Online Appendix for "Merger Activity in Industry Equilibrium"*

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A. Overview

In this online appendix, we provide the computational details and additional results for the paper "Merger Activity in Industry Equilibrium." Section B discusses the numerical algorithm employed to solve and calibrate the model; section C provides a proposition about equilibrium output prices when discounting is stochastic; section D performs a comparative-statics analysis of the target moments with respect to the structural parameters; section E presents empirical evidence on merger activity across industries and countries; and section F reports tables of results for the robustness checks discussed in subsections 4.3 and 4.4 of the paper.

B. Solution Algorithm

In this section, we present the numerical solution algorithm employed to solve the model described in Section 2 of the paper.

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*All remaining errors are our responsibility.

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B.1. General Description of the Solution Algorithm

Our calibration algorithm nests two loops. In the first loop, we compute the recursive competitive equilibrium at a given value of the structural parameters, simulate the economy for a number of periods, and collect a vector of simulated moments. In the second loop, the parameter space is searched until the sum of squared percentage deviations between the set of empirical and simulated moments chosen for calibration is minimized.

To compute the competitive equilibrium, we employ the Parameterized Expectation Algorithm (PEA), treating the continuation value $U(\widehat{x}, z)$ as the object of convergence (see subsection B.2 for details).[1] This algorithm relies on simulating a cross section of firms for many periods, and updates the value function on the basis of realized policies. In total, we simulate 500 periods and discard the first 25 percent, to ensure updating on the basis of stationary paths of the endogenous aggregate states m, $\log(v)$ and $\log(N)$.

To ensure convergence, we follow a nonstochastic simulation approach that traces a continuum of firms over time. We do so because a standard Monte Carlo simulation of a finite number of firms would encounter two computational problems. First, for a given value of the parameters, in an iteration in which firms' expectations are far from equilibrium, there is a high likelihood that at least in one period all simulated firms decide to exit and none to enter. Second, the merger and exit rates are discontinuous functions of parameters, because they are based on aggregation of firm-specific discrete choices. By comparison, these issues do not arise in our nonstochastic simulation. Indeed, with a continuum rather than a finite number of firms, there is always a positive mass of firms remaining in the industry, and the entry and exit probabilities (determined by Equations 17 and 18 in the paper, respectively) are determined by distribution functions that are smooth in parameters. This preserves a uniform level of numerical accuracy across parameters that imply different merger, entry and exit rates.

Our algorithm requires approximating the continuation value $U(\widehat{x}, z)$ using a flexible functional form on a grid of the states $\widehat{x}$ and z. As discussed in subsection B.2, we use a polynomial approximation, and we discretize the state space for z following Tauchen (1986), by assuming that $\log(z)$ lies on a grid of 40 Chebyshev nodes spanning the interval $\left[\frac{-5\sigma_z}{\sqrt{1-\rho_z^2}}, \frac{5\sigma_z}{\sqrt{1-\rho_z^2}}\right]$. We choose a large number of standard deviations of the ergodic distribution of the process of $\log(z)$ to

[1] See Algan, Allais, Den Haan, and Rendahl (2014) for a discussion of parameterized expectation methods for the solution of dynamic models with heterogeneous agents and aggregate uncertainty. See Den Haan (1996) for an application.

obtain a large enough range to incorporate post-merger productivity changes.[2] For our endogenous aggregate states m, $\log(v)$ and $\log(N)$, we employ an adaptive updating rule: We gradually adjust the bounds of the state space, depending on the states' realized values in a given iteration.[3]

Dynamic models with heterogeneous agents are often solved using the Krusell and Smith (1998) algorithm. This method assumes that agents follow a forecasting rule to form expectations on the future distribution of the endogenous aggregate states (typically an autoregressive law based on the first moment of the distribution); solves for the agents' individual policies by dynamic programming given this rule; simulates an economy with a large number of agents; updates the agents' forecasting rule by regression on the simulated data; and iterates until convergence. The algorithm we employ offers three significant advantages compared to Krusell and Smith's (1998) algorithm. First, we do not need to specify an approximate law of motion of the endogenous aggregate states, since Equations 21, 28 and 29 in the paper provide an exact one. Second, our algorithm is faster because it nests the updating of firm's policies and the simulation of the economy in one loop. Finally, compared to dynamic programming approaches, our method is less memory intensive because it computes the continuation value $U(\widehat{x}, z)$ at the realized values of the endogenous aggregate states, rather than for a wide grid of the states that include regions not visited in equilibrium.

B.2. Details of the Computation Procedure

From Equations 3 and 11 in the paper, the continuation value of the firm is the solution to the following fixed point problem:

$$U(\widehat{x}, z) = \mathcal{T}_U(\widehat{x}, z), \tag{B.1}$$

where

$$\begin{aligned}\mathcal{T}_U(\widehat{x}, z) = &- \kappa(\widehat{x}, z) + \frac{1}{1+r} \int_{\mathcal{Z}} \int_{\mathcal{S}} V(\widehat{x}', z', \kappa(\widehat{x}, z)) \\ &+ \overline{W}(e^*(\widehat{x}', z'), \widehat{x}', z') \,\mathrm{d}F_S(s' \mid s) \,\mathrm{d}F_Z(z' \mid z).\end{aligned} \tag{B.2}$$

Let $\Phi(\widehat{x}, z)$ be a matrix of polynomials of states such that $U(\widehat{\mathbf{x}}, \mathbf{z}) = \Phi(\widehat{\mathbf{x}}, \mathbf{z})\beta$ for a set of nodes $(\widehat{\mathbf{x}}, \mathbf{z}) = (\widehat{x}_1, z_1, \ldots, \widehat{x}_I, z_I)$. A value function iteration method would seek a solution to

[2] We verify by Monte Carlo experiments that these bounds are never reached.

[3] This bound-adjustment approach is similar to the one described by Maliar and Maliar (2003) for the standard neoclassical growth model.

$\min_\beta d(\Phi(\widehat{\mathbf{x}},\mathbf{z})\beta, \widehat{\mathcal{T}}_U(\widehat{\mathbf{x}},\mathbf{z};\beta))$ where $d(.,.)$ is a distance metric, and $\widehat{\mathcal{T}}_U(\widehat{\mathbf{x}},\mathbf{z};\beta)$ is a numerical approximation of $\mathcal{T}_U(\widehat{\mathbf{x}},\mathbf{z})$. The Parameterized Expectations Algorithm (PEA), instead, minimizes a distance $d(\Phi(\widehat{\mathbf{x}}_T(\beta),\mathbf{z})\beta, \widehat{\mathcal{T}}_U(\widehat{\mathbf{x}}_T(\beta),\mathbf{z};\beta))$, where $\widehat{\mathbf{x}}_T(\beta) = (\widehat{x}_1(\beta),\ldots,\widehat{x}_t(\beta),\ldots,\widehat{x}_T(\beta)))$ are aggregate states generated by simulation for T periods, in which firms assume that $U(\widehat{x},z) = \Phi(\widehat{x},z)\beta$. Therefore, the PEA seeks a value of the collocation parameters β such that the distance between the value of the polynomial approximating $U(\widehat{x},z)$ and the numerical approximation of the right hand side of the Bellman equation in B.2 is minimal on a set of aggregate states consistent with β. This can be implemented numerically using the iteration

