Uncertainty Shocks, Adjustment Costs and Firm Beliefs: Evidence From a Representative Survey – Online Appendix –

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This appendix provides supplementary material. Section A expounds how we specify the revenue uncertainty shock in the hypothetical vignette such that the size of the shock is equal for each firm despite differences in the a priori uncertainty. Section B presents statistics on firms' revenue expectations. Section C discusses the aggregation procedure used to build representative firm characteristics and representative firm beliefs from the firm-level data. Sections E, F and G present robustness checks for the regression analysis and the counterfactual analysis on the shock transmission channels. Section H demonstrates how the counterfactual analysis can be used to study the relevance of firm heterogeneity in adjustment costs for the expected effects of the uncertainty shock scenario. Finally, Section J provides the survey questionnaire. To facilitate referencing between the appendix and the main text, the equation, figure and table counts in the appendix continue where they left off in the main text. In contrast, the page and footnote counts re-start at number one.

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A Specifying the Uncertainty Shock

We assume that the turnover of firm i for $i = 1, ..., N$ at time t for $t = 1, ..., T$ can be expressed as:[1]

$$log(A_{i,t}) = log(E_{i,t-1}[A_{i,t}]) + \epsilon_{i,t} + \gamma_{i,t}, \tag{9}$$

where $E_{i,t-1}[A_{i,t}]$ is the turnover that firm i expects for the next period, $\epsilon_{i,t} \sim N(0, \sigma^2_{\epsilon_{i,t}})$, $E[\gamma_{i,t}] = 0$, $\text{Cov}(\epsilon_{i,t}, \gamma_{i,t}) = 0$,

$$\gamma_{i,t} = \begin{cases} \overline{\gamma_i} & \text{with probability } p \\ \underline{\gamma_i} & \text{with probability } 1-p \end{cases} \tag{10}$$

in period $t = s$, $\gamma_{i,t} = 0 \ \forall \ t < s$ and $\gamma_{i,t} = \overline{\gamma_i}$ or $\gamma_{i,t} = \underline{\gamma_i} \ \forall \ t > s$ with s being the uncertainty shock period, i.e. the phase from the announcement of the referendum until the resolution of the uncertainty through the referendum vote. Notably, Equation (10) models the uncertainty through the referendum scenario in addition to the baseline uncertainty captured by $\sigma^2_{\epsilon_{i,t}}$.

In our survey experiment, $E_{i,t-1}[A_{i,t}]$ is self-reported by firm i in period $t-1$. Further, firm i reports in period $t-1$ the 1% quantile, $\underline{Q}_{i,t}$ and the 99% quantile, $\overline{Q}_{i,t}$, of its subjective (= perceived) probability distribution $D_{A_{i,t}}$ for the turnover variable $A_{i,t}$ in period t. Our aim is to derive expressions for the lower and upper bound of the turnover variable for firm i, which allow us to change these bounds by a single scalar value.

In our survey experiment we set $p = 0.5$. Note also that the assumption $E[\gamma_{i,t}] = 0$ and $p = 0.5$ imply

$$\overline{\gamma_i} = -\underline{\gamma_i}. \tag{11}$$

Define $\eta_{i,t} = \epsilon_{i,t} + \gamma_{i,t}$ with an expected value

$$\text{E}_t[\eta_{i,t}] = 0 \tag{12}$$

and variance[2]

$$\sigma^2_{\eta_{i,t}} = \sigma^2_{\epsilon_{i,t}} + \text{E}(\gamma^2_{i,t}) = \sigma^2_{\epsilon_{i,}} + p\overline{\gamma_i}^2 + (1-p)\underline{\gamma_i}^2. \tag{13}$$

[1] For $E_{i,t-1}[A_{i,t}] = A_{i,t-1}$ this is similar to the geometric random walk assumption used in Bloom (2009).

[2] Note that given the above specification of $\gamma_{i,t}$, $\sigma^2_{\eta_{i,t}} = \sigma^2_{\epsilon_{i,t}} \ \forall \ s \neq t$ and $\sigma^2_{\eta_{i,t}} > \sigma^2_{\epsilon_{i,t}}$ for $s = t$.

To set a value for γ we want the standard error of $\eta_{i,t}$ to be

$$\sigma_{\eta_{i,t}} = d\ \sigma_{\epsilon_{i,t}}, \tag{14}$$

where $\overline{\gamma_i}$ and $\underline{\gamma_i}$ have to be chosen such that Equation (14) is fulfilled. From Equations (9)–(14) we deduce that

$$\overline{\gamma_i} = \sqrt{(d^2-1)}\ \frac{log(\overline{Q}_{i,t}) - log(E_{i,t-1}[A_{i,t}])}{2.33} \tag{15}$$

and

$$\underline{\gamma_i} = -\sqrt{(d^2-1)}\ \frac{log(\overline{Q}_{i,t}) - log(E_{i,t-1}[A_{i,t}])}{2.33}. \tag{16}$$

By adding $\overline{\gamma_i}$ from Equation (15) or $\underline{\gamma_i}$ from Equation (16) to the expected turnover, $log(E_{i,t-1}[A_{i,t}])$, we get the upper bound and the lower bound for firm i's log turnover:

$$log(E_{i,t-1}[A_{i,t}]) + \overline{\gamma_i} = log(E_{i,t-1}[A_{i,t}]) + \sqrt{(d^2-1)}\ \frac{log(\overline{Q}_{i,t}) - log(E_{i,t-1}[A_{i,t}])}{2.33} \tag{17}$$

and

$$log(E_{i,t-1}[A_{i,t}]) + \underline{\gamma_i} = log(E_{i,t-1}[A_{i,t}]) - \sqrt{(d^2-1)}\ \frac{log(\overline{Q}_{i,t}) - log(E_{i,t-1}[A_{i,t}])}{2.33}. \tag{18}$$

For our survey experiment we use the expression $log(E_{i,t-1}[A_{i,t}])^* = \frac{log(\overline{Q}_{i,t})+log(\underline{Q}_{i,t})}{2}$ instead of $log(E_{i,t-1}[A_{i,t}])$. This ensures that expressions (17) and (18) are valid even when $\epsilon_{i,t}$ is empirically not normally distributed.

The scalar d is a shift parameter. We set $d = 2$, hence, we choose to implement an uncertainty shock that implies a doubling of the standard deviation of log turnovers. Taking exponentials, rearranging and defining $\overline{\Gamma_i} = e^{\overline{\gamma_i}}$ and $\underline{\Gamma_i} = e^{\underline{\gamma_i}}$ yields

$$E_{i,t-1}[A_{i,t}]\ \overline{\Gamma_i} = E_{i,t-1}[A_{i,t}]\ \left(\frac{\overline{Q}_{i,t}}{E_{i,t-1}[A_{i,t}]}\right)^{\frac{\sqrt{(d^2-1)}}{2.33}} \tag{19}$$

and

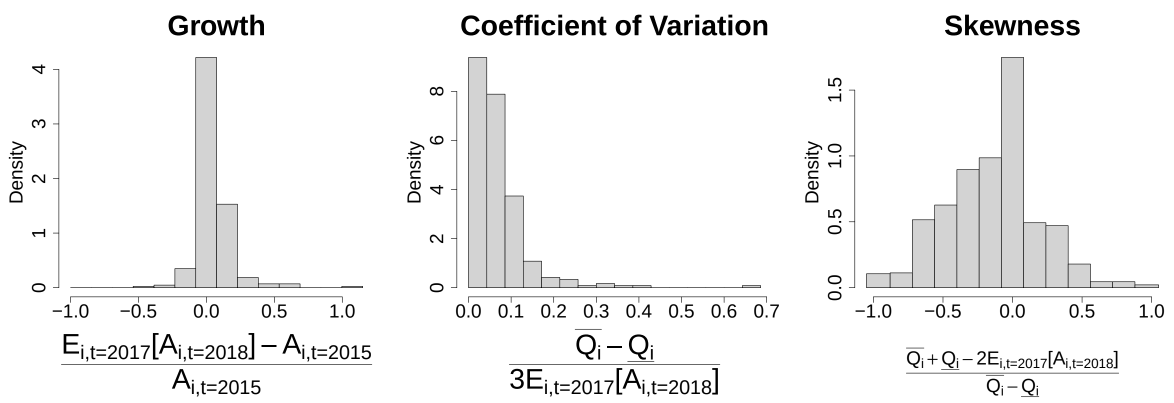
$$E_{i,t-1}[A_{i,t}]\ \underline{\Gamma_i} = E_{i,t-1}[A_{i,t}]\ \left(\frac{\overline{Q}_{i,t}}{E_{i,t-1}[A_{i,t}]}\right)^{-\frac{\sqrt{(d^2-1)}}{2.33}}. \tag{20}$$

Equations (19) and (20) with $d = 2$ are the expressions used for the calculation of the conditional expectations in the hypothetical vignette (see Section 3.3).

