Venting Out: Exports during a Domestic Slump

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Online Appendix (Not for Publication)

E Biases in the Extensive Margin of Exports

We extend here the analysis in Section 2 to the study of the effect of domestic demand shocks on the extensive margin of exports.

Given the CES demand function in equation (1) and the assumption that firms are monopolistically competitive in every market, firm i will find it profitable to export at time t only if export revenue R_{ixt} exceeds a multiple σ of the fixed cost of exporting F_{ixt}. Omitting the subindex t from the notation for simplicity, we can thus express a dummy taking value one if firm i exports as

$$d_{ix} = \mathbb{1}\{\ln R_{ix} > \sigma \ln F_{ix}\}$$

where $\mathbb{1}\{A\}$ denotes an indicator function that takes value one if and only if the statement A is true. The probability that firm i exports conditional on a vector X_{ix} that includes a set of period-specific sector fixed effects, location fixed effects, and observed proxies φ_i^* and ω_i^* is

$$\Pr(X_{ix}) = \mathbb{E}[d_{ix}|X_{ix}] = \mathbb{E}[\mathbb{1}\{\ln R_{ix} > \sigma \ln F_{ix}\}|X_{ix}].$$

Focusing on a linear probability model, we further rewrite the probability of the firm exporting as

$$\Pr(X_{ix}) = \mathbb{E}[\ln R_{ix} - \sigma \ln F_{ix}|X_{ix}],$$

and, therefore, we can write the change in the probability of exporting between any two periods as a function of the changes in the log export revenues and log fixed export costs

$$\Delta \Pr(\Delta X_{ix}) = \mathbb{E}[\Delta \ln R_{ix} - \sigma \Delta \ln F_{ix}|\Delta X_{ix}\}$$

where, from equation (6),

$$\Delta \ln R_{ix} = \gamma_{sx} + \gamma_{\ell x} + (\sigma - 1)\,\delta_{\varphi} \Delta \ln(\varphi_i^*) - (\sigma - 1)\,\delta_{\omega} \Delta \ln(\omega_i^*) + \varepsilon_{ix},$$

with the different terms in this expression defined as in Section 2, and ΔX_{ix} is a vector of sector fixed effects, location fixed effects and first-differences in the observed proxies φ_i^* and ω_i^*. We analogously decompose the log change in fixed costs of exporting as

$$\Delta \ln F_{ixt} = \phi_{sx} + \phi_{\ell x} + \phi_{\varphi} \Delta \ln(\varphi_i^*) + \phi_{\omega} \Delta \ln(\omega_i^*) + u_i^F,$$

similarly to how we decomposed the demand shifter, productivity and cost levels in Section 2. Notice that we are being quite flexible, letting firm-level fixed export costs depend on firm-level productivity and factor costs, and on both sector and location fixed effects. In particular, $\Delta \ln F_{ixt}$ depends on the same elements included in the vector ΔX_{ix} and the additional term u_i^F.

With these expressions at hand, we can write the change in the probability of exporting, expanded to include log domestic sales as an additional covariate, as

$$\begin{aligned}\Delta \Pr(\Delta X_{ix}) = \mathbb{E}\big[&(\gamma_{sx} - \phi_{sx}) + (\gamma_{\ell x} - \phi_{\ell x}) + [(\sigma - 1)\,\gamma_{\varphi} - \sigma \phi_{\varphi}]\Delta \ln(\varphi_i^*) \\ &- [(\sigma - 1)\,\delta_{\omega} - \sigma \phi_{\omega}]\Delta \ln(\omega_i^*) + \beta \Delta \ln R_{id} + \varepsilon_{ix} - \sigma u_i^F \big| \Delta X_{ix}\big],\end{aligned}$$

where, as in equation (9), $\varepsilon_{ix} = (\sigma - 1)\,[u^{\xi}_{ix} + u^{\varphi}_{i} - u^{\omega}_{i}]$. Following the same steps as in Section 2, the following asymptotic properties of $\hat{\beta}_{OLS}$ can be derived:

$$plim(\hat{\beta}_{OLS}) = \frac{cov(u^{\xi}_{ix} + u^{\varphi}_{i} - u^{\omega}_{i} - \frac{\sigma}{\sigma-1}u^{F}_{i}, u^{\xi}_{id} + u^{\varphi}_{i} - u^{\omega}_{i})}{var(u^{\xi}_{id} + u^{\varphi}_{i} - u^{\omega}_{i})}.$$

The only difference relative to equation (11) is the addition of the term $-u^{F}_{i}$ in the first element of the covariance in the numerator. It is clear that, as in the intensive margin regressions, this covariance is likely to be positive, thus generating a positive value of $plim(\hat{\beta}_{OLS})$.

The probability limit of the IV estimator of β is given by

$$plim(\hat{\beta}_{IV}) = \frac{cov(u^{\xi}_{ix} + u^{\varphi}_{i} - u^{\omega}_{i} - \frac{\sigma}{\sigma-1}u^{F}_{i}, \mathcal{Z}_{id})}{cov(u^{\xi}_{id} + u^{\varphi}_{i} - u^{\omega}_{i}, \mathcal{Z}_{id})}.$$

This expression will equal zero as long as the instrument $\widehat{Z}_{id}$ verifies the following two conditions: (a) it is correlated with the boom-to-bust change in domestic sales of firm i, after controlling for (or partialling out) firm and location fixed effects and the boom-to-bust difference in observable determinants of the firm's marginal cost; and (b) it is mean independent of the boom-to-bust changes in unobserved productivity, u^{φ}_{i}, factor costs, u^{ω}_{i}, export demand shocks, u^{ξ}_{ix}, and export fixed-cost shocks u^{F}_{i} (this latter being the only additional condition relative to our results for the intensive margin regressions). As in our discussion in Section 2, an instrument can only (generically) verify conditions (a) and (b) if its effect on domestic sales works exclusively through the domestic demand shock u^{ξ}_{id}.

It is straightforward to extend the above analysis to the case in which total sales and exports are measured with error and domestic sales are imputed by subtracting exports from total sales. Following the same steps as in Appendix A.1, we obtain

$$plim(\hat{\beta}_{IV}) = \frac{cov(u^{\xi}_{ix} + u^{\varphi}_{i} - u^{\omega}_{i} - \frac{\sigma}{\sigma-1}u^{F}_{i} + \frac{1}{\sigma-1}\varpi_{ix}, \mathcal{Z}_{id})}{cov(u^{\xi}_{id} + u^{\varphi}_{i} - u^{\omega}_{i} + \frac{1}{\sigma-1}\left(\varpi_{iT} - \varpi_{ix}\right), \mathcal{Z}_{id})},$$

and, thus, the only additional requirement on the instrument is that it is mean independent of the measurement error in exports ϖ_{ix}.

F Estimation of Revenue Productivity

We present a step-by-step description of our baseline estimation approach in Appendix F.1. For an analogous description of the alternative estimation approach used to compute the estimates in columns 3 and 4 of Table 9, see Bilir and Morales (2018). We summarize the production function estimates that both approaches yield in Appendix F.2.

F.1 Baseline Estimation Approach

We describe here the procedure we follow to estimate a proxy for firm- and year-specific performance or revenue productivity under the assumption that the production function is Leontief in materials. We describe first the assumptions that we impose on the production function, the demand function, market structure, and the stochastic process of revenue productivity or performance. Given these assumptions, we illustrate how we estimate the demand elasticity σ and all parameters of the revenue function. Finally, we describe how we use these estimates to recover a proxy of the revenue productivity or performance for every firm and year.

Assumption on production function. We assume a production function that is a Leontief function of materials and a translog aggregator of labor and capital:

$$Q_{it} = \min\{H(K_{it}, L_{it}; \boldsymbol{\alpha}), M_{it})\}\varphi_{it}, \tag{F.1a}$$

$$H(K_{it}, L_{it}; \boldsymbol{\alpha}) = \exp(h(k_{it}, l_{it}; \boldsymbol{\alpha})), \tag{F.1b}$$

$$h(k_{it}, l_{it}; \boldsymbol{\alpha}) \equiv \alpha_l l_{it} + \alpha_k k_{it} + \alpha_{ll} l_{it}^2 + \alpha_{kk} k_{it}^2 + \alpha_{lk} l_{it} k_{it}, \tag{F.1c}$$

with $\boldsymbol{\alpha} = (\alpha_l, \alpha_k, \alpha_{ll}, \alpha_{kk}, \alpha_{lk})$. In equation (F.1a), K_{it} is effective units of capital, L_{it} is the number of production workers, M_{it} is a quantity index of materials use, and φ_{it} denotes the Hicks-neutral physical productivity. To simplify the notation in this Appendix section, we use here lower-case Latin letters to denote the logarithm of the upper-case variable, e.g. $l_{it} = \ln(L_{it})$. The production function in equation (F.1) nests that introduced in Appendix A.2, which implicitly assumes that $\alpha_{ll} = \alpha_{kk} = \alpha_{lk} = 0$. In our estimation, we impose no *a priori* restriction on the values of the elements of the parameter vector $\boldsymbol{\alpha}$ and, thus, our estimation framework does not take a stand on whether marginal production costs are constant (as assumed in Section 2) or increasing (as assumed in Section 7).

