ISSN 2042-2695

CENTRE *for* ECONOMIC PERFORMANCE

CEP Discussion Paper No 1417

March 2016

How Have EU's Trade Agreements Impacted Consumers?

Holger Breinlich
Swati Dhingra
Gianmarco Ottaviano

THE LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE

E·S·R·C ECONOMIC & SOCIAL RESEARCH COUNCIL

Abstract
Over the past two decades, the European Commission has negotiated a number of Free Trade Agreements (FTAs) which contain both traditional elements of bilateral tariff reductions, as well as additional liberalisation measures like non-tariff barriers. According to economic theory, FTAs lower trade barriers on imported goods, leading to consumer welfare gains from increase in product variety, better quality products and lower prices for existing products. We estimate the variety, quality and price effects of EU FTAs, drawing on recent developments in the quality literature and using detailed import price and expenditure data. On average, trade agreements the EU has entered into over the past two decades increased the quality of UK imports from its FTA partners by 26 per cent and lowered the quality-adjusted price of imports by 19 per cent. We find that consumer prices fell by 0.5 per cent for UK consumers as a result of FTAs with trade partners that are not members of the European Community. Price reductions for UK consumers are greater than those for EU12 consumers, whose prices fell by 0.3 per cent from non-EC FTAs. Using the set of non-EC FTA estimates to predict the effects of future FTAs, we find a projected decline in consumer prices for UK consumers of 0.4 per cent from an FTA with the United States (TTIP) and 0.2 per cent an FTA with Japan (EPA). For EU12 consumers, the TTIP and EPA are predicted to reduce consumer prices by 0.3 per cent and 0.1 per cent.

Keywords: trade agreements, EU, consumers

This paper was produced as part of the Centre's Trade Programme. The Centre for Economic Performance is financed by the Economic and Social Research Council.

We are grateful to Ms Elitsa Garnizova (LSE Enterprise) for administrative support and to Mr C. Thomas and Mr C. Alexander for helpful discussions.

Holger Breinlich, London School of Economics, Centre for Economic Performance, CEPR and Nottingham University. Swati Dhingra, London School of Economics, Centre for Economic Performance and CEPR. Gianmarco Ottavaiano, London School of Economics, Centre for Economic Performance and CEPR.

Published by
Centre for Economic Performance
London School of Economics and Political Science
Houghton Street
London WC2A 2AE

Executive Summary

Over the past two decades, the European Commission has negotiated a number of Free Trade Agreements (FTAs) which contain both traditional elements of bilateral tariff reductions, as well as additional liberalisation measures linked to non-tariff barriers, services trade, government procurement and the protection of intellectual property rights. According to economic theory, FTAs lower trade barriers on imported goods, leading to consumer welfare gains from increase in product variety, better quality products and lower prices for existing products. We quantify the impact of recent European Union (EU) FTAs on consumers, with the purpose of enabling an assessment of past and future FTAs for UK and EU consumers. We estimate the variety, quality and price effects of EU FTAs, drawing on recent developments in the economics literature and using detailed import price and expenditure data. This methodology is used to forecast the potential effects of two FTAs which are currently being negotiated, the EU-Japan Economic Partnership Agreement (EPA) and the EU-US Transatlantic Trade & Investment Partnership (TTIP).

Impact on Imports

Our baseline methodology consists of two steps that build on well-established techniques from international trade and industrial organisation. First, we use disaggregated international trade data to compute measures of variety, quality and quality-adjusted prices available to consumers. In a second step, we link these measures to the trade liberalisation brought about by the FTAs entered into by the EU. At the most disaggregated level, we have quality and quality-adjusted price information for 5,000 products in the trade data.

We find that trade agreements negotiated by the European Union provided UK consumers with access to better quality products and lower prices for imported products. On average, trade agreements the EU has entered into over the past two decades increased the quality of UK imports from its FTA partners by 26 per cent and lowered the quality-adjusted price of imports by 19 per cent. Our baseline methodology enables a straightforward computation of quality, quality-adjusted prices and variety for essentially all traded goods in an economy. As such, it is very comprehensive and can be easily used to analyse the effects of a wide range of different FTAs; all that is

needed are readily available trade data. Our method can be applied at very detailed levels of aggregation, so that even small changes brought about by FTAs can be detected. The estimates nonetheless provide a lower bound on the potential gains from trade. We focus on the direct impact of trade agreements on access to imported products of better quality, lower quality-adjusted prices and greater variety. Trade agreements are expected to increase consumer welfare further because they stimulate competition in the domestic market, leading to lower prices for domestically produced goods. Lack of disaggregated data on domestic products prevents us from estimating this indirect effect of trade agreements on consumer welfare.

Impact on Consumers – Previous FTAs

To understand how these changes in quality-adjusted import prices translate into prices faced by consumers, we propose a methodology to quantify the price impact of trade agreements on consumers using detailed product-specific data underlying the construction of consumer price indices (CPI). We first estimate the reduction in import prices from trade agreements. Then we combine these estimates with the share of imports in a given CPI index to compute the implied reduction in consumer prices.

We find that consumer prices fell by 0.5 per cent for UK consumers as a result of FTAs with trade partners that are not members of the European Community. This implies that non-EC FTAs save UK consumers approximately £5.3 billion every year. By comparison, the recent 2004/2007 EU accessions led to a decline of consumer prices by 0.4 per cent. For the EU12, we estimate reductions of 0.3 per cent for non-EC FTAs and 0.9 per cent for the recent EU accession. Our estimates are based on the price impact of trade agreements that were recently negotiated. We therefore expect consumers to benefit further from these trade agreements as they continue to be fully implemented over time.

Impact on Consumers – future FTAs

Using the set of non-EC FTA estimates to predict the effects of future FTAs, we find a projected decline in consumer prices for UK consumers of 0.4 per cent from an FTA with the United States (TTIP) and 0.2 per cent an FTA with Japan (EPA). The corresponding yearly savings in consumer expenditure are £4.2 billion (TTIP) and £2.1 billion (EPA). When we instead assume that TTIP and EPA would have an impact on UK import prices

similar to the 2004/2007 EU accessions, we predict a consumer price decline of 0.2 per cent for both agreements. For EU12 consumers, the TTIP and EPA are predicted to reduce consumer prices by 0.3 per cent and 0.1 per cent, if we assume a similar import price effect to non-EC FTAs. If the effect were instead similar to EU accessions, the price reductions would be 0.3 per cent for both TTIP and EPA.

1. Introduction

The European Commission negotiates Free Trade Agreements (FTAs) on the United Kingdom's (UK) behalf. Over the past two decades, a number of FTAs have been negotiated which contain both traditional elements of bilateral tariff reductions, as well as additional liberalisation measures linked to non-tariff barriers, services trade, government procurement and the protection of intellectual property rights. This paper investigates the effects of these FTAs on UK and EU consumers, with the purpose of enabling an assessment of past and future FTAs.

Economic theory predicts that FTAs should benefit consumers through lower prices, higher quality and greater product variety (Krugman [1979, 1980], Helpman and Krugman [1985]). To date, however, there are only a limited number of empirical studies which provide evidence for such effects. We estimate the effects of recent EU FTAs on the quality, quality-adjusted prices and variety of imports from FTA partner countries, drawing on recent developments in the economic literature and using detailed import data for the UK and the European Union (EU12).[1] We use our estimates to calculate the overall quality and variety increases and reductions in quality-adjusted prices due to these FTAs and to forecast the likely effects of two FTAs which are currently being negotiated, the EU-Japan Economic Partnership Agreement (EPA) and the EU-US Transatlantic Trade and Investment Partnership (TTIP).

Section 2 briefly discusses the relevant existing literature. Section 3 describes our methodology and data sources. Section 4 contains estimates of quality, quality-adjusted prices and variety of UK and EU12 imports, and examines how they are affected by FTAs. Section 5 combines the estimates from Section 4 with consumer expenditure data to evaluate the overall consumer price reduction due to EU FTAs and to forecast the likely impact of future FTAs. Section 6 concludes with a brief summary and the limitations of the analysis.

[1] Here and in the following, the term "European Union" or EU12 refers to the twelve member states prior to the 1995 enlargement (Belgium, Luxembourg, Germany, France, Italy, the Netherlands, the United Kingdom, Ireland, Denmark, Greece, Portugal and Spain). This geographic focus was chosen to keep the set of countries for our EU-level analysis constant over the sample period 1993-2013 (see below for details).

2. Background

A growing literature estimates the gains from trade to consumers through access to import variety and lower prices from import competition (e.g., Broda and Weinstein [2006], Feenstra and Weinstein [2010]). We build on this well-established literature to estimate the impact of FTAs on consumer welfare. Although most papers use variation in geographical distance between trade partners, we focus on the impact of trade policy on consumer welfare. The typical estimate for the rise in trade flows arising from a percentage drop in tariff rates is five times higher than from a percentage reduction in geographical distance between trade partners (Head and Mayer [2013]). Papers estimating the impact of regional trade agreements find participation is associated with large expansion in trade flows between partners.

In order to quantify the gains to consumers, we examine the impact of recent FTAs negotiated by the European Union on UK and EU12 consumers between 1993 and 2013. Causal analysis establishing the impact of FTAs on consumer welfare has been elusive (Head and Mayer [2013]). Previous work has analysed FTAs between countries that already traded substantially with each other (e.g., NAFTA). This induces reverse causality because the positive correlation between trade volumes and FTAs could be due to governments choosing to form FTAs with bigger trade partners. Controlling for time-invariant trade partner characteristics reduces this problem by accounting for the initial size of bilateral trade, but is unable to mitigate reverse causality arising from FTAs motivated by expected growth in trade volumes. The new generation of FTAs negotiated by the EU are less likely to suffer from this reverse causality problem because they were not motivated by expected growth in bilateral trade of *individual* EU countries.

Recent studies estimate aggregate gains or variety gains from trade for consumers (Mohler and Seitz [2012], Kehoe and Ruhl [2013]). We focus instead on disaggregated trade data to quantify the impact of FTAs on consumer welfare. Our unit of analysis is the finest generally available product category, disaggregated across trade partners and over time. Aggregate trade statistics do not capture all the gains from increase in variety because changes in finer product categories are unobservable in aggregate data (Blonigen and Soderbery [2010]). Importantly, they also underestimate the sensitivity of imports to trade liberalization due to substitutability within the aggregate product

categories. As the sensitivity of imports to trade liberalization is a crucial input into the consumer price index, working at the finest possible unit of analysis captures consumer gains that would be missed in a more aggregate analysis.

Trade data has the advantage of providing highly disaggregated product information which enables us to capture the impact of FTAs with different trading partners. As the new wave of EU FTAs are with smaller trade partners which tend to dominate specific product lines, disaggregated trade data is particularly useful for estimating the gains from FTAs. Aggregate statistics such as consumer expenditure surveys are unlikely to reveal these gains when the aggregation is across products of limited substitutability.

For instance, trade data record the price of “Combined Refrigerator-freezers, Fitted With Separate External Doors” imported from Korea while consumer expenditure surveys record the price of “Refrigerators” which include “Furniture Designed to Receive Refrigerating or Freezing Equipment”. The EU-Korea FTA might reduce the price of combined refrigerator-freezers. If consumers buy furniture for refrigerators domestically, then the consumer price for “Refrigerators” is unlikely to show much of a price change even when there is a large drop in the UK price for combined refrigerator-freezers. Supermarket data addresses this aggregation problem in consumer expenditure surveys. It provides consumer prices at highly disaggregate levels, but it rarely covers products such as electronics or transport equipment which are prominent in recently negotiated FTAs. We therefore use trade data to quantify the potential consumer gains from FTAs, and supplement these estimates with projections for consumer price indices across different sectors. In the subsequent section, we discuss how trade data can be used to estimate the impact of FTAs on consumers through the channels of increased variety, better quality and lower quality-adjusted prices of imports.

3. Baseline Methodology

The literature on gains from trade typically provides estimates for the sensitivity of variety and quality to distance across trade partners. We develop this literature by decomposing the aggregate gains from trade into gains from new varieties, better quality and lower quality-adjusted prices to explain how FTAs affect each channel for consumer welfare. Quality is typically unobservable for products that constitute the bulk of consumer budgets. Building on the most up-to-date research, we use well-understood techniques to measure quality from trade data for all products imported into the UK and the EU12 (Hallak and Schott [2011], Khandelwal et al. [2013]). This methodology requires estimates of the elasticity of substitution across imported products to enable us to infer quality indirectly from trade values and volumes. Drawing on frontier research (Broda and Weinstein [2006], Berlingieri [2014]), we separate quality and quality adjusted prices using elasticities of substitution across products imported into the UK. We then quantify the impact of FTAs on each channel for consumer gains from trade.

This Section describes the methodology for providing quantitative estimates of the impact of EU FTAs on the quality, quality-adjusted prices and variety of UK and EU12 imports. We start in Section 3.1 with an explanation of the baseline methodology to estimate variety, quality and quality-adjusted prices using trade data. Section 3.2 shows how to link the measures of variety, quality and prices to trade agreements. Section 3.3 summarizes our data sources and the specific FTAs selected for this study.

3.1 Description of baseline methodology and tools

Our baseline methodology builds on well-established techniques from the international trade and industrial organisation literature. The baseline methodology for estimating the impact of FTAs consists of two steps. First, we use disaggregated import data to construct measures of product variety, quality and prices of UK imports. In a second step, we link these measures to the trade liberalisation brought about by the FTAs entered into by the EU.

Our first step is based on disaggregated import data which are available at the 6-digit level of the Harmonized System (HS) and consist of approximately 5,000 agricultural and manufacturing products. This detailed classification allows us to provide a comprehensive analysis of the impact of trade agreements and to detect even small changes in quality, quality-adjusted prices and variety arising from trade agreements. The data are however limited to imported goods, and do not allow us to study the impact of trade agreements on services trade and on the quality, quality-adjusted prices and variety of domestically produced goods. Trade agreements typically induce foreign competition which leads to a reduction in prices of domestically produced goods (Levinsohn [1993]). As we do not capture this channel, our estimates can be interpreted as lower bounds for the potential benefits from trade agreements to consumers.

The highly disaggregate import data allow us to study how trade agreements affect the variety, quality and quality-adjusted prices of imported goods. We can use the distinct product categories to calculate measures of the variety of foreign goods available to consumers. A basic measure of variety is the number of these distinct product categories from different origin countries in a particular sector. Sectors are more aggregate product categories which we define as the 97 HS 2-digit product levels. The basic measure of product variety therefore refers to how many of the 5,000 available products are being imported by the UK in a given sector and from how many source countries they are imported.

For each product, the import data record the total value of imports in a given year from a given origin country, as well as the quantity associated with these imports. By dividing values by quantities, we obtain so-called unit values which are the standard proxy for prices in the international trade literature. Differences in unit values across different import origin countries reflect quality differences and differences in prices for the same level of quality (i.e., quality-adjusted prices). We build on well-established ways of identifying quality and prices separately to quantify the contribution of each channel in consumer gains (Hallak and Schott [2011], Khandelwal et al. [2013]). Our basic approach to measuring quality is that higher market shares reflect better quality once differences in prices have been controlled for. For instance, suppose 21-inch LCD televisions from China have the same price as those from Korea, but Korea's market share is 20% and China's is 10%. Then the quality estimate for Korea will be higher. If the price of Korean LCD TVs

was higher, then we would need to control for the price difference and this would reduce the quality estimate for Korea.

