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ABSTRACT

Banking on Snow: Bank Capital, Risk, and Employment*

How does small-firm employment respond to exogenous labor productivity risk? We find that this depends on the capitalization of firms' local banks. The evidence comes from firms offering (quasi-) fixed employment to workers whose productivity depends on the weather. Weather risk reduces this employment, and the effect is stronger in regions where the regional banks have less equity capital. Bank capitalization also proxies for the extent to which the regional banks' borrowers can obtain liquidity when the regions are hit by weather shocks. We argue that, as liquidity providers, well-capitalized banks support economic adaptation to climate change.

JEL Classification: J23, J41, E44

Keywords: labor productivity risk, quasi-fixed employment, bank liquidity

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"making finance flows [...] consistent with climate-resilient development."

from Article 2 of the Paris Agreement, UNFCCC (2016)

1 Introduction

This paper contributes to the literature on "real effects" of imperfections of the financial system by analyzing effects of bank capitalization on the risk-taking of non-financial firms. It is based on data about a group of small firms which take risk by employing workers whose productivity depends on the weather. We analyze how weather-induced labor productivity risk affects the firms' employment – and whether this employment effect is amplified by financial "frictions".

Our analysis yields insights that are relevant for economic adaptation to increasing risks of extreme weather,[1] but the analysis is more broadly motivated by a growing macroeconomic literature on the joint effects of financial frictions and labor productivity risk. For example, Arellano et al. (2019) show that these effects can account for a substantial part of the contraction in employment and output observed during the Great Recession. This insight is based on a model in which financial frictions affect firms when they take risk by hiring workers, promising them quasi-fixed pay and employment before the workers generate uncertain revenues. Related models appear in Herranz et al. (2015) and Quadrini (2017).

We analyze data from a setting that allows us to measure effects of exogenous changes in labor productivity risk because the changes in *risk* can be distinguished from labor productivity *shocks*. This is commonly assumed in the analyses mentioned above.[2] We can match this assumption in a real-world setting by focusing on a particular group of workers: The service personnel of tourism businesses (hotels and restaurants) in Austrian ski resorts. The productivity of these workers depends on the snow conditions in the resorts. Weather risk causes labor productivity risk because weather shocks affect the demand for the workers'

[1] This is a likely effect of climate change. See, e.g., Lange et al. (2020).

[2] For example, Arellano et al. (2019) assume that, prior to any period of their model, all agents receive information about the standard deviation of this period's firm-level labor productivity shocks.

services. We can distinguish between the employment effects of the shocks and the effects of changes the risk of the shocks because this risk can be measured based on past snow data.

In an exploratory analysis, we test for the direct effects of snow shocks on the ski tourism businesses' employment. This is inspired by Oi's (1962) notion that labor is a quasi-fixed factor of production being only completely variable in the long-run.[3] We use a similar notion of quasi-fixity, distinguishing between the employment effects of (longer-run) changes in snow risk and (short-run) snow shocks. We find no evidence that the ski tourism businesses respond to snow shocks during the starting weeks of the skiing season.[4] The firms' employment does, however, respond to the risk of these shocks. It appears that, in hiring employees before the start of the skiing season, the firms take into account that the employees' starting dates may be before there is enough snow in the ski resorts and, thus, before there is sufficient demand so that the employees can "earn their pay". Given that this risk decreases across the starting weeks of the skiing season,[5] the firms' employment picks up during these weeks. (See Figure 2.) This increase in employment is quasi-fixed in the sense that it is largely driven by hiring decisions well in advance of the workers' starting dates: Due to local labor market tightness, the firms mostly hire workers who can only start working after some time because the workers first have to move. The more workers a firm hires with starting dates before a given week, the more the firm exposes itself to snow risk as a risk of demand/labor productivity shocks during this week. We analyze this risk-taking. After the starting weeks of the skiing season, demand shocks have a much less direct effect on the firms' labor productivity because the

[3] Quasi-fixed labor is a key topic for business cycles and labor productivity (Gali and van Rens, 2020). For example, DSGE macro models with labor hoarding due to quasi-fixed hiring and training costs perform better in explaining the dynamics and persistence of aggregate output (Haan et al., 2000).

[4] Snow shocks would explain the firms' employment if they either waited for snowfall before hiring employees or if they fired employees in the event of a lack of snow during the season's starting weeks. This appears to be suboptimal due to search costs associated with local labor market tightness: It seems that the firms cannot wait for snowfall before they (re-)hire workers because, at this point, it may be too late to find workers in time for the start of the high season (right at Christmas). The effects of labor market tightness will be further analyzed in Section 6.2.

[5] We also test whether the risk changes across skiing seasons, and find trends that are likely to be caused by global warming. See Table A.1 in the Online Appendix. This evidence suggests that, during our sample period, the firms did receive new information about snow risk. For further discussion, see Section 4.1.

firms tend to be booked out.[6]

Having found a setting in which we can credibly identify an exogenous component of labor productivity risk in small firms, we test whether the employment effects of the risk depend on financial frictions, with a focus on frictions associated with bank capitalization. We find that the risk has a substantially stronger negative effect on the employment of the firms in areas where the local banks have less equity capital. To the best of our knowledge, this effect of bank capitalization has not yet been documented before. In addition, we document a likely driver of this effect: Bank equity affects the extent to which the borrowers of banks in ski resort municipalities can reduce their interest payments when they are subject to unfavorable weather. In essence, the banks appear to provide their borrowers with the liquidity they need for "weathering cash flow shocks" (Brown et al. (2021)). Our evidence shows that the availability of this liquidity insurance (Holmström and Tirole (1998)) depends on bank capitalization. This is a novel result which adds to the evidence in Brown et al. (2021). It suggests an explanation for our evidence that bank capitalization affects the risk aversion that the ski tourism businesses exhibit in hiring workers prior to the start of the skiing season: The firms close to well capitalized banks are less averse to quasi-fixed labor costs because they have better access to bank-provided liquidity insurance. Our evidence for this real effect of bank capitalization concerns small firms, i.e., firms that tend to be subject to the discretion of their house-banks when they need liquidity (Chodorow-Reich et al. (2022)).

By focusing on a suitable setting, we can resolve a number of identification problems that arise in measuring effects of the weather on economic decision making. These problems are analyzed in Lemoine (2021). We identify what he refers to as the "most direct form of ex-ante adaptation" to the weather, i.e., adaptation "to directly mitigate the consequences

[6] The firms are typically booked out after Christmas. Once a firm is booked out, its labor productivity is affected by capacity constraints, e.g., by a hotel's number of rooms or restaurant seats. These constraints are non-binding not only during the skiing season's starting weeks, but also during the ending weeks. We find that, during the ending weeks, the tourism businesses do respond to snow shocks by firing workers. For the starting weeks, the same tests yield no evidence that snow shocks affect the firms' employment. Data about the ending weeks will be used in a "placebo check" of our results.

(or enhance the benefits) of expected future weather". While we analyze a special setting, our analysis concerns a general role of the banking sector in economic adaptation to climate change, i.e., the provision of liquidity to firms affected by increasing weather risk. Our evidence shows that this requires sufficiently well-capitalized banks. Given that weather risk is a risk of rather verifiable shocks, it should in principle be well-suited for risk-sharing between firms and their banks. As a consequence, banks' capital structure policies and their risk management should be on the agenda for "making finance flows [...] consistent with climate-resilient development" (UNFCCC (2016)).[7]

Section 1.1 discusses our contributions to the related literature. In the remainder of this section, we describe our analysis in a more detailed manner.

We analyze data about businesses with a readily identifiable physical location linked to specific climate-related risks, i.e., tourism businesses in Austrian ski resort municipalities. The data combine data about 16,801 firms' employment spells during the years 1977-2011 with high-resolution data about the snow levels in Austrian ski resorts during the years 1978-2006. While the cut-off in 2006 is due to data non-availability,[8] it results in a sample period for which our snow data convincingly describe the snow conditions in Austrian ski resorts. The data describe natural snow levels and concern a sample period in which a ski resortÂťs natural snow cover still strongly affected the tourist arrivals in the resort.[9] The high granularity of the data allows for regressions with fixed effects at the firm-by-year and week levels.

Our results regarding the effects of bank capitalization come from balance sheet data about Austrian banks, available from 1998 onwards. As discussed above, we use the data in regressions explaining weekly variation in the employment of Austrian ski tourism businesses.

[7] Climate-related financial risks (and their pricing and hedging, (Giglio et al., 2021)) are also relevant for financial stability (Bolton et al., 2020). For analyses of "green" bank capital regulation, see Oehmke and Opp (2022), and Döttling and Rola-Janicka (2022).

[8] The snow data result from a model which was used by the Austrian Meteorological Office to compute high-resolution snow maps based on observations from a grid of weather stations. The year 2006 is the last year for which the model was used to compute snow maps. See Schöner and Hiebl (2009).

[9] After our sample period, artificial snow has been increasingly used to manage snow risk.