Consistently with the definition of φ_{it} as physical productivity, we assume that

$$\mathbb{E}[\varphi_{it}|\mathcal{J}_{it}] = \varphi_{it}, \tag{F.2}$$

where $\mathcal{J}_{it}$ denotes the information set of firm i at the time at which the period-t pricing and input decisions are taken. Therefore, the firm knows the value of its productivity φ_{it} when making the period-t pricing and input decisions.

We assume that both materials and labor are fully flexible inputs, and that capital is dynamic and determined one period ahead. Consequently, both M_{it} and L_{it} are a function of $\mathcal{J}_{it}$, while K_{it} is a function of $\mathcal{J}_{it-1}$.

Assumptions on demand function. We assume that firms face a constant elasticity of substitution demand function as described in equation (1), and impose the assumption that the demand shock ξ_{it} is known to firms when determining their input and output decisions; i.e.

$$\mathbb{E}[\xi_{it}|\mathcal{J}_{it}] = \xi_{it}. \tag{F.3}$$

Assumptions on market structure. As described in Section 2, we assume that firms are monopolistically competitive in the output markets and that they take the prices of labor, materials and capital as given.

Derivation of the revenue function. Given the assumption that materials is a flexible input, equation (F.1a) implies that optimal materials usage satisfies

$$M_{it} = H(K_{it}, L_{it}; \boldsymbol{\alpha}).$$

Therefore, we can rewrite the production function in equation (F.1a) as

$$Q_{it} = H(K_{it}, L_{it}; \boldsymbol{\alpha})\varphi_{it}, \tag{F.4}$$

where $H(K_{it}, L_{it}; \boldsymbol{\alpha})$ is defined as in equations (F.1b) and (F.1c). Given this expression and the demand function in equation (1), we can write the revenue function of a firm i at period t as

$$R_{it} = P_{it}Q_{it} = P_{st}^{\frac{\sigma-1}{\sigma}} E_{st}^{\frac{1}{\sigma}} \xi_{it}^{\frac{\sigma-1}{\sigma}} Q_{it}^{\frac{\sigma-1}{\sigma}} = \mu_{st} H(K_{it}, L_{it}; \boldsymbol{\beta})\psi_{it}, \tag{F.5}$$

where

$$\kappa \equiv (\sigma - 1)/\sigma, \tag{F.6a}$$

$$\boldsymbol{\beta} \equiv \kappa\boldsymbol{\alpha}, \tag{F.6b}$$

$$\psi_{it} \equiv (\xi_{it}\varphi_{it})^{\kappa} \tag{F.6c}$$

$$\mu_{st} \equiv P_{st}^{\kappa}(E_{st})^{1-\kappa}. \tag{F.6d}$$

The parameter κ measures the inverse of the firm's markup. While the parameter vector $\boldsymbol{\alpha}$ includes the production function parameters, the vector $\boldsymbol{\beta}$ includes the revenue function parameters. The variable ψ_{it} captures the revenue productivity of the firm: the residual determinant of a firm's revenue after controlling for sector- and year-specific fixed effects and for the effect of capital and labor on the firm's revenue. As illustrated in equation (F.6c), revenue productivity equals in our model the product of the Hicks-neutral productivity φ_{it} and the demand shifter ξ_{it} to the power of the reciprocal of the firm's markup. The sector-year fixed effects accounts for the price index and total expenditure in the corresponding sector-year pair.

Assumptions on stochastic process for revenue productivity. We assume that revenue productivity follows a first-order autoregressive process, AR(1), with a state- and year-specific shifter:

$$\psi_{it} = \gamma_{st} + \rho\psi_{it} + \eta_{it} \qquad \text{with} \qquad \mathbb{E}[\eta_{it}|\mathcal{J}_{it}] = 0. \tag{F.7}$$

This stochastic process for revenue productivity may arise under different stochastic process for physical productivity φ_{it} and the demand shifter ξ_{it}; e.g. both variables follow AR(1) process with identical persistence parameters equal to ρ; or, one of them follows an AR(1) process with persistence parameter ρ and the other one is independent over time.

Estimation of demand elasticity. In order to estimate the demand elasticity σ, we follow the approach implemented, among others, in Das, Roberts and Tybout (2007) and Antràs, Fort and Tintelnot (2017). Given the assumption that all firms are monopolistically competitive in their output markets, it will be true that

$$R_{it} - C_{it}^{v} = \frac{1}{\sigma} R_{it},$$

where C_{it}^{v} denotes the total variable costs that firm i incurred at period t to obtain the sales revenue R_{it}. This expression indicates that the firm's total profits (gross of fixed costs) is equal to the reciprocal of the demand elasticity of substitution σ multiplied by the firm's total revenues. Given that the only variable inputs are materials M_{it} and labor L_{it}, we can rewrite this relationship as

$$R_{it} - P_{it}^m M_{it} - \omega_{it} L_{it} = \frac{1}{\sigma} R_{it},$$

where P_{it}^m denotes the equilibrium materials' price faced by firm i at period t, ω_{it} denotes the equilibrium salary and, thus, $P_{it}^m M_{it}$ denotes total expenditure in materials' purchases and $\omega_{it} L_{it}$ denotes total payments to labor. Rearranging terms, we obtain the following equality

$$\left(\frac{\sigma - 1}{\sigma}\right) R_{it} = P_{it}^m M_{it} + \omega_{it} L_{it},$$

and, allowing for measurement error in sales revenue, $R_{it}^{obs} \equiv R_{it} \exp(\varepsilon_{it})$, we obtain

$$\ln\left(\frac{\sigma - 1}{\sigma}\right) + r_{it}^{obs} - \varepsilon_{it} = \ln(P_{it}^m M_{it} + \omega_{it} L_{it}),$$

where, as indicated above, lower-case Latin letters denote the logarithm of the corresponding upper case variable and, thus, $r_{it}^{obs} \equiv \ln(R_{it}^{obs})$. Imposing the assumption that $\mathbb{E}[\varepsilon_{it}] = 0$, we identify σ through the following moment condition

$$\mathbb{E}\left[\ln\left(\frac{\sigma - 1}{\sigma}\right) + r_{it}^{obs} - \ln(P_{it}^m M_{it} + \omega_{it} L_{it})\right] = 0. \tag{F.8}$$

Estimation of labor elasticity parameters. Given equation (F.5), we can write the profit function of firm i in period t as

$$\Pi_{it} = \mu_{st} H(K_{it}, L_{it}; \boldsymbol{\beta}) \psi_{it} - \omega_{it} L_{it} - P_{it}^m M_{it} - P_{it}^k I_{it},$$

where ω_{it} denotes the wage that firm i faces at period t and, analogously, P_{it}^m and P_{it}^k denote the materials and capital prices. Assuming that labor is a fully flexible input and that firms are both monopolistically competitive in output markets and take the price of all inputs as given, the first order condition of the profit function with respect to labor implies that

$$\frac{\partial \Pi_{it}}{\partial L_{it}} = (\beta_l + 2\beta_{ll} l_{it} + \beta_{lk} k_{it}) R_{it} - \omega_{it} L_{it} = 0.$$

Reordering terms and taking logs on both sides of the equality, we obtain

$$\ln(\beta_l + 2\beta_{ll} l_{it} + \beta_{lk} k_{it}) = \ln(\omega_{it} L_{it}) - r_{it},$$

and, taking into account that revenues are measured with error, we can further rewrite

$$\ln(\beta_l + 2\beta_{ll} l_{it} + \beta_{lk} k_{it}) = \ln(\omega_{it} L_{it}) - r_{it}^{obs} + \varepsilon_{it}.$$

Assuming that the measurement error in revenue is not only mean zero (as imposed to derive the moment condition in equation (F.8)) but mean independent of the firm's labor and capital usage,

$$\mathbb{E}[\varepsilon_{it} | l_{it}, k_{it}] = 0,$$

we can derive the following conditional moment:

$$\mathbb{E}[r_{it}^{obs} - \ln(\omega_{it}L_{it}) + \ln(\beta_l + 2\beta_{ll}l_{it} + \beta_{lk}k_{it})|l_{it}, k_{it}] = 0.$$

