

## FOREWORD

The World Trade Report 2005 follows the pattern established in previous years and takes up a number of key trade policy issues facing the international trading system for analysis and discussion. The underlying objective of the Report is to contribute to a deeper understanding of trade policy issues facing governments. The core topic in this year's report is standards and international trade. Shorter essays have been prepared on three other topics – the use of quantitative economic analysis in WTO dispute settlement, international trade in air transport services, and offshoring services.

First, however, the Report examines recent trends in international trade. The year 2004 saw impressive growth in trade, against a background of strong output growth. At 9 per cent in real terms export growth was twice as fast in 2004 as in 2003, and the third highest over the last decade. All regions shared in this expansion to a degree, but 2004 was a particularly good year for some commodity-exporting developing countries, including Africa. Other regions that enjoyed strong trade performance were South and Central America, Asia and the Commonwealth of Independent States.

Prospects for trade growth in 2005 are not as promising as in 2004, but at a predicted real rate of 6.5 per cent, trade would still expand faster than the average rate since 1994. Downside risks in the world economy include the dampening effect on economic activity of high oil prices, as well as persistent sluggishness in some economies, and interest rate and exchange rate volatility arising from imbalances in others. I urge governments to address these challenges in a timely and decisive fashion.

Last year was a good year for the WTO. After the disappointing Fifth Ministerial Conference in Cancún in September 2003, Members worked hard in the first half of 2004 to put the Doha negotiations back on track. This they succeeded in doing with the "July package", which embodied a set of clear mandates for bringing the negotiations to successful completion. But much work remains to be done. The present Report is being launched on the eve of a significant milestone in the negotiating process. By the time of the August break in Geneva, we need to see the shape of a set of clear results emerging from the Sixth Ministerial Conference in Hong Kong, China that will set the scene for completing the Doha negotiations in 2006. This is a shared responsibility of the entire WTO membership, requiring constructive engagement and a willingness to act in the collective interest despite sometimes difficult trade-offs.

An interesting debate has taken place over the years about the relationship, at different points in time, between the health of the world economy and progress in building a stronger international trading system. Some have argued, perhaps with certain justification, that governments need to be faced with bad economic news and the threat of worse to come before they can muster the political momentum for difficult decisions on trade – decisions whose benefits may not always be immediate. If bad times are needed for good decisions and good times induce complacency, we surely miss valuable opportunities to make real progress in strengthening the world economy and addressing the core challenges of our time – development and poverty alleviation. Let us not permit today's good economic news to blind us to the pressing need for action to bolster and advance international cooperation in matters of trade policy. Let us mark ten years of the existence of the WTO with decisive action that will set the scene for real progress in the year ahead.

Turning to the specific topics covered in WTR 2005, a stable and mutually supportive relationship between standards regimes and international trade rules is central to the effective functioning of the trading system. The Report thoroughly explores this relationship and seeks to extend our understanding of the issues involved. At its core, the policy challenge is to shape and maintain arrangements that allow governments to pursue multiple objectives in a consistent and effective manner. Standards are essential for addressing market failures such as imperfect information and negative externalities such as environmental degradation. They are also important in facilitating well-functioning markets where technical compatibility (network externalities) is important. But the design and operation of standards must also be such as to avoid the misappropriation or capture of public policy in these areas to construct unwarranted obstacles to competition and trade.

The underlying issues can be complex. Among the questions to be considered are whether standards should be harmonized, whether they should be voluntary or mandatory, how far standard-setting should be a public or a private activity, whether production processes as well as product standards should be the subject of international obligations, and who should be responsible for ensuring that producers and suppliers conform with established standards. Many of these questions do not have straightforward answers. Trade-offs must be made and desirable outcomes are often sensitive to the specificity of circumstances. Not all governments share the same public policy preferences or priorities.

A particular challenge for the WTO is to ensure that everything possible is done to enable developing countries to participate effectively in the trading system. This is as important in the field of standards as anywhere else. Among the challenges here are those which ensure that developing countries possess the requisite infrastructure to meet standards and to shape their own standards regimes, that they are not disadvantaged in the area of conformity assessment and that they can participate effectively in international standard-setting activities. A good deal is being done in these areas, but many developing countries still face formidable challenges.

The first of the three shorter essays, on the use of quantitative economic analysis in WTO dispute settlement, deals with a fascinating issue of increasing importance in the trading system. Broadly, we have seen growing interest in using quantitative analysis to address questions about the trade effects of policy measures and the effects of imports on the markets of domestic products and producers. Resort to arbitration has continued to grow and arbitrators have found it useful to supplement their reasoning and final decisions with quantitative analysis. And parties to a number of disputes have done the same in recent years. This essay explores these various episodes, after taking the reader through a careful explanation of the technical aspects of quantification.

The paper is at pains to point out two important aspects of the use of quantitative analysis in disputes. One is that the techniques used can only produce estimates and not unique, authoritative numbers. The second is that quantification cannot settle disputes, but only assist in their resolution. This is because numbers do not decide points of law – that is the role of legal reasoning. So quantitative analysis is not a panacea, but rather an aid that can become increasingly useful in disputes where complex factual information is of the essence.

The second essay deals with a vital and complex industry – air transport services. Like other network service industries, air transport is both a traded product and a vital producer service for trade in other products. Whether traders enjoy efficient, reliable and well priced air transport services is an important determinant of competitiveness in a whole range of economic activities.

Given the importance of this industry to the economy as a whole, it is gratifying to see the progress made in recent years in improving the quality and reducing the price of air transport services. This has been achieved through a combination of technical advances and deregulation and liberalization, giving rise to more intense competition among suppliers. The air transport industry nevertheless remains a complex one where profitability is a constant challenge and where adequate access will continue to be an issue for smaller and more remote developing countries. Attempts to apply a multilateral approach to rule-making and liberalization have not been successful, and the question remains whether more could be offered at the multilateral level to supplement what has been achieved bilaterally and regionally in recent years.

The third and final essay in this Report deals with offshoring services, an issue that has been the subject of considerable public debate recently. The essay explores the concept of offshoring as a sub-category of outsourcing, considers the economic rationale for this kind of trade, and attempts to estimate its magnitude. This paper provides us with a timely reminder that there is nothing special about offshoring in terms of a trading activity. It is simply one more example of how countries can benefit from specialization. The benefits are shared by both exporting and importing countries, as the paper explains in some detail.

An important finding is that the extent of the effect of offshoring on aggregate employment, output and trade is far more modest than the public debate and recent press coverage of the issue would have us believe. This means that public perceptions of adjustment challenges associated with offshoring have been exaggerated, but it also means we cannot claim as much in terms of gains from trade. The General Agreement on Trade in Services (GATS) offers potential for mutually beneficial liberalization commitments, although certain clarifications and improvements in the Agreement could make the GATS more attractive still as an instrument of liberalization. But we must not fall for the fallacy that we should make a special case of offshoring. Progress in opening this market is no more or less valuable than that which can be achieved in any other market. A broad-based and ambitious approach to the realization of new trading opportunities is the challenge and the promise of the Doha negotiations.



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## DISCLAIMER

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## ABBREVIATIONS AND SYMBOLS

3G	Third Generation
AACC	American Association of Cereal Chemists
AB	Appellate Body
ACIL	American Council of Independent Laboratories
ACP	African, Caribbean and Pacific Group of States
AECMA-STAN	European Association of Aerospace Industries
AEQ	European Association of Manufacturers of Quality Metal Expansion Joints, Metal Bellow and Metal Hoses
AFNOR	Association Française de Normalisation
ALOP	Appropriate Level of Protection
AMPS	Advanced Mobile Phone Service
APEC	Asia Pacific Economic Co-operation
APLAC	Asia Pacific Laboratory Accreditation Co-operation
ARSO	African Regional Organization for Standardization
ASEAN	Association of South East Asian Nations
ATP	Airline Tariff Publishing Company
BIPM	Bureau International des Poids et Mesures
BIS	Bureau of Indian Standards
BOP	Balance of payment
BP	Business process
BPO	Business process outsourcing
BPOM	Agency for Drug and Food Control
BSE	Bovine Spongiform Encephalopathy
BSI	British Standard Institute
CAC	Codex Alimentarius Commission
CAFTA	Central American Free Trade Agreement
CAP	Common Agricultural Policy
CASCO	Committee on Conformity Assessment
CB	Certification Bodies
CD	Compact disc
CDI	Centre for the Development of Industry
CDMA	Code-division multiple access
CE	Conformité Européenne
CEN	European Committee for Standardization
CENELEC	European Committee for Electrotechnical Standardization
CES	Constant elasticity of substitution
CFIA	Canadian Food Inspection Agency
CIS	Computer and information services
CIS	Commonwealth of Independent States
CO <sub>2</sub>	Carbon dioxide
COMTRADE	Commodity Trade Statistics Database of the United Nations
COPOLCO	Committee on Consumer Policy
CPC	Central product classification of the United Nations
CPE	Cross price elasticity
CRS	Computer reservation system
DIN	Deutsches Institut für Normung
DOJ	Department of Justice
DOT	Department of Transportation
DSB	Dispute Settlement Body
DSU	Dispute Settlement Understanding

