Online Appendix: Not for Publication

In this appendix, we report results from our policy experiments that are not discussed in the main text.

A Aggregate Results from Alternative Policies

A.1 Non-targeted Credit Subsidy

In Section 4 and 5, we focused on the macroeconomic implications of credit subsidy policies that target small or young firms in an economy. In this subsection, we present the aggregate results from a non-targeted policy that subsidizes all financially constrained firms in the economy, regardless of age or size. Specifically, we consider a case of perfect credit market, where $\theta = q^{-1}$ implies that firms are allowed to achieve their desired investment. Under this perfect credit market setup, we still maintain the endogenous entry and exit and the underlying distribution of firm-level productivity in the model.

The second column of Table 10 reports the case when each firm's borrowing is not subject to the collateral constraint at all. The first thing to note is that the results from the non-targeted policy is almost similar to the results under the size-dependent policy (the last column of Table 3). Intuitively, this is because our size-dependent policy is targeting SMEs that account for more than 98 percent of all firms. However, the aggregate gain in measured TFP is slightly lower (0.67 percent) under the perfect credit market in relative to that from the size-dependent policy (1.35 percent).

By comparing the average productivity gain per incumbent, ΔTFP_{μ}, we recognize that the above disparity in measured TFP gain is mainly from the indirect general equilibrium effects. First, the selection among potential entrants is weaker under the non-targeted credit subsidies as represented by a smaller entrants size. Next, the cleansing effect among incumbents becomes stronger because of the increased less-productive entrants, which is shown by the relatively higher exit rate in Table 10. As a result, the equilibrium number of firms under the non-targeted policy gets lower than that with the size-dependent policy. This depresses the aggregate productivity gain, as we already discussed in the main text. The above comparison implies that a policy that entirely removes borrowing limits for all firms in an economy may not always guarantee the efficient outcome, due to the presence of endogenous extensive margins.

Table 10 : Aggregate Results, Perfect Credit

Policy Counterfactual: Aggregates, Perfect Credit		
	Benchmark	Perfect Credit
consumption	100 (0.1876)	106.50
capital	100 (0.5744)	115.34
output	100 (0.2584)	102.13
employment	100 (0.3334)	95.83
debt	100 (0.3238)	153.52
cash-on-hand	100 (0.8020)	81.69
firms (μ)	1.0001	0.5936
endo. exit rate	0.0140	0.0243
entrants rel. size	0.0331	0.0183
Type-2 share	0.0992	0.0000
$\Delta TFP(\%)$	(0.5834)	0.6685
$\Delta TFP_{\mu}(\%)$	–	7.1649
CEV(%)	–	10.2400

Note: In the top panel, we normalize the aggregate quantities to 100 in the benchmark, and the values in the parentheses are the corresponding absolute levels. rt is the required cash transfer in each policy. ΔTFP refers to the relative change in the measured total factor productivity from the benchmark. ΔTFP_{μ} is the productivity gain per firm. CEV denotes the consumption equivalent measure of welfare.

A.2 Limited Credit Subsidies

In the main policy analysis of this paper, we mainly consider either the case with entirely removing the borrowing limits of the targeted firms or the model counterpart to the SBA policy. In this sub-section, we consider alternative targeted credit subsidy schemes that partially relax the collateral constraints. This will illustrate the cases of policy intervention at a moderate degree, which can be more relevant in actual policy design by providing the corresponding outcome.

In particular, we consider different cases by varying the value of θ for the age- and size-dependent policies: 5, 10, and 15 percent increases from the steady state value of θ. The aggregate results of the age-dependent policy are reported in Table 11. As shown in the table, the aggregate improvements are gradual as θ increases. Although the overall improvements exhibit monotone patterns, the indirect general equilibrium effects that we discussed earlier become stronger. From the table, this can be represented by the drastic fall in the number of firms as we move to the case of no borrowing limits for young firms (last column). Accordingly, it implies that more firms need to be subsidized (μ^B/μ) as θ increases, and the effectiveness of the age-dependent policy ($\Delta TFP/rt$) falls due to the