We derive unconditional moments from this equation and use a method of moments estimator to estimate $(\beta_l, \beta_{ll}, \beta_{lk})$. With the estimates $(\hat{\beta}_l, \hat{\beta}_{ll}, \hat{\beta}_{lk})$ in hand, we recover an estimate of the measurement error ε_{it} for each firm i, affiliate j, and period t:

$$\hat{\varepsilon}_{it} = r_{it}^{obs} - \ln(\omega_{it}L_{it}) + \log(\hat{\beta}_l + 2\hat{\beta}_{ll}l_{it} + \hat{\beta}_{lk}k_{it}).$$

Combining the estimates of the parameters entering the elasticity of the firm's revenues with respect to labor, $(\hat{\beta}_l, \hat{\beta}_{ll}, \hat{\beta}_{lk})$, and the estimate of the demand elasticity of substitution, we compute estimates of the parameters $(\alpha_l, \alpha_{ll}, \alpha_{lk})$; i.e.

$$(\hat{\alpha}_l, \hat{\alpha}_{ll}, \hat{\alpha}_{lk}) = \frac{\hat{\sigma}}{\hat{\sigma} - 1}(\hat{\beta}_l, \hat{\beta}_{ll}, \hat{\beta}_{lk}).$$

Estimation of capital elasticity parameters. Using the estimates $(\hat{\beta}_l, \hat{\beta}_{ll}, \hat{\beta}_{lk})$ and $\hat{\varepsilon}_{it}$ we can construct a corrected measure of revenues

$$\widehat{r}_{it} \equiv r_{it} - \hat{\beta}_l l_{it} - \hat{\beta}_{ll} l_{it}^2 - \hat{\beta}_{lk} l_{it} k_{it} - \hat{\varepsilon}_{it},$$

and, given the expression for sales revenues in equation (F.5), it holds that

$$\widehat{r}_{it} = \beta_k k_{it} + \beta_{kk} k_{it}^2 + \psi_{it}.$$

Given this expression and the stochastic process for the evolution of productivity in equation (F.7), it will be true that

$$\widehat{r}_{it} = \beta_k k_{it} + \beta_{kk} k_{it}^2 + \mu_\psi(\widehat{r}_{ijt-1} - \beta_k k_{ijt-1} - \beta_{kk} k_{ijt-1}^2) + \zeta_{st} + \eta_{it}, \tag{F.9}$$

where ζ_{st} is an unobserved sector- and time-specific effect that accounts for the revenue shifter μ_{st} and the productivity shifter γ_{st}. Given that both L_{it} and K_{it} are a function of the information set $\mathcal{J}_{it}$, the definition of η_{it} in equation (F.7) implies that

$$\mathbb{E}[\eta_{it}|k_{it}, \widehat{r}_{ijt-1}, \{d_{st}\}_{s,t}] = 0,$$

where $\{d_{st}\}_{s,t}$ denotes a full set of sector- and time-specific dummy variables. Therefore, we can derive the following conditional moment equality

$$\mathbb{E}[\widehat{r}_{it} - \beta_k k_{it} - \beta_{kk} k_{it}^2 - \rho(\widehat{r}_{ijt-1} - \beta_k k_{ijt-1} - \beta_{kk} k_{ijt-1}^2) - \zeta_{st}|k_{it}, \widehat{r}_{ijt-1}, \{d_{st}\}_{s,t}] = 0$$

We derive unconditional moments from this equation and use a method of moments estimator to estimate $(\beta_k, \beta_{kk}, \rho)$. When estimating these parameters, we use the Frisch-Waugh-Lovell theorem to control for the full set of sector- and time-specific fixed effects $\{\zeta_{st}\}_{s,t}$. Combining the estimates of the parameters (β_k, β_{kk}), and the estimate of the demand elasticity of substitution σ, we compute estimates of the parameters (α_k, α_{kk}); i.e.

$$(\hat{\alpha}_k, \hat{\alpha}_{kk}) = \frac{\hat{\sigma}}{\hat{\sigma} - 1}(\hat{\beta}_k, \hat{\beta}_{kk}).$$

Estimation of productivity. We can also use the estimates of the parameters (β_k, β_{kk}) and the constructed random variable $\widehat{r}_{it}$ to build an estimate of the revenue productivity ψ_{it} for every firm and time period

$$\widehat{\psi}_{it} = \widehat{r}_{it} - \hat{\beta}_k k_{it} - \hat{\beta}_{kk} k_{it}^2.$$

F.2 Production Function Estimates

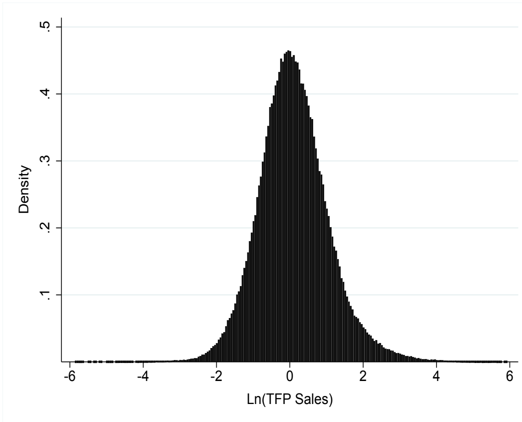
We summarize here the production function and productivity estimates that we obtain both when we assume a production function that is Leontief in materials (see Appendix F.1 for the corresponding estimation approach) and when we assume instead a production function that is Cobb-Douglas in materials (see Bilir and Morales, 2018, for the corresponding estimation approach). No matter which of these two production functions we assume, we estimate the corresponding production function parameters and demand parameters separately for the boom and bust periods and for each of the twenty-four 2-digit NACE sectors in which the manufacturing firms in our dataset are classified. For both the boom and the bust periods, we report here the simple average across all sectors of the estimated labor and capital elasticities, of the estimated persistence parameters ρ and of the demand elasticity σ.

Under the assumption that the production function is Leontief in materials, we obtain the following estimates. In the boom period, the average elasticities of revenue with respect to labor and capital are 0.23 and 0.19, respectively; the average annual autocorrelation in performance is 0.97; and the average demand elasticity is 3.55. In the bust period, the average elasticities of revenue with respect to labor and capital are 0.26 and 0.18, respectively; the average annual autocorrelation in performance is 0.98; and the average demand elasticity is 3.37.

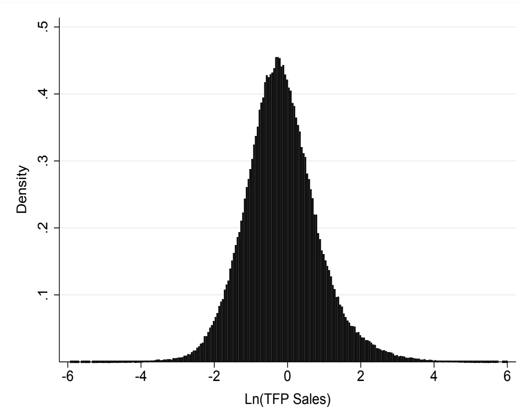
Under the assumption that the production function is Cobb-Douglas in materials, we obtain the following estimates. In the boom period, the average elasticities of value added with respect to labor and capital are 0.76 and 0.19, respectively; the average annual autocorrelation in performance is 0.78; and the average demand elasticity is 3.19. In the bust period, the average elasticities of value added with respect to labor and capital are 0.86 and 0.17, respectively; the average annual autocorrelation in performance is 0.78; and the average demand elasticity is 3.05.

Notice that both estimation approaches yield estimates of the demand elasticity σ that are a bit low relative to those that, using identification strategies different from ours, are typically obtained in the international trade literature (see Head and Mayer, 2014, for a review). One possible explanation for this mismatch between our estimates and those in the international trade literature is the fact that we cannot observe firms' expenditure in energy; this may imply that our measure of the variable production costs underestimates the firms' total expenditure in variable inputs and, thus, that our estimates of σ are downward biased. These estimates of σ do not, however, impact any of the estimates presented in the main draft. More specifically, the only exercise that we perform in the paper and that relies on the estimated value of σ is the quantification in Section 7.2. However, as indicated in that section, our baseline quantification calibrates the value of σ to a central value among the estimates computed in the international trade literature; i.e. $\sigma = 5$.