$$\beta_{n+1} = (1-w)\beta_n + wB_n, \tag{B.3}$$

where

$$B_n = \min_\beta d(\Phi(\widehat{\mathbf{x}}_T(\beta_n),\mathbf{z})\beta, \widehat{\mathcal{T}}_U(\widehat{\mathbf{x}}_T(\beta_n),\mathbf{z};\beta_n)), \tag{B.4}$$

until the sequence β_n converges. In Equation B.3, $w \in (0,1]$ is a dampening parameter useful for numerical stability purposes. Intuitively, given a value of β_n, firms make merger, entry and exit decisions on the basis of $U(\widehat{\mathbf{x}},\mathbf{z}) = \Phi(\widehat{\mathbf{x}},\mathbf{z})\beta_n$. This allows us to simulate the aggregate states $\widehat{\mathbf{x}}_T(\beta_n)$ and compute the continuation value on the realized states $\widehat{\mathcal{T}}_U(\widehat{\mathbf{x}}_T(\beta_n),\mathbf{z};\beta_n)$. Then, the algorithm selects the parameter vector that most closely describes this continuation values in terms of the polynomial function $\Phi(.)$ evaluated at the realized states $\widehat{\mathbf{x}}_T(\beta_n)$. The steps of this numerical procedure are detailed in the following three subsections. All integrations are performed by Chebyshev quadrature methods.

B.3. Algorithm initiation

We specify $\log(z)$ to lie on a grid $logz_G$ consisting of 40 Chebyshev nodes spanning the interval $\left[\frac{-5\sigma_z}{\sqrt{1-\rho_z^2}}, \frac{5\sigma_z}{\sqrt{1-\rho_z^2}}\right]$. The polynomial matrix $\Phi(\widehat{\mathbf{x}},\mathbf{z})$ includes: the tensor product of third-degree Chebyshev polynomials for the states $\log(s)$, $\log(N)$ and $\log(z)$; the linear terms for states m, $\log(v)$ and all their pairwise correlations with $\log(s)$, $\log(N)$ and $\log(z)$. We choose this anisotropic polynomial approach to minimize multi-collinearity problems in Φ (see discussion in Judd, Maliar, Maliar, and Valero, 2013).

B.4. Iterations

For each period $t = 1, \dots, T$:

1. Simulate $\log(s_t) = \rho_s \log(s_t) + \sigma_s \varepsilon_{st}$, where $\varepsilon_{st} \sim \mathcal{N}(0,1)$.

2. Find P_t by linearly interpolating $p(s, \widehat{x}_{t-1})$ on s_t.

3. For each pair i, j in the grid $logz_G$, compute $U_{it} = \Phi(\widehat{\mathbf{x}}_t, z_i)\beta_n$, $U_{jt} = \Phi(\widehat{\mathbf{x}}_t, z_j)\beta_n$, $U_{ijt} = \Phi(\widehat{\mathbf{x}}_t, \zeta_M(z_i, z_j))\beta_n$, and the synergies W_{ijt} from matching types i, j, using Equation 5 in the paper.

4. Determine the distribution of matched firms f_M. Initiate using $f_M = f_t$. For each gridpoint in $logz_G$:

   i. Compute $\overline{W}$ given f_M, using Equation 7 in the paper.

   ii. Compute search effort e^* using Equation 8 in the paper.

   iii. Update f_M using Equation 9 in the paper.

   Iterate steps i to iii until convergence.

5. Determine the distribution of matched firms f_U using Equation 10 in the paper.

6. Compute the fraction of matched firms $\int_{\mathcal{Z}} e^*(\widehat{x}, z) dF_t(z)$.

7. Compute the fraction of matched firms that merge:

$$P_M(\widehat{x}_t) = \int_{\mathcal{Z}^2} \mathbf{1}(W(\widehat{x}_t, z_1, z_2) > 0)\, \mathrm{d}F_M(z_1)\, \mathrm{d}F_M(z_2). \tag{B.5}$$

8. Compute the fraction of matched firms that do not merge and do not exit

$$P_N(\widehat{x}_t) = \int_{\mathcal{Z}^2} \mathbf{1}(W(\widehat{x}_t, z_1, z_2) < 0, U(\widehat{x}_t, z_1) > 0)\, \mathrm{d}F_M(z_1)\, \mathrm{d}F_M(z_2). \tag{B.6}$$

9. Compute the end-of-period distributions $\widetilde{F}_M(z; \widehat{x}_t)$ and $\widetilde{F}_N(z; \widehat{x}_t)$ using Equations 26 and 27 in the paper, respectively.

10. Determine the entry policy:

i. Find the entry threshold $z_{E,t} \in \left[\frac{-5\sigma_z}{\sqrt{1-\rho_z^2}}, \frac{5\sigma_z}{\sqrt{1-\rho_z^2}}\right]$ such that $U(\widehat{x}_t, z_{E,t}) = c_E$ using bisection and linear interpolation between gridpoints.

ii. Compute the fraction of potential entrants entering:

$$P_E(\widehat{x}_t) = 1 - G(z_{E,t}). \tag{B.7}$$

iii. Compute the end-of-period distribution for new entrants using Equation 23 in the paper.

11. Determine the exit policy:

i. Find the exit threshold $z_{\epsilon,t} \in \left[\frac{-5\sigma_z}{\sqrt{1-\rho_z^2}}, \frac{5\sigma_z}{\sqrt{1-\rho_z^2}}\right]$ such that $U(\widehat{x}_t, z_{\epsilon,t}) = 0$ using bisection and linear interpolation between gridpoints.

ii. Compute the fraction of unmatched firms that don't exit:

$$P_\epsilon(\widehat{x}_t) = 1 - F_U(z_{\epsilon,t}). \tag{B.8}$$

iii. Compute end-of-period distribution of unmatched firms using Equation 25 in the paper.

12. Update the end-of-period distribution $\widetilde{F}_t$ and the next start-of-period distribution F_{t+1} using Equations 22 and 28 in the paper, respectively.

13. Update m_{t+1}, $\log(v_{t+1})$ using

$$m_{t+1} = \int_{\mathcal{Z}} \log(z) \mathrm{d}F_{t+1}(z) \tag{B.9}$$

$$v_{t+1} = \int_{\mathcal{Z}} \left(\log(z) - m_{t+1}\right)^2 \mathrm{d}F_{t+1}(z). \tag{B.10}$$

14. Compute $p_{t+1}(s_{t+1}, \widehat{x}_t)$ for each $\log(s_{t+1})$ in the gridspace of $\log(s)$ using Equation 15 in the paper.

