

The Effects of Trade Policy*

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Abstract

The last two decades have witnessed a shift in the focus of international trade research from trade policy to other forms of trade frictions (e.g., transportation, information and communication costs). Implicit in this development is the widespread view that trade policy no longer matters. We confront this view by critically examining a large body of evidence on the effects of trade policy on economically important outcomes. We focus on *actual* as opposed to *hypothetical* policy changes. We begin with a discussion of the methodological challenges one faces in the measurement of trade policy and identification of its causal effects. We then discuss the evidence on the effects of trade policy on a series of outcomes that include: (1) aggregate outcomes, such as trade volumes (and their price and quantity subcomponents), the extensive margin of trade, and static, aggregate gains from trade; (2) firm and industry performance, i.e., productivity, costs, and markups; (3) labor markets, i.e., wages, employment, and wage inequality; (4) long-run aggregate growth and poverty, secondary distortions and misallocation, uncertainty. We conclude that the perception that trade policy is no longer relevant arises to a large extent from the inability to precisely measure the various forms of non-tariff barriers that have replaced tariffs as the primary tools of trade policy. Better measurement is thus an essential prerequisite of policy-relevant research in the future. Despite measurement challenges and scant evidence on the impact of actual policy changes, existing evidence when properly interpreted points to large effects of trade policy on economically relevant outcomes, especially when trade policy interacts with other developments, e.g., technological change. We point to areas and opportunities for further research and draw lessons from the past to apply to future studies.

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1. Introduction

1.1 Does *Trade Policy* Matter?

In an influential study of the factors driving the growth of world trade, Baier and Bergstrand (2001) cite an equally influential quote by Krugman (1995):

“Most journalistic discussion of the growth of world trade seems to view growing integration as driven by a technological imperative – to believe that improvements in transportation and communication technology constitute an irresistible force dissolving national boundaries. International economists, however, tend to view much, though not all, of the growth of trade as having essentially political causes, seeing its great expansion after World War II largely as a result of the removal of the protectionist measures that had constricted world markets since 1913 (p. 328)”.

Twenty years later, the view that trade policy plays only a secondary role in the growing importance of international trade remains pervasive, with one difference: the view is no longer confined to journalistic circles but has now become dominant in academic research. Though most frequently expressed informally, during seminar and conference presentations, it is also reflected in the academic trade literature.

The main focus in recent academic work, both theoretical and empirical/quantitative, has been on “trade costs”, which are often measured as iceberg costs. Such costs are typically backed out from empirical specifications that are informed by specific theoretical models without any attempt to relate them to actual trade policy measures. Of course, trade costs capture much more than trade policy. In fact a frequent claim is that the “backed out” trade costs appear to be much larger than the costs that observable trade policy restrictions alone would justify. However, without actually measuring the restrictiveness of trade policy measures, it is hard to determine what exactly is captured in trade costs. Part of the problem lies with the difficulties in the measurement of trade policy – an issue to which we will repeatedly come back to in the course of this chapter. These measurement challenges are compounded by the belief that “other trade costs”, such as transportation, search and communication costs that are not unique to cross-country trade, as well as productivity growth

in less developed countries (most importantly, China), have been more important than trade policy in the last few decades. If this belief is true, any effort to carefully measure and study trade policy barriers would be a waste of time. The field is slowly moving towards the analysis of the spatial allocation of economic activity, which is akin more to economic geography than *international* trade. Even in studies that exploit specific trade policy changes, trade policy is more often an afterthought than the primary focus of analysis. Recent work on trade liberalization episodes in developing countries, for example, has used trade policy as an identification device – the interest has been less on the trade policy per se and more on the effects of increased trade (for which trade policy serves as an instrument). Similarly, in theoretical and quantitative work, trade policy changes are often used in counterfactual exercises in order to demonstrate the workings of a model, but there is little interest in the policy itself. Perhaps the most indicative sign of this attitude is the absence of any rigorous academic study of the recent “Buy American” clause of the Recovery Act. This dearth of policy-oriented research in international trade is to be contrasted with the plethora of academic papers in the fields of labor, public finance, health, education and industrial organization that have studied specific policy changes (e.g., “No-Child-Left-Behind” Act, Affordable Care Act, mergers, etc.). The only exception to this pattern is studies of trade agreements, which are by nature closely linked to trade policy and its institutions.

The view that commercial policy has become unimportant for world trade seems like an oxymoron in a field that would not exist without the existence of frictions to cross-border trade induced by policy (tariffs, non-tariff barriers, different currencies, etc.). It begs the question of why this perspective has gained support among academics over the last two decades. Is it indeed the case that trade policy has become irrelevant, or is the shift of academic research away from trade policy simply the result of the difficulties and complexities associated with its measurement?

To a large extent, the postulated irrelevance of trade policy arises from the observation that, especially in the developed world, international trade has been already significantly liberalized. Lant Pritchett succinctly summarized this viewpoint in a recent interview with the magazine *Reason* (2008):

*“Relative to when I started working as a trade economist in the early 1980s, the world is completely liberalized. So the incremental gains from anything that could happen as a result of WTO negotiations are just infinitesimal”.*¹

Taken at face value, Pritchett’s claim suggests that commercial policy has in fact had significant effects in the past, and that its own success has rendered it irrelevant. However, early studies of the effects of trade policies and agreements from the 1970s and 1980s tend to report small effects of these policies (see Deardorff and Stern (1986) for a review of this early evidence). Several later studies have employed gravity-equation-based approaches in order to identify the relative contributions of trade policies, reduction in transportation and other trade costs, and income growth or convergence of trading partners to the growth of trade, yielding mixed results. Among these studies, perhaps the best known and most controversial is a study by Rose (2004) that claimed that GATT or WTO membership had no discernable effects on trade volumes. Though the results of this study were subsequently questioned and challenged in several follow-up papers², the debate they inspired pointed to a concern that is distinct from the standard measurement problems faced in the evaluation of trade policy: its fundamental endogeneity. In the extreme, this concern implies that trade policy is the result rather than the cause of changes in the trade environment; hence, it may not be surprising that some studies find that trade policy has no bite – by the time it comes into effect, trade changes may already be in motion.

Claims of the diminishing relevance of trade policy, which are based partly on the undisputed observation that significant liberalization has already taken place and partly on studies of the aggregate effects of trade agreements employing gravity-equation-type approaches, are to be contrasted with the evidence from occasional detailed studies of the effects of trade restrictions (or their removal) on specific industries: Voluntary Export Restraints on autos, anti-dumping suits, and the Multi Fibre Agreement in apparel and textiles. Although narrower in scope, such studies have the benefit of careful measurement of trade policy and attention to institutional features of the economic environment that broader aggregate studies

¹ This quote was originally used in Levy (2008).

² See, Tomz, Goldstein, and Rivers (2007) comment on Rose’s paper or Subramanian and Wei (2007).

of trade policies may not permit. Several of these industry case studies have documented significant adjustments to trade policy changes along several margins, suggesting that the world may not be as liberalized as it seems and that failure to document significant effects of trade policies may instead be due to measurement and identification challenges rather than the absence of such effects.

Against this background, the question that this chapter poses and seeks to address is: “What is the evidence on the actual effects of trade policy, as opposed to other causes of changes in trade?” Does trade *policy* matter?

1.2 Conceptual Issues and Focus of this Chapter

Before we proceed, it is useful to delineate the focus of this chapter and clarify some conceptual issues.

We start the chapter by discussing the main methodological challenges one faces in the evaluation of trade policy and by describing the ways the literature has addressed them. Our discussion covers general methodological issues that arise in the evaluation of *any* type of trade policy, including specific policies that are the focus of other chapters in this Handbook. These methodological issues are addressed in section 2. The most significant of them are briefly summarized below:

a) Measurement: Measurement of trade policy is perhaps one of the toughest issues faced in the evaluation of trade policy, especially in cases where non-tariff barriers are the primary trade policy instrument. The challenges in the measurement of trade policy raise the question of whether the world is truly liberalized, as many believe, or if this impression is misguided and due to our inability to measure the restrictions that really matter.

b) Aggregation and Heterogeneity: Even when trade restriction measures are available, as is the case with import tariffs, the available information comes at a highly disaggregate level.

Economic analysis of these restrictions’ effects often requires the researcher to aggregate the information to a higher level (e.g., industry, region, or country). Given that there are many different ways to aggregate the information, aggregation would ideally be guided by a clear theoretical or conceptual framework. But this in turn raises the question of whether the results

are not merely consistent with, but also dictated by the framework. In addition, the conceptual framework underlying the analysis may imply homogenous or heterogeneous (across types of workers, firms, sectors of the economy, etc.) effects. Any analysis of heterogeneous effects needs to be consistent with the underlying framework.

c) Endogeneity of Trade Policy: The endogeneity of policy is not an issue unique to trade policy. However, in contrast to the case of domestic policies, randomized experiments, the gold standard for identification in empirical work, are substantially harder, if not impossible, to carry out in the context of trade policy. Despite this disadvantage, trade policy has at times the advantage of plausibly economically exogenous, quasi-experimental variation induced by events that are outside the control of specific industries or lobbies within a specific country (e.g., IMF interventions that dictated the pace and scope of trade liberalization, WTO accession, etc.). Nevertheless, even when trade policy is plausibly economically exogenous, in the sense that it was not set deliberately in response to certain economic developments, the concern about econometric endogeneity (i.e., omitted variable bias, effect of pre-existing trends, etc.) remains and must be adequately addressed.

(d) Anticipation and uncertainty about trade policy: If a trade policy change is unanticipated, firms and consumers cannot change their behavior prior to the policy implementation. However, trade policy changes and agreements are often preannounced, so that firms and consumers may adjust their behavior in anticipation of the announced policy change. In addition, trade reforms and agreements are presumed to reduce the uncertainty about the trading environment. An agreement that leads to small changes in the levels of trade restrictions, but large declines in uncertainty about trade policy, could in principle have large effects on trade flows and other outcomes. Inference about the trade policy effects therefore needs to take into account behavioral responses due to anticipation or uncertainty about trade policy changes.

The second issue that arises in an assessment of the effects of trade policy is: effects on what? In section 3, we begin by reviewing the evidence regarding the effects of trade policy on trade volumes. Such effects can be further decomposed to: (a) effects on traded quantities; (b) effects on prices; and (c) effects on the imports of new goods and varieties, i.e., the extensive

margin of trade. We then consider the evidence on the effects of trade policy on the static, aggregate gains from trade. The aforementioned analysis refers to aggregate outcomes. Next, we consider the impact of trade policy on specific parts of the economy. We discuss the effects of trade policy on firms (namely their productivity, costs, and markups) in section 4 and on labor markets (namely wages, employment and wage inequality) in section 5.

Much of the literature on the above outcomes captures the static and short-run effects of trade policy. The long-run effects of trade policy are substantially harder to pin down empirically. As a result, arguments about dynamic long-run effects are often made based solely on principles and theoretical models, with little formal empirical support. In section 6, we consider the (scant) evidence on long-run dynamic effects of trade policy on aggregate growth and poverty. Finally, in section 7, we examine the impact of trade policy on outcomes that have traditionally not received much attention in the literature, yet, might play an important role. These include the effects of trade policy on secondary distortions and misallocation of resources as well as its effects of reducing uncertainty.