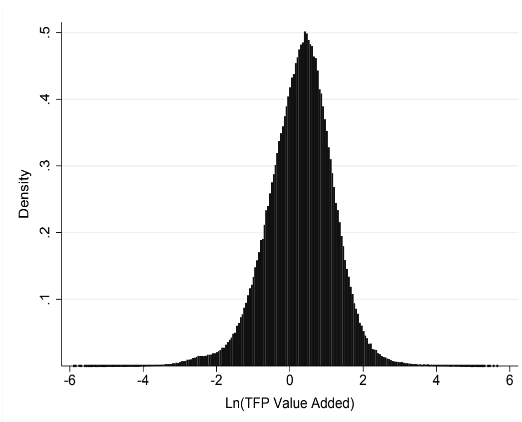
Figure F.1: Productivity Estimates



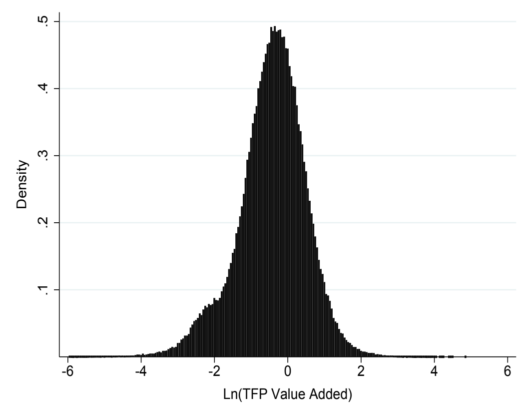
(a) Density of Ln(TFP Sales) in Boom



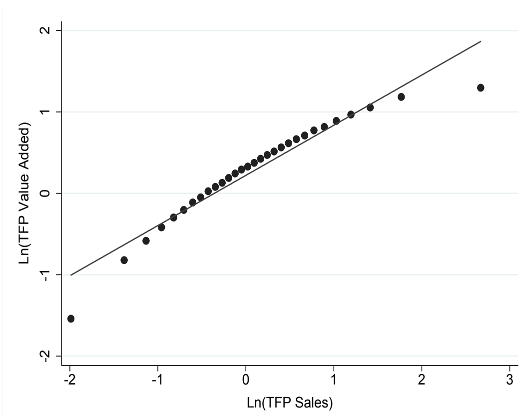
(b) Density of Ln(TFP Sales) in Bust



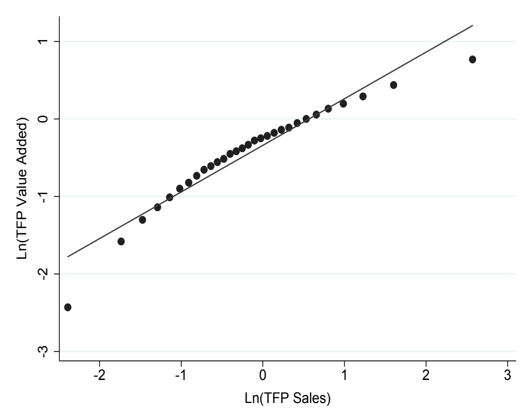
(c) Density of Ln(TFP Value Added) in Boom



(d) Density of Ln(TFP Value Added) in Bust



(e) Binscatter in Boom



(f) Binscatter in Bust

Notes: The figures in panels (a) and (b) present the density function of our (log) TFP estimates in boom and bust, respectively, following the procedure in Section F.1.The figures in panels (c) and (d) present the density function of our (log) TFP estimates in boom and bust, respectively, following the procedure in Bilir and Morales (2018). The figure in panel (e) presents a binscatter illustrating the relationship in the boom period between our two estimates of the firm's log TFP. The figure in panel (f) is analogous for the case of the bust period. The slope of the regression lines in panels (e) and (f) are, respectively, 0.62 and 0.6.

Panels (a) and (b) in Figure F.1 show, respectively, that the marginal distribution in the boom and bust periods of the (log) TFP estimates computed following the procedure in Section F.1. These two marginal distributions are symmetric around zero and close to normally distributed, reflecting that the distribution of the TFP estimates is close to log-normally distributed. Panels (c) and (d) show analogous marginal distributions for (log) TFP estimates computed following the procedure in Bilir and Morales (2018). While the distributions in panels (a) and (b) are similar to each other, that in panel (d) is clearly different from that in panel (c) in that the fraction of firms in the lower tail of the distribution is significantly larger. Thus, our value added-based TFP estimates show that the fraction of firms with relatively lower TFP increased in the bust period relative to the boom.

Panels (e) and (f) in Figure F.1 show how our two measures of TFP relate to each other. They show that, on average, there is a positive association between both measures; i.e. firms that have higher TFP according to our sales-based measure also tend to have higher TFP according to our value added measure. However, the relationship between both is not perfectly linear but slightly concave.

G Exports and Domestic Sales: Year-to-Year Variation

In the main text we focus on empirical specifications that compare export behavior in a *bust* period relative to a *boom* period. In this Appendix section, we study OLS specifications that exploit year-to-year variation in domestic sales and exports. Before doing so, however, we extend the discussion in Section 2 to a setup with multiple periods.

G.1 Theoretical Model

We assume here that equations (1) to (3) hold in every year t and, thus, we can write the expression for log exports by firm i in year t as:

$$\ln R_{ixt} = \kappa + (\sigma - 1)\left[\ln \xi_{ixt} + \ln \varphi_{it} - \ln \omega_{it}\right] - (\sigma - 1)\left(\ln \tau_{xt} - \ln P_{xt}\right) + \ln E_{xt}, \tag{G.1}$$

where κ is a constant. In order to transition into an estimating equation, we model the demand, productivity and cost levels as follows:

$$\begin{aligned} \ln(\xi_{ixt}) &= \xi_{ix} + \xi_{xt} + \tilde{\xi}_{ix} \times t + u^{\xi}_{ixt}, \\ \ln(\varphi_{it}) &= \varphi_i + \varphi_t + \tilde{\varphi}_i \times t + \delta_\varphi \ln(\varphi^*_{it}) + u^{\varphi}_{it}, \\ \ln(\omega_{it}) &= \omega_i + \omega_t + \tilde{\omega}_i \times t + \delta_\omega \ln(\omega^*_{it}) + u^{\omega}_{it}. \end{aligned} \tag{G.2}$$

Note that we are decomposing these terms into (i) a time-invariant firm fixed effect, (ii) a firm-invariant year fixed effect (which in the regressions will be expanded to include a whole set of municipality-year and sector-year fixed effects), (iii) a firm-specific linear trend, (iv) an observable part of these terms for the case of productivity (φ^*_{it}) and input bundle costs (ω^*_{it}), and (iv) a residual term on which we impose an assumption analogous to that in footnote 16. Given these decompositions, we can re-write equation (G.1) as:

$$\ln R_{ixt} = \kappa + \gamma_{ix} + \gamma_{xt} + \tilde{\gamma}_{ix} \times t + (\sigma - 1)\,\delta_\varphi \ln(\varphi^*_{it}) - (\sigma - 1)\,\delta_\omega \ln(\omega^*_{it}) + \varepsilon_{ixt}, \tag{G.3}$$

where $\gamma_{ix} \equiv (\sigma-1)\,[\xi_{ix}+\varphi_i-\omega_i]$, $\gamma_{xt} \equiv (\sigma-1)\,[\xi_{xt}+\varphi_t-\omega_t]-(\sigma-1)\,(\ln\tau_{xt}-\ln P_{xt})+\ln E_{xt}$, $\tilde{\gamma}_{ix} \equiv (\sigma-1)\,[\tilde{\xi}_{ix}+\tilde{\varphi}_i-\tilde{\omega}_i]$, and the error term is given by

$$\varepsilon_{ixt}=(\sigma-1)\,[u^{\xi}_{ixt}+u^{\varphi}_{it}-u^{\omega}_{it}]. \tag{G.4}$$

Following similar steps, we can derive the expression for revenues in the local market:

$$\ln R_{idt}=\kappa+\gamma_{id}+\gamma_{dt}+\tilde{\gamma}_{id}\times t+(\sigma-1)\,\delta_{\varphi}\ln(\varphi^*_{it})-(\sigma-1)\,\delta_{\omega}\ln(\omega^*_{it})+\varepsilon_{idt}, \tag{G.5}$$

where $\gamma_{id} \equiv (\sigma-1)\,[\xi_{id}+\varphi_i-\omega_i]$, $\gamma_{dt} \equiv (\sigma-1)\,[\xi_{dt}+\varphi_t-\omega_t]-(\sigma-1)\,(\ln\tau_{dt}-\ln P_{dt})+\ln E_{dt}$, $\tilde{\gamma}_{id} \equiv (\sigma-1)\,[\tilde{\xi}_{id}+\tilde{\varphi}_i-\tilde{\omega}_i]$, and

$$\varepsilon_{idt}=(\sigma-1)\,[u^{\xi}_{idt}+u^{\varphi}_{it}-u^{\omega}_{it}]. \tag{G.6}$$

Consider now using OLS to estimate the parameters of the following regression, which includes log domestic sales as an additional covariate in equation (G.3):

$$\ln R_{idt}=\kappa+\gamma_{id}+\gamma_{dt}+\tilde{\gamma}_{id}\times t+(\sigma-1)\,\delta_{\varphi}\ln(\varphi^*_{it})-(\sigma-1)\,\delta_{\omega}\ln(\omega^*_{it})+\beta\ln R_{idt}+\varepsilon_{idt}. \tag{G.7}$$