A limitation is that different Korean firms might be offering LCD televisions of different quality levels. Lack of finer trade data implies quality cannot be estimated for individual Korean firms, and our quality estimates therefore reflect the average quality of LCD televisions from Korea. The methodology can be applied to a broad range of products, at any level of disaggregation. It builds on the demand-side relationship between quantities, quality and quality-adjusted prices to give quality estimates based on market share differences after controlling for prices.

To implement this approach, a typical demand function specifies that the units demanded of a product depend on the price and quality of the product, prices of other closely related products and on the income of the consumer. Specifically, the standard specification of demand for a variety from origin country *o* of product *j* at time *t* is

(3.1) $$\ln x_{ojt} = (\sigma_j - 1) \ln q_{ojt} - \sigma_j \ln p_{ojt} + (\sigma_j - 1) \ln P_{jt} + \ln w_{jt}$$

where σ_j is the elasticity of substitution across varieties of product *j*, q_{ojt} is the quality level and p_{ojt} is the price of country *o*'s product *j* at time *t*. Demand for a variety rises with its quality and falls with its price. P_{jt} is the price index for all varieties of product *j* and w_{jt} is the expenditure on product *j* at time *t*. Equation 3.1 shows that demand rises with the price index because other similar varieties become relatively expensive. We observe quantity x_{ojt} and prices p_{ojt} in the trade data, and are interested in inferring quality q_{ojt}. Using panel data on quantities and prices, Equation 3.2 below can be used to infer quality:

(3.2) $$\ln x_{ojt} = \alpha_{jt} - \sigma_j \ln p_{ojt} + \varepsilon_{ojt}$$

The price index and incomes are product-time fixed effects $\alpha_{jt} = (\sigma_j - 1) \ln P_{jt} + \ln w_{jt.}$ The residual error term contains the quality level $\varepsilon_{ojt} = (\sigma_j - 1) \ln q_{ojt.}$ The key issue here is that Equation 3.2 cannot be directly estimated with quantity and price data on imports to arrive at quality estimates $\ln q_{ojt} = \varepsilon_{ojt}/(\sigma_j - 1)$. This is because quality is likely to be correlated with price, leading to an endogeneity bias in the estimated demand elasticities $\sigma_{j.}$

Feenstra [1994] shows consistent estimation of demand elasticities is possible using panel data that provides variation in product demand and supply. Here we discuss the main

approach of this methodology and details of the steps involved are provided in the Appendix. The main insight is that as long as differences in product demand and supply are uncorrelated, demand elasticities can be identified through different demand shocks and supply shocks across different trade partners and over different years. Broda and Weinstein [2006] refine this method to obtain more efficient estimates and implement it for US trade data to understand the contribution of imported varieties to consumer welfare. This has become the standard method for estimating demand elasticities with trade data. Berlingieri [2014] implements this method with UK data to provide us with demand elasticities for the UK from 1993-2013. He also shows that these estimates can be made more robust. There are two issues to overcome here:

- The estimates are sensitive to the weighting scheme used across observations. Berlingieri overcomes this issue by accounting for measurement error in the outcomes for the reference country to which all observations are compared.

- The HS product classification system changes over time so several changes in product variety arise purely due to a change in their classification rather than a change in their product attributes. This problem is addressed by excluding products in HS codes that change over time. If changes in the import value of excluded HS codes are systematically related to participation in trade agreements, then exclusion of HS codes could lead to a selection bias in our estimates on the impact of trade agreements. For instance, our estimates for the impact of trade agreements on quality would be upwardly biased if a large fraction of HS codes that were revised (and excluded from the analysis) showed higher growth rates for trade partners that did not join trade agreements with the EU. As over 90 per cent of imports are in HS codes that do not change over time, we do not expect exclusion of HS codes that change over time to lead to a significant selection bias (Berlingieri [2014]).

Building on these insights, our baseline methodology estimates demand elasticities through the Broda-Weinstein procedure on UK imports that do not suffer from changes in the product classification system during 1993-2013. The Annex provides details of the estimation strategy, its implementation and summary statistics for the demand elasticities estimated using this procedure. As a robustness check, we estimate demand elasticities using the Berlingieri procedure for this set of products. Having estimated the demand elasticities σ_j, we infer quality as $\ln q_{ojt} = \varepsilon_{ojt}/(\sigma_j - 1)$ and quality-adjusted prices as $\ln p_{ojt} -$

$\ln q_{ojt}$ for each procedure. The end result is that we have inferences on quality-adjusted prices and quality levels of UK imports using two different procedures

An advantage of specifying the demand function of Equation 3.1 is that it gives a welfare-based measure of product variety. The basic measure of product variety mentioned earlier simply counts how many products are being imported by the UK in a given year and from how many different destinations. Proxies of this kind have been extensively used in the international trade literature to quantify the gains from trade due to increases in foreign product varieties available to consumers. Although a straightforward measure, it does not reflect the importance of a variety for consumers. Feenstra [1994] shows that the demand function of Equation 3.1 implies welfare rises at a constant rate with a trade-weighted measure of product variety that can be computed from trade data. Specifically, let C_{jt} be the set of varieties of product *j* that are common across time *t – 1* and *t.* Then the welfare-based measure of the growth in product variety is

$$\lambda_{jt}/\lambda_{jt-1} = \left(\sum_{o \epsilon C_{jt}} p_{ojt}x_{ojt} / \sum_{o} p_{ojt}x_{ojt}\right) / \left(\sum_{o \epsilon C_{jt-1}} p_{ojt-1}x_{ojt-1} / \sum_{o} p_{ojt-1}x_{ojt-1}\right) \quad (3.3)$$

Each of the terms λ_{jt} in Equation 3.3 can be interpreted as the period *t* expenditure on the goods in the set of products that are common across *t* – 1 and *t,* relative to the total expenditure in period *t.* The ratio $\lambda_{jt}/\lambda_{jt-1}$ therefore measures the increase in imported varieties from all other countries relative to the base year and reflects the importance of new products for consumers.

Having inferred product variety, quality and quality-adjusted prices from trade data, we can link them to FTAs to understand the impact of trade agreements on each of these channels for consumer gains from trade.

3.2 The Impact of FTAs on Quality, Prices and Variety

Section 3.1 presented our methodology for arriving at measures for variety, quality and quality-adjusted prices. This sub-section discusses how we can estimate the impact of EU FTAs on these measures.

We use a difference-in-differences approach to identify the effects of FTAs. That is, we compare changes in our three measures before and after the FTA for the treated group of

FTA partners with a control group of non-FTA partners of the European Union. We work with UK (EU12) imports from all its trade partners, so the control group consists of all trade partners of the UK (EU12) that never joined an FTA with the EU and trade partners in years before they joined an FTA with the EU.

Comparison with the control group, rather than a simple 'before' and 'after' estimation, reduces concerns that the estimated gains are a result of pre-existing trends that would arise even in the absence of FTAs. For instance, if the quality of imports was growing over time for all countries, then a 'before-after' comparison would erroneously attribute this general growth in quality to trade agreements. A comparison with non-FTA partners avoids this misattribution of pre-existing general trends to participation in trade agreements. Likewise, looking at *changes* in outcomes will partially control for the fact that the EU will tend to sign FTAs with a non-random selection of countries. For example, if the EU only signed agreements with high-quality producers, a simple comparison of quality *levels* of FTA partners with those of the control group would overestimate the quality impact of the FTA. Looking at changes instead of levels addresses this selection problem. We note, however, that our methodology cannot address selection on time-varying characteristics which are different across FTA partners and the control group. For example, if the EU tended to sign FTAs with countries which are expected to upgrade quality in the near future for reasons unrelated to the FTA, then our methodology would overestimate the quality increases due to the FTA.

Our difference-in-differences approach can be implemented through the following estimation equation:

$$m_{ojt} = \alpha_{oj} + \alpha_t + \beta\, FTA_{ot} + \eta_{ojt} \tag{3.4}$$

where m_{ojt} is the price or quality or variety of UK imports from country o of product j at time t, and α_{oj} and α_t are importer-product fixed effects and year fixed effects, respectively. The key variable of interest is FTA_{ot} which is a dummy variable that takes the value of one if the importing country has an FTA in force with the exporting country at time t. The coefficient β estimates how our measures of quality, quality-adjusted prices or variety are affected by the FTA. For example, when m_{ojt} denotes (the log of) quality-adjusted prices, β measures the approximate percentage change in quality-adjusted prices induced by the

FTA.[2] The year fixed effects control for general time trends such as the above-mentioned general increase in quality or the 2008-2009 collapse of world trade. The importer-product fixed effects account for time-invariant differences between FTA and control-group countries, such as any tendency to sign FTAs with high-quality producers, or for high-quality goods only.

How reliable will our estimates of the impact of FTAs on quality, quality-adjusted prices and variety be? Besides the issue of selection on time-varying, FTA country-specific factors discussed above, which could bias estimates in either direction, there are reasons to expect that our estimates will represent a lower bound for the true effects of FTAs. First, we do not capture the impact of trade agreements on domestically produced goods which are likely to see lower prices due to foreign competition. Second, we only have data for goods trade and do not look at services trade. So we cannot measure any consumer gains resulting from better quality, more variety, and lower quality-adjusted prices for imported services. Such gains could materialise both directly through the import of services for final consumption, or indirectly through imports of services used as intermediate inputs. Third, distributors and final goods producers may pass on part of the cost savings from lower trade barriers on intermediate goods and capital inputs to consumers. This is not reflected in our estimates because the data comes from border prices and values, rather than prices and expenditures of consumers. Finally, while the use of a dummy variable for FTAs has the advantage of capturing the effects of different provisions within the agreements (such as tariff reductions, non-trade barriers etc.), it is likely to underestimate the full impact of recent trade agreements because the provisions are typically implemented in phases and can often be back-loaded. By switching the dummy variable to one in the year of the FTA's implementation, we assume instead that all measures are implemented to their full extent immediately.

3.3 Data Sources and Choice of Time Period, Countries and FTAs

Our baseline methodology requires data on imports and trade agreements. We obtain origin-specific UK and EU12 import data at the 6-digit HS level for the period 1993-2013 from the United Nation's COMTRADE database (accessed through the World Bank's

[2] The exact change (in %) is given by $exp(\beta)-1$ which is approximately equal to β for β close to zero.

WITS interface at http://wits.worldbank.org/). Trade data are classified according to the version of the Harmonized System which was in force at the time of reporting. To achieve comparability over time, we map all data into the 6-digit level of the HS0 (1988/1992) version of the Harmonized System, using concordances provided by WITS. Data on trade agreements and their implementation dates are available from the European Commission.[3]

We examine the overall impact of EU FTAs implemented during our sample period 1993-2013. We begin with a very broad definition of "free trade agreements" and also include the 12 European countries which became member states in 2004 and 2007, respectively. These countries are Cyprus, Malta, the Czech Republic, Slovakia, Estonia, Latvia, Lithuania, Hungary, Poland, Slovenia, Bulgaria and Romania. In addition, the EU negotiated a number of additional trade agreements between 1993 and 2013. Within Europe, these include a customs union with Turkey (1996), and FTAs or Association Agreements with the Faroe Islands (1997), Macedonia (2004), Croatia (2005), Albania (2009), Bosnia and Herzegovina (2009), Montenegro (2008/10) and Serbia (2010/13). In the Mediterranean, these include agreements with Israel (2000), Algeria (2006), Egypt (2004), Jordan (2002), Lebanon (2003), Morocco (2000), and Tunisia (1998). Further afield, the EU also implemented FTAs with Mexico (2000), South Africa (2000), Chile (2003), Korea (2011), Peru (2013), Columbia (2013), Costa Rica (2013), El Salvador (2013), Guatemala (2013), Honduras (2013), Nicaragua (2013) and Panama (2013).[4]

In our baseline regressions, we estimate an average effect of all these agreements on prices, quality and variety, separately for the UK and the EU12. We also present results for the "non-EU" agreements, i.e., excluding the 2004 and 2007 accession countries. Decomposing the data into broad sectoral categories, we will also estimate the sector-specific impact of FTAs on quality, quality-adjusted prices and variety.

[3] See http://ec.europa.eu/enterprise/policies/international/files/existing-trade-negotiations_en.pdf updated on September 10, 2010 and http://ec.europa.eu/enterprise/policies/international/facilitating-trade/free-trade/index_en.htm#h2-1 for FTAs that entered into force after September 10, 2010.

[4] Croatia is a special case as it only became a EU member at the very end of our sample period (in 2013). In this report, we group Croatia with the "non-EU" agreements. We do not include the 1995 accession countries (Austria, Finland and Sweden) in either FTA group because they already had FTAs in place with the EU at the beginning of our sample period and because we would only have two pre-accession years of data to estimate accessions effects.

4. Baseline Results

This Section implements the methodology of Sections 3.1 and 3.2 to arrive at estimates for the impact of trade agreements on variety, quality and quality-adjusted prices for UK and EU12 consumers. Section 4.1 contains descriptive statistics for the trade data and estimates for quality and variety. Section 4.2 provides the estimation results for the impact of FTAs and Section 4.3 discusses the robustness of these results.

4.1. Descriptive Statistics

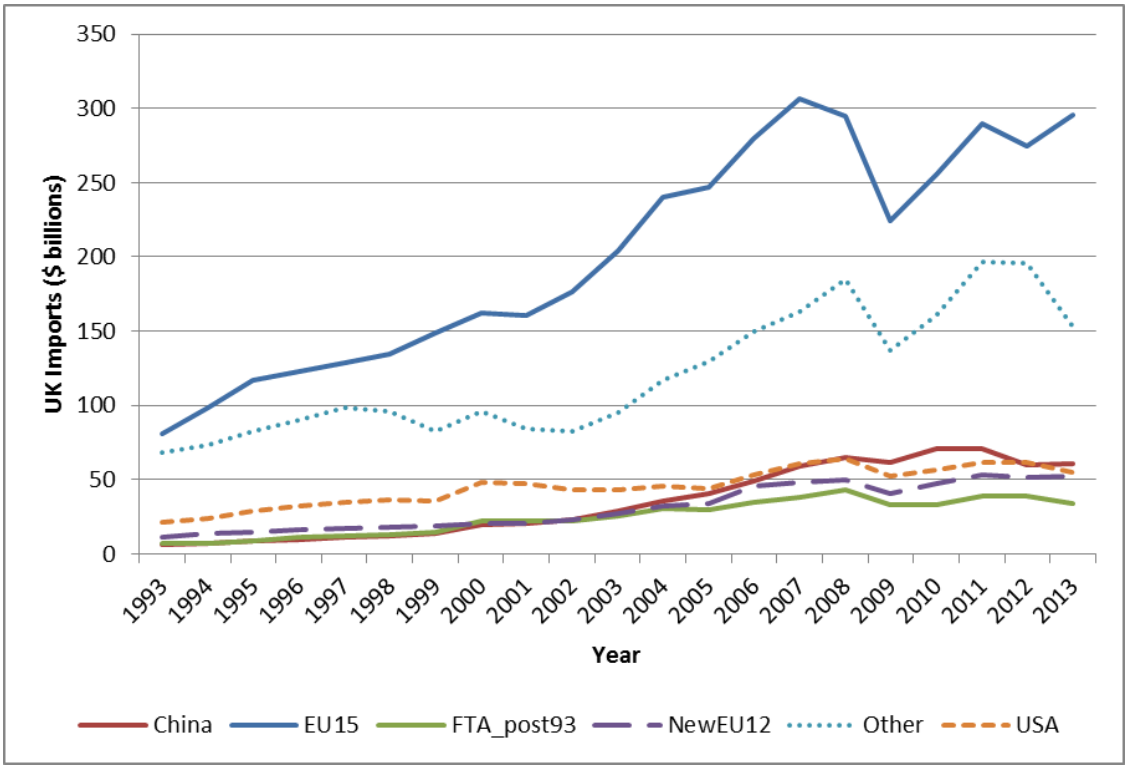
This sub-section contains descriptive statistics for trade flows and estimates for quality and variety derived from the trade data.

