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The impacts of the Lacey Act Amendment of 2008 on U.S. hardwood lumber and hardwood plywood imports

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ABSTRACT

The Lacey Act of 1900 was amended on May 22, 2008, to prohibit the import of illegally sourced plant materials and products manufactured from them into the United States and its territories, and to similarly ban their interstate transport. Trade theory suggests that the effect of the new law would be to reduce the flow of illegally sourced fiber into the United States, increasing prices. Monthly U.S. import data on tropical lumber (January 1989–June 2013) and hardwood plywood (January 1996–June 2013) quantity and unit value were used to estimate alternative statistical models that quantify the impact of the 2008 Lacey Act Amendment on import prices and import quantities of products from potential source countries. Results show that the Amendment's quantity effects are generally negative and double in magnitude in percentage terms than the price effects, consistent with expectations of the effects of a backwards shift in foreign supply against an elastic import demand. Models indicate that there have been double-digit percentage increases in prices and decreases in quantities of tropical lumber imports from Bolivia, Brazil, Indonesia, Malaysia, and Peru. Similarly large changes in hardwood plywood import prices and quantities from Brazil, Indonesia, and Malaysia have occurred, while smaller, and in some cases statistically insignificant, changes have been observed for hardwood plywood imports from China, Ecuador, and Taiwan.

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1. Introduction

The Lacey Act is a U.S. wildlife protection and anti-trafficking statute that makes it a crime to import onto U.S. territory or to transport across any state line within the U.S. or its territories any plant or animal species or derivative product made with such plants or animals that were obtained illegally. The original Lacey Act of 1900 was focused especially on the trafficking of illegally acquired wildlife, while later amendments expanded its concern to include plants. The Lacey Act Amendment of May 22, 2008[1] includes for the first time any tree species illegally obtained in the country of origin. Any product containing illegally obtained tree material (e.g., wood, paper, pulp) is now banned for import and interstate trade. Importers must also, as of December 15, 2008, file Plant and Plant Product Declaration form 505 that lists any and all tree species being imported. Although the date when this form was required upon importation varied from product to product, the Amendment stipulates that importers must adhere to the requirements regarding legal sourcing immediately.

The Lacey Act Amendment of 2008 (LAA) was enacted most proximately as a way of reducing aggregate demand for illegally obtained timber products globally. Although the United States consumes a relatively small share of wood exported by countries suspected of having high rates of illegal logging (Seneca Creek Associates, 2004; Li et al., 2008), having such material entering global markets serves to depress world wood product prices, indirectly and negatively affecting U.S. producers. Moreover, with the LAA's "due care" requirement, the U.S. has sought to set an example of what importing countries could do to help discourage illegal logging, with the hope of leading others to carry out similar policies and programs. Indeed, in 2010, the European Union enacted EU Regulation No 995/2010 (EU Timber Regulation or EUTR), which similarly bans the import of illegally sourced fiber and requires importers of such products into EU member countries to carry out "due diligence" in the tracking of imported timber products.

Measures such as the LAA and EUTR are part of a larger set of policies and programs designed to discourage illegal fiber production worldwide. The U.S., for example, operates bilateral technical assistance programs that work with the forest sector in many suspected source countries. Sometimes these efforts are coupled with free trade arrangements—for example, the U.S. Peru Trade Promotion Agreement of 2006 (Office of the United States Trade Representative, 2007). The European Union has similarly targeted programs of institution building, including the centerpiece Forest Law Enforcement, Governance and Trade (FLEGT) program. Several other countries also work actively on a bilateral basis to address illegal fiber sourcing through trade measures and institution building, as well. The Asia-Pacific Economic Cooperation economic forum established in 2011 an Expert Group on Illegal Logging and Associated Trade to seek out potential solutions.

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[1] The Lacey Act was amended in the Food, Conservation, and Energy Act of 2008 (P.L. 110–234, 122 Stat. 923).

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For the U.S., the EU, and other countries enacting or considering similar trade measures focused on imports, a key question is whether laws such as the LAA will effectively reduce imports of illegally sourced wood. There is no way to directly measure the flow of illegal fiber into the U.S. or any other country, because governmental officials are so far unable to physically detect an illegal product using available tools. Policy makers and those interested in the question of illegal fiber sourcing instead use indirect ways of identifying the effects of trade measures or other forms of intervention. For example, Lawson and McFaul (2010) sought to obtain evidence on the effects of the LAA and FLEGT and other bilateral and multilateral efforts by surveying government officials, non-governmental organizations, and firms, in addition to evaluating recent trade and production data from destination and potential source countries. They found that, since the early- to mid-2000s, exports of illegally sourced wood fiber had declined, timber product prices had risen, rates of illegal logging had dropped, and certification of forestry operations in the countries that they analyzed had significantly expanded.

