



### Microeconomic implications of robot adoption: A firm-level perspective

Marcel Smolka, Michael Koch, Ilya Manuylov (April, 2020)

Revise and resubmit at *Economic Journal*

We study the microeconomic implications of robot adoption using a rich panel data-set of Spanish manufacturing firms over a 27-year period (1990-2016). We provide causal evidence on two central questions: (1) Which firm characteristics prompt firms to adopt robots? (2) What is the (partial equilibrium) impact of robots on adopting firms relative to non-adopting firms? To address these questions, we look at our data through the lens of recent attempts in the literature to formalize the implications of robot technology. As for the first question, we establish robust evidence for positive selection, i.e., ex-ante better performing firms (measured through output and labor productivity) are more likely to adopt robots. On the other hand, conditional on size, ex-ante more skill-intensive firms are less likely to do so. As for the second question, we find that robot adoption generates substantial output gains in the vicinity of 20-25% within four years, reduces the labor cost share by 5-7% points, and leads to net job creation at a rate of 10%. These results are robust to controlling for non-random selection into robot adoption through a difference-in-differences approach combined with a propensity score reweighting estimator. To further validate these results, we also offer structural estimates of total factor productivity (TFP) where robot technology enters the (endogenous) productivity process of firms. The results demonstrate a positive causal effect of robots on productivity, as well as a complementarity between robots and exporting in boosting productivity. We use these results to document that the surprising decline in aggregate TFP in Spanish manufacturing between 1995 and 2007 can be largely attributed to non-adopters.

More information on the paper can be found [here](#).

### Productivity and Firm Boundaries

Marcel Smolka, Wilhelm Kohler (April, 2020)

We use a property rights model of sourcing to derive novel theoretical predictions on how the productivity of a firm affects its choice between vertical integration and outsourcing and how this effect varies with the sourcing intensity of the production process. Our predictions hinge on less restrictive assumptions than industry-level predictions available in existing literature and survive in more realistic versions of the model featuring multiple suppliers. We present robust firm-level evidence from Spain showing that, in line with our prediction, the effect of productivity works more strongly in favor of vertical integration, and against outsourcing, in more headquarter-intensive industries.

More information on the paper can be found [here](#).

### Firm Exports, Foreign Ownership, and the Global Financial Crisis

Marcel Smolka, Peter S. Eppinger

[work in progress]

### The Economics of Processing Trade

Marcel Smolka, Boris Georgiev, Michael Koch

[work in progress]

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