From equations (G.6) and (G.7), the probability limit of the ordinary least-squares (OLS) estimator of the coefficient on domestic sales can we written as

$$plim(\hat{\beta}_{OLS})=\frac{cov(\ddot{r}_{ixt},\ddot{r}_{idt})}{var(\ddot{r}_{idt})}=\frac{cov(u^{\xi}_{ixt}+u^{\varphi}_{it}-u^{\omega}_{it},u^{\xi}_{idt}+u^{\varphi}_{it}-u^{\omega}_{it})}{var(u^{\xi}_{idt}+u^{\varphi}_{it}-u^{\omega}_{it})}, \tag{G.8}$$

where we denote by $\ddot{X}$ the residual of a regression of a variable X on a set of firm fixed effects, year fixed effects, firm-specific linear time trends, and the proxies $\ln\varphi^*_{it}$ and $\ln\omega^*_{it}$. Analogously to the discussion in Section 2, it holds that:

1. As long as productivity and production factor costs are not perfectly observable or captured by the various fixed effects or the firm-specific trends, there will be a spurious positive correlation between exports and domestic sales that, in large samples, would lead one to estimate a positive value of $\hat{\beta}_{OLS}$ even when marginal costs are constant and, thus, demand-driven changes in domestic sales do not impact exports.

2. In the presence of a non-zero correlation in the residual demand (partialling out fixed effects) faced by firms in domestic and foreign markets, $\hat{\beta}_{OLS}$ will also converge to a non-zero value. Because this residual variation in demand does not capture market-specific macro shocks (which are controlled for via municipality-year and sector-year fixed effects), it seems plausible that u^{ξ}_{ixt} and u^{ξ}_{idt} will be positively correlated, leading one again to estimate a positive value of $\hat{\beta}_{OLS}$.

We have focused so far on the intensive margin, i.e., the impact of domestic demand shocks on the level of exports conditional on exporting. As in Appendix E, an analysis of the extensive margin of exports delivers very similar insights. More specifically, even if the true elasticity of the probability of exporting to demand-driven changes in domestic sales were to be 0, one is likely to estimate a positive elasticity whenever productivity and production factor costs are not perfectly captured by the various fixed effects, firm-specific trends and observable proxies, or whenever unobserved *residual* demand shocks are positively correlated across markets.

G.2 Empirical Results: Intensive Margin

Table G.1 presents OLS estimates from different specifications in which the logarithm of exports of a firm in a given year is regressed on the logarithm of its domestic sales in the corresponding year and different sets of controls. When no firm-specific controls are included in the regression, the discussion in Appendix section G.1 implies that we expect to observe a positive relationship between a firm's domestic sales in a given year and its volume of exports. This positive relationship is indeed observed in column 1 of Table G.1, in which we estimate an elasticity of export flows with respect to domestic sales of 0.645. The only controls in that regression are sector-year and municipality-year fixed effects.

In the remaining columns of Table G.1, we control for various sources of marginal cost and export demand heterogeneity across firms, with the aim of attenuating the biases identified in equation (G.8). In column 2, we introduce firm fixed effects, thus controlling for differences in firm characteristics that are constant over time and that may impact their productivity, factor prices and export demand shifters. The resulting estimated elasticity is very close to zero, -0.074, consistent with the predictions of the constant marginal cost model. Columns 3 and 4 additionally control for observed time-varying determinants of firms' marginal costs. Specifically, we control in column 3 for a measure of the firm's productivity (estimated, as in the main text, following the procedure in Gandhi et al., 2016), and we additionally control in column 4 for a measure of the firm's average wages (reported by the firm in its financial statement). Consistent with the results in the boom to bust regressions in the main text, controlling for these supply shocks reduces the OLS estimate of the coefficient on domestic sales, which goes down to -0.263. This indicates that, once we control for the firm's supply shocks, domestic sales and exports are negatively correlated. Columns 5 and 6 aim to additionally control for unobserved determinants of firms' marginal costs that are time varying. To do so, we additionally include firm-specific time trends as controls. The resulting estimates are again lower and indicate that a 10% decrease in a firm's domestic sales, keeping its productivity and average wages constant, implies a 3.19% increase in its aggregate export flows.

The last two columns in Table G.1 re-estimate the regression models in columns 2 and 6 using a specification in first-differences (instead of in levels). The differences between the coefficients on the domestic sales covariate in columns 2 and 7 (higher in the specification in levels than in that in first differences) reflect the fact that, while some of the missing covariates in these two specifications (i.e., firms' time-varying productivity and average wages) are strongly serially correlated and share common underlying trends with the corresponding firm's domestic sales, their year-to-year variation is less correlated with the yearly changes in domestic sales. Consistently with this interpretation, once we control for these serially correlated determinants of firms' marginal costs, the coefficient on domestic sales in the levels specification (column 6) becomes very similar to that in the first-differences specification (column 8). Given that the specifications in columns 6 and 8 yield very similar estimates, but the latter is computationally easier to estimate, we focus on the specification in first differences in the remaining tables presented in this Appendix.

As discussed in Section 5.1, one might be concerned that because total sales is a key input in the computation of our firm-level measure of TFP, our empirical results are just unveiling a mechanical negative correlation between exports and domestic sales once one holds total sale revenue constant. The correlation beween log TFP and log total sales in our data is however far from

Table G.1: Intensive Margin

Dependent Variable:	Ln(Exports)						ΔLn(Exports)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Ln(Domestic Sales)	0.645^a	-0.074^a	-0.231^a	-0.263^a	-0.228^a	-0.319^a		
	(0.013)	(0.017)	(0.016)	(0.015)	(0.016)	(0.016)		
Ln(TFP)			1.031^a	1.344^a		1.061^a		
			(0.042)	(0.048)		(0.063)		
Ln(Average Wages)				-0.627^a		-0.463^a		
				(0.041)		(0.047)		
ΔLn(Domestic Sales)							-0.228^a	-0.320^a
							(0.012)	(0.013)
ΔLn(TFP)								0.917^a
								(0.047)
ΔLn(Average Wages)								-0.408^a
								(0.033)
Observations	54,575	54,276	54,276	54,276	54,276	54,276	54,575	54,276
R-squared	0.474	0.898	0.904	0.906	0.951	0.953	0.237	0.368
Firm FE	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Municipality-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-specific trends	No	No	No	No	Yes	Yes	No	No

Note: a denotes 1% significance, b denotes 5% significance, c denotes 10% significance. Standard errors clustered by firm in parentheses. Exports, domestic sales and average wages are in constant 2011 euros. For any variable X, $\Delta\text{Ln}(X)$ is the difference in $\text{Ln}(X)$ between two consecutive years.

perfect. Specifically, the correlation between log changes in TFP and log total sales is 0.31. Notice also that columns 5 and 7 in Table G.1 unveil a negative correlation between log changes in exports and log changes in domestic sales even when *not* controlling for log changes in TFP.

In Figure G.2, we complement the analysis in Table G.1 by estimating sector-specific elasticities of exports with respect to domestic sales (see Table G.2 in Appendix D for the associated regression tables).[1] The main conclusion is that the negative elasticity between domestic sales and exports documented in Table G.1 is pervasive across nearly all manufacturing sectors, the only exception being the "Pharmaceutical Products" sector, whose 95% confidence interval is such that we cannot reject the null hypothesis that, after controlling for firm-specific fixed effects and time trends and observed measures of productivity and labor costs, changes in domestic sales have no impact on exports. For all remaining sectors, the estimated elasticity of interest oscillates between -0.156 (manufacture of leather and related products) and -0.565 (manufacture of paper and paper products).