Since the Lawson and McFaul (2010) study was carried out, however, additional international trade data have accumulated that might bolster the evidence on the effects of the LAA as a trade measure: has it affected prices and quantities of imports into the U.S. of products deriving from countries suspected of having substantial illegal production (or whose exports may contain illegal content)? Aside from its indirect link to on-the-ground activities in suspected source countries, one challenge facing analysts of trade and production data is that the implementation of the LAA nearly coincided with a weakened building sector in the U.S. (although housing starts in the U.S. had increased by about 70% by June of 2013 from their 2009 lows (U.S. Department of Commerce, Bureau of the Census, 2014)) and with the global recession of 2007–2009 (although the U.S. economy was larger by 4% in real terms by mid-2013 than its pre-recession peak in late 2007 (U.S. Department of Commerce, Bureau of the Economic Analysis, 2014)). However, this near-coincidence is not an insurmountable barrier to the detection of the trade effects of the LAA. Methods are available that can strip away such influences, attempt to isolate other factors, and allow for the law's detection in the trade data. Given long enough time series following the LAA enactment (e.g., to 2013) and appropriate statistical models, even the effects of these potentially confounding factors can be largely controlled for.

The objective of this study is to detect the effects of the LAA on the quantities and prices of products imported into the U.S. from suspected source countries. To do this, we estimate two classes of statistical intervention models. These include simple single variable models—i.e., univariate or multivariate autoregressive models of individual time series of prices and quantities. These models quantify the effect of the LAA by measuring how the autoregressive structure of price[2] and quantity time series may have shifted at the same time that the LAA was implemented. Somewhat more complex are those involving the estimation of cointegrating relations of two or more variables. These models identify the effect of the LAA by quantifying any shift in these cointegrating relations that corresponds with the implementation of the LAA. Another, even more complex, class of intervention models could also be estimated—one based on the full structural relation of supply and demand. However, the data demands of such models are great, requiring data often not available in the same frequency as the most frequently reported import data or not available for particular variables needed for full specification.

One contribution of this research is to document that both intervention modeling approaches used in this study can be used to quantify the effect of the LAA and that the effects that they quantify are similar for those cases where they can be employed and compared. Another contribution is that we quantify the impacts of the LAA on U.S. imports of these products from a variety of countries suspected of providing illegal fiber to world markets, including to the U.S. This impact assessment provides a benchmark for policy makers interested in understanding the effects of this new trade measure, perhaps informing expectations about the effects of similarly proposed measures that could be enacted by other countries on their imports.

2. Methods

2.1. Univariate intervention models

Intervention analytical methods are common tools in assessing the magnitude and, with time series data, the temporal dynamics of shocks to data generating processes. In the forestry sector, intervention analysis (Enders, 1995) has been employed to quantify the effects of policies (e.g., Prestemon, 2009) and biophysical shocks (Holmes, 1991; Prestemon and Holmes, 2000, 2004). Consider a univariate stationary time series data generation process of an economic variable, P_t, which evolves as:

$$\begin{aligned} P_t &= \alpha_0 + \sum_{j=1}^{J} \alpha_{1,j} P_{t-j} + \eta_t, \\ \eta_t &= \lambda S_t + \varepsilon_t \end{aligned} \tag{1}$$

where t indexes time; α_0 is a constant; J is the order of autoregression of the stationary process; ε_t is a zero-centered random error process; η_t is a "noise" process containing a shock (S_t); and λ, the parameter of particular interest, quantifies the effect of the shock on the data generation process. With time series information on the level of P_t and on the timing and magnitude of S_t throughout periods $t = 1,\ldots,T$, a statistical model can be estimated that quantifies the parameters in Eq. (1). The shock in statistical models is often specified as a dummy variable, equal to zero before it occurs and 1 at the time of its occurrence (but it does not need to be so restricted). To powerfully identify the parameters of Eq. (1), a "long" time series is needed that has sufficient observations before and after the shock occurs. The larger the variance of ε_t, and σ_ε^2, the longer time series of P_t needed to identify λ.

Often, P_t is nonstationary, such that $\alpha_{1,1} \geq 1$ or $\alpha_{1,1} \leq -1$. In that case, Eq. (1) is not estimable. Alternatives include modeling a shock by differencing the economic variable or modeling it in a multivariate context. Prestemon (2009) showed that modeling a shock with a first-differenced non-stationary variable is a statistically weak approach. A more powerful intervention modeling approach for a nonstationary process involves cointegration.

2.2. Cointegration intervention models

Prestemon (2009) showed that, if a nonstationary P_t is involved in a cointegrating relation with another nonstationary variable R_t but the shock S_t is contained in the "noise" process of P_t but not that of R_t, then the parameter λ can be identified with greater power by modeling how the relation between P_t and R_t changes due to the shock. The two variables may contain a cointegrating relation through either a direct arbitrage process or through a shared relationship to a third variable (e.g., a substitute or a complement) in a production process that demands them both. Describe the bivariate relation, including the shock, as:

$$\begin{aligned} P_t &= \gamma_0 + \gamma_1 R_t + \theta_t \\ \theta_t &= \mu_t + \lambda S_t \end{aligned}. \tag{2A}$$

In this case, as long as the innovations, μ_t, are distributed as in Dickey and Fuller (1979) and Said and Dickey (1984), then Eq. (2A) can be

[2] In this study, we employ the term "price" interchangeably with the term "unit value," as trade data are originally reported in total quantities and total values; unit value is the ratio of total value to total quantity for the products analyzed.