

Modern trade agreements between countries contain a host of provisions beyond simple tariff reductions on traded products. Research by **Holger Breinlich, Valentina Corradi, Nadia Rocha, Michele Ruta, João Santos Silva** and **Thomas Zylkin** finds that those related to technical barriers to trade, anti-dumping, trade facilitation, subsidies and competition policy have the most positive effects in boosting trade.

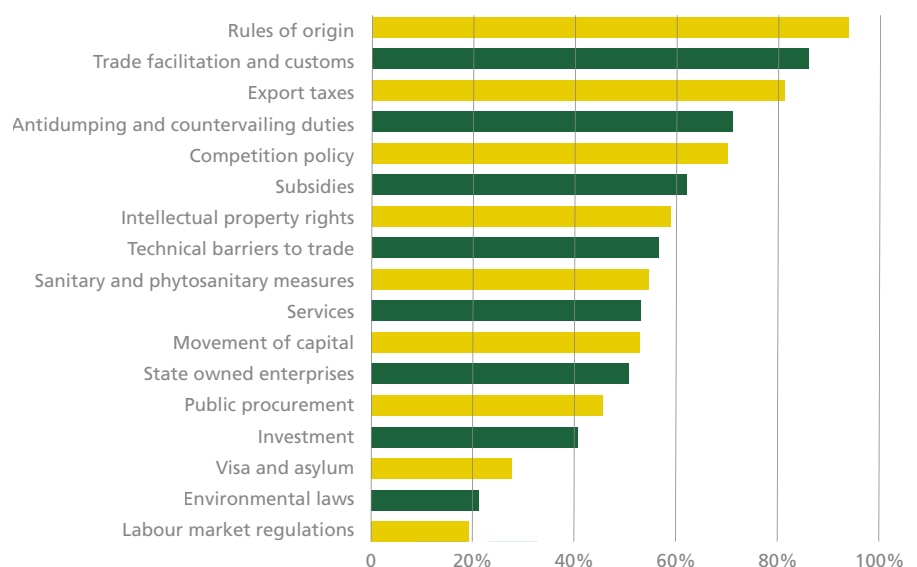
Deep trade agreements: proliferation, provisions, impact

Preferential trade agreements (PTAs) have become more frequent and increasingly complex in recent decades, making it important to assess how they affect trade and economic activity. Modern PTAs contain a host of provisions besides tariff reductions, in areas as diverse as services trade, competition policy and public procurement.

To illustrate the proliferation of non-tariff provisions, Figure 1 shows the share of PTAs in force and notified to the World Trade Organization (WTO) up to 2017 that cover selected policy areas. More than 40% of the agreements include provisions on such matters as investment, movement of capital and technical barriers to trade. And more than two-thirds of agreements cover areas such as competition policy and trade facilitation.

Research has sought to move beyond estimating the overall impact of PTAs

Figure 1:
Share of PTAs that cover selected policy areas



Source: Hofmann et al (2019).

Complex preferential trade agreements have become more frequent

on trade and to establish the relative importance of individual PTA provisions. But such attempts face the difficulty that the number of provisions included in PTAs is very large compared with the number of PTAs available to study, making it difficult to separate their individual impacts on trade flows.

Researchers have tried to address the growing complexity of PTAs in different ways. For example, Mattoo et al (2017) use the count of provisions in an agreement as a measure of its “depth” and check whether the increase in trade flows after a given PTA is related to this measure. Dhingra et al (2018) group provisions into categories (such as services, investment and competition provisions) and examine the effect of these “provision bundles” on trade flows. Obviously, these approaches come at the cost of not allowing the identification of the effect of individual provisions within each group.

Adopting machine learning techniques

In a new study, we instead adopt a technique from research on machine learning – the “least absolute shrinkage and selection operator” (lasso) – to the context of selecting the most important provisions and quantifying their impact. More precisely, we adapt the “rigorous lasso” method of Belloni et al (2016) to the estimation of state-of-the-art gravity models for trade.

The lasso works by shrinking the effects of individual provisions towards zero and progressively removing those that do not have a significant impact on the fit of the model (for an intuitive description, see Breinlich et al, 2021; for more details, see Breinlich et al, 2022). The rigorous lasso, a relatively recent variant of the lasso, refines this approach by taking into account the idiosyncratic variance of the data and by only keeping variables that are found to have a statistically large impact on the fit of the model.

Because the rigorous lasso tends to favour very parsimonious models, it may miss some important provisions. To address this issue, we introduce two methods to identify potentially important provisions that may have been missed by the rigorous lasso.