One of the main challenges of this chapter is determining how to pick and organize material from studies on the effects of trade policies across space and time. The focus of this chapter is primarily on *actual* (as opposed to hypothetical) policy changes; counterfactual analysis of hypothetical policy scenarios carried out within the framework of quantitative models of trade is covered in another chapter of this Handbook (see Ossa (forthcoming)). Second, we focus on the time period following the creation of GATT and WTO. While a historical analysis of the effects of trade policy extending to earlier periods would be fascinating, it is only recently that the relevance of trade policy has been questioned. Examining the current relevance of trade policy to world trade requires a focus on more recent time periods and data. Third, we provide evidence on both developed and developing countries. Developing countries are still substantially less liberalized than developed countries, and the role of international trade in their growth and development remains one of the most interesting and policy-relevant questions. Finally, we primarily discuss evidence based on studies of broad, large-scale trade liberalizations. We focus on these reforms because we aim to minimize the overlap with other chapters in this Handbook, which concentrate on specific trade

policy instruments, including preferential trade agreements, anti-dumping duties, WTO rules and clauses, and other non-tariff barriers to trade. We occasionally draw on lessons from industry case studies of trade policy as such studies offer the advantages of deeper institutional understanding and better measurement.

Overall, the main message of our chapter is that for international trade to remain a policy-relevant field, it needs to focus on better measurement. If the main message of the Leamer and Levinsohn (1995) in the 1995 Handbook of International Economics Chapter was “Estimate, don’t test!”, our message twenty years later is: “Measure before you estimate!”

2. Methodology

2.1 Overview of Methodology

The empirical literature on the consequences of trade policy has embraced a variety of research methods to evaluate the effects of trade policy on outcomes of interest to international economists and policy makers. These research methods provide complementary ways to evaluate the consequences of trade policy. The ultimate choice of the research approach depends on the specific research question and the available data. One set of studies evaluates the consequences of trade policy through the lens of a structural model of behavior of consumers and producers and estimates key economic parameters that influence the responsiveness of consumers and firms to trade policy in this setting. Studies in this category include industry-specific studies of trade policy that use the approach pioneered in the industrial organization literature (Nevo and Whinston (2010), Feenstra (1995)) and economy-wide quantitative studies of trade policy (Costinot and Rodriguez-Clare (2014), Ossa (forthcoming 2016)). This approach is particularly useful to ex-ante evaluate a proposed trade policy change. Another advantage of this approach is that it can be used to evaluate the overall effects of an actual (or counterfactual) trade policy-- operating through the mechanisms specified in the underlying model, as well as the policy’s welfare consequences. The estimated effects from this approach depend on the assumptions of the underlying structural model and the consistency of the estimated behavioral parameters of demand, supply, and implied trade elasticities.

Trade policy could, in principle, also be evaluated through randomized control trials (RCTs), which are increasingly used to study the consequences of domestic policy. RCTs appear difficult, if not impossible, to implement in the context of trade policy, especially in the context of economy-wide trade policy liberalizations. That said, recent work has used randomized experiments to evaluate the effectiveness of export promotion programs (Atkin, Khandelwal, Osman (2014)) and this approach could be more broadly applied to evaluate the effectiveness of export promotion programs of the World Bank and export promotion agencies or aid for trade schemes (Cadot, Fernandes, Gourdon, Mattoo (2011)). We do not focus on this method in the survey given its nascent state in the trade literature.

A third research approach estimates the consequences of actual trade policies by exploiting quasi-experimental research design (see Angrist and Kruger (1999), Angrist and Pischke (2010)). The exact research design is guided by theory, but the identification of the causal effects of trade policy in these studies depends less on specific functional-form assumptions about the underlying demand, production, or market structure. Instead, the studies estimate the direct causal effect of actual trade policy on the outcomes of interest. This flexibility, however, comes at a cost. The quasi-experimental approach is not suited to evaluate welfare implications of actual trade policy changes or the overall effects of trade policy change, both of which require fully-specified structural or quantitative models of trade.

Quasi-experimental studies of actual policy changes illuminate the causal effects of the particular policy in question. More generally, these studies provide evidence on the relevance of various mechanisms through which trade policy (and trade more broadly) affects consumer and producer welfare, without ex-ante imposing such relationships on the data. These studies also provide evidence on the importance of mechanisms that are difficult to capture in quantitative studies of trade policy, including the effects of trade policy on firm-level productivity, innovation, markups, and elimination of institutional distortions. The evidence can in turn influence development of theoretical models that embed these features, which subsequently yield more informative counterfactual evaluations of future trade policy changes. Importantly, the empirical studies of the effects of trade policy on firms and workers has provided an important input for the development of trade models that examine the

consequences of trade with firm heterogeneity (Melitz (2003), Bernard, Eaton, Jensen, Kortum (2003), Yeaple (2005)) as well as models of labor market adjustment to trade costs that feature labor market frictions and/or heterogeneous firms (Kambourov (2009), Harrison, McMillan, and McLaren (2011), Helpman et al (2010), Artuc, Chaudhuri and McLaren (2010), Cosar (2013), Dix-Carneiro (2014), and Goldberg (2015)).

We now briefly illustrate key ingredients of this research approach. These studies estimate the effect of trade policy using information from repeated cross-sectional or panel data on outcomes of interest (e.g. firm-level performance measures, wages of individuals, firm-employee match, etc.) that spans the period before, during, and after a policy implementation.³ The outcomes of interest are related to cross-sectional and time-series variation in trade policy because of the exposure of the relevant economic agents to policy through industry affiliation, produced or consumed products, or spatial location. The causal effect of trade policy is hence identified based on differential exposure of economic agents to implemented trade policy.

The variation in trade policy across cross-sectional units and time is only helpful for identifying the effects of trade policy in the presence of some type of friction and/or heterogeneity in exposure to policy change. Consider empirical studies that aim to identify the effects of trade policy on labor markets in a frictionless world, as in a Heckscher-Ohlin model of trade. With a perfectly integrated national labor market, the effects of trade policy on workers operate at the country level, yielding one observation per trade liberalization episode (see Goldberg and Pavcnik (2007)). In this setting, the effects of trade policy can only be evaluated in a fully-specified structural model of trade via counterfactual simulations (see Porto (2006) as an example). Alternatively, if the mobility of workers is restricted across industries (as in Ricardo-Viner model) or across regions of a country (see Topalova (2010) or Kovak (2013)), some workers will be more exposed to trade policy changes than others due to their industry affiliation or location. This is akin to assuming industry or region-specific labor markets, with the degrees of freedom in the estimation corresponding to the number of industries or local markets per trade liberalization episode. In this setting, the effects of trade policy can be

³ To this end, studies have taken advantage of increased availability of data sets with detailed information about the outcomes and characteristics of firms, individuals, households, and, most recently, administrative employer-employee matches.

identified through differential exposure of workers in different industries (or regions) to trade policy changes.

Frictions and heterogeneity in responses to policy are not simply a convenient modeling assumption, but realistic (see the evidence surveyed in Goldberg and Pavcnik (2007), and Topalova (2010), Kovak (2013), Autor, Dorn and Hanson (2013), Pierce and Schott (2015) for different labor market frictions). The exact specification of how the variation in trade policy is related to outcomes of interest across industries, products, and space depends on the question at hand and the underlying theoretical model (see Goldberg and Pavcnik (2005), Topalova (2010), and Kovak (2013) for three alternative approaches in the literature on trade policy and labor markets). Furthermore, there is no harm in relying on assumptions about frictions for identification. If the assumptions about the frictions or heterogeneity are not valid (meaning workers can easily move across industries and locations or that firms' industry affiliation or underlying heterogeneity in productivity is irrelevant), the estimates based on this approach will show no systematic relationship between trade policy changes and the outcomes of interest. Thus, the main limitation of relying on differential exposure of economic agents to trade policy to identify its causal effects is not that the approach is not valid if the assumptions regarding the differential exposure are not valid, but that this approach by its nature will generally reveal only the relative and not absolute effects of a policy change. The latter require a theoretical framework within which the relative effects can be interpreted.

Irrespective of the particular approach used, the evaluation of the causal effects of trade policy faces several methodological challenges, including the measurement of trade policy, aggregation issues, endogeneity of trade policy, and other identification concerns. These are discussed in the next subsection.

2.2. Methodological challenges

2.2.1. Measurement of trade policy

Measurement of trade policy is one of the toughest issues in the evaluation of trade policy, especially in cases where non-tariff barriers are the primary trade policy instrument.

Domestic regulations and standards, which act as barriers to international trade, also affect our ability to assess the extent to which international trade is free. Consider the automobile market within the European Union. Imports of automobiles within the European Union are not subject to import tariffs. However, until very recently, country-specific requirements on car specifications, national car registration rules, and a selective and exclusive distribution system restricted international trade in automobiles within the single market. The challenges in the measurement of trade policy raise the question of whether the world is truly liberalized, or whether this impression is misguided and due to our inability to measure restrictions to trade that really matter. Multi-country, multi-industry studies are particularly prone to measurement issues. Because of the scope of their analyses, these studies are more affected by data limitations regarding the measurement of trade policy as measures of trade policy restrictiveness are often not comparable across industries, countries, and time.

The measurement of trade policy is challenging even when the definition of trade policy is confined to traditional tariff and non-tariff barriers to international trade. In part, the measurement is affected by the lack of detailed comprehensive information on trade barriers for a large set of countries prior to 1980s (Anderson and van Wincoop (2004)). The United Nations' TRAINS database or the World Bank's WITS database are systematically available only from 1989 onwards. In general, measures of tariffs are more readily available than measures of non-tariff barriers to trade. In addition, for many countries, these databases do not provide comprehensive information on trade policy measures. For example, fewer than 20% of countries report tariffs, non-tariff barriers to trade, and trade flows in any given year (Anderson and van Wincoop (2004)).

In situations in which trade policy measures exist, systematic measurement of their restrictiveness across products, industries, countries, and time is difficult, especially when policies curtail international trade through non-price based instruments. As price-based measures, ad-valorem tariffs are easiest to measure and most comparable across industries and time because they restrict international trade by imposing a tax on imported products that varies proportionally to the product's price. On the other hand, policy instruments such as specific tariffs, which are imposed as a per-unit surcharge on an import, or quantitative

restrictions on imports, vary with underlying market conditions.⁴ The comparability of measured trade policy across countries, industries and time can therefore affect inference about the effects of trade policy in cross-country and multi-industry studies. This is less of an issue in studies that examine the effects of a particular non-tariff barrier in an industry, for example the literature on the effects of the Multi-Fibre Agreement (Harrigan and Barrows (2009), Brambilla, Khandelwal, Schott (2010), Khandelwal, Schott, Wei (2013)), studies of anti-dumping (Blonigen and Prusa (2003, forthcoming)), and studies of VERs in the automobile industry (Goldberg (1995), Verboven (1996), Berry, Levinsohn and Pakes (1999)). These studies incorporate the relevant industry-specific institutional and regulatory details and can appropriately capture variations in industry-specific market conditions that affect the restrictiveness of implemented policy.

Data availability and measurement issues, combined with the timing and nature of large-scale trade liberalizations, help explain why most of the recent empirical studies that examine the effects of trade policy changes from large-scale, economy-wide trade liberalizations focus on trade liberalization episodes in less developed countries rather than in developed economies. Import tariffs in many developed countries, which the WTO estimates averaged between 20 to 30% in ad-valorem terms prior to the first WTO negotiation round, were reduced in early rounds of the GATT/WTO negotiations. The bound tariffs averaged 8.9% by the end of the Dylan negotiation round in 1962, and 4.1% by the conclusion of the Tokyo Round in 1978 (WTO (2007)).⁵ These liberalizations preceded the collection of readily available data on detailed trade flows and surveys of firms and workers, both of which are needed for the analysis of the effects of trade policy.⁶ In addition, tariffs were often replaced by NTBs, including import quotas (such as the multi-fibre agreement in the apparel and textiles and the VERs in the U.S. automobile industry in the 1980s), and anti-dumping duties. Many studies have found that these non-tariff barriers to trade have severely restricted trade, sometimes

⁴ For example, industry-level coverage ratios, a commonly used measure of prevalence of non-tariff barriers, may overstate restrictiveness of these measures in industries in which import quotas might not be binding.