Table G.2: Intensive Margin - Heterogeneity by Sector

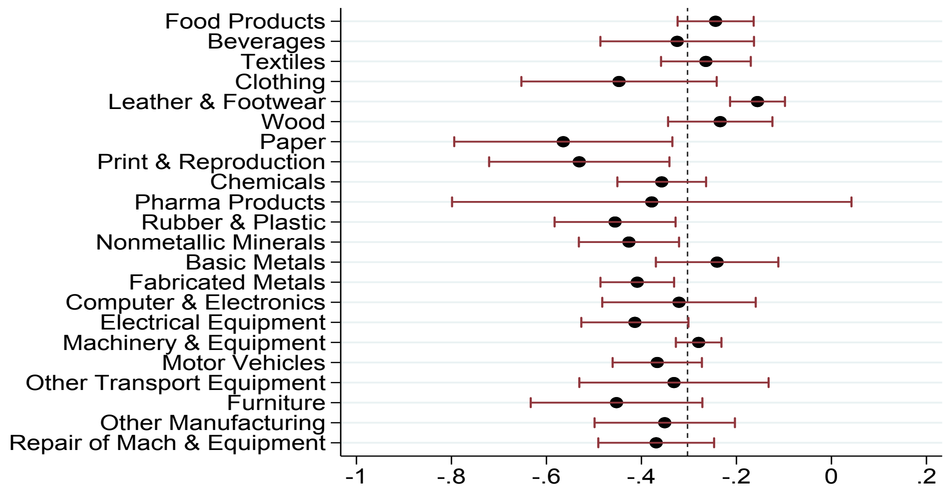
Dependent Variable:	ΔLn(Exports)						
Sector	Food	Beverages	Textiles	Clothing	Leather	Wood	Paper
NACE code	10	11	13	14	15	16	17
ΔLn(Domestic Sales)	-0.244[a]	-0.325[a]	-0.264[a]	-0.447[a]	-0.156[a]	-0.234[a]	-0.565[a]
	(0.041)	(0.082)	(0.048)	(0.105)	(0.029)	(0.056)	(0.117)
ΔLn(TFP)	0.750[a]	0.243	0.578[a]	0.827[a]	0.449[a]	0.512[a]	1.093[a]
	(0.101)	(0.201)	(0.143)	(0.217)	(0.138)	(0.196)	(0.192)
ΔLn(Average Wages)	-0.350[a]	0.091	-0.464[a]	-0.179	-0.225[a]	-0.003	-0.585[a]
	(0.065)	(0.146)	(0.102)	(0.168)	(0.078)	(0.125)	(0.211)
Observations	7,578	1,729	2,489	968	2,620	1,725	1,434
R-squared	0.302	0.361	0.379	0.382	0.348	0.402	0.341

Sector	Printing	Chemicals	Pharma.	Plastic	Non-metals	Basic Metals	Fabric. Metals
NACE code	18	20	21	22	23	24	25
ΔLn(Domestic Sales)	-0.531[a]	-0.357[a]	-0.378[c]	-0.456[a]	-0.426[a]	-0.241[a]	-0.409[a]
	(0.097)	(0.048)	(0.214)	(0.065)	(0.054)	(0.066)	(0.040)
ΔLn(TFP)	1.082[a]	1.125[a]	0.973[a]	1.238[a]	0.910[a]	0.870[a]	1.424[a]
	(0.320)	(0.203)	(0.305)	(0.129)	(0.162)	(0.140)	(0.129)
ΔLn(Average Wages)	-0.620[a]	-0.490[a]	-0.448[c]	-0.514[a]	-0.271[b]	-0.338[b]	-0.493[a]
	(0.224)	(0.112)	(0.250)	(0.104)	(0.118)	(0.133)	(0.090)
Observations	1,258	4,854	1,166	3,979	3,190	2,179	7,226
R-squared	0.343	0.286	0.305	0.345	0.388	0.325	0.283

Sector	Computers	Electron.	Machine	Vehicles	Furniture	Repair	Other
NACE code	26	27	28	29	31	32	33
ΔLn(Domestic Sales)	-0.321[a]	-0.414[a]	-0.280[a]	-0.367[a]	-0.452[a]	-0.351[a]	-0.369[a]
	(0.082)	(0.058)	(0.024)	(0.048)	(0.092)	(0.075)	(0.062)
ΔLn(TFP)	1.023[a]	0.911[a]	1.114[a]	0.992[a]	1.227[a]	1.262[a]	1.562[a]
	(0.249)	(0.259)	(0.146)	(0.202)	(0.231)	(0.309)	(0.399)
ΔLn(Average Wages)	-0.360[b]	-0.430[c]	-0.604[a]	-0.545[a]	-0.546[a]	-0.557[a]	-0.653[b]
	(0.146)	(0.225)	(0.120)	(0.153)	(0.159)	(0.181)	(0.300)
Observations	1,490	2,307	7,502	2,833	1,407	1,287	1,211
R-squared	0.321	0.336	0.241	0.309	0.354	0.349	0.388

Note: *a* denotes 1% significance, *b* denotes 5% significance, *c* denotes 10% significance. All specifications contain firm fixed effects and province-year fixed effects. Standard errors clustered by firm in parentheses. Exports, domestic sales and average wages are in constant 2011 euros. For any variable X, $\Delta\text{Ln}(X)$ is the difference in $\text{Ln}(X)$ between two consecutive years.

Figure G.2: Intensive Margin - Heterogeneity by Sector



Note: The dotted vertical line reflects the average estimate reported in column 8 of Table G.1. The black dots reflect the sector-specific point estimates; the red lines reflect the 95% confidence interval for each of the sectoral estimates.

G.3 Extensive Margin

Local demand shocks may not only generate an intensive margin change in the export volume of those firms participating in export markets but may also lead firms to either start exporting or to stop participating in foreign markets, thus affecting the extensive margin of trade. We next explore the effect of demand-driven changes in domestic sales on the probability that a firm exports. To do so, we estimate three different types of binary choice models: static conditional logit models (columns 1 to 5 in Table G.3), a static linear probability models (column 6 in Table G.3), and a dynamic linear probability model (column 7 in Table G.3).

The results regarding the impact of domestic sales on the extensive margin of exports are similar to those described above for its impact on the intensive margin of exports. When we do not include any control for firm-specific marginal costs, we observe a positive correlation between a firm's domestic sales and its probability of exporting. As columns 2 and 3 in Table G.3 illustrate, controlling either for firm fixed effects only or for firm and sector-year fixed effects reduces the coefficient on domestic sales in absolute value but preserves its positive sign. Nevertheless, when we include controls for observable time-varying determinants of a firm's marginal cost, the elasticity of export participation with respect to domestic sales becomes negative. The most general conditional logit specification that we run accounts for firm fixed effects, sector-year fixed effects, and firm-year specific measures of productivity and average wages (column 5); the resulting elasticity of the export probability with respect to domestic sales is -0.312.[2]

[1] We exclude the "tobacco", the "petroleum refining", and the "other transport" sectors (two-digit industry codes 12, 19 and 30, respectively) due to the extremely low number of firms in those sectors.

[2] The parameters in columns 2 to 5 have been estimated following the procedure in Chamberlain (1980). This estimation procedure maximizes a conditional likelihood function that does not depend on the firm fixed effects and, consequently, does not yield estimates of these unobserved effects. However, given the nonlinear nature of the model, the elasticity of the export probability with respect to domestic sales does depend on these unobserved effects. For the exclusive purposes of computing the elasticities reported in the last row of Table G.3, we have set all these unobserved effects equal to zero.

Table G.3: Extensive Margin

Model:	Conditional Logit					Linear	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Ln(Domestic Sales)	1.184^a	0.141^a	0.255^a	-0.164^a	-0.312^a	-0.030^a	-0.038^a
	(0.008)	(0.018)	(0.020)	(0.024)	(0.026)	(0.001)	(0.001)
Log TFP				1.530^a	2.134^a	0.065^a	0.064^a
				(0.050)	(0.063)	(0.003)	(0.003)
Log Average Wages					-0.982^a	-0.033^a	-0.033^a
					(0.050)	(0.002)	(0.002)
Lagged Participation							0.161^a
							(0.006)
Observations	747,519	129,712	129,712	129,712	129,712	747,519	495,151
Firm FE	No	Yes	Yes	Yes	Yes	Yes	Yes
Sector-Year FE	Yes	No	Yes	Yes	Yes	Yes	Yes
Firm-specific trends	No	No	No	No	No	Yes	No
Elasticities	1.035	0.016	0.013	-0.150	-0.312	-0.234	-0.284

Note: a denotes 1% significance, b denotes 5% significance, c denotes 10% significance. Columns 1 to 5 present Maximum Likelihood estimators of the corresponding conditional logit model. Column 2 to 5 present estimates computed following the procedure in Chamberlain (1980). Column 6 presents OLS estimates of the corresponding linear probability model. Column 7 presents estimates computed following the procedure in Arellano and Bond (1991). The number of observations in columns 1, 6 and 7 correspond to the number of firm-years that we observe in our sample when taking into account all firms. The number of observations in columns 2 to 5 correspond to the number of firm-years that we observe in our sample when taking into account only those firms that change their export status at least once during the sample period. Standard errors in parentheses. Exports, domestic sales and average wages are in constant 2011 euros. For any variable X, $\Delta\text{Ln}(X)$ is the difference in $\text{Ln}(X)$ between two consecutive years.