EA	European co-operation for Accreditation
EAC	European co-operation for Accreditation of Certification
EAL	European co-operation for Accreditation of Laboratories
EAR	European Authorized Representative
EBO	Edible beef offal
EC	European Communities
ECLAC	Economic Commission for Latin America and the Caribbean
EEA	European Economic Area
EFTA	European Fair Trade Association
EITO	European Information Technology Observatory
EMA	Mexican Accreditation Entity
EMC	Electromagnetic compatibility
ENGO	Environmental NGO
ETSI	European Telecommunication Standards Institute
FAO	Food and Agriculture Organization of the United Nations
FAPRI	Food and Agricultural Policy Research Institute
FCC	Federal Communication Commission
FDA	US Food and Drug Administration
FDI	Foreign direct investment
FINE	FLO, IFAT, NEWS and EFTA
FLO	Fairtrade Labelling Organizations
FMD	Foot and Mouth Disease
FSC	Forest Stewardship Council (chapter 2)
FSC/ETI	FSC Repeal and Extraterritorial Income Exclusion Act (chapter 3a)
FSCs	Foreign Sales Corporations (chapter 3a)
FY	Fiscal year
GATS	General Agreement on Trade in Services
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
GE	General equilibrium
GMP	Good Manufacturing Practices
GSM	Global System Mobile
HACCP	Hazard Analysis and Critical Control Points
H-1B	H-1B temporary worker: an alien admitted to the United States to perform services in "speciality occupations"
HKAS	Hong Kong Accreditation Service
HQB	High quality beef
HSDC	High speed data communication
IAAC	Inter-American Accreditation Cooperation
IAF	International Accreditation Forum
IANZ	Internal Accreditation New Zealand
IATA	International Air Transport Association
IBM	International Business Machines
ICAO	International Civil Aviation Organization
ICPM	Interim Commission on Phytosanitary Measures
ICRIER	Indian Council on International Economic Relations
ICS	International Classification for Standards
ICT	Information communications technology
IDA	Industrial Development Agency of Ireland
IDB	Integrated Database
IEA	International Energy Agency
IEC	International Electrotechnical Commission
IECEE	IEC System for Conformity Testing and Certification of Electrical Equipment
IECEE-CB Scheme	Scheme of the IECEE for Mutual Recognition of Test Certificates for Electrical Equipment

IF	Integrated Framework
IFOAM	International Federation of Organic Agriculture Movements
ILAC	International Laboratory Accreditation Co-operation
ILO	International Labour Organization
IMF	International Monetary Fund
INMETRO	International Relations National Institute of Metrology, Brazil
IPPC	International Plant Protection Convention
IRA	Import risk assessment
ISEAL	International Social and Environmental Accreditation and Labelling
ISIC	International Standard Industrial Classification
ISO	International Standardization Organization
ISPM	International Standards for Phytosanitary Measures
ISRAC	The Israel Laboratory Accreditation Authority
IT	Information technology
ITC	International Trade Centre
ITES	IT-enabled services
ITS	International Trade Statistics
ITU	International Telecommunications Union
JAS-ANZ	Joint Accreditation System of Australia and New Zealand
JITAP	Joint Integrated Technical Assistance Program
LCA	Large civil aircraft
LCC	Low cost carriers
LDCs	Least-Developed Countries
LPG	Liquid Petroleum Gas
MERCOSUR	Southern Common Market
MFN	Most-Favoured-Nation
MLA	Multilateral Mutual Recognition Agreement/Arrangement
MNC	Multi-national corporations
MRA	Mutual Recognition Agreement/Arrangement
NADCAP	National Aerospace and Defense Contractors Accreditation Programme
NAFTA	North American Free Trade Agreement
NAICS	North American Industry Classification System
NASSCOM	National Association of Software and Services Companies
NATA	National Association of Testing Authorities
NBC	National Certification Bodies
NEISS	National Electronic Injury Surveillance System
NGO	Non-Governmental Organization
NHTSA	National Highway Traffic Safety Administration
NICs	Newly industrialized Asian countries
NIST	National Institute of Standards and Technology
NMI	National Measurement Institute
NMT	Nordic Mobile Telephone
NTB	Non-tariff barrier
NTE	National trade estimate
NTSC	National Television Standards Committee
NVCASE	National Voluntary Conformity Assessment Systems Evaluation
NVLAP	National Voluntary Laboratory Accreditation Programme
OAS	Organization of American States
OECD	Organization for Economic Co-operation and Development
OIE	Office International des Epizooties
OIML	International Organization of Legal Metrology
OPS	Other professional services
OSHA	Occupational Safety and Health Administration
PAC	Pacific Accreditation Co-operation

PAL	Phase alternate lines
PC	Personal computer
PCE	Phytosanitary capacity evaluation
PE	Partial equilibrium
PKP	Passenger kilometers performed
PPMs	Processes and production methods
PVC	Polyvinyl choride
R&D	Research and Development
RBI	Reserve Bank of India
RTA	Regional Trading Arrangement
S&D	Special and Differential Treatment
SAC	Singapore Accreditation Council
SADC	Southern African Development Community
SADCA	Southern African Development Cooperation for Accreditation
SANAS	South African National Accreditation System
SARS	Severe Acute Respiratory Syndrome
SCC	Standards Council of Canada
SCM	Subsidies and Countervailing Measures
SDoC	Supplier's Declaration of Conformity
SECAM	Sequential Couleur Avec Memoire
SGS	Société Générale de Surveillance
SIC	Standard Industrial Classification
SIM	Inter-American Metrology System
SITC	Standard International Trade Classification
SLSI	Sri Lanka Standards Institution
SO <sub>2</sub>	Sulphur dioxide
SPS	Sanitary and Phytosanitary Measures
STDF	Standards and Trade Development Facility
STPI	Software Technology Park of India
TACS	Total Access Communication System
TBT	Technical Barriers to Trade
TC	Technical Committee
TCBDB	Trade-Related Technical Assistance Capacity Building Database
TED	Turtle Excluder Devices
TISI	Industrial Standards Institute
TKP	Tonne kilometres performed
TRAINS	Trade Analysis and Information Systems
TRIPS	Trade-Related Intellectual Property Rights
TTE	Telecommunication terminal attachment equipment
UL	Underwriters Laboratories
UMTS	Universal Mobile Telecommunication System
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNIDO	United Nations Industrial Development Organization
US	United States
USITC	US International Trade Commission
USTR	US Trade Representative
VAR	Vector autoregression
WHO	World Health Organization
WIPO	World Intellectual Property Organization

The following symbols are used in this publication:

...	not available
0	figure is zero or became zero due to rounding
-	not applicable
\$	United States dollars
€	euro
Q1,Q2,Q3,Q4	first quarter, second quarter, third quarter, fourth quarter
–	break in comparability of data series. Data after the symbol do not form a consistent series with those from earlier years.

## EXECUTIVE SUMMARY

The World Trade Report 2005 begins with a brief review of salient trends in international trade, focusing firstly on recent developments and then examining medium-term developments in the oil sector and the pharmaceutical sector. Section II of WTR 2005 contains the core topic of this year's Report, which is standards and trade in the context of the WTO. The Section looks first at the economics of standards and trade, and then at a range of institutional and policy issues. This is followed by a discussion of standards in the multilateral trading system. Section III of the Report takes up three discrete and topical issues of relevance to international trade. The three thematic essays in this Section are on the use of quantitative economics in WTO dispute settlement, trade in air transport services and offshoring services. The essay on the use of quantitative economic analysis in WTO dispute settlement procedures explains the kinds of quantitative techniques and econometric models that have been applied in various WTO legal disputes and discusses the use that was made of such analysis in a selected range of cases. The essay on trade in air transport services takes a close look at key characteristics of the industry and examines how it has evolved over time. The analysis also considers the economics of this sector, and a number of issues relating to competition, regulation, governance and trade in air transport services. Finally, the essay on offshoring services considers the economic characteristics of the activity, its scope and implications, and how it is relevant to the General Agreement on Trade in Services.

### I. RECENT AND SELECTED MEDIUM-TERM TRADE DEVELOPMENTS

*Global output and trade grew more strongly in 2004 than in the previous three years.*

Global GDP growth amounted to 4 per cent in 2004, providing a solid basis for strong trade growth. For some regions, notably Central and South America and the Commonwealth of Independent States (CIS), this represented the best growth for more than a decade. In all seven regions defined in this Report, output and export growth were higher than the average annual rates for the 1990s.

