

**The Costs to the UK of Language Deficiencies as a Barrier to
UK Engagement in Exporting:**

A Report to UK Trade & Investment

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Executive Summary

This report is a response to the recommendation on UK SME exports of the February 2013 House of Lords Select Committee on Small and Medium Sized Enterprises. The Committee's Recommendation 14 was that UKTI should give priority to dispelling misleading perceptions associated with language differences and to improving the ability of SMEs to deal with language and cultural differences.

Necessary conditions for worthwhile government interventions in markets to improve efficiency are that there should be a market failure and that there must be a cost-effective solution. In the case of domestic firms' entry to foreign trade, and especially the development of foreign markets by SMEs, the likely source of failure arises from deficient information. Companies may not know what they do not know and thereby can lose profitable opportunities.

The present report analyses two types of data to show that this is indeed the case for UK businesses. These data are bilateral international trade flows and responses to questions asked about exporting, actual and potential, in surveys of individual companies. The results of our analysis indicate that the opportunities forgone because of inadequate information, in turn stemming from insufficient UK investment in the languages and cultures of other countries, are potentially very large. They suggest that there are likely to be government policies that could be highly effective in ameliorating these deficiencies.

Conclusions of the trade data analysis are in line with findings from the academic literature, which consistently identifies a strong language barrier effect on trade patterns, although the precise numbers vary. All of these estimates, with the exception of those presented for the first time here, refer to an average for the whole world rather than for the UK. A reasonable estimate of the gross effect for the UK is 3.5 percent of GDP. Although there are wide margins of error around this figure, even the lower bound is a substantial proportion of GDP. This implies that there must be some investments in language skills that would yield a high return.

Our analysis suggests that over time the trade cost to the UK resulting from language barriers has varied in magnitude, but has been consistently large. Costs to rest of world appear to have increased recently (possibly due to rise of China's trade, and limited Chinese language skills among non-Chinese).

The analysis has also been able to identify markets in which the UK is exporting less

than would be expected, using a model which takes account of a wide range of factors, including an average language barrier effect that does not vary between countries. This shows that the UK underperformed in 2006 in all four of the BRICs, as well as in France, Germany and Japan.

The firm-level survey evidence confirms the view that businesses ‘don’t know what they don’t know’. Exporting enterprises claiming that they had not experienced ‘cultural difficulties’ tend to be those without language skills, relying on being able to use English for their foreign sales. By contrast, businesses with high export intensity are much more likely to state they are aware of cultural difficulties. These businesses have deeper experience of exporting, and have gained greater understanding of cultural differences, and of the difficulties they can present.

Our analysis demonstrates that language difficulties are the largest single contributor to perceived cultural problems, even when information, relationship difficulties, and legal problems are taken into account. The findings also show that reliance on English is widespread among UK exporters. The overwhelming majority of businesses that said they had not experienced significant difficulties with language differences reported that this was because they had always been able to use English. Only a few indicated that they had the necessary language skills.

These results strongly suggest that language ignorance is an important reason for the low exports of those firms reporting that they had experienced no cultural difficulties in selling abroad. Either such businesses are relying excessively on English-speaking markets, and not developing sales elsewhere, or they are failing to appreciate the role of language and cultural differences behind the other types of barriers to expansion in non-Anglophone markets. For example, our analysis finds that experience of difficulties with lack of contacts also has a significant adverse effect on export performance. But the ease with which businesses can access and develop such contacts is highly likely to depend, at least in part, on language and cultural skills.

UKTI already has in place some services designed to help UK firms gain a better understanding of the ways in which language and cultural diversity can impact on their export performance, and how they can bridge these differences more successfully. Among the possible further investments to reduce language ignorance currently being investigated by UKTI are ways of developing appropriate links with higher education institutes to enable suitable foreign students to undertake placements in UK businesses, with a view to bridging the language and culture gaps that are hindering their export growth.

We strongly recommend that UKTI should pursue this policy. It is likely that there would be substantial net benefits from some form of student placement scheme, because the costs are small relative to the likely pay offs. Almost all UK HE institutes now enroll large numbers of business students from the full range of languages and markets across the world. Many of them would welcome either the opportunity to enhance their incomes, or to gain a placement in a company so as to write a dissertation or other piece of assessed coursework. These contacts could add substantially to a smaller company's resource base, especially to their exporting skills.

Language Skills and Exports

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Language Skills and Exports

1. Introduction

- 1.1. Knowledge of foreign markets is part of a company's resource base, and language skills are often essential for acquiring such information about opportunities and cultural constraints in other countries. Moreover linguistic ability is a major stimulus for the constructive use of export information. In addition, experience of living and working overseas significantly affects both information-gathering and decision-making by export managers and, in foreign language markets, requires linguistic skills and an ability to appreciate distinctive cultures. Yet smaller firms, interested in expanding sales initially exclusively in the home market, are likely to lack this knowledge. Those that know about what they are ignorant will take steps to remedy their deficiency. But there will be businesses that do not know what they do not know. They may well gravitate to already crowded Anglophone markets simply because they believe they understand the language there.
- 1.2. Another, not exclusive, possibility is that for their sales push they will rely on the non-Anglophone world understanding English. For the UK is in a distinctive linguistic position by virtue of speaking a world language, English. This creates a no less distinctive Anglophone solution to international communication; 'If you learn my language, I can save resources by not learning yours'. At first sight this strategy makes sense from the viewpoint of the world, as well as for the UK. World learning resource use is apparently minimised if smaller linguistic groups join larger ones, rather than the other way round.
- 1.3. The omission in this reasoning stems from motivation and necessity. Because the seller necessarily knows more about what they have to offer- and its suitability for the target market - than the potential buyer, language is a means of finding opportunities in non-common language markets that may not otherwise be offered. Hence when culturally and linguistically informed, the seller is better able to decide on the appropriate marketing effort, at least for their products.
- 1.4. The 'Anglophone temptation' is obviously not restricted to the UK. But even among Anglophones the UK seems to be linguistically backwards. A

Eurobarometer survey¹ found that in native English-speaking Ireland, 41% can speak at least one other language than their mother tongue (including Irish Gaelic) at the level of being able to have a conversation, but in the UK only 30% have this ability. All this suggests there may be informational sources of market failure in the UK allocation of resources to exports.

- 1.5. The purpose of this report is to examine the evidence for these possible shortcomings and suggest remedies. If linguistic knowledge is important in international trade then countries sharing a common language will trade more intensively with each other. This will distort the world pattern of trade relative to an ideal where there is no linguistic ignorance anywhere. First is surveyed the method and the estimates of this common language bias in international trade, and therefore of the gross cost of language ignorance, by examining trade between pairs of countries. Next the analysis is narrowed down to consider only UK trade with other economies and the linguistic distortions.
- 1.6. Much international trade is conducted by, if not actually within, large multinational companies. These businesses may be expected to have tolerably good information sources about the economies in which they operate and therefore about the linguistic needs of their trade. They are in a position to undertake the investment in language skills they judge necessary. However, this is far less likely to be the case for smaller exporters and companies that have not yet begun exporting. Therefore the report goes on to consider the UKTI PIMS Non-User Survey. This Survey permits more detailed focus on UK exporters and language use and is examined for clues about the sources, extent and consequences of language use, especially among UK SMEs. In a final section the report considers possible cost-effective remedies for linguistic shortcomings among actual and potential UK exporters.

2. Literature Review

- 2.1. Surmounting the language barrier to international trade is costly – investment in language acquisition absorbs time and money. But as the European Commission's Lisbon Strategy (2000) recognized, there are economic advantages from doing so. They identified language skills as vital to boosting

¹ Eurobarometer (2005) Europeans and Languages, 63.4. In Ireland 94% give English as mother tongue, in UK 92%. In Ireland apart from the mother tongue 21% can speak Irish/Gaelic 21%, French 19% English 6%). In the UK the comparable figures are French 14%, English 7% and German 6%.

the competitiveness of Europe's economy. Subsequently, a number of official reports and commissions have reinforced the message (EC COM 2005 596 final, Hagen et al 2006, Commission on Multilingualism July 2008). Every year the British Chambers of Commerce (BCC) commission a major international trade business survey; they find that a shortage of exporting knowledge holds back trade between the UK and the global market. The gaps in commercial knowledge are especially substantial for micro and small businesses in manufacturing, IT and media industries. In particular, the largest language barriers remain for the fastest-growing markets such as China and Russia. The BCC language surveys (2003, 2004) use a conceptual framework that classifies four types of British exporters in terms of their attitude towards language skills: opportunists, developers, adaptors and enablers. Analysis of the surveys shows that opportunists and developers report that their exports are declining, while adaptors and enablers experience an increase. Exporters also express strong support of the government drive to introduce modern languages at primary school level.

- 2.2. Academic support comes from research on the economic consequences of linguistic ignorance as a by-product of bilateral international trade models estimated principally for other purposes. Controlling for a range of other influences, such as a common border and former colonial ties, they estimate the trade boost from a common official language. The other side of this coin is that not sharing a common language is a barrier to trade. Frankel and Rose (2002) find that two countries sharing an official language tend to have 1.8 times higher bilateral trade than does a pair of otherwise similar economies. Anderson and van Wincoop (2004) report a tax equivalent of language costs of around 7 percent. Helpman et al. (2009) calculate that a common language increases the probability of bilateral trade by 10 per cent.
- 2.3. Focusing specifically on the relationship between bilateral trade and languages Hutchinson (2002) analyses the role of English in trade relations of selected countries with the USA. The greater the proportion of the population that speaks English, as either a first or second language, the higher the volume of trade, both exports and imports, between the US and that country. Moreover the difficulty of learning a language has an impact. Greater linguistic difference from English reduces trade with the US, controlling for migrants and networks (Hutchinson 2005). Ku and Zussman (2010) show that the ability to communicate in English has a strong effect in promoting trade across the world,

but they simply recognize no other spoken language than the native language except English. Ignoring the ability to speak each other's language may over-estimate the role of English as a lingua franca, since the ability to speak English is not the only possible relevant linguistic factor in trade.

- 2.4. Melitz (2002, 2008) distinguishes between an open circuit language and direct communication. An open circuit language is widely spoken (20% or more) or official in both bilateral trading countries (maximum of two per country). He finds 15 languages in this category. Direct communication depends on the percentage of speakers in each country; in this category he identifies 29 languages. The indicator is found by summing the products of the respective percentages of speakers over all the relevant languages (at least four percent) in the two trading countries. With his new measures Melitz finds a greater impact of languages on trade than does earlier work. Later work by Melitz and Toubal (2012) develops a system of measures of common language by distinguishing common native language, common spoken language, common official language and linguistic proximity. The aggregate impact of all these linguistic factors on bilateral trade is shown to be at least twice as great as the usual single dummy variable for common language.
- 2.5. Taken together these studies provide compelling evidence of the importance of languages for trade. Yet language investment must compete with other uses of time and money. How do we know that more is worthwhile, compared to these other possibilities? If businesses do not ensure they have access to language skills then they must judge that it is not profitable to do so, and why should we second guess them? As noted in the preceding section, the answer is market failure due to information deficiencies. There is reason to suppose that smaller firms under-estimate the contribution that language and cultural skills make to their international trade and the gains from exporting can be substantial.
- 2.6. Those businesses that do export tend to be more productive than those only supplying the home market (Greenaway and Kneller 2004, Greenaway and Yu 2004, Girma, Kneller and Pisu 2005). The principle of comparative advantage – that specialisation is the basis of the gains from trade - is consistent with this association. Countries and economies that specialise in what they do better, exporting these goods and services, while importing products which they cannot make so cheaply, will have higher living standards than those that restrict trade. Exporters will be more productive because of this specialisation.

