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The Impact of REACH on European Chemicals Trade

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Abstract

The European regulation on the Registration, Evaluation and Authorization of Chemicals (REACH) has affected the European Industry across essentially all industrial sectors since its official enactment in 2007. While having the primary objective of protecting human health and the environment, the new chemicals' regulation has been criticised due to the related financial and administrative burden taken on by the chemicals industry and its downstream users. From outside the EU, the regulation continues to be considered a non-tariff trade barrier to the EU chemicals market, artificially protecting domestic supply and thereby causing distortions to international trade. In order to explore these allegations in a semi quantitative manner, cross-border movements of organic chemicals have been monitored and evaluated over the years since implementation of the new regulation. Statistical data provided by the European Commission are presented and analysed in an attempt to assess the impact of REACH on the European chemicals industry and international trade.

Keywords: *REACH; Organic chemicals; Trade barrier*

Abbreviations: Bn: Billion; CMR: Carcinogenic, Mutagenic, or Reprotoxic Chemical; CSA: Chemical Safety Assessment; ECHA: European Chemicals Agency; EEA: European Economic Area; EPA: Environmental Protection Agency; EU: European Union; GDP: Gross Domestic Product; HS: Harmonized System; ICCA: International Council of Chemical Associations; kT: Kilotons; MBA: Master of Business Administration; NAFTA: North American Free Trade Agreement; REACH: European regulation on the Registration, Evaluation and Authorization of Chemicals; SIEF: Substance Information Exchange Forum; SVHC: Substances of Very High Concern; WTO: World Trade Organization

Introduction

European Directive EC 1907/2006, on the Registration, Evaluation and Authorization of Chemicals (REACH) has laid out a fundamental system for collecting, systematizing, and using information about industrial chemicals and its down-stream use [1]. According to its popular maxim "no data-no market" the regulation requires businesses to provide safety data for chemical substances made or sold in the EU or, to withdraw from the European market chemicals produced, imported or used above one ton per year that are not covered by particular substance dossiers. In addition to being applicable in the 28 EU Member States, REACH is of 'EEA relevance' and has been incorporated into the laws of Norway, Iceland and Liechtenstein. It has immediate relevance also to countries aspiring to EU membership, such as Turkey which adopted the Regulation on the Inventory and Control of Chemicals in 2008. REACH is implemented in waves, based on annual quantities per legal entity registering, and the environmental impact and health concern of the substances. The deadline for preregistration of phase-in chemicals in December 2008 marked the start of the REACH implementation period. Registration of bulk chemicals in 2010–those supplied in quantities of over 1000 tonnes per year–and the very hazardous chemicals (SVHC) was followed by the volume band of substance imported or manufactured over 100 tons. By June 2018, the new regulation will affect those chemicals manufactured and imported in amounts over 1 tonne per year, and legal entity (Figure 1).