Real merchandise trade grew by 9 per cent, the best performance since 2000 and the third highest rate over the last decade. In line with the prevailing post-war pattern, trade growth outstripped GDP growth by a significant margin – on this occasion by 5 percentage points. As this pattern continues, trade becomes an ever more crucial component of global economic activity. The most dynamic traders in 2004 were in Asia, South and Central America, and the CIS. Average trade growth in all of these regions was in double digits. Africa's trade grew strongly on average in 2004, buoyed in part by firmer commodity prices, particularly for oil and metals. Oil prices also had a strong influence on trade growth in the Middle East. North America's exports gained further momentum in 2004 compared to previous years, but growth was below the global average. Similarly, improved merchandise trade growth in Europe in 2004 was also very important for world trade growth, but Europe's trade and output growth remained well below the global average.

Price movements and exchange rates exerted a significant influence on trade flows measured in current dollar terms. Prices of primary commodities increased faster than prices for manufactured goods. The most notable exchange rate development in 2004 was the weakening of the dollar, resulting in a marked appreciation of European currencies against the dollar. World merchandise exports increased by 21 per cent in 2004, amounting to \$8.88 trillion. This compares with growth in commercial services trade of 16 per cent in 2004, reaching \$2.1 trillion. In current price terms, both merchandise and services trade grew more strongly for the third successive year, amounting to the strongest rise since 2000. Fuels in the case of merchandise, and transport in the case of services, were the sectors that showed the strongest nominal growth performance in 2004.

Looking at the regional picture in relation to merchandise export growth measured in current prices, the highest rates were recorded by the CIS, Africa and the Middle East, where fuel prices were a key factor. Central and South America also recorded strong export gains owing to a combination of economic recovery and higher commodity prices. At 25 per cent, Asia's nominal export growth rate was also above the global average in 2004. North America and Europe reported below average nominal export and import growth in 2004.

*Some but not all developing countries have benefited from higher oil prices in the last two years.*

Developing countries as a group are large net exporters of fuels, while the developed countries aggregate are net importers. As a result of higher oil prices, developing countries taken together have enjoyed higher export earnings, improved external balances and terms of trade gains. However, higher oil prices also mean production cost increases in many industries, such as petrochemicals, plastics, aluminium and transport services. The oil intensity of output tends to be higher in developing than developed countries, and has been increasing in recent decades while that of developed countries has been falling.

Increasingly, the destination of developing country fuel exports is other developing countries. In 2002-2003, 40 per cent of developing country oil exports went to other developing countries, up from less than 30 per cent in the 1990s. Higher energy prices affect individual developing countries and regions in quite different ways. Among the four developing country regions identified in this report, only the Middle East and Africa are large net exporters of fuel. Developing Asia, in particular, has become a large net-fuel importer.

*Trade in pharmaceutical products has grown with great rapidity in recent years.*

Since 2000, growth in world exports of pharmaceutical products has been four times stronger on average than the equivalent figures for other chemical products and manufactures as a whole. The share of pharmaceuticals in world trade has risen to some \$200 billion, or 3 per cent of total trade. This share exceeds those of textiles and iron and steel.

Trade in pharmaceuticals takes place largely among developed countries, who account for 90 per cent of world exports and more than 80 per cent of world imports. The developed countries dominate research and development (R&D) activity, enjoy a high level of intra-industry and intra-firm trade, and high levels of health expenditures compared to developing countries. A number of factors explain the expansion of the pharmaceutical industry. One is strong demand growth in rich countries, stimulated by an aging population and increased use of "lifestyle" drugs. Another is corporate consolidation (mergers and acquisitions) resulting in more specialization and more intra-industry and intra-firm trade. Trade liberalization may also have played a part, as many industrialized countries eliminated tariffs on pharmaceutical products in the Uruguay Round from an average of 6.2 per cent.

## II. TRADE, STANDARDS AND THE WTO

*We live in a world profoundly reliant on product standards. They affect our lives in ways we sometimes do not even notice, but they can have far-reaching implications for economic activity, including trade.*

Examples abound of how standards affect our world. Safety norms allow us to consume with a confidence that would be impossible if we had to make our own judgements about safety at every turn. Rules of conduct and product standards in numerous areas of activity help us avoid inefficiency, harmful surprises, and high costs. In the case of product standards, for example, faxes can be sent around the world because fax machines obey a common protocol. Computer files can be shared because computers employ various standardized hardware and software formats. The need for product standards is not a new phenomenon. In biblical times, the lack of a common (standardized) language wreaked havoc at the Tower of Babel. In more recent times, during the great Baltimore fire of 1904, fire fighters called in from neighbouring cities were unable to fight the blaze effectively because their hoses would not fit the hydrants in Baltimore.

The specific functions that standards fulfil are very diverse. Two of the most important are providing compatibility and information. It is through sharing a common standard that anonymous partners in a market can communicate, can have common expectations on the performance of each other's product, and can trust the compatibility of their joint production. Thus, standards are necessary for the smooth functioning of anonymous exchanges – and therefore, for the efficient functioning of the market. Although standardization is necessary, it does not follow that all variety is undesirable. The question therefore arises, what type of standards and how many of them are desirable in an increasingly globalized world.

By the end of 2004, the International Organization for Standardization (ISO) had published some 14,900 international standards. Perinorm, a consortium of European standards organizations, maintains a database of around 650,000 standards (national, regional and international) from about 21 countries. The bulk of these standards have been set by the private sector and many of them are international in scope. Non-governmental organizations (NGOs) have also been involved in standard-setting, working with industry and international organizations to develop standards in such areas as environment and corporate social responsibility. Among the factors accounting for heightened standardization activity are demand by consumers for safer and higher quality products, technological innovations, the expansion of global commerce and increased concern over social issues and the environment.

International standards help ensure technical compatibility across countries and convey information to consumers about products that have been produced abroad or processes that took place in another country. International standards thus reduce transaction costs and facilitate international trade. Yet harmonization to international standards is not always desirable, as it reduces product variety. Besides, it may not always be easy to agree on a global standard as local standards are often the outcome of specific technical requirements of domestic producers as well as a reflection of the social values in a society. Local standards may also have the effect of protecting local producers against foreign competition and producers may be interested in maintaining this protection.

The World Trade Organization deals with the rules of international trade and inevitably has to deal with the role of standards in international trade. Indeed, several WTO Agreements make reference to national and/or international standards. The Dispute Settlement System has had to decide on a number of cases involving standards, some of which received a lot of public attention, like *EC-Asbestos*, *EC-Hormones* and *US-Shrimps*. This Report discusses the WTO's role with respect to standards, the content of key provisions of WTO agreements relating to standards, and the resulting WTO jurisprudence. It also examines the link between the WTO and national and international standard setting bodies.

### *The economics of standards and trade*

***Standards may be public or private, mandatory or voluntary, and they may focus on products or processes.***

Standards can be classified into private and public standards, although the line separating these two is not always well demarcated. Many standards adopted by governments have their origin in industry. The distinction between public and private standards matters when considering in whose interests standards might be set. In the case of public standards, it is assumed that the interests of all actors in society are taken into account, while in the case of privately-set standards, the standard is chosen to maximize firms' profits. While firms' choice of standards are likely to be optimal for society in many instances (e.g., when technical compatibility among related products is assured by a standard), there may be a divergence between private and social interests in standards when externalities and less than full information about products is available to all interested parties.

Private standards are by definition voluntary, but public standards can be either voluntary or mandatory. In the case of mandatory standards, only standardized products are allowed to circulate in the market. Where standards are voluntary, non-conforming products can also be supplied. In WTO terminology mandatory standards are referred to as technical regulations under the Agreement on Technical Barriers to Trade and may be sanitary or phytosanitary measures under the Agreement on the Application of Sanitary and Phytosanitary Measures.

It is important to distinguish between product and process standards. Process standards pin down the characteristics of a production process. Processes are typically not traded. But the goods produced through the process may be traded and process standards are therefore relevant to the multilateral trading system. This "indirect" relevance of process standards explains to a large extent why multilateral trade law, which traditionally deals with goods and not their process of production, finds it difficult to deal with process standards.

Process standards are introduced for different reasons – because they affect the goods that are produced (e.g. hygiene standards), because they affect the efficiency of the production process (e.g., in the case of network externalities) or because they affect the environment (e.g., pollution standards). In the first case, process standards are reflected in the final good and thus have a direct impact on trade. WTO terminology would refer to such standards as “incorporated process and production methods (PPMs)”. In the other two cases, the process standards are not reflected or incorporated in the final product. Yet at the same time, consumers or governments in an importing country may care about the way in which an imported good is produced – for instance, because they care about the environmental impact of the production process.