Table 11 : Aggregate Results, Limited Subsidies

Policy Counterfactual: Aggregates, Limited Subsidies, Age-dependent Policy				
	Age-dependent Policy			
	(5%)	(10%)	(15%)	($\theta = q^{-1}$)
consumption	100.59	101.23	102.03	105.60
capital	100.89	102.00	103.52	111.54
output	99.92	99.65	99.50	99.88
employment	99.31	98.41	97.48	94.54
debt	104.91	110.90	118.13	147.56
cash-on-hand	97.13	93.60	90.03	80.27
firms (μ)	0.9470	0.8790	0.7993	0.5193
endo. exit rate	0.0158	0.0189	0.0236	0.0430
entrants rel. size	0.0315	0.0297	0.0277	0.0197
cash transfer (rt)	0.0257	0.0571	0.0930	0.2282
subsidized firms (μ^B)	0.0714	0.0682	0.0657	0.0558
Type-2 share	0.0918	0.0814	0.0682	0.0117
$\Delta TFP(\%)$	0.0857	0.0514	0.0514	0.1885
$\Delta TFP/rt$	0.0195	0.0053	0.0032	0.0048
$\Delta TFP_\mu(\%)$	0.7713	1.5941	2.7940	8.3819
CEV(%)	1.1600	2.5700	4.1700	10.4700

Note: In the top panel, we normalize the aggregate quantities to 100 in the benchmark, and the values in the parentheses are the corresponding absolute levels. rt is the required cash transfer in each policy. ΔTFP refers to the relative change in the measured total factor productivity from the benchmark. ΔTFP_μ is the productivity gain per firm. CEV denotes the consumption equivalent measure of welfare. Columns with (5%)–(15%) are the results from raising θ respectively by the corresponding size from its steady state value.

increasing cash transfers required.

In Table 12, we report the results of the size-dependent policy with different sizes of policy intervention, and the overall patterns of aggregate changes remain similar. Together, our results in Tables 11 and 12 confirm that limited credit subsidies targeting young or small firms can still reduce the resource misallocation arising from financial frictions, while improving the aggregate welfare.

Lastly, we report the results of the SBA-counterpart policy in Table 13 across models that differ in the assumed firm-productivity process. Recall that our benchmark economy with Pareto ϵ generates both firm age and size distributions consistent with their counterparts in the BDS. This allows us to evaluate the aggregate impact of the SBA program via an indirect but plausible mapping, as shown in Section 4. Since the model with log-normal ϵ fails to match the empirical firm size distribution, on the other hand, it follows that our mapping of the actual policy is further limited. In the last column of Table 13, we impute the size of policy intervention in the log-normal model that results

Table 12 : Aggregate Results, Limited Subsidies

Policy Counterfactual: Aggregates, Limited Subsidies				
	Size-dependent Policy			
	(5%)	(10%)	(15%)	($\theta = q^{-1}$)
consumption	100.59	101.23	101.92	106.29
capital	100.70	101.76	102.77	113.04
output	99.96	100.23	100.27	102.71
employment	99.37	98.98	98.35	96.55
debt	104.01	108.49	113.19	144.66
cash-on-hand	97.85	96.17	94.40	87.68
firms (μ)	0.9589	0.9221	0.8750	0.6802
endo. exit rate	0.0154	0.0155	0.0165	0.0203
entrants rel. size	0.0316	0.0299	0.0282	0.0196
cash transfer (rt)	0.0204	0.0415	0.0637	0.2003
subsidized firms (μ^B)	0.0791	0.0744	0.0698	0.0555
Type-2 share	0.0890	0.0759	0.0617	0.0151
$\Delta TFP(\%)$	0.1371	0.3600	0.4971	1.3541
$\Delta TFP/rt$	0.0392	0.0506	0.0455	0.0394
$\Delta TFP_\mu(\%)$	0.6514	1.3370	2.1255	6.1536
CEV(%)	1.1100	2.0800	3.3200	9.3700

Note: In the top panel, we normalize the aggregate quantities to 100 in the benchmark, and the values in the parentheses are the corresponding absolute levels. rt is the required cash transfer in each policy. ΔTFP refers to the relative change in the measured total factor productivity from the benchmark. ΔTFP_μ is the productivity gain per firm. CEV denotes the consumption equivalent measure of welfare. Columns with (5%)–(15%) are the results from raising θ respectively by the corresponding size from its steady state value.

in the same share of Type-2 firms as in our benchmark with the SBA policy (column 2). While the aggregate changes across the two different models are similar, we still observe a negative TFP gain following the policy in this alternative model.

A.3 Additional Results of Age-Dependent Policy

We provide the supplementary results of the age-dependent policy in different models that elaborate our discussions of policy effects in Section 5.

First, Table 14 reports the aggregate results in the model with log-normal ϵ process. Consistent with the results in Table 7, we observe negative gains in aggregate productivity following each policy.