4.1.1. Trade Flows

We start by providing an overview of the importance of the agreements signed between 1993 and 2013 in terms of overall UK and EU12 imports. Figure 4.1 shows the value of UK imports by groups of origin countries. The EU15 is still by far the most important source of UK imports. It accounted for $300bn in 2012 (40% of total imports), almost five times as much as the next largest origin countries, the USA and China, from each of which the UK imported goods worth $60bn (9% of total imports each). The twelve EU accession countries accounted for $30bn of imports, and the remaining FTA-partners listed above for $40bn. Thus, the trade agreement partners analysed in this report accounted for around 10% of overall UK imports in 2012.

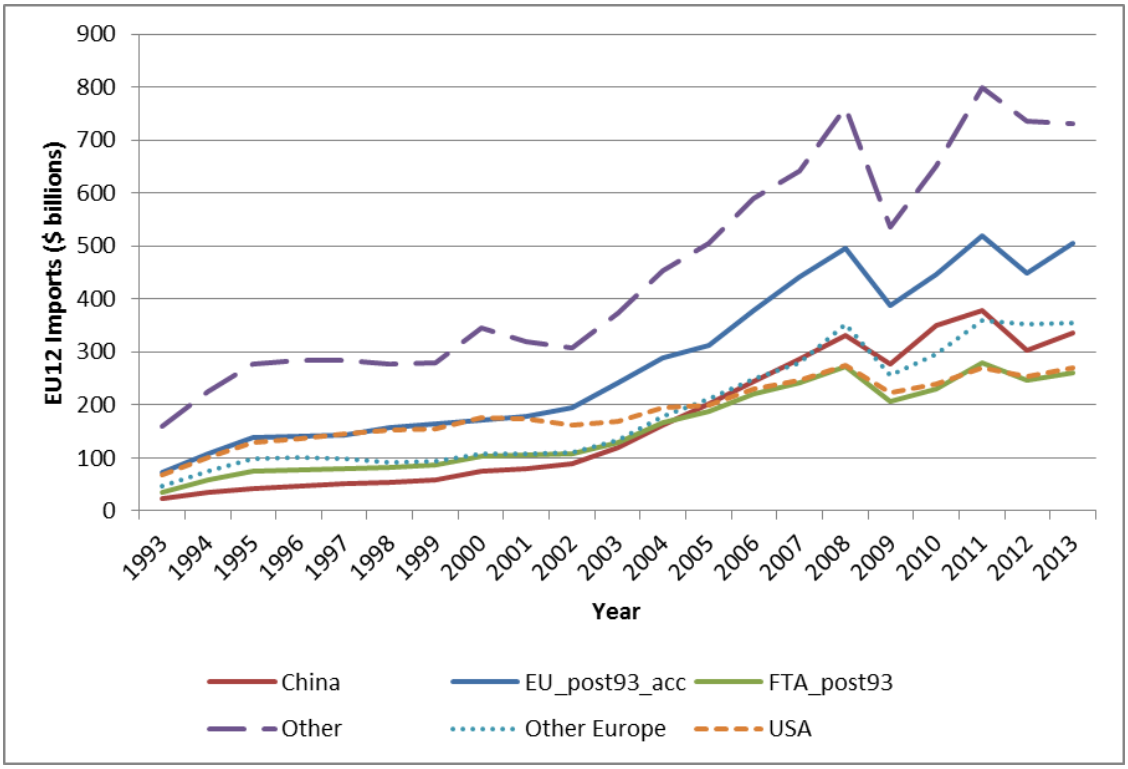
Figure 4.2 presents similar information for the EU12. In 2012, the single most important source country for the EU12 was China which accounted for $293bn or 12.5% of total imports from non-EU12 countries, followed by the United States ($253bn, 11.7%), Russia ($149bn, 6.3%) and Switzerland ($115bn, 4.9%). This compares to imports of $449bn (19.1%) for the post-1993 EU accession countries, and imports of $246bn (10.5%) for the non-EU FTA partners.

Figure 4.1: UK Imports by Origin, 1993-2013



Source: Authors' calculation, using UN COMTRADE data.

Figure 4.2: EU12 Imports by Origin, 1993-2013



Source: Authors' calculation, using UN COMTRADE data.

Figures 4.3 and 4.4 show the importance of individual countries in the group of post-1993 FTA partners for the UK and the EU12, respectively. In 2012, South Africa and Turkey together accounted for approximately half of the $40 billion of UK imports from this group. The third-largest exporter is Korea ($4.8bn), followed by Israel, Algeria, Mexico and Colombia. For the EU12, Turkey is the most important source of imports, followed by Algeria, Korea, South Africa, Mexico and Israel.

4.1.2. Quality and Variety Estimates

The final set of descriptive statistics presented in this section concerns estimates of quality and variety. To implement the methodology of Section 3.1, we first estimate demand elasticities using the Broda-Weinstein procedure for each HS 6-digit product using UK data from 1993-2013. Having estimated the elasticities (see Appendix), we follow Hallak and Schott [2011], Khandelwal et al. [2013] to estimate quality through the following regression:

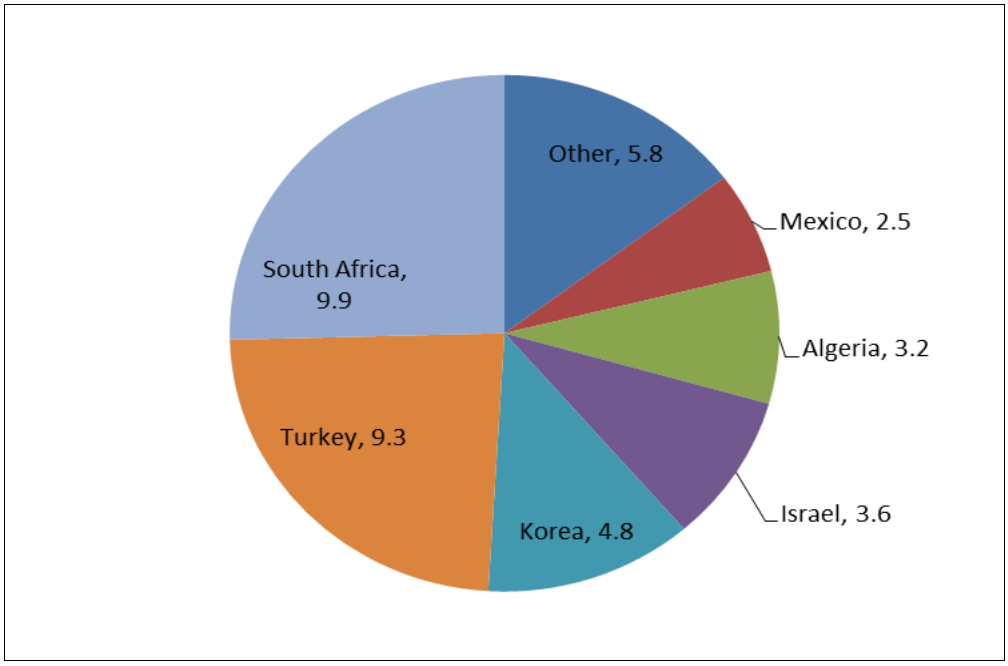
$$\ln x_{ojt} + \sigma_j \ln p_{ojt} = \alpha_{jt} + \alpha_o + \varepsilon_{ojt}$$

where α_o are partner fixed effects that capture time-invariant characteristics specific to trade partners and ε_{ojt} is the residual net of partner fixed effects. Quality is computed as $\ln q_{ojt} = \varepsilon_{ojt}/(\sigma_j - 1)$ and quality-adjusted prices are computed as $\ln p_{ojt} - \ln q_{ojt.}$

Our quality estimates are best interpreted as relative quality rankings within each of our approximately 5,000 products. Figures 4.5 and 4.6 correlate averages of these rankings for each country with per capita GNI.[5] Figure 4.5 does this for UK imports and Figure 4.6 for EU12 imports. As is clearly visible, richer countries tend to produce higher quality products. Among the group of countries with the highest average quality scores are the

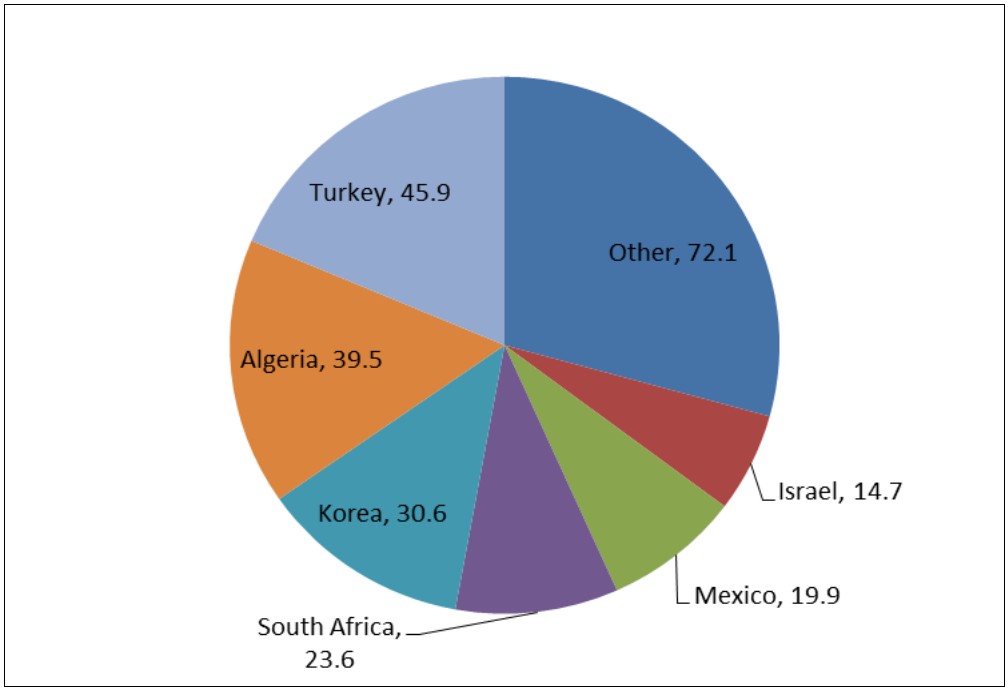
[5] We calculate this average ranking as follows. We first discard all countries which are not within the top 100 sources of UK imports, or do not export more than 100 product lines to the UK in 2010. For the remaining countries, we compute their quality ranking for each product and take an average across all products which they export. (Note that a higher rank indicates higher quality.) Because not all countries export every product, the length of each product-specific ranking can vary, and we normalise a country's rank to lie between 0 and 100 in each ranking. An average ranking of 100 thus means that the country has the highest quality estimates for each product it exports. The average ranking for the EU12 is constructed following the same procedure, using EU12 import data.

Figure 4.3: UK Imports from post-1993 FTA Partners ($bn, 2012)



Source: Authors' calculation, using UN COMTRADE data.

Figure 4.4: EU12 Imports from post-1993 FTA Partners ($bn, 2012)

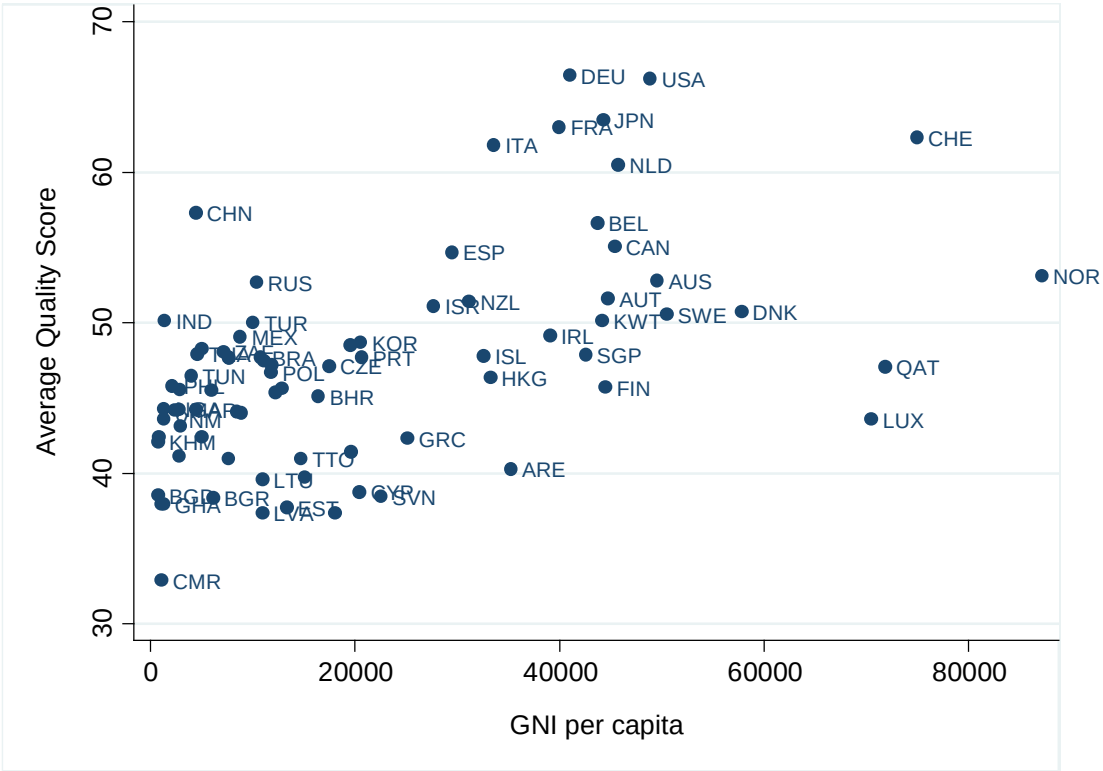


Source: Authors' calculation, using UN COMTRADE data.