B Statistics on Firms' Revenue Expectations

The collected data allow us to provide insights into the statistics of firms' revenue expectations. Figure 10 presents the distribution of firms' expected revenue growth, their coefficient of variation of expected revenue growth and their skewness of expected revenue growth. Note that the coefficient of variation of expected revenue growth is equal to three times the initial revenue uncertainty variable in our main specification (Table 8). The mean expected revenue growth between 2015 and 2018 is 4.9%. 91.2% of firms report an expected growth between ± 20%. The coefficient of variation lies mostly between 0 and 0.1. Finally, the average of our measure of skewness is −0.02. 28% of all firms report symmetric revenue expectations. 52% report left-skewed revenue expectations, whereas 20% report right-skewed expectations.

Figure 10: Statistics on Firms' Revenue Expectations



Notes: The left-hand side graph shows the distribution of the growth rate of firms' expected revenue growth from to 2015 to 2018. We compute the distribution using firms' reported revenue for the year 2015 ($A_{i,t=2015}$) and firms expected revenue in 2018 reported in 2017 ($E_{i,t=2017}[A_{i,t=2018}]$). The right-hand side graph presents the distribution of the coefficient of variation of firms' revenue expectations. The coefficient of variation is computed as the difference between the upper and lower range of expected revenue ($\overline{Q}_i - \underline{Q}_i$) normalized with by three times firms' expected revenue in 2018 reported in 2017 ($3 \times E_{i,t=2017}[A_{i,t=2018}]$). The third graph shows the distribution of the skewness of revenue expectations. We compute the skewness using the general formulation of a skewness function as shown in, e.g., Groeneveld and Meeden (1984): $(\overline{Q}_i + \underline{Q}_i - 2E_{i,t=2017}[A_{i,t=2018}])/(\overline{Q}_i - \underline{Q}_i)$.

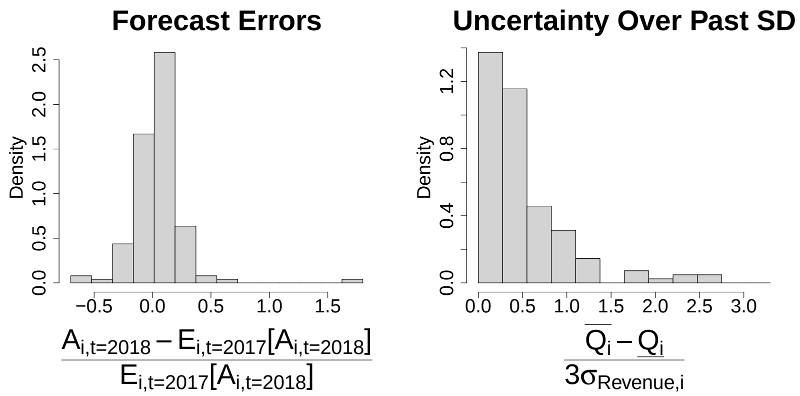
Further, we benchmark managers' ex-ante revenue expectations against ex-post revenue realizations. For this, we match the data from our firm survey to data from the KOF Innovation Survey Panel that provides realized revenue from 2010 to 2018 for a large fraction of the firms in our survey (approximately 80%).[3] We then compute each firm's

[3]We do not observe all years for all firms.

one-year ahead revenue forecast error for the year 2018, i.e., realized revenue for 2018 minus expected revenue for 2018 (reported at the beginning of 2017) divided by realized revenue. The left-hand side graph in Figure 11 plots the distribution of the forecast errors across all firms. The average forecast error amounts to 0.043. Thus, on average firms' revenue in 2018 were 4.3% higher than expected at the beginning of 2017. 63.6% of the firms achieved higher revenue than expected and 36.4% had lower revenue than expected. The largest mass of the firms (79.3%) experienced a forecast error between ± 20%. Next, we compute for each firm the standard deviation of realized revenue over 2010 to 2018 and divide the expected revenue range for 2018, $\overline{Q}_i - \underline{Q}_i$, by three times the standard deviation of realized revenue. This factor is a measure of each firm's uncertainty about future revenue relative to the actual revenue volatility in the past. A factor below one suggests that firm managers believe they are able to predict their revenue for 2018 relatively precisely. The right-hand side graph in Figure 11 shows the distribution of the aforementioned factor across all firms. We find that a large majority of firms (82.1%) report an uncertainty (standard deviation) about expected revenue that is below the standard deviation of past revenue. The median firm reports a factor of 0.419. The average is 1.09.

In Appendix F, we test whether these additional variables affect firm behavior. We find that our findings remain unchanged by the inclusion of the variables.

Figure 11: Benchmarking of Revenue Expectations



Notes: The left-hand side graph shows the distribution of the one-year ahead revenue forecast error for the year 2018 across firms where the forecast error is calculated as realized revenue for 2018 minus expected revenue for 2018 (reported at the beginning of 2017) divided by realized revenue. The right-hand side graph shows the cross-firm distribution of the expected revenue range for 2018, $\overline{Q}_i - \underline{Q}_i$, divided by three times the standard deviation of realized revenue over 2010 to 2018. This factor is a measure of uncertainty about future revenue relative to actual revenue volatility in the past.

C Aggregation

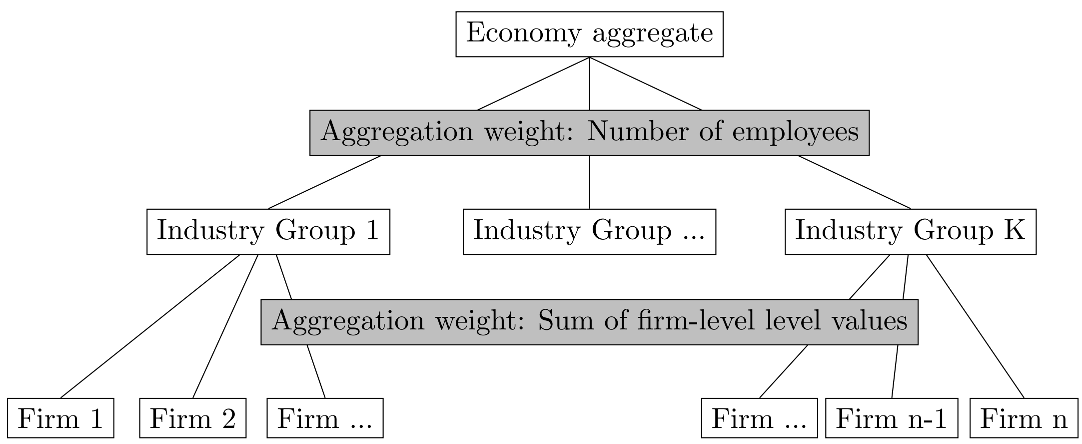
While studying firm-level data allows us to evaluate the importance of firm characteristics for the understanding of uncertainty shocks, the reactions in an economy on aggregate over all firms might differ significantly from the average firm-level effects. In order for account for this possible difference, we aggregate the firm-level responses using a standard procedure (European Commission, 2007). The procedure ensures that the responses are representative at the economy-wide level and at the sector level. We aggregate firm-level responses to the national level using a two-step procedure. This procedure differs slightly for level and rate variables. The following section outlines the exact aggregation procedure.

