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The Impact of Cross-Border E-Commerce On International Trade

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Abstract:

This study investigates whether the growing cross-border electronic commerce increases the volume of international trade or merely replaces the traditional mode of physical delivery. We carry out a comparative statistical analysis of Total trade and trade in digitizable products by developed and developing countries. The study suggests that developing countries have in the recent past penetrated into developed countries' markets and made up for the decline in their market share of world Total trade as well as trade in digitizable products. As a result, electronic delivery of digital products promises benefitting developing countries by gaining deeper access to international markets. We argue that given its current magnitude, market efficiency, and growth trajectory, especially in developing countries, cross-border electronic commerce offers an 'additional' basis for explaining the flow of international trade.

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Key Words: e-commerce, cross-border e-commerce, digital delivery, digitizable products, services.

JEL Classification System: F1, O3

1. Introduction

Globalization in the second half of the twentieth century has been driven primarily by advances in Information and Communication Technologies (ICTs) and, in particular, by the public use of the Internet. Starting in the late 1980s, people began online shopping which gave rise to the development of e-commerce, a process in which goods and services are 'ordered' and 'paid for' via the Internet and goods delivered either in physical or digital forms.

Cross-border e-commerce (CBEC) marks the beginning of a new era in the history of international trade where production, marketing, distribution, and delivery of some goods and

services (digitizable) can all take place in online networks[1]. The scope of cross-border online trade is fast growing to include the provision of all kinds of services in areas such as health and consulting services, banking, finance, accounting, insurance, tax processing, and telecommunications services, etc.

The surge of e-commerce especially in services and in digitizable media products has in the recent past significantly altered the ways businesses are conducted around the world. The development, in turn, induced firms to find new ways to become competitive at home and abroad. More important, e-commerce has emerged as a catalyst in altering the mixture of physical (tangible) and information (intangible) components of some goods and also making online delivery a viable alternative to the traditional physical delivery. For example, a book or a music CD purchased online can be delivered physically or downloaded onto the buyer's computer which, in principle, blurs the line between goods and services categories and causes complications around the rules of international trade.

For the purpose of international trade, a book would be subject to the rules of the General Agreement on Tariffs and Trade (GATT) if it is considered a good and under the rules of the General Agreement on Trade in Services (GATS) if it is considered a service delivery. In fact, the bulk of electronically delivered products, actual and potential, are considered services. The distinction is important as there are significant differences between the rules under GATT and GATS. For instance, GATT Regime prohibits customs duties and virtually all other trade-restrictive measures, while GAST allows countries to decide whether or not to commit to 'market access' and 'national treatment,' i.e., not to discrimination against foreign services and suppliers, Mattoo, et al. (1999).

In comparison to the conventional trade, CBEC exhibits unique characteristics where technology and the Internet play an indispensable role for its popularity and rapid growth. Such ubiquitous platform allows e-traders reach a wider market and sell a large number of small quantities to a large number of buyers at different countries. Many e-traders choose to remain small and are seldom established in the market into which they expect to export.

Because of the growing share of e-commerce in global trade, the World Trade Organization (WTO) assumes a major responsibility in ensuring a fair and secure operating framework by all parties. Also UNCTAD's Electronic Commerce Branch routinely carries out studies to investigate the impact of the adoption of e-commerce and internet technologies by developing countries and assist them in adopting proper national polices and strategies, UNCTAD (2001-2004). At its second Ministerial Conference in Geneva in May 1998, WTO Members adopted a declaration on global e-commerce to direct the WTO General Council to establish a working

[1] According to UN Comtrade, 'Digitizable Product' constitutes: "goods, identifiable by HS headings, that can be sent both physically via a carrier medium and electronically via networks. They include five product categories: (i) printed matter, (ii) software, (iii) music and other media, (iv) film, and (v) video games."

program to examine all trade-related issues arising from e-commerce. The Declaration also included a so-called 'moratorium' stating that:

"Members will continue their current practice of *not* imposing customs duties on electronic transmission[2]." Such preferential treatment combined with the convenience and cost-effectiveness of the electronic delivery can potentially give rise to the following hypotheses:

a) an increase, in absolute terms, in trade of digitizable products,

b) replacing the conventional delivery channels by electronic transmission, and

c) boosting volume of trade.

This study aims at clarifying the merit of the above hypotheses by investigating whether digital delivery complements or replaces part of the traditional mode of physical delivery and increases total trade. In doing so, we highlight the ways in which CBEC differs from the traditional mode because of its characteristics and also exemption from the customs duties. Finally, we argue that digital delivery has the potential to facilitate firms' access to international markets and enhance free trade.

The rest of the paper is organized as follows: Section 2 reviews e-commerce literature with particular attention to the traditional mode of delivery as well as its electronic counterpart. Section 3 offers a summary statistics of the recent growth of digitizable products compared with physical deliveries. Section 4 concludes with the impact of CBEC on international trade and suggests some policy implications.

2. Literature Review

The enormous impact of the Internet on diffusion of information and the conduct of businesses has been an unprecedented phenomenon, which led some in the business community to regard it as a 'paradigm shift' in the field of business, Whinston (1997); Petzinger (2000), for example, argues that the 'traditional' economic principles cannot be applied to analyze e-commerce because of the emergence of such ground breaking technological changes. Borenstein, et al. (2001), on the contrary, emphasize that although the new medium of online trading has brought about new opportunities as well as challenges, it still remains as an integral part of the

[2] Because e-traders sell to a significantly large number of customers in different countries, customs procedures become complicated and costly for governments to track the flow of cross-border internet sales. Given that domestic residents can easily access and download from foreign Web sites, enforcement of a quota policy on cross-border sales is even more difficult than enforcing a tariff as dispersion of sales across foreign countries will unlikely render to any measure of quantitative restrictions. For many developing countries a capital control, which is long abandoned by most developed nations, remains the only alternative control mechanism over an offline or online purchase from a foreign country. It is, however, more cumbersome and costlier if the governments try to monitor flow of e-funds instead of goods and services.

conventional trade -- domestic or international[3]. As such, economics and business principles are equally applicable to the conduct of online businesses and also policy agenda pertaining to e-commerce will be more effective within the broader framework of national trade policies.

According to OECD (2002), a 'narrow' definition of e-commerce implies an Internet sale or purchase of goods or services, whether between businesses, households, individuals, governments, and other public or private organizations, conducted over the **Internet**. The goods and services are ordered over those networks, but the payment and the ultimate delivery of the good or service may be carried on or off-line. A 'broader' definition of e-commerce, however, accounts for all the transactions described above but conducted over the **computer mediated networks** including all automated transactions such as Internet applications, EDI, Minitel or interactive telephone systems[4].

Kauffman, et al. (2001) review of the e-commerce literature adopt the broader definition of e-commerce where digital goods play a pivotal role. The digital goods, also known as information goods, exhibit some characteristics that are significantly different from those of the traditional goods sold on the Internet. In particular, when a physical product is searched for and bought on the Internet, it becomes a digital-physical bundle[5]. VanHoose (2003) defines the e-commerce as any process that entails exchanging the ownership or rights to use of goods and services via electronically linked devices that communicate interactively within the networks.

Since the advent of the Internet and the subsequent emergence of e-commerce, its scope has expanded to cover electronic labor market, electronic procurement, electronic money, and electronic entertainment, among many other enterprises. Expansion of the e-commerce, both in scale and scope, has outpaced the breadth of research in examining its economic impacts, organizational developments, and regulatory structures, etc. The scope of the e-commerce is now so widespread that each facet of this new phenomenon deserves a subcategory research of

[3] Borenstein, et al. (2001) argue that: "*Eventually, of course, electronic commerce will become just commerce. Along with telephone communication, railroad shipping, electrification of production processes, and other technologies, it will be another part of the critical backbone on which business relies. During the transition, however, e-commerce will drastically change the ability of firms to create and capture value and will lead to the restructuring of many markets, just as the previous technology shifts have. They show that the microeconomic tools that have been used to analyze the impact on markets of previous technology shifts are equally applicable to the business world that is now adopting electronic commerce.*"

[4] Schuknecht, et al. (1999) divides e-commerce activities into three interrelated stages: 1) pre-purchase stage including advertising and information-seeking, 2) the purchase stage, including purchases and payment, and 3) the delivery stage which involves two modes of delivery: a) delivery through conventional channels, and b) electronic transmission of goods and services which have traditionally been delivered in a physical mode. This covers many types of digitizable services, information and media products, books, software, music, etc., Mattoo (1999)

[5] It is noteworthy to bear in mind that information is, to a varying degree, a key component of all goods and services, as well as production processes. In addition, new products seem to embody more information than traditional products and the information content accounts for one of the important factor for 'product differentiation.'

its own, Mann, et al. (2000). Nonetheless, in comparison to that of its traditional counterpart the literature on e-commerce is relatively new but growing rapidly[6].

Kauffman, et al. (2001) review the growing body of e-commerce literature from the perspective of economic analysis to include: 1) micro analysis such as firms' pricing strategy, market efficiency, product differentiation, and welfare and 2) macro analysis level such as impacts on employment, productivity, inflation, economic growth and development. The study suggests a new framework and a range of applicable theory in the context of new conceptual model for understanding e-commerce.

In the meantime, a sizable part of the e-commerce literature focuses on the efficiency of e-markets in comparison with the conventional markets, Smith M. D., et al. (2000); Brynjolfsson, et al. (2000; 2010); Bergen, M. (2004); Bakos, Y. (1998; 2001); Kauffman, J. R., et al. (2001). This central hypothesis is made because e-markets offer a platform in which exchanges are facilitated immensely by digital networks and businesses and consumers are connected in real time. The new phenomenon has been argued to bring new opportunities for businesses by making them more competitive in the global marketplace and offering consumers more choices and competitive prices, Brynjolfsson, et al. (2000). An extensive review of the literature by Smith, et al. (2000) suggest that the online markets which are based on frictionless flow of information have all the characteristics of nearly an efficient market, or at least more efficient than the conventional markets.

Yousefi (2014) argues that despite efficiency brought about by e-commerce, buyers and sellers can potentially be affected differently. Specifically, a number of online market characteristics such as product differentiation and brand loyalty can lead to market power concentration and skew the ways in which benefits are distributed between buyers and sellers[7].