Next, Table 15 compares the results of the age-dependent policy across different model specifications, which corresponds to Table 6 in Section 5. As discussed earlier, models without endogenous entry and exit margins predict larger aggregate improvements other

Table 13 : SBA Program with Different Models

Policy Counterfactual: Aggregates, SBA Policy				
	(Pareto ϵ)		**(log-N ϵ)**	
	Benchmark	SBA Policy	Steady State	SBA Policy
consumption	100 (0.1876)	100.59	100 (0.4681)	100.43
capital	100 (0.5744)	100.70	100 (1.5912)	101.11
output	100 (0.2584)	99.96	100 (0.6592)	100.00
employment	100 (0.3334)	99.37	100 (0.3332)	99.55
debt	100 (0.3238)	104.01	100 (0.8842)	105.43
cash-on-hand	100 (0.8020)	97.85	100 (1.5000)	98.25
firms (μ)	1.0001	0.9589	1.0004	0.9600
endo. exit rate	0.0140	0.0154	0.0141	0.0190
entrants rel. size	0.0331	0.0316	0.0331	0.0323
Type-2 share	0.0992	0.0890	0.1430	0.0889
$\Delta TFP(\%)$	(0.5834)	0.1371	(1.1192)	-0.0357
$\Delta TFP_{\mu}(\%)$	–	0.6514	–	0.4826
CEV(%)	–	1.1100	–	0.8100

Note: In the top panel, we normalize aggregate quantities to 100 in the benchmark, and the values in the parentheses are the corresponding absolute levels. ΔTFP refers to the relative change in the measured total factor productivity from the benchmark. ΔTFP_{μ} is the productivity gain per firm. CEV denotes the consumption equivalent measure of welfare. The first and third columns are reproduced from Table 3, for comparison.

than welfare, following the same targeted policy. Again, this is due to the direct effect of the credit subsidies is relatively stronger than the indirect equilibrium effects in such models only with π_d.

Lastly, we also report the step-by-step analysis of the age-dependent policy with $\theta = q^{-1}$ in models with different ϵ process. Table 16 shows the corresponding results which are similar to those in Table 9.

B The Importance of General Equilibrium

So far, we have conducted our policy counterfactual exercises in a general equilibrium (GE) environment. This involves endogenous changes in the equilibrium price of the model, which is the real wage rate (w). Our focus on the equilibrium price adjustments is nothing novel when compared to the previous studies of firm dynamics with an industrial policy such as Hopenhayn and Rogerson (1993). However, in this section, we attempt to decompose the mechanism behind our results from the GE policy counterfactuals by

Table 14 : Aggregate Results, Model with Log-normal AR(1), Age-dependent Policy

Policy Counterfactual: Aggregates, Model with Log-normal AR(1)

	Model with log AR(1), Age-dependent Policy			
	SS	($\theta \uparrow 5\%$)	($\theta \uparrow 10\%$)	($\theta = q^{-1}$)
consumption	100 (0.4681)	100.36	100.60	100.83
capital	100 (1.5912)	101.00	101.99	103.09
output	100 (0.6592)	100.02	99.91	100.09
employment	100 (0.3332)	99.64	99.31	99.25
firms (μ)	1.0004	0.9668	0.9321	0.9180
endo. exit rate	0.0141	0.0175	0.0218	0.0329
entrants rel. size	0.0331	0.0323	0.0319	0.0321
Type-2 share	0.1430	0.0968	0.0518	0.0041
$\Delta TFP(\%)$	–	-0.0447	-0.2234	-0.3127
$\Delta TFP_{\mu}(\%)$	–	0.3753	0.6434	0.7417
$CEV(\%)$	–	0.6700	1.1900	1.4700

Note: *SS* refers the initial steady state equilibrium. In the top panel, we first normalize aggregate quantities to 100 in SS and report their relative changes under the policy. ΔTFP refers to the relative change in the measured total factor productivity from SS. ΔTFP_{μ} is the productivity gain per firm. CEV denotes the consumption equivalent measure of welfare.

contrasting them with those from a partial equilibrium (PE) environment. In addition, recent studies such as Buera, Kaboski, and Shin (2017) emphasize the use of a standard macroeconomic framework in analyzing policy effects at the long-run equilibrium, which complements the conventional microeconometric evaluations.

In general, the equilibrium wage under each policy becomes higher than that in our benchmark economy. This section compares the aggregate results of a targeted policy in GE and PE of the model. In particular, we illustrate the importance of the GE price effect on firm entry and exit margins by comparing the firm dynamics respectively under GE and PE. We only report the results from the age-dependent policy because our main findings are still robust under different credit subsidy policies.