C.1 Level Variables

We start from a NACE-2-digit level. The KOF Investment Survey is based on NACE 2008 codes. The population contains 75 2-digit branches (10-33; 35-38; 41-43; 45-47; 49-53; 55-56; 58-66; 68-75; 77-82; 84-96) spanning over 12 letter sectors.

In the first step, for each NACE-2-digit level, we sum up firm-level investment, employment and output. In the second step, we correct for sample decomposition and aggregate to a national level. The correction is based on full time equivalent (FTE) employment and conducted on a NACE-2-digit level. We use the FTE employment on a NACE-2-digit level in the population and employ the FTE employment in our sample to derive sector specific weights. Finally, we compute the aggregate value by summing up the weighted NACE-2-digit level values. Figure 12 depicts the aggregation procedure.

Figure 12: Aggregation Scheme for Level Variables



The following equations formally describe the procedure:

$$\tilde{Y}_k = \sum_{i=1}^{n} Y_{i,k} \tag{21}$$

$$Y_k = \tilde{Y}_k * \frac{u_k}{\tilde{u}_k} \tag{22}$$

$$\bar{Y} = \sum_{k=1}^{K} Y_k, \tag{23}$$

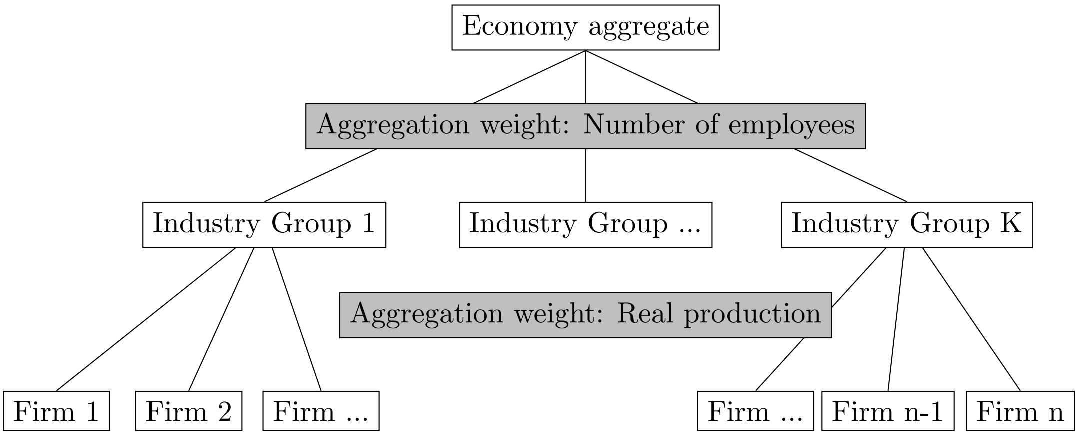
where

$$\begin{aligned}
Y_{k,i} &:= \text{“level value of firm } i \in \{1, \ldots, n\} \text{ in sector } k \in \{1, \ldots, K\}\text{”} \\
\tilde{Y}_k &:= \text{“level value (in-sample) for sector } k\text{”} \\
Y_k &:= \text{“level value (population) for sector } k\text{”} \\
\bar{Y} &:= \text{“aggregate level value for Switzerland”} \\
u_k &:= \text{“FTE (population) in sector } k\text{”} \\
\tilde{u}_k &:= \text{“FTE (in sample) in sector } k\text{”}
\end{aligned}$$

C.2 Rate Variables

We aggregate our rate variables, i.e. capital resale values measured in percent of the total costs for purchasing and installing the investments in the first place, firing and hiring costs in percent of the average gross yearly salary of a full-time employee in the firm and labor attrition rates in percent of the total number of employees, using again a two-step procedure. However, the aggregation procedure for rate variables differs for the first step slightly from the aggregation of level variables. While for level values, we use the cumulative value of output, employment and investment to obtain NACE-2-digit sector level values, we compute a weighted mean for the rate variables on the NACE-2-digit sector level. We weight firm answers by their firm-level production. In a second step, we aggregate these weighted means using employment weights. Figure 13 depicts the aggregation procedure for rate variables.

Figure 13: Aggregation Scheme for Rate Variables



The following equations formally summarize the aggregation procedure for rate variables:

$$x_{m,k} = \sum_{i}^{n} x_{m,i,k} \frac{A_{i,k}}{\sum_i^n A_{i,k}} \tag{24}$$

$$\omega_i = \frac{A_{i,k} \frac{u_k}{\tilde{u}_k}}{\sum_i^n A_{i,k} \frac{u_k}{\tilde{u}_k}} \tag{25}$$

$$\bar{x}_m = \sum_{i}^{n} \omega_i * x_{m,i,k}, \tag{26}$$

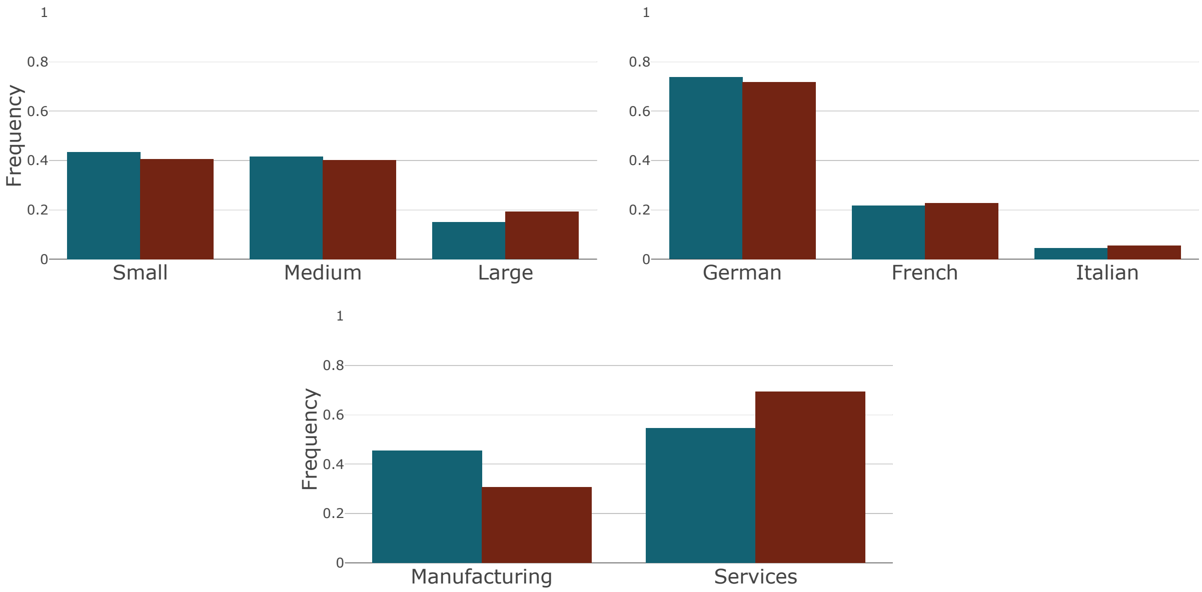
where

$$\begin{aligned}
x_{m,i,k} &:= \text{“value of variable } m \text{ for firm } i \text{ in sector } k\text{”} \\
A_{i,k} &:= \text{“turnover of firm } i \text{ in sector } k\text{”} \\
\bar{x}_m &:= \text{“aggregate value of variable } m \text{ for Switzerland”} \\
u_k &:= \text{“FTE (population) in sector } k\text{”} \\
\tilde{u}_k &:= \text{“FTE (in-sample) in sector } k\text{”}
\end{aligned}$$

D Comparing KOF Survey and Population Statistics

In this section, we compare the KOF survey panel with official population statistics. We consider firm size, linguistic diversity and sectoral distribution to assess the differences between the datasets. Figure 14 shows that the characteristics of the KOF survey panel match well with the population data, despite some minor differences with regard to the sector shares.