The main explanatory variables measure snow risk and the capitalization of the banks in the vicinity of ski resorts. We include the interaction of the two variables as an explanatory variable in order to test whether bank capitalization modulates the effect of snow risk on the tourism businesses' employment during the starting weeks of the skiing season. To interpret the regression estimates as evidence regarding effects of labor productivity risk (rather than snow risk), we must address the problem that we cannot directly observe the extent to which snow risk induces labor productivity risk in a given firm.[10] We do this using IV estimates, exploiting an institutional feature of the Austrian banking sector, i.e., that there are many regional banks that belong to banking groups with internal capital markets (e.g., the group of savings banks). We use the variation in the groups' *aggregate* equity capital to instrument the bank-level variation in the regional banks' equity capital. Our setting allows for an analysis of the validity of the instrument using data about tourist arrivals as a proxy for ski tourists' demand. We find that the instrument does not explain the extent to which demand in a ski resort responds to snow shocks. This allows us to estimate an effect of bank capitalization on employment which is *not* due to bank capitalization proxying for the extent to which snow risk induces demand risk.

Our identification strategy is illustrated in Figure 1. Its two key elements are the use of an instrument to credibly identify employment effects of bank capitalization which result from labor productivity risk, and the use of a setting in which this risk results from weather-induced demand risk.[11] The first element is depicted through the broken arrow in Figure 1 which represents the validity of our instrument, i.e., that the instrument does not proxy for the extent to which snow risk induces demand risk. The second element is depicted through the equation in the central box of Figure 1: demand risk = labor productivity risk. This equation is arguable because we focus on firms in the service sector and analyze a risk of

[10] This is a concern because our measures of bank equity may be correlated with cross-sectional variation in the extent to which the tourism businesses face demand shocks due to snow risk. For example, bank capitalization may proxy for the firms' ability to finance investments in facilities (e.g., the spa area of a hotel) that attract tourists if there is not enough snow for skiing.

[11] Here, we omit some details, e.g., our use of fixed effects. See Section 2 for further discussion.

demand shocks that directly affect the firms' labor productivity since they occur at a time when the firms' employment is quasi-fixed and the firms are not constrained by capacity limits associated with their fixed assets.

Our IV estimates measure the effect depicted by the non-broken arrow pointing to the link between labor productivity risk and (quasi-fixed) firm-level employment. As discussed above, we document that the strength of this link depends on the capitalization of the banks in a given region. Per basis point of bank equity above its mean, there is a 1.5% reduction in the semi-elasticity of the employment with respect to exogenous labor productivity risk.[12]

Why should bank capitalization modulate the employment effects of labor productivity risk? To address this question, we use annual bank-level balance sheet data and test for evidence that Austrian regional banks provide liquidity to their borrowers in ski resorts when the resorts suffer from a lack of snow.[13] This liquidity provision would be an instance of the banks performing a core function of the financial system.[14] Given our previous results, we specifically test for evidence that the liquidity provision is associated with snow shocks during the starting weeks of the skiing season, i.e., during the period in which the tourism businesses' employment is quasi-fixed, so that they are vulnerable to weather-induced labor productivity shocks. We indeed find evidence that the snow shocks affect the banks: In an average ski resort municipality, a shortening of the skiing season by one (starting) week causes a reduction in the interest income growth of the nearby regional banks by 1.37 percentage points.[15] For the banks' borrowers, any non-paid interest is, of course, a liquidity transfer they receive from the banks. Our regressions show that the size of these liquidity

[12] See Table 8, discussed in Section 5.2.2.

[13] We have no data about specific transactions between the banks and the tourism businesses or their owners or workers. We, therefore, use bank-level balance sheet data to test for effects of the snow shocks, aggregating the balance sheets of all regional banks close to a municipality, based on data about the banks' branch networks. Our sample is focused on municipalities in which almost all local economic activity during the winter season is associated with ski tourism.

[14] See Holmström and Tirole (1998), Kashyap et al. (2002), and Gatev and Strahan (2006).

[15] We do not find similar evidence for the ending weeks of the skiing season. This is consistent with the finding, mentioned above in footnote 6, that snow shocks during the ending weeks do affect the firms' employment. By laying off employees, the firms may avoid the cash flow shortfalls that would otherwise cause some of them to reduce their interest payments to local banks.

transfers depends on bank capitalization. This novel finding can explain why we observe the employment effects of bank capitalization, discussed above. We attribute these effects to variation in the extent to which the tourism businesses in ski resorts can expect to obtain liquidity from the local banks when they have to cope with negative cash flow shocks due to a lack of snow.

The following section discusses our contribution to the related literature. Section 2 describes our research strategy. Section 3 presents institutional details of the industry we focus on. Section 4 describes our data sources and descriptive statistics. Sections 5 and 6 present our results. Section 7 concludes.

1.1 Related literature

Our analysis tests the foundations of macro-finance models in which firm-level employment depends on financial frictions and the volatility of labor productivity. Two such models appear in Arellano et al. (2019) and Quadrini (2017). The models highlight that firm-level employment decreases in the risk of labor productivity shocks if financial frictions affect the risk-taking of firms that occurs when the firms "insure" their workers against this risk.[16] With this focus, the models represent a joint hypothesis concerning two effects of labor productivity risk on firm-level employment, i.e., the effect of changes in the risk, as well as the effect of actual labor productivity shocks. In the two models, the latter effect is set to zero – firm-level employment is assumed to be quasi-fixed.

We analyze a setting in which we can analyze both parts of the joint hypothesis. This puts our analysis at the intersection of two empirical literatures. The first literature analyzes direct effects of labor productivity shocks on employment and wages, while the second analyzes effects of risk. The papers in the first literature show that, in highly developed economies, firms typically offer their workers an income that is insured against transitory

[16] In general equilibrium, part of the negative effect of increased volatility of labor productivity on employment is offset by a reduction in the wage level.

firm-specific shocks, but workers receive less insurance against permanent shocks.[17] This suggests that the effects of labor productivity risk on employment can only be interpreted conditional on the results of a prior analysis of the direct effects of the shocks associated with the risk. By using this research strategy, we obtain the first evidence that quasi-fixed employment responds to changes in risk, making sure that we actually analyze a risk of shocks that do not cause lay-offs.[18] This evidence adds to the second literature mentioned above. For a recent survey and contribution to this literature, see Alnahedh et al. (2019) who propose a novel method for identifying "short-term" cash flow uncertainty and find a negative effect of this uncertainty on corporate employment growth. Our evidence partly corroborates this finding, but no evidence for a negative effect of snow risk on employment emerges for the ending weeks of the skiing season. During these weeks, the risk appears to mostly be a risk of shocks which directly cause lay-offs, while the firms do not respond to the risk *per se*.

Our main result adds to the literature on the real effects of bank capitalization: We report the first evidence that banks' equity capital buffers modulate the effects of exogenous labor productivity risk on small firm employment. This complements evidence that bank capitalization affects the speed of economic recoveries after recessions (Jordà et al. (2021)). The latter evidence points to effects of bank capitalization on the risk-taking capacity of firms in the real economy because risk/uncertainty tends to rise in recessions (Bloom (2014), Bloom et al. (2018)).[19] Evidence for effects of bank capitalization on firm-level employment also appears in Schüwer et al. (2019), and Rehbein and Ongena (2020), while Jiménez et al. (2017) and Fraisse et al. (2020) present evidence regarding employment effects of bank capital requirements. Schüwer et al. (2019) analyze the effects of Hurricane Katrina in 2005 and

[17] Surveys of this literature appear in Pagano (2020) and in Guiso and Pistaferri (2020). The idea that firms insure their workers against labor productivity shocks goes back to Knight (1921). Guertzgen (2014) analyzes this insurance based on German data. We know of no analysis based on Austrian data.

[18] These are the snow shocks that occur during the starting weeks of the skiing season.

[19] Another contribution complementing Jordà et al. (2021) with microeconometric evidence is that of Acharya et al. (2021). While they do not specifically consider effects of bank capitalization on the risk-taking capacity of non-financial firms, they document a range of non-desirable effects of bank under-capitalization due to regulatory forbearance.

finds that, among affected counties, those with a larger share of independent banks and more bank capital saw more positive employment growth. Rehbein and Ongena (2020) also report effects of bank capitalization on employment while analyzing spillovers of local shocks to unaffected regions. They use data on a natural disaster in Germany to show that credit demand shocks caused by the disaster affect banks' credit supply in non-shocked regions, and that this effect is driven by banks lacking equity capital.[20] The paper of Jiménez et al. (2017) uses Spanish data to document the employment effects of mitigating credit supply cycles through pro-cyclical capital requirements (resulting in counter-cyclical equity capital buffers of banks), while Fraisse et al. (2020) use cross-sectional heterogeneity in bank capital requirements (under "Basel-II" bank capital regulation) to document sizeable negative effects on employment. Our results come from the period of the "Basel-I" regulatory framework and specifically concern the effect of bank capitalization on firms' risk-taking with respect to labor productivity risk. As discussed above, this focus of our analysis is motivated by the contributions of Quadrini (2017) and Arellano et al. (2019) demonstrating the macroeconomic relevance of interactions of financial frictions with labor productivity risk. In Quadrini (2017), the frictions are directly associated with bank capitalization since employers in the real economy are modeled as risk-takers who use bank liabilities for precautionary saving.

