



Multiproduct firms and product scope adjustment in trade[☆]



John Lopresti

College of William & Mary, United States

ARTICLE INFO

Article history:

Received 27 August 2014

Received in revised form 16 December 2015

Accepted 6 March 2016

Available online 14 March 2016

JEL classification:

F10

F14

F15

Keywords:

Multiproduct firms

CUSFTA

Product scope adjustment

Bayesian

ABSTRACT

A recent theoretical literature has emphasized the importance of multiproduct firms in trade. However, models within this literature have reached contradictory conclusions regarding the product-level response of firms to changes in trade costs. This paper attempts to resolve these contradictions by employing Bayesian techniques to estimate the product portfolio response throughout the distribution of US firms following the Canada–US Free Trade Agreement of 1989. I find evidence of a differential response among firms that are heterogeneous in terms of their involvement in foreign markets. Firms with less than 10–20% of total sales accounted for by foreign markets reduced product diversification as trade costs fell, while more foreign-oriented firms increased diversification.

© 2016 Elsevier B.V. All rights reserved.

1. Introduction

It is by now well known that an overwhelming majority of international production and trade is accounted for by firms that produce more than a single good.¹ This fact has recently led trade economists to develop a range of theoretical models focusing on the behavior of multiproduct firms in trade. While these new models each emphasize the aggregate importance of multiproduct firms, they deliver strikingly different predictions regarding how firms adjust product portfolios in response to changes in trade costs. Specifically, it is theoretically ambiguous whether firms will adjust product scope heterogeneously following a trade liberalization, and what the nature of this heterogeneity will be. For instance, do larger or more foreign-oriented firms adjust product scope differently than smaller, more domestically-oriented ones? If so, how? These questions, unresolved by theoretical literature, are empirical ones.

In an attempt to shed light on the matter, this paper examines changes in product portfolios among public US firms in response to the Canada–US Free Trade Agreement (CUSFTA) of 1989. Using two Bayesian econometric techniques, I examine whether the bilateral reduction in trade costs induced a differential response throughout the

distribution of firms. Specifically, I allow for the possibility that a threshold, or change point, existed in the distribution of firms, with the firm response to reductions in trade costs differing on either side of the change point. Further, I explore how the nature of this differential response depended upon the dimension of firm heterogeneity considered. Finally, I calculate Bayes factors for a range of models in order to allow for greater flexibility in the nature of the heterogeneous response throughout the distribution of firms. I find evidence of a differential product-level response among firms that were heterogeneous in terms of their involvement in foreign markets. A range of specifications indicate that firms for which less than 10–20% of sales were accounted for by international segments experienced a decrease in diversification as trade costs fell, while more foreign-oriented firms either increased diversification or did not respond to changing trade costs. Calculation of Bayes factors for a wider range of models supports these findings. These findings are robust to inclusion of both foreign production and exports in the measure of foreign orientation. When considering firm heterogeneity in terms of firm sales, however, the results are considerably more mixed, with evidence failing to support a model with a distinct change point.

The approach employed here has several appealing features. First, as will be discussed in more detail below, recent theoretical models of heterogeneous firms in trade predict that a threshold level in the distribution of firms may exist, with differential firm behavior on either side of the threshold. This lends itself naturally to a regression framework that incorporates a change point, above and below which the effect of changes in trade costs differs. To the best of my knowledge, this is the first paper to employ such a framework in a trade context.

[☆] I would like to thank David Hummels and Justin Tobias for their continued guidance and encouragement on this paper. I also thank Stephen Martin, Chong Xiang, Kevin Mumford, Anson Soderbery, Andrew Greenland, and Katie Schultz for their comments and suggestions. All remaining errors are my own.

¹ Bernard et al. (2010) note that among manufacturing firms in the United States as of 1997, multiproduct firms account for 39% of all firms, but 87% of output.

Second, I am interested not only in the existence of a change point in the firm diversification response, but also the location of this change point in the distribution of firms. That is, I care not only whether “large” firms behave differently than “small” firms, but also what constitutes a “large” or “small” firm. The specification I employ in the paper provides a posterior distribution for the level of the change point, allowing me to determine the probability that such a break point falls within any given range in the distribution of firms.

More specifically, the Bayesian approach involves combining prior distributions specified by the author with a likelihood function implied by the observed data to calculate posterior distributions for all variables of interest. I then iteratively sample from the posteriors to obtain an estimate of the change point, as well as all model covariates. Each iteration provides a single draw for the level of the change point as well as a draw for each covariate conditional on that particular change point value. Thus, my estimates incorporate the uncertainty not only in each coefficient conditional on the level of the change point, but also the uncertainty in the level of the change point itself.

This approach is similar in spirit to estimating a piecewise linear specification with a single break point in a classical framework. One could, in practice, specify such a model and repeat the specification for various potential values of the break point. One could then compare the mean squared error of each break point level, choosing the value that best fits the data. Using my baseline specification, such process estimates a break point at the same value as the Bayesian approach employed in this paper. Specifically, I estimate a change point in the distribution of firm foreign orientation at 0.18, suggesting that firms for which more than 18% of sales are accounted for by foreign markets respond differently to changes in trade costs than more domestic-oriented firms. Note, however, that the point estimates from the classical approach are conditional on the value of the break point chosen. That is, while uncertainty in the level of the break point is incorporated into my estimates, it is ignored in the classical approach.