Figure 14: KOF Survey vs. Official Statistics



Notes: The upper left panel illustrates the frequency distribution of small, medium and large firms as represented in the KOF survey (blue) and in the population data from the Federal Statistical Office (red). The upper right panel presents the frequency distribution of the three different languages evaluated in the study. Meanwhile, the lower panel visualizes the frequency distribution across the manufacturing and services sectors.

E Additional Regressions

This section iterates the main regressions of Table 8 with additional inclusion of an interaction term between the labor adjustment costs and the labor attrition rate (see Table 12) or with additional inclusion of a financial constraint variable and its interaction with the investment resale value (see Table 13 and Figure 15). Further, the section presents the main regressions including additional control variables (see Table 14). Also, the section shows alternative specifications for the main regressions 8 (see Tables 15 to 17). Tables with alternative specifications for the regressions of Tables 9 and 10 are available on request.

Table 12: Regressions With Interaction of Labor Adjustment Costs and Attrition Rate

	(1) Investment	(2) Employment	(3) Real Output
Investment resale value	0.098***	0.0004	0.016**
	(0.030)	(0.003)	(0.007)
Labor adjustment costs	−0.190**	−0.037***	−0.031**
	(0.085)	(0.010)	(0.012)
Labor attrition rate	−0.181	0.007	0.033
	(0.150)	(0.018)	(0.029)
Labor adjustment costs × attrition rate	0.012	0.003***	0.002***
	(0.008)	(0.001)	(0.001)
Initial revenue uncertainty	−0.062	−0.012	−0.043
	(0.136)	(0.016)	(0.031)
Firm size	0.000	0.000	−0.000
	(0.000)	(0.000)	(0.000)
Horizon-specific intercepts	Yes	Yes	Yes
Industry-specific dummies	Yes	Yes	Yes
Canton-specific dummies	Yes	Yes	Yes
Observations	1,096	1,196	1,172
Adjusted R^2	0.294	0.417	0.262

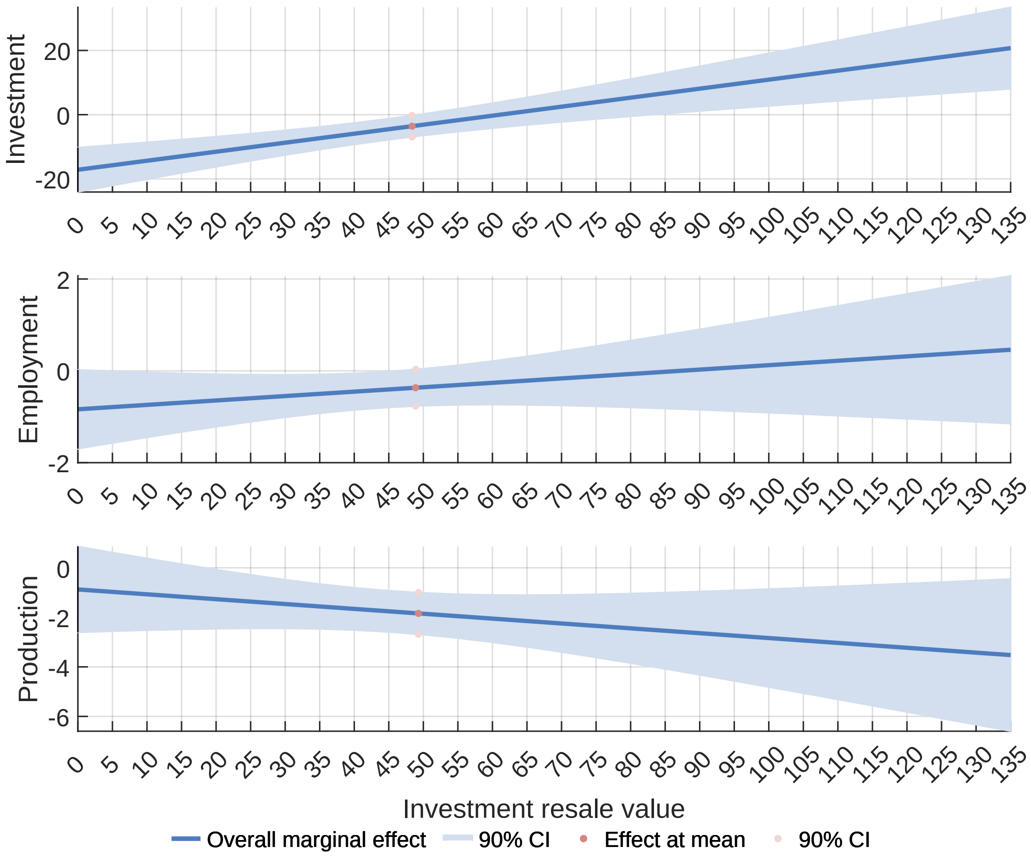
Notes: Dependent variable: Firm manager's expected change in investment/employment/real output in response to uncertainty shock relative to no-shock scenario. Standard errors in parentheses. *p<0.1; **p<0.05; ***p<0.01.

Table 13: Regressions With Interaction of Resale Value and Financial Constraint

	(1) Investment	(2) Employment	(3) Real Output
Investment resale value	0.112***	0.002	0.024***
	(0.036)	(0.004)	(0.008)
Labor adjustment costs	−0.090**	−0.011**	−0.004
	(0.037)	(0.004)	(0.008)
Labor attrition rate	0.082	0.050***	0.094***
	(0.115)	(0.013)	(0.029)
Initial revenue uncertainty	−0.091	−0.001	−0.073*
	(0.167)	(0.019)	(0.041)
Firm size	0.000**	0.000	−0.000
	(0.000)	(0.000)	(0.000)
Financial constraint dummy	−17.149***	−0.838	−0.874
	(4.226)	(0.524)	(1.058)
Inv. resale value × fin. constr. dummy	0.281***	0.010	−0.020
	(0.083)	(0.011)	(0.020)
Horizon-specific intercepts	Yes	Yes	Yes
Industry-specific dummies	Yes	Yes	Yes
Canton-specific dummies	Yes	Yes	Yes
Observations	964	1,056	1,024
Adjusted R^2	0.327	0.447	0.291

Notes: Dependent variable: Firm manager's expected change in investment/employment/real output in response to uncertainty shock relative to no-shock scenario. Standard errors in parentheses. *p<0.1; **p<0.05; ***p<0.01.

Figure 15: Interaction Regressions: Effect of Financial Constraint Dummy



Notes: Based on the regressions with additional inclusion of an interaction term between the investment resale value and the financial constraint dummy (see Table 13), these figures show the overall marginal effect of the financial constraint dummy on the firm managers' expected change in investment/employment/real output in response to the uncertainty shock (relative to the no-shock scenario) over the range of the investment resale value variable.