Our setting is not suitable for identifying effects of the "bank liabilities channel" through which bank capitalization affects employment in Quadrini (2017), but the results in the final part of our paper point towards an effect that is based on a credit channel. These results contribute to a small literature on bank behavior when borrowers are hit by weather-induced cash flow shocks. Brown et al. (2021) provide the first evidence that firms use credit lines to cope with "pure" cash flow shocks due to abnormally severe winter weather. We obtain a complementary result when we find that weather (snow) shocks in ski resorts

[20] The disaster is a flood affecting many German regions in the year 2013. Rehbein and Ongena (2020) build on prior research by Koetter et al. (2020) who analyze the response of bank lending to the disaster with a focus on the shocked regions.

affect the interest income of the nearby banks. Our result seems to be inconsistent with evidence in Giroud et al. (2011) that Austrian banks are not willing to write off debt when ski hotels become financially distressed due to a lack of snow in the nearby resorts. The latter evidence, however, comes from data about a small sample of financially distressed ski hotels, while the analysis in the present paper is based on data about the total population of ski tourism businesses in rural Austria. Neither Brown et al. (2021) nor Giroud et al. (2011) test whether banks' capitalization affects their provision of liquidity to borrowers hit by weather-induced cash flow shocks.[21]

2 Research strategy

We analyze the employment of Austrian ski tourism businesses. The first part of our analysis explores how the firms respond to the risk that, due to a lack of snow for skiing, there may be little demand for their employees' services. As discussed above, the main finding is that, despite this risk, the ski tourism businesses offer quasi-fixed employment to their employees during the starting weeks of the skiing season.[22] This sets the stage for our main analysis, in which we test whether bank capitalization affects the sensitivity of this employment with respect to exogenous labor productivity risk.

We now describe the research strategy behind our main analysis. In this analysis, we focus on a decision problem that can be interpreted as a simple version of Lemoine (2021)'s framework for analyzing economic adaptation to changing weather conditions. Using Lemoine (2021)'s notation, we specify the payoff generated by a firm's employees as a function $\pi(w_t, S_t, K)$, where w_t is a weather shock (unknown at the time when the firm hires its

[21]By documenting this effect, we add to a literature on bank liquidity creation which has found effects of bank capitalization, but without focusing on banks' provision of liquidity to borrowers hit by cash flow shocks. See Bouwman (2019) for a recent survey of the literature on bank liquidity creation.

[22]See the following section for a discussion of the relevant institutional details, including the evidence that, during our sample period, tourist arrivals in Austrian ski resorts strongly responded to the (natural) snow conditions in the resorts. By focusing on the starting weeks of the skiing season, we analyze firms' employment during a period in which the productivity of their employees is not affected by capacity constraints determined by the firms' fixed assets (e.g., a hotel's number of rooms or restaurant seats). A similar argument holds for the ending weeks of the skiing season, data for which will be used in a placebo analysis.

employees), S_t is the firm's staff (hired at an exogenous wage), and K denotes a set of variables that determine the extent to which the firm is affected by a given shock w_t.

In Lemoine (2021), S_t denotes an abstract stock variable evolving as $S_t = gS_{t-1} + h(A_{t-1})$, where $g \in [0, 1)$ and $h(\cdot)$ is a monotonic function of an adaptation action A_{t-1}. We interpret the action A_{t-1} as a firm's hiring of employees for period t, and we assume that the firm cannot adjust its staff after observing the shock w_t, – i.e., we assume that employment is quasi-fixed. As discussed above, these assumptions fit what we see in the data for the starting weeks of the skiing season. For simplicity, we also assume that the action A_{t-1} only affects a firm's payoffs through the stock variable S_t while abstracting from direct effects.[23]

Our analysis seeks to identify what Lemoine (2021) refers to the "most direct form of ex-ante adaptation" to expected future weather, i.e., adaptation that occurs in an essentially static setting, based on a forecast of the future weather. This adaptation has the form:

$$A_{t-1} - \bar{A} \propto \bar{\pi}_{Sw}(f_{t-1} - C), \tag{1}$$

where f_{t-1} denotes a weather forecast,[24] $\bar{A}$ and $\bar{\pi}$ denote a "steady-state" action and the associated payoff in a deterministic limit case of the model (with a given climate C),[25] and $\bar{\pi}_{Sw}$ denotes a second derivative of the payoff function $\bar{\pi}$. Lemoine (2021) shows that the above-stated type of adaptation occurs if firms do not engage in "preparatory adaptation", which, in our setting, would mean that a firm adjusts its hiring to prepare for longer-run changes in its workforce.

Why can we assume that preparatory adaptation does not occur? In our setting, this is tenable because we focus on workers hired on a seasonal basis: They work in firms –

[23]Lemoine (2021) allows for direct effects of adaptation by including A_t among the arguments of the payoff function $\pi(\cdot)$. By abstracting from such effects, we ignore, for example, that hiring workers may be costly in itself. In our setting, this assumption concerns the firms' hiring well before the start of the skiing season. The assumption does not rule out that short-notice hiring of workers is very costly.

[24]In our setting, the relevant weather forecast would be a longer-term forecast concerning the snow conditions during a given skiing season, given information well before the start of the season, i.e., at the time a firm hires its employees.

[25]See Lemoine (2021) for formal definitions. In the deterministic limit case, the weather is deterministically given by the climate C (so that the forecast f_{t-1} would always equal the climate C).

ski tourism businesses – which typically shut down after the winter months. A firm's hiring of these workers in a given year has no direct effect on its employment during other years: $g = 0$. Moreover, it is reasonable to abstract from inter-temporal complementarity or substitutability of firms' adaptation to changing weather conditions. In our setting, this assumption mostly rules out effects of a firm's hiring and employment on the pool of suitable employees from which the firm can hire at other times. This is tenable because we focus on an industry hiring employees with rather general skills (waiters, room maids, etc.), few of which come from local labor markets. After working for a firm in our sample during a given skiing season, these employees typically return to their permanent residences, most of which are outside of Austria.

Our main regressions explain variation in the employment of the Austrian ski tourism businesses across the starting weeks of the skiing season. In this setting, the variables A_{t-1} and S_t should be thought of as vectors stating the number of workers a firm hires for/employs during any (starting) week τ of the skiing season t. A picture of this hiring process appears in Figure 2 (further discussed in Sections 3.2 and 4.1) which shows how an average firm's employment gradually picks up during the starting weeks of the skiing season. As discussed above, our exploratory analysis shows that this increase in employment is not driven by snow shocks which occur after the season's start (denoted as time "zero" in Figure 2). Instead, the increase in employment can be explained by information about the snow conditions which is available well in advance of the skiing season, at the time the firms hire their seasonal employees. This hiring process can be formalized in terms of the vectors A_{t-1} and S_t if f_{t-1} is interpreted as a vector of forecasts regarding the snow conditions in the different weeks (where the subscript $t-1$ indicates that the forecasts are based on information about previous skiing seasons).

Within the framework outlined above, our main regressions test for employment effects of financial frictions. We think of these effects as effects of costs of cash flow shortfalls which occur due to demand shocks that keep a firm's employees from "earning their pay". We hypothesize that, if the banks in the vicinity of a firm lack equity capital, this compromises the firm's ability to cope with negative cash flow shocks, making the firm more reluctant to take a risk of such shocks by committing to labor costs. This hypothesis is based on two ideas, i.e., that a lack of equity capital has a negative effect on a bank's capacity to provide liquidity to borrowers hit by cash flow shocks, and that small firms depend on the *nearby* banks in order to obtain the liquidity they need to make up for cash flow shortfalls. The first idea will be tested below, with a focus on the effects of snow shocks in Austrian ski resorts. It concerns the effects of bank capitalization on banks' provision of liquidity "insurance" (Holmström and Tirole (1998), Kashyap et al. (2002), and Gatev and Strahan (2006)) to their customers. The second idea is motivated by evidence regarding bank lending in the presence of transportation costs and costs of information transmission, e.g., the evidence in Degryse and Ongena (2005), Agarwal and Hauswald (2010), and related papers, recently surveyed in Nguyen (2019).

To test for effects of bank capitalization, we use regressions explaining the quasi-fixed employment of the ski tourism businesses during the starting weeks of the skiing season.[26] The regressions include the baseline effect of snow risk, as well as its interaction with (demeaned) proxies for the equity capital of the banks with branches close to a ski resort municipality:

$$\ln(ED_{i,\tau,t}) = \beta_0 SR_{j(i),\tau,t} + \beta_1 SR_{j(i),\tau,t} \times BE_{j(i),t} + \gamma Z_{i,\tau,t} + \alpha_{i,t} + \alpha_\tau + \epsilon_{i,\tau,t}, \qquad (2)$$

where t indexes years (skiing seasons), τ indexes weeks of the skiing season (e.g., the week before Christmas), i indexes firms in ski resort municipality $j(i)$, $ED_{i,\tau,t}$ denotes person-days of employment ("Employment Days", ED), $SR_{j(i),\tau,t}$ denotes Snow Risk, $BE_{j(i),t}$ measures the equity capital of the banks with branch offices close to the municipality $j(i)$, and $Z_{i,\tau,t}$ denotes control variables. $\alpha_{i,t}$ and α_τ are firm-year fixed effects as well as week fixed effects.

[26] We actually also run similar regressions for the ending weeks, but this is a "placebo check" since our exploratory analysis shows that, during the ending weeks, the firms' employment is not quasi-fixed. See Section 5.2.1 and Table 6.

The fixed effects specification will be discussed below, and Section 4.1 defines all variables. To mark these variables in the text, we use capital letters, e.g., referring to the variable $BE_{j(i),t}$ as "Bank Equity".

