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## Protectionism versus risk in screening for invasive species



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### ABSTRACT

I examine the extent to which enforcement of a biosecurity import restriction – US border inspections for foreign pests and diseases – is used as a protectionist trade barrier. The parameters of a structural model of border inspection are estimated using a detailed dataset documenting the outcome of US agricultural border inspections. I find that inspections are conducted in a manner that places an implied welfare weight on domestic producers (relative to consumers) ranging from 1 to 1.63. I also find evidence that the inspection agency takes terms of trade into account when inspecting agricultural imports. These results suggest that border inspections are used as a protectionist non-tariff barrier.

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### 1. Introduction

New introductions of foreign pests and diseases reduce agricultural productivity, compromise human health, and threaten the viability of ecosystems [37]. The predominant pathway of new plant pest and disease introductions is international trade in agricultural commodities [29,27,31] and the use of biosecurity restrictions on agricultural imports – typically enforced by screening imports at border crossings and ports of entry – has a long history.<sup>1</sup> These measures are often contentious issues in international trade and the recent emergence of a number of high profile biosecurity threats has increased scrutiny of import standards and their enforcement [38]. Uncertain damages and lack of transparency in enforcement contribute to the perception that biosecurity import restrictions are used as protectionist tools. Recognizing the potential for misuse of enforcement mechanisms, international trade agreements prohibit the use of border inspections as arbitrary or unjustified barriers to trade [34].

Despite widespread suspicions that biosecurity import restrictions are used as protectionist tools, cleanly identifying protectionism is difficult and there has been little empirical work on this topic. Identifying protectionist use of an import restriction requires an assessment of expected damages and risk preferences—factors that can vary across countries and government agencies within countries. Heterogeneous standards and incomplete data make quantifying the restrictiveness of import standards difficult [4]. Empirical analysis is further complicated by the fact that enforcement of import restrictions is often imperfect and unobserved.

The analysis in this paper addresses these issues, focusing on enforcement of a single import standard applied to individual imported commodities by a single government agency. In particular, I examine the extent to which US agricultural border inspections for foreign crop pests and diseases are used as a protectionist barrier to trade. I focus on

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<sup>1</sup> Germany was the first to introduce significant pest legislation in 1875 in response to introduction of the Colorado potato beetle. England followed in 1877 with passage of the Destructive Insects Act. In the US, the first state quarantine and destruction program was introduced in Massachusetts in 1859 in response to imports of Dutch cattle infected with pleuropneumonia. The first Federal quarantine was implemented in 1879 when US customs collectors imposed a ninety day quarantine on imports of European cattle [21].

inspection of individual commodities by a single government agency, thereby avoiding the need to explicitly control for risk preferences and expected damages. Further, in contrast to previous work, I investigate protectionist *enforcement* of a biosecurity import restriction.

I begin with a theoretical model of the optimal intensity of border inspections conducted by a government inspection agency with a mandate to prevent or to slow new invasive species introductions. In addition to genuine risk reduction, the government agency may also use border inspection as a protectionist tool, both to protect domestic producers from import competition and to manipulate terms of trade. A structural econometric model is derived directly from the theory. The model controls for terms of trade motives and identifies the implicit welfare weight the inspection agency assigns to domestic producers. Expected damages, as implied by the actions of the inspection agency, are also identified. Estimates of protectionism are therefore identified conditional on expected damages.

The empirical analysis focuses on imported vegetables primarily sourced from Mexico. Import competition from Mexico has been contentious in the past and a number of non-tariff barriers, including border inspection, slow the flow of vegetable imports into the US from Mexico [1]. The parameters of the structural econometric model are estimated using a detailed dataset documenting the outcome of US agricultural border inspections for foreign pests and diseases. I find evidence that US border inspection of vegetable imports is implemented in a protectionist manner, both to manipulate terms of trade and to protect domestic producers from import competition. The results suggest that the extent of protectionism varies according to commodity and can be quite large; estimates of the implicit welfare weights on domestic producers (relative to consumers) range from 1 to 1.63, corresponding to a premium on domestic producer welfare as high as 63 percent. I also find that the inspection agency behaves as if expected damage due to new pest and disease introductions ranges from \$0 to more than \$0.07 per dollar of inspected imports.

This paper contributes to three literatures. First, the empirical trade literature has shown that US non-tariff barriers are influenced by motives to protect import-competing domestic production sectors (notable examples in the US manufacturing sector include [16] and [15]). Building on this empirical literature, Broda et al. [6] relax the small country assumption and present evidence that terms of trade, in addition to protection of domestic producers, increases the stringency of US non-tariff barriers. This paper examines the role of protectionism in enforcement of a specific non-tariff barrier. This focus permits a tight link between the theory and the empirical model, which allows me to identify the implied welfare weight the government agency places on domestic producers while controlling for the influence of terms of trade.

Second, this paper contributes to the literature on trade and the environment. There is an extensive theoretical literature demonstrating that environmental policy can substitute for more direct import controls as protectionist tools, yet there is little supporting empirical evidence ([8] survey the existing literature). Recent empirical work presents evidence that constraints on tariffs increase the use of non-tariff barriers as substitute forms of protection [22]. This paper is the first, to my knowledge, to provide empirical evidence that an environmental import restriction is used in place of import tariffs as a protectionist barrier to trade.

Third, a related literature examines border enforcement to combat illegal immigration (see Hanson [18] for a survey). Like border inspections for invasive pests, border enforcement for illegal immigration can be changed over short time intervals and border enforcement personnel have discretion over the intensity of border enforcement activities. Hanson and Spilimbergo [19] examine the political economy of border enforcement combating illegal immigration along the US–Mexico border. Using monthly data, they find that the intensity of border enforcement falls when demand for undocumented labor from the apparel, the fruit and vegetable, and livestock industries is high. Hanson and Spilimbergo [19] use high frequency border enforcement data to account for seasonal variation in the political economy factors associated with perishable products, such as fruits and vegetables that are intensive users of manual labor. Explicit evidence of political influence on border inspection personnel is not available. As in Hanson and Spilimbergo [19] the analysis in this paper is indirect, and provides evidence suggesting border inspections are influenced by political economy motives.

The paper is organized as follows. In Section 2, I provide a brief institutional background of the US agricultural border inspection program. A model of border inspection of contaminated imports is presented in Section 3. The framework for the empirical analysis, including a description of the data and specification of the structural model, is described in Section 4. I present results of the empirical analysis in Section 5 and concluding remarks are provided in the final section.

## 2. Background

Border inspection of agricultural imports into the US was initiated in 1881 in California and the first recorded interception occurred in 1891 on a shipment of orange trees from Tahiti [21]. Federally, the United States Department of Agriculture (USDA) began inspecting imported agricultural commodities – primarily nursery stock – in 1913 under the authority of the 1912 Plant Quarantine Act [13]. The Animal and Plant Health Inspection Service (APHIS), a division of the USDA, was established in the 1970s and maintained responsibility for various plant and animal health inspection services through to 2002. The Homeland Security Act of 2002 transferred inspection responsibility to the newly formed Customs and Border Protection (CBP), a division of the Department of Homeland Security (DHS).

Although CBP is currently responsible for physical inspection of agricultural imports, APHIS retained responsibility for setting inspection protocols, training inspection staff, and conducting risk assessment. APHIS has the authority to regulate US fruit and vegetable imports under Quarantine 56 (Title 7 Code of Federal Regulations §319.56) and the Plant Protection Act.

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