***Standards fulfil diverse functions. They can improve welfare in markets where compatibility standards capture network externalities.***

Compatibility standards play an important role in increasing economic efficiency in the case of network externalities. There are circumstances where the value of a product for a consumer does not depend only on the quantity or the quality of the product itself, but also on the availability and variety of complementary goods and/or the number of people using the same product. A mobile phone, for example, is more valuable for a consumer the higher the total number of people using the same or a compatible mobile phone network. A computer is more valuable the more compatible software is available in the market. It may happen, however, that lack of information about the size of the network, different preferences and firms’ marketing actions may generate a non-optimal outcome: markets may oversupply varieties and the size of the network may be too small, or it may happen that users delay the adoption of a new technology or rush to an inferior technology for fear of becoming stranded. In all these cases, by setting a standard, the industry is able to solve the problem of coordination among consumers.

There is little scope for government intervention in network industries, as compatibility standards are likely to result from the interaction of market forces. Network industries have a tendency to tipping – that is, when a certain technology has reached a critical mass it tends to dominate the whole market. Therefore, firms owning different technologies will either cooperate and agree on a standard or engage in fierce competition in the attempt to reach the critical mass.

Compatibility standards can create problems through their anti-competitive effects. This will happen if a dominant firm imposes its own standard (e.g. the de facto proprietary standard of Microsoft) and pursues anticompetitive behaviour. The role of the government would then be to ensure competitive behaviour through the pursuit of competition policy.

The argument that compatibility standards solve a coordination problem in network industries, thus increasing market efficiency and consumers’ welfare, also holds in global markets. Several network industries are global in scope, such as telecommunications and transport systems. A natural tendency exists in global network industries to ensure that compatibility is extended across countries. In the case of industries where the final product is assembled from parts and modules, shared standards will thicken the market for suppliers of components. It will allow firms to diversify the sources of their inputs, creating a more competitive market and lower prices for intermediate products or components.

In practice, international compatibility may be more difficult to achieve than compatibility at the national level, as there are more consumers to coordinate and they are spread across different jurisdictions. International compatibility can also be impeded by strategic trade and market power considerations. To the extent that compatibility standards capture global network externalities, allow producers to coordinate their activity more efficiently and embody information about consumer preferences in foreign markets, compatibility standards are likely to enhance international trade and welfare.

***Standards can also increase welfare by removing information asymmetries in markets...***

Information asymmetries occur when producers have information about the characteristics of goods they produce which users do not possess. Whether as end consumers or as producing firms acquiring inputs, buyers may be at a significant disadvantage compared to sellers because the latter possess information

about the good or service not available to the buyer. This asymmetry can significantly hamper the efficient functioning of markets, and standards can help solve the problem and increase efficiency.

Product safety is an important area where standards are used to address information asymmetry problems. A wide range of consumer goods – food, drugs, vehicles, electrical appliances, safety equipment – face many types of requirements, from design (e.g., toys), to ingredients (e.g., chemicals), to the process of manufacture or production (e.g., pasteurisation of milk), and to performance (e.g., helmets). The economic cost from accidental injuries and deaths can be large. In the United States for example, there were more than 12 million accidents in 2003 from the use of consumer products that required patients to be treated in hospitals. The US Consumer Product Safety Commission estimates the economic costs of these accidental deaths and injuries at \$700 billion annually. The potential gains from safety standards are therefore significant.

*...but while national welfare in the standard-imposing country will increase if a standard is well designed, global welfare may not necessarily be improved as a consequence of the trade effects of the standard.*

If mandatory safety standards differ across countries, they may increase trade, decrease it, or leave it unaltered. The outcome will depend to a large extent on the effect of a standard on the relative costs of domestic and foreign producers. But it also depends on many other factors, like the level of competition in exporting and importing countries and the willingness of consumers in different countries to pay higher prices for safer products.

Welfare effects are even more difficult to predict than trade flows. When trade flows decrease as a result of a standard in the importing country, the reduction in imports represents a welfare loss for the country setting the standard. On the other hand, the standard increases product safety, i.e. it corrects an existing market failure. This has a positive effect on domestic welfare. The optimal standard from the point of view of the country setting the standard is the one that leads to the best trade-off between a negative trade effect and a positive welfare effect due to increased product safety. In other words, safety standards may increase national welfare even if they decrease imports. The effect on exporters' welfare may be positive or negative. If consumers in the exporting countries have the same preferences as those in the importing country (they prefer the higher standard product), their welfare may also increase. In this case global welfare increases despite a fall in trade volume. But a decrease in the exporting countries' welfare cannot be excluded. In theory at least, standards may create conflicts of interest between trading partners even if they are not set with the intention of protecting domestic producers.

*Standards increase welfare by reducing negative environmental externalities...*

An important area where governments around the world have increased regulatory activity in recent decades is in relation to the environment. Government intervention aims in this case to create incentives for consumers and producers to take into account the effects of their actions on the environment.

Economic theory recommends the use of price-based policy instruments (e.g. taxes or charges) to manage environmental externalities. However, there is a strand in the literature in which price-based and quantity-based instruments are compared and in which one does better than the other in different circumstances. For instance, distributional concerns, the uncertainty of the costs and benefits of pollution abatement and the costs of monitoring and enforcement have led many governments to resort to environmental regulations rather than price-based instruments.

Preferences for different environmental policy instruments are likely to differ across countries. Some governments are more able than others to absorb the costs of environmental policies. Producers and consumers with lower average incomes are also less able and willing to incur such costs. Members of lower-income societies often face greater uncertainty about the future and therefore are more reluctant to invest in it, which after all is what much environmental policy is about. These are all reasons why industrialized countries tend to have more stringent environmental standards than developing countries.

*...but once again the trade and global welfare effects are ambiguous. The effects depend on whether externalities are local or global, whether they are production- or consumption-related, and whether standards are mandatory or voluntary.*

The trade effects of environmental standards depend on the nature of the environmental externality – whether it originates in production or consumption and whether it is local or global – and the nature (mandatory or voluntary) of the standard applied to products or processes. In the case of standards relating to production externalities, they also depend on whether standards are applied to both foreign and domestic producers or only to domestic producers.

*In the case of local production externalities, it makes sense to apply mandatory standards only to domestic producers while applying voluntary standards to foreign producers.*

In practice, applying mandatory standards only to domestic producers raises fears about the possible relocation of domestic producers to countries with less stringent standards and maybe even a “race-to-the-bottom” if governments compete to lower environmental standards so as to keep or attract jobs and investments. While theoretically plausible, it is much harder to find empirical evidence for these effects.

Imposing mandatory process standards on foreign producers raises two major concerns. First, the domestic process standards imposed on foreign producers may not be efficient from a global point of view, as the costs of production techniques differ across countries. Second, the question arises as to who controls and enforces the standards applied in the production of imported goods, given that production takes place abroad.

Voluntary process standards accompanied by a labelling policy give foreign producers the option of which production process to apply. But independent of their decision, they may be affected in any case if the labelling policy has an effect on the relative price of labelled and unlabelled products. If foreign producers decide to sell in an environmentally friendly market, problems of control and enforcement of process standards arise, as discussed above.

Product standards targeting a consumption externality affect both domestic production and imports. It could be argued that a priori there is no reason to expect that the regulation will favour domestic firms relative to foreigners. However, to the extent that the appreciation for the environment differs across countries and results in differing standards, foreign firms could be penalized more, as discussed in the case of safety standards.

*In the case of global environmental externalities, it is likely that no standard will ever be fully optimal since individual countries will not take into account the effect of their actions on other countries.*

When environmental externalities are of a global nature individual countries are unlikely to develop optimal policy instruments because they will not take into account the impact the deterioration of the environment has on other countries. International collaboration is therefore desirable.

*To sum up, standards that aim at increasing market efficiency have complex trade effects.*

The effects of standards on the direction and size of trade flows tend to be complex and need to be analysed on a case-by-case basis. Standards typically have an effect on both consumers and producers. They may affect the willingness of consumers to pay for product varieties meeting the standard, because they change consumers’ perceptions or appreciation of these varieties. Standards may affect the costs of producing varieties to meet the standard and thus the prices at which producers are willing to supply them. Standards will affect trade flows if they have a different effect on the demand for and supply of varieties produced abroad and varieties produced domestically. This may be the case if foreign and domestic producers supply different varieties of the relevant good, or if standards affect their production costs differently.

*In order to design standards, governments need information from both consumers and producers. Producers, however, may have an interest in influencing the design of standards in order to obtain an artificial advantage over foreign competitors. If they succeed, the resulting standards will tend to lower both trade and welfare...*

The trade consequences of standards will affect the welfare of countries, including the welfare of the country introducing a standard. Governments need information from both producers and consumers in order to design optimal standards. Producers may have incentives to influence the design of standards in such a way that the relevant standards do not only target the environmental externality or product safety but also give them an artificial competitive advantage over foreign producers. If the design of a standard reflects protectionist interests, it will reduce trade flows as well as domestic and global welfare.