- 2.7. For sound empirical reasons recent analysis commonly focuses on the fixed and sunk costs associated with exporting, such as establishing distribution and service networks in foreign markets, which can be barriers for less productive firms (Helpman, Meltiz and Yeaple, 2004). Exporting, on one interpretation then, identifies those firms with sufficiently competitive products, or which are productive enough, to overcome the sunk costs. Expansion of these more efficient and effective firms must improve the productivity of the economy as a whole.
- 2.8. More importantly, the higher productivity of exporters is, in part, caused by exporting. Through international buyers and competitors, exporters learn about new processes, products or management practices. Export markets allow firms to exploit economies of scale, thereby enhancing productivity. By gaining access to bigger markets, they may simply be in a better position to spread their overheads over more sales, increasing their productivity in this way. Exporters also face greater competitive pressures in international markets, which could more strongly encourage efficiency².
- 2.9. Are exporters in fact more productive because productivity causes exports, or because exporting boosts their productivity? Both effects are likely to be at work. Only the second is pertinent for the present study however. Selling more abroad would not necessarily improve economic performance if for instance there is no difference from the consequences of selling more at home. Switching more resources into foreign languages for a firm could require a reduction of investment in domestic marketing. In such a case, only if the additional linguistic resources generated more sales than were lost from the diversion away from marketing at home would there be a gain to the firm and to the economy. This is where the contribution of scale economies or learning in the wider export market may be critical.
- 2.10. Industries do gain from 'learning-by-exporting' (Harris and Li 2007 Table 3.6). But experiences differ between entrants, exiting firms, and those that enter and exit overseas markets. Harris and Li (2007) show that firms new to exporting

² On the other hand, firms in countries already very open to trade may already be exposed to these competitive pressures and benefits from learning, whether or not they export.

experienced substantial productivity effects³; a 34 percent long-run increase in Total Factor Productivity in the year these firms began exporting⁴. This was a once and for all boost for, in the year after beginning exporting, a productivity increase of only about 5 percent was found. Because the ‘follow on’ effect is small compared with the initial stimulus, the fixed cost explanation for exporting permitting greater productivity appears to be of greater significance than learning by exporting.

2.11. One strong possibility to explain persistence of the high productivity-export entry association is inadequate information. Information can be costly to acquire and the value may be unknown until it is obtained. So the optimum investment in information is hard to establish. Language skills are often essential for acquiring information about opportunities in other economies. Consequently inadequate investment in language skills could lose firms profitable opportunities. Peel and Eckhart’s (1993) survey showed a difference in perceived export and language barriers between small, medium and large Welsh manufacturing enterprises. 29% of respondents also indicated that they considered that their future trading performance would improve significantly if language skills were enhanced within their firms. Another, UK, survey of SMEs found that although most maintained that they were aware of the importance of languages for international trade, this was not reflected in their language use in certain functional areas and in many of their recruitment and training policies (Crick 1999).

3. Economic Analysis of Language Investment

3.1. An efficient market economy identifies especially productive investments by their actual and prospective high returns. Investment in skills however presents distinctive challenges. The person – often a child – who would benefit from the investment commonly lacks the resources for the skill acquisition, or even the appreciation that it is worthwhile. For this reason the state now universally invests in education. Yet the subjects and the extent of this investment are usually controversial; how much should be devoted to mathematics, to language education or to sport, for instance? It might be thought that, where the

³ Omitting the retail and wholesale sectors. Parameter values that were significant (at the 15% level or better) were weighted by their shares in total (real) gross output to obtain an overall estimate for the UK economy.

⁴ Based on the Instrumental Variable model.

economy's requirements are concerned, the matter is straightforward. If earnings of those with particular skills are unusually high then expand provision. But market signals may not be sufficient for deciding on efficient language investment; private and social returns may diverge.

- 3.2. If firms incorrectly do not see profit opportunities from exploiting language skills, then they will not demand them, and private returns- primarily wages for those with such skills- will be lower. Prospective employees will not invest sufficiently in language education. Such a 'market failure' will probably be exacerbated by the complementarity between skills particular to individual firms, such as marketing their products, and general language skills. Each enhances the other's productivity, yet firms may be unwilling to provide language training for an employee who may leave before the investment has paid off. Investment in English as a second language in Switzerland yields a 25 percent earnings differential for fluent skills, controlling for education and experience (Grin 2003). But returns depend on whether employment is in a trade-orientated sector; languages together with business yield high returns while languages and, say, teaching, do not.
- 3.3. That there also may be an information-based market failure in language investment is suggested by a study of export managers of British SMEs (Williams and Chaston 2004). The research found that linguistic ability was a major stimulus for the positive use of export information. Experience of living and/or working overseas significantly affected both information-gathering and decision-making. Without this experience it would be difficult to judge what was being missed. The distinctive ways in which a business utilises and acquires knowledge influence the capabilities that determine its competitive position (Makadok 2001; Grant 2003). Competitive advantage depends upon knowledge resources, intangible assets. 'Born global' firms and accelerated internationalising SMEs, tend to rely on critical knowledge assets or belong to knowledge-based and knowledge-intensive sectors (Harris and Li, 2005).
- 3.4. A resource-based view of the firm (Wernerfeld 1984; Conner and Pralahad 1996; Westhead et al 2001; Dhanaraj and Beamish 2003) provides a partial framework to understand the positive impact of language skills to exporting. An exporting firm's competitive position is determined by the way in which a firm uses and acquires market knowledge and information. The capacity of a firm to create,

extend or modify its resource base is referred to as ‘dynamic capability’, which is the key to exporting.

- 3.5. For smaller firms indivisibilities of human assets can be additional sources of social inefficiency. They will lack sufficiently large sales over which they can spread the costs of specialised language skills, and remain profitable. Cooperation or collaboration between firms to share a fixed cost, such as a linguistically trained switchboard operator, could in principle go some way to address the problem. But the difficulty of finding a group of firms, with the same needs, willing to cooperate in this respect while presumably competing in others, is likely to be very considerable. Large firms with many projects in a wide range of markets can better afford to acquire the special expertise or even the information that they need special expertise. Even for large businesses, there will be pressures to use the language native to the majority of participants in transactions (Loos, 2007).
- 3.6. The English-speaking nations’ lack of language skills might be explained by the fact that at present they belong to the largest economic group measured by spending power (not by population). For two economies with different languages that are merely communications technologies and perfect substitutes for each other, the cost of learning each language is the same (Church and King 1993). If these costs are not too high, then the efficient language learning solution is for the smaller language group to learn the language of the larger group. This maximises the excess of communication benefits over learning costs. The communication benefits are the same whichever group becomes bilingual, and the costs are lowest if the fewest possible acquire the extra language skills⁵.
- 3.7. Even in this simple model, language learning costs can be so high that the socially ideal arrangement of the minority learning the majority language does not come about. When deciding whether to invest in language skills, individual learners do not take into account the benefit conferred upon those they will be able to communicate with. Only individuals’ own payoff enters the private calculation. But for the world as a whole the gains to both parties relative to the

⁵ European language investment is then probably covered by this model. To explain the English-speaking economies’ language investment stance on say Mandarin or Hindi, it is necessary to note that the value of time spent acquiring language skills is less the lower the earning power that constitutes the opportunity cost. The opportunity cost to a member of a rich nation of learning say Mandarin is much higher than that for a Chinese citizen learning English — leaving aside intrinsic difficulty. Asian economic growth may well change this opportunity cost in a couple of decades though.

investment costs are pertinent. This ‘network externality’ can give rise to underinvestment in languages.⁶

4. The Gravity Model and International Trade

- 4.1. By ‘taxing’ trade with some partners but not with others, language underinvestment lowers trade with some, in part to the benefit of others (trade diversion) and in part reducing trade in total (trade destruction). The ‘common language’ effect captures some of the trade diversion (away from better partners) of language barriers. A greater trade diversion effect of the common language implies greater trade destruction (worthwhile exchanges that do not happen) as well.
- 4.2. Estimation of the language effect in international trade requires a model of trade flows so that the impact of language knowledge or ignorance can be isolated. Here the gravity model is the source of controls. Isaac Newton proposed that the attractive force between two objects depended on the product of their masses divided by the square of the distance between them. Some centuries later it was found that the general form of gravity model provided a good explanation for international trade flows. The attractive force is replaced by trade between two countries and the ‘mass’ of the countries is their GDP or GDP per capita or both. Distance and other barriers such as language also have been found to influence trade flows in this type of model.
- 4.3. The micro-economic foundations of the gravity model are explained following Baldwin and Taglioni (2007). Subscripts o and d represent country origin and destination of bilateral trade flows. Trade cost factors including language barriers multiply origin prices to get destination prices p_{od} . P_d is nation- d ’s (destination) ideal CES price index of these destination prices p_{od} (assuming all goods are traded).

$$P_d = \left(\sum n_o p_{od}^{1-\sigma} \right)^{\frac{1}{1-\sigma}} \dots (1)$$

where n_o is the number of varieties of goods and σ is the elasticity of substitution between the goods of each pair of trading economies.

⁶ Konya (2006) develops this idea further in a different framework. He concludes that in some circumstances it may be optimal for small countries to subsidise language learning in actual or potential trading partners.

- 4.4. The value of trade between any origin and destination pair equals expenditure in the destination economy times the share of spending on the origins goods. This share depends on the destination import prices relative to destination home prices of each variety of imports. It follows that, V_{od} , trade between origin and destination economies depends on the number of varieties from the origin (n_o), their origin prices (p_o) times trade costs (including language costs) of landing the goods at the destination (τ_{od}), expenditure on these goods in the destination (E_d) and a price index for the destination (P_d);

$$V_{od} = n_o (p_o \tau_{od})^{1-\sigma} (E_d / P_d)^{1-\sigma} \dots (2)$$

- 4.5. Define Ω_o as the market potential of the origin country, how much the origin might sell, which depends upon spending in destination markets and the costs of accessing them. This is obtained by summing over all of o's markets indexed $i = 1$ to R including its own;

$$\Omega_o = \sum_i \tau_{oi}^{1-\sigma} (E_i / P_i^{1-\sigma}) \dots (3)$$

- 4.6. Assume that markets clear, so economy o 's wages and prices adjust to ensure that economy o 's production of traded goods equals its sales of traded goods. Then the origin economy's output (Y_o) is the sum of all bilateral origin exports, including those to itself. These bilateral flows depend on origin prices and trade costs, expenditure in the destinations and the destination price indices;

$$Y_o = n_o p_o^{1-\sigma} \Omega_o \dots (4)$$

- 4.7. The fundamental gravity equation is then obtained by substituting (4) into (2) (for $n_o p_o^{1-\sigma}$).

$$V_{od} = (Y_o / \Omega_o) \tau_{od}^{1-\sigma} (E_d / P_d^{1-\sigma}) \dots (5)$$

- 4.8. When using cross-section data, and all bilateral trade costs are symmetric, equation 5 could be simplified by assuming the openness of an economy to imports from the world is proportional or effectively the same as the openness of the world to that economy's exports; $\Omega_d = \chi P_d^{1-\sigma}$. If economy o has good market access, facilitating exporting, then it may also satisfy conditions for foreign exporters to sell easily to economy o . This allows P_d to be substituted out of (5). But in the present empirical study the estimating equation (6) is no different for practical purposes. Without the assumption of symmetrical trade

costs in cross-section empirical equations two dummy variables – one for $P_d^{1-\sigma}$, and the other for the market potential variable will be necessary, just as two dummies are necessary when symmetry is assumed as in equation 6.

$$\ln V_{od} = \ln(Y_o E_d) + (1 - \sigma) \tau_{od}^{1-\sigma} - \ln \Omega_o - \ln(\Omega_d / \chi) \dots (6)$$

4.9. Under the assumptions here exports and imports have the same determinants as each other and so may be grouped together for empirical analysis. In a single year cross-section for each bilateral flow there are two different market potential/price index dummies. When there are k countries in the cross-section there are $(k - 1) k$ bilateral flows and $2k$ origin and destination dummies or categories. Hence the dummies can be identified. But when there is one country only, exporting to or importing from $k - 1$ others in one year, there are $2(k - 1)$ trade flows and $2(k - 1)$ dummies; $\ln \Omega_o$ and $\ln(\Omega_d / \chi)$ can only be assumed to be random effects in an OLS regression. With the market access effects identified, then the purely bilateral trade costs (τ_{od}) – including language costs – can be distinguished.