15. Determine the investment policy k_{t+1} using Equation 14 in the paper.

16. Evaluate $\widehat{\mathcal{T}}_U(\widehat{x}_t(\beta), \mathbf{z}; \beta)$. To do so:

i. For each $\log(s_{t+1})$ on the gridspace of $\log(s)$ repeat steps 2 to 14 and evaluate π_{t+1}, k_{t+2}, $f_{M,t+1}$, $f_{U,t+1}$, $U_{1,t+1}$, $U_{2,t+1}$, $U_{M,t+1}$, and the expected gains from participating the next period takeover market, $\overline{W}_{t+1}$.

ii. Evaluate $\widehat{\mathcal{T}}_U(\widehat{x}_t(\beta), \mathbf{z}; \beta)$ using numerical integration on the right hand side of Equation B.2, and noting that

$$V_{t+1} = \pi_{t+1} + (1-\delta)k_{t+1} + \max\{U_{1,t+1}, 0\}. \tag{B.11}$$

B.5. Updating of grids and coefficients

To update the grid of states and the collocation coefficients, we follow the steps below:

i. Discard computations on the initial 125 periods.

ii. Update the range $[\underline{m}_{n+1}, \overline{m}_{n+1}]$ for state m, so that for $n = 1$, $\underline{m}_{n+1} = \min\{m_{126}, \ldots, m_T\}$, $\overline{m}_{n+2} = \max\{m_{126}, \ldots, m_T\}$, and for $n > 1$, $\underline{m}_{n+1} = 0.9\underline{m}_n$, and $\overline{m}_{n+1} = \overline{m}_2(3 - 2\exp(-n))$. Therefore, asymptotically m can be at most as large as 3 times its maximum realized value in the first iteration. This step follows Maliar and Maliar (2003).

iii. Update the range $[\underline{\log(v)}_{n+1}, \overline{\log(v)}_{n+1}]$ for state $\log(v)$, so that for $n = 1$, $\underline{\log(v)}_{n+1} = \min\{\log(v)_{126}, \ldots, \log(v)_T\}$, $\overline{\log(v)}_{n+2} = \max\{\log(v)_{126}, \ldots, \log(v)_T\}$, and for $n > 1$, $\underline{\log(v)}_n = 0.9\underline{\log(v)}_n$, and $\overline{\log(v)}_{n+1} = \overline{\log(v)}_2(3 - 2\exp(-n))$. Therefore, asymptotically $\log(v)$ can be at most as large as 3 times its maximum realized value in the first iteration.

iv. Update B_n by regressing $\widehat{\mathcal{T}}_U(\widehat{x}_t(\beta_n), \mathbf{z}; \beta_n)$ on $\Phi(\widehat{x}_t(\beta_n), \mathbf{z})$ for $t = 126, \ldots, T$ using regularized least squares with truncated singular value decomposition (RLS-TSVD). This method is proposed by Judd, Maliar, and Maliar (2011) to address collinearity problems in the columns of the data matrix

$$\begin{bmatrix} \Phi(\widehat{x}_{126}(\beta_n), \mathbf{z}) \\ \ldots \\ \Phi(\widehat{x}_T(\beta_n), \mathbf{z}) \end{bmatrix}. \tag{B.12}$$

v. Update $\beta_{n+1} = w\beta_n + (1-w)B_n$, setting the dampening parameter to $w = 0.2$.

Iterations finish when $\max\{(\mid \Phi(\widehat{\mathbf{x}}_T(\beta_n), \mathbf{z})(\beta_{n+1} - \beta_n)) \mid\}$ is smaller than our tolerance level, 10^{-3}, where $\mid . \mid$ is the element-by-element absolute value operator.

C. Equilibrium Output Price with Stochastic Discounting

The following proposition derives the equilibrium output prices when firms discount future payoffs using a stochastic discount factor. This proposition is used in subsection 4.4.2 of the paper.

Proposition 1 *Denote the incumbents' end-of-period c.d.f. of productivity by $\widetilde{F}(z;x)$ and assume firms discount using the pricing kernel $M(s',s)$. The next-period price is*

$$\begin{aligned} p(s',x) =& s'(E(M(s',s)p(s',x)|s)^{-\frac{\alpha}{(1-\alpha)\eta}} \\ &\times \left[N' \left[\frac{1+r(s)}{r(s)+\delta}\alpha\right]^{\frac{\alpha}{1-\alpha}} \int_{\mathcal{Z}} \left([E(z'|z))]^{\frac{1}{1-\alpha}} \right) \tilde{f}(z;x)dz \right]^{-1/\eta}, \end{aligned} \tag{C.13}$$

where

$$\begin{aligned} E(M(s',s)p(s',x)|s) =& (E(M(s',s)s' \mid s))^{\frac{(1-\alpha)\eta}{(1-\alpha)\eta+\alpha}} \\ &\times \left[N' \left[\frac{1+r(s)}{r(s)+\delta}\alpha\right]^{\frac{\alpha}{1-\alpha}} \int_{\mathcal{Z}} \left([E(z'|z))]^{\frac{1}{1-\alpha}} \right) \tilde{f}(z;x)dz \right]^{-\frac{(1-\alpha)}{(1-\alpha)\eta+\alpha}}, \end{aligned} \tag{C.14}$$

and

$$r(s) = \frac{1}{E\left(M(s',s) \mid s\right)} - 1. \tag{C.15}$$

Proof For a stochastic discount factor $M(s',s)$, the firm's end-of-period continuation value is

$$\begin{aligned} U(x,z) = \max_{k'} -k' + \int_{\mathcal{Z}} \int_{\mathcal{S}} M(s',s)J(x',z',k')dF_S(s' \mid s)dF_Z(z' \mid z) \\ \text{s.t. } \chi' = \Gamma(\chi, s', s). \end{aligned} \tag{C.16}$$

The firm's optimal next-period capital is

$$\kappa(s,z) = \left[\frac{1+r(s)}{r(s)+\delta}\alpha(E(M(s',s)p(s',x)|s)E(z'|z))\right]^{\frac{1}{1-\alpha}}. \tag{C.17}$$

The market clearing output price is:

$$p(s',x) = s'\left[N'\int_{\mathcal{Z}^2} z'\kappa(s,z)^{\alpha} f(z'|z)\tilde{f}(z;x)dz'dz\right]^{-\frac{1}{\eta}}, \tag{C.18}$$

where $\tilde{f}(z;x)$ is the cross sectional distribution of firms that have decided to be incumbents in next period, that is, the cross-sectional distribution of productivity after merger, entry and exit decisions are incurred in the current period. Expanding Equation C.18,

$$\begin{aligned} p(s',x)^{-\eta} &= (s')^{-\eta} N' \int_{\mathcal{Z}^2} z' \left(\left[\frac{1+r(s)}{r(s)+\delta} \alpha (E(M(s',s)p(s',x)|s) E(z'|z)) \right]^{\frac{\alpha}{1-\alpha}} \right) f(z'|z) \tilde{f}(z;x) dz' dz \\ &= (s')^{-\eta} N' \left[\frac{1+r(s)}{r(s)+\delta} \alpha (E(M(s',s)p(s',x)|s) \right]^{\frac{\alpha}{1-\alpha}} \int_{\mathcal{Z}} \left([E(z'|z))]^{\frac{1}{1-\alpha}} \right) \tilde{f}(z;x) dz, \quad \text{(C.19)} \end{aligned}$$

or

$$\begin{aligned} p(s',x) &= s'(E(M(s',s)p(s',x)|s)^{-\frac{\alpha}{(1-\alpha)\eta}} \\ &\times \left[N' \left[\frac{1+r(s)}{r(s)+\delta} \alpha \right]^{\frac{\alpha}{1-\alpha}} \int_{\mathcal{Z}} \left([E(z'|z))]^{\frac{1}{1-\alpha}} \right) \tilde{f}(z;x) dz \right]^{-1/\eta}. \quad \text{(C.20)} \end{aligned}$$