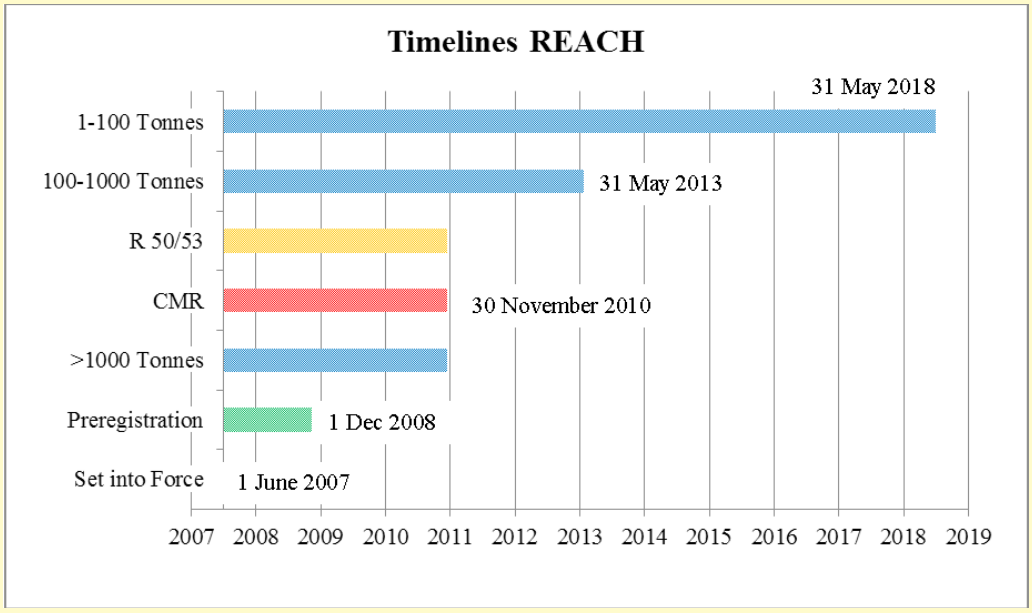

Figure 1: *Timeline of REACH implementation.*

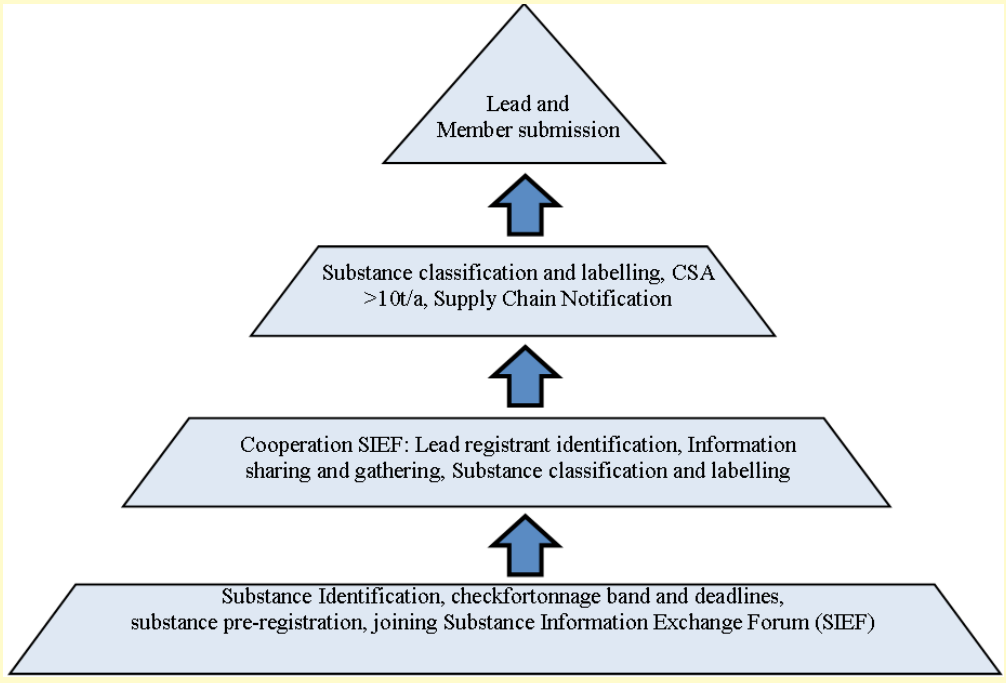

Figure 2: *Requirements of substance registration under REACH.*

In the centre of the new regulation is the requirement for businesses to provide safety data for its chemical substances manufactured, used and commercialized, shifting financial and administrative burden from regulators to the chemical industry. While registration fees with the European Chemicals Agency (ECHA) account for a relatively small share, expenses related to information sharing and gathering, strongly driven by the provision of toxicological data and assessment of the environmental impact of the substances, make up the largest part of a company's expenses (Figure 2). In meeting a company´s REACH obligations, internal human resource expenditure and consultancy fees contribute further to the overall costs. Business sensitive data to be shared often are subject to confidentiality clauses, adding further expenses and resources in their preparation. The European Commission calculated an average cost of € 85,000 for each of about 30,000 chemical substances notified which sums up to about 2.5 billion Euros of total registration and testing expenses [2]. On another occasion, the total cost of REACH were estimated to up to 9.5 billion Euros, spread over its eleven years period of implementation, and ambiguity still exists about what REACH will eventually cost the chemical industry [3]. Nevertheless such vast amounts are relativized by the total size of the European chemicals business, which accounted for € 558 billion in 2012 alone. Furthermore, the European Commission estimated some 20-40 billion Euros occupational health benefits through the development of safer and environmentally benign chemicals as a direct consequence of REACH [4].