Freund, C., Weinhold, D. (2004) argue that the Internet reduces the fixed cost of entry into online markets by firms thereby positively impacting trade. The paper offers estimates of the effects of the Internet on international trade by using time-series and cross-sectional variation in bilateral trade from1995-1997. For instance, a 10 percentage point increase in web hosts in one

[6] Gordon (2000) investigates how the 'New Economy' --the post-1995 acceleration in the rate of technical changes in information technology in the U.S. economy -- and the Internet measure up to the great inventions of the past. He concludes that the Internet represents a far smaller increase in the standard of living than that achieved by the past beak-through inventions such as electricity, electric motors, telephone, etc. Despite of such a controversy, the rapid expansion of the Internet, globalization, and e-commerce mark a new era in business practices around the world. Shapiro and Varian (1999) use somewhat a different term for the new economy, 'the information economy' and elaborate the pricing of 'information goods' which tend to have zero marginal cost with a familiar example of digital Yellow Pages available online at no charge.

[7] The classical theory of international trade has long been viewed to enlarge trading nations' production and consumption capacities and provide access to scarce resources. In addition, the continued expansion of trade is expected to equalize returns to factors, promote greater international equality, and in the long run bring about economic growth. However, the prediction that trade is capable of leading to the convergence of the standards of living of poor and rich countries has often failed to meet the test of reality. It would be of profound importance to investigate whether and how CBEC alters the landscape and possibly the outcome of this debate.

year lead to about 0.2 percentage point increase in exports in the following year. Evidently, there are other economic factors leading to the rapid growth of e-commerce which in turn can affect the levels of productivity and inflation. Willis (2004) projects that increased e-commerce activities as well as it impacts on making the conventional trade more competitive represent a structural change that could boost the overall productivity and put downward pressure on inflation over the next decade. The study by Mann, et al., (2000) show that the Internet and other ICT-related infrastructure have reduced friction in the marketplace in three dimensions: time, distance, and information. The new development then resulted in lower entry and exit costs to-and-from an industry paving the way for more competitive business environment. The study also elaborates the mutual relationship between the Internet and business processes as to how the Internet and e-commerce are affected by and will affect policymaking around the world. Finally, the study maintains that despite the Internet has virtually wiped out national boundaries, but some barriers to free flow of trade still linger as of today.

A study of e-commerce-specific trade barriers within the European Union (EU) has been carried out by Linden, et al. (2011:2). According to the study, EU's online markets for e-commerce are still characterized by barriers that inhibit the free movement of goods and services within the EU. Based on a report by Euro barometer, 33% of consumers purchase products online within the EU, but only 7% do this across borders. The study classifies the barriers into six major categories:

"*1) bans on e-commerce as a sales form, 2) pure establishment requirements, 3) barriers linked to sales conditions, 4) intellectual property barriers, 5) legal barriers linked to payments, and 6) barriers linked to e-government.*"

Clearly, most of the barriers affect both traditional trade as well as e-commerce; but certain barriers such as a top-level domain registration and e-signature requirements affect e-commerce only. The process necessary to resolve the impediments is often time-and-resource consuming, and especially in the case of small and medium-sized firms it is not a cost-effective undertaking. As a result, the risk of incurring higher costs associated with e-commerce barriers leads to lower sales to certain countries by many businesses in EU. The study lists 27 different online markets in EU and suggests that an integrated digital internet market is pressingly needed. If the EU succeeds in abolishing the legal barriers currently affecting e-commerce and uniting the 27 national online markets into one integrated market which would benefit freer functioning of e-commerce within the EU and harmonize trade with non-EU trading partners[8].

Schuknecht, et al. (1999) provide a quantitative assessment of the role of e-commerce in tariff revenue collection and economic activities including trade. To use tariff revenues from digitizable products as a guide to the size of e-commerce, tariff revenue on digitizable products, on average, amounts for less than 1 percent of the total tariff revenues and 0.03 percent of total

[8] There are many other forms of Non-tariff Trade Barriers (NTBs) affecting cross-border e-commerce, which are beyond the scope of this. The pervasive state control of the Internet and other telecommunications modes via eavesdropping, overt and covert censorship, and encryption are just few examples each deserving a separate study, Jonströmer, et al. (2012).

fiscal revenues of most developed countries. Only China and Hungary are estimated to collect more than10 percent of tariff revenues from these products, and not a single country collects more than 1 percent of its total revenue from this source. An important implication for international trade in digitizable products is that even if the delivery of all potentially digitizable media products carried online -- which is very unlikely -- with no tariff levied on such products, the revenue loss would be minimal, except for China and Hungary[9]. According to the study, trade in potentially digitizable goods in 1990-1996 was estimated to be less than1 percent of world total trade. Of this, 60 percent was related to printed materials, recorded tapes, CDs and packaged software. Nonetheless, trade in such media items was growing 1.5 times faster that the growth of world trade. In addition, cross-border electronic supply of services in the period represented 30 percent of world trade in services which accounted for 6 percent of the world total trade. The study concludes that as access to the Internet becomes more easily available word-wide and bandwidth of phone lines expands, this will likely to result in lower transportation and administration costs of sending products online. There are instances where the costs of mail orders are often higher than the value of the product crossing borders. Such cost advantages will boost e-commerce, especially in services, and dampen physical trade of many goods and services[10]. It is projected that substitution between physical delivery and electronic transmission of digitizable products will continue in time to come, so long as the cost advantage of electronic transmission persists.

Along with the broader e-commerce, cross-border e-commerce (CBEC) has endured many complex global challenges especially with trade in services and in digitizable products, Mattoo, et al. (1999). Some economists consider the Internet possessing characteristics of a 'global' public good which like international transportation or communication regimes cannot be regulated without international coordination. In other words, multinational characters of the Internet as well as e-commerce necessitate a regime of treaties and regulatory accords among all trading nations. The rapid growth of e-commerce has also made it difficult for national and international trade partners to timely legislate and implement proper regulatory mechanisms for online trading, including cross-border e-commerce[11]. As part of its mandate, WTO plays a major

[9] For a discussion of the national and international tax treatment of different components of e-commerce on the Internet, see Panagariya (2000).

[10] The relatively new 'cloud computing' services are becoming increasingly popular with companies all around the world as a way of reducing costs related to IT sectors by having data stored in external servers and administered by a third party. Just like the Internet, cloud computing services are becoming an indispensable part of doing business including the traditional and cross-border trade. One would, however, argue that because of the characteristic of goods traded online, CBEC would rely more on cloud computing services than traditional trade. Notwithstanding, cloud computing services not only delivers cost cutting advantages, but also gives rise to uncertainty about privacy of personal information, data security, and other legal challenges. In a sum, international differences in legislation in different countries involving cloud computing services compound many uncertainties surrounding CBEC.

[11] Many of the existing rules pertaining to international trade such as intellectual property rights, health and safety requirements, country-of-origin certificates, etc. may be technically difficult to enforce for cross-border

role in ensuring a competitive and fair operating environment for all trading parties, such as enforcing the1998 declaration of the moratorium stating that[12]:

"*Members will continue their current practice of not imposing customs duties on electronic transmission*"

Mattoo, et al. (1999) examine the WTO declaration from the legal and economic perspectives. The study highlights the pitfalls of the decision and the technical challenges for its implementation. In particular, they point out that since most online deliveries are already free of barriers, the objective should instead preclude the introduction of 'new' barriers. In a final assessment, the declaration falls short of being a comprehensive recipe for free e-commerce for at least two reasons:

First, only electronic transmissions are covered excluding those ordered through electronic means but delivered though the normal channels. Clearly, such preferential treatment would divert physical delivery of some digitizable products into electronic channels.

Second, only customs duties are covered which leaves the opportunity for other forms of restrictions. For instance, countries are free to decide whether to allow 'market access,' i.e., not to impose quotas and to 'national treatment,' i.e., not to discriminate against foreign services and suppliers. There is evidence, however, that many countries, developed and developing, have not made such commitment in a large number of services sectors where electronic delivery is feasible.

According to Mattoo, et al. (1999) barrier-free e-commerce would be more effectively secured only by deepening and widening the limited cross-border trade commitment under the GATS. Trade barriers such as differences in consumer protection laws, intellectual property rights, and customs-related barriers which affect traditional trade can even be more onerous for CBEC, JonstrÖmer, et al. (2012:4)[13]. CBEC also faces many 'specific' barriers including the

online trading, Mattoo, et al. (1999).

[12] WTO's mandate has grown complicated because:

a) services receive somewhat different treatment under the GAST than goods under the GATT,

b) the growth of online transmission of digital products has blurred the line between goods and services categories,

c) cross-border e-commerce has gradually becoming a replacement for the traditional physical delivery mode.

13. Illegal downloads and Intellectual Property Rights (IPRs) infringements of digital and physical products are by no means a specific concern of the online trade. It is only the nature of CBEC which makes copyright protection more difficult with digital goods than physical goods and necessitates a new perspective on the domain and implications of IPRs. Likewise, it is almost impossible for an e-trader to follow its domestic nation's rules to make sure of the final destination of a product where an item could be resold online and the consignment diverted to a different destination. The myriad examples of IPR violation, particularly across borders, could convolute official

requirement of foreign firms to have a local establishment in order to register a top-level domain. Among the new challenging issues, a transaction on a commodity like a CD which can be delivered physically or downloaded onto a buyer's computer blurs the line between goods and services categories. For the purpose of international trade, a CD is subject to the rules of GATT if it is considered a good and under the rules of GATS if it is considered a service delivery. Although it seems easier for the nations to enforce targeted barriers on electronic trading, it is indeed more difficult to charge consumers with a customs duty when downloading a music file than doing so when a CD physically crosses a nation's boundary.

The distinction is so important because there are significant differences in rules governing GATT and GATS. For instance, GATT Regime virtually prohibits other trade-restrictive measures while discrimination against foreign suppliers is allowed for trade in services. That is, importers can decide whether or not to commit to the rules of nondiscrimination between domestic and foreign suppliers of services, Mattoo, et al. (1999). Another ambiguity involves the mode of delivery of services (Technological Neutrality) such as health diagnostic test results and accountancy services between the trading nations. Such services which used to be delivered via the mail delivery and facsimile can now be transmitted over the Internet. For a summary of different legal frameworks and policy implications of GATT and GAST regimes pertaining to National Treatment, Customs Duties and Quota, see Appendix 1.

A dominating message from the literature is that cross-border online delivery seems to have the potential to penetrate deep into new markets and also open up the domestic markets to outsiders and boost trade. However, online trade which is expected to generate additional trade may indeed replace parts of the traditional mode of delivery. In other words, in the absence of a quantitative analysis it would be unwarranted to consider all cross-border online delivery as a trade-creating development. Finally, CBEC marks the beginning of a new chapter in the development of international trade where production, marketing, sales, and distribution all occur in the cyberspace. Such a phenomenal change merits a fresh look at the operation modality and the promises of the new mode of delivery within the international trade literature. In particular, because of its market efficiency and continued growth CBEC offers an 'additional' basis for explaining international trade[14].