The above-stated regression represents the hiring process described in expression (1) if the forecast f_{t-1} includes Snow Risk.[27] By including the interaction of Snow Risk and Bank Equity, the regression also allows for a specific type of cross-sectional heterogeneity in the risk-sensitivity of the Employment Days. An identification problem, however, arises if we – specifically – interpret the coefficient β_1 as evidence concerning cross-sectional heterogeneity in the employment effects of labor productivity risk induced by an exogenous risk of demand shocks. With this interpretation, the above-stated regression would yield evidence that is potentially generalizable to many other settings since it measures employment effects of a type of risk which is much more general than Snow Risk and tests whether these effects depend on Bank Equity. The problem is that Bank Equity may also proxy for the extent to which this more general risk is caused by Snow Risk. As a proxy for the availability of bank credit, Bank Equity may for example proxy for the scale of investments that reduce the effects of snow shocks on the demand for ski tourism.[28] Lacking data about such investments and related control variables, we use two other ways of addressing the identification problem.

The first way in which we address the problem is our use of firm-year fixed effects. These fixed effects force our regressions to estimate the effects of Snow Risk on employment from variation within firm-years. The fixed effects control for effects of changes in a firm's exposure to Snow Risk due to upgrades of the firm's fixed assets or due to investments in some sort of

[27] We include any other elements of the forecast in the control variables. Our measure of employment days is the empirical equivalent of S_t which, in our setting, is a vector of weekly employment during the starting weeks of the skiing season.

[28] In the payoff function $\pi(\cdot)$, these investments would concern the variable K. Lemoine (2021) describes this variable as "long-lived infrastructure". In our setting, the most obvious type of infrastructure for mitigating snow risk is that for generating artificial snow in ski resorts. While our data concern a sample period in which this infrastructure mostly did not yet exist, the identification problem also arises with respect to firm-specific provisions for stabilizing their cash flow with respect to snow risk. For example, some ski hotels offer their guests spa areas as an attraction unrelated to skiing, and this may be more common in areas with well-capitalized banks.

regional infrastructure for ski tourism.[29] This allows us to assume a constant effect of Snow Risk on each firm's labor productivity across the weeks of the same skiing season. In our empirical analysis, we actually run different regressions for different sets of weeks (e.g., the starting and ending weeks of the skiing season), thus allowing also for some within-season variation in a firm's fixed effects. Moreover, all our regressions include week fixed effects which control for effects of predictable demand variation in ski tourism. For example, the predictable increase in ski tourists' demand during the Christmas holidays tends to induce a faster increase in the employment of ski tourism businesses during the week before (relative to the other starting weeks of the skiing season).

Our second way of addressing the identification problem is the use of an instrumental variable. We found a suitable instrument based on an institutional feature of the Austrian banking system, i.e., that it is a "three-pillar" banking system composed of privately owned banks, savings banks (Sparkassen), and two groups of cooperative banks (Raiffeisen, Volksbanken), where the last three groups contain many small banks with geographically concentrated branch networks. The instrument measures these small banks' capitalization in terms of group-level aggregates of the banks' equity capital. This aggregate group-level equity capital is arguably exogenous in the sense that the region of any given ski resort accounts for only a negligible share of the overall business of any of the three banking groups. The groups' aggregate equity capital should, however, affect each of their member banks because these banks rely on group-specific internal capital markets.[30]

We can test whether the aggregate equity capital of the banking groups measures the extent to which snow risk induces labor productivity risk via demand shocks in Austrian ski tourism. If our instrument is valid, it should not proxy for the sensitivity of ski tourists'

[29]We can safely assume that, within a given skiing season, the assets (e.g., buildings or spa areas) of the tourism businesses remain unchanged. The business model of the firms in our sample is highly seasonal with a key focus on the winter season. To avoid disruptions of their operations and to avoid the wintry cold, the firms move all construction projects to the off-season. For similar reasons, we can also assume that, during a skiing season, there won't be any major investments in ski resorts.

[30]During our sample period, all groups' access to external equity capital was only through their publicly listed group-specific lead banks. Moreover, the groups featured group-specific deposit insurance systems.

demand with respect to the snow conditions in ski resorts. This can be tested using data about ski tourists' arrivals aggregated to the level of Austrian municipalities.[31] The test will be described in detail below. It yields no evidence against the validity of our instrument. See Section 5.2.2.

Given that our instrument for Bank Equity appears to be valid, our IV estimates identify a novel real effect of bank capitalization, i.e., its effect on the semi-elasticity of employment with respect to exogenous labor productivity risk in non-financial firms. To measure this effect, we will compute the ratio β_1/β_0 of the coefficients of snow risk and its interaction with bank equity.

A similar estimation strategy will be used in regressions that add further evidence regarding effects of bank capitalization in our setting. As discussed above, the regression (2) is motivated by the idea that bank capitalization affects the way the ski tourism businesses respond to weather-induced labor productivity risk because they need bank-provided liquidity insurance to cope with cash-flow shortfalls. Are the banks in ski resorts actually providing their borrowers with this kind of insurance? Corroborating evidence emerges from regressions in which we use snow shocks to explain variation in banks' interest income growth. These regressions will be based on the same instrument for Bank Equity. For further discussion, see Section 6.1.

3 Our industry focus

In this section, we describe the group of firms we focus on in our empirical analysis: hospitality businesses in Austrian ski resort municipalities. We refer to these businesses as ski tourism businesses.

[31] In fact, we can only test the validity of our instrument at the regional level because there are no firm-level data about tourist arrivals.

3.1 Ownership and financing

The Austrian hotel industry consists mostly of small family-owned firms: Dörflinger et al. (2013) report that such firms account for 93% of all firms in the industry. In our sample, the fraction of family-owned businesses should be even higher because we focus on tourism businesses (hotels and restaurants) operating in rural areas, i.e., the Austrian municipalities which are connected to one of Austria's ski resorts.[32] Our sample selection process will be described in the next section.

As family-owned businesses, the firms in our sample typically obtain their outside financing from local banks. When they borrow from the banks, they often use real estate as collateral, i.e., their buildings and land. In some cases, the owners are also personally liable for their firms' debt.[33] If the firms receive outside equity, it is typically from relatives. Loans from relatives are also treated as equity investments under Austrian bankruptcy law.

3.2 Weather risk and employment

We next discuss the firms' exposure to weather risk, i.e., snow risk. This weather risk gives rise to a risk of demand shocks. Töglhofer et al. (2011) analyze panel data about 185 Austrian ski resorts and find that an unexpected change in the snow conditions by one standard deviation changes the number of tourists' overnight stays in nearby hotels by 0.6-1.9%. This result is based on the snow dataset we also use in our paper, i.e., data about natural snow levels. The dataset can be used to measure the snow conditions relevant for skiing because artificial snow was still uncommon in Austrian ski resorts during the period covered by the data.[34]

[32] Our sample, in fact, excludes firms in larger cities because these firms tend to cater to business travelers and tourists which travel for reasons unrelated to skiing. We have no data about the ownership structure of the firms in our sample.

[33] A case like this is described in Giroud et al. (2011). This case concerns a financially distressed hotel. For non-distressed firms, the firms' fixed assets typically constitute sufficient collateral.

[34] The rapid growth in the use of artificial snow after our sample period (1978-2006) can be illustrated using the following numbers: In 2007, there were 3100 snow "cannons" (i.e., devices producing artificial snow) in all of Europe, while in 2015 even more of these devices were used in just three Austrian ski resorts.

Given the relevance of snow risk as a risk of demand shocks, it is not surprising that this risk also affects the employment in the Austrian ski tourism industry. In Figure 2, we plot an average firm's employment over the weeks of the skiing season. We measure this employment in terms of employment-days, as discussed in Section 4.1. The solid line shows the average total employment and the dashed line plots the average employment of seasonal workers, i.e., the workers who are employed during the skiing season only. We plot the variation in these averages over the weeks of the skiing season, i.e., between week 47 of the current year and week 15 of the subsequent year.[35] The plot reveals that the tourism businesses' employment exhibits strong seasonal variation, driven by their hiring and firing of seasonal employees. The permanent employees often include some of businesses' owners or their family members. In our empirical analysis, we will focus on the seasonal employment in Austrian tourism businesses during the skiing season because this is clearly associated with ski tourists' demand for accommodation.

3.3 Institutional details

In the remainder of this section, we discuss institutional details concerning the tourism businesses' risk management with respect to weather-induced demand risk and also describe their employment contracting with their seasonal employees.

With respect to demand risk, the firms' main risk-management tools are their cancellation and pricing policies. While booking platforms nowadays allow hotels much flexibility in adjusting their prices, these platforms were not yet common during our sample period.[36] This limited the ability of the hotels to respond to within-season snow/demand shocks by adjusting their prices. Instead, most hotels set their prices in advance of the skiing season

See https://www.sn.at/wiki/Beschneiungsanlage. We do not know of any comprehensive data source about snow cannons in Austria.

[35] These start and end dates are based on information about ski lifts' opening and closing dates. See Section 4.1.