*...on the other hand, if standards do not reflect protectionist interests, they increase welfare, even in cases where they reduce trade flows.*

Standards that reduce trade flows are not necessarily welfare reducing, in particular if they are designed in order to reduce the negative welfare effects of a market imperfection. Standards that improve information available to consumers, that increase consumer safety or that reduce the negative effects of environmental externalities, for instance, may well increase domestic welfare even if they have a negative effect on trade. As a consequence it may be in the interest of individual countries to set standards in order to raise their own welfare but which, as a by-product, reduce trade flows.

*Harmonization and mutual recognition are alternative approaches to standard-setting in international markets and are likely to have quite different consequences...*

Different standards across countries, although optimal from the national point of view to pursue a certain policy objective, might hinder trade. They may reduce the scope for international arbitrage and they may increase costs for foreign companies relatively more than for domestic firms. When countries open up to trade, previous standards may become suboptimal as they can result in some forgone trade. Policy makers have various ways to deal with technical barriers to trade – full harmonization, harmonization of essential requirements, equivalence and mutual recognition of product standards.

Full harmonization implies that both policy objective and detailed technical provisions required to achieve the objective be commonly defined. Mutual recognition implies that countries simply accept each other's standards. Equivalence implies unilateral recognition. As mutual recognition entails the risk of a race to the bottom, in practice, it will therefore only be observed among countries with equivalent policy objectives. If countries prefer to control the risk of variation of policy objectives among partners, they can harmonize some essential requirements and accept (mutually recognize) each other's design/specific technical details.

As to voluntary standards in markets with network externalities, economic theory suggests that opening up to trade is likely to lead to a process of harmonization of standards initiated by industry groups, as coalitions of firms will reorganize internationally and exploit economies of scale at a more disaggregated level of economic activity. The role of the government would be confined to preventing anti-competitive outcomes.

*...and we have no a priori way of knowing the welfare implications of the alternatives.*

There is no a priori answer to the question of whether harmonization is more desirable than mutual recognition from a national or a global welfare point of view. When standards addressing global externalities (environmental or network externalities) are set at the national level they are likely to be inefficient. International collaboration would be beneficial in these circumstances, though the optimal solution would not necessarily mean harmonization.

Economic theory does not provide a clear-cut answer even to the question whether harmonization of product standards is more trade enhancing than mutual recognition. The advantage of harmonization is that products produced in different countries are homogeneous and therefore better substitutes from the point of view of producers and consumers. This, in turn, may facilitate trade by improving confidence in the importing country

about product quality, enhancing compatibility with domestically produced goods and intensifying competition. On the other hand, harmonization imposes a cost in terms of reduced variety. Insofar as demand for foreign goods is driven by a love of variety, a reduced degree of product differentiation would hamper trade. Another potential advantage of mutual recognition is that it allows any firm to pick a standard and to sell its products in the whole regional market. So, unless consumer preferences are biased toward domestic specification, a firm located in the region can freely access the whole regional market without the additional costs of complying with a specific harmonized standard. Harmonization to a specific standard, by contrast, may imply a higher cost of compliance for firms in certain countries, thus effectively erecting a barrier to trade.

***Multiple tests to determine conformity with technical requirements increase transaction costs and can hinder trade.***

Independently of whether standards are harmonized or not, exporters may be faced with having to test or certify their products in each of the countries to which they are exporting. This can substantially increase the costs of exports. In order to reduce such costs, a number of regional agreements on mutual recognition of conformity assessment procedures have been negotiated. Although these agreements unambiguously foster trade among participating countries, they can divert trade from excluded countries.

***Empirical evidence on the impact of standards on trade embodies certain limitations, but still provides interesting insights.***

The empirical literature has tended to rely upon a rather short list of databases from which to measure standardization activity. But the data are not usually classified in a way that reflects the various economic functions of standards. Information on whether these are voluntary or mandatory, national or international, can be found in some databases but not in others. While it may be possible to identify the sector to which a standard applies, it will not always be clear whether all products in that sector are covered or only a subset of them. Most of the available databases also depend on the willingness of countries to provide accurate and prompt responses to questionnaires or surveys. The number of empirical studies has also been limited. These limitations have to be taken into account in assessing the results of the empirical survey on standards and trade.

***Industries characterized by network externalities are standards-intensive while technical regulations are primarily focused on problems of information asymmetry.***

Standard-setting activity is pronounced in industries characterized by network externalities whereas the bulk of technical regulations seem to address various types of problems associated with information asymmetries. In some major markets these regulations cover a large number of tariff lines and a significant share of imports, so there is potential for these regulations to have an adverse effect on trade. For example, based on a count of tariff subheadings, Brazil, the United States and Australia have thousands of items at the HS-6 level covered by technical measures. The share of imports covered by technical measures ranges, at the high end, from about half of total imports in the case of Brazil to about a third in the case of the United States and China.

***Standards do not significantly increase the costs of large firms in OECD countries although smaller firms may face greater difficulties. In the case of firms in developing countries, the story is more complex - costs vary enormously across countries and depend on a range of factors.***

The costs or price-raising effects of standards do not emerge as a major concern in OECD countries. Surveyed OECD firms did not generally identify major problems in complying with regulations in other OECD markets, although smaller firms tend to face greater difficulties than large ones. The evidence on the cost of compliance by firms in developing countries is mixed. Survey work suggests that some firms in developing countries face very high costs, sometimes almost doubling their production costs in order to meet technical requirements in major developed country markets. However, the case studies tell a more complex story where the costs of and benefits from compliance vary enormously among firms and countries and depend on a range of factors – industrial structure, the possibility of collective action, the strength of consumer preferences for safety, and so on.

*Comparing the effectiveness of mutual recognition with harmonization in increasing trade flows, early evidence based on the EU experience suggests that mutual recognition has greater trade enhancing effects.*

The available empirical literature on the effects of standards on international trade flows is still rather limited, reflecting the difficulty of the subject and the nature of the data. One approach to quantifying the impact of standards on trade has been to test whether country-specific standards and internationally harmonized standards have different effects on trade. All the empirical studies based on this approach use the count of idiosyncratic and shared product standards in a specific industry as a factor to explain trade flows. The idea is that national standards can facilitate or deter trade, depending on whether they decrease information costs more than they increase adaptation costs for foreign suppliers. Harmonized standards are believed to facilitate trade were it not for their negative effect on product variety. This specification of the empirical models, however, does not allow us to distinguish important aspects of standards, such as their role in solving market failures, their impact on compliance costs, technical complexity and innovativeness. These are all elements that can significantly affect trade. Moreover, the econometric models used are often *ad hoc* and lack theoretical foundations. Nevertheless, some interesting results have emerged. Most importantly, the adoption of standards, even purely national ones, can increase trade. One estimate suggests that a 10 per cent increase in the number of shared standards enhances bilateral trade by 3 per cent.

Another approach to quantifying the impact of the removal of technical barriers to trade has been to compare the effects on trade of harmonization as against mutual recognition of product standards. Early evidence based on the EU found more robust results for the trade enhancing effects of mutual recognition compared to harmonization.

*It has been suggested in the literature that SPS measures have been too restrictive – the risks from the introduction of pests through imports would need to be very high to justify some of the measures deployed. But there is also evidence that the adoption of some quality and safety standards by producers has placed them in a better position in the global marketplace.*

The welfare-based literature finds that SPS measures are generally restrictive and involve a welfare loss in the importing country. According to this work, the presumed health risks or losses from the introduction of pests through imports need to be extraordinarily high in order to justify some regulatory regimes in place. But questions have been raised about the appropriateness of the analytical framework employed, since there may be circumstances where regulatory authorities are not able to assign credible probabilities to outcomes and are therefore more risk averse than assumed in the studies.

Conflicting conclusions emerge as well on the trade impact of SPS measures in developing countries. There have been cases where access to export markets was denied on sanitary or phytosanitary grounds, resulting in substantial costs in terms of lost sales and market share. But rising standards also serve to accentuate underlying supply chain strengths and weaknesses and thus impact differently on the competitive position of individual countries. Some countries are able to use high quality and safety standards to reposition themselves in global markets.

*Differences in environmental standards do not generally seem to spur a “race-to-the-bottom” or to create pollution havens.*

Environmental standards do not appear to have significant effects on trade and investment flows, although more recent studies find a pollution haven effect compared to the older literature. But there is some question about the robustness of these results. Less work has been done to examine empirically the “race-to-the-bottom” story, but available studies point to little or no effect on the behaviour of regulators in this connection.

### *Institutions and policy issues*

*While information on standardization at the international level is fairly comprehensive and easily accessible, it is difficult to obtain a complete picture in many countries. But it is clear that approaches to standardization are evolving.*

Outside the institutionalized system, including ISO and a few other international standardization bodies, information is scattered and often incomplete. However, our overview suggests that the standards regimes are evolving, including those at the national and regional levels.