4.10. When economies' GDPs and trade costs vary, as they do over time; then $\ln \Omega_o$ and $\ln \Omega_d$ are variables as Baldwin and Taglioni (2007) demonstrate. For this reason, that these 'gravitational constants' are not constant in a panel application, the present empirical exercise is restricted to international cross-sections.

Language Ignorance as a Quasi-Tax

4.11. The language barrier coefficient depends on the level of the 'language tax' and on how well the exports of one country can be substituted for the goods of others (measured by σ). This last adds another element of uncertainty to the final estimates.

4.12. Although little work has been undertaken explicitly to assess the language costs in international trade a number of estimates have been generated as a by-product of a broader interest in trade costs. From these it is fair to conclude for the world as a whole that lost trade opportunities are on average equivalent to at least a 7% tax⁷. This figure is so large that there are certainly unexploited language skills investments that would yield a high rate of return. In addition they are likely to

⁷ Assuming $\sigma = 10$ and using coefficients from Head et al (2010) and Baldwin and Taglioni (2007). The coefficient estimated by Melitz (2008) on the same assumption implies a tax of 17%.

be productivity impacts from accessing wider markets (by exporting). These gains may be as much as a one third increase in output, controlling for all inputs

4.13. For the UK the ‘tax’ figure is perhaps less if English as a world language confers advantages upon Anglophones. Other economies invest in learning English so that UK exporters are more likely to be able to communicate adequately in their native language than, say, Hungarians.

4.14. For some purposes we may call the estimate of the costs of language barrier a ‘tax’ because both trade barriers raise the price of traded commodities, making them more expensive to buy and more difficult to sell. How much higher the price is raised depends not only on the trade diversions caused by the common language effect but also on the extent to which the goods of different countries are substitutes. When they are close substitutes the trade barrier will not push up prices as much as when they are poor substitutes. The extent of substitution is somewhat conjectural though many economists have produced estimates. The term ‘tax’ is of course inaccurate to the extent that nobody gains from the language barrier effect, whereas the government receives revenue from a tax to pay for the things we expect from government.

4.15. In the theoretical gravity equation τ_{od} is the bilateral distance, a term that can be used to describe the geographic distance, language difference, etc. Since we focus on the effect of language distance on trade, we derive the ‘tax’ coefficient (β_1) in the theoretical model by substituting

$$\ln \tau_{od} = \beta_1 \ln(\text{language_difference}_{od}) + \beta_2 \ln(\text{distance}_{od}) \dots (7)$$

into (6). This shows language difference effects depend upon the extent to which goods are substitutes for each other as well as the language coefficient or ‘tax’ itself

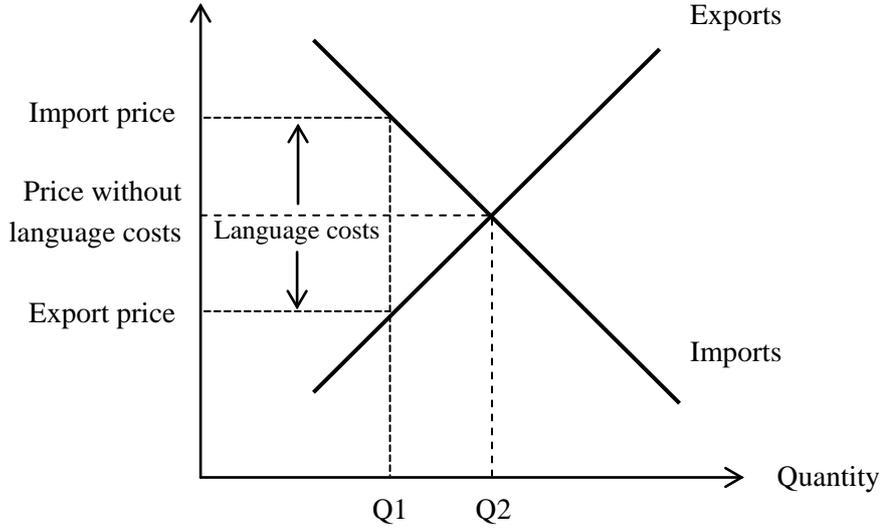
$$\ln V_{od} = \dots + (1 - \sigma) \beta_1 \ln(\text{language_difference}_{od}) + \dots$$

4.16. The ‘tax equivalent idea’ is that the more different are languages the greater the barrier to trade. What we actually estimate is the similarity of languages as indicated by common official language. A language similarity index can be regarded as the inverse of a language difference index. So in logs of the indices

$$\ln(\text{language_difference}_{od}) = -\ln(\text{language_similarity}_{od}) = -\text{Comlang}_{od}$$

- 4.17. In logarithmic form the 'tax coefficient' β_1 (elasticity) from the language difference index is found simply by dividing estimated coefficient by $1 - \sigma$. But if we use the similarity index as a dummy variable (no logs) the implied elasticity for language difference is slightly different. First we must recognise the sign change when we substitute \ln (language similarity). Then we divide the estimated α coefficient by $\sigma - 1$ (the sign change), and exponentiate (minus 1) to infer the elasticity. When $\alpha_4 = 0.5$ and $\sigma = 10$ we have an implied β_1 or 'tax rate' of 5.7%, When $\alpha_4 = 1.2$ we have 14.3%. Changing σ to 5, the 'tax rate' rises to 35%.
- 4.18. In Figure 1 (which ignores other trade costs) shows the effects of the language barrier in a simplified market for an economy's imports and exports. The language cost or tax drives a wedge between the price that exporters can sell in foreign markets and the price at which importers can buy. The simplest measure of these costs to the economy, albeit an under-estimate, is the volume of exports or imports multiplied by the 'tax; Q1 (import price – export price). This leaves out the triangle that takes into account the expansion of trade (to Q2) when language costs are eliminated in the diagram but the effect is small compared with what is measured.
- 4.19. It is important to recognize that these costs themselves would impose costs if they were to be lowered. Language skills are not acquired for free. But if the estimated costs of language ignorance turn out to be very large, it must be possible to find highly profitable investments in skills that reduce this distortion of international trade.

Figure 1 Language Costs in International Trade



The Empirical Exercise

4.20. We can estimate the coefficient α_4 from the econometric model, in its most general form;

$$\begin{aligned} \ln(X_{ij}) = & \alpha_0 + \alpha_1 \ln(Y_i Y_j) + \alpha_2 \ln(Y_i Y_j / \text{Pop}_i \text{Pop}_j) + \alpha_3 \ln(\text{Dist}_{ij}) + \alpha_4 \text{Comlang}_{ij} \\ & + \alpha_5 \text{Gatt}_o + \alpha_6 \text{Gatt}_d + \alpha_7 \text{IndepDate} + \alpha_8 \text{ColHist} + \alpha_9 \text{validmirror} \\ & + \alpha_{10} \text{Comcur}_{ij} + \alpha_{11} \text{Comleg}_{ij} + \alpha_{12} \text{acp_to_eu} + \alpha_{13} \text{eu_to_acp} + \alpha_{14} \text{rta} \\ & + \alpha_{15} \text{gsp} + \alpha_{16} \text{gsp_rec} + \varepsilon_{ij} \end{aligned}$$

$$\text{where, } \alpha_4 = -(1 - \sigma) \beta_1 \Rightarrow \beta_1 = \frac{\alpha_4}{\sigma - 1}.$$

4.21. i and j denote countries, and variables are defined as follows:

- X_{ij} is the merchandise trade flow from country i to country j , and bilateral exports are treated as equivalent to bilateral imports. In national trade statistics, often the single flow between i and j is reported as two values. This is because country i may report its imports from j and country j reports its exports to i . The trade flows may differ for a number of reasons such as, reporting may be ambiguous when trade passes through third countries before reaching the final destination, or there may be a greater fiscal interest in accurately measuring imports than exports. The present data set is that of Head et al. (2010), who select the larger value

reported by a country pair as the more reliable.

- Y is real GDP ($\ln(Y_i Y_j)$) is 'lnyy' in the tables below).
- Pop is population ($\ln(Y_i Y_j / Pop_i Pop_j)$) is 'lnypyp' below.
- $Dist_{ij}$ is the distance between i and j .
- $Comlang_{ij}$ is a binary variable which is unity if i and j have a common language.
- Heg_o is a binary variable which is unity when the origin is a current or former hegemon of destination.
- Heg_d is a binary variable which is unity when the destination is a current or former hegemon of origin.
- $Gatt_o$ is a binary variable which is 1 if the origin is a GATT/WTO member.
- $Gatt_d$ is a binary variable which is 1 if destination is a GATT/WTO member.
- rta is a binary variable which is 1 for a regional trade agreement in force.
- $Comleg_{ij}$ is a binary variable which is 1 when i and j share common legal origin.
- $Comcur_{ij}$ is a binary variable which is 1 when i and j share common currency.
- acp_to_eu is a binary variable which is 1 for ACP to EU.
- eu_to_acp is a binary variable which is 1 for EU to ACP.
- gsp is a binary variable which is 1 if from GSP country to others.
- gsp_rec is a binary variable which is 1 if from other country to GSP countries.
- $validmirror$ is a binary variable which is 1 when the same flow reported by the two related countries is available.
- $ColHist$ is a binary variable which is 1 if a pair was ever in a colonial relationship.
- $Indeupdate$ is the year of independence if the economy was ever a colony.

Data Description

4.22. The data set in this study comes from the Head et al. (2010) gravity dataset CEPII⁸ for all world pairs of countries, but restricted to observations where

⁸ The data is provided by Head et al (2010), which is available after free registration from CEPII at http://www.cepii.fr/CEPII/en/bdd_modele/presentation.asp?id=8.

those merchandise trade flows are non-missing. The period covered is from 1948 to 2006, but the recent years from 1970 to 2006, especially the latest year 2006 are the principal focus of the present exercise.

- 4.23. There are a great many “zeros” in trade flows of the dataset (304,951 out of 892,597 observations from 1970 to 2006), reflecting the genuine absence of trade. In addition, there are also 240,568 (about 27% of the total) trade flows with a value greater than zero but less than one, and they will become negative once we take log. When taking logs of the trade flows, as required by gravity model estimation, these zeros (about 34% of the total trade flows) are dropped from the empirical model. Yet these are likely to be cases where trade barriers were particularly high so that excluding them may lead to understatements of the effects of barriers such as language.
- 4.24. To deal with this selection bias issue, we firstly multiply by 1000 for all trade flows, then replace all zeros with ones, and then take log. In this case, the ordering of the log trade will be unchanged. Substituting very small values for zeros allows the inclusion of these cases in the empirical model but the smaller the number substitutes for zero, the larger the likely effect that is estimated. So an element of arbitrariness is introduced. For UK trade this matters little because there are very few zero trade flows.