Table 14: Regressions With Additional Controls

	(1)	(2)	(3)
Investment resale value	0.095***	−0.002	0.017**
	(0.031)	(0.004)	(0.007)
Labor adjustment costs	−0.110***	−0.011**	−0.012
	(0.039)	(0.004)	(0.009)
Labor attrition rate	0.077	0.052***	0.051*
	(0.111)	(0.013)	(0.028)
Initial revenue uncertainty	−0.257	−0.041**	−0.085**
	(0.165)	(0.020)	(0.039)
Firm size	0.000**	0.000	−0.000
	(0.000)	(0.000)	(0.000)
Risk willingness: High	−0.627	−0.533***	0.427
	(1.612)	(0.179)	(0.361)
Gender: Woman	2.432	−0.669***	1.121**
	(2.355)	(0.253)	(0.475)
Experience	−0.129	−0.045**	−0.053
	(0.205)	(0.023)	(0.046)
Horizon-specific intercepts	Yes	Yes	Yes
Industry-specific dummies	Yes	Yes	Yes
Canton-specific dummies	Yes	Yes	Yes
Observations	1,040	1,140	1,104
Adjusted R^2	0.311	0.435	0.289

Notes: Dependent variable: Firm manager's expected change in investment/employment/real output in response to uncertainty shock relative to no-shock scenario. Standard errors in parentheses. *p<0.1; **p<0.05; ***p<0.01. To capture the subjective risk willingness of the firms, we included the following question into the questionnaire: "How do you rate your corporate culture: Is your company generally prepared to take entrepreneurial risks or does it try to avoid such risks where possible?". Firms could answer on an ordinal scale of 1 to 10, where 1 means 'not at all prepared to take risks' and 10 means 'very willing to take risks'. For the regressions shown here, we compile a dummy variable being one if a respondent ticked 6 or higher and zero if the respondent ticked 5 or lower. We also compile three other variable variants based on the aforementioned question. First, we take the 1-to-10 scale as a cardinal variable. Second, we compile separate dummy variables for each of the ten categories. Third, we condense the ten categories to three categories by creating separate dummies for low risk willingness (1, 2 or 3), middle risk willingness (4, 5, 6 or 7) and high risk willingness (8, 9 or 10). None of the alternative specifications alters our findings.

Table 15: Alternative Specifications for the Investment Regression in Table 8

	(1) Main	(2) No Trim	(3) Winsorized	(4) Balanced
Investment resale value	0.095***	0.090***	0.088***	0.080**
	(0.030)	(0.034)	(0.031)	(0.032)
Labor adjustment costs	−0.077**	−0.091**	−0.090**	−0.135***
	(0.037)	(0.042)	(0.038)	(0.037)
Labor attrition rate	−0.032	0.010	0.015	0.005
	(0.110)	(0.130)	(0.116)	(0.119)
Initial revenue uncertainty	−0.047	−0.041	−0.074	0.150
	(0.136)	(0.160)	(0.143)	(0.150)
Firm size	0.000	0.000	0.000	0.000*
	(0.000)	(0.000)	(0.000)	(0.000)
Horizon-specific intercepts	Yes	Yes	Yes	Yes
Industry-specific dummies	Yes	Yes	Yes	Yes
Canton-specific dummies	Yes	Yes	Yes	Yes
Observations	1,096	1,128	1,128	1,092
Adjusted R^2	0.293	0.208	0.258	0.298

Notes: Dependent variable: Firm manager's expected change in investment in response to uncertainty shock relative to no-shock scenario. Column (1): Specification as shown in Table 8 in the main part of the paper. Column (2): Specification with winsorizing the dependent variables at the 1st and 99th percentile instead of trimming. Column (3): Specification without trimming or winsorizing the dependent variables. Column (4): Specification with balancing of the data sample across the three regressions in Table 8. Standard errors in parentheses. $^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$.

Table 16: Alternative Specifications for the Employment Regression in Table 8

	(1) Main	(2) No Trim	(3) Winsorized	(4) Balanced
Investment resale value	0.0003	0.002	0.0002	0.012***
	(0.003)	(0.006)	(0.004)	(0.004)
Labor adjustment costs	−0.010**	−0.019**	−0.012**	−0.006
	(0.004)	(0.007)	(0.005)	(0.005)
Labor attrition rate	0.043***	0.042*	0.032**	−0.0002
	(0.013)	(0.025)	(0.016)	(0.015)
Initial revenue uncertainty	−0.015	0.005	−0.014	−0.019
	(0.016)	(0.030)	(0.019)	(0.019)
Firm size	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Horizon-specific intercepts	Yes	Yes	Yes	Yes
Industry-specific dummies	Yes	Yes	Yes	Yes
Canton-specific dummies	Yes	Yes	Yes	Yes
Observations	1,196	1,248	1,248	1,092
Adjusted R^2	0.412	0.212	0.339	0.390

Notes: Dependent variable: Firm manager's expected change in investment in response to uncertainty shock relative to no-shock scenario. Column (1): Specification as shown in Table 8 in the main part of the paper. Column (2): Specification with winsorizing the dependent variables at the 1st and 99th percentile instead of trimming. Column (3): Specification without trimming or winsorizing the dependent variables. Column (4): Specification with balancing of the data sample across the three regressions in Table 8. Standard errors in parentheses. *p<0.1; **p<0.05; ***p<0.01.

Table 17: Alternative Specifications for the Output Regression in Table 8

	(1) Main	(2) No Trim	(3) Winsorized	(4) Balanced
Investment resale value	0.017**	0.024**	0.025***	0.023***
	(0.007)	(0.011)	(0.007)	(0.007)
Labor adjustment costs	−0.006	−0.015	−0.012	0.003
	(0.008)	(0.013)	(0.008)	(0.009)
Labor attrition rate	0.064**	0.126***	0.091***	0.031
	(0.026)	(0.043)	(0.028)	(0.028)
Initial revenue uncertainty	−0.041	−0.006	−0.023	−0.107***
	(0.031)	(0.052)	(0.034)	(0.035)
Firm size	−0.000	−0.000	−0.000	−0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Horizon-specific intercepts	Yes	Yes	Yes	Yes
Industry-specific dummies	Yes	Yes	Yes	Yes
Canton-specific dummies	Yes	Yes	Yes	Yes
Observations	1,172	1,208	1,208	1,092
Adjusted R^2	0.258	0.159	0.259	0.309

Notes: Dependent variable: Firm manager's expected change in investment in response to uncertainty shock relative to no-shock scenario. Column (1): Specification as shown in Table 8 in the main part of the paper. Column (2): Specification with winsorizing the dependent variables at the 1st and 99th percentile instead of trimming. Column (3): Specification without trimming or winsorizing the dependent variables. Column (4): Specification with balancing of the data sample across the three regressions in Table 8. Standard errors in parentheses. *p<0.1; **p<0.05; ***p<0.01.

F Regressions With Control for Revenue Statistics

It is important to understand whether firms react differently to an uncertainty shock depending on their expectations. In order to verify this, we re-run our main specification of Table 8 including the statistics of firms' revenue expectations, i.e., the expected growth, the coefficient of variation and the skewness variable. We presented these variables in Appendix B. Table 18 presents the results of these regressions. Overall, we do not find a systematic effect of expectations on firms' reactions to the uncertainty shock. Only for output, we find that firms with higher growth expectations are associated with a smaller decrease of expected output in response to the uncertainty shock scenario. Further, a higher coefficient of variation, i.e., higher initial revenue uncertainty, is associated with a larger decrease in expected output in response to the uncertainty shock. Most importantly, the inclusion of the additional variables does not alter the relevance of adjustment costs in explaining firms' reaction to the uncertainty shock.

As we use the reported range of expected revenue, $\overline{Q}_i$ and $\underline{Q}_i$, to construct the firm specific uncertainty shock within the survey, it is also important to benchmark this uncertainty.In Appendix B, we compare uncertainty about future revenue with past revenue volatility. This allows us to examine whether a firm is over- or underconfident about future revenue relative to past revenue volatility and to test if this affects the way a firm reacts to the uncertainty shock. Thus, we include the confidence variable that takes a value of one if a firm's uncertainty about future revenue is below past sales volatility, and zero otherwise, in our main specification of Table 8. As can be seen from Table 19, the confidence variable does not influence the way firms react to the uncertainty shock. Moreover, and most importantly, it also does not influence our main results. This is particularly reassuring as including the aforementioned variable drops more than 30% of observations for some specifications.