⁵ See Table 6 and 7 in WTO (2007). The countries include the U.S., Japan, the United Kingdom, and the members of the European Economic Community at the time.

⁶ For example, the analysis in Rose (2004) is based on a data set that does not contain information on periods prior to the initial 1947 WTO round and that covers very few countries in the 1950s and 1960s.

even prior to the imposition of the barriers.⁷ To the extent that one cannot comprehensively control for these NTBs, the identification of trade policy effects, especially in multi-sector and multi-country studies that include developed countries, is challenging. With a few notable exceptions, most empirical studies on developed countries have focused on the effects of import competition or exporting rather than the effects of trade policy on outcomes of interest. A handful of studies have examined the effects of recent trade agreements, such as NAFTA and CUFTA, in developed countries.⁸

In studies that focus on developing countries, which encompass most of the recent studies on consequences of trade policy, these measurement issues present less of a problem. Most developing countries did not actively participate in earlier GATT/WTO negotiation rounds. As a result, import tariffs remained high in many of these countries at the onset of their large-scale trade liberalizations since the 1980s. For example, ad-valorem tariffs averaged over 50% in Colombia and over 80% in India prior to their trade liberalizations. Trade liberalizations in these countries, therefore, are characterized by large declines in import tariffs. In many cases, non-tariff barriers were also reduced, and declines in tariffs were highly correlated with declines in NTBs (see Goldberg and Pavcnik (2005) for Colombia's trade liberalization). These characteristics of the trade liberalization episodes in less developed countries facilitate the measurement and identification of the effects of trade policy.

2.2.2. Aggregation and heterogeneity

A related issue is the issue of aggregation and heterogeneity. National governments apply trade policy to products at a disaggregated level, dictated by national or international trade product classification schemes (such as the now commonly used Harmonized System (HS)). However, economic analysis of the effect of these restrictions often requires the researcher to aggregate the information to a higher level (e.g. industry, region, bilateral trade flow, or country) to map it to the level at which economic outcomes of interest are measured.

⁷ See Staiger and Wolak (1994) for such effects of anti-dumping duties, Blonigen and Prusa (2003) and Blonigen and Prusa (forthcoming) for surveys on antidumping and antidumping duties. See Harrigan and Barrows (2009), Brambilla, Khandelwal, Schott (2010) on Multi-Fibre Agreement; Goldberg (1995) and Berry, Levinsohn and Pakes (1999) for VERs. Feenstra (1995) reviews several of these earlier studies.

⁸ See Trefler (2004), Lileeva and Trefler (2010), Bernard, Jensen, Schott (2006).

Given that there are many different ways to aggregate the information, aggregation would ideally be guided by a clear theoretical or conceptual framework. But this in turn raises the question of whether the results are not merely consistent with, but also dictated by, the framework. In addition, the conceptual framework underlying the analysis of trade policy may imply homogenous or heterogeneous (across types of workers, firms, sectors of the economy, etc.) effects. Any analysis of heterogeneous effects needs to be consistent with the underlying framework (see Kovak (2013) and Dix-Carneiro and Kovak (2015a)).

In practice, aggregation choices are often dictated by available industry or product concordances and the level of aggregation at which variables of interest are collected. Imperfect concordance mappings across classifications introduce measurement error in the variables of interest. This is particularly problematic in studies covering many countries from different data sources. In addition, product and industry-level classifications in firm-level, worker-level, or household-level data sets tend to be substantially more aggregated than the categories to which trade policy is applied. Even with a perfect mapping across categories, aggregation of the relevant data to the industry level will lead one to ignore variation in trade policy within an industry. Both of these measurement issues may attenuate the estimated effects of trade policy.

2.2.3 Endogeneity of Trade Policy

A key challenge in examining the causal effects of trade policy is that trade policy may itself be the outcome of economic conditions. Economic theory suggests that economic conditions affect the timing of trade liberalizations and their reversals (Bagwell and Staiger (2003)) as well as cross-sectional patterns of protection across industries (Grossman and Helpman (1994)). These predictions are supported by abundant empirical evidence (Rodrik (1995)). More recent studies also suggest that global fragmentation of production provides additional incentives for firms and industries to influence trade policy (Blanchard (2007, 2010), Blanchard and Matschke (2015), Blanchard, Bown, Johnson (2015)).

The economic endogeneity of trade policy provides one potential explanation for the profession's perception that trade policy does not matter, particularly in cases where trade

reforms are enacted ex-post, in order to ratify developments in trade that were already in motion. To illustrate the problem, consider first a case where trade barriers are imposed in order to halt a rise in imports. As a result, imports drop. In this case, trade policy has a clear effect on imports, though the enactment of the policy was endogenous to the increase in imports. The policy endogeneity in this instance would not lead one to conclude that the policy was ineffective. But now consider an alternative scenario, in which the domestic industry is doing well and does not feel threatened by imports. As a result, no one objects to trade liberalization and trade barriers fall. Suppose that imports were unaffected by this liberalization. The economic endogeneity of trade policy would pose a big problem for inference in this case. The lack of relationship between trade policy and imports would be due to the endogeneity of trade policy: the policy was only enacted because it was expected to have no effects. Trade policy in this case ratifies changes in trade that were already happening for other reasons.

The above example does not imply that a truly random decrease in trade barriers would have no effect on imports. But it does suggest that in practice, the enacted trade policies may have no observable impact because of their economic endogeneity. In a systematic study of the effects of endogeneity of trade policy on import penetration for the United States, Trefler (1993) finds that the absolute magnitude of the effect of non-tariff barriers to trade on import penetration substantially increases once the empirical framework accounts for the endogeneity of trade policy. Of course, the effect could also go the other way: the economic endogeneity of trade policy could bias estimates of the effects of trade policy upwards, overstating the true effects of trade policy. Consider countries that foresee future increases in mutual trade and as a result form a preferential regional trade agreement. In this instance, empirical estimates of the effect of policy that do not account for endogeneity of agreement's formation, overstate the effects of trade agreements on trade flows.

This discussion suggests that it is informative to study both types of effects of trade policy: the effects of observed trade policy (without corrections for endogeneity) and the effects of exogenous variation in trade policy. The former tells us what actually happened. Did trade policy matter, or did it come too late to have effects? The latter is useful for normative

implications and for assessing the effects of counterfactual scenarios, including potential further liberalization and liberalization in other settings.

With this latter goal in mind, studies of the causal effects of actual trade policies rely on institutional details of trade policy changes to determine whether such changes were plausibly economically exogenous. The arguments for economic exogeneity are carefully established on a case-by-case basis. In many instances, researchers have taken advantage of plausibly economically exogenous, quasi-experimental variation in trade policy induced by events that are outside the control of specific industries or lobbies within a specific country. Because less developed countries did not actively participate in early GATT/WTO negotiation rounds, many of these liberalizations have been implemented in less developed countries. They include unilateral liberalizations that occurred as a result of IMF interventions that dictated the pace and scope of the reforms (India's trade liberalization in 1991), WTO accessions (Mexico in 1985), unilateral liberalizations where the government's goal was to reduce dispersion of tariffs across industries to a more uniform level (Colombia in late 1980s and early 1990s), and the signing of a broad trade agreement that did not involve negotiations over a particular tariff lines (the U.S.-Vietnam Bilateral Trade agreement in 2001).

Importantly, these liberalizations not only lowered the levels of tariffs, but also led to plausibly economically exogenous differential changes in trade policy changes across industries. It is this variation in trade policy across industries that empirical studies exploit to identify the causal effects of trade policy on outcomes of interest. Take for example, the case of India's trade liberalization. Declines in India's tariffs varied widely across industries and were largely set as part of the IMF conditions in 1991, rather than set to reflect the underlying industry-specific conditions across India's industries (see Topalova and Khandelwal (2011)). So, while the timing of India's trade liberalization was clearly a function of existing economic conditions (after all, it was induced by India's balance of payments crisis in the aftermath of the U.S.-Iraq war), the magnitudes of the industry-specific tariff changes were not influenced by economic conditions in India's industries at the time of trade reform.⁹

⁹Topalova and Khandelwal (2011) formally show lack of correlation between industry-specific tariff changes and pre-reform industry characteristics and conditions. This lack of correlation is also consistent with the institutional details of India's trade policy. Gang and Pandey (1996) suggest that India's trade policy prior to liberalization was

So far we have discussed the economic endogeneity of trade policy arising from the political economy of trade protection (i.e., trade policy is enacted in response to economic conditions and lobbying). Equally important is the issue of econometric endogeneity. Even when trade policy is plausibly economically exogenous in the sense that it was not set deliberately in response to certain economic developments, the concern about econometric endogeneity remains and needs to be adequately addressed. Econometric endogeneity may arise from omitted variable bias when there are other concurrent policy reforms or demand and supply shocks on the world markets. Another concern is pre-existing trends in the outcomes of interest that might be spuriously correlated with trade policy changes. To this end, studies of trade policy have used a wide range of falsification or placebo tests to check the validity of assumptions needed to identify the effects of trade policy. For example, if data on outcomes of interest is available prior to the implementation of trade policy, one can rule out spurious pre-existing trends by showing that trade policy does not have a significant impact on outcomes of interest prior to its implementation (see Topalova (2010), Edmonds, Pavcnik, and Topalova (2010)). Likewise, one can show that the implemented trade policy had effects only on economic agents who were affected by the policy, but not on unaffected agents (for examples, see Edmonds, Pavcnik, and Topalova (2010), McCaig and Pavcnik (2014), Pierce and Schott (2015)).

The above discussion emphasizes the causality of trade policy in studies that evaluate the effects of actual trade policy changes. The issues of causality and endogeneity are just as important in the studies that evaluate counterfactual effects of trade policy within a structural or quantitative model of trade. The estimated counterfactual effects of trade policy depend crucially on the consistent estimates of key parameters of the model (such as the trade elasticity) and the plausibility of the underlying assumptions of the structural model.

Industry-specific studies of trade policy directly model trade policy within the context of the particular industry under study and evaluate the effects of actual and counterfactual trade policies through simulations. In recent quantitative models of trade however, the effects of

largely set as part of India's Second Economic Plan after the Independence. Subsequently, trade policy levels were not adjusted to reflect particular economic conditions across industries. It is therefore not surprising that industry-specific changes are not correlated with industry's conditions in 1991.

trade policy, especially on welfare, are typically evaluated by considering a counterfactual in which the economy moves from autarky to a frictionless world. The question then is whether such a counterfactual is informative about the consequences of declines in trade costs associated with actual policies. Would a counterfactual in which trade costs decline from a more to less restrictive trade regime yield similar conclusions about the effects of trade on welfare or income distribution? In addition, counterfactual simulations in the above models of abstract from political economy concerns that may be key in understanding the patterns of trade protection and the effects of reducing it. Consider for example the following scenario. A counterfactual simulation of the move from autarky to free trade in a simple 2x2x2 Heckscher-Ohlin model would predict a decline in income inequality between educated and less educated workers in unskilled labor-abundant countries. This is based on the premise that the protected sectors in an unskilled labor-abundant country would be those that use unskilled labor relatively more intensively. However, the *actual* structure of protection in several less developed countries, such as Colombia and Mexico, was such that tariffs were higher in more unskilled-labor intensive industries. The actual trade liberalizations implemented in these countries in the past three decades led to bigger declines in tariffs in more unskilled-labor intensive industries (see Harrison and Hanson (1999), Goldberg and Pavcnik (2007)). In this setting, the simple counterfactual considered above that relies on a comparison of autarky to the free trade equilibrium, without taking into account the political economy of protection, would fail to capture the effects of the actual trade policy that was implemented.