Results

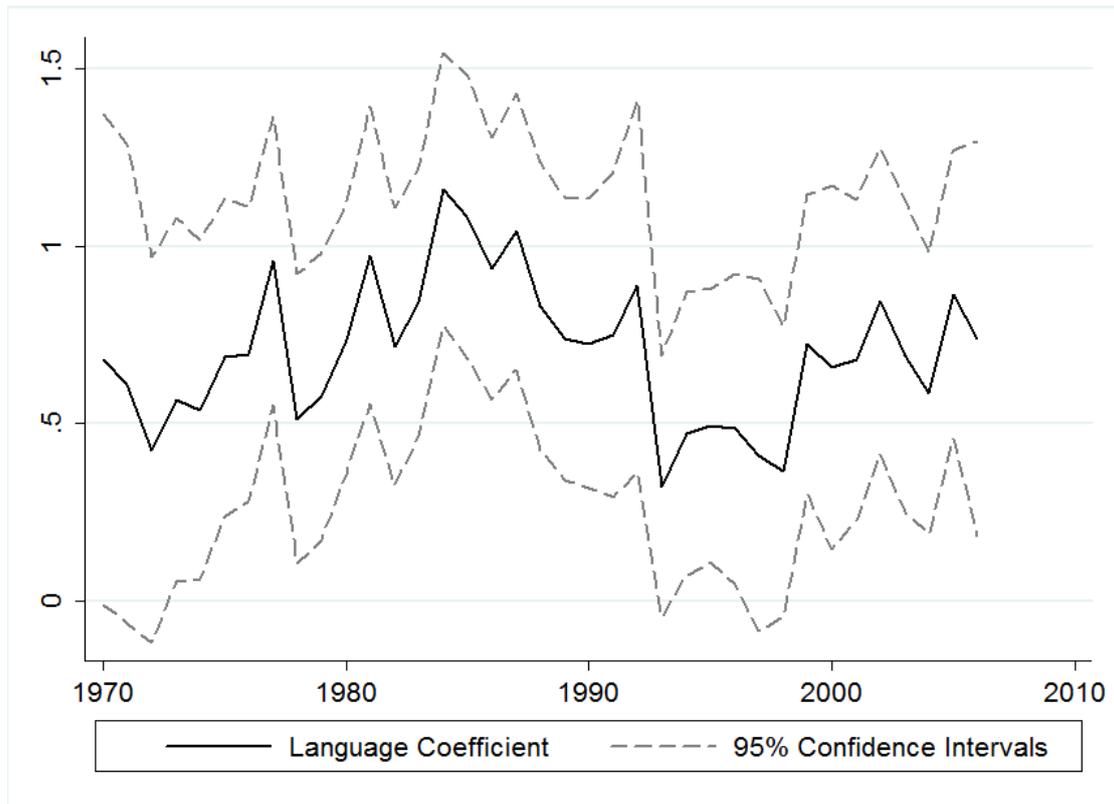
- 4.25. UK Trade: Model specification:

$$\ln(X_{ij}) = \alpha_0 + \alpha_1 \ln(Y_i Y_j) + \alpha_2 \ln(Y_i Y_j / \text{Pop}_i \text{Pop}_j) + \alpha_3 \ln(\text{Dist}_{ij}) + \alpha_4 \text{Comlang}_{ij} \\ + \alpha_5 \text{Gatt}_o + \alpha_6 \text{Gatt}_d + \alpha_7 \text{indepdate} + \alpha_8 \text{col_hist} + \alpha_9 \text{validmirror} + \varepsilon_{ij}$$

- 4.26. Uncertainty surrounds the value of the UK common language coefficient, partly because it must change over time but also for sampling reasons, in view of the fairly small number of observations. In the figure below the average value of the coefficient seems to have been stationary at around 0.7 but the standard errors are large. For 2006 one estimate of the common language coefficient is 0.74 (the full equation estimates are reported in Table 10 in Appendix 1). However, there is a 95 % chance that the true value could fall between 0.18 and 1.29. For the rest of the world, we also include another dummy variable ‘common currency’. The ‘common currency’ is omitted in the UK equation because no

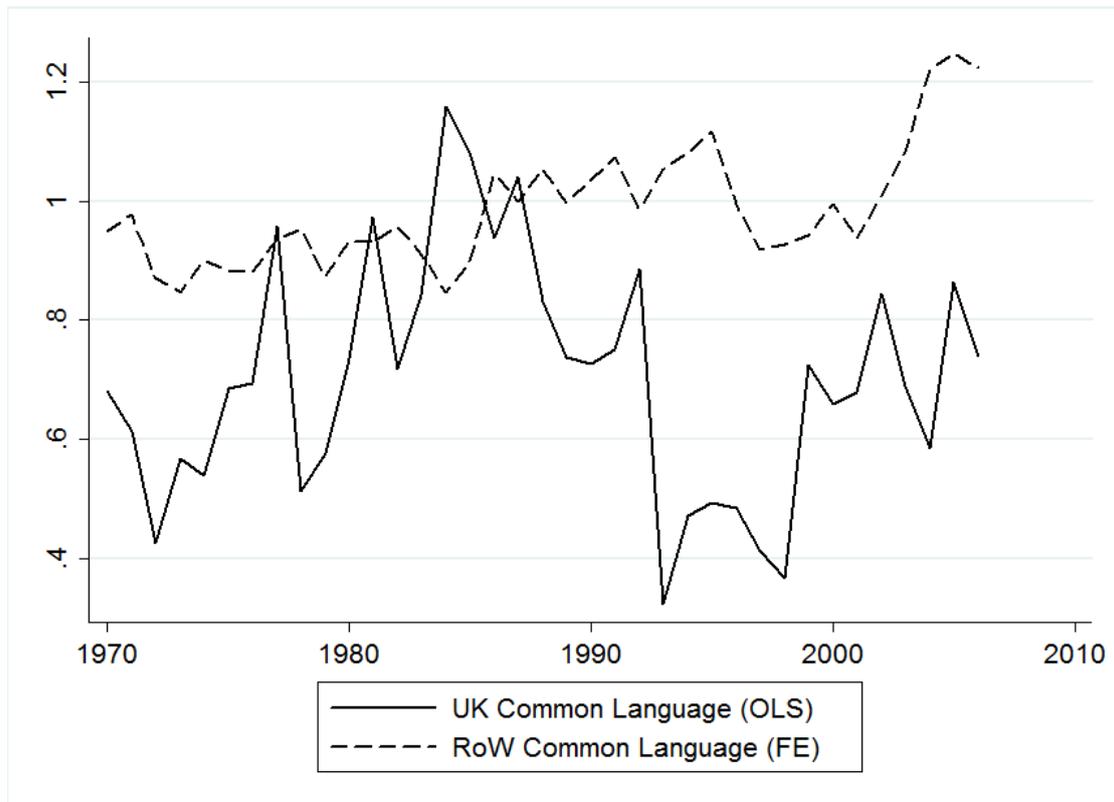
countries other than the UK use British pounds; this regressor will be dropped anyway.

Figure 2 The UK Common Language Coefficient 1970-2006 and Confidence Intervals



4.27. The rest of the world common language coefficient is higher than the UK's. This is to be expected if the international use of English as a common language reduces the bias for the UK of the common language effect relative to non-Anglophone countries. The Rest of the World coefficient is also more stable, in part because of the much larger sample. But towards the end of the period the coefficient starts to rise. One interpretation is that language is becoming more important as trade expands after about the year 2000, perhaps as a consequence of China accounting for a larger proportion of world trade.

Figure 3 Common Language effect for the UK and RoW (1970-2006)

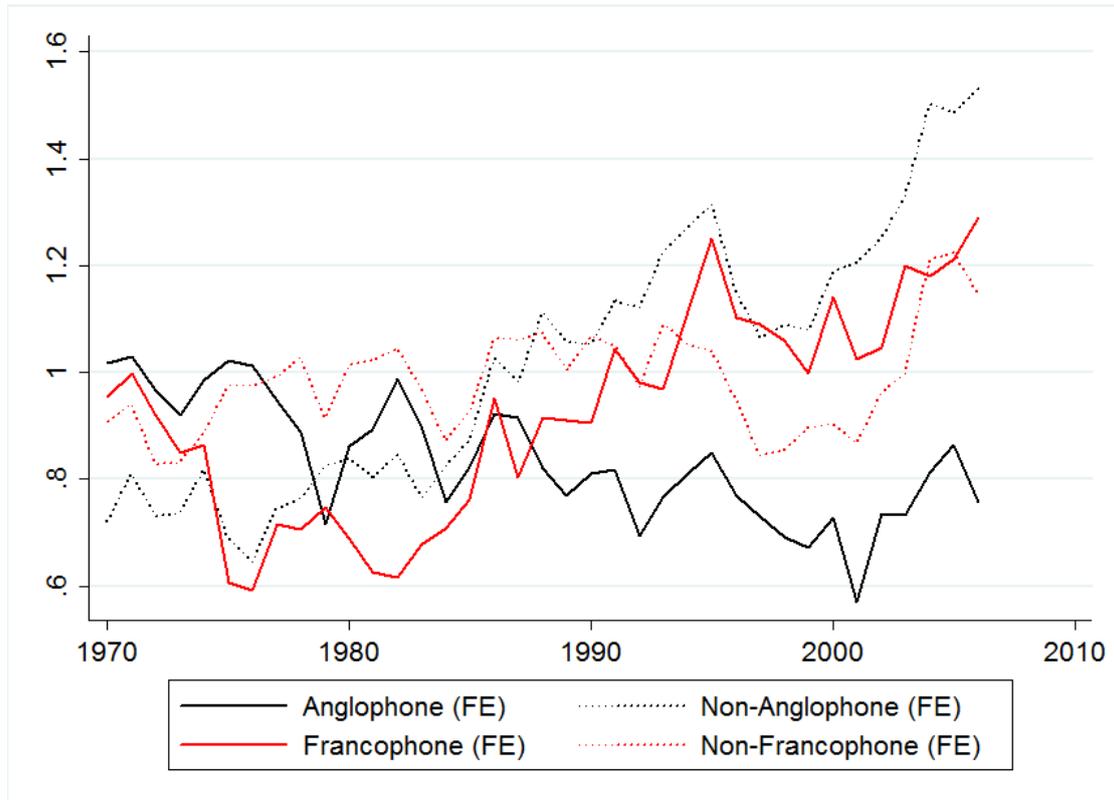


4.28. Language often follows colonial connections so it is important to distinguish between the two trade effects. For the UK, if a trading partner was at some time a colony, trade flows were lower. But if the former colony achieved independence at the sample mean of 1954, it had a higher trade flow⁹. The US on the other hand, with independence in the much more distant past (1776), traded less with UK for this reason than other economies.

4.29. Another way of estimating the UK language effect is simply to consider the UK as typical of Anglophone economies as a whole in being able to take advantage of English as an international language. The Anglophone group of countries' language coefficient is more stable over time than the UK's because of the larger sample, but it is about the same average magnitude. The Francophone coefficient is larger as expected because the rest of the world is less inclined to learn French than they are to learn English.

⁹ The former colony effect must be included in the calculation with that of the independence date, for becoming independent is impossible without having been a colony. Using UK equation 1 in the Appendix the calculation is $-32 + (.017 * 1954) = 1.218$ for the log of bilateral trade.

Figure 4 Comparison between Anglophone & Francophone language coefficients



How big is the cost to the UK?