After two of the three stages of its implementation have been accomplished it is evident that REACH functions well and delivers on its key objectives to increase safety to human health and the environment by constricting applications of hazardous chemicals, enhancing transparency and information related to chemicals manufacturing, their use and disposal along supply chains [5,6]. By December 2014 a total of 7992 unique substances were registered, covered by 40229 individual registrations [7]. Of those, 22% were filed by Only Representatives on behalf of non-EU manufacturers and a 41% of the total number came from small and medium sized companies. 14783 of these registrations had been already processed for the December 2010 deadline, 90% of which were related to high volume chemicals. The next wave of the 100-1000 ton volume band saw 9030 registrations completed by the June 2013 deadline, filed for 2923 unique substances. By the end of 2013 about half of the 38095 registrations received by ECHA were filed by importers or Only Representatives acting for non-EU manufacturers which is reflecting the dependence of the European chemical industry on global supply chains.

Of the 29,000 phase-in substances identified at the end 2008, substances covered by registrations to date only make up for about 28% of the total number. Albeit there are substances that due to their hazardous nature and/or high cost of registration will be eventually withdrawn from the European market, this ratio suggests that the larger number of phase-in substances are yet to be registered under REACH. The 2018 deadline for registrations of the 1-100 tons volume chemicals will inevitably produce a larger number of registrations, as small and medium sized manufacturers and distributers become involved. Nevertheless, chemicals that enter the European market in massive quantities make up for the bulk of European chemical imports in terms of volume. These are now largely covered by registrations after completing the second wave of implementation, [8] and it is the aim of this study to investigate the impact of REACH on bulk chemicals imports to the European chemicals market.

Results and Discussion

The European Union reported annual revenues for chemicals of 558 billion Euros for 2012, which represents about 18 per cent of global chemical sales [9] (Figure 3). Europe regularly reports a trade surplus with the Americas and most other world regions, which is a clear indicator for its competitive position in the chemicals business (Figure 4). However, in the past five years the EU's chemical industry grew only moderately by 0.9 per cent, as opposed to an average 3.6 per cent growth worldwide. Not surprisingly, the largest share of the 3.13 billion Euro worldwide chemicals business is now occupied by China, which consistently outpaced Europe and the Americas by boosting double digit growth rates in the past decade.

Figure 3: *Worldwide shares of chemical businesses (Billion Euro) by the end of 2012 [10].*

The trend of increased involvement of China in the chemical business clearly is a reflection of favorable Asian value chains. Quickly growing production capacities on the back of the world's largest population and a steadily growing domestic market combined with an ever-growing outsourcing tendency from western-world economies rendered Chinese production highly competitive at international level due to its favorable economies of scale. A rapidly developing infrastructure and improved logistic links with Europe contribute further to the increased competitiveness of Asian manufacturing.

On the other hand market entry for European chemicals supplies into these regions has been notoriously difficult due to regulatory complexity in major Asian economies such as Japan and China. In addition, China recently implemented its "Measures for the Environmental Management of New Chemical Substances", in analogy to REACH [10,11]. Widely dubbed as "China REACH" it requires eco-toxicological tests to complete the substance dossier which depend on the notification type and registration tonnage band.

Several other international standards for chemicals management exist alongside REACH, most importantly the High Production Volumes Program (EPA) and the Responsible Care Program (ICCA) [12,13]. Both are globally respected environmental standards that found broad acceptance within the European manufacturing community, yet do not as such form an integral part of REACH. In fact REACH must be considered complementary to existing national and international regulations rather than having a purely supplementary function.