Recent approaches to standardization require standardizing bodies to focus on the development of voluntary rather than mandatory standards, to become more responsive to markets, to rely more heavily on international standards, and to participate more actively in international standardization. These latter trends have enhanced the role of international standardization bodies.

At the regional level, initiatives aimed at reducing the trade restrictive impact of technical barriers have been implemented or announced. Integration in the area of standards and technical regulations is probably most advanced in Europe.

The national standardization infrastructures of most industrialized countries are now integrated into the network of international standardization. In Europe for instance, adoption of European standards is mandatory for national member bodies and European standards organizations transpose the international standards into European standards.

*Change in the standardization field is putting pressure on governments in developing countries to reform and develop their standardization infrastructures.*

Both the demand for standards infrastructure and the capacity to implement standardization activities depend on factors correlated with a country's level of development. Standardization infrastructure in developing countries has often been non-existent or rudimentary. National standardizing bodies are in many cases governmental bodies weakly linked to markets and largely inward-oriented.

African standardization bodies, for example, had produced an average of only 1,281 standards in total by the end of 2002, while the corresponding figure for Western European bodies was 15,407. Some developing countries are participating more fully in the system. Malaysia, for example has aligned some 40 per cent of its standards to international standards. But many low income and transition countries have not followed the trend and national institutions are not part of the international network. More than half the LDCs have no formal contact with ISO, the most important international standardization body.

*The process of establishing voluntary, consensus based standards, and in particular the procedures used by ISO and many of its member bodies, are regulated by the WTO and ISO codes of good practice.*

The process consists of several distinct but closely related activities. It is fairly open and transparent but producers who have clear priorities, and are usually better organized than consumers, typically play the leading role. In some industrial countries, governments actively promote the participation of consumers by funding consumer organizations.

Institutions that compete with less formal private standardization initiatives are concerned that their formal standardization process may be too slow. The general trend is towards separating standardization activities from regulatory activities, with the former left to the private sector and the latter with the public sector. However, the separation between public and private standard setting is not always clear-cut.

*The organization of the process of standardization varies widely across countries.*

In general, regulations concerning safety, health and the environment are issued by governments. Often, however, the specific measures that satisfy the objectives of government regulations are spelled out in technical standards developed by private organizations. In European countries, for instance, governments often refer to privately developed standards in regulations.

Standards institutions in poorer countries are generally in the public sector with little or no participation of the private sector. In a small number of countries, mainly in Africa, the CIS and the Middle-East, the share of national standards with a mandatory status exceeds 50 per cent of the total number of standards published.

*Improving participation of developing countries in international standardization is crucial.*

This need has been recognized for several decades and numerous initiatives have been undertaken to improve the situation. Recent evidence, however, suggests that these initiatives have not yet achieved much improvement. Major difficulties for developing countries seem to be the lack of expertise needed for participation in technical work on the formulation of standards, and limited support from the private sector.

*Conformity assessment is not a trade barrier as such, but an everyday reality in commercial transactions. But conformity assessment arrangements can have important implications for competitiveness and market access.*

Purchasers and regulators want to ensure that the requirements and standards they impose on suppliers are fulfilled. Sometimes these additional transactions costs can be higher for foreign suppliers than for domestic ones.

In a narrow sense, conformity assessment refers to testing, inspection and certification as well as a supplier's declaration of conformity – that is, activities that deal with the characteristics of the product itself. A wider definition includes the area of metrology, which is an important prerequisite for the proper conduct of all other forms of conformity assessment involving measurements, and accreditation (the evaluation of the competence of any institution involved in conformity assessment).

The degree to which the assessment of conformity with a regulation may act as a trade barrier hinges critically upon the flexibility provided to exporters in choosing conformity assessment providers, activities and procedures. But even if the importing country is rather flexible as to where and how conformity is demonstrated, transaction costs for foreign suppliers can be significant, depending on the availability and cost-effective provision of relevant conformity assessment services and their international recognition.

Ideally, an attestation of conformity with regulatory requirements should be carried out only once and in the most cost-effective manner and should be recognized in all markets. For this to become a reality, confidence in the work of conformity assessment bodies in other countries needs to be established through multilateral cooperation. Cooperation is facilitated if harmonized standards on best practices in conformity assessment are adhered to, such as the international standards/guides on conformity assessment established by the ISO's Committee for Conformity Assessment (CASCO).

*A number of international and regional systems have developed over time with the objective of establishing networks of conformity assessment bodies whose competence can be relied upon by all members.*

Cooperation on accreditation has proven particularly important in order to minimize the number of bilateral coordination efforts that confidence-building in other countries' conformity assessment arrangements would otherwise require. For instance, the International Laboratory Accreditation Co-operation (ILAC), has developed a "global" mutual recognition agreements (MRA) among all its 46 full Members.

Regional cooperation efforts often precede wider international engagement, not least since neighbouring countries may also be principal trading partners. But effective cooperation is not always an easy task where different levels of development exist among member countries.

Regional efforts can help to address the problem of a complete absence or insufficiency of relevant institutions in smaller or poorer countries. For instance, only two countries in Southern Africa (Mauritius and South Africa) currently have national accreditation bodies, and cooperation within the Southern African Development Community (SADC) is crucial for other members.

***In developing countries, the provision of conformity assessment services is often inadequate, costly, government-driven and centralized.***

Commercial provision of conformity assessment services, such as testing, inspection and certification may be inadequate for a variety of reasons, including restrictive policies, the small size of the domestic market, high costs of inputs and scarce human resources. Conversely, in the United States, the testing laboratories sector has grown at around 11 per cent in recent years. As a conservative estimate, the sector generates more than \$9 billion in revenues annually.

Considerable technical assistance at the international, regional and bilateral levels is provided to developing countries in order to build the necessary conformity assessment infrastructure. Priority is usually given to conformity assessment needs in sectors of particular export interest, where suppliers face stringent conformity assessment requirements in major export markets. However, rigid prescriptions on conformity assessment by importing country governments can be challenging even for countries with a well-developed conformity assessment infrastructure.

Exporters may face extra costs due to: (i) difficulties in obtaining information on conformity assessment requirements and admissible providers; (ii) additional conformity assessment activities to those carried out domestically or a duplication of procedures; (iii) procedures that are more costly to exporters than domestic producers owing, for instance, to higher transport and communication costs; and (iv) administrative delays caused, for instance, by test reports and other documentation that may be refused, remitted for further clarification or, even when admissible, less familiar to importing country authorities.

***A range of bilateral and plurilateral government-to-government mutual recognition agreements (MRAs) show that commitments to mutual acceptance of conformity assessment results in sectors involving health, safety and environmental regulations tend to be quite limited.***

MRAs are more likely to exist among countries at higher and similar levels of development. According to the database on MRAs notified to the WTO under TBT Article 10.7, only 5 per cent of MRAs include African partners. More than half of all notified agreements (53 per cent) involve developed countries only.

There is an almost confusing multitude of publications describing institutional arrangements and conformity assessment concepts. However, the systematic reporting of conformity assessment procedures as barriers to trade, or of their cost implications for exporters, is extremely rare. This is especially so for developing countries, where at best some anecdotal evidence is available. In particular, there is a shortage of comparative analyses of conformity assessment practices across sectors or countries.

The absence of data on conformity assessment costs and on the costs of sustaining conformity assessment institutions makes it difficult to assess the real benefits of an ever more complex international conformity assessment infrastructure.

### Standards in the multilateral trading system

*Multilateral disciplines on standards seek to ensure an appropriate balance between WTO commitments to open trading arrangements and other public policy objectives.*

WTO Members have committed themselves to ensure that technical regulations and standards do not create unnecessary obstacles to international trade, while also recognizing that governments should not be prevented from using standards to pursue other legitimate policy objectives. This implies that, in case of a dispute, a panel may be required to distinguish between a “legitimate” standard and an “illegitimate” standard, i.e. one that is inconsistent with WTO law.

The TBT and SPS Agreements seek to ensure that when governments pursue non-trade-related policy objectives through the use of standards, they do so with the least disruptive effect on trade consistent with the underlying policy objective. The MFN and national treatment obligations provide an important check against standards whose application results in less favourable treatment of foreign suppliers compared to domestic producers. The dispute settlement mechanism allows countries to settle disagreements regarding the consistency of specific standards with the requirements of the TBT and SPS Agreements and the obligations of GATT 1994.

*Even though governments subscribe to the commitment that standards should be non-discriminatory and the least trade-restrictive possible, disagreements still arise sometimes over the specificities of particular situations.*

It may not always be straightforward to distinguish a “legitimate standard” from an “illegitimate” one. While a tariff clearly has the purpose and effect of discriminating between imported and domestic products, it can in practice be quite difficult to establish the purpose and effect of a standard. Governments may claim that they have introduced a standard in order to correct for market imperfections, but in reality the standard has been designed so as to create an artificial comparative advantage for domestic producers. In other words, standards may be employed as a “disguised” form of protectionism. Note that this may not be in the interest of the country introducing the standard, as consumers tend to suffer from protectionist policies. Given the reliance of governments on information from producers when it comes to designing standards, the risk of government capture by the private sector can be real.