[36] For example, consider the most popular platform, i.e., www.booking.com. While this platform was founded in the Netherlands in 1996, it only started to operate in Austria in week 27 of 2006, i.e., at the very end of our sample period. Data from Google trends show zero traffic in Austria before that date. The overall share of total online travel sales in Europe was only 5.5% in the year 2003 (Eurostat, 2006).

and specify two prices per room, i.e., a high-season price and an off-season price. Given these prices, tourists would typically book their rooms several months in advance.[37] In the event of a lack of snow, tourists would cancel their bookings subject to cancellation policies specified in industry-wide terms of trade.[38] The cancellation fee is typically a fraction of the total price of a booking, depending on the lateness of the cancellation. The standard fee schedule suggests that tourists' demand for accommodation during a given week of the year should depend on their expectations about the snow conditions one week before their planned arrival.[39] We take this into account by including the lagged snow conditions as explanatory variables in some of our regressions.

Besides managing the risk of weather-induced demand shocks through their pricing and cancellation policies, the tourism businesses can reduce their exposure to this risk through investments that reduce the effects of snow shocks on tourist arrivals. For example, a hotel may be equipped with "wellness" facilities which attract tourists even if there is not enough snow for skiing. This will be taken into account in our research strategy, as discussed in Section 2.

While the tourism businesses have a few ways of reducing their exposure to weather-induced demand shocks (e.g., through cancellation fees), explicit insurance against weather risk is not commonly used. Markets for suitable weather derivatives do not exist and bad-weather-insurance is only available for big events (e.g., ski races). It may actually be efficient for the firms to obtain most insurance against (the more usual) weather risk through risk-sharing with their house banks since these banks should have the requisite financial expertise for hedging/insuring against the risk and they can realize economies of scale relative to each

[37] Even in 2015, 66% of Austrian hotels' bookings were made more than one month in advance WKO (2016). In ski resorts, this percentage must have been even higher because of the missing short-run bookings by business travelers.

[38] The terms of trade are drafted by lawyers of the Austrian Hotel Association. By using these terms of trade, the hotels avoid costs of legal expertise. This fee schedule has remained unchanged for decades. The 2006 fee schedule – which is still in place – is depicted in the Online Appendix.

[39] Cancellations with a notice period of less than 1 week are subject to an additional cancellation fee of 20 percentage points, on top of the standard fee for cancellations less than 1 month prior to the first night booked.

firm hedging/insuring on its own.

We next turn to the tourism businesses' contracting with their workers. They typically employ few permanent workers (mostly members of the owner family) so that seasonal employees constitute most of their workforce during the skiing season. Under Austrian labor law, these workers (who are defined as "Saisonniers" in the law, and are here referred to as seasonal workers) sign fixed-term contracts with the firms. Such a contract is only valid, if it contains a start and end date,[40] as well as the worker's weekly hours and monthly pay. It is not legal for a firm to unilaterally fire a seasonal worker before the worker's contract ends, but, by entering into fixed term contracts, the firms avoid the need for a notice period when they lay off a worker whose contract expired. If a fixed-term contract ends and the worker continues working (in agreement with the employer), the fixed-term employment automatically turns into a permanent contract. Because extending an employment relationship is relatively easy, many fixed-term employment contracts specify ending dates before the likely end of the skiing season.[41] The contracts' starting dates are typically chosen so that the workers have sufficient time to move to the ski resort municipalities before they have to start working. Hiring workers on the spot is limited by local labor market tightness since most Austrian ski resorts are in rural areas with small local labor markets and population density. [42]

[40] A contract starting when the first snow falls and/or ending when the snow is gone would not be a fixed-term contract according to the law.

[41] Very short-term contracts are, however, not common. A likely reason for this is that the firms hire most of their workers from outside of Austria, and this has to be permitted by the firms' local employment offices. If these offices would permit short-term contracts, they would have to grant a substantially larger number of permissions.

[42] For evidence regarding effects of labor market tightness, see Section 6.2.

4 Data and descriptive statistics

4.1 Data and main variables

We construct a data set in which one observation corresponds to a firm-week. The focus is on calendar weeks of the skiing season. We distinguish between a season's starting and ending weeks, and the high-season weeks. The starting weeks are the four weeks 47-50 of the calendar year in which a season starts. These weeks lead up to the start of the high season, i.e., the Christmas holidays. The skiing season's ending weeks are defined as the four weeks 11-15 of the following calendar year. Below, we will simply refer to skiing seasons as "years", using the year index t to refer to the entire skiing season starting at the end of calendar year $t-1$ and ending in week 15 of calendar year t.

Our sample of firms includes all employers that appear in employment spells associated with ski tourism in the Austrian Social Security Database (Zweimüller et al., 2009). We start with the universe of employment relations (spells) in the Austrian tourism sector between 1977 and 2011: 10,316,391 employment spells. 47.5% of these spells concern seasonal employees working in ski tourism.[43] To identify these employment spells, we use data about the starting and ending dates of the employment spells. We define the employment spells in ski tourism as those spells which meet two criteria. The first criterion is that the spells feature an employer located in a municipality with at least one ski lift, but we exclude larger cities (population>20,000) which tend to attract also business travelers.[44] The second criterion identifies spells the timing of which appears to be associated with a skiing season. We define these spells as those starting after November 1 and ending before May 1 of the following year. This period includes the starting and ending weeks of a skiing season, as defined above.

[43] The remaining 52.5% of employment spells concern employees working in tourism during the summer months or year-round.

[44] We use the following list of Austrian ski resorts: https://de.wikipedia.org/wiki/Liste_der_Skigebiete_in_%C3%96sterreich. It suffices to focus on the location of the employer because, at this point of the selection process, we already select from the employment spells in which the employers are tourism businesses. In the resulting sample, most of the workers are in the hotel industry (62.9%), while the rest work in other accommodation, or in food and beverage services.

Our dataset combines three types of data, i.e., snow data, employment data, and balance sheet data of banks. In the remainder of this section, we define the variables that we construct using the three types of data. The merging of the data is based on the municipalities in which the firms (employers) are located, to which we assign the snow data (using the locations of ski lifts) and the banking data (using the locations of bank branches). Austrian municipalities are identified by the standard five-digit municipality identifier code which is based on the Nomenclature of Territorial Units for Statistics (NUTS) framework. We refer to the municipalities of the employers in our sample as "ski resort municipalities".

Employment data To measure a firm's employment using the Austrian Social Security Database, we first define an indicator variable, denoted as $I_{w,i,d}$, which indicates whether worker w was employed by firm i on calendar day d. Moreover, we define an indicator variable $ES_{w,i,t}$ which indicates whether the employment spell between some worker w and firm i in year (skiing season) t was an employment spell in ski tourism, as defined above. The product of the two indicator variables identifies person-days of employment associated with ski tourism. We can therefore compute a firm-week level measure of employment in ski tourism as follows:

$$\text{Employment Days ED}_{i,\tau,t} = \sum_{d \in \mathcal{D}(\tau,t)} \sum_{w} ES_{w,i,t} I_{w,i,d}, \tag{3}$$

where τ indexes weeks, t indexes years (skiing seasons), and $\mathcal{D}(\tau, t)$ is the set of calendar days in a particular week. The above-stated variable is the dependent variable of the regression in expression (2). In addition, we also use a broader measure of employment measuring some firm i's total employment days during a given week, based on all of our data about employment spells involving this firm. This second measure results if we omit the indicator variable $ES_{w,i,t}$ in the above-stated definition. Figure 2 plots averages of the two variables across all firms and skiing seasons.

We also use (un)employment data at the level of Austrian political districts ("counties").

The source of these data is the Austrian Employment Office which reports district-level unemployment rates. We use this information to measure the level of labor market tightness (LMT) within firm i's county $c(i)$ in year t. LMT is defined as $(1 - \text{unemployment rate}_{c(i),t})$.

Snow data We use the same snow data as Töglhofer et al. (2011). The data come from the Austrian Meteorological Office (AMO). The AMO provided us with 1×1 km grid data containing daily information on snow depth, based on a snow cover model (Schöner and Hiebl (2009)), using air temperature, precipitation data, and variables describing the geospatial topology of ski resorts as inputs. The model has been used to generate natural snow data for the years 1978-2006. As discussed in Section 3.2, the data can be used to measure the snow conditions relevant for skiing because, before 2006, there were few snow cannons in Austrian ski resorts.

We match the snow data to municipalities based on the coordinates of all ski lifts within a 10 kilometer radius around the geographic center of a municipality's area. This radius defines a region around the ski resort municipality $j(i)$ where firm i is located according to the municipality code of the firm in the employment data. Given this region, we consider the center of each ski lift in the region and average the snow levels at the closest grid points in our gridded snow data. We thus obtain a measure of ski resorts' average snow levels for each day of our sample period. Given this measure, we identify weeks in which the snow conditions allowed for skiing, using a dummy variable to indicate a sufficiently high level of snow. This "Snow Week" dummy equals one for weeks in which the average snow level exceeded 15cm on a majority of days. In choosing the 15cm cutoff, we follow Giroud et al. (2011).

Figure A.2 in the Online Appendix illustrates our mapping of ski lifts to municipalities for the municipality of Lech am Arlberg, a well known resort in the Austrian state of Vorarlberg. The dashed circle is at a radius of 10 kilometers around the center of Lech. To measure the snow conditions around Lech, we consider all ski lifts marked by red lines. The grid of points shows the locations for which we have snow data. For each ski lift, we use the data for the grid point closest to the center of the line representing the ski lift.