Traded goods are categorized by the Harmonized System, an internationally standardized system that obliges contracting parties to base their tariff schedules on a minimum of six common digits. Extra digits are often assigned for statistical reasons. The HS nomenclature divides goods into 21 sections and 96 chapters, according to their form and function. Databases such as EUROSTAT provided by the European Commission's statistical division allow for product specific tracking of traded products on the basis of the Harmonized System [14,15]. Chemical products are listed under the chapters 28-40 divided into Organics, Inorganics, Fertilizers, Surfactants, Starches,

Pharmaceuticals, Plastics and Rubber Chemicals. Some chapters comprise of chemicals that are largely exempted from REACH such as polymers, minerals, natural products. HS 29 Organic Chemicals represent the class of chemicals mostly affected by REACH, which forms the basis of the following discussion. Chapter 29 is essentially formed of Alcohols, Aldehydes, Acetals, Amines, Ammonium salts, Carbonic acids and anhydrides, Hydrocarbons, Esters, Ethers, Epoxides, Ketones, Nitriles, Nitrogen containing and Organosulfur chemicals.

Figure 4: *Imports and exports of HS 29 Organic Chemicals (Billion Euros) for the EU27 countries by 2013 [14].*

Tracking the trade data of a single substance is a rather difficult as HS codes are formed on the grounds of chemical structure as well as their application. Consequently, different HS codes may exist for the same chemical but with broad application across various industrial sectors. Furthermore in covering the broad spectrum of these chemicals the simplification can be made that their market specific dynamics such as supply and demand fluctuations are compensated for within the chapter 29 group of chemicals. In addition, technological advancements such as the substitution of hazardous substances and market entry of new, innovative chemicals influence market behavior and consequently chemical trade [16,17]. In considering traded volumes rather than monetary value these effects are assumed to be only marginally affecting the total of cross-border movements of chemicals. The annual variation of organic chemicals imported to the European Union over the past five years thus represents the best indicator for assessing the impact of REACH on international trade. The analysis will be based on the EU27 omitting the data for Croatia that joined the EU in 2013, after the implementation of REACH.

Imports of organic chemicals, as measured in weight, experienced considerable variations over the timeframe accessible through Eurostat but on average grew by about 4 percents annually (Figure 5). These data reflect the growing globalization and outsourcing trend within chemical supply chains. The years 2008 to 2009 were marked by a sharp drop for both exported, and more pronounced for imported chemicals which coincidence with the worldwide financial and economic crisis. The subprime crisis that shocked the financial

community by September 2008 almost instantly led to a massive feeling of insecurity in which financial institutions essentially froze the worldwide credit markets. In the following three quarters consumers, companies, and investors held off on postponable purchases that had a dramatic negative effect on aggregate demand and consequently, international trade. The world economies, with exception of China, experienced a synchronized drop in Gross-domestic product by approximately 3-4 per cent from the 3rd quarter 2008 to the 2nd quarter 2009 [18]. This demand shock was of extraordinary magnitude and felt to a greater extent in the chemicals industry than in many other industrial sectors. Manufacturing of value added chemicals saw a synchronized and sudden drop as the consequence of the economic downturn in all cyclic businesses such as construction, automobile and many other industrial sectors. The highly integrated nature of supply networks infected exports and imports on a global scale, leading to an estimated13 per cent overall decline of global trade in 2009 [19]. As a fear-factor, demand drop was the main driver for the 2009 trade collapse, the growing confidence in international markets led to an equally sudden recovery by 2010. In addition, robust demand from Asian markets drove international trade to remarkable growth. In 2010 worldwide trade rose by nearly 15 per cent the strongest growth since the end of the Second World War [20]. Consequently, demand for chemical raw materials and intermediates saw a swift recovery. In Europe however, the stability of the financial markets were more heavily affected than in other global economies. Sovereign-debt crises repeatedly hit Europe in the period of global economic recovery and started to effect market behavior and international trade. Even so, national support packages, crisis induced stimuli, and austerity measures at national level influenced domestic output in the years following the economic recession. As sovereign policies certainly helped temporarily to ease the effect of the recession it caused distortions to international markets and worldwide trade. In depth studies have shown that expenses for bilateral trade rose by about 11 per cent as the consequence of the worldwide recession [21]. These facts give a rationale for the relatively heavy variations observed for imports and exports of organic chemicals in the most recent years.