From Table 17, we recognize that the quantitative effects of a credit subsidy policy can be seriously misleading when the equilibrium price adjustments are not considered. The first two columns of Table 17 are exactly from Table 3 to facilitate the comparison. The last column of the table reports the aggregate results from the age-dependent policy when the real wage is fixed. Under this PE exercise, the policy increases the aggregate quantities enormously. For instance, the aggregate capital more than doubles under PE.

Table 15 : Aggregate Results by Model Specification, Age-dependent Policy

Policy Counterfactual: Aggregates, Age-dependent Policy								
ϵ process	Bounded Pareto				Log-normal AR(1)			
entry/exit	Endogenous		Exogenous		Endogenous		Exogenous	
	SS	Age	SS	Age	SS	Age	SS	Age
consumption	(0.1876)	105.60	(0.2281)	109.21	(0.4681)	100.83	(0.5084)	104.86
capital	(0.5744)	111.54	(0.5989)	121.29	(1.5912)	103.09	(1.4665)	109.33
output	(0.2584)	99.88	(0.2693)	111.14	(0.6592)	100.09	(0.6096)	105.59
employment	(0.3334)	94.54	(0.3332)	101.77	(0.3332)	99.25	(0.3332)	100.72
firms (μ)	1.0001	0.5193	1.0000	1.0000	1.0004	0.9180	1.0000	1.0000
endo. exit rate	0.0140	0.0430	–	–	0.0141	0.0329	–	–
entrants rel. size	0.0331	0.0197	0.0331	0.0193	0.0331	0.0321	0.0331	0.0248
$\Delta TFP(\%)$	–	0.1885	–	4.2298	–	-0.3127	–	2.5498
CEV(%)	–	10.4700	–	7.8500	–	1.4700	–	4.3200

Note: *SS* refers the initial steady state equilibrium, and *Age* is the new equilibrium reached after the age-dependent policy. In the top panel, we first normalize aggregate quantities to 100 in each initial equilibrium and report their relative changes under the policy. ΔTFP refers to the relative change in the measured total factor productivity from each steady state. CEV denotes the consumption equivalent measure of welfare. We use re-calibrated values of α and ψ to compute TFP and CEV in each model specification.

Moreover, the number of firms increases by about 43 percent in relative to the benchmark, which dramatically raises the size of productivity gains in the aggregate: 5.28 percent under PE and 0.19 percent under GE. By comparing this result with the gains in average productivity per firm, TFP_{μ}, in the table, we can see that the boosted aggregate productivity under PE largely comes from the increased number of incumbents that are, on average, less productive than those in GE. On the other hand, the welfare of households falls drastically under PE following the age-dependent policy, and this is mainly due to the large increase in aggregate employment while consumption remains constant.

Our results in Table 17 demonstrate that it is quantitatively important to consider the effects of equilibrium price changes when we evaluate a targeted credit subsidy policy. In the PE analysis, on the other hand, we abstract from the indirect general equilibrium effects on aggregate productivity, as discussed in the main text: (i) changes in optimal production scale, (ii) firm entry and exit margins, and (iii) equilibrium number of firms.

Figure 12 compares firm dynamics with and without the equilibrium wage change under the age-dependent policy. Clearly, the dynamics of the average firm size and productivity under PE are not much different from those in the GE environment. One noticeable

Table 16 : TFP Changes across Intermediate Stages, log AR(1)

Isolating the Effects, Age-dependent Policy					
	(Benchmark)	(Model A)	(Model B-1)	(Model B-2)	(GE)
(Pareto ϵ)					
firm measure	1.0001	1.0001	1.0001	0.5193	0.5193
TFP	0.5834	0.6076	0.6261	0.5786	0.5845
$\Delta TFP(\%)$	–	4.1481	7.3192	-0.8228	0.1885
(log-N ϵ)					
firm measure	1.0004	1.0004	1.0004	0.9180	0.9180
TFP	1.1192	1.1306	1.1265	1.1148	1.1157
$\Delta TFP(\%)$	–	1.0186	0.6523	-0.3931	-0.3127

Note: We calculate TFP in each stage, while fixing α and nu values at (Benchmark). $\Delta TFP(\%)$ denotes the percentage deviation of TFP from (Benchmark).

difference, however, is that the levels of capital stock of each age group are larger in PE. With credit subsidies, the equilibrium real wage rate rises and this reduces the optimal capital choice, $K^w(\epsilon)$, and the constrained capital choice, $\bar{K}(m)$. Thus, the average size of firms falls in a GE environment. This is exactly what we previously mentioned as the first indirect effect of the policy in GE.