2.2.4. Anticipation of Trade Reform and Reduction in Uncertainty about Trading Environment

The estimates of the effects of implemented trade policies are also affected by the anticipation of trade policy. The effects of trade policy are estimated by examining how outcomes of interest change after the policy is implemented relative to the period before policy implementation. The implicit assumption in this research design is that trade policy only has an effect on the outcome of interest after its implementation.

If a trade policy is unanticipated (as it was the case in India's 1991 trade liberalization), the quasi-experimental research design will fully capture its effects because firms and

consumers cannot change their behavior prior to implementation. If a trade policy is anticipated (and its implementation credible), firms and consumers might react to it before its implementation. For example, in anticipation of trade liberalization, firms might change their investment decisions, either delaying them or expediting them. Likewise, consumers might delay purchases of durable products until after the trade liberalization is implemented. Anticipation is a greater concern in studies that use higher frequency data. Depending on the situation in question, it could lead to either overestimates or underestimates of the policy effects. However, as long as the data includes observations that cover a long enough period prior to the announcement and implementation of a particular policy, one can directly examine whether the policy affected behavior prior to its implementation, and accordingly adjust the estimated effects.

A related issue is trade policy uncertainty (see Handley (2014), Handley and Limao (2015), Pierce and Schott (2015)). Trade agreements can reduce the uncertainty about trade policy by committing countries to a specific trade policy regime more permanently. To the extent that uncertainty about trade policy affects firms' and consumers' decisions on market entry, investment and purchases of durable products, the effects of trade policy changes on trade flows and other outcomes of interest may be larger than suggested by the magnitudes of the trade barrier reductions. Consider for example recent trade agreements such as NAFTA, CUFTA, and the Chinese entry into the WTO. The associated trade reforms did not lead to large declines in tariff levels. But despite the small tariff changes, these trade agreements may have had significant effects through the elimination (or reduction) of uncertainty.

These methodological challenges notwithstanding, recent research has found creative ways to address them and make significant progress towards assessing the effects of trade policies. This evidence is discussed in the next sections.

3. The Effects of Trade Policy: Trade Volume, Prices, Extensive Margin, Gains from Trade

3.1 Effects on Trade Volume

3.1.1 Evidence on Effects on Trade Volume

We start by revisiting an old question on the topic of trade policy: To what extent can the growth of world trade since World War II be attributed to trade liberalization? Baier and Bergstrand (2001) used a gravity-equation-framework to run a horserace between several factors contributing to world trade growth: income, tariff reductions, transport costs, and income convergence. Baier and Bergstrand examined data for 16 OECD countries between the late 1950s and late 1980s and concluded that trade policy played a critical role in the growth of trade. According to their results, real GDP growth explains approximately 67-69% of the trade growth, tariff reductions and preferential trade agreements explain 23-26%, transport cost reductions explain 8-9%, and real GDP convergence is found to have no effect at all. Baier and Bergstrand highlight in their discussion the fact that tariff reductions are found to have approximately three times the effect of transport costs, hence lending support to the view that trade policy is more important than transport costs. However, they acknowledge that the explanatory factors they include in the gravity equation explain only 40% of the variation in trade flow growth, which leaves the possibility open that other factors, including technological advances (which may have reduced communication and search costs in international markets), played an important role in trade growth. Finally, due to data constraints, their results cover only 16 highly developed OECD countries that experienced dramatic tariff reductions post-World War II. In addition, the study has little to say about the role of non-tariff barriers or the impact of trade policy in less developed countries that did not experience the same degree of tariff liberalization. Despite these limitations of sample coverage, the main message of Baier and Bergstrand's work is that trade policy (i.e. tariff reductions) matters.

Yi's (2003) study of the determinants of world trade growth reached a very different conclusion. Yi considers a more extended sample than Baier and Bergstrand, but more importantly, he extends his empirical analysis to more recent years that cover the period between the mid-1980s to 2000. He points out two facts that are hard to reconcile with the view that tariff reductions were instrumental in the growth of world trade: (1) First, tariff rates declined by only 11 percent after the mid-1960s, yet trade grew rapidly in subsequent decades. In order to explain this rapid trade growth, one would have to appeal to implausibly large trade elasticities. (2) Second, and perhaps more importantly, the tariff reductions were larger before

than after the mid-1980s; yet, trade growth was much smaller in the earlier than in the later period. In order to explain these trade patterns, one would have to assume a trade elasticity (elasticity of exports with respect to tariffs) of 7 for the 1962-1985 period and an elasticity of 50 for the 1986-1999 period. Traditional trade models have a hard time generating such non-linearity in trade elasticities, and in general, it is hard to come up with an explanation that would justify such non-linear effects. The main takeaway from this evidence is that there must have been something else than tariff reductions alone driving the growth in trade.

Yi proceeds to show, both theoretically and quantitatively (through calibration), that these patterns can be explained through vertical specialization: vertical trading chains spanning many countries where each country specializes in a particular stage of a good's production sequence. Importantly, he shows that vertical specialization and multiple border crossing can generate a magnified and non-linear response to tariff reductions. Consider, for example, a product that has five stages of production, each produced in a different country. When tariffs fall by 1%, the cost of producing this good will fall by 5%, in contrast to the 1% decrease of a standard traded good produced in a single country. This magnified cost decline will lead to a magnified response of trade. This magnification is solely related to the intensive margin. In addition, there is an extensive margin: as tariffs fall, vertical specialization will start occurring in cases where it was previously not profitable due to high trade costs. This will lead to an additional magnification effect and generate a non-linear response of trade flows to tariffs.

Yi's argument is not that trade policy does not matter, but rather that it matters most *in interaction* with vertical specialization. Vertical specialization may be to a large extent technologically driven, but as Yi shows, it responds to trade liberalization. Hence, the main takeaway from Yi's work is twofold. First, empirical work that tries to assess the importance of trade policy by relating trade growth to tariff reductions may seriously understate the true effect of trade policy, as trade policy may affect trade flows in interaction with other factors, including vertical specialization. The significance of these interactions has likely increased over time. Second, the increasing importance of vertical specialization in world trade suggests that the focus on export or import flows as measures of trade may be misguided and understate the

true extent of trade. Measures based on value-added are thus more appropriate and realistic as they do justice to the sequential and fragmented nature of the production process.

The latter point is made most explicitly in a recent paper by Johnson and Noguera (2014), which examines both value-added and gross exports over the last four decades (1970-2009) and seeks to identify the driving forces behind the changing patterns in cross-border trade. The authors use the ratio of value-added to gross exports as a measure of international vertical specialization and document that this ratio has fallen significantly (in the range of 10%) over the last four decades. This aggregate number masks significant heterogeneity across countries and sectors. The decline in the valued-added ratio implies that double-counting in gross trade data (due to multiple border crossing of traded goods) is more pervasive in recent years than in the past. When the authors relate the value-added to gross export ratio to regional trade agreements, they find that trade agreements have a substantial impact on the decline of this ratio. By simulating a gravity model with input-output linkages, the authors further show that changes in trade frictions following trade agreements do not only explain changes in the bilateral trade patterns, but also account for approximately 20% of the global decline. They conclude that trade frictions and regional trade agreements play a first-order role in explaining changes in bilateral and global trade patterns and suggest revisiting many classic questions regarding the role of trade frictions and policy from a value-added perspective.

To conclude, the message of recent work that has taken the international fragmentation of production seriously is *not* that trade policy is second-order in explaining the explosion of global trade in recent decades. On the contrary, the message of this work is that trade policy has played a critical role, but only in interaction with other (possibly technologically driven) developments that have contributed to the rise of vertical specialization in the production process. The implication for empirical work is that trade policy measures should enter empirical specifications in interaction with other measures capturing vertical specialization, and that – depending on the particular research question – it might be more appropriate to measure trade flows in valued-added rather than gross terms.

3.1.2 Trade Growth versus Trade Elasticity and Gains from Trade

Independent of the question of how large the effects of tariffs or other trade policy frictions on trade flows are, Yi's analysis raises another interesting question: Even if trade policy matters for trade volume, does it matter for the gains from trade? In addition, are "trade flows" what we should be focusing on if we want to demonstrate the relevance of trade policy?

The reason Yi's work brings up this question is that his analysis was motivated by the observation that the growth of trade in the last three decades implied implausibly large trade elasticities if one were to explain the trade growth by tariff reductions alone. But large elasticities imply (conditional on trade volume) small gains from trade. One cannot have it both ways: if trade policy generates large increases in trade, then it also generates small (static) gains from trade. We will revisit this issue when we examine the evidence on the impact of trade policy on the aggregate gains from trade. For now, we simply point out that showing that trade policy played an important role in the increase of world trade does not imply that trade policy matters from a welfare point of view. And vice versa, a finding of small effects of trade policy changes on trade volume does not imply that the gains associated with these trade policy changes are small.

3.1.3 Trade Elasticity and Trade Policy

As we conclude the topic of the effects of trade policy on trade flows and gradually move towards an analysis of its effects on the gains from trade, one more observation is necessary. Recent work on the gains from trade (Arkolakis, Costinot, Rodriguez-Clare (2010)) has highlighted the importance of the reduced-form trade elasticity in computing the aggregate gains from trade. Given that the trade elasticity relates -- by its very definition -- changes in trade flows to changes in trade costs, exploiting observable changes in trade policy (i.e. tariff reductions) seems an obvious way to credibly estimate it. What trade elasticity estimates do changes in trade policy imply?

Perhaps surprisingly, estimates of the trade elasticity based on *actual* trade policy changes are scarce, and the few that exist are all over the place. As discussed in Hillberry and Hummels (2013) in their review of the trade elasticity parameters used in the literature, the "trade elasticity" is usually estimated either based on cross-sectional (cross-country and cross-

industry) variation of trade costs other than trade policy barriers or based on time series variation stemming from exchange rate fluctuations. Studies that rely on cross-sectional variation are often labeled “micro” studies and yield high values for the trade elasticity (around five or higher). Studies that rely on time-series variation are often identified as “macro” studies and yield low estimates for the trade elasticity, around one or lower. A standard explanation for these divergent results is that cross-sectional studies identify long-run effects corresponding to different steady states associated with different trade costs, while studies based on time-series variation capture only the short-run effects of changing trade costs. Economic agents have time to adjust in the long-run so the long-run trade elasticity is larger than the short-run elasticity. While this explanation is appealing, it abstracts from the fact that the two types of studies rely on very different sources of variation, so that the different estimates could instead be due to these different sources of variation. Indicatively, Shapiro (2014) relies on panel data in order to estimate the trade elasticity. The use of panel data implies that his elasticity estimate should be best thought of as a short-run one; yet his results are closer to the ones obtained by cross-sectional studies because he relies on similar sources of variation.

This review does not examine work on estimation of the trade elasticity, but given the central role that trade elasticity plays in a number of trade models and in welfare analysis, it is surprising that trade policy has not been exploited to a larger extent to identify this crucial parameter. To our knowledge, the only exceptions to this pattern are the work by Yi (2003) – who however calculated the trade elasticity implied by tariff reductions only to subsequently denounce it as implausible – and the estimates provided in recent work by Caliendo and Parro (2015). Caliendo and Parro estimate sectoral trade elasticities based on the import tariff reductions associated with NAFTA. The estimates displayed in Table 1 of their paper display substantial heterogeneity, with trade elasticities ranging from 0.37 to 51.8! The authors reject the null hypothesis of a common elasticity across sectors. The heterogeneity of the estimates suggests that trade elasticity estimates may vary by sector, time and country. This makes careful empirical work that exploits trade policy variation in order to identify the trade elasticity/ies more important. The fact that a key parameter in the trade literature is so rarely estimated based on trade policy variation speaks to the secondary role assigned to trade policy.