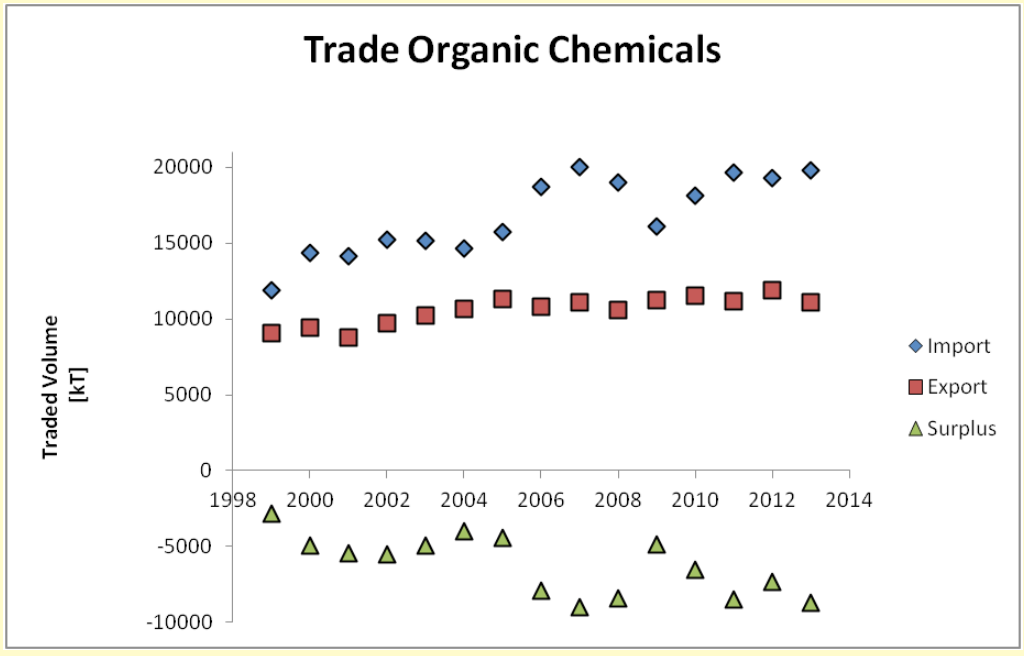

Figure 5: *Worldwide trade organic chemicals of the EU27 countries [14].*

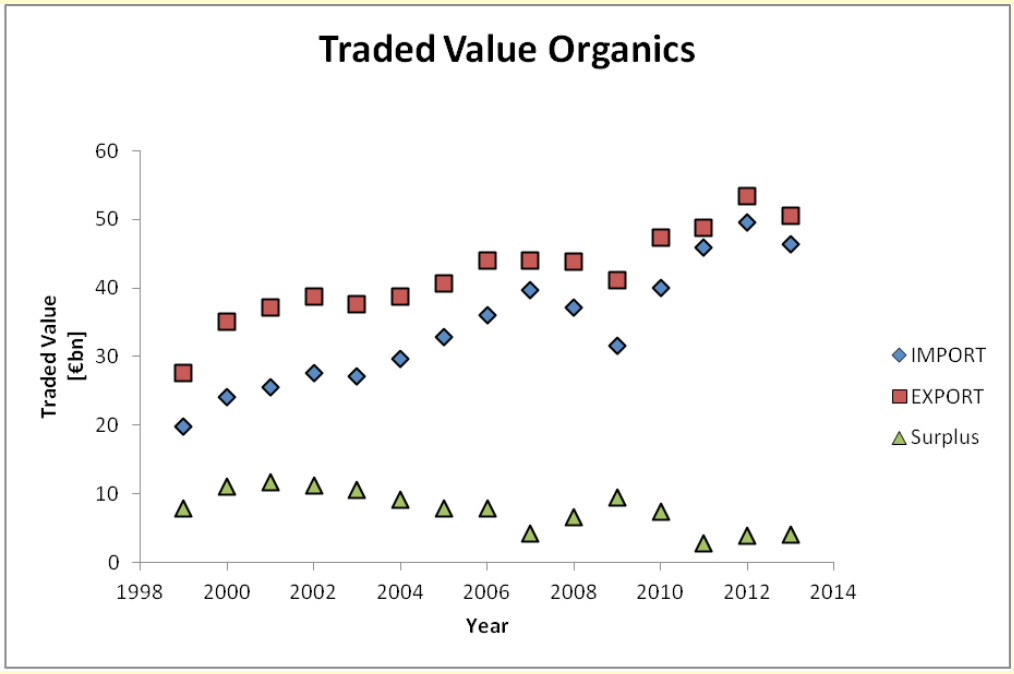

Figure 6: *Global trade organic chemicals of the EU27 countries (since the monetary union 1999) [14].*