UK's most important sources of imports, such as Germany, the USA and France. China also ranks surprisingly highly, despite a still relatively low per-capita income level.[6]

Finally, Figures 4.7 and 4.8 provide information on the number of varieties (i.e., product lines) which the UK and the EU12 import from different origin countries, respectively. There is a very strong correlation with country size (as measured by 2010 GNI), with larger countries exporting more varieties to the UK and the EU12.

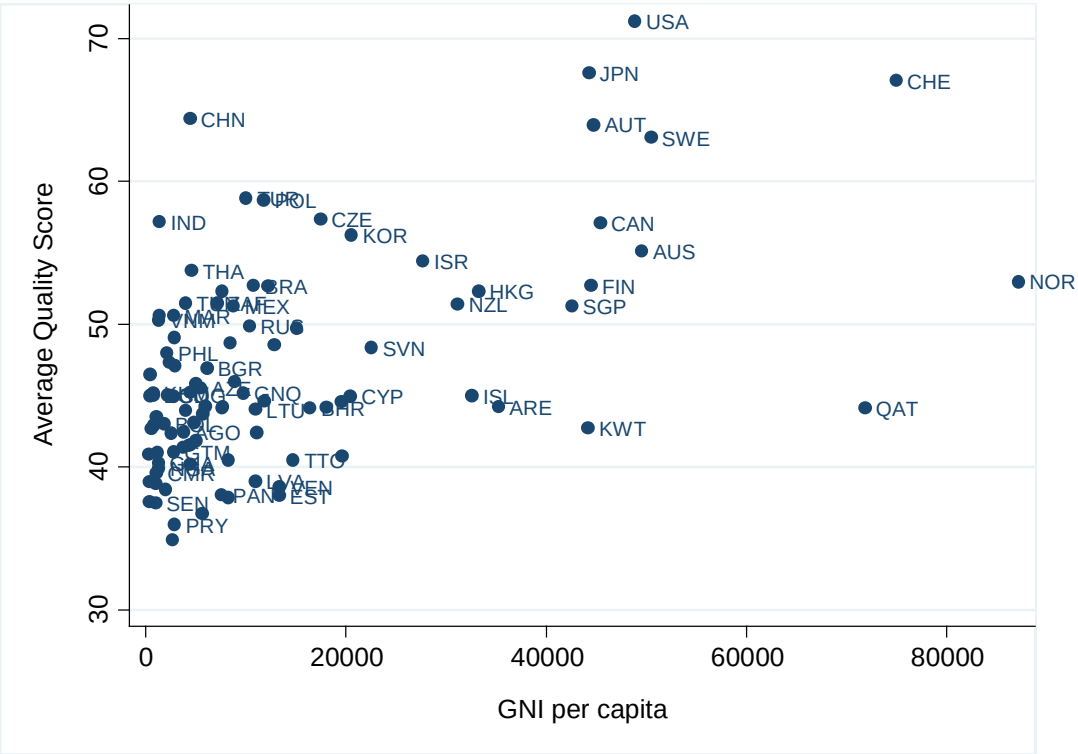
Figure 4.5: Average Quality Scores and per capita GNI, 2010 (UK imports)



Source: Authors' calculation, using UN COMTRADE data.

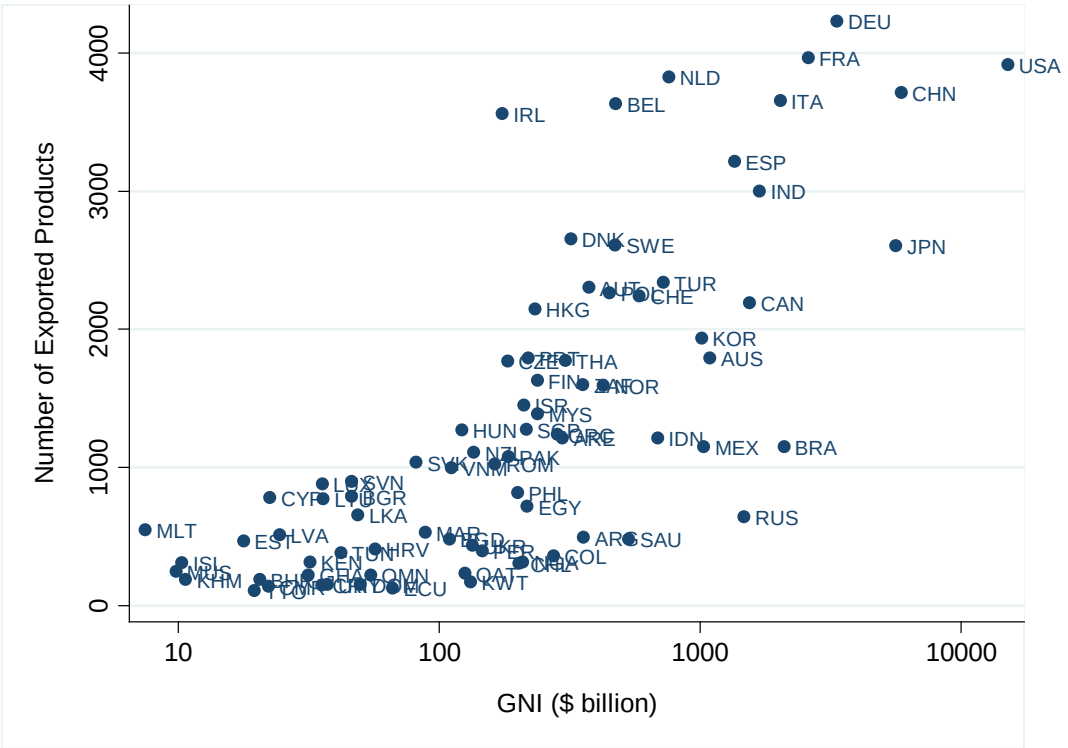
[6] In the absence of data on value addition of products across countries, we are unable to conclude whether the high ranking of China is driven by products that are exported from China but that experience most of their value addition in developed countries.

Figure 4.6: Average Quality Scores and per capita GNI, 2010 (EU12 imports)



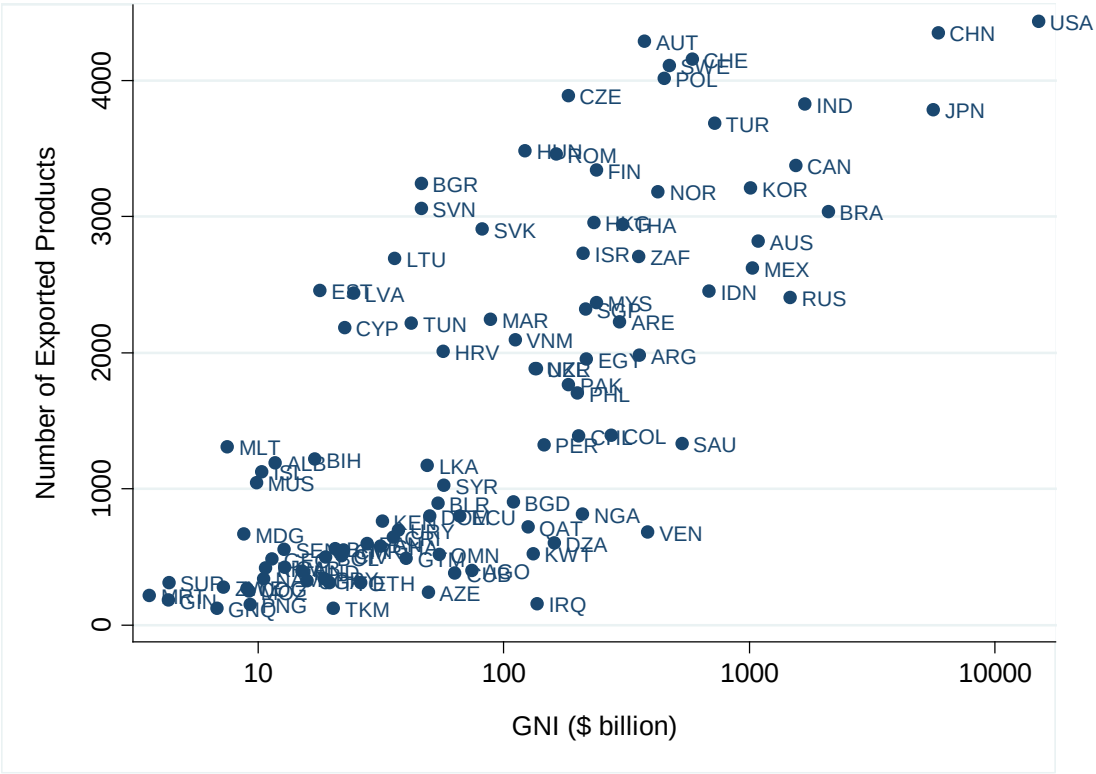
Source: Authors' calculation, using UN COMTRADE data.

Figure 4.7: Number of Varieties (Product Lines) by Origin Country GNI, 2010 (UK)



Source: Authors' calculation, using UN COMTRADE data.

Figure 4.8: Number of Varieties (Product Lines) by Origin Country GNI, 2010 (EU12)



Source: Authors' calculation, using UN COMTRADE data.

4.2. The Impact of Trade Agreements on Quality, Prices and Variety

Table 1 reports the baseline results where quality and quality-adjusted prices are estimated using the Broda-Weinstein procedure and variety is a welfare-based measure from Equation 3.3. As the Broda-Weinstein procedure is well-established, we use these elasticities for our baseline results and test the robustness of the baseline results with the Berlingieri elasticities (which use a different weighting matrix to arrive at the weighted least squares estimates for demand elasticities).

Consistent with theoretical predictions, we find that FTAs increase the quality of imported products and lower their quality-adjusted prices. Our estimates show that the FTA-induced increase in quality is 26 per cent and the estimated reduction in quality-adjusted prices is 19 per cent.[7] The coefficients seem large in magnitude, but they do not imply that

[7] These effects are calculated as *exp(0.234)-1* and *exp(-0.205)-1*, respectively.

observed import prices fall by 19 per cent due to FTAs. The interpretation is different because we have decomposed observed prices into their quality and pure (quality-adjusted) price components, enabling us to say if a price rise is driven by pure price increases or by increases in quality. Our results show that FTAs caused an increase of the quality of imports from FTA partners at unchanged prices (see Box 2). Because consumer price indices are, in principle, adjusted for quality increases, this should be reflected in lower consumer price inflation as indicated by our estimates for quality-adjusted prices.[8] Finally, Table 1 shows that the variety of imported products available in the UK was not affected. This likely reflects the fact that UK consumers already had access to most imported varieties because of the UK's size and high degree of openness. Even in a stringent specification that nets out time-invariant partner-product and time-fixed effects, we find that FTAs induced an overall gain to consumers through improvements in quality and reductions in quality-adjusted prices.

Table 1: The Impact of FTAs on Quality, Prices and Variety: UK 1993-2013

	Quality	Quality-Adjusted Prices	Variety
	(a) Coeff. (Std. Err.)	(b) Coeff. (Std. Err.)	(c) Coeff. (Std. Err.)
FTA_{ot}	0.234	-0.205	-0.0002
	(0.040)**	(0.041)**	(0.001)
Partner-Product FE, α_{oj}	yes	yes	yes
Time FE, α_t	yes	yes	yes
N	1,887,311	1,887,311	2,138,705
R^2	0.977	0.978	0.177

Notes: ** denotes statistical significance at the 1% level. The LHS variables are in natural logarithms. Quality in Column (a) and quality adjusted prices in Column (b) are estimated with elasticities from the Broda-Weinstein procedure. Variety in column (c) refers to $\lambda_{jt}/\lambda_{jt-1}$ from equation 3.3. The RHS variable FTA_{ot} is 1 when there is an FTA in force between the EU and the trade partner, and 0 otherwise. The RHS contains partner-product and year fixed effects. Standard errors are clustered at the product level.

Why would FTAs lead to increases in the quality of imports? One important reason is that better and more secure access to large developed markets induces foreign exporters to invest in higher-quality products. Because the corresponding investments are often of a one-off nature and represent essentially sunk costs, they are only worthwhile if exporters

[8] In practice, the CPI quality adjustment is imperfect and might not reflect the full decrease in quality-adjusted prices measured here. See the discussion in Section 5 for more details.

expect to have continued access to a large consumer base demanding high-quality goods. For example, Iacovone and Javorcik (2012) show that Mexican exporters upgraded quality in preparation to entering the large and high-income U.S. market during the implementation period of the North America Free Trade Agreement (NAFTA). Similarly, Verhoogen (2008) demonstrates that the Peso devaluation of 1994 led to investments in quality upgrading of Mexican manufacturers who started to export more.

To understand the effects of trade agreements other than the European Community, we separate the impact of countries that joined the European Community (EC) in 2004 and 2007 from FTAs with countries that have never been members of the EC.[9] Table 2 reports the results for both non-EC FTAs and EC accessions where quality and quality-adjusted prices are estimated using the Broda-Weinstein procedure and variety is a welfare-based measure from equation 3.3.

Table 2: The Impact of EC and Non-EC FTAs on Quality, Prices and Variety: UK 1993-2013

	Quality	Quality-Adjusted Prices	Variety
	(a) Coeff. (Std. Err.)	(b) Coeff. (Std. Err.)	(c) Coeff. (Std. Err.)
FTA_exEC_{ot}	0.326	-0.355	-0.001
	(0.037)**	(0.038)**	(0.001)
EC_{ot}	0.149	-0.069	0.001
	(0.055)**	(0.056)	(0.001)
Partner-Product FE, α_{oj}	yes	yes	yes
Time FE, α_t	yes	yes	yes
N	1,887,311	1,887,311	2,138,705
R^2	0.977	0.978	0.177

Notes: ** denotes statistical significance at the 1% level. The LHS variables are in natural logarithms. Quality in Column (a) and quality adjusted prices in Column (b) are estimated with elasticities from the Broda-Weinstein procedure. Variety in column (c) refers to λjt/ λjt-1 from equation 3.3. The RHS variable FTA_exECot is 1 when there is an FTA in force between the EU and the (non-EU) trade partner, and 0 otherwise. The RHS variable EC_{ot} is 1 when the trade partner is a 2004/2007 accession country (for years after the accession), and 0 otherwise. The RHS contains partner-product and year fixed effects. Standard errors are clustered at the product level.

[9] Note that Austria, Finland and Sweden joined the EU during our sample period (in 1995). We choose not to include them in our accession country group because we only have two years of pre-accession data. We also note that all three countries had free trade agreements with the EU12 in place since 1973, implying an already substantial degree of integration prior to 1995. Thus, we code these countries' FTA status as unchanged over our sample period, and their 1995 accession does not influence our estimates.