Additionally, the model comparison approach in Section 6 allows me to report the strength of the evidence in favor of a wide range of models. As I will discuss in more detail in Section 6, model comparison entails calculating the marginal likelihood of a range of potential models and comparing the ratios of those likelihoods. Models with larger marginal likelihoods are revealed to better fit the data. The models examined in this paper will be motivated by the multiproduct firm theoretical literature. As noted by Kass and Raftery (1995), classical hypothesis tests can serve to reject null hypotheses pertaining to particular model variables, but have little to say regarding the strength of evidence in favor of a particular model against an alternative. Bayes factors provide just such evidence.

In addition to serving as a test of existing theory, the questions addressed here matter on several fronts. First, firm diversification behavior directly affects firm productivity levels.² Any differential response in firm diversification is thus a de facto differential response in firm productivity levels. A large literature has focused on the productivity effects of changes in trade costs, and the role of firm diversification has recently begun to be recognized as a key driver of such effects. Thus, firm-level product scope adjustment is a crucial dimension in the multiproduct firm literature. Identifying the set of models that match this dimension empirically is important.

Second, as I will discuss further below, firm product-level adjustments account for a sizable share of changes in economic output. Thus, to the extent that trade policy affects firm product diversification decisions, it also affects economy-wide macroeconomic patterns. Finally, several recent papers have focused on the implications of the fact that relatively few large firms account for the vast majority of economic activity.³ To the extent that firms at the right tail of the productivity distribution drive welfare changes accompanying changes in the trade

environment, for instance, it is important to understand whether these firms behave differently from other firms.

The structure of the paper is as follows. Section 2 describes the multiproduct literature to date as motivation for the empirical approach taken in the paper. In Section 3, I describe the Bayesian approach I use to estimate a linear regression with a change point to examine differential firm behavior on either side of the change point in response to changing trade costs. Section 4 describes the firm and trade cost data that I employ in my estimation. Section 5 discusses the results of the linear change point model. In Section 6, I calculate Bayes factors for a number of possible model structures. Section 7 includes a brief discussion and concludes.

2. Prior literature

Within the past ten years, multiproduct firms have become the focus of a still-expanding literature. In addition to their importance in terms of output, multiproduct firms are quite dynamic. Bernard et al. (2010) find that 54% of manufacturing firms alter their product mix every five years between Manufacturing Censuses, and on average, one-third of the output of a given product is produced by firms that either did not produce the product at the time of the previous Census or will have dropped the product by the next Census.⁴ Such product churning has substantial effects on the aggregate economy. Focusing on India between 1989 and 2003, Goldberg et al. (2010) estimate that 25% of the total increase in manufacturing output was accounted for by the net addition of products at the firm level.

It is therefore important to understand the nature of firm-product level decisions, and how such decisions are altered by a changing trade environment. In the theoretical literature, however, predictions regarding firm product-level responses to trade liberalization have proven to be rather fragile, and contingent upon a number of assumptions. Broadly, a reduction in bilateral trade costs increases competition in the domestic market and simultaneously increases access to foreign markets for domestic firms. The former effect encourages a reduction of domestic firm's product scope, while the latter product expansion. The relative strength of these effects may vary across firms, potentially creating a differential response throughout the distribution of firms. The exact form of this response, however, is sensitive to model particulars.

Perhaps the most common prediction regarding the firm-product-level response to a bilateral reduction in trade costs is that all firms will reduce product scope. This is the prediction of models developed by Eckel and Neary (2010) and Mayer et al. (2014) in which marginal costs of production vary across products within the firm. In these models, firms each have a core competence – a variety in which the marginal cost of production is lowest – with each additional variety becoming progressively less efficient. As trade costs fall and competition in the domestic market rises, all firms choose to reduce product scope, dropping products with the highest marginal costs. Baldwin and Gu (2009) reach a similar conclusion in a model in which marginal costs of production vary across firms but are constant across products within the firm. However, firms are assumed to produce a non-negligible set of varieties, and thus behave as oligopolists. As firms add varieties at the margin, demand for all other firm varieties is reduced, or cannibalized. As trade costs fall, firms are able to relax competition by reducing product scope.

Bernard et al. (2011) propose a multiproduct Melitz (2003) style model in which the firm product-level response to trade liberalization is ambiguous. Firms are assumed to differ in productivity levels, while products within firms differ according to taste parameters, each of which is drawn from a known distribution. Productivity levels determine the marginal cost of production for firms across all products, while the taste parameters determine the strength of consumer preferences for each product within the firm. As the authors note, even in a

² This has been documented in a large finance literature. See, e.g., Lang and Stulz (1994), Berger and Udell (1995), Rajan et al. (2000), Schoar (2002) and Villalonga (2004).

³ See di Giovanni and Levchenko (2012, 2013) and references therein.

⁴ For related findings from other countries, see Arkolakis and Muendler (2011) for Brazil, Goldberg et al. (2010) for India, Iacovone and Javorcik (2010) for Mexico and Mayer and Ottaviano (2008) for Europe more broadly.

Download English Version:

<https://daneshyari.com/en/article/962428>

Download Persian Version:

<https://daneshyari.com/article/962428>

[Daneshyari.com](https://daneshyari.com)