Trade surplus is expressed as the difference of exports and imports and is an indicator for the competitiveness of an economy. In considering chemical volumes, the EU27 reported a negative trade surplus (Figure 5) as opposed to trade surplus based on monetary value (Figure 6). The apparent antagonism corroborates the European Chemicals Industry`s position in which commodities are largely imported to manufacture value added chemicals. These are then consumed within the borders of the European Union or back exported in form of advanced materials to the world economies. Interestingly, the decline for exported value of organic chemicals was much more pronounced in 2009 compared to its drop in volumes. The argument of a currency effect is not very strong as the exchange rates of the Euro, although weak against the US dollar in the first semester, recovered quickly over the second half of the year 2009 [22]. It appears that the European chemicals industry widely divested surplus capacities across its borders at the time, at the cost of revenue and profit. The trade volume of organic chemicals within the European Union is about twice as much as the trade across its borders (Figure 7). As the impact of the global recession was felt particularly strongly in Europe, competition at the global markets was the obvious alternative to compensate for the stagnant European business.

Technical regulations may be introduced by governments to protect their domestic industry from international competition in which case the term Non-Tariff Trade Barrier is used. In its character, REACH is a technical regulation as it lays down the characteristics of the substances used and manufactured in the EU and sets their standards for the purpose of health protection, safety and impact on the environment. However REACH is designed to be applied to both EU and non-EU producers, and under WTO rules every member is free to determine the level of protection of its population's health and environment [23]. Therefore the regulation can hardly be challenged as such, but some of its aspects have been brought forward under WTO Art 2.1 Technical Barriers to Trade Agreement [24]. Conflicts may arise from asymmetric implementation of the regulation and specific technical requirements that lead to a discrimination of the trade partners involved. For example, participation in the Substance Information Exchange Forum (SIEF) has been controversial

been controversial for companies that operate from outside the EU. Confidentiality issues may arise in sharing business sensitive data with their customers or a lead registrant which is often the main European competitor. Also, non-European manufacturers and importers that willing to compete on the European market must not file their registration on their own behalf, but have the obligation in going through European regulatory services in form of the "Only Representative". To partner with a European affiliate in going through the registrations process is meant to avoid the violation of basic principles of international law, since the European Commission cannot set standards in territories outside its jurisdiction. However leaving the regulatory part of businesses in the hands of external service providers, or alternatively, EU distributers and customers can increase costs and the risk of disrupting supply chains at a later stage in the business cycle [25]. Thus it has been anticipated that non-EU manufacturers may exit the EU market entirely to shun the large initial investments for REACH compliance. Certainly REACH does affect European manufacturers in a more direct way as its compliance cost cannot be avoided by simply exiting the European market. However in having Europe as their main market, REACH related expenses might be recovered much more quickly than companies operating from outside Europe, thereby limiting risk and financial burden.