FTAs with non-EC members increased quality by 39 per cent and lowered prices by 30 per cent. Variety was not affected but overall there is a gain to consumers through quality improvements and price reductions. The effect of the expansion of EC membership is smaller, possibly reflecting the fact that all new EC members had already completed trade integration prior to the EC expansion.[10]

To estimate the impact of FTAs on consumers in all EU12 countries, we conduct the analyses of Tables 1 and 2 on imports into EU12 countries. Table 3 shows a similar increase in quality for EU12 imports as for UK imports, but the price reduction is smaller. As for UK imports, FTAs have a statistically insignificant impact on product variety imported into the EU12 countries.

Table 3: The Impact of FTAs on Quality, Prices and Variety: EU12 1993-2013

	Quality	Quality-Adjusted Prices	Variety
	(a) Coeff. (Std. Err.)	(b) Coeff. (Std. Err.)	(c) Coeff. (Std. Err.)
FTA_{ot}	0.248	-0.119	0.0001
	(0.018)**	(0.019)**	(0.0001)
Partner-Product FE, α_{oj}	yes	yes	yes
Time FE, α_t	yes	yes	yes
N	2,974,889	2,974,889	3,496,625
R^2	0.972	0.974	0.097

Notes: ** denotes statistical significance at the 1% level. The LHS variables are in natural logarithms. Quality in Column (a) and quality adjusted prices in Column (b) are estimated with elasticities from the Broda-Weinstein procedure. Variety in column (c) refers to $\lambda_{jt}/\lambda_{jt-1}$ from equation 3.3. The RHS variable FTA_{ot} is 1 when there is an FTA in force between the EU and the trade partner, and 0 otherwise. The RHS contains partner-product and year fixed effects. Standard errors are clustered at the product level.

Table 4 shows that the impact of non-EC FTAs on quality and prices is smaller for EU12 countries than for the UK on its own, but that the quality and price responses to EC expansion are larger. A possible explanation for this difference is that some of the EU12 countries (e.g., Germany) represent a much larger market for the exports of the 2004/2007

[10] All estimations on UK data include other EU12 countries as part of the control group. Dropping these countries leads to smaller estimates for non-EC FTAs (a 22% increase in quality and a -20% drop in quality adjusted prices), and renders the impact of EC accession on the quality of UK imports statistically insignificant. We prefer to work with the results displayed in Table 2 in the following because the EU12 is by far the UK's most important trading partner and dropping it would make the control group much less representative of UK imports.

accession countries than the UK, leading to stronger quality and quality-adjusted price effects. For example, it may have been worthwhile for Eastern European exporters to incur substantial sunk costs to upgrade quality for products demanded by German consumers but not necessarily for those demanded by UK consumers. That market size is important for quality upgrading effects has also been demonstrated in other contexts, such as the quality-upgrading by Mexican producers during the implementation phase of NAFTA (Iacovone and Javorcik, 2012).

Table 4: The Impact of EC and Non-EC FTAs on Quality, Prices and Variety: EU12 1993-2013

	Quality	Quality-Adjusted Prices	Variety
	(a) Coeff. (Std. Err.)	(b) Coeff. (Std. Err.)	(c) Coeff. (Std. Err.)
FTA_exEC_{ot}	0.167	-0.138	0.0002
	(0.018)**	(0.019)**	(0.0001)
EC_{ot}	0.315	-0.103	0.0001
	(0.026)**	(0.027)**	(0.0002)
Partner-Product FE, α_{oj}	yes	yes	yes
Time FE, α_t	yes	yes	yes
N	2,974,889	2,974,889	3,496,625
R^2	0.972	0.974	0.097

Notes: ** denotes statistical significance at the 1% level. The LHS variables are in natural logarithms. Quality in Column (a) and quality adjusted prices in Column (b) are estimated with elasticities from the Broda-Weinstein procedure. Variety in column (c) refers to $\lambda_{jt}/\lambda_{jt-1}$ from equation 3.3. The RHS variable FTA_exEC_{ot} is 1 when there is an FTA in force between the EU and the (non-EU) trade partner, and 0 otherwise. The RHS variable EC_{ot} is 1 when the trade partner is a 2004/2007 accession country (for years after the accession), and 0 otherwise. The RHS contains partner-product and year fixed effects. Standard errors are clustered at the product level.

4.3. Robustness of the Baseline Methodology

To ensure these results are robust, we first provide a sectoral decomposition of the findings by implementing the regressions by broad sectoral categories. Then we change the measures for the dependent variables to cross-check the validity of our findings.

4.3.1. Sectoral Impact of FTAs on Quality, Prices and Variety

We separate 6-digit HS codes into their aggregate 2-digit categories and implement the regressions of Table 2 for each 2-digit HS code category. Table 5 summarizes sectors for

which quality, quality-adjusted prices and variety changes are statistically significant. Note that the lack of statistical significance does not necessarily mean that that the sector saw no impact, just that such an impact is more difficult to identify at this more granular level than on an aggregate level. At the aggregate level, the estimates are more precisely estimated and we can conclude that FTAs increased quality and reduced quality-adjusted prices.

Table 5: The Impact of Non-EC FTAs on Quality, Prices and Variety: UK 1993-2013

Quality Increases		Quality-Adjusted Price Increases	
HS2	Sector	HS2	Sector
14	Vegetable Plaiting Materials	62	Apparel & Clothing (Non-knitted)
28	Inorganic Chemicals	91	Clocks & Watches
29	Organic Chemicals		
38	Miscellaneous Chemical Products		
39	Plastics & Articles thereof		
48	Paper & Paperboard		
49	Printed Books		
54	Sewing Thread (Man-made)		
68	Articles of Stone/Plaster/..		
69	Ceramic Products		
70	Glass & Glassware		
72	Iron & Steel		
75	Nickel & Articles thereof		
76	Aluminum & Articles thereof		
84	Nuclear, Boilers, Mechanical		
85	Electrical Machinery & Applicances		
88	Aircraft, Spacecraft & Parts		
		Variety Increases	
		HS2	Sector
		70	Glass & Glassware
		90	Precision Instruments

Notes: All reported coefficients are for Non-EC FTA that are statistically significant at least at the 10% level. Quality in Column (a) and quality adjusted prices in Column (b) are estimated with elasticities from the Broda-Weinstein procedure. Variety in column (c) refers to $\lambda_{jt}/\lambda_{jt-1}$ from equation 3.3. The RHS variable FTA_exEC_{ot} is 1 when there is an FTA in force between the EU and the (non-EU) trade partner, and 0 otherwise. The RHS contains Ec_{ot}, partner-product and year fixed effects. Standard errors are clustered at the product level.

At the sectoral level, we find that a large fraction of sectors experienced quality increases. A couple of sectors saw increases in quality-adjusted prices and variety. The increase in quality-adjusted prices in Apparel and Clothing might reflect the fact that non-FTA partners experienced greater access to UK consumers due to the dismantling of the multifibre agreement (MFA) during this time period. This might be caused by the fact that we impose

a stringent estimation strategy to measure the impact of FTAs. Specifically, FTAs are estimated to have a negative impact on quality-adjusted prices only when the FTA partner reduces its price more than the control group of non-FTA partners, netting out any other downward time trends that are common across products and countries.

We also find that several intermediate goods sector experience a rise in quality from trade agreements. Intermediate inputs affect consumers indirectly through their use in final products manufacturing, but they do not directly impact consumer welfare. Section 5 will therefore focus on product categories that are part of the consumer price index for UK and EU consumers

4.3.2. Different Measures for Quality, Prices and Variety

In a final robustness check, we measure quality and quality-adjusted prices using the Berlingieri procedure as described previously. Tables 6 shows that FTAs induce quality improvements and price reductions, with broadly similar coefficient estimates.

Table 6: Different Measures of Quality, Prices and Variety: UK 1993-2013

	Quality	Quality-Adjusted Prices	Variety
	(a) Coeff. (Std. Err.)	(b) Coeff. (Std. Err.)	(c) Coeff. (Std. Err.)
FTA_exEC_{ot}	0.261 (0.024)**	-0.290 (0.025)**	-0.001 (0.001)
EC_{ot}	0.082 (0.036)*	-0.001 (0.037)	0.001 (0.001)**
Partner-Product FE, α_{oj}	yes	yes	yes
Time FE, α_t	yes	yes	yes
N	1,887,311	1,887,311	2,138,705
R^2	0.970	0.972	0.056

Notes: ** denotes statistical significance at the 1% level. The LHS variables are in natural logarithms. Quality in Column (a) and quality adjusted prices in Column (b) are estimated with elasticities from the Berlingieri procedure. Variety in column (c) refers to a count of trade partners *o* per product *j*. The RHS variable FTA_exEC_{ot} is 1 when there is an FTA in force between the EU and the (non-EU) trade partner, and 0 otherwise. The RHS variable EC_{ot} is 1 when the trade partner is a 2004/2007 accession country (for years after the accession), and 0 otherwise. The RHS contains partner-product and year fixed effects. Standard errors are clustered at the product level.

Measuring variety as a count of trade partners in each HS 6-digit product, we continue to find FTA-induced variety changes which are either insignificant or very close to zero. We conclude that using different methodologies to measure quality, quality-adjusted prices and variety effects yields estimates comparable to our baseline approach.

Table 7: Different Measures of Quality, Prices and Variety: EU12 1993-2013

	Quality	Quality-Adjusted Prices	Variety
	(a) Coeff. (Std. Err.)	(b) Coeff. (Std. Err.)	(c) Coeff. (Std. Err.)
FTA_exEC_{ot}	0.129 (0.012)**	-0.100 (0.013)**	-0.001 (0.001)
EC_{ot}	0.277 (0.020)**	-0.064 (0.021)**	-0.004 (0.001)**
Partner-Product FE, α_{oj}	Yes	Yes	Yes
Time FE, α_t	Yes	yes	Yes
N	2,974,889	2,974,889	3,779,443
R^2	0.963	0.967	0.056

Notes: ** denotes statistical significance at the 1% level. The LHS variables are in natural logarithms. Quality in Column (a) and quality adjusted prices in Column (b) are estimated with elasticities from the Berlingieri procedure. Variety in column (c) refers to a count of trade partners *o* per product *j*. The RHS variable FTA_exEC_{ot} is 1 when there is an FTA in force between the EU and the (non-EU) trade partner, and 0 otherwise. The RHS variable EC_{ot} is 1 when the trade partner is a 2004/2007 accession country (for years after the accession), and 0 otherwise. The RHS contains partner-product and year fixed effects. Standard errors are clustered at the product level.

5. Quantifying the Impact of FTAs on Consumer Prices

The baseline methodology provides estimates for the impact of FTAs on import quality, quality-adjusted prices and variety at the HS product-line level. To understand how overall consumer prices are affected by FTAs, Section 5.1 combines our import price estimates with consumer expenditure data to determine the potential impact of FTAs on the consumption basket. Section 5.2 provides projections of the impact of future FTAs on consumer price indices based on the assumption that the effects of these FTAs are similar to those of existing trade agreements.

5.1. Quantification Methodology and the Price Impact of Existing FTAs

To estimate the impact of existing FTAs on consumer prices, implement this approach, we first estimate our baseline specification from Equation 3.4 separately for the HS codes mapping into a given consumer price (CPI) sub-index. This yields estimates of the FTA-induced (quality-adjusted) price reductions for specific groups of imports from the FTA partner countries. Weighting these implied price reductions by the share of FTA partner countries in total imports, and by the share of imports in total expenditure, we can calculate the impact of FTAs on each CPI sub-index. We then use CPI expenditure shares to combine the estimates for individual sub-indices into an overall FTA impact on consumer prices. The two key assumptions underlying this approach are i) that wholesalers do not change their mark-ups in response to changes in quality-adjusted import prices; and (ii) that changing quality-adjusted prices of imported goods do not have an impact on the quality-adjusted prices of domestically-produced goods. In a final step (Section 5.2), we use our existing estimates to predict the likely price impact of two potential future FTAs, the EU-Japan Economic Partnership Agreement (EPA) and the EU-US Transatlantic Trade & Investment Partnership (TTIP).

For our quantification approach, we require a mapping from the product classification system (HS) of trade data to the product classification system used for CPI indices (the “Classification of Individual Consumption According to Purpose”, COICOP). We use a correspondence between HS products and CPI groups developed by the OECD. The COICOP is multi-tier classification system which comprises of 86 so-called classes at its most detailed level. Our mapping is at the next higher level of aggregation, which consists

of 43 so-called groups. Of these, 24 contain predominantly tradable products which can be linked to HS codes using our mapping.[11] For each COICOP group, we thus obtain a set of corresponding HS codes.[12]

We estimate Equation 3.4 for each COICOP group separately to obtain the impact of non-EC FTAs and EU accessions on quality-adjusted import prices within that group. Tables 10 and 14 report the corresponding results for the EU12 and the UK, respectively. For comparison with our earlier findings, we also present results for regressions in which we pool observations from all 24 tradable COICOP groups (see Tables 8 and 9).[13] These are broadly similar to our baseline results (Tables 2 and 4), although we estimate a larger price-reducing effect of EU accessions on EU12 quality-adjusted prices, and a weaker effect of the non-EC-FTAs on the quality and quality-adjusted prices of UK imports. The effect of EU accessions on quality and quality-adjusted prices is no longer statistically significant. As before, we do not find any significant impact on product variety.

Table 8: The Impact of FTAs on Quality, Prices and Variety (UK, CPI Sample)

	Quality	Quality-Adjusted Prices	Variety
	(a) Coeff. (Std. Err.)	(b) Coeff. (Std. Err.)	(c) Coeff. (Std. Err.)
FTA_exEC_{ot}	0.217 (0.044)**	-0.197 (0.046)**	0.001 (0.001)
EC_{ot}	-0.044 (0.070)	0.159 (0.072)*	0.000 (0.001)
Partner-Product FE, α_{oj}	Yes	yes	Yes
Time FE, α_t	Yes	yes	Yes
N	1,148,757	1,148,757	1,292,336
R^2	0.977	0.978	0.028

Notes: ** denotes statistical significance at the 1% level. Quality in Column (a) and quality adjusted prices in Column (b) are estimated with elasticities from the Broda-Weinstein procedure. Variety in column (c) refers to $\lambda_{jt}/\lambda_{jt-1}$ from equation 3.3. The RHS variable FTA_exEC_{ot} is 1 when there is an FTA in force between the EU and the (non-EU) trade partner, and 0 otherwise. The RHS variable EC_{ot} is 1 when the trade partner is a 2004/2007 accession country (for years after the accession),

[11] See Table 10 below for list of these COICOP groups.

[12] About 35 per cent of HS 6-digit codes do not map into a COICOP category. This reflects the existence of intermediate inputs in the HS classification. We therefore report sectoral results using the full HS 2-digit classification in Section 4. Further, a small fraction of HS 6-digit codes map into more than one COICOP category. In our COICOP group-level regressions, some HS codes will thus be used in several regressions.

[13] Recall that around 35% of HS codes cannot be linked to COICOP groups (see previous footnote), explaining the changes in coefficient estimates and the lower number of observations reported.

and 0 otherwise. The RHS contains partner-product and year fixed effects. Standard errors are clustered at the product level.