4.30. Language costs of trade as described above are born by all potential trading partners by raising the prices at which they can buy and reducing the number of customers to whom they can sell. Both imports and exports are reduced accordingly. For simplicity assuming trade is balanced, the costs of language ignorance can be approximated by the volume of exports multiplied by the language ‘tax’ as a proportion of the trade. In the tables below, the plausible range of costs to the UK economy in 2006 are shown, using the following; UK Exports 2006 is £387,585m; % GDP (£1,356,853m) exports 28%. As explained in the preceding section, for a language coefficient of $\alpha_4 = 0.5$, a substitution elasticity of $\sigma = 10$, we have an elasticity of exports with respect to language of $\beta_1 = \exp[\alpha_4/(\sigma - 1)] - 1 = 0.057$. Multiplying this by 2006 UK exports gives gross language costs of $0.057 \times £387,585m = £22.1bn$.

Table 1 Total value of export ‘tax’ £bn -cost to the UK economy 2006

		Language coefficient			
		0.5	0.7	0.9	1.2
Substitution elasticity	5	51.6	74.1	97.8	135.6
	7	33.7	48	62.7	85.8
	10	22.1	31.3	40.8	55.3

Table 2 Percentage of 2006 national income at stake

		Language coefficient			
		0.5	0.7	0.9	1.2
Substitution elasticity	5	3.73	5.35	7.07	9.80
	7	2.43	3.46	4.53	6.20
	10	1.60	2.26	2.94	3.99

4.31. On the basis of the econometric results and the consensus of academic analysts about the elasticity of substitution, the most likely values are for a language coefficient of 0.7 and a substitution elasticity of 7. These values suggest that perhaps 3.5 percent of GDP is at stake. Although there are wide margins of possible error to this figure as Table 2 suggests, even the lowest likely percentage is still very large.

Trade Resistance in Destination countries (Ω_d)

4.32. The underestimation of the UK’s common language coefficient due to the international use of English as a common language may be interpreted in econometrics as a result of omitted variable – the trade resistance in destination countries. From the UK-only trade equation the ‘resistance’ or ‘relative failure’ of UK exports can be gleaned from the equation residuals for the appropriate destination country.

4.33. For 2006 the destination residuals for the countries on which we are going to focus are all negative, indicating that the equation predicts more exports than actually took place, hence ‘relative failure’ (Table 3). That is to say, the effects of the language barrier for the UK are higher for some countries and lower for the others. It is useful to identify those countries with ‘relative failure’, because this information can shed light on in which languages would increase language skills bring greatest trade benefits for the UK. Alternatively we could consider countries on the basis of their existing trade for expansion and the largest or fastest growing markets.

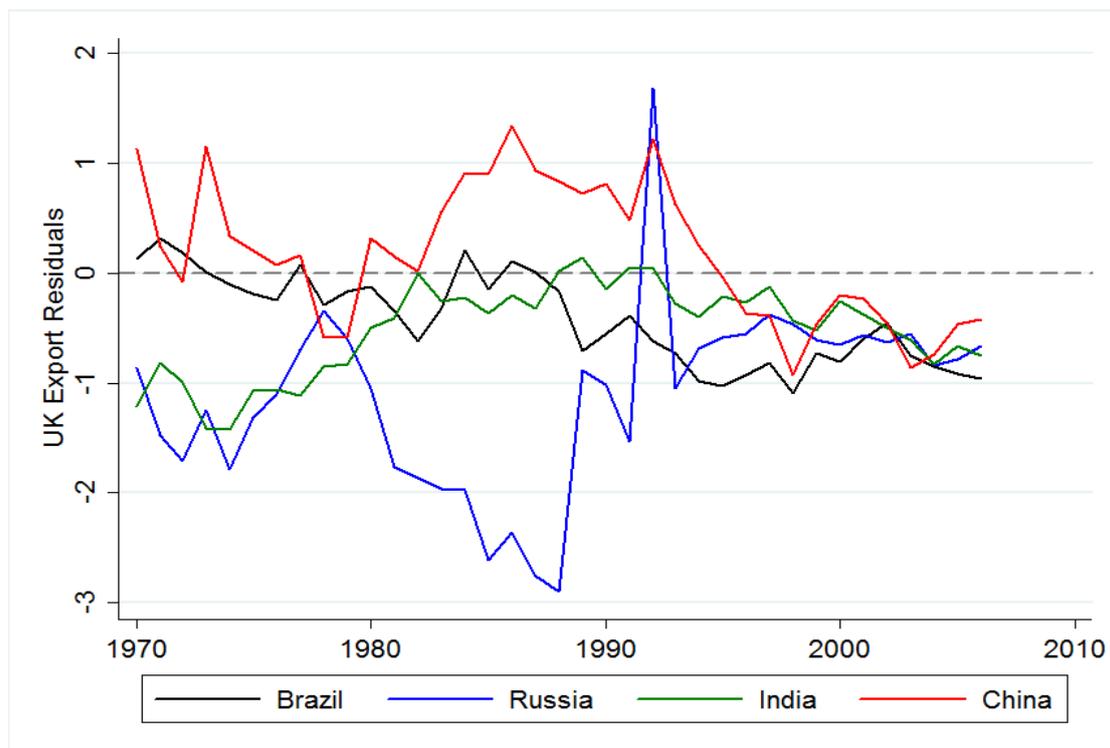
- 4.34. In the last ‘normal’ year 2006 before the financial crisis, there were nine export destinations with trade flows over \$10,000 million, three of which are Anglophone. The second and third largest destination countries of UK’s export are France and Germany. Import origins are more diverse: five out of fourteen import origins are non-European (China, Japan, Hong Kong, Russia and US).
- 4.35. The difference between the largest import and export markets may suggest a role for languages, assuming the seller is likely to initiate the transaction. UK ‘linguistic distances’ are greater for China, Japan and Russia than for France or Germany and certainly the likelihood of a firm employing speakers of Mandarin, Russian or Japanese is low. So language deficiencies may well be part of the explanation for British exports to these economies being so much lower than imports, assuming knowledge of English is more widespread in these markets than is knowledge of their languages in the British economy.
- 4.36. The gravity equation gives an average bilateral trade relation, conditional on GDP, population, distance, language and so on. Some trades are greater than predicted by the equations. In such cases for UK exports, this means sales exceed expectations. Conversely, if the actual trade is lower than predicted value, then there is underperformance in the market – the potential target market. According to the gravity equation for the UK, the exports to France, Germany, Brazil, India, China and Russia in 2006 are all less than predicted. Some of this may be due to linguistic ignorance, even though a common language effect is included in the equation, because the language effect may differ by country. For example, India is categorized as an English-speaking country, but Hindi is spoken by 46% of the population, dominating English which is spoken by 23% as a common language.
- 4.37. The residuals can be interpreted as the gap between the actual log trade flow ($\ln(flow)$) and the predicted log trade flow ($\ln \widehat{flow} = xb$), i.e. the percentage difference between actual trade flow and expected flow: $\ln(flow) - xb = \ln(flow) - \ln(\widehat{flow}) = \ln \frac{flow}{\widehat{flow}} = \ln \left(1 + \frac{flow - \widehat{flow}}{\widehat{flow}} \right) \approx \frac{flow - \widehat{flow}}{\widehat{flow}}$.
- 4.38. UK exports to India underperform very strongly despite the common language effect!

Table 3 Residuals of BRICs in UK Equation

	Residuals		UK exports to
	Origin	Destination	
Brazil	-0.3121	-0.9559	1873
China	1.0431	-0.4199	8504
India	-0.6891	-0.7534	5492
Russia	1.1277	-0.6646	4188

4.39. How stable are these results over time? As Figure 5 shows for the UK equation the country trade resistance effects (the Ω_d of section 4) seem to converge in the recent period. There has been improvement with respect to Russia – plausible in the light of the opening up of the economy from 1990 – and for India apparently. The deterioration of Brazilian openness to the UK is not so readily explained and over the last decade of the analysis, China has become negative, joining other BRIC members in being an export market in which the UK underperforms relative to the average UK market.

Figure 5 BRIC Openness to UK Exports 1970-2006



4.40. For the UK estimation, the resistance effects seem to converge across BRICs in the recent years. The trade resistance of Russia against the UK is on average higher after the dissolution of the Soviet Union in 1991, because Russia’s trade

within the Former Soviet are now counted as ‘international trade’ but ‘national trade’ before the dissolution. As a result, its trade resistance with respect to the UK is relatively higher. India, as a former colony of the UK, experienced a gradual increase in resistance after the WWII because the independence can lead to large reductions in trade (Head et al, 2010). Over the last decade of the analysis, China has become negative – plausible in the light of the opening up the economy.

4.41. The ranking of export destinations is fairly robust to equation re-specification, though the magnitudes change. In the following table, the under-performance of China is similar to that of Russia.

Table 4 Selected Predictions from a UK Trade Gravity Equation

% Under-performance	UK Merchandise Exports	Destination
95.6	1863.1	Brazil
66.5	4187.8	Russia
75.3	5492.3	India
42.0	6659.6	China
53.1	48495.7	France
67.3	52441.6	Germany
	950830	Rest of world

4.42. Japan would be one of the largest markets if the under-performance were remedied according to the equation. The merchandise exports from the UK to Japan is US\$ 8,130 million in 2006, while the exports predicted by equation is about three times as much, US\$ 25,958 million.

4.43. Conclusions of the trade data analysis are that the literature consistently identifies a strong language barrier effect on trade patterns, while varying in precise numbers. However, all of these estimates, with the exception of those presented for the first time here, refer to an average for the whole world rather than for the UK. A reasonable estimate of the gross effect for the UK is 3.5 percent of GDP. Our analysis suggests that over time the cost to the UK has varied but remained large. Costs to rest of world appear to have risen recently (possibly due to rise of China’s trade). Also the analysis identifies markets in which UK is exporting less/more than the model would predict (independently of an assumed language effect that does not vary between countries). This shows that the UK underperformed in 2006 in all four of the BRICs (and Japan).

4.44. Policy implications from a review of the literature are that market failure is likely to result in firms under-investing in language capability. The magnitude of the costs is so high that there is certainly scope for policy action at high benefit-cost ratio. Comparison of markets suggests that costs from deficiencies in some languages are likely to be higher than others; non-European language investment Chinese, Japanese and Russian may lead to greater returns than investment in most European languages, judging by the patterns of imports and exports.

5. Firm Level PIMS Analysis

5.1. The second strand of the research examines possible deficiencies in foreign language skills at the level of the enterprise or firm. Much international trade is conducted by, if not actually within, large multinational companies. They may be expected to have tolerably good information sources about the economies in which they operate and therefore about the linguistic needs of their trade. They are in a position to undertake the investment in language skills they judge necessary. However, this is far less likely to be the case for smaller exporters and companies that have not yet begun exporting.

5.2. Using data from UKTI's PIMS Non-User Surveys (dominated by SMEs) the study investigates links between export performance and language expertise. It focuses particularly on the extra exports attained by firms with language skills, but considers other aspects of enterprise performance, as appropriate. The key questions are:

- How do language deficiencies impact on exporting businesses themselves?
- Why looking at firm survey data is probably (even) more informative than at trade aggregates?
- How can we address the problem of respondent ignorance in survey data?
- What is the evidence that awareness of cultural difficulties in exporting is the critical signal in export intensity and planning to grow?

Language deficiency and the interpretation of 2012 PIMS non-Users Survey

- 5.3. Barriers to trade must be understood by respondents if their questionnaire responses are to be accurate. Language and cultural barriers do not rank very highly in the 2012 survey results compared to legal and regulatory obstacles for instance. But language and cultural barriers can be the fundamental reason why firms experience legal and regulatory hindrances, lack of contacts and so on.
- 5.4. In answer to the question about ‘Reasons for not having difficulties establishing initial dialogue’, the majority response was ‘initiated by customers or partners’. It is likely that this reply indicates that language ignorance is creating sales policy inertia. Such a judgement is reinforced by the answer to ‘Reasons for language not being a barrier’; most commonly it was that respondent firms ‘used English’.