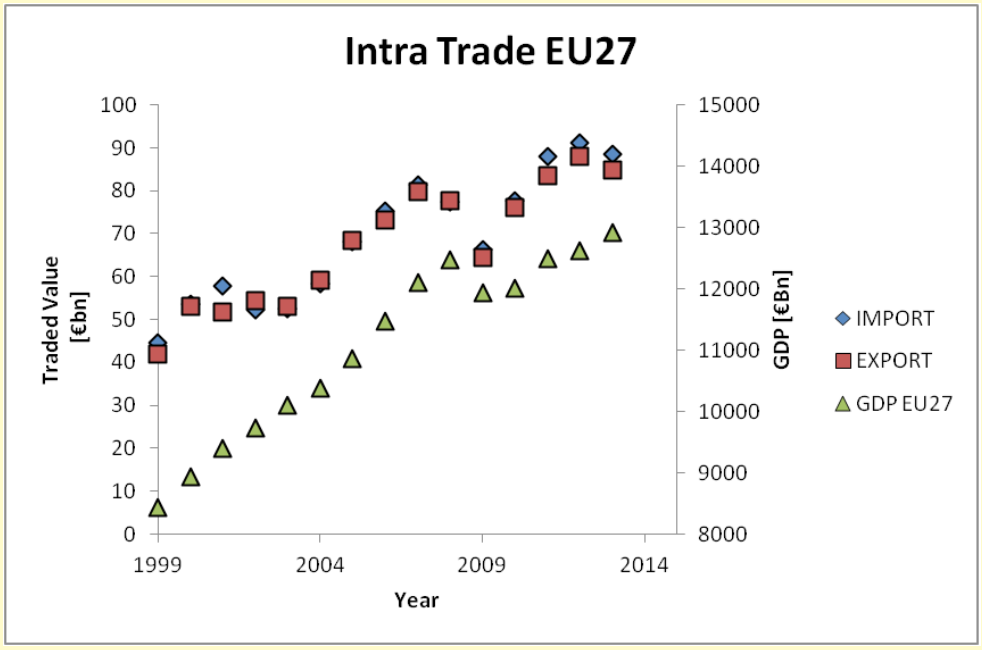

Figure 7: *Gross-domestic product (EU27) and trade organic chemicals between its member states [14].*

Whether or not specific technical aspects of REACH cause distortions to imports may be difficult to assess for a particular chemical but if REACH represented a Non-Tariff Trade Barrier in the general sense, one might expect a continuous decrease for imports since its implementation in 2007. As REACH not only concerns the chemical business but equally so its downstream users across a broad range of industries, the impact on chemical imports would be pronounced and, as a result of its volume based approach, highly synchronized. Although REACH was already put into force by July 2007, the 2010 and 2013 milestones had direct mandatory effect and therefore represent the more important reference points in evaluating its impact on chemicals trade. Starting with the 2010 data it becomes apparent that chemical import grew significantly in that period. Also, a steady decrease of trade surplus indicates much stronger growth for imports relative to exports, clearly contra intuitive to the theory of a non-tariff trade barrier to the European market place

(Figure 5). In general Trade Barriers, seen as a competition restricting measure, would cause the demand curve of a given market to shift and cause its equilibrium price to increase. In comparing volume and value based imports of organic chemicals this trend should become apparent. The data collected for the past four years however indicate a clear correlation of volume and value of organic chemicals, lacking the clear evidence for a shift of the market equilibrium (Figure 8). Drawing conclusions from the entirety of thousands of chemicals, each of them subject to its own market dynamics is certainly a daring venture. However, it is apparent that the group of organic chemicals when considered on a yearly basis does in fact follow an obvious pattern in which imported volumes are correlated linearly with their respective values.