Having estimated FTA coefficients (β_s) for each COICOP group, we compute the predicted consumer price change (in %) for COICOP group *s* in year *t* as:

$$\Delta price(COICOP_{st}) = [exp(\beta_s)-1] \times (Import\ Share_{FTA,t}) \times (Trade\ Share_{UK/EU12,t})$$

where $Import\ Share_{FTA,t}$ is the share of the FTA country group of interest (i.e., the 2004/2007 EU accession countries or the non-EC FTA countries listed previously), and $Trade\ Share_{UK/EU12,t}$ is the share of imports in total consumer expenditure on COICOP group *s* in year *t*.

Table 9: The Impact of FTAs on Quality, Prices and Variety (EU, CPI Sample)

	Quality	Quality-Adjusted Prices	Variety
	(a) Coeff. (Std. Err.)	(b) Coeff. (Std. Err.)	(c) Coeff. (Std. Err.)
FTA_exEC_{ot}	0.183	-0.144	0.0001
	(0.023)**	(0.023)**	(0.0001)
EC_{ot}	0.376	-0.190	0.0000
	(0.037)**	(0.038)**	(0.0000)
Partner-Product FE, α_{oj}	Yes	yes	Yes
Time FE, α_t	Yes	yes	Yes
N	1,830,316	1,830,316	2,113,824
R^2	0.973	0.975	0.035

Notes: ** denotes statistical significance at the 1% level. Quality in Column (a) and quality adjusted prices in Column (b) are estimated with elasticities from the Broda-Weinstein procedure. Variety in column (c) refers to $\lambda_{jt}/\lambda_{jt-1}$ from equation 3.3. The RHS variable FTA_exEC_{ot} is 1 when there is an FTA in force between the EU and the (non-EU) trade partner, and 0 otherwise. The RHS variable EC_{ot} is 1 when the trade partner is a 2004/2007 accession country (for years after the accession), and 0 otherwise. The RHS contains partner-product and year fixed effects. Standard errors are clustered at the product level.

For example, Table 14 reports that non-EC FTAs decreased the quality-adjusted price of UK imports of cars, motorcycles and bicycles (COICOP 07.1, “Purchase of Vehicles”) from non-EC FTA partner countries by exp(-0.299)-1) = -26%. In 2012, the share of non-EC FTA partner countries in total imports of vehicles was 5.1%, and the share of UK imports in

total consumer expenditure on this category was 56%.[14] Thus, the total FTA price impact for COICOP 07.2 in 2012 was (-0.26) x (0.051) x (0.56) = -0.7%.[15] We calculate estimates in this way for each COICOP category and year and report the average price effect across years in Table 11 for the EU12 and Table 15 for the UK.[16] For example, Table 15 shows that the average price effect of non-EC FTAs was -0.6%, close to the value of -0.7% we calculated for the year 2012.

We note that these estimated price declines should, in principle, also be reflected in the official CPI figures because the CPI adjusts prices for quality changes. That is, if nominal prices remain unchanged but quality increases, we should observe a decrease in the CPI. In practice, however, quality adjustment in the CPI is imperfect and not all of the estimated declines in quality-adjusted prices will be reflected in official CPI figures. We do not see this as a limitation of our analysis because conceptually, the CPI should adjust prices for quality improvements. The fact that this does not always happen in practice is due to practical limitations faced by statistical agencies, rather than methodological shortcomings of our approach.

Tables 11 and 15 present results for individual COICOP categories as well as a total impact (last row). As discussed, the latter are obtained by weighting the COICOP group results by the share of each group in total consumer expenditure. Note that because a substantial share of overall expenditure is in non-traded goods, these weights do not add up to one, and the overall price impact is smaller than the impact for most individual COICOP groups.

Our results show that for the UK, the overall effect of non-EC FTAs was slightly larger than that of the 2004/2007 EU accessions, with a total expenditure weighted impact on quality-adjusted prices of -0.5% for the former and -0.4% for the latter (Table 15). For the EU, this ordering is reversed and we find that the EU accessions had an effect which was three

[14] Total consumer expenditure by COICOP group is obtained from the UK National Accounts (Blue Book 2014, Table 6.4). We do not have comparable data for all EU12 countries, and use the UK expenditure data adjusted by the share of UK GDP in EU12 GDP in 2010 (i.e., we multiply expenditure in each category by a factor of 6.5 to obtain EU12 consumer expenditures).

[15] Note that this estimate assumes that mark-ups charged by intermediaries (wholesalers and retailers) do not change as a consequence of the FTAs. If they increase, the resulting price change will be smaller; if they decrease, it will be larger.

[16] These averages are for 2005-2013, the years for which we have consumer expenditure data. An advantage of using relatively recent data is that this should improve the accuracy of our forecasts of the effects of future FTAs (see below).

times larger in total than that of non-EC FTAs (-0.9% compared to-0.3%, see Table 11). Most likely, this reflects the higher importance of Eastern Europe as a source of imports for continental European countries such as Germany.

Note that these estimates represent one-off effects. That is, in the absence of non-EC FTAs, UK consumer prices would be 0.5% higher than they currently are. Given that total UK consumer expenditure was £1,059 billion in 2013, this implies that non-EC FTAs save UK consumers approximately £5.3 billion every year. The corresponding figure for the 2004/2007 EU accessions is £4.2 billion.

Looking at the results for individual COICOP groups, the first impression is one of strong heterogeneity, with changes in quality adjusted prices ranging from small increases to large decreases of up to -15% for the EU12 and up to -10% for the UK. We caution that it is difficult to interpret these individual numbers, however, because of the sample size underlying the COICOP-group-specific regressions is much smaller than that used for estimating the overall impact. As a consequence, the group-level estimates, as well as the differences between these estimates, are often statistically insignificant.[17]

Nevertheless, there are a few COICOP groups for which our estimates are consistently significant. For Non-EC FTAs, we observe the largest significant decreases in quality-adjusted prices for COICOP 4.3 ('Products for the regular maintenance and repair of dwelling'; -5.1% for the UK and -2.5% for the EU12), COICOP 9.3 ('Other recreational items and equipment'; -3.5% for the UK and -1.2% for the EU12), COICOP 5.6 ('Goods and services for routine household maintenance'; -3.4% for the UK and -1.9% for the EU12), and COICOP 5.5. ('Tools and equipment for house and garden'; -2.2% for the UK and -2.3% for the EU12). For the 2004/2007 accession, we find the largest decreases for COICOP 9.1 ('Audio-visual, photographic and information processing equipment', -4.0% for the UK and -5.1% for the EU12), COICOP 7.2 ('Operation of personal transport equipment', -2.7% for the UK and -4.2% for the EU12), COICOP 1.2 ('Non-Alcoholic Beverages'; -0.9% for the UK and -1.2% for the EU12), and COICOP 1.1 ('Food'; -0.6% for the UK and -1.2% for the EU12).

[17] Tables 11 and 15 highlight group-level estimates which are based on statistically significant regression coefficients from Tables 10 and 14.

More surprisingly, our results also indicate that quality-adjusted prices for clothing and footwear have increased in both the UK and the EU12 as a consequence of non-EC FTAs and EU accession. As already discussed, this might be an artefact of our estimation strategy and be driven by even stronger quality-adjusted price decreases of non-FTA partner imports as a consequence of the implementation of the multifibre agreement. Likewise, the absence of strong price effects for food and non-alcoholic beverages could be due to the fact that liberalisation of agricultural trade was often exempted from non-EC FTAs. (Note that we do find an effect for EU accessions, where agricultural trade was of course also liberalised.)

5.2. Projections for Future FTAs

Ideally, we would like to know how FTAs that might be negotiated in the future would impact EU consumers. Amongst the several FTAs the EU has been negotiating, we have picked a couple of prominent ones, which are the EU-Japan Economic Partnership Agreement (EPA) and the EU-US Transatlantic Trade and Investment Partnership (TTIP). To understand how these FTAs might affect UK and EU12 consumers, we provide two sets of estimates for each future FTA. The first set of estimates assumes future FTAs with Japan and the US would have the same impact on quality-adjusted import prices as the non-EC FTAs negotiated after 1993. The second set of estimates assumes future FTAs would have an impact similar to the EC expansion of 2004 and 2007. Because both TTIP and EPA are likely to be different from these two sets of agreements, both in terms of their scope and the economic size of the partner countries, assuming a similar impact on quality-adjusted import prices is clearly a strong assumption. Thus, we see the following results as an illustration of what the effect of TTIP and EPA might be under different assumptions, rather than as a forecast of the most likely effects.

To arrive at our predictions for TTIP and EPA, we use the estimates for each COICOP category from Tables 10 and 14 along with expenditure shares for imports from Japan and the U.S. in each COICOP category. Thus, while the estimated import price effects are derived from already implemented FTAs, the weighting of these effects will be different and the overall predicted effects can diverge substantially from the ones reported earlier for existing FTAs.

Tables 12 and 13 show the predicted consumer price declines from TTIP and EPA, respectively, under each scenario for consumers in EU12 countries. The price decline across all COICOP categories from EPA would be -0.1% if its impact were similar to FTAs with non-EC members and -0.3% percentage points if its impact were similar to the 2004/2007 expansion of the EC. The corresponding price declines from TTIP are -0.3% under both scenarios.

Tables 16 and 17 conduct a similar analysis for UK consumers. If quality-adjusted price effects were similar to FTAs with non-EC members, the economy-wide price decline from the EU-Japan FTA would be -0.2% and -0.4% from TTIP. This corresponds to yearly total consumer expenditure savings of £4.2 billion (TTIP) and £2.1 billion (EPA), respectively. If we instead assume that price effects were similar to the 2004/2007 exceptions, we obtain reductions in quality-adjusted prices of -0.2% for both EPA and TTIP. These effects are additive, so that an implementation of both EPA and TTIP would reduce quality-adjusted prices by -0.6% (non-EC estimates) or -0.4% (EU accession estimates).

Because they are based on the same underlying coefficients estimates, the ranking of COICOP groups in terms of predicted declines in quality-adjusted prices for TTIP and EPA is broadly similar to the ranking of our earlier results for non-EC FTAs and the 2004/2007 accession. Some differences arise, however, because of the different import shares of the U.S. and Japan. For example, we estimate a substantially larger decrease in quality-adjusted prices in the UK from EPA than from non-EC FTAs for the COICOP category ‘Purchase of Vehicles’ (cars and motorcycles) because Japan is a more important source of UK imports for goods in this categories. Likewise, the estimate for EU12 quality-adjusted price declines for COICOP 6.1 (‘Medical products, appliances and equipment’) is 2-3 times larger than that of EU accessions and non-EC FTAs.

Table 10: Results for Quality-Adjusted Prices by COICOP Groups (EU)

COICOP	COICOP Group Name	Non-EC FTAs		EC		No. Obs.
		Coeff.	Std. Error	Coeff.	Std. Error	
01.1	Food	-0.046	0.050	-0.538**	0.091	304,411
01.2	Non-alcoholic beverages	0.009	0.096	-1.157**	0.422	42,301
02.1	Alcoholic beverages	-0.127	0.110	-0.738*	0.310	18,746
02.2	Tobacco	-0.730+	0.386	-1.497	0.957	9,863
03.1	Clothing	-0.017	0.033	0.279**	0.058	388,024
03.2	Footwear	-0.257	0.195	0.273*	0.127	34,963
04.3	Maintenance and repair of the dwelling	-0.412**	0.149	-0.484**	0.161	138,507
04.5	Electricity, gas and other fuels	-0.449	0.310	-0.031	0.188	9,247
05.1	Furniture, furnishings, carpets and other floor coverings	-0.279*	0.121	-0.220	0.140	140,369
05.2	Household textiles	-0.318*	0.151	0.004	0.137	99,847
05.3	Household appliances	0.036	0.148	-0.729+	0.434	36,034
05.4	Glassware, tableware and household utensils	-0.261+	0.134	-0.009	0.124	156,140
05.5	Tools and equipment for house and garden	-0.170**	0.063	-0.266**	0.085	227,647
05.6	Goods and services for routine household maintenance	-0.263**	0.080	-0.311**	0.078	309,892
06.1	Medical products, appliances and equipment	-0.525	0.369	-0.603*	0.293	50,221
07.1	Purchase of vehicles	-0.439	0.561	-1.425	1.344	21,792
07.2	Operation of personal transport equipment	-0.241**	0.087	-0.484**	0.096	231,096
08.2	Telephone & telefax equipment	-0.442	0.318	-0.499	0.505	7,914
09.1	Audio-visual, photographic and information processing equipment	-0.346**	0.131	-0.652**	0.171	110,742
09.2	Other major durables for recreation and culture	-0.406	0.293	-0.700	0.720	42,442
09.3	Other recreational items and equipment; flowers, garden and pets	-0.190*	0.084	-0.067	0.084	294,497
09.5	Newspapers, books and stationery	-0.012	0.112	-0.177	0.181	33,784
12.1	Personal care	-0.275	0.232	-0.454+	0.243	9,968
12.3	Personal effects n.e.c.	-0.131+	0.074	0.153	0.102	135,305
All	All COICOP Groups pooled	-0.144**	0.023	-0.190**	0.038	1,830,316

Notes: Table shows coefficient estimates and standard errors from regressions of quality adjusted import prices on dummy variables for whether the exporting country is an FTA partner or a 2004/2007 accession country (see Equation 3.4 and Table 2). The RHS contains partner-product and year fixed effects. Standard errors are clustered at the product level. **, * and + denote statistical significance at the 1%, 5% and 10% level, respectively.

Table 11: Estimated Quality-Adjusted Price Effects of Non-EC FTAs and 2004/2007 Accession, Total and by COICOP (Results for EU12, including the UK)

COICOP	COICOP Group Name	Price Impact, Non-EC FTAs	Price Impact, EU Accession
01.1	Food	-0.1%	-1.2% (**)
01.2	Non-alcoholic beverages	0.0%	-1.2% (**)
02.1	Alcoholic beverages	-0.1%	-0.4% (*)
02.2	Tobacco	0.0% (+)	-0.8%
03.1	Clothing	-0.1%	0.7% (**)
03.2	Footwear	-0.5%	0.9% (*)
04.3	Maintenance and repair of the dwelling	-2.5% (**)	-15.2% (**)
04.5	Electricity, gas and other fuels	-1.1%	-0.1%
05.1	Furniture, furnishings, carpets and other floor coverings	-0.5% (*)	-1.5%
05.2	Household textiles	-0.9% (*)	0.0%
05.3	Household appliances	0.2%	-4.1% (+)
05.4	Glassware, tableware and household utensils	-0.6% (+)	0.0%
05.5	Tools and equipment for house and garden	-2.3% (**)	-5.8% (**)
05.6	Goods and services for routine household maintenance	-1.9% (**)	-2.8% (**)
06.1	Medical products, appliances and equipment	-3.1%	-2.0% (*)
07.1	Purchase of vehicles	-0.9%	-4.8%
07.2	Operation of personal transport equipment	-0.8% (**)	-4.2% (**)
08.2	Telephone & telefax equipment	-1.3%	-10.9%
09.1	Audio-visual, photographic and information processing	-1.0% (**)	-5.1% (**)
09.2	Other major durables for recreation and culture	-0.8%	-3.5%
09.3	Other recreational items and equipment; flowers, garden and	-1.2% (*)	-0.4%
09.5	Newspapers, books and stationery	0.0%	-0.2%
12.1	Personal care	0.0%	-0.1% (+)
12.3	Personal effects n.e.c.	-0.9% (+)	0.3%
All	**Total price impact, expenditure weighted**	**-0.3%**	**-0.9%**

Notes: (+), (*) and (**) denote statistical significance (at the 10%, 5%, and 1% level, respectively) of the coefficient estimates from Table 10 underlying the estimated reductions in quality-adjusted prices in this table.