Language in the PIMS Non-User Survey 2013: Descriptive Statistics

- 5.5. Industries in the sample with more than 20 firms are tabulated in Table 5 to examine whether there is any association between language skills and export intensity. There is no obvious link. For instance ‘other transport agencies’ with one third or more of firms exporting half or more of their turnover are among the least likely to have language skills. By contrast, software publishing, with a similar export intensity, is the second most likely industry in the sample for firms to have language skills. The likelihood is that the many other influences upon industry export intensity are swamping the language effect.

Table 5 PIMS Industry classifications with more than 20 firms

	Percent. of firms with export ratio greater than or equal to 50%	Percent of firms with language skills
Other transport agencies sic 8*	33.33%	9.09%
Freight by road nes sic 36*	15.38%	17.86%
General mechanical engineering sic38	9.09%	9.09%
Motion picture sic125	16.00%	16.00%
Other computer related sic 130	11.11%	10.00%
Software publishing sic 158*	32.14%	19.35%
Specialty design sic 179	12.50%	25.00%
Wholesale of other machinery sic209*	30.77%	7.69%

Note: * significantly greater industry export ratio than sample average.

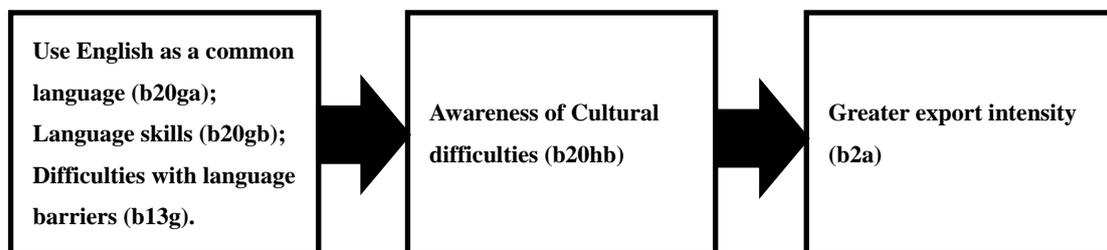
- 5.6 . Question b20g, ‘Have you always been able to use English’ reveals that, of those

firms experiencing no language difficulties, 86 percent had always been able to use English. Only a few said they had the necessary language skills. The same number responding both that they had 'always been able to use English' and 'have the necessary language skills', indicated only that they had 'the necessary language skills'. These results vividly illustrate the point that UK businesses who say they have not experienced difficulties in this area in reality are mainly relying on English because most do not have the skills to do otherwise.

The Model

5.6. From the analysis of the PIMS data a model of enterprise exporting emerges as described in the figure below.

Figure 6 Language and Export Intensity- the PIMS Based Model



5.7. As Figure 6 indicates there are two critical links in the impact of languages on exporting; the awareness of cultural difficulties and their effect on export intensity, and the contribution of language skills to cultural awareness. In addition there is a contribution of language skills to the likelihood of becoming an exporter. This section therefore analyses the PIMS non-user survey under these three headings.

Equation Identification

5.8. In an equation explaining export propensity (exports revenue/total turnover), greater awareness of cultural difficulties might merely switch turnover away from more profitable home markets towards less profitable foreign markets. We can control for this possibility by including domestic sales as an independent variable and keeping the export-turnover ratio dependent variable. If the coefficient on a 'cultural difficulties' variable is statistically significant in such an equation, holding constant domestic turnover, then firms with greater exports as a consequence of the cultural awareness did not gain them by reducing domestic sales.

5.9. A correlation between exports and ‘cultural difficulties’ could stem entirely from the experience of exporting creating an awareness of cultural difficulties. But the interest here is in the reverse direction; in consciousness of cultural complexities changing behaviour so that export sales rise. The ‘cultural difficulties’ variable in the export equation is purged of the first effect above by instrumenting.

Equation Estimates

5.10. Implementing these approaches to the identification problem, export intensity equations are estimated on the PIMS non-user survey sample and reported in Table 6. Column 1 implies that a firm that says it has not experienced cultural difficulties has at least a $\exp(-0.624) - 1 = 46.5\%$ lower export ratio.

5.11. **Evidence of ignorance** – firms that say they have not ‘experienced cultural difficulties’ have at least a 46% lower export-turnover ratio (Table 6).

5.12. **Corporate self-knowledge and performance** – firms that said ‘advice about specific markets would have helped’ have export ratios more than 50% higher. More years spent exporting increases a firm’s export propensity, as does entry into more markets (Table 6).

Table 6 Export/Turnover Regressions of Firm Level Data

	(1)	(2)	(3)	(4)
Dep. Var. log export ratio	OLS	GMM	OLS	GMM
No cultural difficulties (b20hb) (‘You haven’t come across...’)	-0.624*** (-4.81)	-1.523** (-2.71)	-0.634*** (-4.92)	-1.484** (-2.66)
No. of trading countries (b6a) (‘how many overseas countries have you done business..’)	0.0478*** (5.85)	0.0390*** (4.14)	0.0453*** (5.83)	0.0367*** (3.89)
Years exporting (b1) (‘how long ago start overseas’)	0.296*** (6.29)	0.279*** (5.85)	0.302*** (6.12)	0.287*** (5.92)
Age of business (s1c) (‘how long ago..’)	-0.214*** (-3.72)	-0.190*** (-3.31)	-0.206*** (-3.53)	-0.183** (-3.16)
Log domestic turnover	-0.0204 (-1.19)	-0.0167 (-0.91)	-0.0201 (-1.13)	-0.0161 (-0.89)
Information (on specific markets would have helped)			0.437** (2.62)	0.478** (2.70)
Constant	2.382*** (6.88)	2.904*** (5.78)	2.245*** (6.37)	2.716*** (5.40)
N	431	431	431	431
R-sq	0.243	0.158	0.255	0.179
Inst’d		noculture2		noculture2
Excl. exog.		skills1		skills1
Wk. id stat.		contact1		contact1
Id stat.		12.72		12.84
Id pr.		21.19		21.46
Hansen’s j		0.0000251		0.0000219
j pr.		0.107		0.327
		0.743		0.567

Note: t ratios in parentheses. * p<0.05, **p<0.01, ***p<0.001.

Which firms have ‘no cultural difficulties’?

5.13. Lacking language skills raises the chances of a firm experiencing ‘no cultural difficulties’ by 22.5% (Table 7 equation 1). Could this be because of the enterprise’s excellent market choices and arrangements? This is unlikely because awareness of such shortcomings - ‘difficulties with language barriers’ – increases the chances of appreciation of cultural difficulties. Firms that ‘have always used English’ are most likely to believe they face ‘no cultural barriers’, because they have not noticed them (Table 7 equations 2 and 3). If they were a subsidiary of a transnational company they were more likely to experience

cultural difficulties, despite the resources behind them. We can assume that this was because the resources allowed them to recognise these problems.

Table 7 Explaining Absence of Cultural Difficulties in Exporting: Probit Marginal Effects

Marginal Effects at Mean			
	(1)	(2)	(3)
Dep var 'no cultural differences' (b20hb)	Probit	IVProbit	IVProbit
Lack Necessary language skills(b20gb)	0.225*** (0.0538)	0.384* (0.149)	
Always used English (b20ga)		0.630*** (0.165)	0.788*** (0.155)
Difficulties with Language Barriers (b13g)	-0.114* (-0.0468)	0.159 (0.174)	0.305 (0.167)
Difficulty identifying contacts (b13b)	-0.165*** (-0.0487)	-0.412** (-0.13)	-0.423** (-0.13)
Part of mnc? (s4)	-0.161* (-0.0679)	-0.546** (-0.176)	-0.566** (-0.176)
Difficulties with legal or tax regs? (b13d)	-0.106* (-0.0426)	-0.297* (-0.118)	-0.297* (-0.117)
log export/turnover ratio (b2a)	(-0.0184*) -0.00808	0.0667 (0.0776)	0.0615 (0.0788)
N	691	691	691

Notes: 'Cultural difficulties?' No=1; standard errors in parentheses. * p<0.05, **p<0.01, ***p<0.001.

Firms 'not yet exporting' compared with exporters

5.14. The enterprises, selected because they were considering exporting, constituted a relatively small sample of non-exporters. If they had 'always used English' their chance of being an exporter was reduced by perhaps 10% (Table 8). 'Lack necessary language skills' has about half that effect – in the same direction, and similar to the impact of 'difficulties identifying contacts'. 'General advice would have helped' increases chances of being an exporter by a little more than 10%. Not surprisingly, 'difficulties with language barriers' increase the chances of identifying an exporter: non-exporters miss out on that experience.

Table 8 ‘Not Yet Exporting’ Compared with Exporters: Probit Marginal Effects

Exporting =1 not=0 (s2) (oseas1)	(1) oseas1	(2) oseas1	(3) oseas1
Always used English (b20ga)	-0.0895** (-0.0307)	-0.101** (-0.033)	-0.114** (-0.0374)
Lack Necessary language skills(b20gb)	-0.0406** (-0.0138)	-0.0402** (-0.0142)	-0.0476*** (-0.0143)
Difficulties with Language Barriers (b13g)	0.0403** (0.0146)	0.0396** (0.015)	0.0427** (0.0163)
Difficulty identifying contacts (b13b)	-0.0496* (-0.0225)	-0.0518* (-0.0223)	-0.0540* (-0.0236)
Would general advice help (y2a)	0.104*** (0.0238)	0.107*** (0.024)	0.104*** (0.0252)
No cultural differences (b20hb)	0.0221 (0.0159)		
Log turnover			-0.00158 (-0.00212)
N	829	829	722

Note: Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. ‘Always used English’ yes=1.

Firms’ Growth Plans

5.15. The cross-tabulation Table 9 shows for firms that plan to grow substantially, broadly similar numbers have experienced cultural difficulties as have not. But among those not planning to grow, more than twice as many have not experienced cultural difficulties as have. Firms that experience cultural difficulties are significantly more likely to plan to grow substantially. This supports the idea already mooted that ignorance is associated with poorer performance.

Table 9 Cross-Tabulation of Growth Plans and Cultural Difficulties

Plan to grow substantially?	Cultural difficulties?		
	No	Yes	Total
No	448	204	652
Yes	96	81	177
Total	544	285	829

5.16. For firms that plan to grow, the strongest predictor is whether they have grown in the past (probit equations not reported). ‘Cultural difficulties’ (and length of time established (-ve)) matter (as in the export/turnover equation).

5.17. Profit is correlated with past growth but not with export ratios.

Comparison with UKTI Internationalisation Survey 2012

5.18. The model derived from the PIMS non-user survey allows us to interpret the ‘language and cultural barriers’ element of the 2012 Internationalisation Survey, which otherwise might be hard to do. For example for the two most important trading partners – at least for SMEs – France and Germany, language and cultural barriers are rated the second most important or frequently cited barrier to exports (using the original table number, Table 13.1.13). (That the same is true for China is less surprising) The reason implied by the model is that familiarity with the market allows greater awareness of prior ignorance of language and cultural barriers.

Table 13.1.13 Summary Barriers – By Individual Market

	Market						
	China	France	Germany	India	Ireland	Russia	USA
<i>Base: All exporters</i>	58	48	36	37	61	45	59
Types of Barriers							
Legal & regulatory	58%	29%	12%	45%	16%	58%	40%
Customs	25%	24%	15%	31%	3%	58%	20%
Contacts	40%	28%	21%	29%	6%	38%	21%
Information	10%	12%	9%	8%	6%	26%	5%
Resource	22%	21%	9%	17%	7%	16%	16%
Language & cultural	40%	35%	16%	11%	0%	26%	6%
Bias	18%	40%	4%	13%	1%	7%	14%

5.19. It then follows that firms with more than 2 years exporting are more likely to be aware of language and cultural barriers than those with less (original Table 13.1.7). Another corollary is that larger firms are more aware than smaller of these difficulties – because of their greater resources – as are those that have been trading longer (Table 13.1.6).