In our empirical analysis, we distinguish between two types of information about the snow conditions in ski resort municipalities, i.e., information available well before the start of a skiing season, and "news" that arrive during the season. The first type of information includes the expected snow conditions and a measure of snow risk. To measure the expected snow conditions for week τ of resort j and season t, we compute the average of the snow-week dummy during the same week of the previous five years in the resort j. Snow risk, SR, is defined in a similar way, based on the variance of the snow-week dummy. The formal definitions of the two variables are as follows:

$$\text{Expected Snow}_{j,\tau,t} = \frac{1}{5}\sum_{n=1}^{5} \text{Snow Week}_{j,\tau,t-n}, \tag{4}$$

$$\text{Snow Risk SR}_{j,\tau,t} = \frac{1}{5}\sum_{n=1}^{5} (\text{Snow Week}_{j,\tau,t-n} - \text{Expected Snow}_{j,\tau,t})^2. \tag{5}$$

The second variable is the main explanatory variable of the regression in expression (2).[45] Given that the sums in the above-stated definitions are based on rolling five years of data prior to a skiing season t, the definitions allow for variation over time in our measures of Expected Snow and Snow Risk. In the Online Appendix, we report that the two variables indeed exhibit significant long-term trends which are consistent with common ideas about effects of climate change, e.g., that climate change increases weather risks.[46] It is therefore plausible that the variables measure the expectations of the owners of tourism businesses regarding the expected future weather.[47] While our sample period ends before climate change

[45]As discussed above, the matching of resorts j to firms is based on the municipality code of a firm i in the employment data. In expression (2), we represent this matching using the notation $j(i)$.

[46]We find that Expected Snow decreased over time, while Snow Risk increased. The strength of the former trend decreases in the altitude of ski resorts, and that of the latter trend increases in altitude. At above-median altitudes, we find an increase in Snow Risk of more than 40% relative to its mean in the first year of the sample period. If we distinguish between the different parts of the skiing season, we actually find even stronger evidence for an increase in snow risk in high-altitude resorts for the season's starting and ending weeks than for the other weeks.

[47]The two variables thus represent the forecast f_{t-1} which appeared in expression (1). As discussed above, the variables are based on snow data which not only result from weather data, but also from data about the

became a widely discussed topic in the media, it is likely that the owners of Austrian ski tourism businesses started to think about weather risk already during this period. In fact, our snow data include some winters in the beginning of the 1990s in which many Austrian ski resorts lacked snow to an extent deemed highly unusual at the time.[48]

We next define our measure of snow "news". This is the difference between the snow-week dummy and Expected Snow, defined above:

$$\text{Unexpected Snow}_{j,\tau,t} = \text{Snow Week}_{j,\tau,t} - \text{Expected Snow}_{j,\tau,t}. \tag{6}$$

This variable is used in two ways in our analysis. The first use is in testing whether snow news affect firm-level employment during specific weeks of the skiing season. This is motivated by the notion that, in ski tourism businesses, labor productivity should depend on ski tourists' demand, so that snow shocks should cause productivity shocks via demand shocks. As discussed above, stylized facts suggest that Austrian ski tourism businesses cater to customers whose demand responds to expectations regarding the snow conditions in ski resorts that the customers form one week before their planned arrival (because the tourists can avoid a substantial increase in cancellation fees by canceling bookings one week ahead). In forming these expectations, the tourists will generally consider information not included in our measure of Expected Snow (which is only based on information available prior to the start of a skiing season). To proxy for this information, we will use lags of Unexpected Snow as explanatory variables.

In some regressions based on annual bank balance sheet data, we will use a variable measuring annual variation in Unexpected Snow. This annual measure of Unexpected Snow results from aggregating Unexpected Snow$_{j,\tau,t}$ for all starting weeks of a skiing season t, i.e.,

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geospatial topology of ski resorts. The latter data represents information which is well-known to owners of tourism businesses in Austrian ski resorts, but is not included in any official weather forecast.

[48] See Figure A.3 in the Online Appendix which is taken from Aigner and Gattermayr (2019) and shows that the winters around the year 1990 were highly unusual in Austria: the temperatures recorded by weather stations in the Alps during these winters are up to four degrees Celsius above the long-term average. Unfortunately, our data about bank capitalization only start in 1998, so that we cannot test whether the winters in the 1990 changed the real effect of bank capitalization that our analysis documents.

the calendar weeks 47-50 of year $t-1$ which we index as weeks 1-4 (since our index starts at the start of the skiing season):

$$\text{Unexpected Snow}_{j,t} = \sum_{\tau=1}^{4} \text{Unexpected Snow}_{j,\tau,t} \tag{7}$$

Banking data Balance sheet data about Austrian banks are available from the Austrian Central Bank (OeNB). The data start in the year 1998 and contain unconsolidated balance sheets of all banks operating in Austria. To map the data to the firms in our sample, we use data about the branch networks of Austrian banks. This second type of data also comes from the OeNB.

The bank balance sheet data are used to construct the measures of bank capitalization denoted as $BE_{j(i),t}$ in expression (2). The measures are defined at the level of municipalities. They are mapped to the ski tourism businesses using the coordinates of the center of the area associated with a firm i's municipality. We first identify all bank branches within a radius of 20 kilometers around these coordinates. This defines the banking landscape around municipality j, denoted as $\mathcal{B}(j)$. Given this area, we then define a number of variables. The first variable is the average equity ratio of the banks in the vicinity of municipality j:

$$\text{Bank Equity } BE_{j,t} = \sum_{b \in \mathcal{B}(j)} \frac{m_{j,b,t}}{M_{j,t}} \times \frac{\text{Total Equity}_{b,t}}{\text{Total Assets}_{b,t}}, \tag{8}$$

where the second ratio measures the equity ratio of bank b in year t (the calendar year in which the skiing season ends), and we compute a weighted average of the equity ratios of all banks. For bank b, the weight is the number of its branches in the area $\mathcal{B}(j)$ divided by the total number of bank branches in this area: $m_{j,b,t}/M_{j,t}$. The data on $\text{Total Equity}_{b,t}$ and $\text{Total Assets}_{b,t}$ is obtained from bank b's annual statements for year t.[49]

We also construct measures of bank capitalization based on measures of banks' equity

[49]Our entire sample period falls into the era of "Basel I" bank regulation. As a consequence, bank capitalization measures based on tier I-III capital were not yet reported by the banks during our sample period.

capital and total assets, which are aggregates at the level of banking groups. Like the well-known German banking sector, the banking sector in Austria has a "three-pillar" structure, with private banks (stock corporations), savings banks (Sparkassen), and cooperative banks (Volksbanken and Raiffeisenbanken). The groups of savings banks and cooperative banks operate within group-specific institutional frameworks, featuring joint supervisory institutions and deposit insurance, as well as lead banks that provide the groups with access to the wider financial markets. Within-group competition between banks is quite limited, but there is a healthy level of between-group competition.[50] The opposite is true with respect to ownership links. The groups of savings and cooperative banks are separate parts of the Austrian banking sector, but there are complex within-group ownership overlaps.[51] Put differently, the three banking groups (Sparkassen, Volksbanken, and Raiffeisenbanken) feature internal equity capital markets. We, therefore, measure the capitalization of the savings banks and cooperative banks not only at the bank-level, but also at the group-level.

From now on, we refer to the savings banks and cooperative banks as "regional" banks and denote the set of regional banks by $\mathcal{R}$. For all regional banks, we compute two different measures of bank equity. The first is their average equity ratio. This is measured using a suitably restricted version of expression (8):

$$BE^{reg}_{j,t} = \sum_{b \in \mathcal{R} \cap \mathcal{B}(j)} \frac{m_{j,b,t}}{M^{reg}_{j,t}} \times \frac{\text{Total equity}_{b,t}}{\text{Total assets}_{b,t}} \tag{9}$$

where $M^{reg}_{j,t}$ denotes the number of branches operated by regional banks in the area $\mathcal{B}(j)$.

The second measure of the regional banks' capitalization is measured at the level of the

[50] In terms of population size per bank branch, Austria remains among the most competitive countries in the European Union. See Table 9.2 in ECB (2017). In terms of total assets, the savings banks have a market share of about 20% while the cooperative banks have a share of about 30% (Bülbül et al. (2014)).

[51] For example, the savings banks' lead bank, Erste Bank, is partly owned by other savings banks. The internal equity markets are also key to resolving cases of financial distress. Distressed banks are typically saved through mergers with other banks in the same group.

respective banking groups. It is defined as follows:

$$BE_{j,t}^{grp,reg} = \sum_{b \in \mathcal{R} \cap \mathcal{B}(j)} \frac{m_{j,b,t}}{M_{j,t}^{reg}} \times \frac{\text{Total Equity}_{b,t}^{grp}}{\text{Total Assets}_{b,t}^{grp}} \tag{10}$$

where Total Equity$_{b,t}^{grp}$ denotes the aggregate equity capital of the group of banks associated with bank b (i.e., the sum of the equity capital of all member banks of this group), and Total Assets$_{b,t}^{grp}$ denotes the group's aggregate assets.

The measure of bank equity in expression (10) will be used as an instrument for the regional banks' equity, defined in expression (9). As discussed in Section 2, the instrument should be exogenous in the sense that the banking business in any given ski municipality accounts for only a negligible share of any banking group's business in Austria. An unaddressed endogeneity issue may, however, result from our use of bank branch network data in order to assign our measures of bank equity to ski resorts. This is a small concern because, until the end of our sample period, bank branch networks varied only little over time. These networks appear to be largely pre-determined by those in place when the Austrian ski resorts were still mainly agricultural areas.