3.2 Effects on Prices

While studies on the effects of trade policy on trade flows abound, evidence on its effects on prices is rare. Traditional trade models feature either perfect competition or monopolistic competition with CES demand implying perfect pass-through of tariffs or other trade barrier changes to prices. Accordingly, there has been relatively little interest in examining the response of prices to trade reforms in the past. The standard premise has been that tariff or NTB reductions led to a proportional decrease in the prices of imported products.

This premise has been called into question in more recent work that has highlighted the relevance of variable markups. Before we examine the implications of variable markups for price adjustment, it is important to note that independent of the particular theoretical model underlying the analysis, a reduction of trade policy barriers would be expected to lead to lower prices in the importing country. This price reduction seems unambiguous in *qualitative* terms and is realized through several channels.

First, trade policy changes will directly impact the prices of imported goods. A reduction of tariffs, for example, will lead to a decline in the price of imports, though the exact magnitude of the decline will depend on market conditions. Second, a reduction of trade barriers exerts competitive pressure on the domestic producers of final products. Producers face a downward shift in the residual demand for their products accompanied by an increase in the price elasticity of the residual demand curve given the intensified import competition. With variable markups, these changes in the residual demand facing domestic producers imply lower markups and lower prices. This is the pro-competitive effect of trade liberalization. In addition, one would expect a trade liberalization to also have a cost reduction effect. To the extent that the reduction of trade barriers affects products that are used as intermediate inputs in domestic production, one would expect a decline in the prices of these intermediate inputs. Further, trade liberalization may lead to improved firm efficiency (for example, through the elimination of X-inefficiencies, or the introduction of new products that contribute to lower costs), which will further lower costs. These cost reductions should also contribute to lower prices. In sum, the above considerations lead to the *qualitatively* unambiguous conclusion that

a reduction of trade barriers should lead to lower prices in the importing country. The *quantitative* effect however is less clear and will depend on many factors regarding the demand, market structure and competitive conditions.

A recent quantitative study of the effects of trade liberalization (Edmond, Midrigan, and Xu(2015)) uses counterfactual simulations to quantify the pro-competitive effect of trade policy and concludes that trade liberalization leads to lower markups and lower prices. But evidence on actual, as opposed to counterfactual, trade policy changes is scant. This is partly due to the fact that reliable data on prices are difficult to find and partly due to the aforementioned assumption that prices move one-to-one with trade policy changes, so that an examination of the price response is not necessary or particularly interesting. To our knowledge, only two recent studies have directly examined the price response to trade liberalization: Topalova (2010) and De Locker, Goldberg, Khandelwal, and Pavcnik (2015), henceforth DLGKP, both on India. Both studies found that domestic prices decline approximately 10% as a result of India's trade liberalization. However, this reduction is small relative to the cost reductions implied by the trade liberalization, which are substantial. The reason for the attenuated response of prices is that the pass-through of cost reductions to final goods prices is incomplete. This incomplete pass-through in turn implies rising markups. This result may seem counterintuitive at first, but it can be easily generated in many models featuring imperfect competition and demand with variable markups. The authors also report that once they condition on changes in marginal costs arising from trade liberalization, they can identify the pro-competitive effect of trade liberalization: a decline in markups arising from the exposure of domestic producers to intensified competition. Hence, the results do not imply that this pro-competitive effect does not exist, but rather that in their setting, the pro-competitive effect is dominated by the incomplete pass-through effect associated with variable markups.

The possibility that prices respond only partially to trade policy changes is important for trade policy evaluation. Many key results in the literature have been derived under the assumption of complete price adjustment and need to be revisited once the possibility of incomplete adjustment is considered. As micro data on prices are becoming more widely available, this is an important question for future research. While it is too early to say whether

the results of DLGKP generalize to other settings, it is instructive to draw a parallel to the macro literature on price rigidities and incomplete exchange rate pass-through. This literature has repeatedly documented incomplete pass-through of exchange rate changes to prices, not only in the short, but also in the long-run, resulting in persistent deviations from the Law of One Price. Despite this evidence, the micro-oriented trade literature has for years proceeded under the assumption that price rigidities do not exist and that prices fully respond to trade policy changes.¹⁰ The insights from these two literatures should be merged in order to assess the actual effects of trade policy changes. Examining the actual response of prices to trade policy changes is a first step in this direction.

3.3 Effects on the Extensive Margin

If trade policy has attenuated effects on prices, how can it have large effects on trade quantities and volumes? One possibility is that trade policy changes lead to the trade of new products and varieties. Following the convention in the trade literature, we will use the term “product” to describe genuinely new products, and the term “variety” to refer to a product/source country pair. For example, if a policy change leads to the import of bananas, and bananas were previously not imported, bananas will be considered a new product. If bananas were already imported, but a trade policy change leads to imports from a new country, such as Ecuador, Ecuadorian bananas will be referred to as a new variety. In addition to the introduction of new imported products and varieties, trade policy may also indirectly lead to the introduction of new domestic products. This could occur if the technology and imported inputs for producing certain products domestically were unavailable or too expensive prior to trade liberalization and the reduction of trade barriers made their production economically viable.

The empirical trade literature has extensively investigated the effects of trade on the extensive margin (see Feenstra (1994) and Broda and Weinstein (2006)). However, the majority of the work has focused on the impact of *trade*, not *trade policy*. Both Feenstra and Broda and

¹⁰ An important exception to this pattern is a recent paper by Atkin and Donaldson (2013) that examines the implications of incomplete pass-through for intra-national prices in Ethiopia and Nigeria. We do not discuss this paper here since it does not consider any actual trade policy changes, but it should be noted that its results do have implications for the effects of trade policy, and in particular for how trade barrier reductions would affect prices in ports versus inland locations, especially in developing countries.

Weinstein rely on an identification strategy that does not use any information on trade policy. They find very large effects of trade on the extensive margin, but given that trade policy is completely absent from their work, it is not clear that these effects can be interpreted as the outcome of trade policy.

In contrast to these two studies that explicitly focus on trade policy, Klenow and Rodriguez-Clare (1997) and Arkolakis, Demidova, Klenow and Rodriguez-Clare (2008), find miniscule effects. Both studies focus on the tariff reductions associated with the Costa Rican trade liberalization. The authors' interpretation for the small effects of trade policy on the extensive margin is that the liberalization led to the import of marginal, or relatively unimportant, products and varieties, as reflected in the relative low shares of these products/varieties in total expenditure. The products/varieties that were important for Costa Rica were already being imported prior to the liberalization. Along the same lines, it seems that the reason that Feenstra and Broda and Weinstein find an important role of trade for the extensive margin in the U.S. is that in the U.S. the new imported products/varieties were important for the economy. In this setting, however, these new imports were not necessarily the result of trade policy changes. Though never explicitly stated, the sentiment underlying the Costa Rican papers is that trade policy may again not "matter". By the time a trade liberalization comes into effect, the products that were important for the economy were already imported.

In a different study on India, that also examines the effects of trade policy changes on the extensive margin, Goldberg, Khandelwal, Pavcnik and Topalova (2010) find results that are strongly at odds with those reported in the previous two papers on Costa Rica. In the case of India, the effects of the tariff reductions on the introduction of new imported products and varieties are large and result in significant welfare gains for the economy, as measured by the decline in the exact price index. Moreover, the authors document that the tariff reductions also led to the introduction of new domestic products. The intuition behind these results is straightforward: Indian businesses and policy makers had complained for years that restrictions on the imports of important inputs held back domestic production and lowered the quality of the domestically produced products. The trade liberalization relaxed these constraints. Hence,

in contrast to the case of Costa Rica, the Indian trade liberalization resulted in the import of new products and varieties that were important.

The contrast between the two studies on Costa Rica and India makes clear that there is nothing inherent in the nature of trade policy that implies it would have small effects on the extensive margin. Rather, the results depend on the setting, pre-existing conditions, and in particular the severity of the trade restrictions facing the economy prior to the onset of the trade liberalization. As with prices, much more work in this area is needed before a general assessment of the extensive margin effects of trade policy is possible.

A recent working paper by Caliendo et al (2015) examines the effects of trade policy (i.e., tariff reductions) on a different type of extensive margin: the decisions of firms to enter new markets. The evidence presented in the paper suggests that tariff reductions over the period 1990-2010 had a large impact on firm entry and selection into markets, and that this effect was more pronounced in developed than in developing countries. Interpreting their estimates within a quantitative model of trade, the authors attribute more than 90% of the gains from trade to the reductions in MFN tariffs.

3.4 Effects on Aggregate (Static) Gains from Trade

Ultimately, what is most relevant is not how trade flows or prices or the extensive margin respond to commercial policy, but how the economy as a whole is affected by policy. What gains are associated with trade liberalization and what losses are associated with trade protection?

In principle, this seems like a question that should have been addressed in the literature. Although estimates of the gains from “trade” abound, there is relatively little work on estimating the gains associated with particular trade liberalization episodes. There are few exceptions, and these consist of either older studies that employed CGE models or case studies of particular industries (e.g. welfare effects of VERs on autos (Berry, Levinsohn and Pakes 1999)). A general challenge for these studies is that they need to assume a particular theoretical structure in order to derive the welfare implications of trade policy. Thus, the conclusions are as credible as the underlying model.

Arkolakis, Costinot and Rodriguez-Clare (2010), ACR henceforth, in an influential paper, provide a simple formula that can be easily applied ex-post to trade liberalization episodes to assess the gains associated with the policy changes: the welfare gains are related to the reduced form “trade elasticity” and to the change in the share of domestic expenditure. The advantage of this approach is that it is consistent with a large class of models, in fact with all workhorse models of trade. Hence, while the formula is theoretically informed, it does not depend on the validity of one specific model. Moreover, at first sight, it seems easy to implement: one needs information on the change in domestic expenditure attributable to the trade policy change (which, subject to identification challenges, can be obtained from widely available data) and the trade elasticity (which, again subject to the same identification challenges, should be estimable from publicly available data). To our knowledge, the ACR formula has been applied only to assess the gains from trade relative to autarky, not the gains or losses associated with particular policies.

This observation is surprising because trade policy is not only interesting by itself, but it also provides a natural way for identifying the change in the domestic expenditure that arises from changes in trade costs. In the process of assigning changes in the domestic expenditure to changes in trade policy, one also identifies the “trade elasticity” which plays a key role in welfare analysis. In short, implementation of an ex-post welfare analysis as suggested by the ACR formula is tantamount to estimating the “trade elasticity.” This brings us back to the topic discussed earlier, of why variation induced by trade policy has not been used more extensively in order to identify the “trade elasticity.” This is a hole in the literature that future research will hopefully address.

The more challenging question is whether estimates of the trade elasticity and the ACR formula can also be applied ex-ante, in lieu of counterfactual simulations conducted within the framework of a specific theoretical model, to predict the gains or losses from a trade policy intervention that has not yet occurred. From a theoretical point of view, such ex-ante application is justified within models that predict that the trade elasticity should be invariant to the policy change. From an empirical point of view, we would like to have substantially richer evidence on the magnitude of the trade elasticity based on trade policy variation, and most

importantly, on the question of whether the trade elasticity appears to be invariant across time and space, or is dependent on the particular setting. The divergent results regarding Costa Rica and India mentioned earlier, suggest that the latter may be the case.

4. The Effects of Trade Policy on Firms: Productivity, Costs, and Markups

A repeated observation we have made up to this point is that while there is a large literature that has focused on various forms of trade costs other than trade policy barriers, empirical work on trade *policy* is surprisingly scarce. The one exception to this pattern is the literature focusing on firms, specifically relating to how productivity, costs and markups are affected by trade liberalization. This is the one part of the trade literature that has been policy-oriented from the outset.

Because this literature is mature and voluminous, it has been reviewed extensively in previous surveys (Harrison and Rodriguez-Clare (2010), De Loecker and Goldberg (2014), Melitz and Redding (2014)). Therefore, we will abstain from providing another detailed review of existing findings. Instead, we will highlight the main messages from this literature.