Table 12: Predicted Quality-Adjusted Price Effects of EU-US FTA (TTIP), Total and by COICOP (Results for EU12, inc UK)

COICOP	COICOP Group Name	Price Impact, Non-EC FTAs	Price Impact, EU Accession
01.1	Food	0.0%	-0.3%(**)
01.2	Non-alcoholic beverages	0.0%	-0.2%(**)
02.1	Alcoholic beverages	-0.1%	-0.3% (*)
02.2	Tobacco	0.0% (+)	0.0%
03.1	Clothing	0.0%	0.1% (**)
03.2	Footwear	0.0%	0.0% (*)
04.3	Maintenance and repair of the dwelling	-1.4% (**)	-1.6% (**)
04.5	Electricity, gas and other fuels	-0.7%	-0.1%
05.1	Furniture, furnishings, carpets and other floor coverings	-0.3% (*)	-0.2%
05.2	Household textiles	-0.1% (*)	0.0%
05.3	Household appliances	0.0%	-0.3% (+)
05.4	Glassware, tableware and household utensils	-0.3% (+)	0.0%
05.5	Tools and equipment for house and garden	-1.6% (**)	-2.4% (**)
05.6	Goods and services for routine household maintenance	-1.6% (**)	-1.8% (**)
06.1	Medical products, appliances and equipment	-6.3%	-6.9% (*)
07.1	Purchase of vehicles	-0.5%	-1.0%
07.2	Operation of personal transport equipment	-0.6% (**)	-1.0% (**)
08.2	Telephone & telefax equipment	-0.7%	-0.7%
09.1	Audio-visual, photographic and information processing	-1.7% (**)	-2.7% (**)
09.2	Other major durables for recreation and culture	-1.2%	-1.9%
09.3	Other recreational items and equipment; flowers, garden and	-1.7% (*)	-0.6%
09.5	Newspapers, books and stationery	0.0%	-0.2%
12.1	Personal care	0.0%	0.0% (+)
12.3	Personal effects n.e.c.	-0.2% (+)	0.3%
All	**Total price impact, expenditure weighted**	**-0.3%**	**-0.3%**

Notes: (+), (*) and (**) denote statistical significance (at the 10%, 5%, and 1% level, respectively) of the coefficient estimates from Table 10 underlying the estimated reductions in quality-adjusted prices in this table.

Table 13: Predicted Quality-Adjusted Price Effects of EU-Japan Economic Partnership Agreement, Total and by COICOP (Results for EU12, including the UK)

COICOP	COICOP Group Name	Assume Price Impact as for Non-EC FTAs	Assume Price Impact as for EU Accession
01.1	Food	0.0%	0.0% (**)
01.2	Non-alcoholic beverages	0.0%	0.0% (**)
02.1	Alcoholic beverages	0.0%	0.0% (*)
02.2	Tobacco	0.0% (+)	0.0%
03.1	Clothing	0.0%	0.0% (**)
03.2	Footwear	0.0%	0.0% (*)
04.3	Maintenance and repair of the dwelling	-0.2% (**)	-0.2% (**)
04.5	Electricity, gas and other fuels	0.0%	0.0%
05.1	Furniture, furnishings, carpets and other floor coverings	0.0% (*)	0.0%
05.2	Household textiles	0.0% (*)	0.0%
05.3	Household appliances	0.0%	-0.6% (+)
05.4	Glassware, tableware and household utensils	-0.1% (+)	0.0%
05.5	Tools and equipment for house and garden	-0.9% (**)	-1.3% (**)
05.6	Goods and services for routine household maintenance	-0.3% (**)	-0.4% (**)
06.1	Medical products, appliances and equipment	-0.9%	-1.0% (*)
07.1	Purchase of vehicles	-1.3%	-2.7%
07.2	Operation of personal transport equipment	-0.4% (**)	-0.8% (**)
08.2	Telephone & telefax equipment	-0.3%	-0.3%
09.1	Audio-visual, photographic and information processing equipment	-1.3% (**)	-2.1% (**)
09.2	Other major durables for recreation and culture	-1.4%	-2.1%
09.3	Other recreational items and equipment; flowers, garden and pets	-0.2% (*)	-0.1%
09.5	Newspapers, books and stationery	0.0%	0.0%
12.1	Personal care	0.0%	0.0% (+)
12.3	Personal effects n.e.c.	0.0% (+)	0.0%
All	**Total price impact, expenditure weighted**	**-0.1%**	**-0.3%**

Notes: (+), (*) and (**) denote statistical significance (at the 10%, 5%, and 1% level, respectively) of the coefficient estimates from Table 10 underlying the estimated reductions in quality-adjusted prices in this table.

Table 14: Results for Quality-Adjusted Prices by COICOP Groups (UK)

COICOP	COICOP Group Name	Non-EC FTAs		EC		No. Obs.
		Coeff.	Std. Error	Coeff.	Std. Error	
01.1	Food	0.059	0.082	-0.471*	0.209	173,180
01.2	Non-alcoholic beverages	-0.105	0.192	-0.972+	0.581	25,333
02.1	Alcoholic beverages	-0.243	0.207	0.079	0.367	11,762
02.2	Tobacco	-0.882*	0.353	0.068	0.763	5,491
03.1	Clothing	0.008	0.069	0.960**	0.107	246,685
03.2	Footwear	-0.071	0.269	1.142**	0.369	21,310
04.3	Maintenance and repair of the dwelling	-1.019*	0.430	-0.448	0.474	89,056
04.5	Electricity, gas and other fuels	-1.387+	0.826	-0.123	0.519	5,084
05.1	Furniture, furnishings, carpets and other floor coverings	-0.500*	0.246	-0.645	0.428	87,128
05.2	Household textiles	-0.442	0.428	-0.422	0.841	58,004
05.3	Household appliances	-0.377	0.558	-0.606	0.442	23,086
05.4	Glassware, tableware and household utensils	-0.365	0.233	0.325	0.364	100,143
05.5	Tools and equipment for house and garden	-0.273*	0.130	0.004	0.139	152,379
05.6	Goods and services for routine household maintenance	-0.450*	0.174	-0.152	0.229	202,564
06.1	Medical products, appliances and equipment	-0.603	0.663	-0.205	0.953	34,948
07.1	Purchase of vehicles	-0.299	0.440	-0.416	0.558	10,518
07.2	Operation of personal transport equipment	-0.376+	0.209	-0.497*	0.219	154,169
08.2	Telephone & telefax equipment	0.509	0.373	-0.173	0.495	6,308
09.1	Audio-visual, photographic and information processing equipment	-0.211	0.151	-0.547*	0.256	79,285
09.2	Other major durables for recreation and culture	-0.268	0.260	-0.259	0.491	24,730
09.3	Other recreational items and equipment; flowers, garden and pets	-0.383*	0.191	-0.014	0.262	186,309
09.5	Newspapers, books and stationery	-0.256*	0.102	0.143	0.217	21,542
12.1	Personal care	0.052	0.121	-0.481	0.755	6,777
12.3	Personal effects n.e.c.	-0.245	0.167	0.430*	0.207	86,016
All	All COICOP Groups pooled	-0.197**	0.046	0.159*	0.072	1,148,757

Notes: Table shows coefficient estimates and standard errors from regressions of quality adjusted import prices on dummy variables for whether the exporting country is an FTA partner or a 2004/2007 accession country (see Equation 3.4 and Table 2). The RHS contains partner-product and year fixed effects. Standard errors are clustered at the product level. **, * and # denote statistical significance at the 1%, 5% and 10% level, respectively.

Table 15: Estimated Quality-Adjusted Price Effects of Non-EC FTAs and 2004/2007 Accession, Total and by COICOP (Results for the UK only)

COICOP	COICOP Group Name	Price Impact, Non-EC FTAs	Price Impact, EU Accession
01.1	Food	0.3%	-0.6% (*)
01.2	Non-alcoholic beverages	-0.2%	-0.9% (+)
02.1	Alcoholic beverages	-1.0%	0.1%
02.2	Tobacco	0.0% (*)	0.1%
03.1	Clothing	0.0%	2.4% (**)
03.2	Footwear	0.0%	1.8% (**)
04.3	Maintenance and repair of the dwelling	-5.1% (*)	-10.4%
04.5	Electricity, gas and other fuels	-1.8% (+)	-0.3%
05.1	Furniture, furnishings, carpets and other floor coverings	-1.3% (*)	-2.3%
05.2	Household textiles	-1.0%	-0.2%
05.3	Household appliances	-2.0%	-2.5%
05.4	Glassware, tableware and household utensils	-1.3%	0.8%
05.5	Tools and equipment for house and garden	-2.2% (*)	0.0%
05.6	Goods and services for routine household maintenance	-3.4% (*)	-1.0%
06.1	Medical products, appliances and equipment	-5.4%	-0.5%
07.1	Purchase of vehicles	-0.6%	-1.6%
07.2	Operation of personal transport equipment	-1.0% (+)	-2.7% (*)
08.2	Telephone & telefax equipment	3.9%	-2.9%
09.1	Audio-visual, photographic and information processing equipment	-1.4%	-4.0% (*)
09.2	Other major durables for recreation and culture	-0.4%	-1.2%
09.3	Other recreational items and equipment; flowers, garden and pets	-3.5% (*)	-0.1%
09.5	Newspapers, books and stationery	-0.2% (*)	0.1%
12.1	Personal care	0.0%	0.0%
12.3	Personal effects n.e.c.	-2.7%	0.5% (*)
All	**Total price impact, expenditure weighted**	**-0.5%**	**-0.4%**

Notes: (+), (*) and (**) denote statistical significance (at the 10%, 5%, and 1% level, respectively) of the coefficient estimates from Table 14 underlying the estimated reductions in quality-adjusted prices in this table.

Table 16: Predicted Quality-Adjusted Price Effects of EU-US FTA (TTIP), Total and by COICOP (Results for the UK only)

COICOP	COICOP Group Name	Assume Price Impact as for Non-EC FTAs	Assume Price Impact as for EU Accession
01.1	Food	0.1%	-0.3% (*)
01.2	Non-alcoholic beverages	0.0%	-0.2% (+)
02.1	Alcoholic beverages	-0.4%	0.1%
02.2	Tobacco	0.0% (*)	0.0%
03.1	Clothing	0.0%	0.5% (**)
03.2	Footwear	0.0%	0.3% (**)
04.3	Maintenance and repair of the dwelling	-2.5% (*)	-1.4%
04.5	Electricity, gas and other fuels	-1.5% (+)	-0.2%
05.1	Furniture, furnishings, carpets and other floor coverings	-1.7% (*)	-2.0%
05.2	Household textiles	-0.1%	-0.1%
05.3	Household appliances	-0.3%	-0.5%
05.4	Glassware, tableware and household utensils	-1.3%	1.6%
05.5	Tools and equipment for house and garden	-2.4% (*)	0.0%
05.6	Goods and services for routine household maintenance	-2.6% (*)	-1.0%
06.1	Medical products, appliances and equipment	-4.9%	-2.0%
07.1	Purchase of vehicles	-0.1%	-0.1%
07.2	Operation of personal transport equipment	-1.0% (+)	-1.2% (*)
08.2	Telephone & telefax equipment	1.1%	-0.3%
09.1	Audio-visual, photographic & information processing equipment	-1.2%	-2.8% (*)
09.2	Other major durables for recreation and culture	-1.6%	-1.6%
09.3	Other recreational items & equipment; flowers, garden and pets	-3.5% (*)	-0.2%
09.5	Newspapers, books and stationery	-0.8% (*)	0.6%
12.1	Personal care	0.0%	0.0%
12.3	Personal effects n.e.c.	-1.4%	3.5% (*)
All	**Total price impact, expenditure weighted**	**-0.4%**	**-0.2%**

Notes: (+), (*) and (**) denote statistical significance (at the 10%, 5%, and 1% level, respectively) of the coefficient estimates from Table 14 underlying the estimated reductions in quality-adjusted prices in this table.

Table 17: Predicted Quality-Adjusted Price Effects of EU-Japan Economic Partnership Agreement, Total and by COICOP (Results for the UK only)

COICOP	COICOP Group Name	Assume Price Impact as for Non-EC FTAs	Assume Price Impact as for EU Accession
01.1	Food	0.0%	0.0% (*)
01.2	Non-alcoholic beverages	0.0%	0.0% (+)
02.1	Alcoholic beverages	0.0%	0.0%
02.2	Tobacco	0.0% (*)	0.0%
03.1	Clothing	0.0%	0.1% (**)
03.2	Footwear	0.0%	0.0% (**)
04.3	Maintenance and repair of the dwelling	-0.2% (*)	-0.1%
04.5	Electricity, gas and other fuels	0.0% (+)	0.0%
05.1	Furniture, furnishings, carpets and other floor coverings	-0.2% (*)	-0.2%
05.2	Household textiles	0.0%	0.0%
05.3	Household appliances	-0.5%	-0.7%
05.4	Glassware, tableware and household utensils	-0.2%	0.2%
05.5	Tools and equipment for house and garden	-1.2% (*)	0.0%
05.6	Goods and services for routine household maintenance	-0.5% (*)	-0.2%
06.1	Medical products, appliances and equipment	-0.5%	-0.2%
07.1	Purchase of vehicles	-1.3%	-1.7%
07.2	Operation of personal transport equipment	-1.0% (+)	-1.3% (*)
08.2	Telephone & telefax equipment	0.2%	-0.1%
09.1	Audio-visual, photographic & information processing equipment	-0.6%	-1.4% (*)
09.2	Other major durables for recreation and culture	-1.4%	-1.3%
09.3	Other recreational items & equipment; flowers, garden and pets	-0.4% (*)	0.0%
09.5	Newspapers, books and stationery	0.0% (*)	0.0%
12.1	Personal care	0.0%	0.0%
12.3	Personal effects n.e.c.	-0.1%	0.2% (*)
All	**Total price impact, expenditure weighted**	**-0.2%**	**-0.2%**

Notes: (+), (*) and (**) denote statistical significance (at the 10%, 5%, and 1% level, respectively) of the coefficient estimates from Table 14 underlying the estimated reductions in quality-adjusted prices in this table.