Table 18: Regressions With Statistics on Firms' Revenue Expectations

	(1) Investment	(2) Employment	(3) Real Output
Investment resale value	0.100***	0.001	0.010**
	(0.030)	(0.003)	(0.007)
Labor adjustment costs	−0.070**	−0.010**	−0.003
	(0.040)	(0.004)	(0.008)
Labor attrition rate	−0.050	0.040***	0.070***
	(0.100)	(0.010)	(0.030)
Firm size	0.000	0.000	−0.000
	(0.000)	(0.000)	(0.000)
Revenue expectations: Expected growth	−8.000	0.700	0.020***
	(6.000)	(0.700)	(0.006)
Revenue expectations: Coeff. of variation	6.000	−5.000	−20.000**
	(43.000)	(5.000)	(10.000)
Revenue expectations: Skewness	0.600	−0.300	−0.500
	(2.000)	(0.300)	(0.500)
Horizon-specific intercepts	Yes	Yes	Yes
Industry-specific dummies	Yes	Yes	Yes
Canton-specific dummies	Yes	Yes	Yes
Observations	1,088	1,188	1,164
Adjusted R^2	0.300	0.400	0.300

Notes: Dependent variable: Firm manager's expected change in investment/employment/real output in response to uncertainty shock relative to no-shock scenario. Standard errors in parentheses. The variable *revenue expectations: coefficient of variation* is equal to three times the variable *initial revenue uncertainty* in the main specification (Table 8). *p<0.1; **p<0.05; ***p<0.01.

Table 19: Regressions With Revenue-Uncertainty-Over-Past-SD Variable

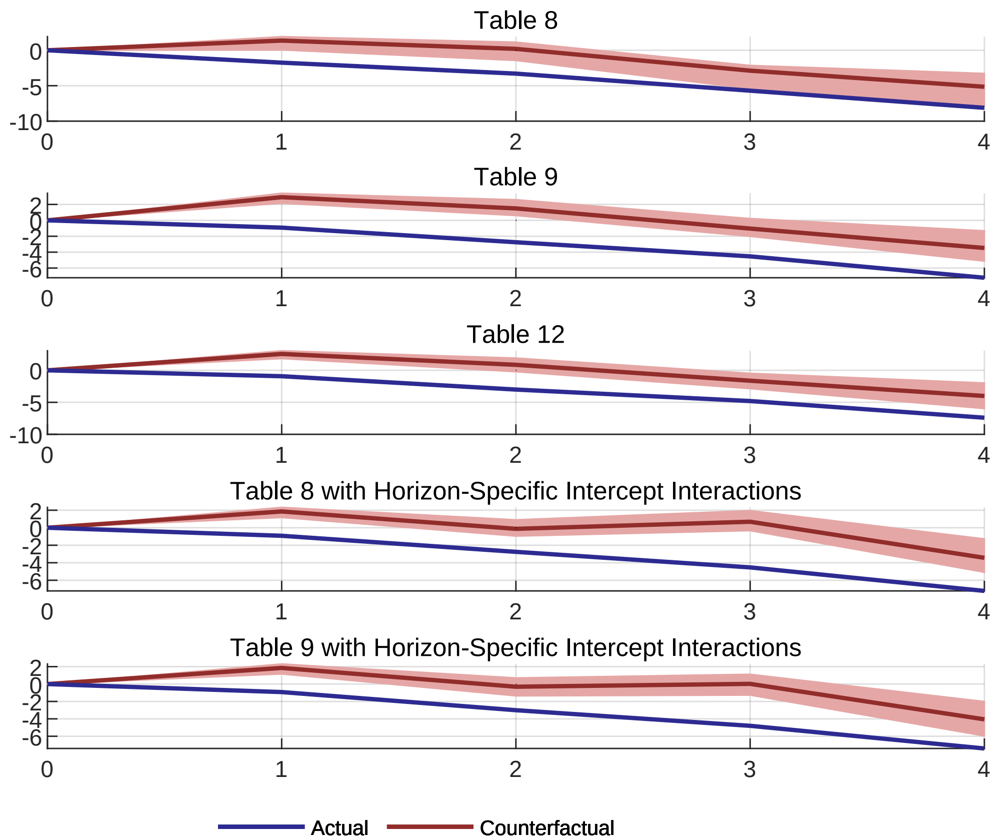
	(1) Investment	(2) Employment	(3) Real Output
Investment resale value	0.084**	0.004	0.033***
	(0.038)	(0.005)	(0.009)
Labor adjustment costs	0.048	−0.009	−0.018
	(0.060)	(0.007)	(0.012)
Labor attrition rate	−0.093	0.017	0.082***
	(0.130)	(0.017)	(0.031)
Initial revenue uncertainty	0.338**	−0.057***	−0.009
	(0.168)	(0.022)	(0.039)
Firm size	0.000***	−0.000	−0.000
	(0.000)	(0.000)	(0.000)
Confidence	−0.037	−0.410	−0.675
	(2.410)	(0.312)	(0.564)
Horizon-specific intercepts	Yes	Yes	Yes
Industry-specific dummies	Yes	Yes	Yes
Canton-specific dummies	Yes	Yes	Yes
Observations	656	704	736
Adjusted R^2	0.296	0.346	0.351

Notes: Dependent variable: Firm manager's expected change in investment/employment/real output in response to uncertainty shock relative to no-shock scenario. Confidence is a binary variable that takes value one in case a firms uncertainty about future revenue is below past sales volatility and zero otherwise. Standard errors in parentheses. *p<0.1; **p<0.05; ***p<0.01.

G Robustness for Counterfactual Analysis

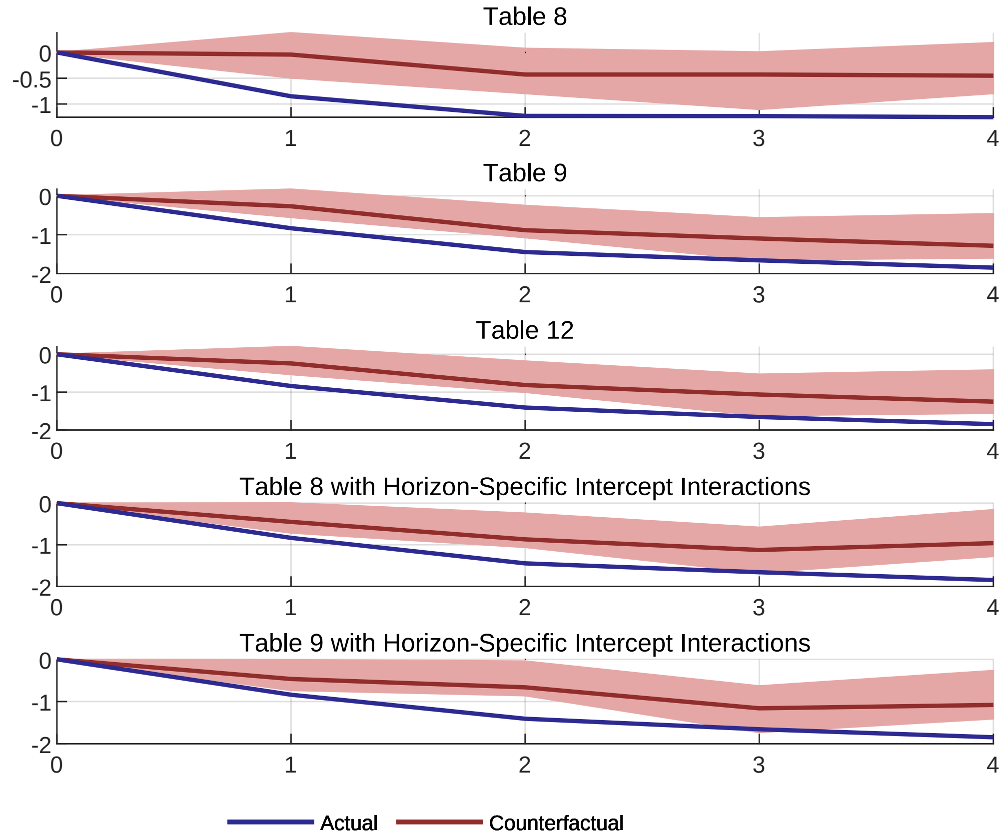
This section displays the counterfactual responses for alternative regression specifications. To save space, we show only the counterfactuals with no capital adjustment costs for investment and real output. All other response figures are available on request.