The main and robust finding of research in this area is that a reduction of trade policy barriers leads to an unambiguous increase in industry revenue productivity. The evidence on the exact channels through which the productivity improvements are realized is, however, more mixed and depends on the particular setting and trade liberalization episode. In general, the literature has found support for the hypothesis that industry productivity increases through reallocation of market shares towards more productive firms and the hypothesis that within-firm revenue productivity increases in response to trade liberalization. Within-firm revenue improvements can in turn be attributed either to the increase of productive efficiency (i.e., physical productivity) or the increase of markups.

A main challenge for the interpretation of the results of this literature is that until recently, most studies had access to revenue data only, so that a distinction between revenue and physical productivity was not possible. While in both cases firms benefit as a result of trade liberalization, increases in revenue versus physical productivity may have different welfare implications and distributional consequences. It is only recently that the literature has started

taking this distinction seriously by examining separately the effects of trade liberalization on physical productivity, costs, and markups.

Changes in within-firm physical efficiency and costs can be attributed either to the reduction of X-inefficiencies and adoption of better management practices, or to the import of new and higher quality inputs that generate an increase in measured productivity. In addition, declines in the prices of existing imported inputs will show up as a direct cost decrease for importing firms. In general, one would expect reductions of tariffs on imported final products (“output tariffs”) that compete with those offered by domestic firms to affect management and X-inefficiencies through the additional competitive pressure they exert on domestic firms. On the other hand, declines in the tariffs of imported intermediate products that are used as inputs (“input tariffs”) in the production of domestic firms should have a direct cost reduction effect and an indirect effect on measured productivity through the introduction of new imported products (see Halpern, Koren and Szeidl (2015)). A second robust finding of the literature on firm productivity is that input tariffs have large effects on firm productivity, often much larger than the ones found for output tariffs (Amiti and Konings (2007), Khandelwal and Topalova (2011), DLGKPT (2015)).

An additional channel through which trade barrier reductions may contribute to within-firm productivity enhancements is by encouraging investment in new technology and R&D, which will also lead to productivity improvements. This point is exemplified in Bustos (2011) who is among the few who have studied actual trade liberalization episodes. Bustos shows that firms in Argentina increased their innovative activity as a result of Mercosur, though the effects were heterogeneous across firms of different size.

We already referred to some recent results regarding the effects of trade liberalization on markups, when we reviewed the evidence on prices. In addition to DLGKPT (2015), two earlier papers examined the effects of actual trade liberalization episodes on markups, though in these cases without exploiting information on prices: Levinsohn (1993) in his study of the trade reforms of Turkey, and Harrison (1994) in her study of the trade liberalization in the Cote d'Ivoire. Even though the authors did not have firm or product-specific data on prices, they managed to estimate price-cost margins for the pre and post-reform periods by using a method

proposed by Hall (1986). Both studies found that markups decreased as a result of the respective trade liberalization episodes, lending support to the view that trade policy has pro-competitive effects. At first, these results may seem at odds with DLGKP's recent findings on India, which indicate an increase in markups. However, both Levinsohn and Harrison focus on trade liberalizations that affected final goods, and hence their work captures only the pro-competitive effect of tariff reductions. They do not consider the potential cost reduction effect of trade reforms on intermediate inputs which drive – via the incomplete pass-through mechanism – the increase in markups in DLGKP. Ideally, we would like to have more evidence from many different settings in order to assess whether and how trade policy affects firms' market power. Moreover, all studies mentioned above focus on unilateral trade liberalizations. Arkolakis, Costinot, Rodriguez-Clare and Donaldson (2015) point out that in the case of a bilateral trade liberalization the general equilibrium effects on prices and markups would be more complicated as exporters, in addition to importers, adjust their prices. This is an interesting possibility that future work could investigate. Price data are becoming more widely available, and by combining them with information on actual trade liberalization episodes, one can shed light on how actual markups respond to trade policy and examine whether the mechanisms postulated in theoretical papers and counterfactual simulations are indeed borne out in the data.

The message from the existing literature on the effects of trade policy on firm performance (i.e. firm productivity and markups) is very different from the one that is implicit in examinations of aggregate outcomes. Trade policy seems to truly matter here for firm performance and deliver large, economically significant effects.¹¹ It seems clear that firms (especially the initially better performing ones) and industries benefit from trade liberalization. What is less clear is whether this improvement in performance is due to higher efficiency or increased market power. The trade literature to date seems to have operated predominantly under the premise that exposure to more international competition inevitably leads to a containment of firms' market power and benefits consumers. Recent findings on firms' markups post trade policy changes challenge this conventional wisdom.

¹¹Industry-specific studies of trade policy reviewed by Feenstra (1995) also conclude that trade policy matters for firm performance.

One notable exception to the policy-oriented focus of the empirical studies of firms and trade is the literature on multinational firms. Multinational firms account for a large share of international trade transactions and a vast literature in international economics examines the impact of such firms on the structure of international trade, host-country firm performance, and labor markets (see Antras and Yeaple (2014), Harrison and Rodriguez-Clare (2010) for recent surveys).¹² However, very few studies provide a detailed examination of the effects of trade policy on the performance of multinationals and their organization and expansion across space.¹³ An exception is the literature that examines the tariff-jumping argument for foreign direct investment in the context of U.S. anti-dumping duties (see, for example, Blonigen (2002)). The lack of studies is in part data driven: data sets on multinationals rarely include detailed information about their activities in multiple countries. Given the growing interest in understanding the global production chains and improvements in data availability, this remains a promising area for future research.

5. The Effects of Trade Policy on Labor Markets

As is the case with literature on the effects of trade policy on firm performance, the literature on trade and labor markets is extensive and has been reviewed in several previous surveys (Wood (1999), Goldberg and Pavcnik (2007), Harrison, McLaren, and McMillan (2011), Pavcnik (2012), Goldberg (2015)). With a few notable exceptions, studies on trade and labor markets in developed countries focus on the effects of import competition or exporting on labor market outcomes. This is in stark contrast to the literature in developing countries, which has, from the onset, focused on the effects of trade policy. The difference in the emphasis of trade policy in the two settings in part stems from the methodological issues discussed in section 2. In this section, we highlight the main messages from the studies that focus explicitly on the effect of trade policy, with emphasis on the more recent literature.

¹² Harrison and Rodriguez-Clare (2010) also discuss the implications for industrial and trade policy.

¹³ Blonigen and Figlio (1998) and Blanchard and Matschke (2015) show that the presence of multinational firms influences trade policy.

One of the main findings is that the effects of trade policy on labor market outcomes depend on relevant labor market frictions within a country. Because of these frictions, observationally equivalent workers earn different wages, depending on the workers' industry affiliation and local labor market conditions. Correspondingly, the effect of trade policy on workers' earnings and employment vary with industry affiliation and local labor market conditions. However, the importance of the extent of these frictions appears to differ across settings.

The literature on the effects of trade policy on industry employment and earnings in developing countries finds small industry employment responses to trade policy changes, with wage adjustment playing a more important role. However, trade liberalization decreases the industry wage premiums of workers in industries that experienced the largest tariff reductions, relative to workers in industries with lower tariff declines. When wage responses to trade liberalization are more pronounced than quantity (i.e., employment) responses, labor market rigidities are plausible. That said, the evidence so far suggests that changes in industry wage premia induced by trade policy can explain only a small share of the observed increase in wage inequality in developing countries.¹⁴

In contrast, studies of the effect of trade policy in developed countries find larger employment responses than industry wage responses to declines in industry tariff protection (Grossman (1986)).¹⁵ More recently, Trefler (2004) documents contractions in employment in Canadian industries subject to larger declines in tariffs induced by the CUFTA, and notes that earlier studies failed to find adjustments in industry wages. Pierce and Schott (2015) examine the effects of the elimination of trade policy uncertainty vis-à-vis China with the China's WTO entry on the employment in the U.S. manufacturing industries. Instead of examining the direct effect of trade policy on industry employment through lower levels of protection, as

¹⁴For example, while trade liberalization in Colombia lead to large and statistically significant declines on industry wage premia in Colombian apparel, industry wage premia account for less than 5 percent of the variation in worker earnings, so that the effects of trade policy on worker earnings through this channel do not make an economically significant contribution to the observed increase in wage inequality (or skill premium). See Attanasio, Goldberg and Pavcnik (2004) and Goldberg and Pavcnik (2005).

¹⁵A negative cross-sectional relationship between industry tariffs and industry wage premia of U.S. workers in Trefler and Gaston (1994, 1995) are also consistent with this view. Trefler and Gaston (1994, 1995) argue that lower industry wages in industries with higher trade protection might reflect that unions trade off employment security for lower wages.

emphasized in earlier studies, Pierce and Schott (2015) focus on the effects of the elimination of trade policy uncertainty.¹⁶ They measure trade policy uncertainty prior to China's WTO entry with the gap between the non-MFN tariff and the MNF tariff imposed on the Chinese exporters. The results suggest that the U.S. manufacturing industries that experience the largest decline in tariff uncertainty experienced the biggest employment contraction. This interpretation of results is further supported by the lack of corresponding losses in employment in the manufacturing industries in the European Union after China's entry into the WTO. Unlike the United States, the European Union granted China permanent MFN status prior to China joining the WTO, so that China's entry into the WTO did not change trade policy uncertainty vis-à-vis the EU.

Other studies have emphasized the importance of the effects of trade policy on worker earnings that operate through local labor markets and thus location-specific component of wages. The definition of a geographic unit that corresponds to a local labor market is country-specific, depending on the commuting and mobility patterns of workers within and across geographic areas in a country. To the extent that workers are not mobile across local labor markets, trade policy implemented at the national level can have differential effects on worker earnings across these geographic regions. Local labor markets differ in composition of industry employment prior to trade policy reforms: areas that have higher concentration of industries affected by large trade policy changes are more exposed to trade policy reform than others.¹⁷ Consistent with the frictions in labor mobility across these geographic regions, the literature finds no or weak effects of trade policy on regional population or migration patterns in less developed countries (Topalova (2007, 2010), McCaig (2011), Kovak (2013)). Workers mobility is also constrained across geographic areas within developed countries such as the U.S. (Autor et. al. (2013)). However, to our knowledge only McLaren and Hakobyan (2012) have examined the effects of trade policy on local labor markets in a developed country setting.

A second finding of these studies is that the effects of trade policy on worker earnings vary systematically across geographic regions, depending on the region's exposure to a particular trade policy reform, and their magnitudes are also economically significant. The sign

¹⁶Section 7.2 discusses the literature on the effects of trade policy uncertainty more generally.

¹⁷See Kovak (2013) for theory on how to measure exposure of local labor markets to trade policy.

of the effect depends on the nature of trade policy change. Studies that examine the effects of large-scale unilateral tariff liberalizations in developing countries find that relative poverty declined by less in areas that had higher concentration of industries that lost protection as a result of import tariff declines (Topalova (2010), Kovak (2013)). Topalova (2010), for example, ties her results to lower industry and agricultural wages in more affected areas after trade reform, which disproportionately harmed living standards of the poor households. Along the same lines, McLaren and Hakobyan (2012) find declines in location-specific wages of U.S. workers due to tariff reductions implemented as part of NAFTA.