2.1. Cross-border E-commerce

According to Mattoo, et al. (1999) conventional international trade is likely to continue growing but CBEC is expected to grow even faster. Both regimes, however, can lead to two methods of delivery: physical delivery through conventional channel, and electronic delivery including those which have traditionally been delivered in the physical forms, Schuknecht, et al. (1999).

figures of CBEC.

[14] Subsequent to the classical theory of trade, new trade theories have emerged to offer explanation for trade on the basis of such factors as product differentiation, intra-industry trade, economies of scale, and technological differences.

This study aims at examining the growth dynamics of the two regimes. Specifically, whether and to what extent CBEC has the potential in replacing or boosting the traditional delivery mode[15]. In so doing, we assess separately the CBEC carried out by developed and developing countries. The distinction is to account for the difference in the 'stage of development' of the two groups of countries. Many developing countries have not made commitment to allow for 'market access' and 'national treatment' against foreign services where electronic delivery is feasible. Such differences are explained in detail in, Mattoo, et al. (1999) and Panagariya, A. (2000).

We also adopt measures of e-commerce and total international trade variables as follows:

i) Total E-Commerce (TEC) to include Domestic E-Commerce (DEC) and Cross-Border E-Commerce (CBEC), TEC = DEC + CBEC.

ii) Total International Trade (TIT) to include Conventional International Trade (CIT) and Electronic International Trade (EIT), TIT = CIT + EIT (where EIT = CBEC = trade on services + trade on digitizable goods).

We use these defined measures to assess the impacts of CIT and EIT on each other. To this end, we put forward the following alternative hypotheses.

i) CIT causes EIT to grow;

ii) EIT causes CIT to grow;

iii) there is a bi-directional causal relationship between CIT and EIT;

iv) there is no causal relationship and EIT replaces part of CIT resulting in no effect on TIT.

In what follows we provide a summary statistics and highlight some salient features of the existing data on DP as well as total trade.

3. Trade in Digitizable Products

Table1 provides world trade in digitizable products for a total of 71 countries, 36 developed and 35 developing in 2012, the latest year for which DP data are available[16]. Among developed countries, Germany, Czech Rep., Poland, and the Netherlands were the largest net exporters of DP of $4,635 million, $952 million, $707 million, and $632 million (in current US Dollars), respectively. On the other hand, Canada, Switzerland, France, and Australia were the largest net importers of DP of $3,566 million, $1,769 million, $1,864 million, $1,467 million, respectively.

[15] Because e-commerce is capable of disrupting the traditional way of doing business and reinventing a new one, it exemplifies Schumpeter's theory of 'creative destruction' similar to the historical breakthrough technologies such as electricity, the telephone, radio, automation, etc.

[16] The developed and developing countries are specified by UNCTAD STAT.

In the developing countries category, China was by far the single largest net exporter of DP for $6,870 million followed by Singapore and Hong Kong with $3,659 million and $1,143 million net exports, respectively. It is important to note that the remaining of developing countries, except for Honduras, were all net importers of DP. In 2012, developed countries, as a group, were a net importers of $5,547 million and developing countries were net exporters of $7,691 million, due to the three net export nations mentioned above.

Developed nations' DP imports as a percentage of total imports were all below1.3%, with New Zealand and Switzerland at 1.3%, Austria 1.23% and Norway 1.14%. The highest DP exports as a percentage of total exports were 1.12% for UK and Czech Rep. and 1.1% for Austria.

In regard to world DP imports and exports, US, Germany and UK had the largest share of the world DP imports, 14.36%, 8.40% and 7.32%, respectively and developed countries accounted for a sizable 78.34%. For world DP exports, the three countries shared 14.04%, 14.42% and 7.29%, respectively and developed countries captured 68.56%.

Among developing countries, China and Hong Kong shared 6.06% and 4.03% of world DP imports and exported 15.18% and 5.46% of world DP exports, respectively. Developing countries, as a whole, captured 21.66% of world DP imports and 31.44% world DP exports. The figures indicate that in 2012, developed and developing countries carried out roughly 3/4 and 1/4 of world DP imports and 2/3 and 1/3 of world DP exports, respectively. In comparison with figures from an earlier year, in 1997 developed countries were accounted for 85.87% of world DP imports and 90.18% of world DP exports while developing nations captured merely 14.13% and 9.82%, respectively. The figures confirm a significant increase in developing countries' share of world trade in digitizable products.

3.1. Growth of Trade in Digitizable Products

Figures 1-2 illustrate the recent trends in DP imports and exports. Since 1998 (the beginning of our data set) until the 2008 recession, DP imports and exports had grown continuously, more sharply for developed countries than for developing countries. In 2008, the total DP imports and exports of developed countries reached a peak of $80 and $68 billion and for developing countries $22 and $27 billion, respectively. It is important to note that even at the peak of world trade in DP in 2008, about $197 billion, it remained less than1 per cent of the world total trade. In other words, while trade in DP is a significant figure, it does not represent a large share of total trade.

But if the historical trend stands as a guide for the future, this is expected to change. The existing body of the literature also offers convincing economic rationale, Brynjolfsson et al. (2000); Smith et al. (2000). It is now an undisputed fact that trade over the networks reduces transportation and administration costs leading to competitive prices for many products including film, music, and data which are now downloadable in a vast scale much easier than before.

Starting in 2008 recession, however, the upward trends reversed course and continued falling for both developed and developing countries till the last year for which data is available, 2012,

Figures 1-2. The downward slopes for DP imports as well as DP exports have been much steeper for developed countries than those for developing countries. Such disparity may be a reflection of the deeper recession in developed countries, especially in advanced economies, than developing nations. However, as to when the trends might bounce back remain to be seen.

Unlike the levels of DP imports and exports, shares of the world DP imports and exports of developed and developing countries have shown different patterns. During the period of 1998-2012, imports and exports of developed countries as a percentage of world DP imports and exports have fallen continuously, imports from 90% to below 80% and exports from 90% to below 70%. On the contrary, for developing countries these figures have risen from nearly 10% to above 20% for imports and above 30% for exports, Figures 3-4.

Annual growth rates of DP imports and exports are illustrated in Figures 5-6. The annual growth rates of DP imports and exports have been, with the exception of a few years, higher for developing countries than those of developed countries. The high growth rates are expected to continue well into the future. One reason for this observation might be due to the 'so-called' leapfrog phenomenon by developing countries in areas such as ICTs, wireless communications technologies, information dissemination through wireless network, and rapid product digitization processes, among many others. Specifically, digitization of information products is now taking place at an ever increasing rate which makes it easier to preserve, access, and distribute it through the Internet. For instance, a piece of art or historic document which were accessible for viewing by a visit to the site -- or many products such as data or a music file stored in CD which needed physical delivery -- can now be transmitted through digital networks.

The shares of world total imports and exports by developed and developing countries' have shown patterns similar to those of the shares of world DP imports and exports over the 1998-2012 period, Figures 3-4 and 7-8. For developed countries, both total imports and exports shares have fallen from 80% to 60% and those for developing countries have risen from 20% to 40%. From these observations two suggestions are in order: first, the market shares remained unaffected by the 2008-09 recession; second, developing countries have made up for the fall in developed countries' share of world trade both in total as well as in Digitizable Products. More important, over this period the rise in the share of DP exports by developing countries has been the highest, roughly three folds from 10% to 30%, Figure 4.

Annual growth rates of world total imports and exports were very much similar to the DP imports and exports until 2008, Figures 9-10 and 1-2. Unlike the latter trends which kept falling past the 2008 recession, the trends of total imports and total exports bounced back from the 2009 trough marking a full recovery of the cycle. That is, despite DP imports and exports downward turning points in 2008 coincided with other macro-variables, including total imports and total exports, they failed to follow a pro-cyclical pattern. From the perspective of business cycle theory, the fact that contraction in DP imports and exports has taken longer than other macro variables remains a puzzling observation.

As noted above, China alone accounts for a sizable part of trade in DP and affects developing

countries' trade figures. To compare it with the US figures, Figures15-16 depict DP imports and exports of China along with the US. DP Imports by US rose from nearly US$7 bi in1998 to US$10 bi in 2012 with a significant up-and-down before and after the 2008 recession. On the contrary, during this period China's DP imports grew steadily from US$0.5 bi to US$4 bi. in 2012 without a meaningful decline in 2008, Figure 11. On the export side, US DP exports rose from US$9 bi in 1998 to US$10 bi in 2012, yet with the expected reaction to the 2008 recession. On the other hand, China's DP exports grew from nearly US$0.6 bi to more than US$11 billion in 2012, surpassing the US, Figure 12. China's share of DP imports and exports as a percentage of world DP imports and export rose from around 1% in 1998 to more than 5% for imports and nearly 15% for exports in 2012. The US share of DP imports hovered around 15% and the share of exports fell from 20% to 14%, Figures 13-14. It is safe to conclude that developing countries' DP trade figures are shaped, to a significant degree, by trade of China.

4. Conclusions

Since 1998 (the beginning of our data set) until the 2008 recession, DP imports and exports had grown continuously, more sharply for developed countries than developing countries. In 2008, DP imports and exports by developed countries reached peaks of $80 and $68 billion and for developing countries $22 and $27 billion, respectively. World trade in DP followed an upward trend along with the total trade and reached its peak of $197 billion in 2008. While trade in DP remains a significant figure, it does not represent a large share of total trade and accounts for roughly 1 per cent of the world total trade.

During the 1998-2012 period, DP imports and exports grew in tandem with the total imports and exports until 2008. However, the trends of total imports and exports bounced back from the 2009 trough marking a full recovery while the trends of DP imports and exports continued falling past the 2008 recession. That is, despite the turning points of DP imports and exports coincided with other macro-variables, including total imports and exports, they have failed to follow a pro-cyclical pattern after 2008. The observation that contraction in DP imports and exports persist longer than other macro variables remains a puzzling phenomenon from the perspective of business cycle theory.

Unlike the trends of DP imports and exports, the shares of world DP imports and exports have shown different patterns for developed and developing countries. During the period of 1998-2012, imports and exports of developed countries as a percentage of world DP imports and exports have fallen continuously, imports from 90% to below 80% and exports from 90% to below 70%. On the contrary, for developing countries these figures have risen from nearly 10% to above 20% for imports and above 30% for exports.

The shares of world total imports and exports have also shown patterns similar to those of the shares of world DP imports and exports. For developed countries, total imports and exports shares both have fallen from 80% to 60% and those for developing countries have risen from 20% to 40%. From the observed trends two features are noteworthy: First, the trends remained unchanged during the 2008-09 recession; Second, developing countries have made up for the fall

in developed countries' share of world trade both in total as well as in Digitizable Products. The share of DP exports by developing countries has risen the highest, roughly three times over the period.