Multiplying both sides of Equation C.20 by $M(x',x)$, we get

$$\begin{aligned} M(s',s)p(s',x) &= M(s',s)s'(E(M(s',s)p(s',x)|s)^{-\frac{\alpha}{(1-\alpha)\eta}} \\ &\times \left[N' \left[\frac{1+r(s)}{r(s)+\delta} \alpha \right]^{\frac{\alpha}{1-\alpha}} \int_{\mathcal{Z}} \left([E(z'|z))]^{\frac{1}{1-\alpha}} \right) \tilde{f}(z;x) dz \right]^{-1/\eta}. \quad \text{(C.21)} \end{aligned}$$

Taking expectations on both sides of Equation C.21 and rearranging, we obtain

$$\begin{aligned} [E(M(s',s)p(s',x)|s)]^{1+\frac{\alpha}{(1-\alpha)\eta}} &= E(M(s',s)s' \mid s) \\ &\times \left[N' \left[\frac{1+r(s)}{r(s)+\delta} \alpha \right]^{\frac{\alpha}{1-\alpha}} \int_{\mathcal{Z}} \left([E(z'|z))]^{\frac{1}{1-\alpha}} \right) \tilde{f}(z;x) dz \right]^{-1/\eta}, \quad \text{(C.22)} \end{aligned}$$

which yields Equation C.14.

D. Comparative Statics Results

In this section, we perform a comparative statics analysis to examine how informative our calibration targets are with respect to the parameters of the model. This exercise also highlights how cross-sectional differences in technology affect firm turnover.

Table A.1 presents the results of changing each of the parameters of the model. To facilitate comparison, Column 1 reports the moments at the calibrated parameters in Table 1 of the paper. In Column 2, we examine the effect of increasing the weight of the most efficient firm in the merged firm's productivity by setting its value to 0.7. The difference in the Tobin's Q of the merging firms rises, because higher values of λ increase the merger gains for firms with different levels of productivity. This point is illustrated in Figure A.1, which shows contour plots of the merger synergies as a function of the productivity of the merging firms for two different values of λ.

In industries in which mergers generate higher productivity improvements (the curvature parameter θ decreases, Column 3), the merger rate is higher, and future merger options are more valuable, which decreases the exit rate. While both changes in λ and θ imply a higher spread in Q between the merging firms, the former implies an increase in the standard deviation of mergers, whereas the latter a decrease.

The merger rate declines with the merger-implementation cost, c_M, and the search costs c_s (Columns 4 and 5, respectively). Interestingly, an increase in either c_M or c_s raises the average combined merger gains. The intuition is the following. First, c_M and c_s have a direct effect on the option value of merging, defined in Equation 6 of the paper, which decreases in c_M and increases in c_s—firms only search when expected synergies are high enough to compensate for the search costs. However, an increase in either of the two costs reduces the expected net gains from participating in the merger market, defined in Equation 32 of the paper, and therefore the stand-alone value of the firm. For c_s, both the direct and the selectivity effects move in the direction of higher combined merger gains (Column 5 of Table A.1). For c_M, the selectivity effect dominates the direct effect on expected synergies, explaining why the combined merger gains in Column 4 are higher compared to those in Column 1.

When fixed costs of production rise (Column 6 of Table A.1) firm turnover accelerates for two main reasons: Unmatched firms have a stronger incentive to exit the industry, and matched firms are more inclined to merge and save production costs. The latter effect dominates and the average exit rate decreases compared to Column 1. Figure A.2 shows that the decline in the exit rate is only a local effect. When the fixed costs of production are either at a low level, so that synergies are small,[4] or at a high level, so that the incentive to exit is strong, the average exit rate is positively related to c_f.

[4]For low c_f, the potential cost savings due to a merger are small, and productivity gains are also small because there is a low exit rate, a high mass of incumbents, and a low product price.

Industries with higher costs of entry (Column 7 of Table A.1) feature a higher (lower) average productivity of entrants (exiting firms) relative to that of the incumbents, and a lower exit rate. This is because higher costs of entry discourage firms from entering, which raises the product price and allows more low-productivity incumbents to remain in the industry. By comparison, when the mass of potential entrants N_E rises (Column 8), the average productivity of entrants rises, but the exit rate and the relative productivity of exiting firms to incumbents increase. The reason is that more potential entrants means a lower product price, which discourages unproductive firms from entering and induces more incumbents to exit.

More persistent aggregate shocks (Column 9) imply a higher autocorrelation of aggregate operating-earnings growth and a higher average exit rate, because spells of poor demand last longer. By comparison, a lower elasticity of demand (Column 10) also yields a higher exit rate, because the output price decreases, but it is associated with a lower persistence in earnings growth. Finally, more volatile aggregate shocks imply a larger fraction of firms below the exit threshold, a higher standard deviation of earnings growth, and a more volatile merger rate (Column 11).

E. Additional Evidence on Merger Activity and Productivity

In this section, we first discuss heterogeneity in M&A activity across industries and countries (subsection E.1), and then present cross-country evidence on the relation between productivity and merger activity (subsection E.2).

E.1. Merger Activity Across Industries and Countries

Table A.2 shows the values, across 2-digit SIC-code industries, of three target moments in the calibration: the mean and standard deviation of the annual merger rate, and the average absolute scaled difference in log Tobin's Q of merged firms. The sample period is 1981 to 2010, and the moments are computed for industries with at least 20 active firms in any given year. The sample construction is described in Appendix C of the paper, and variable definitions are available in section 3.2 of the paper. The industry with the highest merger rate is Communications (on average 6.03% annual merger rate), while Apparel & Accessory Stores has the lowest rate (2.76%); the standard deviation of the merger rate varies between 1.61% (Wholesale Trade - Durable Goods) and 4.49% (Transportation by Air); and the average log Tobin's Q difference between merging firms is highest for Food & Kindred Products (1.2347) and lowest for Wholesale Trade - Durable Goods (0.7571).

Table A.3 shows the mean and standard deviation of the annual M&A volume across twenty countries. For each year, we compute M&A volume as the fraction of the total dollar volume of completed M&As announced in that year in the target company's country, over the country's gross domestic product.[5] M&A data is from Thomson Reuters' SDC Platinum, GDP at current prices and purchasing power parity is from the OECD, and the sample period is 1995 to 2013. The United kingdom has the highest average M&A volume (10.48%), and South Korea the lowest (1.45%). M&A activity is most volatile in Switzerland (9.06%), while South Korea features the lowest dispersion (0.73%).

Overall, these results show that there is considerable heterogeneity in merger activity across industries and countries. Using our model, we interpret this heterogeneity as driven by differences in the structural parameters, and in particular in the search-cost and synergy parameters to which the target moments reported in the tables correspond (the mean and standard deviation of the merger rate are the target moments for θ and c_s, respectively, and the average difference in Tobin's Q for λ).

E.2. Cross-country Evidence on Productivity and M&A Activity

Our model predicts that recessions should lead to lower average firm productivity in the presence of an active merger market, and a productivity increase in the absence of M&A activity (see discussion in section 4.2 of the paper). To test this prediction empirically, we construct a panel data of multi-factor productivity (MFP) growth for a sample of twenty countries in the period 1995-2013.[6] We then regress MFP growth on M&A volume in the previous year, a dummy for the years 2008 to 2012, and an interaction term for the dummy variable and lagged M&A volume. The dummy variable covers the post-financial crisis years of the Great Recession in the United States (2008 and 2009) and the sovereign debt crisis in Europe, from the crisis in Greece (2010) until the "whatever it takes to preserve the Euro" speech of the European Central Bank's President Mario Draghi (July 2012).