McCaig (2011), on the other hand, focuses on the local labor market effects of a trade liberalization, which mainly lowered import tariffs by a major trade partner on exports from a low-wage country. He focuses on the consequences of the U.S.-Vietnam Bilateral Trade Agreement on Vietnamese households. McCaig finds that declines in U.S. import tariffs on Vietnamese exports led to bigger poverty reductions in provinces in Vietnam that had a higher pre-reform concentration of industries that ultimately experienced larger tariff cuts. Lower poverty rates reflect increased wages of workers in provinces better positioned to gain from the trade agreement, especially the less educated workers.¹⁸

The above studies highlight the importance geographic frictions to mobility of workers in assessing the effects of trade policy on labor market outcomes through the location-specific earnings of workers and increased wage inequality across regions. Trade policy exhibits persistent longer-term effects in this setting as well. For example, by affecting the living standards of families, local labor market effects of trade policy influences household decisions on schooling of children (Edmonds, Topalova, Pavcnik (2009, 2010)). In addition, regional wage gaps that emerge after trade policy reforms appear to widen, rather than decrease, over time, pointing to persistence of frictions in geographic mobility over longer time horizons (Dix-Carneiro and Kovak (2015b)).

Overall, as is the case for the literature on trade policy and firm performance, the message from the literature on the effects of trade policy on labor markets is very different

¹⁸McCaig and Pavcnik (2014) show that the agreement induced reallocation of workers from the informal sector to employers in the formal sector, which was most pronounced in internationally integrated provinces.

from the one that is implicit in examinations of aggregate outcomes. Trade policy seems to matter for worker outcomes, although the magnitude of the contribution of trade policy to changes in aggregate income distribution varies across settings. Another message that emerges from this literature is that labor frictions across geographic regions (and across industries in developing country settings) are important channels through which trade policy plays a role.

The literature is lacking in analysis of how the effects of trade policy on worker outcomes are related and interact with the effect of trade policy on firm performance. With a few exceptions (Amiti and Davis (2012), Pierce and Schott (2015), Meneses-Filho and Muendler (2011), Dix-Carneiro and Kovak (2015b)), the studies of labor market adjustment to actual external policy and shocks at the firm level are confined to exchange rate shocks (Verhoogen (2008) and Brambilla, Lederman, and Porto (2012)).¹⁹ The increased availability of detailed employee-employer data in developed and developing countries, which can be linked to data on a firms' domestic activities and a firms' exposure to trade through exporting and importing, provides a fruitful setting to continue to explore the channels through which trade policy affects labor market outcomes.

6. The Effects of Trade Policy on Aggregate Growth and Poverty

Much of the literature on the effects of trade policy on the outcomes discussed in sections 3 and 4 focuses on its short-run and static effects. The distinction between short- and long-run effects is not unique to trade policy. But in the case of trade policy, there are good reasons to believe that the long-run effects are orders of magnitude larger than the short-run effects. While the latter can be potentially identified through careful empirical work, the long-run effects are substantially harder to pin down empirically. As a result, arguments about dynamic long-run effects are often made based solely on principles and theoretical models,

¹⁹For example, Pierce and Schott (2015) suggest that the reduced trade policy uncertainty lead to employment losses in the U.S. manufacturing through several channels. These include increased sourcing of inputs by U.S. firms from China, expansion of Chinese export to the U.S. (which includes foreign owned firms located China), the shift in structure within U.S. industries away from labor-intensive plants, increased capital-deepening among the surviving U.S. plants, and increased offshoring by U.S. firms.

with little formal empirical support. In this section, we consider the (scant) evidence on long-run effects of trade policy on aggregate growth and poverty.

The relationship between a country's trade policy and aggregate economic growth is of key policy interest, and the empirical literature on the topic is one of the oldest areas of empirical inquiry in international economics. Although many economists believe, based on economic theory, that reductions in trade barriers promote economic growth, robust evidence on this relationship at the aggregate level has been elusive. Rodriguez and Rodrik (2001) and Hanson and Harrison (1999) review the issues that affect the estimation of the effect of trade policy on aggregate growth and conclude that the estimates of the effect are not robust. Most of the literature on the topic has examined the relationship between trade policy and growth in a cross section of countries. The issues that influence the inference include weak links between the empirical work to the underlying predictions from the theoretical literature, selective samples of countries with available data, measurement of trade policy at the aggregate level, consistency of measurement of key variables across countries and time, and endogeneity of trade liberalizations. To the extent that there is a positive relationship between trade policy and economic growth, it is not clear whether trade policy leads or lags. Does trade policy lead to higher economic growth or do countries at a certain level of development choose to implement more liberalized trade policy? Alternatively, do countries with less restrictive trade policy in general have economic institutions in these economies that are associated with higher growth?

While the robustness of findings in this area of research continues to be debated, researchers have recently used micro-level data on trade policy from trade liberalizations during the 1980s and 1990s and empirical frameworks guided by economic theory to make progress on the effects of trade policy on aggregate growth. Estevadeordal and Taylor (2013) find that countries that liberalized trade policy during the 1980s and 1990s (in part driven by the Uruguay round of the WTO negotiations) observed higher growth rates in GDP per capita over this period relative to countries that did not liberalize. According to a version of Solow model they develop, decline in import tariffs on capital goods increases incentives for firms to invest, which in turn increases steady state growth. Lower tariffs on intermediate inputs increase productivity, and subsequently steady state growth. Further analysis, which

distinguishes between liberalized trade in production inputs and final consumption goods, finds that the positive relationship between trade liberalization and economic growth is driven by declines in tariffs on intermediate inputs and capital goods. Consistent with these channels, they show that countries that lowered tariffs on intermediate inputs and capital goods observed increased imports of intermediate and capital goods. On the other hand, there is no relationship between lower tariffs on consumer goods and economic growth. These findings provide country-level support for the effects of liberalized trade on improved efficiency of production through imported inputs and technology, channels that have been emphasized in studies of firm performance (Amiti and Konings (2007), Topalova and Khandelwal (2011), Goldberg, Khandelwal, Pavcnik, and Topalova (2009, 2010)).

The effects of trade policy (via economic growth) on poverty are even more difficult to quantify empirically than the relationship between trade policy and growth. In addition to establishing that trade policy affects growth, one needs to determine both whether and how trade policy-induced growth affects the poor. This is a challenging task to accomplish with aggregate data. Lack of availability of household survey data with information on consumption and income from many low-income countries affects measurement of poverty and average incomes of the poor (Deaton (2005), Ravallion (2001)). In the absence of reliable survey data, average incomes of the poor, which are often measured by the average income of the households in the bottom fifth of income distribution, are imputed from very noisy measures of income distribution within a country. With noisy measures of income inequality, this imputation makes it likely that measures of income of the poor simply follow changes in average incomes (Banerjee, Deaton, Lustig, Rogoff, and Hsu (2006)). This biases the results in favor of pro-poor effects of growth.²⁰ In recent years, household surveys are increasingly available and the World Bank Research Department has made substantial progress on measurement of poverty across time and space. Nonetheless, the poverty measures do not span periods of trade liberalization for a large share of countries, so the relationship between trade policy and poverty across countries remains empirically elusive.

²⁰ Banerjee, Deaton, Lustig, Rogoff, and Hsu (2006) discuss how measurement of average incomes of the poor affected several key policy debates within the World Bank, including the relationship between trade policy and poverty.

In summary, the literature on the effects of trade policy on aggregate growth does not provide much robust evidence that trade policy affects growth. This is a very different conclusion from the message in the studies of the effects of trade on firm performance. This leaves one wondering whether the lack of robust aggregate evidence in part reflects the methodological challenges highlighted in section 2, which are amplified in aggregate studies. Recent work by Estevadeordal and Taylor (2013) makes headway on overcoming some of these issues, while focusing on one particular channel of the link between trade policy and growth. Its findings are consistent with the evidence from firm-level studies that emphasize the role of trade policy in promoting efficiency and innovation through access to imported inputs and capital goods in less developed countries. However, more work is needed in this area.

7. The Effects of Trade Policy: Secondary Distortions, Misallocation, the Role of Policy Uncertainty, Dynamics

7.1 Effects of Secondary Distortions and Misallocation

Most studies evaluate the effects of trade policy under the assumption that the resources are optimally allocated given the level of trade policy and market structure, without considering the role of secondary distortions. If resources are misallocated, the effects of trade policy that operate through secondary distortions might be just as important as the primary effects. In an early study, Leibenstein (1966) argues that welfare gains from trade through reduction of secondary distortions might be an order of magnitude more important than the welfare gains from primary effects of trade on allocative efficiency that are emphasized in traditional trade models.²¹

With a few exceptions, secondary distortions have not received much attention in the studies of the effects of trade policy.²² An important exception is the literature on the rent-seeking activities associated with import quotas (Krueger (1974)). More recently, Khandelwal, Schott, and Wei (2013) argue that distortions in institutions that manage trade policy impose

²¹Leibenstein (1966) focuses on X-inefficiencies and managerial performance within a firm.

²² Krueger (1984) provides an early discussion of this issue.

welfare costs of trade restrictions in addition to those emphasized in standard trade models and rent-seeking literature. If the institutions that allocate trading rights award them to politically connected rather than the most productive firms, the misallocation of trading rights generates productivity losses in addition to the productivity losses due to the actual trade restriction.

Khandelwal, Schott, and Wei (2013) examine distortions in trade institutions in China in the context of the elimination of the Multi Fibre Agreement in 2005. If the Chinese government would allocate quota licenses efficiently across firms through a competitive auction, these licenses would be allocated to the most productive firms because they are sufficiently profitable to pay the per-unit license fee.²³ Under this scenario, the theory predicts that the removal of quotas would expand exports of the most productive incumbent exporters and encourage export market entry of less productive firms. In addition, the prices of products exported by the most efficient incumbents would be expected to fall, while new entrants into exporting would be expected to increase the prices of exported goods. These predictions are not borne out in the data. After the quotas are eliminated, firms that newly enter the export markets, rather than the incumbent exporters, account for most of the expansion of export volumes and decline in export prices. This implies that quota licenses were misallocated. The new entrants are mostly comprised of foreign-owned firms and domestic privately-owned firms, both of which tend to be more productive than the incumbent state-owned enterprises. In this study, liberalized trade policy generates bigger productivity gains through the elimination of secondary distortions than the primary ones. The elimination of the MFA leads to a 21% increase in revenue productivity, with counterfactual analysis attributing two thirds of the productivity gains to the elimination of misallocated quota licenses.

Overall, Khandelwal, Schott, and Wei (2013) illustrate that the effect of trade policy is potentially substantially underestimated if one does not consider the effects of trade policy on secondary distortions. The relative magnitude of the effects of trade policy through primary versus secondary effects is consistent with the predictions made previously by Leibenstein

²³See KSW (2013) for detailed discussion of the underlying model of quota license allocation across heterogeneous firms, where quotas licenses are auctioned in a competitive process for a per-unit license fee.

(1966). An interesting question for future work is whether the relatively greater magnitudes of the effects of trade policy through secondary distortions hold more generally.

Another setting where trade policy could have effects through secondary distortions is the allocation of resources between informal and formal sector in low-income countries. One unique feature of firm distribution in low-income countries is prevalence of small, unproductive, informal firms, which account for a large portion of aggregate employment, and scarcity of productive establishments (see Hsieh and Olken (2014), La Porta and Shleifer (2014)). To the extent that secondary distortions generate a wedge in the marginal productivity of workers between the informal and formal sector, the reallocation of workers from household businesses to firms in the enterprise sector could be associated with improved aggregate labor productivity. McCaig and Pavcnik (2014) show that reductions in trade barriers to exporting—a product market distortion that disproportionately lowers the profitability of more productive establishments leads to reallocation of workers from informal to formal sector. The estimated effects of the associated aggregate productivity gains due to elimination of the wedge in marginal productivity of workers between the two sectors depends on the size of the marginal productivity wedge.