Annual growth rates of DP imports and exports have also been, with the exception of a few years, higher in developing countries than those of developed countries. This observation suggests that developing countries have gradually penetrated into developed countries' share of world trade. In other words, the study suggests that CBEC shows the potential to benefit developing nations by gaining deeper access to international markets. It should be noted that our conclusions are not definitive as they are not inferred from a statistical analysis. However, consistent with the existing general agreement in the e-commerce literature we offer the following rationale in support the above conclusions: 1) Deeper Internet penetration, subscription growth, and network effect; 2) Accelerating digitization process of information products and services; 3) Economies of scale in doing business over the Internet and the technological leapfrog phenomenon in developing countries. Finally, because of its efficiency and growth trajectory, particularly out of developing countries, CBEC seems to offer an 'additional' account for explaining international trade.

As a policy implication, we argue that during the transition period e-commerce creates specific challenges as well as new opportunities for businesses and economies around the world. To facilitate growth of CBEC, nations need to adopt new arrangements at the national and international levels. At the national level, governments should provide support and encourage competition and innovation. Governments should also cooperate at the international level though institutions such as WTO, UNCTAD, and EU to enhance information security and promote fair and transparent business operations over the Internet.

This paper paves the way for future research agenda in two dimensions: a) to address limitations in the scale and scope of DP data and the number of countries, and b) to carry out an empirical analysis estimating the impact of CBEC on international trade, which constitute a major shortfall of this paper.

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Appendix 1:

A comparison of the key WTO rules for measures affecting goods and services trade			
	National Treatment	Customs Duties	Quotas
GATT rules for goods trade	General obligation, permitting no exceptions, but applies only to internal measures.	Allowed where Members have not bound their tariffs at zero.	Not allowed except in certain emergencies.
GATS rules for services trade	Not a general obligation, applies only to sectors that a member has explicitly scheduled and there too may be subject to limitations. But applies to all measures affecting the supply a service.	Not allowed if a Member has committed to providing national treatment without limitations.	Allowed, unless a Member has committed to providing market access without limitations.

Source: Mattoo, A. and Schuknecht, L. (1999)

Appendix 2:

Sources of Data

1. Data are obtained from UNComtrade available by classification HS96 at:

http://comtrade.un.org/db/mr/rfCommoditiesList.aspx

2. According to the introduction of HS, "The Harmonized System (HS), indicating a classification of products, is an internationally standardized system of names and numbers to classify traded products. It came into effect in 1988 and has since been developed and maintained by the World Customs Organization (WCO)." The above introduction of HS is retrieved from the following two websites:

http://unstats.un.org/unsd/tradekb/Knowledgebase/

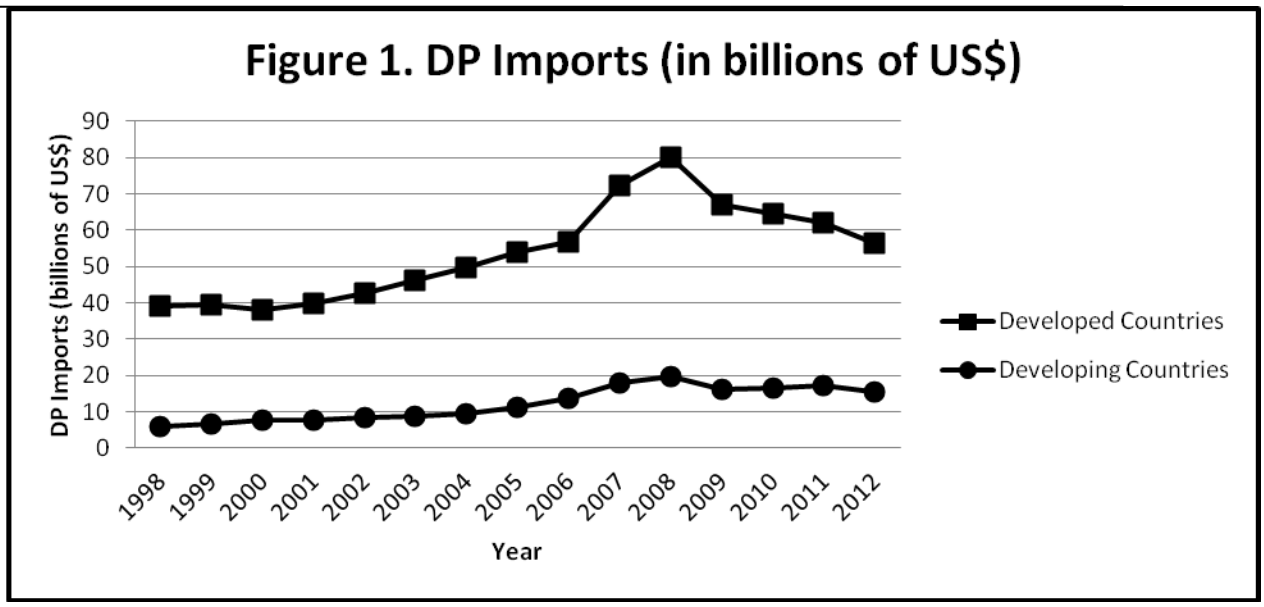
http://en.wikipedia.org/wiki/Harmonized_System)