The results in Column 1 of Table A.4 show that MFP growth is positively related to the lagged M&A volume, although the regression coefficient is not statistically significant, and to the dummy for the post-financial crisis years. The coefficient of interest for the interaction term between the dummy variable and the lagged M&A volume is negative and statistically significant at the 5%

[5]We use the M&A volume instead of the merger rate, defined as the fraction of public firms that delist because of a merger in a given year, because of data constraints for some countries in our sample.

[6]MFP estimates are from the OECD.

level. These results are robust to the inclusion of country fixed effects in Column 2 of Table A.4, and lagged MFP growth in a dynamic panel regression (Blundell and Bond, 1998) in Column 3. The negative coefficient associated with the interaction term is consistent with the model's prediction that recessions have stronger effects on productivity for countries with lower M&A activity.

Finally, in unreported results, we replaced the dummy for the post-financial crisis years with a recession dummy based on the country-specific recession dates provided by the OECD. In this regression, the interaction term is not statistically significant. This result may support the idea that the effect of M&A activity on productivity becomes significant only for large enough recessions, as it is the case for the 2008-2012 period.

F. Additional Robustness Checks

In this section, we perform robustness checks with respect to three parameters: the returns-to-scale parameter α; the persistence of idiosyncratic productivity shocks ρ_z; and the standard deviation of innovations to productivity σ_z. For each of these parameters, we perturb the value used in the main calibration (Panel A of Table 1 in the paper) by $\pm 10\%$. We then recalibrate the parameters in Panel B of Table 1 targeting the moments in Table 2 of the paper. For each robustness check, we perform the same experiments described in section 4.4 of the paper: i) We increase the merger implementation cost c_M to infinity; and ii) we reduce the entry cost c_E by 40%. For each robustness check, we also recalibrate an economy without mergers and perform experiment ii) on entry costs. In the calibrations without mergers, we set the entry cost c_E at the value in the corresponding economy with mergers, and we match the five merger-unrelated moments in Table 2 of the paper. The calibrated parameter values and the corresponding simulated moments for each robustness check are shown in Table A.5 and Table A.6.

The results in Table A.7 show that the main conclusions of the paper remain unchanged when considering different values of the parameters α, ρ_z and σ_z. In general, merger activity induces a substantial increase in mean industry productivity, a higher entry rate, a lower exit rate, and an increase in the correlation between industry productivity and demand shocks. Public policies that reduce entry costs encourage new firms to enter the industry, but discourage merger activity, ultimately canceling, or even reversing, the benefits in mean industry productivity obtained by the entry of new firms. The effects of mergers on productive efficiency are larger for industries in which corporate investment responds more strongly to productivity shocks (α or ρ_z higher) or to demand shocks (η higher).

Finally, Table A.8 presents the calibrated parameters and simulated moments for the robustness checks in Sections 4.4.1, 4.4.2 and 4.4.3 of the paper, and Table A.9 shows the calibration results for the counterfactual experiment in Section 4.3.

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Table A.1: Comparative statics results. This table presents simulated moments for different values of the model's parameters. The starting parameter values are those in Table 1 of the paper. Column 1 shows the simulated moments for the base case, when parameters are equal to those in Table 1 of the paper. The remaining columns present the following comparative statics exercises: $\lambda = 0.7$ in Column 2; $\theta = 0.47$ in Column 3; $c_M = 0.33$ in Column 4; $c_s = 0.024$ in Column 5; $c_f = 0.16$ in Column 6; $c_E = 0.31$ in Column 7; $N_E = 1$ in Column 8; $\rho_s = 0.64$ in Column 9; $\eta = 2.06$ in Column 10; and $\sigma_s = 0.073$ in Column 11. Definitions of the moments and variables are provided in Tables 2 and 3 of the paper, respectively.

Variable	Base case (1)	λ (2)	θ (3)	c_M (4)	c_s (5)	c_f (6)	c_E (7)	N_E (8)	ρ_s (9)	η (10)	σ_s (11)
Average merger rate	0.0421	0.0437	0.0689	0.0228	0.0380	0.0537	0.0425	0.0402	0.0406	0.0373	0.0405
Standard deviation of merger rate	0.0122	0.0151	0.0079	0.0144	0.0115	0.0072	0.0097	0.0108	0.0122	0.0118	0.0124
Autocorrelation of merger rate	0.2919	0.422	0.3566	0.2715	0.2705	0.3490	0.2698	0.2502	0.2841	0.2608	0.2467
Average log Tobin's Q difference	0.9253	0.9702	0.9883	0.8606	0.9111	0.9379	0.9345	0.9102	0.9204	0.8953	0.9214
Average combined merger gains	0.0163	0.018	0.0155	0.0168	0.0170	0.0150	0.0163	0.0161	0.0162	0.0163	0.0163
Average exit rate	0.0371	0.0346	0.0201	0.0525	0.0403	0.0327	0.0338	0.0397	0.0382	0.0435	0.0381
Average relative TFP of entrants	1.0603	1.0597	1.0281	1.0816	1.0649	1.0466	1.0639	1.0636	1.0622	1.0678	1.0622
Average relative TFP of exitors	0.7229	0.7227	0.6924	0.7370	0.7266	0.7186	0.7180	0.7260	0.7242	0.7320	0.7242
Autocorr. of aggr. earnings growth	0.1822	0.201	0.1482	0.2024	0.1788	0.1421	0.1682	0.1748	0.2120	0.1614	0.1828
St. dev. of aggr. earnings growth	0.0930	0.0935	0.0905	0.0958	0.0935	0.0915	0.0928	0.0926	0.0936	0.0933	0.0979

Table A.2: Merger activity across industries. This table shows the mean and standard deviation of the annual merger rate, and the average absolute scaled difference in log Tobin's Q of merged firms across 2-digit SIC code industries. The sample period is 1981 to 2010. Appendix C in the paper describes the sample construction, and the moments are computed for industries with at least 20 active firms in any given year. Variable definitions are available in section 3.2 of the paper.

Industry	Average merger rate (1)	St. dev. of merger rate (2)	Average log Tobin's Q diff. (3)
Communications	0.0603	0.0295	0.8987
Health Services	0.0576	0.0360	1.0182
Business Services	0.0556	0.0274	0.9982
Miscellaneous Retail	0.0516	0.0293	1.0500
Rubber & Miscellaneous Plastics Products	0.0455	0.0387	0.7648
Oil & Gas Extraction	0.0449	0.0232	0.8424
Eating & Drinking Places	0.0439	0.0292	1.0652
Instruments & Related Products	0.0432	0.0250	0.9540
Food & Kindred Products	0.0407	0.0280	1.2347
Primary Metal Industries	0.0398	0.0365	0.9957
Transportation by Air	0.0395	0.0449	1.0118
Fabricated Metal Products	0.0391	0.0263	0.9869
General Merchandise Stores	0.0381	0.0418	0.8008
Paper & Allied Products	0.0377	0.0287	1.0822
Wholesale Trade - Durable Goods	0.0376	0.0161	0.7571
Printing & Publishing	0.0374	0.0308	0.8434
Miscellaneous Manufacturing Industries	0.0370	0.0264	0.7705
Industrial Machinery & Equipment	0.0364	0.0200	1.0044
Chemical & Allied Products	0.0362	0.0177	0.9549
Electronic & Other Electric Equipment	0.0355	0.0184	0.9211
Wholesale Trade - Nondurable Goods	0.0351	0.0205	0.8340
Trucking & Warehousing	0.0350	0.0336	0.9570
Transportation Equipment	0.0316	0.0220	0.8353
Furniture & Fixtures	0.0313	0.0343	1.0794
General Building Contractors	0.0306	0.0360	1.1069
Apparel & Other Textile Products	0.0298	0.0275	1.0094
Apparel & Accessory Stores	0.0276	0.0316	1.2260
Mean	0.0400	0.0289	0.9631
Standard deviation	0.0083	0.0073	0.1293
Maximum	0.0603	0.0449	1.2347
Minimum	0.0276	0.0161	0.7571