More importantly, the equilibrium changes in wage rate affect firm exit and entry margins, which we distinguished as the second indirect effect above. Other things being equal, the higher real wage rate hurts firms with low productivity and high leverage ratio, as reflected in the higher exit rate in the second column of Table 17. In contrast, the case of PE implies that the endogenous margin of exit works only marginally as shown by a modest increase in the exit rate.

In addition, the rise in equilibrium wage may strengthen or weaken the selection among the potential entrants. As discussed earlier, the policy actually lowers the initial productivity of entrants in GE. From Figure 12, this effect is reversed in the PE case by raising the initial productivity slightly.[45] Noting that the relative size of entrants is similar across the GE and PE economies after the age-dependent policy, the rise in productivity of age 0 firms indicates that the entry margin is adjusted along the fat-tailed productivity distribution under PE.

The last indirect effect is on the equilibrium change in the number of firms. Given the relatively weaker cleansing effect from the exit margins and the stronger selection

[45] This is different from what Buera, Moll, and Shin (2013) predict in a similar model environment. They show that credit subsidies improve aggregates in the short run, while distorting the entry into entrepreneurships in the long run due to the fixed subsidy target over time. Our policies, in contrast, depend on firm size or age in each period.

Table 17 : Aggregate Results, GE vs. PE

Policy Counterfactual: Aggregates, GE vs. PE			
	Benchmark	Age-dependent (GE)	Age-dependent (PE)
consumption	100 (0.1876)	105.60	100.00
capital	100 (0.5744)	111.54	215.86
output	100 (0.2584)	99.88	194.85
employment	100 (0.3334)	94.54	194.81
debt	100 (0.3238)	147.56	264.33
cash-on-hand	100 (0.8020)	80.27	168.12
firms (μ)	1.0001	0.5193	1.4250
endo. exit rate	0.0140	0.0430	0.0171
entrants rel. size	0.0331	0.0197	0.0208
cash transfer (rt)	–	0.2282	0.3482
subsidized firms (μ^B)	–	0.0558	0.0791
Type-2 share	0.0992	0.0117	0.0170
$\Delta TFP(\%)$	(0.5834)	0.1885	5.2794
$\Delta TFP/rt$	–	0.0048	0.0885
$\Delta TFP_\mu(\%)$	–	8.3819	0.8913
CEV(%)	–	10.4700	-54.3400

Note: In the top panel, we normalize the aggregate quantities to 100 in the benchmark, and the values in the parentheses are the corresponding absolute levels. rt is the required cash transfer in each policy. ΔTFP refers to the relative change in the measured total factor productivity from the benchmark. ΔTFP_μ is the productivity gain per firm. CEV denotes the consumption equivalent measure of welfare.

among potential entrants as discussed above, the total number of firms under the PE environment rather increases as shown in Table 17. This in turn boosts the aggregate productivity gains from the size- or age-dependent policies. Our point here is that the GE environment is crucial in more precisely quantifying and evaluating the macroeconomic impact of a targeted credit subsidy policy for firms' external financing.

C Sensitivity Analysis

C.1 Inelastic Labor Supply

In our calibration of the model, we assumed indivisible labor in the utility function. This specification implies an infinite Frisch elasticity of labor supply, so that equilibrium changes in aggregate employment are large following credit subsidy policies. Since the indirect effects of a policy is mainly through equilibrium adjustments in wage rate, it is worth considering alternative specifications of labor supply in our model. In this regard, we consider a case of inelastic labor supply by households and then conduct policy experiments. Specifically, we now assume that households do not value leisure and their time endowment is exactly the same as the aggregate employment in our benchmark economy, 0.333. We regard this fixed labor supply model as a special case of inelastic labor supply by households.

Before showing the quantitative results with fixed labor supply, notice that another complication comes from the endogenous margins of firm entry and exit. This is because the number of firms affects the aggregate productivity in our model and thus the slope of aggregate labor demand schedule. When the extensive margins are exogenously fixed, it is straightforward that we will have a larger increase in equilibrium wage in the model with inelastic labor supply, following a policy. On the other hand, when we allow adjustments in the extensive margins, the rise in wage will be smaller when the fall in the number of firms affect the aggregate labor demand. In Table 18, we first show that the aggregate impact of the age-dependent policy becomes larger when we fix both the labor supply and the number of firms in the model (last column). When the aggregate employment