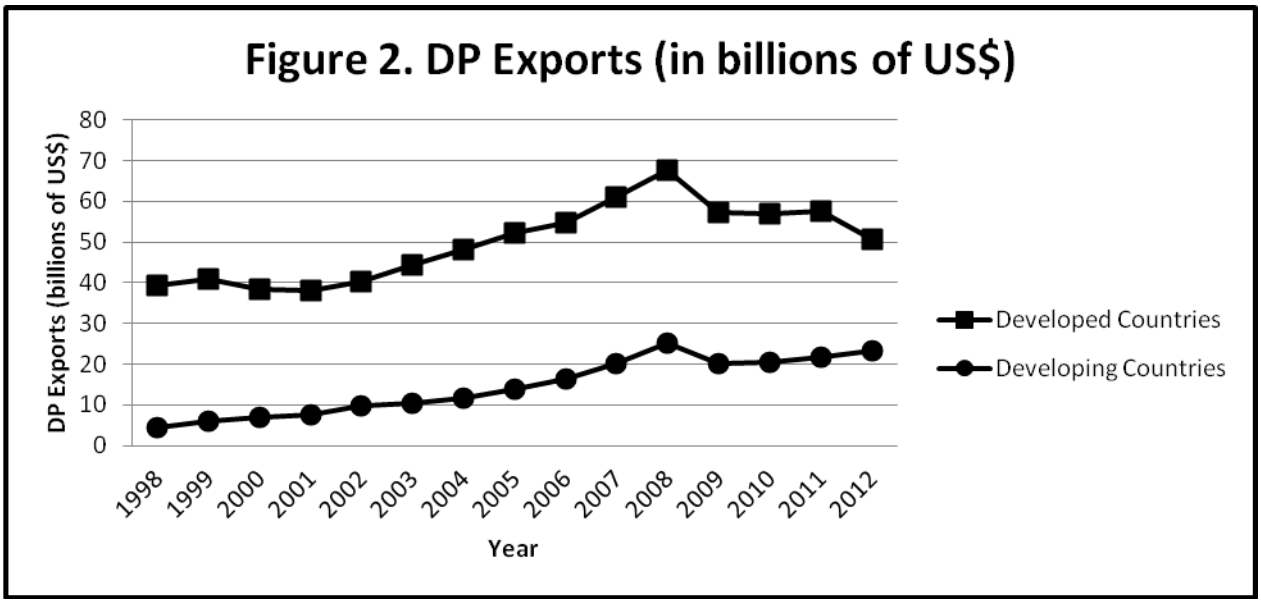
Table 1. World Trade in DP, 2012

Country	Total imports (000 US$)	Total exports (000 US$)	DP imports (000 US$)	DP Exports (000 US$)	Net DP Exports (000 US$)	DP imports share of total imports (%)	DP exports share of total exports (%)	DP imports share of world DP imports (%)	DP exports share of world DP exports (%)	Total imports share of world total imports (%)	Total exports share of world total exports (%)
Australia	250,464,794	256,242,913	1,835,593	369,101	-1,466,492	0.73	0.14	2.56	0.50	1.62	1.73
Austria	169,663,241	158,820,954	2,091,354	1,743,708	-347,646	1.23	1.10	2.91	2.36	1.10	1.07
Bulgaria	32,743,134	26,698,780	47,601	38,297	-9,304	0.15	0.14	0.07	0.05	0.21	0.18
Canada	462,369,245	453,380,895	4,932,440	1,366,487	-3,565,953	1.07	0.30	6.87	1.85	3.00	3.05
Croatia	20,834,262	12,368,983	96,900	71,847	-25,054	0.47	0.58	0.14	0.10	0.14	0.08
Cyprus	7,376,934	1,826,017	45,085	6,471	-38,614	0.61	0.35	0.06	0.01	0.05	0.01
Czech Rep.	139,726,824	156,422,743	791,731	1,743,711	951,980	0.57	1.11	1.10	2.36	0.91	1.05
Denmark	92,296,840	106,125,966	905,482	608,436	-297,046	0.98	0.57	1.26	0.82	0.60	0.71
Estonia	19,750,324	18,157,456	43,706	128,076	84,370	0.22	0.71	0.06	0.17	0.13	0.12
Finland	76,089,021	72,974,489	452,014	293,138	-158,876	0.59	0.40	0.63	0.40	0.49	0.49
France	663,268,640	556,575,682	4,717,766	2,853,798	-1,863,968	0.71	0.51	6.57	3.86	4.30	3.75
Germany	1,173,287,645	1,416,184,199	6,026,669	10,661,258	4,634,588	0.51	0.75	8.40	14.42	7.60	9.54
Greece	62,341,250	35,179,710	252,985	122,111	-130,875	0.41	0.35	0.35	0.17	0.40	0.24
Hungary	94,266,239	103,006,014	317,903	297,215	-20,688	0.34	0.29	0.44	0.40	0.61	0.69
Iceland	4,771,916	5,063,442	30,657	2,003	-28,654	0.64	0.04	0.04	0.00	0.03	0.03
Ireland	63,100,437	118,295,519	534,686	1,014,040	479,354	0.85	0.86	0.75	1.37	0.41	0.80
Israel	73,112,080	63,140,632	222,986	84,073	-138,913	0.30	0.13	0.31	0.11	0.47	0.43
Italy	489,104,116	501,528,851	1,874,109	1,962,445	88,336	0.38	0.39	2.61	2.66	3.17	3.38
Japan	885,843,335	798,567,588	3,829,170	2,562,374	-1,266,797	0.43	0.32	5.34	3.47	5.74	5.38
Latvia	16,082,388	12,685,522	39,203	103,751	64,549	0.24	0.82	0.05	0.14	0.10	0.09
Lithuania	32,237,640	29,652,662	58,687	125,773	67,085	0.18	0.42	0.08	0.17	0.21	0.20
Malta	7,896,221	5,646,270	35,983	119,685	83,702	0.46	2.12	0.05	0.16	0.05	0.04
Netherlands	501,134,302	554,677,907	2,273,088	2,904,789	631,700	0.45	0.52	3.17	3.93	3.25	3.73
New Zealand	38,242,731	37,304,685	495,696	62,078	-433,619	1.30	0.17	0.69	0.08	0.25	0.25
Norway	87,320,955	160,999,480	994,392	122,090	-872,302	1.14	0.08	1.39	0.17	0.57	1.08
Poland	191,430,112	179,603,599	613,360	1,320,698	707,337	0.32	0.74	0.85	1.79	1.24	1.21
Portugal	72,292,573	58,378,986	345,367	124,598	-220,769	0.48	0.21	0.48	0.17	0.47	0.39
Romania	70,259,719	57,904,330	160,443	103,386	-57,058	0.23	0.18	0.22	0.14	0.46	0.39
Russian Federation	316,192,918	524,766,421	1,232,405	415,121	-817,283	0.39	0.08	1.72	0.56	2.05	3.53
Slovakia	76,859,352	79,866,996	299,322	305,264	5,941	0.39	0.38	0.42	0.41	0.50	0.54
Slovenia	28,382,568	27,080,022	144,693	205,149	60,455	0.51	0.76	0.20	0.28	0.18	0.18
Spain	325,835,176	285,936,446	1,295,900	1,037,940	-257,961	0.40	0.36	1.81	1.40	2.11	1.93
Sweden	162,709,211	172,641,917	1,122,761	1,300,182	177,421	0.69	0.75	1.56	1.76	1.05	1.16
Switzerland	197,786,932	225,948,762	2,499,780	730,804	-1,768,976	1.26	0.32	3.48	0.99	1.28	1.52
United Kingdom	689,137,011	481,225,754	5,255,078	5,384,583	129,505	0.76	1.12	7.32	7.29	4.47	3.24
United States	2,333,805,233	1,545,565,186	10,306,669	10,379,991	73,322	0.44	0.67	14.36	14.04	15.12	10.41
Total	9,928,015,318	9,300,445,778	56,221,667	50,674,469	-5,547,198	0.57	0.54	78.34	68.56	64.33	62.62
Albania	4,879,830	1,967,919	16,674	7,289	-9,386	0.34	0.37	0.02	0.01	0.03	0.01
Algeria	50,369,391	71,865,749	107,692	437	-107,255	0.21	0.00	0.15	0.00	0.33	0.48
Argentina	68,507,490	80,927,108	279,112	111,237	-167,875	0.41	0.14	0.39	0.15	0.44	0.54
Belize	880,335	340,449	4,704	25	-4,679	0.53	0.01	0.01	0.00	0.01	0.00
Bolivia	8,281,037	11,793,372	45,243	247	-44,997	0.55	0.00	0.06	0.00	0.05	0.08

Brazil	223,149,128	242,579,776	382,406	67,265	-315,141	0.17	0.03	0.53	0.09	1.45	1.63
Chile	79,461,529	78,276,983	368,714	76,529	-292,184	0.46	0.10	0.51	0.10	0.51	0.53
China	1,818,199,228	2,048,782,233	4,351,106	11,221,524	6,870,418	0.24	0.55	6.06	15.18	11.78	13.79
Colombia	58,087,854	60,273,618	221,032	140,805	-80,226	0.38	0.23	0.31	0.19	0.38	0.41
Costa Rica	18,355,993	11,250,804	139,424	56,591	-82,833	0.76	0.50	0.19	0.08	0.12	0.08
Ecuador	25,196,517	23,852,017	109,180	7,798	-101,383	0.43	0.03	0.15	0.01	0.16	0.16
El Salvador	10,269,627	5,339,088	82,324	21,385	-60,938	0.80	0.40	0.11	0.03	0.07	0.04
Greenland	855,950	476,937	5,768	25	-5,742	0.67	0.01	0.01	0.00	0.01	0.00
Guatemala	16,978,686	10,124,555	186,447	35,390	-151,057	1.10	0.35	0.26	0.05	0.11	0.07
Honduras	8,646,619	5,006,940	50,226	87,008	36,782	0.58	1.74	0.07	0.12	0.06	0.03
Hong Kong	553,486,469	492,907,472	2,895,051	4,038,255	1,143,204	0.52	0.82	4.03	5.46	3.59	3.32
India	488,976,378	289,564,769	710,891	548,804	-162,087	0.15	0.19	0.99	0.74	3.17	1.95
Indonesia	191,690,908	190,031,839	139,208	35,078	-104,131	0.07	0.02	0.19	0.05	1.24	1.28
Jamaica	6,580,358	1,711,790	47,265	1,605	-45,660	0.72	0.09	0.07	0.00	0.04	0.01
Korea Rep. of	519,575,597	547,854,448	1,013,583	572,861	-440,722	0.20	0.10	1.41	0.78	3.37	3.69
Macau	8,982,053	1,020,521	26,505	29	-26,476	0.30	0.00	0.04	0.00	0.06	0.01
Madagascar	2,658,987	1,224,514	24,815	4,939	-19,875	0.93	0.40	0.03	0.01	0.02	0.01
Malaysia	196,196,619	227,449,500	397,619	289,377	-108,241	0.20	0.13	0.55	0.39	1.27	1.53
Mauritius	5,772,006	2,257,737	22,100	5,795	-16,305	0.38	0.26	0.03	0.01	0.04	0.02
Mexico	370,751,407	370,642,552	1,317,776	739,598	-578,178	0.36	0.20	1.84	1.00	2.40	2.50
Nicaragua	5,917,131	2,690,040	40,819	7,159	-33,660	0.69	0.27	0.06	0.01	0.04	0.02
Panama	26,866,100	18,123,040	271,719	147,329	-124,390	1.01	0.81	0.38	0.20	0.17	0.12
Paraguay	11,555,136	7,271,300	370,044	1,947	-368,097	3.20	0.03	0.52	0.00	0.07	0.05
Peru	42,274,274	45,946,180	178,839	95,448	-83,391	0.42	0.21	0.25	0.13	0.27	0.31
Saint Vincent	403,242	43,042	3,841	30	-3,811	0.95	0.07	0.01	0.00	0.00	0.00
Singapore	379,722,889	408,393,020	1,126,520	4,785,472	3,658,952	0.30	1.17	1.57	6.47	2.46	2.75
Turkey	236,544,494	152,536,653	400,703	119,193	-281,511	0.17	0.08	0.56	0.16	1.53	1.03
United Rep. of Tanzania	11,715,589	5,547,229	27,790	1,511	-26,279	0.24	0.03	0.04	0.00	0.08	0.04
Uruguay	11,614,301	8,743,116	22,505	9,933	-12,572	0.19	0.11	0.03	0.01	0.08	0.06
Venezuela	40,938,152	124,586,994	159,413	126	-159,580	0.39	0.00	0.22	0.00	0.27	0.84
Total	5,504,341,306	5,551,403,303	15,547,056	23,238,044	7,690,696	0.28	0.42	21.66	31.44	35.67	37.38
Total	15,432,356,625	14,851,849,081	71,768,723	73,912,513	2,143,498	0.47	0.50	100.00	100.00	100.00	100.00

Note: Data is obtained from UNComtrade, by classification HS96;
The developed and developing countries are specified by UNCTAD STAT





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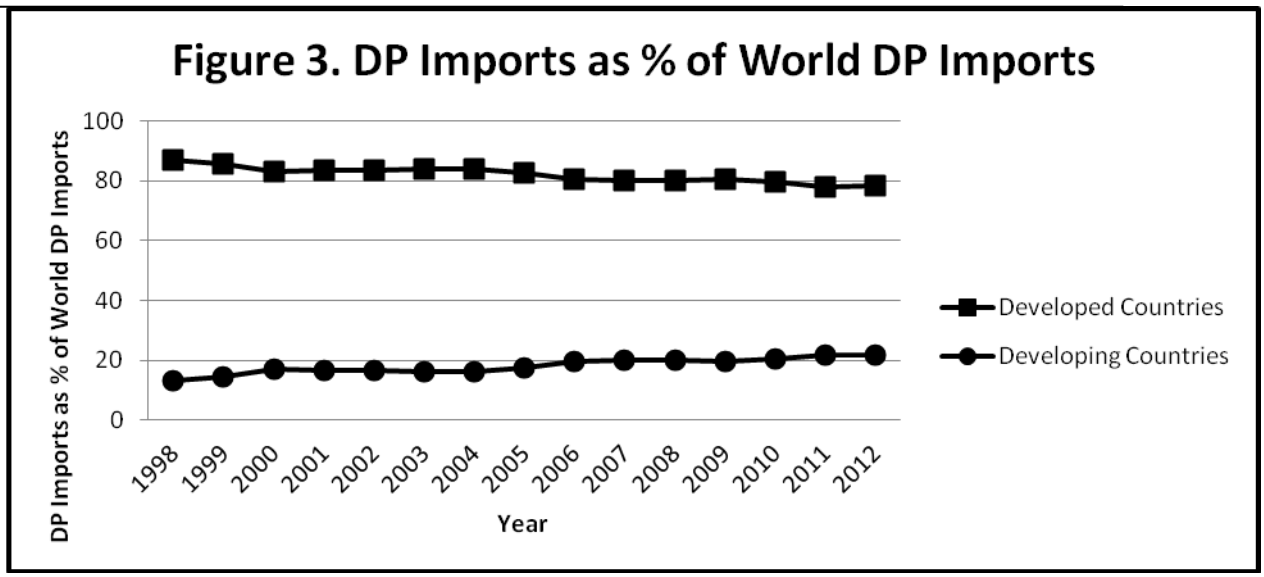

