).

4. Discussion

Of course, considerable development is required to develop the robustness of this approach (66). Key amongst these is how the weights are derived, as the validity and reliability of the index depends on the quality and depth of information available (a higher score may simply reflect a greater availability of data rather than a more restrictive regime), and some restrictions may not be captured, or may be scored differently from the way they are applied in practice. The other 'top three' developmental considerations include: (i) determining the *objective* of increased openness – the hypotheses that one is likely to test will play a (significant) part in determining

how best to construct the TRI, such as what types of restrictions are covered. In the health sector it is possible that there may be a trade off between increasing economic development and 'health'. This then, of course, requires determining how 'health' is measured. Health is a stock, with the flow of health services and goods used to maintain it. In this case, a real income constant uniform tariff equivalent may not be the most appropriate choice, and one may thus have to develop a model more similar to the MTRI that holds constant the stock of health; (ii) considering *contingent relationships* (context). For instance, whether openness operates differentially in low, middle and high income countries. Liberalisation does not occur in a vacuum, but often involves many other forms of domestic as well as international policies, regulations and incentives, and these will all interact with efforts made to open a country's health sector to trade; and (iii) differentiating between *general* and *sector-specific* elements. There will likely be some aspects in the measurement of openness that will relate more generally to the economy as a whole, as the degree to which health will itself be open to trade will, of course, be a function of how open to trade the country more generally is. Differentiating these is likely to be useful for two reasons. First, existing techniques or measures of openness may perhaps be used to assess convergent validity of the measure for openness of the health sector. Second, there is likely to be an existing level of data and/or evidence relating to general parameters which will ease the analytical burden.

Further work to develop this approach, and tackle the issues above, is currently underway, but the views of HESG, especially on the health angle to measuring openness, would be very welcome.

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