Table 13.1.7 Summary Barriers – By Export Experience

	Years Exporting			Number of Markets		
	Less than 2 years	2-10 years	Over 10 years	1-5	6-10	More than 10
<i>Base: All exporters</i>	132	448	248	438	178	211
Types of Barriers						
Legal & regulatory	26%	36%	40%	30%	38%	48%
Customs	21%	22%	27%	18%	27%	34%
Contacts	18%	22%	26%	19%	25%	30%
Information	9%	11%	9%	8%	11%	12%
Resource	13%	14%	18%	12%	18%	19%
Language & cultural	10%	17%	16%	11%	20%	19%
Bias	9%	12%	12%	9%	12%	16%

Table 13.1.6 Summary Barriers – By Age & Size

	Age (Years Trading)			Size (Number of Employees)				
	Up to 5	6-10	Over 10	0-9	10-49	50-249	250+	All SMEs
<i>Base: All exporters</i>	215	235	382	587	181	46	17	814
Types of Barriers								
Legal & regulatory	38%	39%	35%	33%	47%	36%	45%	36%
Customs	25%	26%	23%	21%	30%	28%	33%	24%
Contacts	22%	21%	25%	20%	30%	33%	27%	23%
Information	10%	11%	9%	8%	12%	12%	33%	9%
Resource	12%	16%	16%	14%	20%	7%	37%	15%
Language & cultural	13%	16%	16%	15%	18%	12%	33%	15%
Bias	14%	11%	11%	10%	14%	16%	18%	12%

5.20. Companies with a passive sales policy are least likely to be aware of these barriers. So we find the second least probable category by mode of market entry is those that enter in response to an approach from a potential customer (Table 13.1.4). It is no surprise that companies delegating to agents and distributors are least aware of language and cultural barriers; they do not experience these barriers themselves. On the other hand, businesses exposed to different cultures and languages because they have an overseas site are most likely to appreciate these difficulties (Table 13.1.3).

Table 13.1.4 Summary Barriers – By Market Entry Motivations

	Significant Motivations				
	Enquiry from potential customer	Existing customer request	In-house experience or contacts	Helped by company already working with in another market	Market is at forefront of developments for industry
<i>Base: All exporters</i>	576	334	238	208	168
Types of Barriers					
Legal & regulatory	37%	41%	36%	40%	39%
Customs	23%	26%	24%	31%	22%
Contacts	21%	25%	23%	29%	26%
Information	10%	10%	8%	12%	8%
Resource	14%	16%	15%	20%	12%
Language & cultural	15%	18%	13%	21%	17%
Bias	10%	14%	12%	17%	18%

Table 13.1.3 Individual Barriers – By Modes Used In Selected Market

	Modes Used In Market			
	Selling direct	Agents/ distributors	Contractual arrangements	Overseas site
<i>Base: All exporters</i>	658	221	43	51
Types of Barriers				
Legal & regulatory barriers	35%	39%	43%	51%
Customs barriers	24%	24%	28%	40%
Contacts barriers	23%	26%	38%	38%
Information barriers	9%	11%	14%	18%
Resource barriers	15%	19%	17%	23%
Language & cultural barriers	15%	13%	20%	21%
Bias barriers	12%	12%	13%	27%

Language Management Strategies

5.21. The resource base conception of the firm, together with knowledge base dynamic capabilities, provide some hints about how to identify worthwhile language strategies to reduce the costs of language ignorance. Capabilities are enhanced by planning, by making careful decisions about which markets can be entered profitably and how best to do it. This reduces the problem of language investment to the skills, training and cultural awareness for specific markets; the outlays and planning are adjuncts to marketing strategy. Small firms addressing many markets are likely to face indivisibilities; the difficulty of employing sales staff trained in all possible languages. But this is just one reason why most smaller firms only supply a small number of export markets. Even for these enterprises simply keeping a record of language skills of staff is a low cost tactic that may come in useful.

- 5.22. Once a foreign market has been targeted, the language requirements for dealing with emails, telephone conversations and web design, for preparing order confirmations, invoices and statements in local language, need to be considered. One solution is to hire external translators and agents, but these arms length approaches have their drawbacks. Many products and services – and contracts – are technical and industry- specific. External translators may be insufficiently versed in industry lore to avoid significant mistakes. If, as is likely, agents insulate enterprises from foreign markets they are serving, they may reduce the awareness of the enterprise of the need to adapt their product and packaging to the foreign environment. For these reasons- as the resource base theory of the firm implies – it is desirable to embed appropriate language skills in the firm, so that the firm’s distinctive capabilities are properly represented. One way of achieving this without incurring excessive costs adopted by some firms is to employ a full time language expert who can liase in an informed fashion with specialized external translators when necessary for particular projects.
- 5.23. One way of doing this is permanently to employ native speakers of the target market language. Here larger enterprises with sites in the foreign market obviously have an advantage. Another, complementary approach is to initiate staff language training programmes or encourage the acquisition of language skills by subsidies for staff following language courses. Providing language programmes and dictionaries on employees’ computers may be expected to increase staff confidence in acquiring and using language skills.
- 5.24. Appropriate links with higher education institutes can be a source of information about foreign markets as well as a means of tapping linguistic expertise. This is because not only the HE staff skills but because of the students. Almost all UK HE institutes now enrol large numbers of students from the full range of languages and markets across the world. Many of them would welcome either the opportunity to enhance their incomes, or to gain a placement in a company so as to write a dissertation or other piece of assessed coursework. These contacts could add to a company’s resource base and in particular, exporting skills. An awareness of, and flexibility towards, the timing in the academic year when the student can be available, and consciousness of the mutually expected duration of cooperative arrangements are important. They require planning ahead to ensure that mutually valuable relationships will be created.

Rationale for Government Support for Business to Encourage Increased Investment in Language Skills

5.25. Arguably, foreign language skills investment is a positive externality for the exporting firms. If firms fail to see the benefits, or if the private benefits are less than the social benefits, then there will be underinvestment to language skills because of the perceived absence of rewards. Such 'market failure' is referred to in HM Treasury's Green Book (2003 p.11) as 'where the market has not and cannot of itself be expected to deliver an efficient outcome; the intervention that is contemplated will seek to redress this'. 'The underlying rationale for the government intervention is usually founded either in the market failure or where there are clear government distributional objectives that need to be met.' Firms sometimes just 'don't know what they don't know', and this is likely to be especially true for smaller firms with fewer resources to invest in information acquisition. This supports the rationale for forms of intervention which may involve some subsidy from the government.

5.26. We have supplied evidence that there are potential benefits from increased language skills and that market incentives have not solved the problem unaided. In view of the magnitude of the gross benefits it must be possible to design policy interventions that generate benefits substantially greater than the cost. For example, it is likely that there would be substantial net benefits from some form of student placement scheme, because the costs are small relative to the likely pay offs. The export benefits firmly established by PIMS surveys ensures this will be the case.

6. Conclusion

6.1. Bilateral national trade analysis indicates the gross costs of language ignorance are high for the UK despite English being a world language. 3.5% of national income in 2006 - £48 bn. - is a defensible estimate, though one surrounded with uncertainty. These costs are likely to be centred on smaller firms and non-exporters. In particular, language barriers are shown to hinder the UK's participation in the potential trade growth of the fast emerging economies like BRIC, as well as to developed countries like France, Germany and Japan. Non-European languages in which there is likely to be the least investment include Chinese, Japanese and Russian. These countries' markets have huge potential.

- 6.2. Firm-level evidence shows that language ignorance is a prime reason for the low exports of those firms claiming to experience no cultural difficulties in selling abroad. Among exporters, the export/turnover ratio or intensity decreases strongly with the perceived absence of cultural differences. Either they are crowded into English-speaking markets and not developing potential sales elsewhere, or they are failing to appreciate the barriers to expansion in non-Anglophone markets. Lack of ‘cultural difficulties’ is associated with an absence of language skills and a reliance on English. Language difficulties are the largest single contributor to these perceived cultural problems, even when information, relationship difficulties, and legal problems are controlled. More than 70 percent of the PIMS non-user sample who admit to an inability to use English as a common language in exporting do not have staff with the necessary language skills. Lack of contacts also matter and these too are likely in part to depend on language and cultural skills.
- 6.3. Moreover, inability to use English as a common language, or lacking ‘necessary language skills’, is a statistically significant predictor of not exporting (as an alternative to cultural difficulties). Firms that have not yet begun exporting are likely to be aware of this deficiency, which is one probable reason for not yet entering foreign markets.
- 6.4. The findings from the PIMS non-user survey also allow an interpretation of a number of the results from the 2012 Internationalisation Survey that support the general finding of this report. For exporters to the UK’s two largest trading partners, France and Germany, language and cultural barriers are rated the second most important or frequently cited barrier to exports. The reason implied by the model is that familiarity with the market allows greater awareness of prior ignorance of language and cultural barriers to exporting. This suggests that information deficiencies may constrain UK exports in general substantially and one way of remedying such shortcomings is by appropriate investment in language and cultural skills.
- 6.5. Pursuit of solutions to the challenges that businesses face around language skill warrants examination of ways in which the needs of potential exporters could be linked to those of students studying in UK Business Schools. The likelihood is that there would be substantial net benefits from some form of foreign student placement scheme. There are many foreign (language) students in the UK, on

business courses (e.g. MBA), who need to undertake projects that could be of interest to UK firms. UK Trade & Investment are currently exploring this idea.

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Appendix 1: Estimation Tables

Table 10 OLS Results for the UK and FE Results for RoW, Anglophone and Francophone (2006)

Variable	UK	UK	RoW	Anglophone	Non-Anglophone	Francophone	Non-Francophone
lnyy	1.048*** (0.044)	1.033*** (0.048)	0.956*** (0.01)	0.869*** (0.018)	0.998*** (0.012)	0.972*** (0.025)	0.954*** (0.011)
lnypyp	0.250*** (0.064)	0.197** (0.064)	0.109*** (0.015)	0.046 (0.028)	0.136*** (0.018)	-0.122** (0.038)	0.156*** (0.016)
lndist	-0.642*** (0.082)	-0.447** (0.149)	-1.634*** (0.03)	-1.767*** (0.059)	-1.550*** (0.035)	-1.313*** (0.078)	-1.672*** (0.032)
comlang_off	0.740** (0.282)	0.690* (0.29)	1.223*** (0.061)	0.757*** (0.092)	1.530*** (0.087)	1.290*** (0.114)	1.146*** (0.072)
gatt_o	0.889* (0.346)	0.733* (0.354)	(omitted) NA	0.741* (0.356)	0.014 (0.175)	1.154*** (0.245)	-0.37 (0.223)
gatt_d	0.1 (0.228)	0.3 (0.228)	0.464*** (0.049)	0.594*** (0.090)	0.248*** (0.050)	-0.235* (0.096)	0.442*** (0.049)
indepdate	0.017*** (0.004)	0.018*** (0.004)	0.008** (0.003)	(omitted) NA	(omitted) NA	(omitted) NA	(omitted) NA
col_hist	-32.083*** (7.414)	-34.535*** (7.201)	-13.910** (4.977)	-0.125 (0.118)	-0.621*** (0.126)	-0.332* (0.163)	-0.347*** (0.100)
validmirror	1.121* (0.481)	1.253* (0.498)	0.182* (0.092)	0.480*** (0.091)	0.437*** (0.057)	0.642*** (0.120)	0.408*** (0.052)
comcur	NA NA	(omitted) NA	0.228 (0.157)	0.081 (0.310)	0.262* (0.103)	0.604 (0.451)	0.252* (0.099)