Table A.3: Merger activity across countries. This table shows the average and standard deviation of the annual M&A volume for twenty countries. We compute M&A volume as the fraction of the total dollar volume of completed mergers and acquisitions in the target company's country by year of announcement, over the country's gross domestic product. M&A data is from Thomson Reuters' SDC Platinum, GDP at current prices and purchasing power parity is from the OECD, and the sample period is 1995 to 2013.

Country	Average M&A volume (1)	St. dev. of M&A volume (2)
Australia	0.0744	0.0274
Austria	0.0164	0.0128
Belgium	0.0476	0.0426
Canada	0.0690	0.0345
Denmark	0.0482	0.0394
Finland	0.0507	0.0338
France	0.0364	0.0231
Germany	0.0282	0.0296
Ireland	0.0460	0.0266
Italy	0.0291	0.0194
Japan	0.0173	0.0123
South Korea	0.0145	0.0073
Netherlands	0.0664	0.0604
New Zealand	0.0458	0.0309
Portugal	0.0172	0.0131
Spain	0.0252	0.0149
Sweden	0.0799	0.0501
Switzerland	0.0934	0.0906
UK	0.1048	0.0598
USA	0.0801	0.0403
Mean	0.0495	0.0335
St. dev.	0.0273	0.0203
Max.	0.1048	0.0906
Min.	0.0145	0.0073

Table A.4: Multifactor productivity growth and merger activity across countries. This table shows the results of regressions of multifactor productivity growth on lagged M&A volume, a dummy for the post-financial crisis years (2008 to 2012), and an interaction term between the dummy and the lagged M&A volume. The sample period is 1995 to 2013. MFP growth data comes from the OECD. We compute M&A volume as the fraction of the total dollar volume of completed mergers and acquisitions in the target company's country by year of announcement, over the country's gross domestic product. M&A data is from Thomson Reuters' SDC Platinum, and GDP at current prices and purchasing power parity is from the OECD. Column 1 presents the results of an OLS regression, Column 2 of a regression that includes fixed effects at the country level, and Column 3 of a dynamic panel data regression (Blundell and Bond, 1998). Standard errors are reported in parentheses.

	MFP growth (1)	MFP growth (2)	MFP growth (3)
Lagged M&A volume	0.0232	0.0295	0.0333
	(0.0298)	(0.0188)	(0.0193)
Dummy for years 2008-12	-0.0062	-0.0061	-0.0078
	(0.0024)	(0.0022)	(0.0020)
Lagged M&A volume × *Dummy for 2008-12*	-0.0880	-0.0900	-0.0855
	(0.0363)	(0.0331)	(0.0272)
Lagged MFP growth			-0.0298
			(0.0413)
Constant	0.0094	0.0091	0.0096
	(0.0033)	(0.0011)	(0.0014)
Country fixed effects	No	Yes	Yes
Adjusted R^2	0.093	0.117	
χ^2			95.52
Number of observations	360	360	360

Table A.5: Calibrated parameters and simulated moments for different values of α and ρ_z. This table shows the results of robustness checks with respect to the curvature parameter of the profit function, α, and the persistence, ρ_z, of the idiosyncratic productivity shocks. For each robustness check, we present two sets of results, corresponding to a calibration that accounts for merger activity ("Mergers") or ignores it ("No Mergers"). In the calibrations with mergers, we use the target moments in Table 2 of the paper. In the calibrations without mergers, we set c_M to infinity, c_E at the value in the corresponding merger economy, and we match the five merger-unrelated moments in Table 2. Panel A shows the calibrated parameters, and Panel B the simulated moments.

Panel A: Calibrated parameters						
	$\alpha = 0.825$		$\alpha = 0.675$		$\rho_z = 0.726$	
Parameters	Mergers (1)	No Mergers (2)	Mergers (3)	No Mergers (4)	Mergers (5)	No Mergers (6)
c_M	0.355	—	0.321	—	0.347	—
c_s	0.024	—	0.035	—	0.023	—
λ	0.511	—	0.510	—	0.533	—
θ	0.641	—	0.605	—	0.621	—
c_f	0.081	0.081	0.264	0.205	0.130	0.095
c_E	0.291	0.291	0.302	0.302	0.290	0.290
ρ_s	0.439	0.611	0.620	0.631	0.563	0.653
σ_s	0.069	0.068	0.069	0.062	0.069	0.069
η	2.259	2.260	2.931	2.873	2.172	2.170
N_E	0.962	0.962	0.942	0.941	0.962	0.962
Panel B: Simulated moments						
	$\alpha = 0.825$		$\alpha = 0.675$		$\rho_z = 0.726$	
Moments	Mergers (1)	No Mergers (2)	Mergers (3)	No Mergers (4)	Mergers (5)	No Mergers (6)
Average merger rate	0.053	—	0.033	—	0.049	—
Standard deviation of merger rate	0.025	—	0.007	—	0.013	—
Autocorrelation of merger rate	0.300	—	0.061	—	0.334	—
Average log Tobin's Q difference	0.849	—	0.885	—	0.894	—
Average combined merger gains	0.012	—	0.022	—	0.016	—
Average exit rate	0.038	0.037	0.040	0.032	0.041	0.035
Average relative TFP of entrants	1.060	1.159	1.047	1.114	1.047	1.167
Average relative TFP of exitors	0.712	0.718	0.728	0.711	0.709	0.698
Autocorr. of aggr. earnings growth	0.228	0.141	0.181	0.153	0.181	0.132
St. dev. of aggr. earnings growth	0.090	0.087	0.106	0.105	0.090	0.097

Table A.6: Calibrated parameters and simulated moments for different values of ρ_z and σ_z. This table shows the results of robustness checks with respect to the persistence, ρ_z, and standard deviation, σ_z, of the idiosyncratic productivity shocks. For each robustness check, we present two sets of results, corresponding to a calibration that accounts for merger activity ("Mergers") or ignores it ("No Mergers"). In the calibrations with mergers, we use the target moments in Table 2 of the paper. In the calibrations without mergers, we set c_M to infinity, c_E at the value in the corresponding merger economy, and we match the five merger-unrelated moments in Table 2. Panel A shows the calibrated parameters, and Panel B the simulated moments.