6. Conclusions

This report provides a methodology building on standard methods in the economics literature to estimate the gains from international trade agreements to consumers in the UK and the EU12. Our baseline methodology enables a straightforward computation of quality, quality-adjusted prices and variety for essentially all traded goods in an economy. As such, it is very comprehensive and can be easily used to analyse the effects of a wide range of different FTAs; all that is needed are readily available trade and consumer expenditure data.

We find that FTAs negotiated by the European Union provided UK and EU12 consumers with access to better quality products and lower quality-adjusted prices for imported products. On average, the trade agreements of the past two decades increased the quality of UK imports from its FTA partners by 26 per cent and lowered the quality-adjusted price of imports by 19 per cent. For the EU12, we find that quality increased by 28 per cent and quality-adjusted prices decreased by 11 per cent.

We combine these FTA-partner specific effects with data on the share of FTA partners in total imports, and with the share of imports in total consumer expenditure to calculate an FTA price impact for 24 groups of tradable goods, as well as for economy-wide consumer prices.

We show that consumer prices fell by 0.5 per cent for UK consumers as a result of FTAs with trade partners that are not members of the European Community. This implies that non-EC FTAs save UK consumers approximately £5.3 billion every year. By comparison, the recent 2004/2007 EU accessions led to a decline of consumer prices by 0.4 per cent.

Using the set of non-EC FTA estimates to predict the effects of future FTAs, we find a projected decline in consumer prices for UK consumers of 0.4 per cent from an FTA with the United States (TTIP) and 0.2 per cent an FTA with Japan (EPA). The corresponding savings in consumer expenditure are £4.2 billion (TTIP) and £2.1 billion (EPA), respectively. When we instead assume that TTIP and EPA would have an impact on UK import prices similar to the 2004/2007 EU accessions, we predict a consumer price decline of 0.2 per cent for both agreements.

For EU12 consumers, we obtain broadly similar results, although non-EC FTAs had a smaller effect when compared to the recent 2004/2007 EU accessions. Overall, non-EC FTAs reduced EU12 consumer prices by 0.3 per cent and the 2004/2007 accessions by 0.9 per cent. The predicted effects of TTIP and EPA are a reduction in EU12 consumer prices by 0.3 per cent and 0.1 per cent, respectively, if we assume a similar import price effect to non-EC FTAs. If the effect were instead similar to EU accessions, the price reductions would be 0.3 per cent for both TTIP and EPA.

We noted several limitations of our analysis. First, the difference-in-differences methodology we use cannot account for biases arising from possible strategic aspects of EU trade policy. For example, if the European Commission systematically negotiated FTAs with partner countries with large expected future increases in product quality, our results would overestimate the actual gains to UK and EU12 consumers. On the other hand, there are several reasons why we might believe that our results present a lower bound for the consumer benefits of FTAs. First, we do not capture the impact of trade agreements on domestically produced goods which are likely to see lower prices due to increased foreign competition. Second, we only have data for goods trade and do not look at services trade. Thus, we cannot measure any consumer gains resulting from better quality, more variety, and lower quality-adjusted prices for imported services. Such gains could materialise both directly through the import of services for final consumption, or indirectly through imports of services used as intermediate inputs. Third, distributors and final goods producers may pass on part of the cost savings from lower trade barriers on intermediate goods and capital inputs to consumers. This is not reflected in our estimates because our data is on border prices and values, rather than prices and expenditures of consumers. Finally, while the use of a dummy variable for FTAs has the advantage of capturing the effects of different provisions within the agreements (such as tariff reductions, non-trade barriers etc.), it is likely to underestimate the full impact of recent trade agreements because the provisions are typically implemented in phases and can often be back-loaded. By switching the dummy variable to one in the year of the FTA's implementation, we assume instead that all measures are implemented to their full extent immediately.

References

Giuseppe Berlingieri. Variety growth, welfare gains and the fall of the iron curtain. Technical report, 2014.

Bruce A. Blonigen and Anson Soderbery. Measuring the benefits of foreign product variety with an accurate variety set. *Journal of International Economics*, 82(2):168–180, 2010.

C. Broda and D. E. Weinstein. Globalization and the Gains from Variety*. *Quarterly Journal of Economics*, 121(2):541–585, 2006.

R. C. Feenstra and D. E. Weinstein. Globalization, markups, and the US price level. *NBER Working Paper*, 2010.

Robert C. Feenstra. New product varieties and the measurement of international prices. *American Economic Review*, 84:157, 1994.

Juan C. Hallak and Peter K. Schott. Estimating Cross-Country differences in product quality*. *The Quarterly journal of economics*, 126(1):417–474, 2011.

Keith Head and Thierry Mayer. Gravity equations: Workhorse, toolkit, and cookbook. *Handbook of international economics*, 4, 2013.

E. Helpman and P. R. Krugman. *Market Structure and Foreign Trade: increasing returns, imperfect competition, and the international economy*. MIT Press, 1985.

L. Iacovone and Beata Javorcik. Getting Ready: Preparation for Exporting. CEPR Discussion Paper 8926, 2012.

Timothy J. Kehoe and Kim J. Ruhl. How important is the new goods margin in international trade? *Journal of Political Economy*, 121(2):358–392, 2013.

Amit K. Khandelwal, Peter K. Schott, and Shang-Jin Wei. Trade liberalization and embedded institutional reform: Evidence from chinese exporters. *The American Economic Review*, 103(6):2169–2195, 2013.

P. Krugman. Increasing Returns, Monopolistic Competition, and International Trade. *Journal of International Economics*, 9(4):469–479, 1979.

Paul R. Krugman. Scale Economies, Product Differentiation, and the Pattern of Trade. *American Economic Review*, 70(5):950–959, 1980.

James Levinsohn. Testing the imports-as-market-discipline hypothesis. *Journal of International Economics*, 35(1):1–22, 1993.

Lukas Mohler and Michael Seitz. The gains from variety in the european union. *Review of World Economics*, 148(3):475–500, 2012.

Eric Verhoogen Trade, Quality Upgrading and Wage Inequality in the Mexican Manufacturing Sector. *Quarterly Journal of Economics*, vol. 123, no. 2, pp. 489-530, May 2008

Appendix

Methodology for Estimating Demand Elasticities

The following steps provide an overview of the method for estimating demand elasticities. Details of the procedure are available in Berlingieri [2014] which is implemented for data on UK imports from 1993-2013.

1. Start with a demand system: Equation (3.2) $\ln x_{ojt} = \alpha_{jt} - \sigma_j \ln p_{ojt} + \varepsilon_{ojt.}$

2. Following Feenstra [1994], add a supply equation to get a demand-supply system.

   – Demand: $\ln x_{ojt} = \alpha_{jt} - \sigma_j \ln p_{ojt} + \varepsilon_{ojt}$.

   – Supply: $\ln p_{ojt} = \gamma_{jt} + \omega_j \ln x_{ojt} + \xi_{ojt}$.

3. Following Broad and Weinstein [2006] and Berlingieri [2014]:

   – Normalize by reference origin-product to eliminate α_{jt} and γ_{jt}.

   – Use quantity and unit value data to get composite of demand and supply elasticities.

4. Identify demand elasticity (separately from supply elasticity) using data on different countries. Assumes demand and supply shocks are independent & countries differ in shocks.

Berlingieri [2014] implements this procedure as follows. The import demand equation for each variety of good *j* can be expressed in terms of shares and changes over time:

$$\Delta \ln s_{ojt} = \varphi_{jt} - (\sigma_j - 1) \Delta \ln p_{ojt} + \Delta \varepsilon_{ojt.}$$

where Δ represents changes from period *t-1* to *t*, φ_{jt} captures the product-specific price index and $\varepsilon_{ojt.}$ is treated as an unobservable random variable, reflecting changes in quality. The shares and prices are likely to be correlated with the error term due to the simultaneous determination of import prices and quantities. The demand equation cannot therefore be directly estimated. Simultaneity bias is corrected by allowing the supply of variety *j* to vary with the amount of exports through the following export supply:

$$\Delta \ln p_{ojt} = \Delta \gamma_{jt} + \omega_j \Delta \ln x_{ojt} + \Delta \xi_{ojt}$$

where ω_j is the inverse supply elasticity (assumed to be the same across countries) and $\Delta \xi_{ojt}$ captures any random changes in technology.

Defining $\Delta\delta_{ojt} = \Delta\xi_{ojt} / (1+\omega_j)$, the identfication strategy relies on $E(\Delta\varepsilon_{ojt}\ \Delta\delta_{ojt}) = 0$. This implies that demand and supply equations errors at the variety level are uncorrelated. Differencing with respect to origin country k eliminates the intercepts in the demand and supply specifications and the estimating equation becomes:

$$\Delta^k \ln p_{ojt} = [\omega_j/(\sigma_j - 1)(1-\rho_j)]\Delta^k \ln s_{ojt} + \Delta^k \delta_{ojt}$$

where $\Delta^k z_{ojt} = \Delta z_{ojt} - \Delta z_{kjt}$ and $\rho_j = \omega_j (\sigma_j - 1) / (1 + \omega_j \sigma_j)$. In order to take advantage of the identification strategy, the differenced demand and supply equations are multiplied together to obtain:

$$(\Delta^k \ln p_{ojt})^2 = \theta_1 (\Delta^k \ln s_{ojt})^2 + \theta_2 (\Delta^k \ln s_{ojt}) (\Delta^k \ln p_{ojt}) + u_{ojt}$$

where $\theta_1 = [\rho_j / (\sigma_j - 1)^2 (1-\rho_j)]$, $\theta_2 = [(2\rho_j - 1)/(\sigma_j - 1)(1-\rho_j)]$ and $u_{ojt} = (\Delta^k \varepsilon_{ojt}\ \Delta^k \delta_{ojt}) / (\sigma_j - 1)$. Averaging this equation over time, the coefficients can be consistently estimated through weighted least squares to obtain estimates of the demand elasticity. Box A1 reports summary statistics for these demand elasticity estimates.

BOX A1: Demand Elasticities, UK Imports 1993-2013

Summary Statistics for Elasticities from Broda-Weinstein Procedure

No. Elasticities	Mean	Std. Dev.	Min	Max
3,574	35.56	59.02	1.06	885.05

Percentiles for Elasticities from Broda-Weinstein Procedure

1%	5%	10%	25%	50%
1.20	1.38	1.52	1.89	2.76
75%	**90%**	**95%**	**99%**	**100%**
17.87	135.5	140	140	885.05

The median demand elasticity is 2.76 which is close to the median demand elasticity estimate of 2.7 reported by Broad and Weinstein [2001] for the United States in 1990-2001. The top ten percentile of HS products by demand elasticities show that these varieties made negligible contributions to consumer welfare.

It is typical to find some outlier values for demand elasticities using this estimation procedure. We therefore check the robustness of our main findings by trimming products which are in the top 5 percent and bottom 5 percent of elasticity estimates. Even in this trimmed sample, we find strong evidence for an increase in the quality of UK imports, reductions in quality-adjusted prices and negeligble effects on the variety of imports available to consumers. Table 18 reports the baseline results where quality and quality-adjusted prices are estimated using the Broda-Weinstein procedure and variety is a welfare-based measure from Equation 3.3.

Table 18: The Impact of FTAs on Quality, Prices and Variety: Trimmed Sample for UK 1993-2013

	Quality	Quality-Adjusted Prices	Variety
	(a) Coeff. (Std. Err.)	(b) Coeff. (Std. Err.)	(c) Coeff. (Std. Err.)
FTA_{ot}	0.159	-0.125	0.0006
	(0.028)**	(0.028)**	(0.0005)
Partner-Product FE, α_{oj}	yes	yes	yes
Time FE, α_t	yes	yes	yes
N	1,791,791	1,791,791	1,645,382
R^2	0.977	0.979	0.120

Notes: ** denotes statistical significance at the 1% level. The LHS variables are in natural logarithms. Quality in Column (a) and quality adjusted prices in Column (b) are estimated with elasticities from the Broda-Weinstein procedure. Variety in column (c) refers to $\lambda_{jt}/\lambda_{jt-1}$ from equation 3.3. The RHS variable FTA_{ot} is 1 when there is an FTA in force between the EU and the trade partner, and 0 otherwise. The RHS contains partner-product and year fixed effects. Standard errors are clustered at the product level.

CENTRE FOR ECONOMIC PERFORMANCE
Recent Discussion Papers

1416	Stefan Bender Nicholas Bloom David Card John Van Reenen Stefanie Wolter	Management Practices, Workforce Selection and Productivity
1415	Emanuel Ornelas	Special and Differential Treatment for Developing Countries
1414	Markus K. Brunnermeier Luis Garicano Philip R. Lane Marco Pagano Ricardo Reis Tano Santos David Thesmar Stijn Van Nieuwerburgh Dimitri Vayanos	The Sovereign-Bank Diabolic Loop and ESBies
1413	Antoine Dechezleprêtre Elias Einiö Ralf Martin Kieu-Trang Nguyen John Van Reenen	Do Tax Incentives for Research Increase Firm Innovation? An RD Design for R&D
1412	Luis Garicano Luis Rayo	Relational Knowledge Transfers
1411	João Paulo Pessoa	International Competition and Labor Market Adjustment
1410	Claudia Olivetti Barbara Petrongolo	The Evolution of Gender Gaps in Industrialized Countries
1409	Quoc-Anh Do Kieu-Trang Nguyen Anh N. Tran	One Mandarin Benefits the Whole Clan: Hometown Favoritism in an Authoritarian Regime
1408	Caroline J. Charpentier Jan-Emmanuel De Neve Jonathan P. Roiser Tali Sharot	Models of Affective Decision-making: How do Feelings Predict Choice?

1407	Johannes Boehm Swati Dhingra John Morrow	Swimming Upstream: Input-output Linkages and the Direction of Product Adoption
1406	Felix Koenig Alan Manning Barbara Petrongolo	Reservation Wages and the Wage Flexibility Puzzle
1405	Gianluca Benigno Luca Fornaro	Stagnation Traps
1404	Brian Bell Stephen Machin	Minimum Wages and Firm Value
1403	Gene M. Grossman Elhanan Helpman Ezra Oberfield Thomas Sampson	Balanced Growth Despite Uzawa
1402	Emanuele Forlani Ralf Martin Giordano Mion Mirabelle Muûls	Unraveling Firms: Demand, Productivity and Markups Heterogeneity
1401	Holger Breinlich	The Effect of Trade Liberalization on Firm-Level Profits: An Event-Study Approach
1400	Richard V. Burkhauser Jan-Emmanuel De Neve Nattavudh Powdthavee	Top Incomes and Human Well-Being Around the World
1399	Rabah Arezki Thiemo Fetzer	On the Comparative Advantage of U.S. Manufacturing: Evidence from the Shale Gas Revolution
1398	Adriana Kocornik-Mina Thomas K.J. McDermott Guy Michaels Ferdinand Rauch	Flooded Cities

The Centre for Economic Performance Publications Unit
Tel 020 7955 7673 Fax 020 7404 0612
Email info@cep.lse.ac.uk Web site http://cep.lse.ac.uk