Table 18 : Labor Supply, Exogenous Entry and Exit

Labor Supply, Age-dependent Policy			
Model with Exogenous Entry and Exit, Pareto ϵ			
	Steady State	Elastic N^s	Fixed N^s
w	0.484969	0.529561	0.531128
$\Delta w(\%)$	-	9.1959	9.5179
N	0.3332	0.3391	0.3332
$M(\mu)$	1.0000	1.0000	1.0000
TFP	0.6005	0.6259	0.6260
$\Delta TFP(\%)$	-	4.2298	4.2465

Note: *Steady State* is the initial equilibrium without a policy. *Elastic* N^s is the model with indivisible labor, and *Fixed* N^s is the case with fixed labor supply after a policy. $M(\mu)$ is the mass of firms, and $\Delta TFP(\%)$ refers the relative change in the measured total factor productivity from Steady State.

does not change, the rise in equilibrium wage is relatively larger by 0.32 percent than that in the case of indivisible labor. Since the policy does not induce less-productive firms to enter in this model, the resulting TFP gain becomes larger.

In Table 19, we now show the results of the same policy in the model with the endogenous extensive margins, by varying the assumed firm productivity distribution. First, our main findings still survive when we modify the household preference for labor supply. In

Table 19 : Labor Supply, Endogenous Entry and Exit

Labor Supply, Age-dependent Policy						
Models with Endogenous Entry and Exit						
	(Pareto ϵ) Steady State	Elastic N^s	Fixed N^s	(log-N ϵ) Steady State	Elastic N^s	Fixed N^s
w	0.465156	0.491393	0.489130	1.187138	1.197015	1.196298
$\Delta w(\%)$	-	5.6320	5.1540	-	0.8340	0.7716
employment	0.3334	0.3152	0.3334	0.3332	0.3307	0.3332
$M(\mu)$	1.0001	0.5193	0.5897	1.0004	0.9180	0.9237
endo. exit rate	0.0140	0.0430	0.0337	0.0141	0.0329	0.0330
TFP	0.5834	0.5845	0.5868	1.1192	1.1157	1.1161
$\Delta TFP(\%)$	-	0.1885	0.5828	-	-0.3127	-0.2770

Note: *Steady State* is the equilibrium without a policy. *Elastic* N^s is the model with indivisible labor, and *Fixed* N^s is the case with with fixed labor supply. $M(\mu)$ is the mass of firms, and $\Delta TFP(\%)$ denotes the percentage deviation of TFP from Steady State.

the case of assuming the Pareto ϵ process, the TFP gain from the age-dependent policy is 0.58 percent with fixed labor supply, which is slightly larger than that with indivisible labor. As explained above, this is clearly from the smaller increase in equilibrium wage under the fixed labor which is 5.15 percent in relative to 5.63 percent in our benchmark. It follows that the associated indirect effects are a bit smaller, so that the equilibrium number of firms falls by less. We observe similar patterns in the model with the log-normal productivity process. Moreover, the policy still results in a negative gain in aggregate productivity by 0.27 percent in such models, as in the case with elastic labor supply. The results in Table 19 confirm that our main quantitative results in this paper are not critically based on the assumption of indivisible labor supply. Notice that we only consider the two extreme cases of labor supply elasticity. Thus, the quantitative results from an intermediate degree of labor elasticity will fall into the ranges between the two models.

The above exercise confirms that our main quantitative results are robust across different elasticities of labor supply. In fact, the aggregate elasticity to a policy change is slightly smaller when labor supply fixed. Recall that any labor market frictions or wedges can be nested in households' labor supply decision, lowering the resulting labor elasticity. It follows that we can regard the above alternative model with fixed labor as a stand-in that implicitly introduces labor market frictions. That is, a credit subsidy policy still leads to a modest TFP gain in a model with such implicit frictions.

C.2 Exogenous Exit Rate

In Section 3, we calibrate the model to be consistent with the empirical moments in the US data. One caveat in our calibration is that we simply fix the exogenous exit rate, π_d, at 0.10 and attempt to match the total exit rate in the data by setting the values of fixed costs, ξ_o and ξ_e. This approach further allows us to reproduce the firm age distribution in the BDS reasonably well, as shown in Table 2. This is because large-mature firms in the model are mainly affected by the exogenous exit, while it is young firms that choose to endogenously exit without paying the fixed operation cost, ξ_o. When we instead lower π_d while still matching the total exit rate of firms by adjusting the fixed costs, the relative population share of young firms becomes smaller than that in the data.

In this sub-section, we check whether our quantitative findings are robust when we change the value of π_d. Table 20 reports the aggregate outcome from the model with different values of π_d. Notice that we arbitrarily choose π_d values, 0.08 and 0.06, in our policy exercises without re-calibrating the model.