Panel A: Calibrated parameters						
	$\rho_z = 0.594$		$\sigma_z = 0.121$		$\sigma_z = 0.099$	
Parameters	Mergers (1)	No Mergers (2)	Mergers (3)	No Mergers (4)	Mergers (5)	No Mergers (6)
c_M	0.286	—	0.311	—	0.485	—
c_s	0.021	—	0.028	—	0.032	—
λ	0.479	—	0.491	—	0.510	—
θ	0.641	—	0.619	—	0.605	—
c_f	0.204	0.174	0.129	0.119	0.302	0.150
c_E	0.291	0.291	0.291	0.291	0.302	0.302
ρ_s	0.590	0.658	0.569	0.670	0.620	0.655
σ_s	0.070	0.069	0.070	0.069	0.069	0.068
η	2.175	2.288	2.127	2.128	3.503	2.271
N_E	0.961	0.959	0.977	0.976	0.942	0.960
Panel B: Simulated moments						
	$\rho_z = 0.594$		$\sigma_z = 0.121$		$\sigma_z = 0.099$	
Moments	Mergers (1)	No Mergers (2)	Mergers (3)	No Mergers (4)	Mergers (5)	No Mergers (6)
Average merger rate	0.047	—	0.034	—	0.035	—
Standard deviation of merger rate	0.003	—	0.012	—	0.016	—
Autocorrelation of merger rate	0.316	—	0.268	—	0.227	—
Average log Tobin's Q difference	0.917	—	0.920	—	0.861	—
Average combined merger gains	0.013	—	0.022	—	0.013	—
Average exit rate	0.037	0.041	0.043	0.036	0.049	0.037
Average relative TFP of entrants	1.057	1.118	1.080	1.165	1.023	1.123
Average relative TFP of exitors	0.738	0.735	0.702	0.692	0.760	0.743
Autocorr. of aggr. earnings growth	0.094	0.156	0.166	0.134	0.290	0.150
St. dev. of aggr. earnings growth	0.094	0.099	0.094	0.099	0.110	0.098

Table A.7: Parameter robustness checks. This table shows the results of robustness checks with respect to the curvature parameter of the profit function, α, and the persistence, ρ_z, and standard deviation, σ_z, of the idiosyncratic productivity shocks. For each robustness check, we present two sets of results, corresponding to a calibration that accounts for merger activity ("With mergers") or ignores it ("Without mergers"). In the calibration with mergers, we use the target moments in Table 2 of the paper. In the calibrations without mergers, we set c_E at the value in the corresponding merger economy, and we match the five merger-unrelated moments in Table 2. The lines "$c_M \to \infty$" and "c_E reduced by 40%" show comparative statics results that obtain from setting c_M to infinity and reducing c_E by 40% from its calibrated value, respectively. Column (1) shows the time-series mean of average productivity z in the cross-section. Column (2) shows the mean value of the cross-sectional standard deviation of productivity. Column (3) shows the time-series correlation of mean cross-sectional productivity and the aggregate demand shock $\log(s)$. Columns (4) and (5) show the mean entry and exit rates, respectively.

Type of economy	Robustness check	Mean productivity (1)	St. dev. of productivity (2)	Cyclicality of mean productivity (3)	Mean entry rate (4)	Mean exit rate (5)
Panel A: $\alpha = 0.825$						
With mergers	At calibrated parameters	1.1168	0.1625	0.9685	0.0905	0.0376
	$c_M \to \infty$	1.0451	0.1514	0.0006	0.0366	0.0365
	c_E reduced by 40%	1.0622	0.149	0.0002	0.0766	0.0764
Without mergers	At calibrated parameters	1.0448	0.1515	-0.013	0.0375	0.0373
	c_E reduced by 40%	1.0613	0.1489	0.0083	0.0733	0.073
Panel B: $\alpha = 0.675$						
Type of economy	Robustness check	Mean productivity (1)	St. dev. of productivity (2)	Cyclicality of mean productivity (3)	Mean entry rate (4)	Mean exit rate (5)
With mergers	At calibrated parameters	1.0872	0.1508	0.6328	0.0735	0.0398
	$c_M \to \infty$	1.0491	0.1473	0	0.0575	0.0569
	c_E reduced by 40%	1.0867	0.1485	0.7041	0.0994	0.0707
Without mergers	At calibrated parameters	1.0354	0.1483	0.8403	0.0323	0.0321
	c_E reduced by 40%	1.0867	0.1485	0.7041	0.0994	0.0707
Panel C: $\rho_z = 0.726$						
Type of economy	Robustness check	Mean productivity (1)	St. dev. of productivity (2)	Cyclicality of mean productivity (3)	Mean entry rate (4)	Mean exit rate (5)
With mergers	At calibrated parameters	1.1524	0.1707	0.8913	0.0897	0.0408
	$c_M \to \infty$	1.0863	0.1631	0.0003	0.0693	0.0691
	c_E reduced by 40%	1.1203	0.1616	0.7275	0.1183	0.1042
Without mergers	At calibrated parameters	1.0557	0.1652	-0.0121	0.0348	0.0346
	c_E reduced by 40%	1.0726	0.1614	-0.0412	0.0623	0.062

Continued in next page

Parameter robustness checks (continued).

Panel D: $\rho_z = 0.594$						
Type of economy	Robustness check	Mean productivity (1)	St. dev. of productivity (2)	Cyclicality of mean productivity (3)	Mean entry rate (4)	Mean exit rate (5)
With mergers	At calibrated parameters	1.0847	0.144	0.8484	0.0844	0.0373
	$c_M \to \infty$	1.046	0.1395	0.0009	0.067	0.0665
	c_E reduced by 40%	1.0896	0.1416	0.8167	0.1251	0.0825
Without mergers	At calibrated parameters	1.034	0.1396	0.8608	0.0417	0.0413
	c_E reduced by 40%	1.0463	0.1375	0.6454	0.0809	0.0801
Panel E: $\sigma_z = 0.121$						
Type of economy	Robustness check	Mean productivity (1)	St. dev. of productivity (2)	Cyclicality of mean productivity (3)	Mean entry rate (4)	Mean exit rate (5)
With mergers	At calibrated parameters	1.11	0.1736	0.8542	0.0771	0.043
	$c_M \to \infty$	1.0543	0.1668	0.0001	0.046	0.0458
	c_E reduced by 40%	1.0844	0.1634	0.4828	0.109	0.1061
Without mergers	At calibrated parameters	1.0476	0.1669	0.2448	0.0363	0.0361
	c_E reduced by 40%	1.0655	0.164	-0.055	0.0708	0.0703
Panel F: $\sigma_z = 0.099$						
Type of economy	Robustness check	Mean productivity (1)	St. dev. of productivity (2)	Cyclicality of mean productivity (3)	Mean entry rate (4)	Mean exit rate (5)
With mergers	At calibrated parameters	1.0787	0.1338	0.7751	0.0846	0.0491
	$c_M \to \infty$	1.046	0.1302	0.0001	0.0725	0.0718
	c_E reduced by 40%	1.0776	0.1337	0.7718	0.0842	0.0501
Without mergers	At calibrated parameters	1.0365	0.134	0.156	0.0374	0.0371
	c_E reduced by 40%	1.0491	0.1314	0.0562	0.0695	0.0689