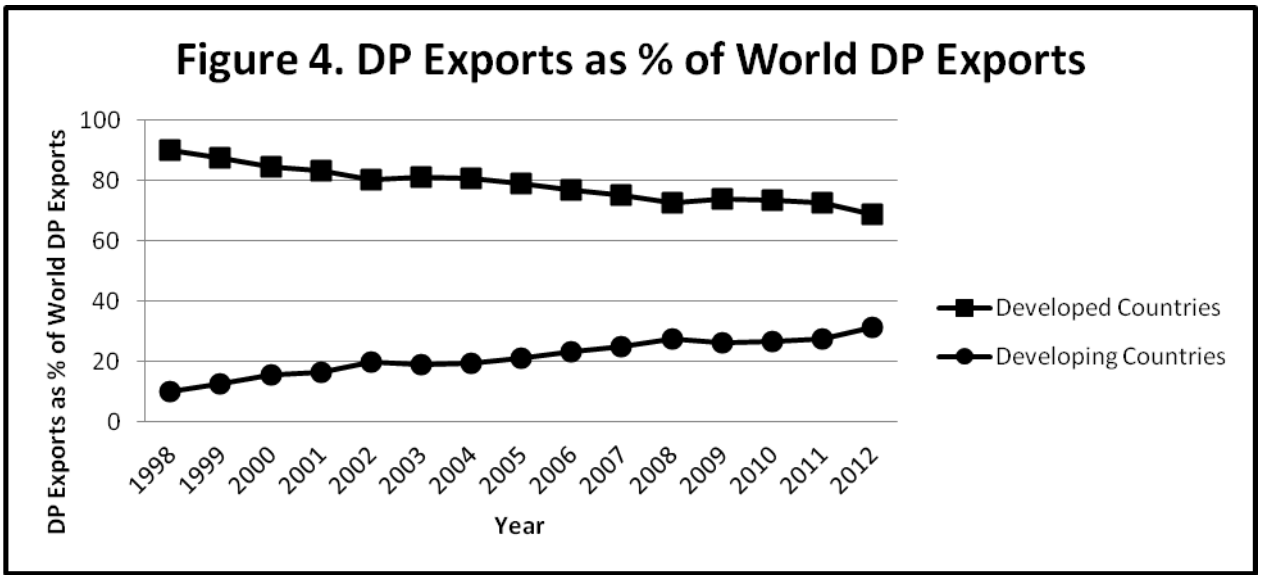

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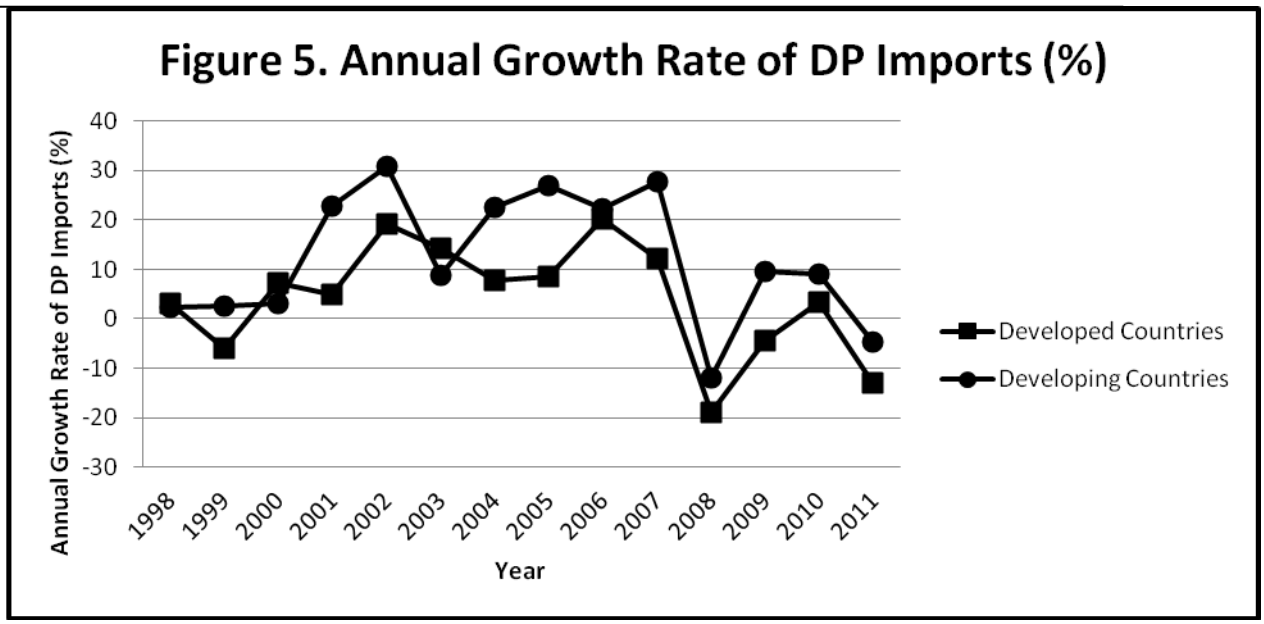