Figure 16: Robustness for Counterfactual Investment Responses



Notes: The red lines depict the counterfactual change in the aggregate of firms' investment plans for the first, second, third and fourth half-yearly horizon after the hypothetical uncertainty shock in percent of the aggregate of the investment plans for the respective horizons in the no shock scenario. The counterfactual responses are calculated according to Equation (8), where the employed regression specification is indicated above each subfigure. The counterfactual in all panel is that that none of the firms has capital adjustment costs. The red shaded areas report the 68% non-parametric bootstrap confidence intervals (Efron and Tibshirani, 1993). The blue lines depict the actual change in the aggregate of firms' investment plans for the four horizons, again in percent of the aggregate of the investment plans for the respective horizons in the no shock scenario. The first three panels use the specifications summarized in Tables 8, 9 and 12. The fourth and the fifth panel base on the specifications of Table 8 and Table 9 additionally including horizon-specific intercept interactions.

Figure 17: Robustness for Counterfactual Real Output Responses



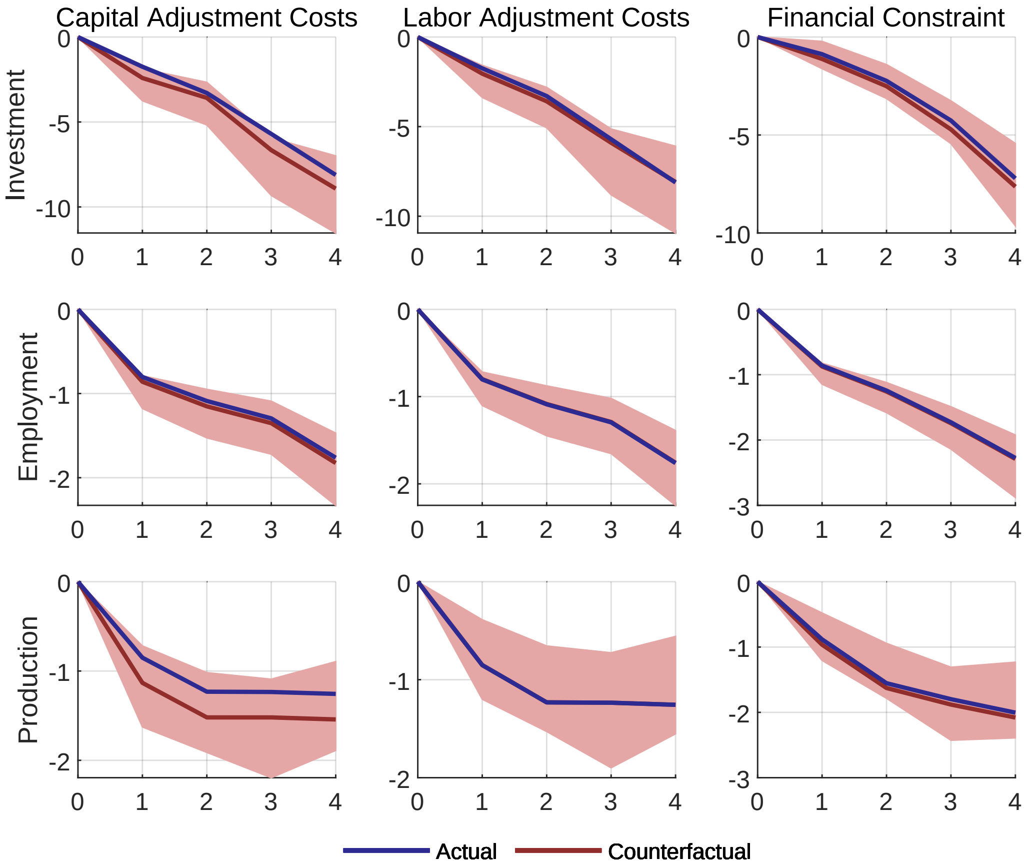
Notes: The red lines depict the counterfactual change in the aggregate of firms' real output plans for the first, second, third and fourth half-yearly horizon after the hypothetical uncertainty shock in percent of the aggregate of the investment plans for the respective horizons in the no shock scenario. The counterfactual responses are calculated according to Equation (8), where the employed regression specification is indicated above each subfigure. The counterfactual in all panels is that none of the firms has capital adjustment costs. The red shaded areas report the 68% non-parametric bootstrap confidence intervals (Efron and Tibshirani, 1993). The blue lines depict the actual change in the aggregate of firms' investment plans for the four horizons, again in percent of the aggregate of the investment plans for the respective horizons in the no shock scenario. The first three panels use the specifications summarized in Tables 8, 9 and 12. The fourth and the fifth panel base on the specifications of Table 8 and Table 9 additionally including horizon-specific intercept interactions.

H Role of Firm Heterogeneity in Adjustment Costs

We compute the aggregate expected response δ_h^c of Equation (8) under the counterfactual assumption that variable m in Equation (7) has the realization $x_{i,m}^c = \bar{x}_m$ for all firms $i = 1, \dots, n$ in the sample, where $\bar{x}_m$ is the economy-wide aggegrate value of variable m calculated from our representative sample (see Appendix C). Hence, the counterfactual expected response δ_h^c is equal to the actual expected response δ_h from Equation (5) with the sole difference that the cross-firm heterogeneity in variable m is turned off. By comparing δ_h^c and δ_h we can see whether cross-firm heterogeneity in variable k matters for the expected effects of the uncertainty shock scenario. Variable m may be any explanatory variable in the employed regression. As previously, we concentrate on the investment resale value, the labor adjustment costs and the financial constraint variable whose aggregate values have been reported in Section 4.1.

Figure 18 presents the aggregates of the counterfactual expected responses to the uncertainty shock (red lines) together with the aggregates of the actual (i.e. the non-counterfactual) expected responses (blue lines). The left (middle, right) panels of the figure show the case where the cross-firm heterogeneity in the investment resale value (in labor adjustment costs, in the financial constraint variable) is turned off. The differences between the counterfactual responses, which exclude adjustment cost heterogeneity, and the actual responses turn out to be small or even non-existent for all subfigures. We conclude that heterogeneity in firms' capital and labor adjustment costs per se is not a driving force of firm managers' expectations about the effects of an uncertainty shock on investment, employment and real output.

Figure 18: Counterfactual Responses With Cross-Firm Heterogeneity Turned off



Notes: The red lines depict the counterfactual change in the aggregate of firms' investment, employment and real output plans for the first, second, third and fourth half-yearly horizon after the hypothetical uncertainty shock in percent of the aggregate of the investment, employment and real output plans for the respective horizons in the no shock scenario. The counterfactual responses are calculated according to Equation (8), where the employed regression specifications are the ones shown in Table 8 for the capital adjustment cost counterfactual (left subfigures) and for the labor adjustment cost counterfactual (middle subfigures) or the ones shown in Table 10 for the financial constraint counterfactual (right subfigures). The counterfactual responses in the left (middle, right) subfigures correspond to the case where the investment resale value (the labor adjustment costs, the financial constraint dummy) for each firm in the representative sample is set to the respective economy aggregate (see Table 2 in Section 4.1 and Appendix C). The red shaded areas report the 68% non-parametric bootstrap confidence intervals (Efron and Tibshirani, 1993). The blue lines depict the actual change in the aggregate of firms' investment, employment and real output plans for the four horizons, again in percent of the aggregate of the respective variable for the corresponding horizons in the no shock scenario.