While the last two measures of bank equity are only available for the regional banks, we also define a variable, which combines the group-level equity ratios with the equity ratios of banks that are not part of a group. This variable is denoted as $BE_{j,t}^{grp}$. It is defined in a similar way as the variable in expression (8), but we replace the equity ratios of all regional banks in municipality j's area by the group-level equity ratios of these banks' groups.

A further variable resulting from bank balance sheet data appears in Section 6. This variable is the growth rate of the interest income of the average regional bank operating in an area $\mathcal{B}(j)$. This interest income, INT, is defined as:

$$INT_{j,t} = \sum_{b \in \mathcal{R} \cap \mathcal{B}(j)} \frac{m_{j,b,t}}{M_{j,t}^{reg}} \times \text{Interest income}_{b,t}^{reg} \tag{11}$$

The growth rate of the interest income is the first difference of the logarithm of the above-stated variable, denoted as $\Delta log(INT)$.

Tourists arrivals data When testing for the validity of our instrument, we use data about the number of tourists who arrived in a municipality j during the winter-season of a year t. The source of the data is the Austrian Statistical Office (Statistik Austria). We have data on tourist arrivals for ski-resort municipalities between the years 1998 and 2006. The number of tourists arrivals is denoted by $A_{j,t}$. In our regression, we use the growth rate of $A_{j,t}$, $\Delta log(A_{j,t})$.

4.2 Descriptive statistics

We next discuss the descriptive statistics of our main variables. Table 1 concerns our snow variables, i.e., the two indicator variables indicating Snow Days and Snow Weeks, as well as the variables defined in expressions (4) and (5).[52] For each variable, we report the extent of its variation between and within firm-years. The within-variation in snow risk is key to our research strategy for measuring effects of exogenous labor productivity risk on weekly firm-level employment. The descriptive statistics show that the within-variation accounts for a substantial part of the overall variation in snow risk and expected snow.

Table 2 reports descriptive statistics regarding our measure of firm-level employment in ski tourism, defined in expression (3). We also report on the total employment of firms, measured as discussed below expression (3). For both measures of employment, we again distinguish between variation within and between firm-years and separately report summary statistics for the entire winter season, the starting weeks and the ending weeks of the winter season. These statistics complement Figure 2 which shows the variation in employment days over the weeks of the skiing season. Both in terms of number of employees and employment

[52]Recall that Snow Weeks are defined as weeks in which the average snow level across all ski lifts in a resort exceeded 15cm on a majority of days. If the 15cm cutoff was exceeded on a particular day, we refer to this day as a Snow Day. While the indicator variables are based on the entire period for which we have snow data (1978-2006), the other snow variables are measured over the period 1983-2007 because each data point of these variables is based on 5 years of snow data.

days, seasonal employment accounts for roughly 50% of total employment of the firms in our sample. While the within-variation is much smaller than the between-variation, it is still substantial compared to the measures of mean employment. This is particularly true for the starting weeks of the skiing season, which are the focus of our empirical analysis.

Table 3 reports descriptive statistics regarding the variables describing the banking landscape in the municipalities in Austrian ski resorts. Given that these variables are based on annual data, they do not vary within years. We split the standard deviation into variation between and within municipalities. Bank equity is generally measured in basis points. The mean of bank equity is close to 800 basis points for all four measures. This is not surprising because, under "Basel I" regulation, banks had to hold equity capital of at least 8% of their risk-weighted assets. The measures of bank capitalization, therefore, differ mainly in terms of their standard deviations. The standard deviations of the measures based on the aggregate equity capital of the banking groups are lower than those of the measures based on equity capital measured at the bank-level. This pattern results, by construction, from the lower between variation in the aggregate measures for bank equity.

The final row of Table 3 reports descriptive statistics of the variable we use to document the effects of bank capitalization on banks' provision of liquidity insurance to borrowers in regions subject to weather shocks. This variable is interest income growth, with a mean of 1.2% and a standard deviation of 10%.

5 Main results

5.1 Exploratory analysis: Snow risk and employment

We start our analysis by testing whether the Austrian ski tourism businesses adjust their employment in response to information about the snow conditions in the nearby ski resorts. The firms could be responding to snow shocks since these shocks affect tourists' demand for accommodation. In addition, the firms' employment could depend on information about the expected future snow conditions that they obtain before the start of the season. This includes information affecting the firms' pre-season expectations about snow risk.

As discussed above, we focus on the starting and ending weeks of the skiing season, i.e., the weeks in which the ski tourism businesses are not booked out and the tourist arrivals in ski resort areas respond to the resorts' snow conditions (Töglhofer et al., 2011). We present separate regressions for the two sets of weeks, reported in Table 4. The dependent variable is employment days $ED_{i,t,T}$, defined in expression (3) above. We regress this variable on the snow variables defined in expressions (4), (5), and (6) while allowing for fixed effects at the firm-year and week levels. The standard errors are clustered at the municipality-year level, i.e., the level of variation in our main explanatory variables (which are based on a mapping of ski lifts/snow data to municipalities).

All estimates show that firms' employment during the skiing season responds significantly positively to Expected Snow. The most insightful results in Table 4 are those concerning the effects of Snow Risk and Unexpected Snow, i.e., snow shocks/news. We find that Snow Risk has a significantly negative effect on employment, but only during the starting weeks. The opposite picture emerges with respect to Unexpected Snow: Snow shocks/news have no significant effect during the starting weeks of the skiing season, but they do affect employment during the season's ending weeks. For these weeks, the estimates show that employment in the tourism businesses responds to the snow conditions in the same week:[53] Unexpected Snow prolongs the skiing season and employment. Given that the snow conditions are likely to have similar effects on tourists' demand and their propensity to cancel hotel bookings during the skiing season's starting and the ending weeks, our estimates reveal that these two types of weeks differ with respect to the flexibility and policies of the tourism businesses in adjusting their employment. During the ending weeks, an unexpected snow week (Unexpected Snow equal to one) raises employment by about as much as an increase of 16%-18%

[53]This may seem to be at odds with the fact (discussed above) that tourists can only avoid a substantial increase in cancellation fees if they cancel their hotel bookings one week before the planned arrival date. Our estimates may, however, show precisely this effect since the cancellations should be based on snow forecasts which should be correlated with the actual weather/snow conditions in the following week.

in Expected Snow (which measures the probability of a Snow Week). During the starting weeks, Unexpected Snow has no significant effect, but Snow Risk has an economically significant negative effect on employment. If we use the standard deviation of Snow Risk within firm-years, the coefficient of Snow Risk in Table 4 implies that a one-standard deviation (8%) increase in the risk reduces employment in ski tourism during the skiing season's starting weeks by about 2%.

In summary, the results in Table 4 show that, during the starting (ending) weeks of the skiing season, the tourism businesses' employment is (not) quasi-fixed with respect to Unexpected Snow. A likely reason appears to be local labor market tightness, which forces the firms to hire seasonal workers who have to move before they can start working. Given this labor market tightness, the employers are apparently unable to wait for snowfall before they hire the workers because, at this point, it may be too late to find workers in time for the high season (starting at Christmas). The firms, however, respond to Snow Risk in a way which suggests that they anticipate the quasi-fixity of their employment during the starting weeks of the skiing season: This employment is lower in weeks in which the risk is higher and the demand for the workers' services is more uncertain. This finding is based on a measure of Snow Risk which results from information that is actually available to the firms at the time they hire their seasonal workers. For the ending weeks, Snow Risk has no significant effects, presumably because, during these weeks, the firms' employment is no longer quasi-fixed.

In the next section, we use IV estimates to test whether bank capitalization affects the way the tourism businesses respond to exogenous labor productivity risk induced by Snow Risk. As discussed in Section 2, the IV regressions measure cross-sectional heterogeneity in the firms' response to the labor productivity risk, and attribute this heterogeneity to cross-sectional variation in the capitalization of the firms' nearby banks. For now, we interpret bank capitalization as a proxy for financial frictions that may affect the risk aversion the firms exhibit in hiring workers for quasi-fixed employment during the starting weeks of the skiing season. In Section 6.1, we will provide direct evidence regarding the effects of Snow

Risk on the regional banks in ski resort areas. This evidence pinpoints a specific type of financial friction associated with bank capitalization, i.e., that it affects the banks' provision of liquidity to their borrowers when the ski resorts are subject to the shocks the risk of which we measure as Snow Risk.

5.2 Main results: Bank equity, risk, and employment

5.2.1 OLS estimates

In this section, we present estimates regarding our main regressions, stated in expression (2). We start by presenting ordinary least squares (OLS) estimates. For now, we focus on the starting weeks of the skiing season, i.e., the weeks during which the firms' employment appears to be quasi-fixed. The regressions extend those in the first section of Table 4 because they allow for heterogeneity in the response of the employment to Expected Snow and Snow Risk: We include interaction terms of these variables with de-meaned measures of the equity ratios of the banks in the vicinity of a firm, i.e., the various versions of the variable Bank Equity, defined in Section (4.1). In all regressions, we continue to use firm-year and week fixed effects and again report standard errors clustered at the municipal level.