Table 20 : Exogenous Exit, Age-dependent Policy

Exogenous Exit, Age-dependent Policy						
Model with Pareto ϵ						
π_d	0.10		0.08		0.06	
	Steady State	Age-policy	Steady State	Age-policy	Steady State	Age-policy
consumption	100 (0.1876)	105.60	100 (0.1896)	104.91	100 (0.1915)	104.39
capital	100 (0.5744)	111.54	100 (0.5757)	110.44	100 (0.5784)	110.36
output	100 (0.2584)	99.88	100 (0.2576)	99.34	100 (0.2568)	99.92
employment	100 (0.3334)	94.54	100 (0.3288)	94.68	100 (0.3244)	95.72
$M(\mu)$	1.0001	0.5193	0.8949	0.4222	0.7878	0.3992
tot. exit rate	0.1140	0.1430	0.0901	0.1170	0.0719	0.0964
$\Delta TFP(\%)$	-	0.1885	-	-0.1536	-	-0.2040
$\Delta TFP_\mu(\%)$	-	8.3819	-	9.2424	-	8.2769
young share	0.4127	0.4676	0.3560	0.4376	0.2982	0.5357

Note: *Steady State* is the equilibrium without a policy. *Age-policy* is the new equilibrium reached under the age-dependent policy. In the top panel, we normalize aggregate quantities to 100 in each Steady State, and the values in the parentheses are the corresponding absolute levels. $M(\mu)$ is the mass of firms, and $\Delta TFP(\%)$ denotes the percentage deviation of TFP from each Steady State. TFP_μ is the average firm productivity. *young share* is the relative share of young firms aged 0 to 4.

In Table 20, before the policy is implemented, the number of firms in each steady state is smaller than that in our benchmark economy with $\pi_d = 0.10$. Since we keep the levels of fixed costs same in this exercise, the exit rate of young firms becomes higher when we lower the value of π_d. Thus, the share of young firms becomes smaller in the economies with lower risk of exogenous exit.[46] Next, the aggregate changes are similar across the economies with different values of π_d, following the age-dependent policy. In particular, the gains in aggregate productivity are negative when π_d is lower than 0.10. This result is mainly driven by the indirect effects of the policy in general equilibrium, as discussed earlier. That is, we still observe large falls in the number of firms ($M(\mu)$) and positive gains in average productivity of incumbents (ΔTFP_μ), after the policy. Our results also confirm the importance of a model being consistent with micro-level data when evaluating the impact of such policies. As in the case with a log-normal productivity distribution in Section 5.2, the policy leads to negative TFP gains when the model is not consistent with the empirical firm age distribution by imposing low values of π_d.

C.3 Fixed Costs in Labor Unit

In our model, the fixed costs of operation and entry, (ξ_o, ξ_e), are assumed to be in units of output. Since the indirect effects of a policy arise from wage adjustments in general equilibrium, firm-level decisions in the model may be different when the fixed costs are instead in units of labor. Moreover, recent works on the cross-country variations of resource misallocation adopted fixed costs in terms of labor in their quantitative analyses.[47] Thus, in this sub-section, we quantitatively investigate the role of such fixed costs in our policy experiments. In the model, firms now need to pay the fixed costs in units of labor at a given wage rate, w. This modification affects the value functions in Equation (2) and (4) as below, and we accordingly change the market clearing conditions in Section 2.2.2.

$$v^1(k, b, \epsilon_i) = \max\left\{0, -\xi_o \cdot w + v(k, b, \epsilon_i)\right\}$$
$$v^e(k_0, b_0, \epsilon_0) = \max\left\{0, -\xi_e \cdot w + \beta v^0(k_0, b_0, \epsilon_0)\right\}$$

In Table 21, we show the results from the modified model following the age-dependent policy. For comparison, we reproduce the results in the first 3 columns from Table 17. The results in the last 3 columns of the table imply that there is no fundamental difference between the two models that differ in fixed costs. That is, the patterns of aggregate changes following a policy are independent from the assumed type of fixed costs. Further, the differences in GE and PE are similar in these two models. In particular, the TFP gain in GE is significantly lower that that in PE whereas the change in average productivity

[46] We still find the lower population share of young firms when we adjust the values of ξ_o and ξ_e to match the equilibrium number of firms and the total exit rate as in our benchmark.

[47] For example, see Barseghyan and DiCecio (2011) and Bartelsman, Haltiwanger, and Scarpetta (2013). We also thank an anonymous referee for pointing out this difference.