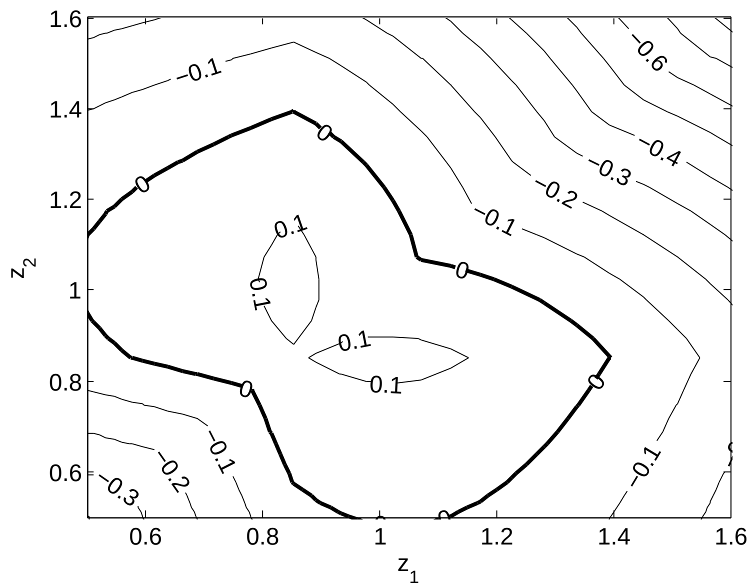
Table A.8: Calibrated parameters and simulated moments for robustness checks in Sections 4.4.1, 4.4.2 and 4.4.3 of the paper. This table shows the calibrated parameters (Panel A) and simulated moments (Panel B) for three robustness checks: In the first ("Exit rate"), we recalibrate our model to match an exit rate of 2%; in the second ("Discount rate"), firms discount future cash flows using an exogenous pricing kernel as in Gomes and Schmid (2010); in the third ("Entry cost"), we recalibrate the model fixing c_E at 0.582, twice the baseline calibration value in Table 1 of the paper. For each robustness check, we present two sets of results, corresponding to a calibration that accounts for merger activity ("Mergers") or ignores it ("No Mergers"). In the calibrations with mergers, we use the target moments in Table 2 of the paper. In the calibrations without mergers, we set c_M to infinity, c_E at the value in the corresponding merger economy, and we match the five merger-unrelated moments in Table 2.

Panel A: Calibrated parameters						
	Exit rate		Discount rate		Entry cost	
	Mergers	No Mergers	Mergers	No Mergers	Mergers	No Mergers
Parameters	(1)	(2)	(3)	(4)	(5)	(6)
c_M	0.305	—	0.234	—	0.551	—
c_s	0.023	—	0.030	—	0.023	—
λ	0.485	—	0.532	—	0.491	—
θ	0.706	—	0.647	—	0.619	—
c_f	0.152	0.124	0.161	0.147	0.255	0.195
c_E	0.296	0.296	0.356	0.356	0.583	0.583
ρ_s	0.590	0.630	0.456	0.466	0.608	0.608
σ_s	0.070	0.070	0.050	0.049	0.069	0.069
η	2.277	2.277	1.499	1.919	2.173	2.173
N_E	0.976	0.980	0.965	1.133	0.962	0.962
Panel B: Simulated moments						
	Exit rate		Discount rate		Entry cost	
	Mergers	No Mergers	Mergers	No Mergers	Mergers	No Mergers
Moments	(1)	(2)	(3)	(4)	(5)	(6)
Average merger rate	0.050	—	0.052	—	0.041	—
Standard deviation of merger rate	0.012	—	0.018	—	0.011	—
Autocorrelation of merger rate	0.288	—	0.218	—	0.245	—
Average log Tobin's Q difference	1.011	—	0.964	—	0.868	—
Average combined merger gains	0.018	—	0.018	—	0.011	—
Average exit rate	0.025	0.022	0.041	0.039	0.039	0.035
Average relative TFP of entrants	1.053	1.152	1.080	1.155	1.089	1.177
Average relative TFP of exitors	0.707	0.693	0.727	0.720	0.729	0.715
Autocorr. of aggr. earnings growth	0.195	0.130	0.165	0.163	0.183	0.098
St. dev. of aggr. earnings growth	0.094	0.103	0.119	0.113	0.095	0.097

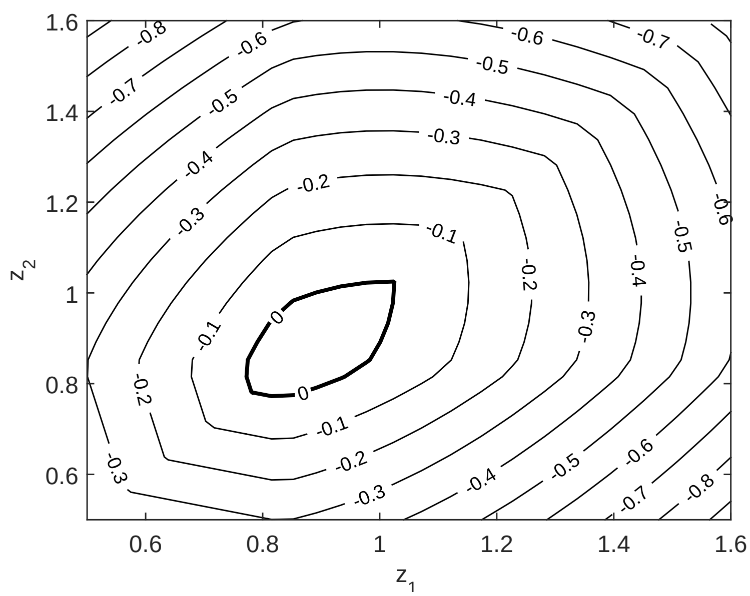
Table A.9: Calibrated parameters and simulated moments for counterfactual experiment in Section 4.3 of the paper. This table shows the calibrated parameters (Panel A) and simulated moments (Panel B) for a counterfactual experiment in which we recalibrate a version of the model that ignores the merger market. In particular, we set c_M to infinity, c_E at the calibrated value in Table 1 of the paper, and we calibrate the parameters c_f, ρ_s, σ_s, η and N_E to match the five merger-unrelated moments in Table 2.

Panel A: Calibrated parameters	
Parameters	Values
c_f	0.154
ρ_s	0.609
σ_s	0.069
η	2.173
N_E	0.962
Panel B: Simulated moments	
Moments	Values
Average exit rate	0.058
Average relative TFP of entrants	1.119
Average relative TFP of exitors	0.742
Autocorr. of aggr. earnings growth	0.083
St. dev. of aggr. earnings growth	0.097

Figure A.1: Comparative statics analysis of merger synergies. The two graphs show contour plots of the merger synergies, defined by Equation 5 in the paper, as a function of the productivity of the two merging firms, z_1 and z_2. Figure (a) shows the case of $\lambda = 0.7$, figure (b) shows the case of $\lambda = 0.2$. The remaining parameters are set at the values shown in Table 1 of the paper. The thicker curve represents the locus of points for which merger synergies are zero. For the region of (z_1, z_2) points where synergies are positive, the matched firms merge. The data is generated according to the algorithm described in section B. States s, m, v, and N are set at their average levels in the simulation.



(a) $\lambda = 0.7$



(b) $\lambda = 0.2$

Figure A.2: Average merger and exit rates as a function of the fixed cost of production, c_f. The other parameter values are shown in Table 1 of the paper. The definition of the merger and exit rates according to the model is provided in Table 3 of the paper. The data is generated according to the algorithm described in section B.