The focus on the effects of trade policy through the secondary distortions might be a fruitful area of future research given that the distortions due to misallocation of resources appear to matter in other settings. Recent literature has emphasized that misallocation of resources across firms has large implications for aggregate income differences across countries (Banerjee and Duflo (2005), Restuccia and Rogerson (2008), Hsieh and Klenow (2009)). Hsieh and Klenow (2009) show that the elimination of such distortions would raise the aggregate productivity in China and India by 30 to 60%. In addition, distortions in sectors that are key inputs in the production process of other sectors have multiplier-like effects, amplifying aggregate income differences across countries (Jones (2011, 2013)). Surprisingly, most of this literature has not linked the degree of misallocation (as measured by dispersion in revenue TFP) to a particular policy. Taking the Hsieh and Klenow (2009) framework as a starting point, it would be natural for the future work to examine whether trade reforms affect misallocation as measured by the metric in their framework, namely the dispersion in revenue TFP.

7.2 The Role of Trade Policy Uncertainty

The literature usually examines the effects of trade policy that operate through changes in the levels of trade barriers rather than through changes in the uncertainty regarding future policies. Trade agreements can reduce the uncertainty about trade policy by more permanently committing countries to a specific trade policy regime. To the extent that uncertainty about trade policy affects firms' decisions on investment, reduced uncertainty about trade policy could have large effects on trade flows and other outcomes. Handley (2014) and Handley and Limao (2015) formally model this channel in a framework that incorporates the effect of trade policy uncertainty on a firm's exporting and technology upgrading decisions. Their framework further suggests that trade policy uncertainty provides an explanation as to why trade agreements that yield relatively small changes in trade policy levels, but large declines in uncertainty, could have large effects on trade flows and other outcomes. Consider trade liberalizations such as NAFTA, CUFTA, and China's entry into the WTO with respect to the U.S. import tariffs on Chinese exports. These liberalization episodes are all characterized by small changes in tariff levels. Even though the actual tariff changes were small, these trade agreements might have eliminated uncertainty about trade policy, and could potentially have large effects through this channel. This is especially the case for China's entry into the WTO given that the loss of China's MFN status in the U.S. would increase an average tariff facing Chinese export to the U.S. from 4 to 31% and that Chinese MFN status has to be renewed by the U.S. Congress on an annual basis (Handley and Limao (2014)).²⁴

The empirical literature on the effects of trade policy has largely abstracted from estimating the effects of trade policy uncertainty. One issue facing the literature is measurement of trade policy uncertainty. Handley and Limao (2015) argue that, relative to other sources of uncertainty, measurement of trade policy uncertainty is in many situations aided by observed information about the applied trade policy and the maximum allowed level of trade policy. To this end, all studies measure trade policy uncertainty as a function of the gap

²⁴Handely and Limao (2014) and Pierce and Schott (2015) document several anecdotes on the importance of uncertainty about U.S.-China trade policy in this context.

between the largest possible import tariff and the applied tariff facing a product (or an industry). A product (or an industry) faces less uncertainty when this gap is reduced.

Recent studies suggest that this channel plays an important role. One set of studies examines the effect of trade policy uncertainty on trade volumes and export market participation (Handley (2014), Handley and Limao (2015)). Handley (2014) examines the effects of trade policy uncertainty that occurs through the imposition of tariff bounds on applied tariffs within the WTO for the case of Australia. The study finds that the reduction in tariff bounds is associated with increased entry of products from new import destinations to Australia. This effect occurs even though the Australian tariff bounds exceed the applied tariffs, highlighting the role of trade policy uncertainty (as opposed to changes in applied tariffs). Handley and Limao (2015) find that the reductions in trade policy uncertainty, associated with Portugal's entry into the European Community, increased export participation of Portuguese firms in the European Community. Handley and Limao (2014) examine the effects of China's entry into the WTO, which eliminated the uncertainty about China's tariff levels vis-à-vis the U.S. on China's exports to the US. Elimination of trade policy uncertainty is associated with increased export volumes of Chinese products to the United States. Furthermore, higher export volumes are driven by increased exports among the incumbent products rather than by the new entry, as emphasized in the Handley studies.

Pierce and Schott (2015) examine the effects of the elimination of trade policy uncertainty vis-à-vis China on the employment in the U.S. manufacturing industries. They measure trade policy uncertainty prior to China's WTO entry with the gap between the non-MFN tariff and the MFN tariff imposed on the Chinese exporters. The study finds that the U.S. manufacturing industries that experience the largest decline in tariff uncertainty experienced the biggest employment contraction. This trade-policy uncertainty-based interpretation of results is further supported by the lack of corresponding losses in employment in the manufacturing industries in the European Union after China's entry into the WTO. Unlike the United States, the European Union granted China permanent MFN status prior to China joining the WTO, so that China's entry into the WTO did not change trade policy uncertainty vis-à-vis the EU.

Overall, these studies suggest that the effects of trade policy uncertainty matter. However, the size of the effects will likely vary, depending on the setting. A related issue is identifying the settings in which the effects of trade policy uncertainty are most relevant. The concern about the trade policy uncertainty likely depends on the identity of the trading partners. To this end, most of the work has been done on the effects of uncertainty in trade policy between China and the U.S. This is not surprising given that the uncertainty surrounding a trade war between two large trading partners such as the U.S. and China (or the U.S. and the European Community) would exert a large influence. The uncertainty about trade policy might also be important from the perspective of a small country vis-à-vis a large trading partner (as shown in Handley and Limao (2015)). Interestingly, to date, there is no study that examines the effects of the uncertainty trade policy uncertainty in the context of small, less-developed economy vis-à-vis large trading partners. The case study below provides an informative illustration that uncertainty about trade policy, coupled with weak institutions that link producers to exporters, could play an important role.

In less developed countries, small-holder farmers often do not produce cash crops for export markets even though these appear more profitable than the crops produced for local or personal consumption. Uncertainty about conditions on the export markets, including trade policy and associated regulations, could play a role. A randomized control trial by Ashraf, Karlan, and Gine (2009) examined the effects of a marketing scheme that provided some Kenyan farmers with the incentives to switch to cash crops for export markets in the European Community. These incentives were administered by a local organization, which facilitated interactions between small-scale farmers and exporters. The study finds that the incentives initially increased production of cash crops by farmers in the treatment group relative to the control group, but over the longer time frame the farmers abandoned cash crop production. After the implementation of the field experiment, the European Community increased sanitary and health standards on food imports by the European Community in 2005 (the EurepGap). Ashraf, Karlan and Gine (2009) argue that the drop in cash crop production was related to the change in this policy. Because small-holder farmers did not become certified for exporting as

required by the EurepGap, the Kenyan exporters stopped purchasing the crops from small-holder farmers, inducing the farmers to abandon the cash crops.

The case study illustrates that the uncertainty about the regulatory regime, coupled with the inability of the local organization to foresee and adequately prepare small-scale producers to the changing regulatory environment, can lead to the collapse in cash crop production. Low participation in cash crops for export markets observed in low-income countries might reflect such considerations. In future work, it would be interesting to examine the role of trade policy and regulation uncertainty, coupled with lack of institutions to effectively deal with uncertainty, in explaining low participation in export markets in low-income settings.

Overall, the existing studies suggest that the magnitudes of the effects of trade policy uncertainty are potentially large. Because the studies so far have focused on situations where one would ex-ante expect the effect of trade policy uncertainty to potentially matter the most (for example the U.S.-China trade) further research is needed to determine the role of trade policy uncertainty in other contexts. Trade liberalization episodes and trade agreements implemented at the regional and multilateral levels provide rich settings for further investigation of this topic.

8. Concluding Thoughts

We started this chapter by posing the question: Does trade policy still matter? The view that it does not seems surprising given the evidence we reviewed. Even when one focuses on import tariffs, which have been reduced to historically low levels in developed countries post World War II, the evidence suggests large, nonlinear effects of tariff liberalization on trade volumes – in fact such effects are so large that they were initially deemed implausible. However, as we discussed, both their magnitudes and time patterns can be rationalized by the interaction of tariff liberalization with increasing vertical specialization that created a magnification effect. Accordingly, the conclusion is not that tariffs do not matter: they do matter but only in interaction with technology, specifically increasing vertical specialization. A perhaps more difficult question to answer is whether trade volumes is the relevant outcome

one should focus on when debating the relevance of trade policy. A more appropriate metric would be welfare. But assessing the impact of trade policy on the welfare gains from trade presumes knowledge of the “elasticity of trade.” Surprisingly, while estimates of this elasticity abound in the literature, estimates based on variation in *trade policy* are rare, and the ones that exist point to substantial heterogeneity across sectors. Obtaining credible elasticity estimates that can be directly linked to policy is a fruitful area of future research and a prerequisite for assessing the relevance of policy to welfare.

The evidence on the relevance of trade policy is even stronger for outcomes that concern specific parts of the economy rather than aggregate outcomes. This is especially the case when assessing the impact of trade policy on firm and industry productivity where the literature has consistently documented large effects of trade reforms on revenue productivity. Increased availability of data on product prices has revived the debate on whether trade policy affects firm performance through its effects on markups or through its effects on cost/productivity. The strength of the evidence is partly due to the fact that the focus on specific firms and industries allows the researcher to more accurately measure the actual trade barriers, assess their impact through particular channels, and take into account the specific institutional setting. The recent literature on the effects of trade policy on labor markets also finds statistically significant (and at times economically large) effects of trade policy on the wage distribution, albeit the magnitude of the effects depends on the particular setting.

In general, proper measurement and identification of causal impacts are first-order issues in the evaluation of trade policy. The recent literature has made progress on both issues. Empirical studies of the actual effects of trade policy increasingly focus on the nature of the policy changes and the institutional settings in which trade policy takes place. This new focus, combined with the increased availability of detailed micro-data on trade flows, firms, and workers, has enabled researchers to identify several mechanisms through which trade policy affects outcomes of interest and assess the economic significance of these effects. The empirical evidence has in turn influenced the development of richer theoretical models that embed features that have been shown to be important empirically (e.g., labor market frictions,

firm heterogeneity, and incomplete pass-through). Such models can be used to yield a more informative counterfactual evaluation of future trade policy changes.

Nonetheless, several open questions pertaining to measurement remain. Most of the existing work still focuses on trade policy as measured by import tariffs. In order to answer the question of whether the world is as liberalized as the profession believes, and to more accurately evaluate the effects of trade policy, we need better and more comprehensive measures of trade policy instruments beyond import tariffs. Some of these measures are (or could be) systematically collected by international organizations. Recent data-collection efforts by the World Bank and measurement of Temporary Trade Barriers are a productive step forward and draw on the Bank's institutional capacity to implement such large-scale measurement projects. In some cases, especially for non-price based barriers, the focus on the effects of non-tariff barriers to trade requires a move away from assessing the effects of trade policy at the economy-wide level and towards industry-specific studies. The later approach ensures that the impact of non-tariff barriers is assessed in the context of an industry's market structure (and industry-specific demand and supply conditions) to appropriately capture the institutional details, restrictiveness, and consequences of these regulations.

While better measurement of trade policy should be the number one priority of future research, the measurement of trade volumes can also be improved. The increasing importance of vertical specialization suggests that it would be more appropriate to measure trade flows in valued-added rather than gross terms. In general, the main message of our chapter is that for international trade to remain a policy-relevant field, it needs to focus on better measurement. If the main message of the Leamer and Levinsohn (1995) chapter in the 1995 Handbook of International Economics Chapter was "Estimate, don't test!", our message twenty years later is: "Measure before you estimate!"

Our survey also identifies several promising new areas for future work. These focus on the more "dynamic" aspects of trade policy. They include the role of price adjustments to trade policy changes, the impact of trade policy on the performance and organization of multinational firms, the effects of trade policy through reductions in secondary distortions/misallocation, and the effects of trade policy through a decline of uncertainty.

Initial studies on these topics suggest that the effects of trade policy through these channels might play an important role and thus warrant further examination.

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