In addition, “legitimate” standards may have the effect of reducing trade if it increases transaction costs. From an economist’s point of view, a well-designed standard would strike the best possible balance between the positive effects owing to an enhanced functioning of the market on the one hand and the costs of implementing the standard and any possible negative trade effects on the other. The notion of “striking a balance” is also present in WTO jurisprudence. Although the GATT has no specific language authorizing a balancing test, “balancing” of a range of factors has explicitly been mentioned in cases where recourse was taken to GATT Article XX(d) in interpreting the term “necessary”. The factors evoked in the jurisprudence are very similar to those that inform economic thinking, and include the standard’s positive effect on the policy aim and the possible negative effect on trade.

When it comes to disputes concerning standards, there is generally no disagreement about the legitimacy of the policy objective that the defendant claims to pursue. The protection of human or animal health, for instance, or the protection of the environment, are widely shared policy objectives. However, disagreement may arise within or among societies about the desirable degree of protection to be achieved. Disagreement may also arise about the existence of a link between a tradable good and the policy objective or about the true nature of that link. Last but not least, disagreement may arise about the effectiveness of a given policy instrument, like a standard, to achieve a certain policy objective. In practice, claims regarding any of these issues may involve a large amount of technical information.

Scientific evidence can play an important role in shedding light on these issues. Indeed, both the TBT Agreement and to a greater extent the SPS Agreement make reference to the use of scientific evidence in

order to establish links between trade and public policy objectives and the relevance of particular standards in given situations. The question arises, however, whether the WTO dispute settlement system is in all instances adequately equipped to deal with the scientific evidence provided by the parties and/or external experts.

*In practice, the rules have to accommodate the reality that national and global welfare maximization will not always coincide in the field of standards.*

The concept of own “appropriate level of protection” is closely related to the concept of “national welfare maximization”. The WTO is a multilateral organization and its role has often been defined in terms of global welfare maximization. Yet, pursuing global welfare maximization in the context of standards may be difficult in practice as it would require the weighing of different “appropriate levels of protection” across Members.

Consumer preferences play a crucial role in economic analysis when it comes to determining appropriate government policy. Indeed, government intervention in standard setting is above all justified when the incentives of producers do not coincide with the interests of consumers. Scientific evidence is likely to be one of the determinants of consumer opinions, which raises important questions concerning the availability of scientific evidence to consumers, the quality of that evidence and its timeliness. Governments may have an important role in providing appropriate information to consumers on scientific evidence.

*Harmonization of standards internationally is not always optimal from an economic standpoint, although the WTO rules encourage the use of international standards. This does not necessarily throw up contradictions.*

The economic discussion of standards concluded that the international harmonization of standards is not a desirable objective in all cases, either from the national or global point of view. WTO Agreements encourage the creation and use of international standards. In particular, countries applying an international standard are presumed to be applying WTO-consistent policies under both the SPS Agreement and the TBT Agreement. Should it be concluded that WTO Agreements are in conflict with economic thinking? Not necessarily, as both Agreements allow for deviations from international standards under well-specified conditions. Moreover, harmonization brings advantages such as lower transactions costs and economies of scale in production.

In a global world, coherence between multilateral trade rules and standard-setting policies is necessary in order to avoid conflicts among trading partners. Currently the relationship between these two aspects of policy making in the global domain is not sufficiently well-defined. It is questionable whether the WTO dispute settlement system can always deal effectively with the type of disputes that may arise as a consequence of this lack of coordination.

*Dealing with non-incorporated production and process measures may prove a challenge for the WTO dispute settlement system in the future.*

The multilateral trading system has long been hesitant to deal with non-incorporated PPMs, but with the *US-Shrimps* decision, such measures may be argued to have become part of the system. The concerns about their enforcement, however, remain. Non-incorporated PPMs cannot be controlled at the border and involve control on the production site of the exporting country. It is doubtful that exporting countries will readily accept inspectors from importing countries to inspect production sites in their territory. It is not clear, therefore, whether solutions along the line of *US-Shrimps* can be found in future disputes involving process standards.

### III. THEMATIC ESSAYS

#### Quantitative economics in WTO dispute settlement

*There is a growing but still small literature on the economics of dispute settlement.*

This essay focuses on quantitative economic analysis and the extent to which it has played a role in WTO dispute settlement, both in the interpretation and application of WTO rules and in respect of arbitration on authorized countermeasures. The essay does not question the economic rationale of WTO rules, although a

good deal could be said about the economic rationale of the rules. Neither does it deal with the much broader question of how economic concepts and terminology have been used or have influenced WTO adjudication bodies in structuring their reasoning.

***Quantitative economic analysis has been used to address two main questions – the effect of a policy measure on trade flows (trade effects) and the effect of imports on similar domestic products or their producers.***

The first of these questions has been dealt with in the context of arbitrations. Quantitative analysis has been used by some arbitrators to help determine the level of authorized countermeasures. But the issue of trade effects has also arisen in the context of determinations by panels and/or the Appellate Body whether a violation has occurred. In most cases, trade effects do not have to be demonstrated to prove a violation of WTO provisions.

An interpretation may be developed on the basis of the ordinary meaning and context of a WTO provision, as well as in the light of its object and purpose. The difference between arbitrations and Panel/Appellate Body proceedings can be illustrated in the *US–Continued Dumping Subsidy Offset Act (CDSOA)* case, where the Panel and Appellate Body found a violation by concluding that the CDSOA payments constituted a non-permissible specific action against dumping. However, in arbitration, it needed to be determined quantitatively to what extent such payments could affect trade.

The second question referred to above, on the effect of imports on similar domestic products or their producers, typically arises in the context of determining a violation in trade remedy cases. There are also a few WTO cases involving “directly competitive or substitutable” products, where quantitative economic analysis has been used to provide empirical evidence of the intensity of competition, notably by estimating cross-price elasticities.

***Quantitative analysis generally involves the specification of a relatively simple model that can be used for estimation purposes.***

The essay also provides a basic introduction into technical aspects of trade model-building. Such technical characteristics can be the subject of controversy if models form part of parties’ submissions in a dispute. For instance, the application of aggregate elasticities to individual sectors, or of an average elasticity from disaggregated estimates to an aggregated commodity, can lead respectively to the under-estimation or over-estimation of values.

Quantitative economic analysis need not be complex for dispute settlement purposes. Elasticity estimates measuring the responsiveness of one variable to a change in another are the centre-piece of the (“comparative static”) partial equilibrium approach used in many instances. Usually, a number of options exist for the construction of a model. The burden of data collection and estimation challenges may have to be compared to the expected gains in precision from greater complexity.

Economic modelling can provide useful benchmark values against which qualitative outcomes may be checked, especially if similar results are obtained using alternative methodologies. This is true despite the lack of absolute precision due to inherent difficulties in empirical work. For instance, a range of possible values may still give a good impression of the direction and magnitude of actual effects and confirm a theoretical penchant or intuitive guess.

***The use of quantitative analysis has been relatively frequent in arbitrations and counterfactual analysis has been key in this context.***

In arbitrations the concept of counterfactual trade effects – that is, the estimation of the level of trade that would occur if the contravening measure was brought into conformity – has provided the analytical backbone. Even in subsidies cases, such as the *US–Tax Treatment for “Foreign Sales Corporations” (FSC)* case, some analysis of trade effects has been carried out. In the FSC case the analysis played a supporting role, but only insofar as it coincided with the decision of the arbitrators to grant an award based on the value of the subsidy.

Arbitrators have been open to quantification on the basis of economic models where they have found it useful to fulfil their mandates, even though parties have sometimes argued against such analysis. In the *US-CDSOA* case, the arbitrator concluded that while “evaluating the trade effects [of a measure] cannot be accomplished with mathematical precision, ... economic science allows for the consideration of a range of possible trade effects with a certain degree of confidence.” (*US-CDSOA* (22.6): para. 3.125).

In the *US-FSC* (22.6) and *US-CDSOA* (22.6) cases, the arbitrators had to choose among competing models. In the *US-FSC* case, the arbitrator noted that his “task would not be to judge, with absolute precision which is the single correct model or which are the correct parameters, but to examine the results of these models to see if they provide an insight into the range of trade effects caused” (*US-FSCs* (22.6): para. 6.47). The arbitrator in *US-CDSOA* (22.6) also rejected models proposed by parties in favour of his own approach.

***In Panel and Appellate Body proceedings parties have sometimes submitted quantitative analyses, but such analysis has not so far been initiated by adjudicators.***

The specific type of analysis submitted by parties in some Panel and AB proceedings has varied depending on the nature of the claims and legal provisions involved. In cases involving “serious prejudice”, a complaining party needs to show that its trade flows are affected, for instance, because prices it obtained previously or could be expected to receive have been suppressed due to subsidization. There have only been three serious prejudice disputes to date, and in only one of them – the recent *US-Upland Cotton* case – did a party rely on economic modelling in presenting its claims and arguments.