Contrary to the specifications discussed in Appendix G.2, those discussed in columns 1 to 5 of Table G.3 do not account for firm-specific time trends. Accounting for both firm fixed effects and firm-specific time trends in a conditional logit model would be problematic for two reasons. First, it would be computationally very challenging. Second, it would give rise to an incidental parameters problem (Chamberlain, 1980), resulting in inconsistent estimates of the elasticity of export participation with respect to domestic sales.[3] Consequently, to test the robustness of our estimates to accounting for firm-specific time trends, we resort to the linear probability model specification. The estimates in column 6 of Table G.3 predict an elasticity of export participation with respect to domestic sales of -0.234, very similar to that predicted by the conditional logit model in column 5.

As shown in Das et al. (2007) and Morales at al. (2018), the export decision of firms is dynamic, depending both on their prior export status as well as on their expectations of future potential profits that a firm may earn by entering export markets. While correctly accounting for firms' expectations of future export profits is beyond the scope of this paper (see Dickstein and Morales, 2018), accounting for the prior export status of each firm only requires additionally controlling for a dummy that captures each firm's one-year lagged export participation (see Roberts

[3]Charbonneau (2017) introduces a new estimator that allows to consistently estimate binary logit models in the presence of an individual-specific fixed effect and a choice-specific fixed effect. This estimator does not apply to our context, in which both sets of unobserved effects are firm-specific.

and Tybout, 1997). We introduce this control in column 7 of Table G.3: the resulting estimate of the export participation elasticity with respect to domestic sales is -0.284, very similar to those obtained in columns 5 and 6.

In sum, our OLS estimates in Tables G.1, G.2, and G.3 demonstrate the existence of a strong, within-firm negative relationship between demand-driven changes in domestic sales and changes in the intensive and extensive margin of exports. As discussed in Section 2, however, it is reasonable to expect that these OLS estimates underestimate the extent to which demand-driven reductions in domestic demand generate expansions in export markets.

H Regression Results with Total Sales instead of Domestic Sales

We present in this Appendix section specifications analogous to those in tables 1 to 10, with the only difference that the boom to bust log change in total sales is included as right-hand-side variable instead of the corresponding log change in exports.

Table H.1: Intensive Margin: Ordinary Least Squares Estimates

Dependent Variable:	ΔLn(Exports)					
	(1)	(2)	(3)	(4)	(5)	(6)
Δ Ln(Total Sales)	0.891[a]	0.778[a]	0.764[a]	0.778[a]	0.785[a]	0.801[a]
	(0.029)	(0.036)	(0.037)	(0.039)	(0.037)	(0.041)
Δ Ln(TFP)		0.302[a]	0.334[a]	0.409[a]	0.397[a]	0.382[a]
		(0.046)	(0.053)	(0.055)	(0.053)	(0.057)
Δ Ln(Avg. Wages)			-0.069	-0.107[b]	-0.095[b]	-0.051
			(0.043)	(0.047)	(0.047)	(0.050)
Observations	8,018	8,018	8,018	8,018	8,018	7,507
R-squared	0.164	0.170	0.170	0.210	0.223	0.327
Sector FE	Yes	Yes	Yes	Yes	Yes	Yes
Province FE	No	No	No	No	Yes	No
Municipality FE	No	No	No	No	No	Yes

Note: a denotes 1% significance, b denotes 5% significance, c denotes 10% significance. Standard errors clustered at the municipality level are reported in parenthesis. For any X, $\Delta\text{Ln}(X)$ is the difference in $\text{Ln}(X)$ between its average in the 2009-2013 period and its average in the 2002-2008 period. The estimation sample includes all firms selling in at least one year in the period 2002-2008 and in the period 2009-2013.

Table H.2: Intensive Margin: Two-Stage Least Squares Estimates

Dependent Variable:	ΔLn(Domestic Sales)				ΔLn(Exports)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Δ Ln(Total Sales)					-4.767^b	-2.220^a	-2.326^a	-2.624^a
					(2.355)	(0.770)	(0.763)	(0.916)
Δ Ln(Vehicles p.c. in Municipality)	0.154^a	0.271^a	0.262^a	0.221^a				
	(0.052)	(0.047)	(0.045)	(0.046)				
Δ Ln(TFP)		0.827^a	0.983^a	0.985^a		2.771^a	3.361^a	3.741^a
		(0.020)	(0.024)	(0.024)		(0.642)	(0.762)	(0.900)
Δ Ln(Avg. Wages)			-0.519^a	-0.432^a			-1.675^a	-1.567^a
			(0.026)	(0.031)			(0.419)	(0.408)
F-statistic	8.84	33.07	34.34	23.42				
Observations	8,018	8,018	8,018	8,018	8,018	8,018	8,018	8,018
Sector FE	No	No	No	Yes	No	No	No	Yes
Province FE	No	No	No	Yes	No	No	No	Yes

Note: *a* denotes 1% significance, *b* denotes 5% significance, *c* denotes 10% significance. Standard errors clustered by municipality appear in parenthesis. For any X, $\Delta\text{Ln}(X)$ is the log difference between the average of X in 2009-2013 and its average in 2002-2008. Vehicles p.c. denotes the stock of vehicles per capita. Columns 1-4 contain first-stage estimates; columns 5-8 contain second-stage estimates. F-statistic denotes the corresponding test statistic for the null hypothesis that the coefficient on Ln(Vehicles p.c. in Municipality) equals zero.

Table H.3: Extensive Margin: Two-Stage Least Squares Estimates

Dependent Variable:		Export Dummy		Proportion of Years	
	1st Stage	OLS	2nd Stage	OLS	2nd Stage
	(1)	(2)	(3)	(4)	(5)
Ln(Total Sales)		0.072^a	-0.133	0.054^a	-0.088
		(0.003)	(0.225)	(0.002)	(0.119)
Ln(Vehicles p.c. in Municipality)	0.072^a				
	(0.022)				
Ln(TFP)	1.091^a	0.002	0.226	0.014^a	0.168
	(0.015)	(0.005)	(0.247)	(0.003)	(0.130)
Ln(Average Wages)	-0.415^a	-0.010^b	-0.096	-0.017^a	-0.076
	(0.011)	(0.004)	(0.094)	(0.002)	(0.050)
F-statistic	10.20				
Observations	125,808	125,808	125,808	125,808	125,808
Mean of Dep. Var.		0.183	0.183	0.113	0.113
Ext-Margin Elasticity		0.395	-0.729	0.474	-0.777

Note: *a* denotes 1% significance, *b* denotes 5% significance, *c* denotes 10% significance. Standard errors clustered by zip code appear in parenthesis. For any X, $\Delta\text{Ln}(X)$ is the log difference between the average of X in 2009-2013 and its average in 2002-2008. Vehicles p.c denotes the stock of vehicles per capita. All specifications include firm fixed effects, sector-period fixed effects, and province-period fixed effects.

Table H.4: Intensive Margin: Robustness to Excluding Zip Codes Linked to Auto Industry

	Panel A: Exclude zipcodes w/ high auto employment share			*Panel B: Exclude zipcodes with at least one sizeable auto maker*		
Dependent Variable:	ΔLn(Exp)	ΔLn(DSales)	ΔLn(Exp)	ΔLn(Exp)	ΔLn(DSales)	ΔLn(Exp)
	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	1st Stage	2nd Stage	OLS	1st Stage	2nd Stage
Δ Ln(Total Sales)	0.787[a]		-4.317[a]	0.771[a]		-6.016[b]
	(0.039)		(1.409)	(0.047)		(2.393)
ΔLn(Vehicles p.c. in Municipality)		0.181[a]			0.147[a]	
		(0.056)			(0.047)	
Δ Ln(TFP)	0.381[a]	0.975[a]	5.341[a]	0.407[a]	0.952[a]	6.845[a]
	(0.057)	(0.025)	(1.369)	(0.071)	(0.032)	(2.275)
Δ Ln(Avg. Wages)	-0.062	-0.419[a]	-2.198[a]	-0.124*	-0.400[a]	-2.831[a]
	(0.049)	(0.030)	(0.608)	(0.067)	(0.037)	(0.992)
F-statistic		14.16			6.98	
Observations	7,178	7,178	7,178	4,613	4,613	4,613

	Panel C: Exclude zipcodes 'neighboring' zipcodes in Panel A			*Panel D: Exclude sectors w/ I-O links to automakers*		
Dependent Variable:	ΔLn(Exp)	ΔLn(DSales)	ΔLn(Exp)	ΔLn(Exp)	ΔLn(DSales)	ΔLn(Exp)
	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	1st Stage	2nd Stage	OLS	1st Stage	2nd Stage
Δ Ln(Total Sales)	0.810[a]		-4.851[b]	0.825[a]		-6.095[b]
	(0.040)		(1.888)	(0.046)		(2.469)
ΔLn(Vehicles p.c. in Municipality)		0.170[a]			0.136[a]	
		(0.056)			(0.047)	
ΔLn(TFP)	0.351[a]	0.972[a]	5.836[a]	0.330[a]	0.975[a]	7.058[a]
	(0.060)	(0.025)	(1.817)	(0.067)	(0.029)	(2.388)
Δ Ln(Avg. Wages)	-0.071	-0.393[a]	-2.292[a]	-0.118[b]	-0.399[a]	-2.874[a]
	(0.060)	(0.025)	(1.817)	(0.067)	(0.029)	(2.388)
F-statistic		9.38			8.33	
Observations	6,137	6,137	6,137	6,080	6,080	6,080

Note: *a* denotes 1% significance, *b* denotes 5% significance, *c* denotes 10% significance. Standard errors clustered by municipality appear in parenthesis. All specifications include sector and province fixed effects. For any X, $\Delta \text{Ln}(X)$ is the log difference between the average of X in 2009-2013 and its average in 2002-2008. 'Exp' denotes exports, and 'DSales' denotes domestic sales. 'Vehicles p.c.' denotes the stock of vehicles per capita. 'F-statistic' denotes the corresponding statistic for the null hypothesis that the coefficient on the ΔLn(Vehicles p.c. in Municipality) covariate is equal to zero.