I VAR Analysis

Consider the following VAR(p), which is identical to the VAR described in Dibiasi and Sarferaz (2023):

$$y_t = c + \sum_{i=1}^{p} A_i y_{t-i} + \epsilon_t, \tag{27}$$

where $t = 1, ..., T$ denotes time, y_t is a $n \times 1$ vector containing all endogenous variables, c is a $n \times 1$ vector of constants, A_i for $i = 1, ..., p$ are $n \times n$ parameter matrices and ϵ_t is the $n \times 1$ reduced form error vector with $\epsilon_t \sim N(0, \Sigma)$, where Σ is the $n \times n$ variance-covariance matrix. The reduced error ϵ_t can be written as a linear combination of structural innovations $\epsilon_t = Bu_t$ with $u_t \sim N(0, I_n)$, where I_n is an $(n \times n)$ identity matrix and where B is a non-singular parameter matrix. We set the lag-length to $p = 2$.

Similar to Dibiasi and Sarferaz (2023), we use a recursive identification scheme where the variables in the VAR are ordered as follows:

$$\begin{bmatrix} \text{stock market} \\ \text{policy rate} \\ \text{CPI} \\ \text{employment} \\ \text{investment} \\ \text{consumption} \\ \text{GDP} \\ \text{uncertainty} \end{bmatrix}. \tag{28}$$

Ordering uncertainty last ensures that the impact of all other shocks is already considered for when evaluating the impact of uncertainty on the economy. The VAR is similar the one used in Basu and Bundick (2017), which is augmented by a stock market index.

We use Bayesian methods to estimate the model. More specifically, we specify diffuse priors and obtain draws for the parameters of the model from a Normal-inverse Wishart distribution. The macroeconomic uncertainty measure is derived from changes in the volatility of GDP revisions (see Dibiasi and Sarferaz, 2023 for a more detailed discussion). The uncertainty measure in Dibiasi and Sarferaz (2023) is based on GDP, while the uncertainty shock in our survey experiment is based on turnover. We use the ratio of turnover to GDP in the economy to make the size of the VAR shock equal to the size of the shock in our survey.

J Questionnaire

Basic information [Page 1]

1. Your company's turnover (excluding VAT) at the Swiss site (including goods/services delivered abroad (approximate figure) in 2015:

   2015 ______ .- CHF

2. Your company's operating expenses (including personnel expenses, cost of materials, other operating expenses, depreciation) in Switzerland in 2015:

   2015 ______ .- CHF

3. Your personnel expenses in 2015:

   2015 ______ .- CHF

4. Please state the expected range of your annual net turnover at the Swiss site in 2018.

   Top of range:

   2018 ______ .- CHF

   Bottom of range:

   2018 ______ .- CHF

   Explanation:
   Please enter the top figure (total annual turnover in 2018) in the **upper field** (1% probability that the actual turnover will exceed this figure).
   Please enter the bottom figure (total annual turnover in 2018) in the **lower field** (1% probability that the actual turnover will be below this figure).

5. Please also state which annual turnover figure within the range is most likely.

   Expected value:

   2018 ______ .- CHF

In the following, we will ask some general questions regarding your company. [Page 2]

6. What is the total expected value of the services provided / goods delivered in the coming periods? Please put a price-indexed value on the goods/services at current selling prices in order to calculate the total value.

1st six months of 2017	2nd six months of 2017	1st six months of 2018	2nd six months of 2018
.- CHF	.- CHF	.- CHF	.- CHF

7. Your expected gross investments in plant and machinery in Switzerland in the coming periods:

   Please specify investments at acquisition/production cost.

1st six months of 2017	2nd six months of 2017	1st six months of 2018	2nd six months of 2018
.- CHF	.- CHF	.- CHF	.- CHF

8. Please assume that, due to operational reasons, you will have to sell the investments made in 2017 and 2018 directly after their realization.

   In your opinion, what will their resale value (net residual value) be?

   (as a percentage of the total investments stated above)

   Real estate ☐ %

   Intangible assets (including IT) ☐ %

   Mobile tangible assets (excluding IT) ☐ %

   Not relevant ☐

   In the context of this question, we are investigating a hypothetical value that plays a central role in the economy. In specific, we are interested in the decline of an investment's price directly after its acquisition. We are therefore asking you about the price at which you could resell an investment directly after its purchase. If you could sell an investment at acquisition price, the resale value would be 100%. If you could not sell the investment at all, its resale value would be 0%. We are aware that this is a hypothetical value and that an exact figure is difficult to provide. Nevertheless, we hope that you can give us a rough estimate.

   [Page 3]

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9. What is your projected number of staff (including temporary staff, trainees and family members helping out) in the coming periods?

   (in full-time equivalents)

1st six months of 2017	2nd six months of 2017	1st six months of 2018	2nd six months of 2018
☐	☐	☐	☐

10. What is the projected number of temporary staff in the coming periods?

    (in full-time equivalents)

1st six months of 2017	2nd six months of 2017	1st six months of 2018	2nd six months of 2018
☐	☐	☐	☐

11. What was the estimated cost of recruiting a new full-time employee (e.g. advertising, recruitment agency, selection process, training, on-the-job training, etc.) in 2015? A rough estimate is sufficient.

    (as a percentage of the average annual salary (including additional benefits) of a new full-time employee)

    2015 ☐ %

12. In your experience, which average costs are associated with a statutory dismissal by the employer (e.g. severance pay, lawyer's or court costs, release from work, reduced working hours, etc.)?

    (as a percentage of the average annual salary of a new full-time employee)

    ☐ %

13. What is the annual fluctuation rate in your company (including voluntary departures and retirement)?

    (average figure of the last few years)

    ☐ %

14. How do you rate your corporate culture: Is your company generally prepared to take entrepreneurial risks or does it try and avoid such risks where possible?

    Please tick a figure on the scale below, where 1 means: ‘not at all prepared to take risks’ and 10 means: ‘very willing to take risks’. Tick a value in-between for a graduated response.

1	2	3	4	5	6	7	8	9	10
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

[Page 4]

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15. In response to one of the questions above, you provided the following estimate of your long-term future net turnover (net annual turnover in 2018):

    Top of range [redacted] .- CHF

    Bottom of range [redacted] .- CHF

    Expected value [redacted] .- CHF

Please imagine the following scenario:

At the beginning of April 2017, the Federal Council announces that it will put an initiative to the vote in July 2017 that will have a substantial impact on your future turnover. If the initiative is voted in, the impact on your demand will be positive, if it is rejected the effect will be negative.

Recent polls show that around 50% of Swiss voters are currently in favour of the initiative. The percentage of voters who reject the initiative is also 50%.

The initiative will affect your long-term expected turnover (net annual turnover in 2018) as follows:

Your new expectations

if the initiative is accepted [redacted] .- CHF

if the initiative is rejected [redacted] .- CHF

16. How would you adapt your current plans in the above scenario?

    What is the total value of the services provided / goods delivered in the coming periods? Please put a price-indexed value on the goods/services at current selling prices in order to calculate the total value.

1st six months of 2017	2nd six months of 2017	1st six months of 2018	2nd six months of 2018
.- CHF	.- CHF	.- CHF	.- CHF

17. How would you adapt your current plans in the above scenario?

    In the above scenario, your company’s expected gross investments in plant and machinery in Switzerland in the coming periods is:

1st six months of 2017	2nd six months of 2017	1st six months of 2018	2nd six months of 2018
.- CHF	.- CHF	.- CHF	.- CHF

18. How would you adapt your current plans in the above scenario?

    Your projected number of staff (including temporary staff) in the coming periods:

    (in full-time equivalents)

1st six months of 2017	2nd six months of 2017	1st six months of 2018	2nd six months of 2018

19. How would you adapt your current plans in the above scenario?

    Your projected number of temporary staff in the coming periods:

    (in full-time equivalents)

1st six months of 2017	2nd six months of 2017	1st six months of 2018	2nd six months of 2018