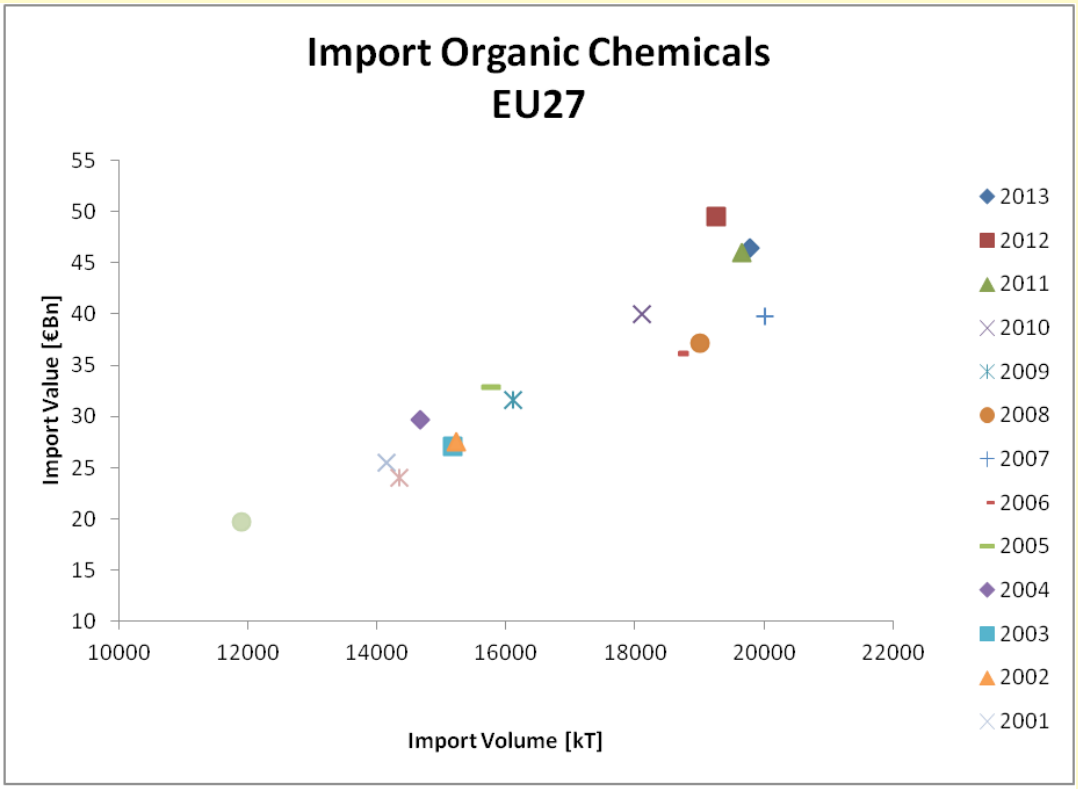

Figure 8: *Evolution imports of organic chemicals for the total of the EU27 countries [14].*

Conclusion

The impact of the new European chemicals regulation REACH on international chemicals trade has been investigated. The yearly evolution of imports of organic chemicals indicate a steady growth over the years of REACH implementation, both in terms of quantity moved across European borders and in monetary terms. Imports of organic chemicals were heavily impaired by the 2008/2009 worldwide financial and economic crisis, and its effects on the data have been evaluated. Statistical data do not support the hypothesis of a general trade barrier to the EU chemicals market due to REACH. Possible discriminatory elements of REACH that would asymmetrically affect non-EU manufacturing and chemical imports are not unambiguously reflected across the data and the period considered in this study. In moving towards the third and final wave of REACH implementation, the data may become more strongly biased due to increasing participation of small and medium sized companies in the registration process. Therefore this topic will continue to be in the centre of attention in the upcoming years and remain worthy of further investigation.

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Bibliography

1. "European Chemicals Agency". Web, December 30, 2014.
2. Milmo S. "REACHing for a Price Tag". *C&I Magazine* 2 (2011): Web, December 30, 2014.
3. O'Driscoll Cath. "REACH costs could soar to €9.5bn". *C&I Magazine* 17 (2009): Web, December 30, 2014.
4. DiGangi J. "REACH and the Long Arm of the Chemicals Industry". *Multinational Monior* 25 (2004): December 30, 2014.
5. "European Chemicals Agency". Web, December 30, 2014.
6. Todd M. "Within REACH?" *Speciality Chemicals Magazine* June 2013. Web, December 30, 2013.
7. "European Chemicals Agency". Web, December 30, 2014.
8. "European Chemicals Agency". Web, December 30, 2014.
9. "European Chemical Industry Council". Web, December 30, 2014.
10. "European Chemical Industry Council". Web, December 30, 2014.
11. "Ministry of Environmental Protection". *The People's Republic of China* Web, October 30, 2013.
12. "Environmental Protection Agency". Web, September 30, 2013.
13. "International Council of Chemical Associations". Web, September 30, 2013.
14. "European Commission". Web, December 20, 2014.
15. "European Commission". Web, November 30, 2014.
16. "Eastman to cut two Phthalates". *Speciality Chemicals Magazine* April 2011. Web, November 30, 2014.
17. "BASF". Web, December 30, 2013.
18. "European Commission". Web, December 30, 2014.
19. "Organization for Economic Cooperation and Development". Web, September 2013.
20. "VOXEU". Web, September 2009.
21. "VOXEU". Web, November 2009.
22. "OANDA". Web, January 2014.
23. Harrell S. "Analysis of the EU's Chemicals Regulation Program under World Trade Organization Agreements". *Wisconsin International Law Journal* 24 (2006): 471-475. Print.
24. Yaygir D. Web, December 30, 2013.
25. Nair A. "REACH threatens Export". *C&I Magazine* 6 (2011): Web, December 30, 2013.

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