Table 21 : Fixed Costs, Age-dependent Policy

Fixed Costs (ξ_o, ξ_e), Age-dependent Policy						
	(Costs in Output Unit)			(Costs in Labor Unit)		
	Steady State	Age, GE	Age, PE	Steady State	Age, GE	Age, PE
consumption	100 (0.1876)	105.60	100.00	100 (0.1986)	103.93	100.00
capital	100 (0.5744)	111.54	215.86	100 (0.5259)	117.38	205.25
output	100 (0.2584)	99.88	194.85	100 (0.2349)	105.96	186.50
employment	100 (0.3334)	94.54	194.81	100 (0.3333)	94.48	178.19
$M(\mu)$	1.0001	0.5193	1.4250	1.0002	0.5822	1.3684
endo. exit rate	0.0140	0.0430	0.0171	0.0140	0.0417	0.0164
$\Delta TFP(\%)$	–	0.1885	5.2794	–	4.8188	7.8168
$\Delta TFP_\mu(\%)$	–	8.3819	0.8913	–	11.8242	3.8249

Note: *Steady State* is the equilibrium without a policy. *Age-policy* is the new equilibrium reached under the age-dependent policy. In the top panel, we normalize aggregate quantities to 100 in each Steady State, and the values in the parentheses are the corresponding absolute levels. $M(\mu)$ is the mass of firms, and $\Delta TFP(\%)$ denotes the percentage deviation of TFP from each Steady State. TFP_μ is the average firm productivity.

per firm is the opposite. It follows that the indirect GE effects are still robust when the fixed costs are in labor unit, which is represented by the large fall in the number of firms. One notable difference is that, by construction, aggregate output rises in relative to the steady state of the modified model while employment falls relatively more. Again, the huge discrepancy in the results between GE and PE, regardless of our assumption on the fixed costs, suggests that the general equilibrium consideration is important in evaluating the macroeconomic effects of credit subsidy policies.

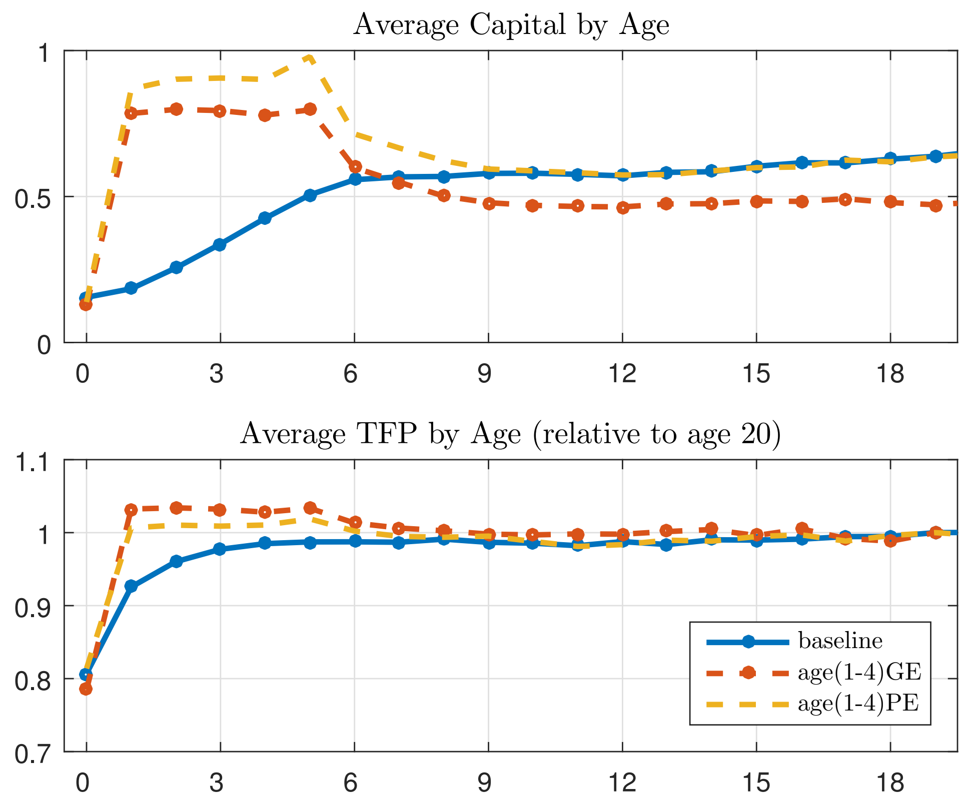

Figure 12 : Cohort average capital and TFP are constructed from a simulation of an unbalanced panel of firms.