One of the methods, which we call the “iceberg lasso”, involves regressing each of the provisions selected by the rigorous lasso

on all other provisions, with the purpose of identifying relevant variables that were initially missed due to their collinearity with the provisions selected in the initial step. The other method, termed the “bootstrap lasso”, augments the set of variables selected by the rigorous lasso with the variables selected when the rigorous lasso is bootstrapped.

Which provisions increase trade?

We use the World Bank’s database on deep trade agreements, where we observe 283 PTAs and 305 “essential” provisions grouped into 17 categories. Essential provisions in PTAs include the set of substantive provisions (those that require specific integration/liberalisation commitments and obligations) plus the disciplines among procedures, transparency, enforcement or objectives, which are required to achieve the substantive commitments (Mattoo et al, 2020).

The rigorous lasso selects eight provisions more strongly associated with increasing trade flows following the implementation of the respective PTAs. As detailed in Table 1, these provisions are in the areas of anti-dumping, competition policy, technical barriers to trade and trade facilitation.

Building on these results, the iceberg lasso procedure identifies a set of 42 provisions, and the bootstrap lasso identifies between 30 and 74 provisions

that may affect trade, depending on how it is implemented. Therefore, the iceberg lasso and bootstrap lasso methods select sets of provisions that are small enough to be interpretable and large enough to give us some confidence that they include the more relevant provisions. In contrast, the more traditional implementation of the lasso based on cross-validation selects 133 provisions.

Reassuringly, both the iceberg lasso and bootstrap lasso select similar sets of provisions, mainly related to anti-dumping, competition policy, subsidies, technical barriers to trade and trade facilitation. Therefore, although our results do not have a causal interpretation and, consequently, we cannot be certain of exactly which provisions are more important, we can be reasonably confident that provisions in these areas stand out as having a positive effect on trade.

Table 1:

Provisions selected by the rigorous lasso

Provision code	Provision content
AD 14	Requirement to establish material injury to domestic producers
CP 23	Does the agreement contain provisions that promote transparency?
TBT 02	Technical regulations – is mutual recognition in force?
TBT 07	Technical regulations – is the use of international standards promoted?
TBT 08	Conformity assessment – is mutual recognition in force?
TBT 29	Standards – is mutual recognition in force?
TBT 33	Standards – is the use or creation of regional standards promoted?
TF 45	Do trade facilitation provisions simplify procedures to issue proof of origin?

Provisions easing technical barriers to trade may have a positive impact

Table 2:
Partial effects for selected PTAs estimated
by different methods

PTA	Rigorous lasso	Iceberg lasso	Bootstrap lasso
EU	87.1%	101.6%	64.2%
EEA	9.3%	94.4%	18.3%
Eurasian Economic Union	144.4%	38.5%	101.0%
NAFTA	79.9%	81.5%	52.9%
MERCOSUR	42.1%	76.2%	39.6%
ECOWAS	9.3%	23.3%	19.4%
ASEAN	0.0%	0.0%	3.3%
Average	13.8%	17.2%	12.5%

Estimating the increase in trade

Besides identifying the set of provisions that are more likely to have an impact on trade, our methods also provide an estimate of the increase in trade flows associated with the selected provisions. We use these results to estimate the effects of different PTAs that have already been implemented.

Table 2 summarises the estimated effects for selected PTAs obtained using the different methods we introduce. We find a wide variety of effects, ranging from very large impacts in agreements that include many of the selected provisions to no effect at all in agreements that do not include any.

Table 2 also shows that different methods can lead to substantially different estimates, and therefore these results need to be interpreted with caution. As noted above, our results do not have a causal interpretation. Therefore the accuracy of the predicted effects of individual PTAs will depend on whether the selected provisions have a causal impact on trade or serve as a signal of the presence of provisions that have a causal effect. When this condition holds, the predictions based on this method are likely to be reasonably accurate, and in Breinlich et al (2022), we report simulation results suggesting that this is the case.

But it is possible to envision scenarios where predictions based on our methods fail dramatically; for example, it could be the case that a PTA is incorrectly measured to have zero impact despite having many of the true causal provisions. Finally, we note that our results can also be used to predict the effects of new PTAs, but the same caveats apply.



Certain provisions can be selected that will maximise the trade-increasing impact of free trade agreements

A version of this article first appeared as the CEPR/Vox EU column 'Using Machine Learning to Assess the Impact of Deep Trade Agreements' (<https://new.cepr.org/voxeu/columns/using-machine-learning-assess-impact-deep-trade-agreements>).

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Further reading

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