comleg	NA	0.514	0.295***	1.383***	0.621***	0.907***	0.792***
	NA	(0.37)	(0.044)	(0.159)	(0.086)	(0.193)	(0.082)
acp_to_eu	NA	-0.601	-0.411***	1.730***	0.999***	1.554***	1.139***
	NA	(0.316)	(0.085)	(0.135)	(0.095)	(0.178)	(0.087)
eu_to_acp	NA	0.344	0.220*	0.542**	0.818***	0.446	0.816***
	NA	(0.248)	(0.1)	(0.172)	(0.105)	(0.259)	(0.095)
rta	NA	0.415	0.839***	0.002	0.010***	0.001	0.007**
	NA	(0.265)	(0.077)	(0.005)	(0.003)	(0.008)	(0.002)
gsp	NA	-0.229	1.216***	-3.095	-17.678***	-0.411	-12.952**
	NA	(0.232)	(0.079)	(10.022)	(5.177)	(15.274)	(4.696)
gsp_rec	NA	-0.380*	0.793***	0.179	0.195	0.097	0.220*
	NA	(0.18)	(0.092)	(0.165)	(0.110)	(0.221)	(0.100)
_cons	-15.610***	-15.961***	-2.088***	1.813**	-4.087***	-2.322**	-2.297***
	(1.57)	(1.905)	(0.341)	(0.632)	(0.406)	(0.802)	(0.374)
AIC	1104.836	1093.68	104337	31210.49	74312.1	20521.563	85022.34
BIC	1142.767	1154.36	104465	31319.23	74434.72	20623.211	85147.2
Log-likelihood	-542.418	-530.84	-52152.5	-15589.2	-37140	-10244.781	-42495.2
R²	0.843	0.853	0.549	0.504	0.58	0.483	0.576
Adjusted R²	0.838	0.846	0.545	0.499	0.577	0.478	0.572
F	249.629	173.65	1770.232	443.076	1436.899	261.736	1623.851
Prob (F)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
N	328	328	22015	6607	15736	4243	18100

NB: * p<0.05; ** p<0.01; *** p<0.001. Standard errors in the parentheses.

Table 11 Estimated Common Language Coefficients for the UK and RoW

Year	UK-simple	UK-long	RoW-long
1970	0.680	0.507	0.949
1971	0.613	0.574	0.979
1972	0.426	0.420	0.871
1973	0.567	0.477	0.847
1974	0.540	0.508	0.900
1975	0.686	0.612	0.884
1976	0.695	0.541	0.880
1977	0.959	0.848	0.936
1978	0.513	0.350	0.954
1979	0.578	0.340	0.874
1980	0.735	0.577	0.933
1981	0.973	0.827	0.931
1982	0.717	0.629	0.957
1983	0.843	0.574	0.911
1984	1.159	0.881	0.846
1985	1.083	0.781	0.899
1986	0.937	0.592	1.046
1987	1.040	0.705	1.000
1988	0.831	0.458	1.054
1989	0.738	0.408	0.998
1990	0.726	0.525	1.036
1991	0.750	0.482	1.072
1992	0.887	0.425	0.987
1993	0.323	0.276	1.053
1994	0.471	0.259	1.081
1995	0.495	0.442	1.117
1996	0.486	0.445	0.995
1997	0.412	0.289	0.918
1998	0.367	0.289	0.928
1999	0.724	0.681	0.942
2000	0.659	0.592	0.996
2001	0.679	0.522	0.937
2002	0.845	0.761	1.008
2003	0.691	0.504	1.082
2004	0.585	0.502	1.221
2005	0.864	0.747	1.247
2006	0.740	0.690	1.223

Table 12 Estimated Common Language Coefficients for Anglophone and Francophone Countries

Year	Anglophone	Non-Anglophone	Francophone	Non-Francophone
1970	0.250	1.298	0.825	0.689
1971	0.268	1.432	0.341	0.946
1972	0.310	1.289	0.760	0.783
1973	0.793	0.970	0.173	0.675
1974	0.913	1.201	0.550	0.759
1975	0.500	1.129	-0.285	0.775
1976	0.347	1.093	0.063	0.874
1977	0.462	1.384	0.553	1.160
1978	0.327	1.000	0.413	0.824
1979	0.316	1.154	0.551	0.861
1980	0.219	0.950	0.725	0.863
1981	0.221	1.308	0.712	1.023
1982	0.191	1.329	0.921	1.070
1983	0.203	1.004	1.194	0.843
1984	0.498	1.505	-0.063	1.276
1985	0.411	1.376	0.389	1.192
1986	0.371	1.235	-0.098	1.046
1987	0.343	1.149	0.150	0.984
1988	0.210	1.081	0.893	0.856
1989	0.222	0.968	0.770	0.785
1990	0.353	0.867	0.721	0.800
1991	0.458	0.934	0.598	0.884
1992	0.398	0.634	1.128	0.721
1993	0.337	0.249	0.457	0.271
1994	0.233	0.721	0.547	0.698
1995	0.248	0.994	0.619	0.806
1996	0.077	0.659	0.436	0.634
1997	0.071	0.884	0.814	0.706
1998	-0.039	0.696	0.822	0.448
1999	0.183	0.923	0.976	0.687
2000	0.297	0.927	1.003	0.729
2001	0.232	0.975	0.631	0.731
2002	0.397	0.917	1.031	0.736
2003	0.177	0.765	0.900	0.583
2004	0.192	0.608	0.647	0.537
2005	-0.027	0.638	0.412	0.472
2006	0.115	0.885	0.410	0.799

Table 13 Anglophone Countries according to Head et al (2010)

Abbreviation	Full Name
ATG	Antigua and Barbuda
AUS	Australia
BHS	Bahamas
BLZ	Belize
BMU	Bermuda
BRB	Barbados
BWA	Botswana
CAN	Canada
CMR	Cameroon
DMA	Dominica
ERI	Eritrea
ETH	Ethiopia
FJI	Fiji
FLK	Falkland Islands
GHA	Ghana
GIB	Gibraltar
GMB	Gambia
GRD	Grenada
GUY	Guyana
HKG	Hong Kong
IND	India
IRL	Ireland
ISR	Israel
JAM	Jamaica
KEN	Kenya
KIR	Kiribati
KNA	Saint Kitts and Nevis
LBR	Liberia
LCA	Saint Lucia
LSO	Lesotho
MLT	Malta
MUS	Mauritius
MWI	Malawi
NAM	Namibia
NGA	Nigeria
NRU	Nauru
NZL	New Zealand
PAK	Pakistan
PHL	Philippines
PLW	Palau
PNG	Papua New Guinea

RWA	Rwanda
SGP	Singapore
SHN	Saint Helena, Ascension and Tristan da Cunha
SLB	Solomon Islands
SLE	Sierra Leone
SOM	Somalia
SWZ	Swaziland
SYC	Seychelles
TON	Tonga
TTO	Trinidad and Tobago
TZA	Tanzania, United Republic of
UGA	Uganda
USA	United States
VCT	Saint Vincent and the Grenadines
VUT	Vanuatu
WSM	Samoa
ZAF	South Africa
ZMB	Zambia
ZWE	Zimbabwe

Table 14 Francophone Country List according to Head et al (2010)

Abbreviation	Full Name
BDI	Burundi
BEL	Belgium
BEN	Benin
BFA	Burkina Faso
CAF	Central African Republic
CAN	Canada
CHE	Switzerland
CIV	Côte d'Ivoire
CMR	Cook Islands
COG	Republic of the Congo
COM	Comoros
DJI	Djibouti
DMA	Dominica
DZA	Algeria
GAB	Gabon
GIN	Guinea
GLP	Guadeloupe
GNQ	Equatorial Guinea
GUF	French Guiana
HTI	Haiti
LBN	Lebanon
MAR	Morocco
MDG	Madagascar
MLI	Mali
MTQ	Martinique
MUS	Mauritius
NCL	New Caledonia
NER	Niger
PYF	French Polynesia
REU	Réunion
RWA	Rwanda
SEN	Senegal
SPM	Saint Pierre and Miquelon
SYC	Seychelles
TCD	Chad
TGO	Togo
TUN	Tunisia
VUT	Vanuatu
ZAR	Democratic Republic of the Congo

Appendix 2: Head et al (2010) Approach

1. Head, Mayer, Ries (2010) adopt a differencing approach to the ‘gravitational unconstant’ problem. Their ‘tetrad’ technique approach has some advantages, but still involves some limitations which is why we do not apply this method in the paper.
2. They summarise the theoretical gravity equation as:

$$V_{ijt} = G_t M_{it} M_{jt} \phi_{ijt} \dots (1)$$

G_t : Common year-specific factor determining trade.

M_{it}, M_{jt} : Monadic effect involving only one country (e.g. GDP of each country).

ϕ_{ijt} : Dyadic effect involving both countries (e.g. language, distance).

3. The approach adopted by the present analysis is to take the logs of (1), and use dummies;

$$\begin{aligned} \ln V_{ijt} &= \ln G_t + \ln M_{it} + \ln M_{jt} + \ln \phi_{ijt} \\ &= \ln G_t + \ln M_{it} + \ln M_{jt} + \delta D_{ijt} + u_{ijt} \end{aligned}$$

where D_{ijt} and u_{ijt} are respectively observed and unobserved trade cost determinants.

4. The tetrad approach by contrast consider four countries indexed 1, 2, 3 and 4:
5. Step 1: Obtain the ratios

$$1\text{'s export to 2 over 1's export to 3: } \frac{V_{12t}}{V_{13t}} = \frac{\cancel{G_t} M_{1t} M_{2t} \phi_{12t}}{\cancel{G_t} M_{1t} M_{3t} \phi_{13t}} \dots (2)$$

$$4\text{'s export to 2 over 1's export to 3: } \frac{V_{42t}}{V_{43t}} = \frac{\cancel{G_t} M_{4t} M_{2t} \phi_{42t}}{\cancel{G_t} M_{4t} M_{3t} \phi_{43t}} \dots (3)$$

6. Step 2: Obtain the ratio of ratios

$$(2) \text{ over } (3): R = \frac{\frac{M_{2t}}{M_{3t}} \frac{\phi_{12t}}{\phi_{13t}}}{\frac{M_{2t}}{M_{3t}} \frac{\phi_{42t}}{\phi_{43t}}} \dots (4)$$

7. Take logs of (4) and we will get a specification free of any monadic terms (country effects). The only terms left are dyadic terms ϕ_{ijt} , i.e. τ_{od} in the present specification:

$$V_{od} = \frac{P_d^{\sigma-1} Y_o E_d}{\Omega_o \tau_{od}^{\sigma-1}} \Rightarrow \ln V_{od} = \ln Y_o E_d + (1-\sigma) \ln \tau_{od} + (\sigma-1) \ln P_d - \ln \Omega_o$$

8. The red part in last equation is the gravitational un-constant which is basically some monadic terms and in the tetrad approach they will be eliminated.

9. Advantages:

- Gravitational un-constant problem will be avoided.

10. Disadvantages:

- In the Head et al paper, the number of destination countries is limited to six. Generating all possible tetrad combinations is not feasible since it involves dealing with billions of observations. But this restriction may matter.
- The choice of reference countries is arbitrary, and may affect estimates.

11. The zero flows problem still exists and is likely to affect language barrier estimates- the barrier is likely to be high when there are zero or small trade flows. But this is not a big problem for UK because there are only two zero flows in the sample of 392 exports and imports in 2006 (though more observations are lost because of missing partner GDP and population). The rest of world effect is substantial.