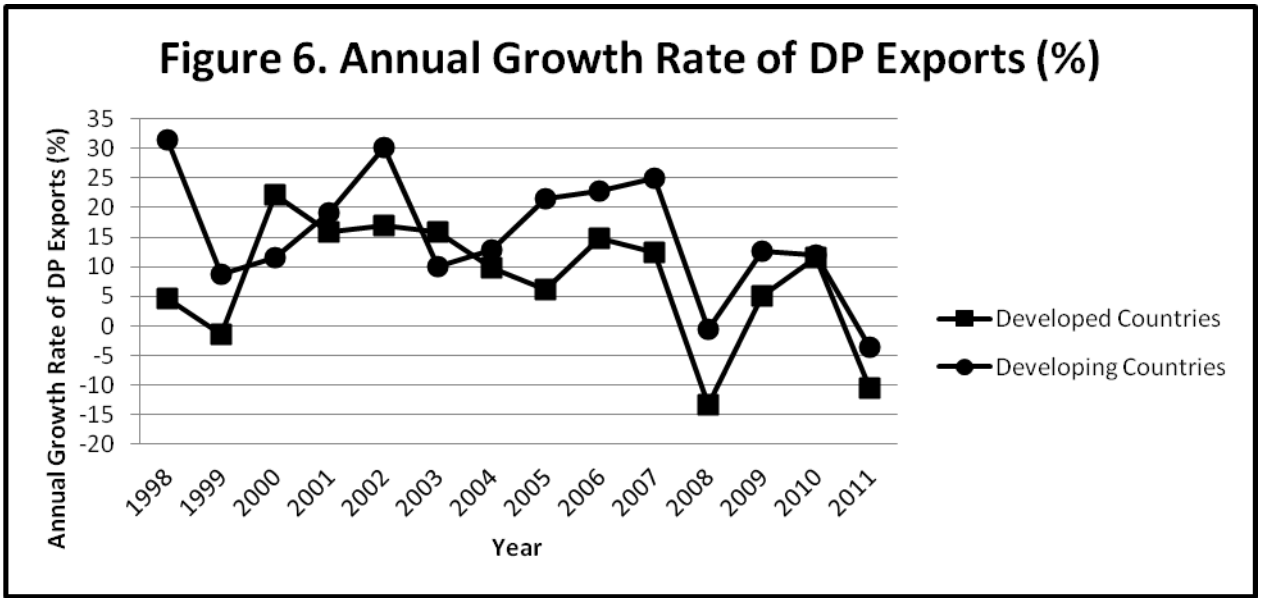

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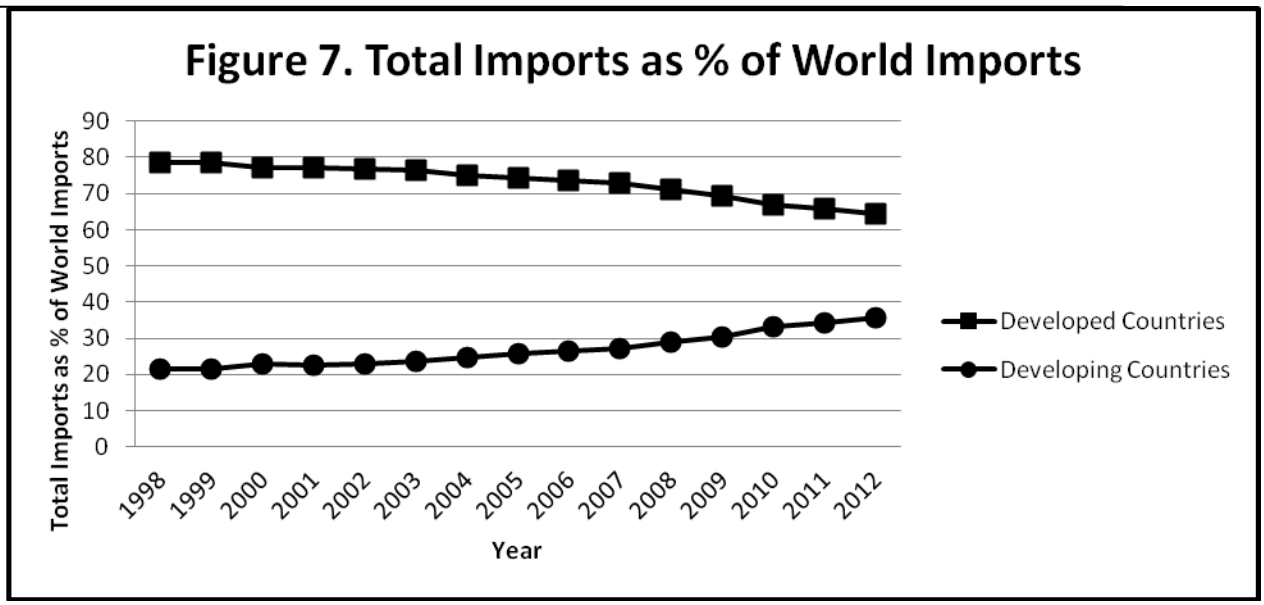
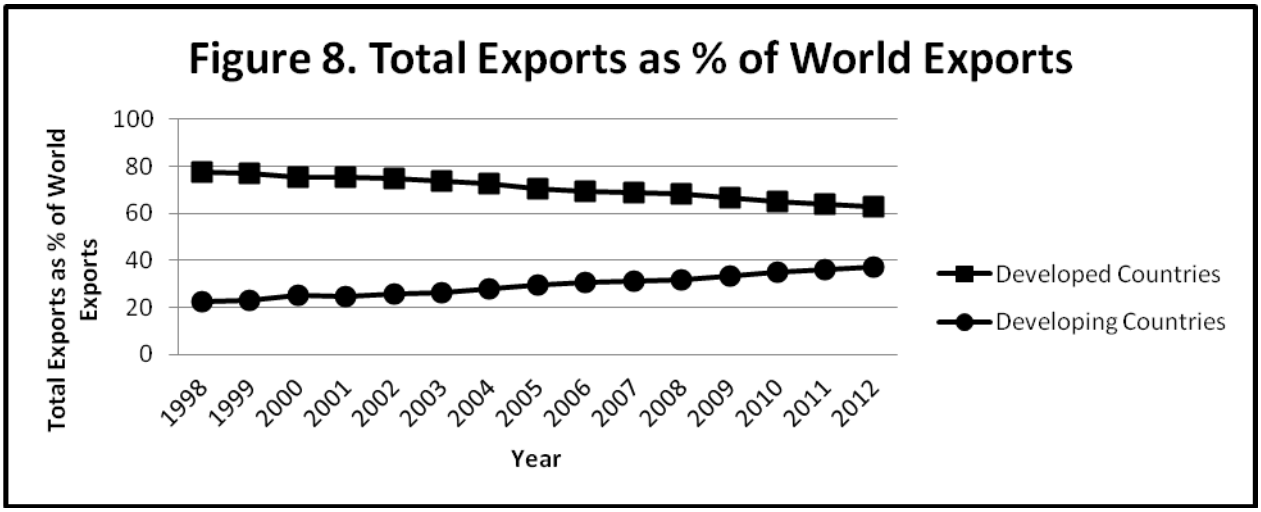
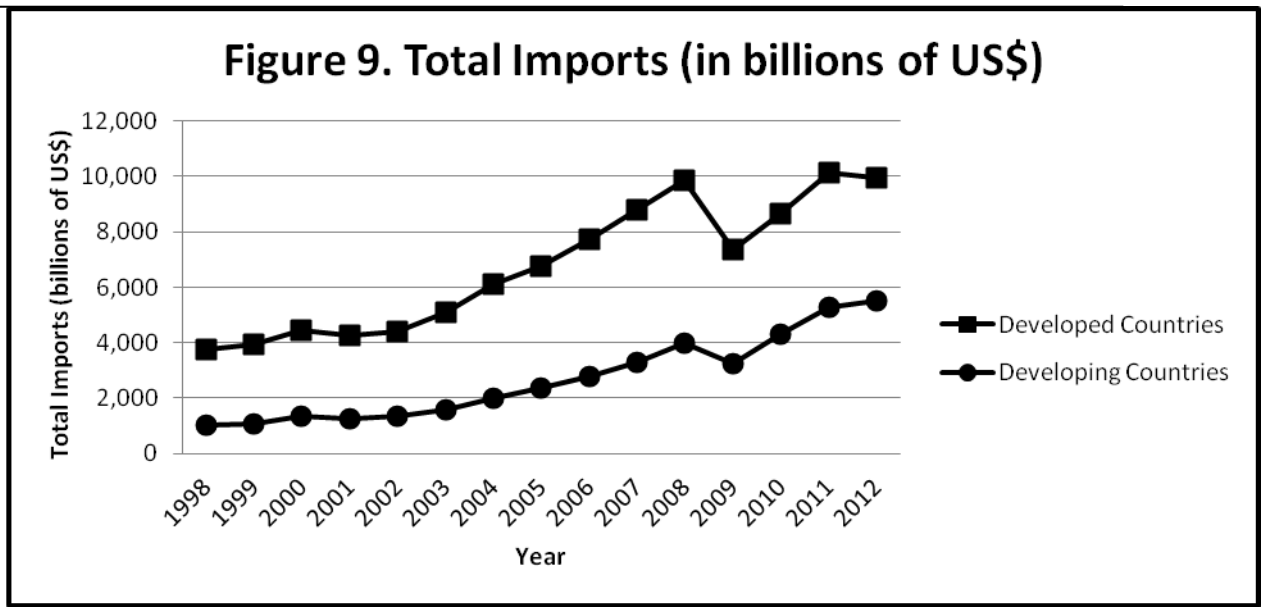
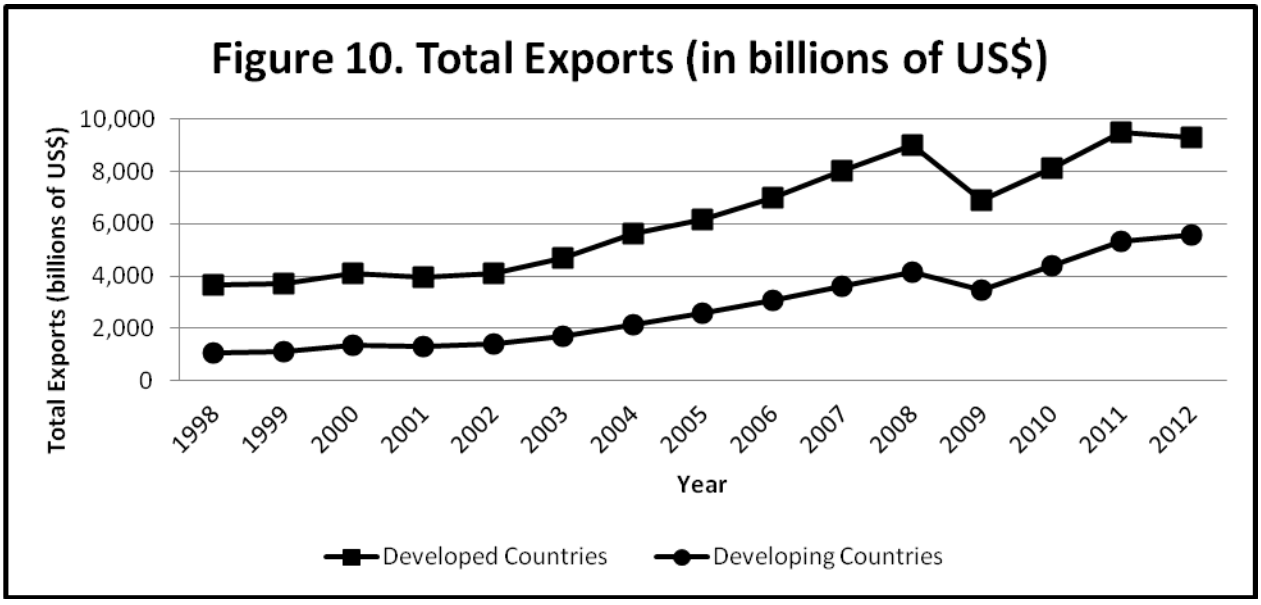
The developed and developing countries are specified by UNCTAD STAT





Note: Data is obtained from UNComtrade, by classification HS96;
The developed and developing countries are specified by UNCTAD STAT