The Panel was willing to grant that the outcomes of the simulations submitted were consistent with the general proposition that subsidies distorted production and trade and that the effects of a subsidy may vary depending upon its nature. But the Panel did not rely upon the quantitative results of the modelling exercise. This may be understandable when disagreements about a model turn on many technical issues, when documentation is not fully available and when economists themselves give conflicting views on the issues.

In some of the disputes involving taxes on alcoholic beverages (different cases involving Chile, Japan and the Republic of Korea), parties have adduced econometric evidence, in particular on cross-price elasticities, to see whether products were “directly competitive or substitutable”. The advantage of using this type of analysis is that it is possible to control for other influences affecting the demand of the relevant good. Yet, in order for results to be reliable, the list of variables included needs to be complete and the posited relationships correctly specified. If, then, enough data of sufficiently high quality were used, the cross-price elasticity would indicate all that there was to know about the relationship between two products. However, in these cases, the interpretation and reliability of estimation results were subject to considerable controversy.

In trade remedy investigations, causation analysis is an important element. In particular, the causal importance of the injurious effects of each factor must be compared separately against the injurious effect of increased imports. A number of academic commentators have considered the kinds of analytical techniques that might be relevant to this analysis. In at least one dispute, the question was raised whether the investigating authorities had conducted a proper causation analysis. The Panel addressed arguments by parties on whether quantification was required and on the use of econometric models. In the same case, complaining parties criticized some of the simplifying assumptions of a model that investigating authorities had used to show that the safeguard measures in question had not been applied beyond the extent necessary.

***In sum, quantitative economic analysis can rarely, if ever, provide clear-cut quantitative answers and such analysis certainly cannot determine points of law or dispute settlement outcomes.***

But in certain cases, quantitative analysis may strengthen parties’ argumentation before panels and increase the comfort level of arbitrators in making an award. Where empirical economic analysis is used, it can certainly help to inform legal reasoning. Quantitative economics can help to avoid misinterpretation when economic rationality is counter-intuitive and less than obvious, but nevertheless pertinent to the substance or direction of legal reasoning.

A limited but encouraging record is being built of how quantitative economics can be employed constructively in dispute settlement proceedings. One reason why the use of quantitative economics may intensify in the future is that cases seem to become more and more “fact-intensive”. Parties are not subject to restrictions as to the type of evidence they wish to furnish, and panels themselves have often requested more detailed factual information. Hence, it is possible to discern a trend towards a higher level of technical sophistication upon which the legal argumentation is founded. If properly understood in its supporting role, there is no reason to believe that quantitative economics could not make a bigger contribution to an effective functioning of the dispute settlement process.

### ***Trade in air transport services***

***The international air transport industry has demonstrated considerable ability to adapt to changes and shocks.***

In the past decade technological developments, such as new aircraft and the internet, combined with regulatory change, have had far-reaching effects on the structure and performance of the industry. External events, such as the rise in fuel prices, the events of 11 September 2001, and the Severe Acute Respiratory Syndrome (SARS) outbreak have also had an impact on the industry.

***Air transport services have direct and indirect effects on international trade. The sector has grown against a background of real yield declines and static financial performance. Air traffic remains highly concentrated by region.***

These services involve the carriage of passengers, the movement of goods (freight), rentals (charters) of carriers and crews, and related supporting and auxiliary services. The WTO estimates that world trade in international air transport services is approximately 10 per cent of world trade in commercial services.

Overall traffic in the industry, as measured in tonne kilometres performed (TKPs) has increased steadily. The only two exceptions are in 1991 and 2001. Real yields in the industry have also been declining as revenues over expenses have been static. Taken together, these two indicators suggest that the financial performance of the industry has been fairly static. This weak performance is against a backdrop of increases in costs of inputs, such as fuel and labour, and productivity gains. In 2003, approximately 1,657 million passengers and 34.5 million tonnes of freight were carried.

International air traffic is highly concentrated. Flights between three regions of the world – East Asia, Europe and North America – account for 77 per cent of the total seat-kilometres available on international routes. International flights in Africa account for only 0.6 per cent of the total.

***Change in the operating environment for international air transport services has resulted in an increasingly competitive industry.***

Carriers have opted for a number of different ways to compete; including developing new business models, such as low cost carriers and non-price forms of competition such as airline alliances.

Deregulation and liberalization of the industry have allowed international air carriers to accommodate growth in demand for air transport in two different ways. First, in some cases, a hub and spoke model has emerged; where key ports in each region serve as hubs to connect different regions. Second, alongside this approach is a point-to-point model, where air traffic is not routed through hubs, but directly between city-pairs that connect various regions. Less government regulation has increased the competitive challenge for carriers.

***Measures to address private anti-competitive practices are an important adjunct of efforts to liberalize international air transport markets.***

If carriers are permitted to create market power through mergers, joint ventures and strategic alliances, or to collude or engage in predatory or other anti-competitive actions, this will limit the potential benefits from deregulation and liberalization.

Trade in international air transport services is regulated by a system of bilateral agreements that were developed in 1944. Competitive pressures have resulted in the development of a new breed of more liberal bilateral agreements called "Open Skies" agreements. A number of regional initiatives to govern international air transport have also been developed.

***The General Agreement on Trade in Services (GATS) has been developed to govern international trade in services and provide opportunities for trade liberalization.***

The GATS, however, only applies to three services that are relevant to international air transport. These are aircraft repair and maintenance services, the selling and marketing of air transport services and computer reservation services.

Differing views persist over the desirability of extending the GATS to cover all aspects of international trade in airline services. The principal area of difference turns on the question whether the pace and depth of liberalization delivered through existing bilateral approaches is sufficient to create an enabling environment that ensures the growth of the industry and its contribution to international trade.

### ***Offshoring services***

There is no commonly accepted definition of "offshoring" in the public debate nor in the economic literature. However, the term "offshoring" is widely used as a particular subcategory of "outsourcing". The latter has been defined as "the act of transferring some of a company's recurring interval activities and decision rights to outside providers, as set in a contract". From an international trade perspective, captive offshoring (supplies sourced from an affiliated firm abroad) and non-captive offshoring (supplies are sourced from a non-affiliated firm abroad) are particularly relevant.

***The impact of offshoring services on production, employment and trade patterns is significantly less than suggested by press reports or popular perceptions.***

The number of jobs affected by offshoring of information technology (IT) is small if related to overall employment in the developed countries most affected. It is also small in the countries which have started exporting IT services if related to their total employment. According to balance-of-payments statistics, Ireland and India have been the major beneficiaries of offshoring services. In Ireland, some 24,000 people were employed in the entire software industry (including but not limited to offshoring) in 2003. The relevant figure reported for India was 568,000.

Moreover, the United States and the United Kingdom have often been portrayed as the economies most severely affected by growing trends in offshoring of IT services. However, both the United States and the United Kingdom report a larger trade surplus in business services (including IT services) than India in 2003. In the case of the UK this surplus was even rising between 2000 and 2003.

***Neither domestic outsourcing nor offshoring are new phenomena. They are conceptually no different from other forms of specialization that drive comparative advantage.***

Among the determinants of decisions by enterprises whether to "make-or-buy" are the degree of feasible technical and institutional separability, the degree of standardization of tasks, transaction and managerial costs within the firm relative to outside suppliers, production costs, and the size of the market. As to the choice of foreign location for offshoring, among the determining factors are labour costs, trade costs, the quality of institutions, the tax and investment regime, the quality of infrastructure and workforce skills (particularly relating to language and computers).

***Gains from offshoring accrue to both the countries exporting and importing the IT services.***

The gains from offshoring in services-exporting countries are employment creation, capital inflows, a new channel for technology transfer and an opportunity to enter new industries before domestic demand can support them. Offshoring is not, however, a panacea for developing countries. Rising employment in the

export oriented business services can only account for a rather small part of the overall rise of the labour force in developing countries in the years to come. Moreover, evidence from India suggests that most of the recent growth in offshoring services has not been at the high-skill end of the IT sector.

The importing countries are able to release resources for more efficient uses elsewhere. Neither the efficiency gains nor the adjustment costs of new offshoring arrangements entered into in recent years are particularly large, as the activity is small from an economy-wide perspective.

*The GATS offers opportunities for multilateral trade liberalization commitments on offshoring services.*

Improvements in the GATS, such as a clearer distinction in the definition of mode 1 and mode 2, and more clarity in the nomenclature used in schedules of commitments, could facilitate new commitments and reduce uncertainty as to their implications. These are not issues limited to offshoring services, but have wider implications for the overall functioning and utility of the GATS.