Table H.5: Heterogeneous Effects: First Stage

Sample:	Number of workers is in the interval: $(0,25]$	$[26,\infty)$	$[51,\infty)$	$[101,\infty)$	$[201,\infty)$	Low Home Bias	High Home Bias
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1st-Stage Coefficient	0.293^a	0.197^a	0.164^b	0.074	0.043	0.260^a	0.161^a
	(0.086)	(0.049)	(0.066)	(0.084)	(0.117)	(0.071)	(0.058)
F-Statistic	11.73	15.93	6.24	0.78	0.14	13.33	7.67
Observations	2,641	5,376	3,190	1,672	790	4,768	3,249

Note: *a* denotes 1% significance, *b* denotes 5% significance, *c* denotes 10% significance. Standard errors clustered by municipality appear in parenthesis. All specifications include sector and province fixed effects. Vehicles p.c. denotes the stock of vehicles per capita. First-stage coefficient and F-statistic refer to the elasticity of the change in the firm's log domestic sales with respect to the change in log vehicles p.c. in the municipality of location of the firm. For columns 1 to 5, the firm's number of workers is measured as the average across all years the firm appears in the sample.

Table H.6: Heterogeneous Effects: Second Stage

Sample	Low Labor Elasticity	High Labor Elasticity	Low Materials Elasticity	High Materials Elasticity
	(1)	(2)	(3)	(4)
2nd-Stage Coefficient	-3.325^c	-1.753^c	-3.169^c	-1.836^c
	(1.872)	(1.013)	(1.792)	(1.040)
1st-Stage F-Stat.	8.80	11.44	6.96	15.26
Observations	3,914	3,914	4,100	3,711

Note: *a* denotes 1% significance, *b* denotes 5% significance, *c* denotes 10% significance. Standard errors clustered by municipality appear in parenthesis. All specifications include sector and province fixed effects. Vehicles p.c. denotes the stock of vehicles per capita. First-stage coefficient and F-statistic refer to the elasticity of the change in the firm's log domestic sales with respect to the change in log vehicles p.c. in the municipality of location of the firm. In columns 1 to 4, we classify firms on the basis of firm-specific labor and materials elasticities computed following the procedure in Bilir and Morales (2018). This table eliminates the specifications in the first two columns of Table 6, as these are not meaningful when ΔLn(Total Sales) is the right-hand-side variable.

Table H.7: Alternative Instruments and Overidentification Tests

Dependent Variable:	ΔLn(Domestic Sales)					
	(1)	(2)	(3)	(4)	(5)	(6)
ΔLn(Vehicles p.c. in Province)	0.617^{a}					
	(0.129)					
ΔLn(Distance-Population Weighted Vehicles p.c. in Other Zip Codes)		0.136^{a}	0.083^{a}			
		(0.027)	(0.021)			
ΔLn(Vehicles p.c. in Municipality)			0.204^{a}			
			(0.060)			
Ln(Urban Land Supply Ratio in 1996)				0.018^{b}		
				(0.009)		
ΔLn(Construction Wage Bill) × 2002 Wage Bill Share in Municipality					0.286^{a}	
					(0.050)	
ΔLn(Foreign Tourists) × 2002 Foreign Tourists p.c. in Province						0.176^{a}
						(0.064)
F-statistic	22.80	25.48	16.97	4.13	32.82	7.55
	ΔLn(Exports)					
	(1)	(2)	(3)	(4)	(5)	(6)
ΔLn(Total Sales)	-1.972^{b}	-3.120^{b}	-2.100^{b}	-2.605	-1.819^{b}	-1.869^{a}
	(0.785)	(1.537)	(0.877)	(2.047)	(0.745)	(0.537)
P-value for Sargan Test	0.76	0.23	0.23	0.60	0.56	0.92
Observations	8,018	7,949	7,949	6,940	7,928	8,018

Note: *a* denotes 1% significance, *b* denotes 5% significance, *c* denotes 10% significance. Standard errors clustered by province except for columns 4 and 5, in which they are clustered by municipality. All specifications include firm-level log TFP and log average wages as additional controls (coefficients not included to save space). Additionally, all specifications also include sector fixed effects, and columns 4 and 5 also include province fixed effects.

Table H.8: Confounding Factors

Dependent Variable:	ΔLn(Exports)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ΔLn(Total Sales)	-2.624[a]	-2.347[a]	-2.724[a]	-2.783[a]	-2.143[b]	-2.096[b]	-2.721[a]
	(0.916)	(0.888)	(1.019)	(1.021)	(0.881)	(0.854)	(1.017)
ΔShare of Temp. Workers (firm level)		-0.501[b]					
		(0.199)					
ΔShare of Temp. Workers (municipality level)			-0.240				
			(0.259)				
ΔManufacturing Empl. p.c. (municipality level)				-0.422[a]			
				(0.113)			
ΔLn(Financial Costs) (firm level)					-0.057[a]		
					(0.020)		
Ln(Financial Costs in Boom) (firm level)						-0.007	
						(0.020)	
Ln(Financial Costs in Boom) (municipality level)							-0.006
							(0.063)
F-Statistic	23.42	21.35	21.00	20.49	20.18	21.23	21.43
Observations	8,018	7,649	7,746	7,748	6,886	6,952	7,743

Note: *a* denotes 1% significance, *b* denotes 5% significance, *c* denotes 10% significance. Standard errors clustered by municipality are included in parenthesis. All specifications include firm-level log TFP and log wages as additional controls (coefficients not included to save space). All specifications also include sector and province fixed effects.

Table H.9: Alternative TFP Measures

Dependent Variable:	ΔLn(Exports)			
	(1)	(2)	(3)	(4)
	OLS	IV	OLS	IV
ΔLn(Total Sales)	0.785[a]	-2.624[a]	0.880[a]	-1.969[b]
	(0.037)	(0.916)	(0.028)	(0.931)
ΔLn(Avg. Wages)	-0.095[b]	-1.567[a]	-0.293[a]	-1.097[a]
	(0.047)	(0.408)	(0.063)	(0.288)
ΔLn(TFP Sales)	0.397[a]	3.741[a]		
	(0.053)	(0.900)		
ΔLn(TFP Value Added)			0.504[a]	1.584[a]
			(0.056)	(0.365)
F-Statistic		23.42		17.85
Observations	8,018	8,018	8,018	8,018

Note: *a* denotes 1% significance, *b* denotes 5% significance, *c* denotes 10% significance. Standard errors clustered by municipality. All specifications include firm-level log average wages and sector and province fixed effects as additional controls.

Table H.10: Placebo Tests of First Stage

Dependent Variable:	ΔLn(Domestic Sales)			
Sample:	Boom firms		Bust firms	
	Within Boom	Boom vs. Bust	Within Bust	Boom vs. Bust
	(1)	(2)	(3)	(4)
ΔLn(Vehicles p.c. in Municipality)	-0.087^c	0.113^b	0.056	0.128^a
	(0.053)	(0.048)	(0.063)	(0.048)
Observations	5,344	5,344	5,245	5,245
F-statistic	2.73	5.40	0.79	7.12

Note: *a* denotes 1% significance, *b* denotes 5% significance, *c* denotes 10% significance. Standard errors clustered by municipality appear in parenthesis. All specifications include firm-level log TFP and log average wages as additional controls. These coefficients are not included to save space. All specifications also include sector and province fixed effects. The sample use to compute the estimates in columns 1 and 2 includes all firms active in at least one year in the subperiod 2002-05 and in at least one year in the subperiod 2006-08. The sample use to compute the estimates in columns 3 and 4 includes all firms active in at least one year in the subperiod 2009-11 and in at least one year in the subperiod 2012-13.