Note: Data is obtained from UNComtrade, by classification HS96;
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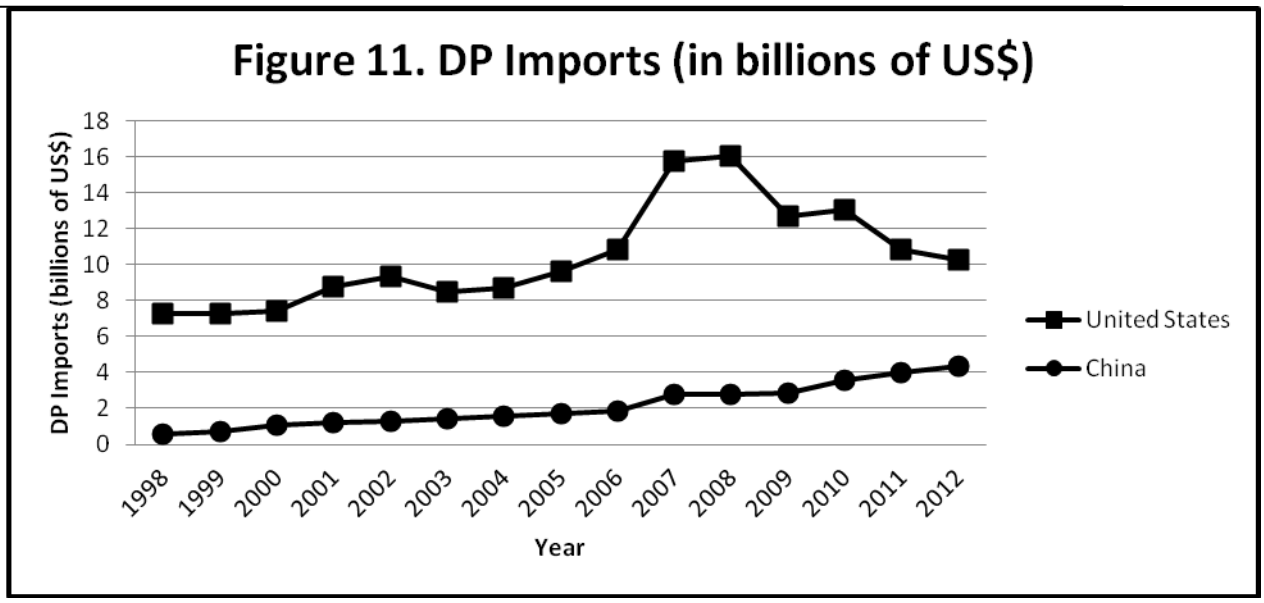
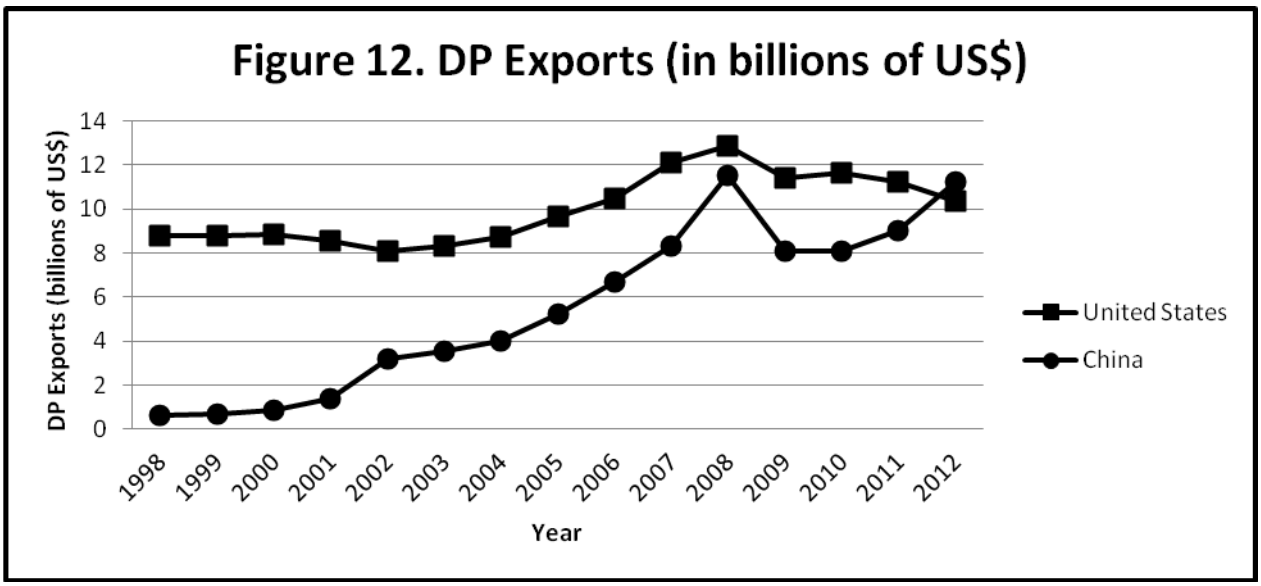
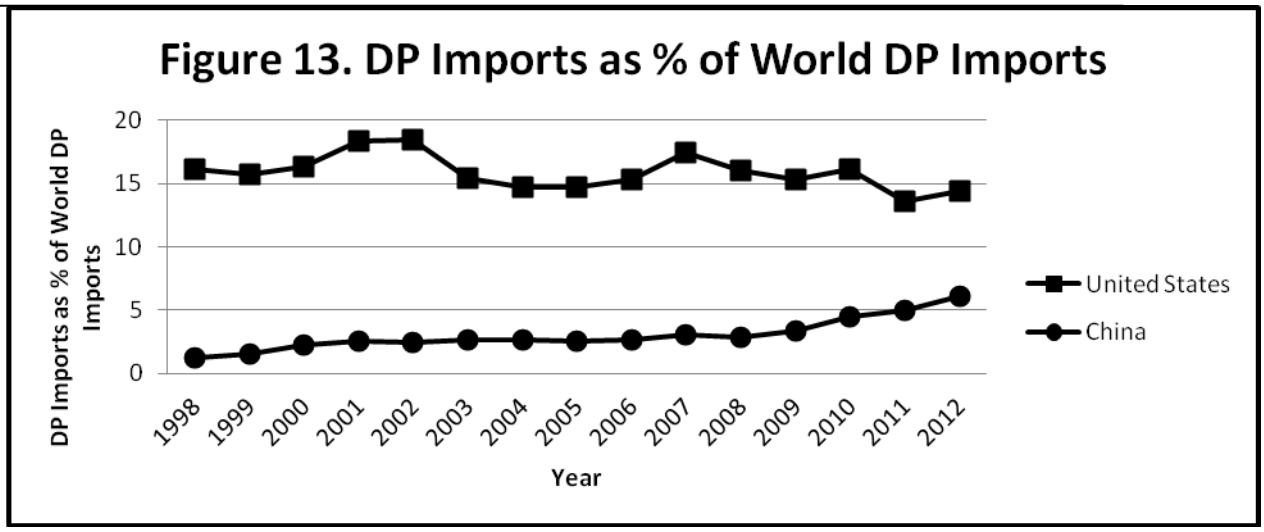
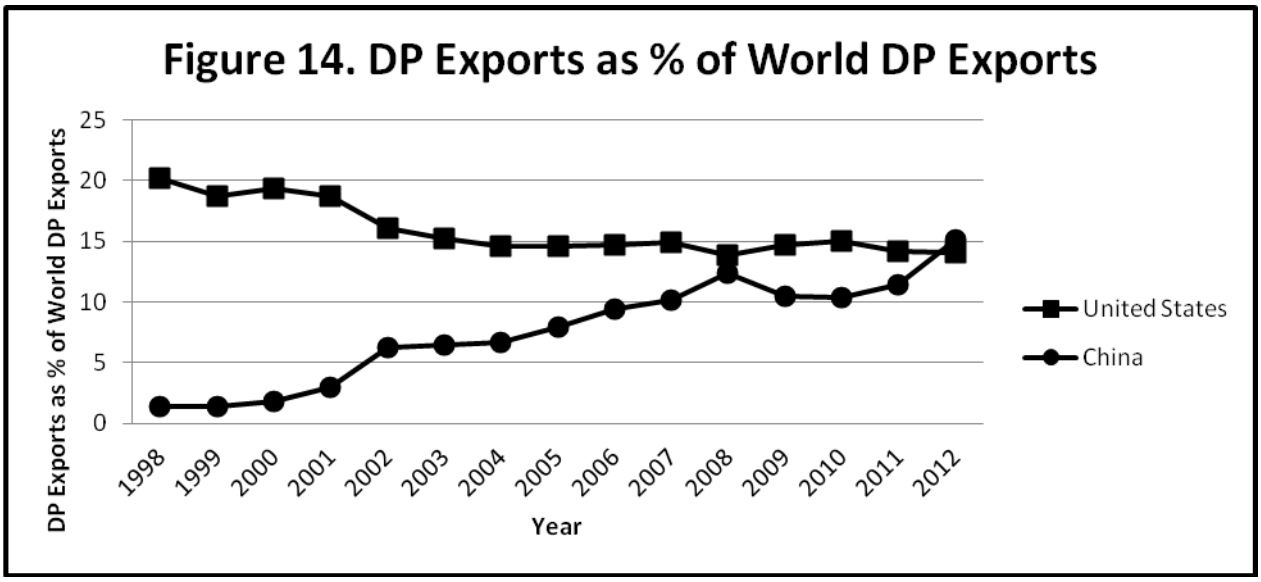




Note: Data is obtained from UNComtrade, by classification HS96;
The developed and developing countries are specified by UNCTAD STAT





Note: Data is obtained from UNComtrade, by classification HS96;
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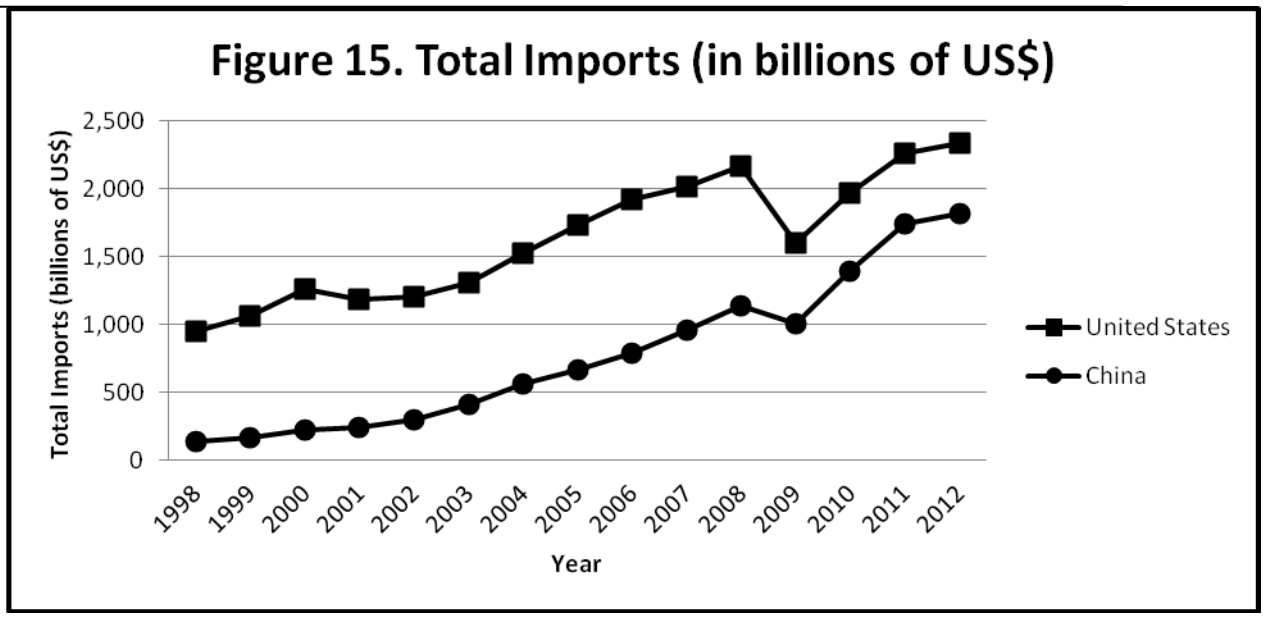

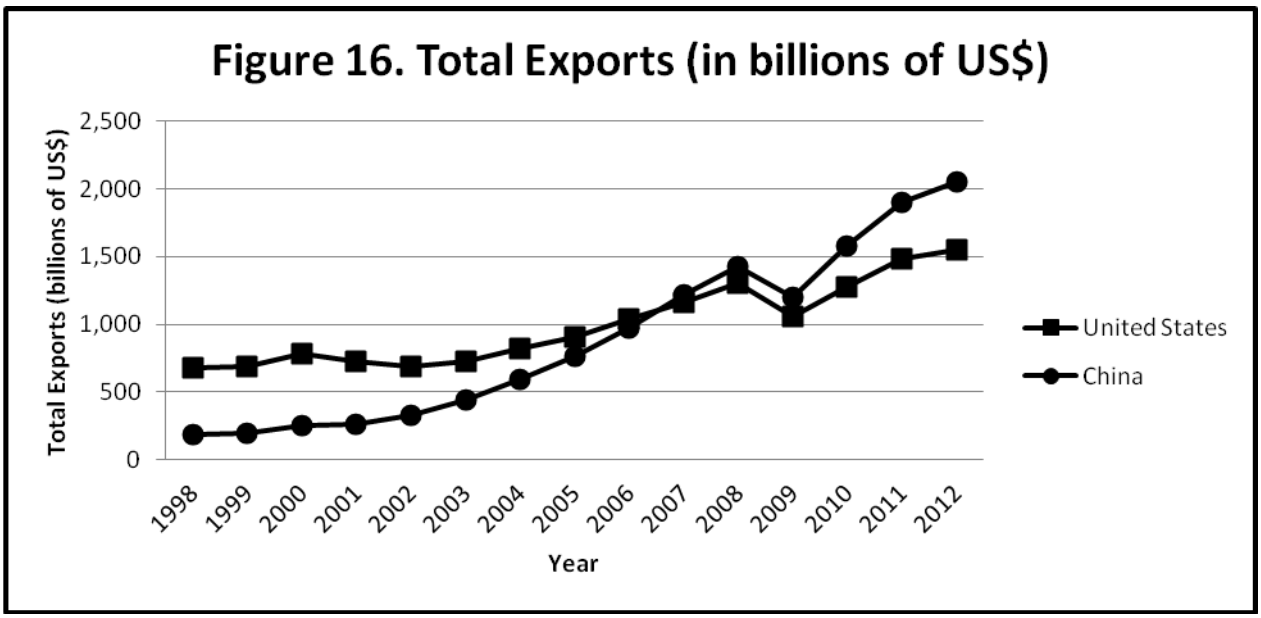

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