The main coefficient of interest is that of the interaction of Bank Equity and Snow Risk. Our estimates show that firms in areas with more Bank Equity respond less negatively to the risk: While the baseline coefficient of Snow Risk is significantly negative, the coefficient of the interaction of Snow Risk and Bank Equity is significantly positive. We also find that employment is higher in municipalities with more Expected Snow, but this correlation is weaker in areas where banks have more equity capital. This last result suggests that Bank Equity is an inverse proxy for the extent to which the expected snow conditions affect the expected labor productivity of the tourism businesses in a ski municipality. As discussed above, a possible reason for this is that Bank Equity may affect the firms' access to bank loans for investments reducing the sensitivity of their demand/labor productivity to the (expected) snow conditions. The interaction of Bank Equity and Expected Snow will, however, turn out to be insignificant in the IV regressions we present below. This can also be seen in the last column of Table 5, where we present estimates based on our most exogenous measure of bank capitalization, i.e., the measure that we use as an instrument in the IV regressions.

Comparing the columns of Table 5 shows that the positive coefficient of the interaction of Snow Risk and Bank Equity remains robustly significantly different from zero when we change our measures of Bank Equity. The first column of estimates results from Bank Equity measured at the bank-level according to expression (8). Next, we only consider the regional banks that are part of banking groups, but we continue to measure Bank Equity at the bank-level, using the measure of Bank Equity in expression (9). Finally, the last two columns of Table 5 present estimates that result from measuring Bank Equity at the level of banking groups, rather than at the bank-level. In the next-to-last column of Table 5 we only use the group-level measures of Bank Equity for the regional banks that actually belong to banking groups. For the other banks, we continue to measure their equity capital at the bank level. If we instead limit the sample to the regional banks, we obtain the estimates in the last column of Table 5. These estimates are based on the measure of Bank Equity stated in expression (10).

Across all measures of Bank Equity, the estimates in Table 5 suggest that Bank Equity acts as a catalyst for the risk taking the tourism businesses engage in when they commit to quasi-fixed employment in hiring workers for the starting weeks of the skiing season. To assess the economic significance of this effect, we use the ratio of the two coefficients β_0 and β_1 in expression (2). Estimates for this ratio appear at the bottom of Table 5. The estimates reveal a sizeable marginal effect of Bank Equity, i.e., that an additional basis point of Bank Equity reduces the negative effect of Snow Risk on employment by as much as 1%.

A second analysis of the economic significance of our estimates appears in Figure 3. This is a graphical analysis concerning four groups of firm-years which result from median splits of our sample based on Snow Risk and Bank Equity^{grp}. Given that the latter variable only changes at the annual level, the respective median split of our sample assigns all observations associated with a firm-year to one pair of groups differing in Snow Risk. For each of these pairs, we plot the average employment days: The solid line running through Figure 3 shows the average employment days of the groups with below-median Bank Equity, while the dashed line shows this for the above-median groups. The bars in Figure 3 show the extent to which the employment in each pair of groups varies due to Snow Risk. We isolate this variation by running a regression like those in Table 5, but excluding Snow Risk and its interaction with Bank Equity. The residuals of this regression are averaged within each group, and each group's average residual is added to the average employment days of the pair the group belongs to. We observe that Snow Risk has an economically significant effect in the group with little Bank Equity: The variation amounts to slightly more than one employment day, which is a sizeable effect given that the firms in this group hire workers for slightly less than 4 employment days during the average starting week of the skiing season.

Can we obtain similar results based on data about the ending weeks of the skiing season? During the ending weeks, the tourism businesses' employment does not appear to be quasi-fixed: The estimates in Table 4 show that the firms respond to snow shocks by adjusting their employment. If this allows the firms to avoid cash flow shocks (by laying off employees who would not be able to "earn their pay"), their employment should not be affected by financial frictions. We therefore use our employment data about the ending weeks for a "placebo check", reported in Table 6. The resulting estimates can also be compared to the estimates regarding the ending weeks reported in Table 4. We again find no significant main effect of Snow Risk on employment. Moreover, there is little evidence for an effect of Bank Equity: Table 6's estimates regarding the coefficient of the interaction of Snow Risk and Bank Equity are at least an order of magnitude smaller than the corresponding estimates in Table 5, they switch signs and only one estimate is statistically significant.

5.2.2 IV estimates

We now present IV estimates regarding the – potentially generalizable – effect of bank capitalization on the sensitivity of employment with respect to labor productivity risk. This effect will again be measured in terms of the ratio of the coefficients β_1 and β_0 in expression (2). To interpret our OLS estimates for this ratio as evidence regarding effects of labor productivity risk, we would have to assume that bank capitalization is uncorrelated with the extent to which labor productivity risk is caused by Snow Risk. This assumption cannot be tested with the available data. We can, however, avoid the assumption by using an instrumental variable for Bank Equity. As discussed in Section 2, this is based on an institutional feature of the Austrian banking sector, i.e., that many regional Austrian banks are part of groups, cooperating in their lending activities and sharing internal equity capital markets: the savings banks, the Raiffeisen group and the Volksbanken. The instrument is the group-level measure of the regional banks' equity capital, defined in expression (10).

Validity of the instrument Before we present the IV estimates, we check the validity of the instrument by testing whether it modulates the sensitivity of tourist arrivals in ski resort municipalities with respect to the snow conditions in the resorts. If so, the instrument is likely to be invalid since it should also proxy for the extent to which weather risk induces demand risk in ski tourism.

The test appears in the first column of Table 7. This column presents regression estimates explaining the growth rate of tourist arrivals in municipalities with ski lifts, based on data that are available from the Austrian Statistical Office. Given that the data only allows us to observe tourist arrivals in a municipality during the *entire* winter season, our regression explains the arrivals using the sum of the Snow Week indicator variable (defined in Section 4.1) across all weeks of a skiing season. The regression estimates the main effect of this explanatory variable, as well as the coefficient of its interaction with our instrument for Bank Equity. The estimates show that one additional Snow Week causes an increase in the growth rate of tourist arrivals by about 0.31 percentage points[54]. With respect to our instrument for Bank Equity, the regression shows no evidence for an effect on the sensitivity of tourist arrivals with respect to the snow conditions: The point estimate for the coefficient of the interaction of the instrument with Snow is rather small and statistically insignificant. This suggests that, as depicted in Figure 1, the instrument does not proxy for cross-regional variation in the extent of demand/labor productivity risk caused by snow risk.

The remainder of Table 7 presents IV estimates which can be used to test the effect of instrumenting Bank Equity in a regression explaining tourist arrival growth. We present two columns of first-stage estimates, as well as IV estimates in the last column of Table 7. The first-stage estimates include F-values which show that our instruments are sufficiently strong. The IV estimates allow us to test for endogeneity. The result is reported at the bottom of Table 7. We actually obtain no evidence that OLS estimation yields biased estimates in regressions explaining tourist arrival growth using our (potentially endogenous) measure of the regional banks' Bank Equity, defined in expression 9. This suggests that, when we used the same measure of Bank Equity to obtain Table 5's third column of OLS estimates, we actually found an effect that is *not* due to cross-regional variation in the extent to which snow risk causes demand shocks impairing labor productivity. We next present IV estimates which allow for a direct test for a potential bias in the OLS estimates.

Results from instrumental variables estimation Table 8 presents IV estimates in which we use our instrument for the capitalization of the regional banks in a regression similar to those in Table 5. The estimates appear in the right-most column of Table 8, and can be compared to the OLS estimates, reported in the first column (which is identical to the third column of estimates in Table 5). The two middle columns of Table 8 present two first stage regressions, as well as F-tests which show that our instruments are sufficiently strong.

[54]Per standard deviation of snow, tourist arrivals grow by additional 1.55 percentage points. This estimate is in line with the findings reported in Töglhofer et al. (2011).

Comparing the OLS and IV estimates shows that the puzzling negative coefficient of the interaction of Expected Snow and Bank Equity becomes statistically insignificant when we instrument this interaction term. As discussed above, the OLS coefficient could result from Bank Equity proxying for investments that allow the tourism businesses to reduce their dependence on the snow conditions in the nearby ski resorts by reducing the effect of the snow conditions on tourists' demand. This effect should indeed vanish in the IV estimates, given that our instrument does not appear to measure the sensitivity of the demand with respect to the ski resorts' snow conditions (Table 7).

An endogeneity test actually yields evidence that the OLS estimates are biased (with a p-value of 0.04). With respect to Snow Risk, the IV estimates, however, confirm that Bank Equity modulates the sensitivity of employment with respect to the risk. Given the baseline coefficient of Snow Risk in the last column of Table 8, an increase in this risk by one standard deviation (i.e., by about 8%) causes a reduction in employment of about 1.8%. This effect drops to roughly zero if Bank Equity increases by one standard deviation (about 86 basis points) above its mean.

The IV estimates allow for measuring a causal effect of Bank Equity on the sensitivity of employment with respect to exogenous (weather-induced) labor productivity risk. This is based on the notion that our instrument isolates an effect of bank capitalization which is (demonstrably) not associated with cross-regional heterogeneity in the effect of snow risk on demand/labor productivity risk. Instead, we must be observing variation in the effect of labor productivity risk on employment, as depicted in Figure 1. To assess the economic significance of this variation, we compare the coefficient of the interaction of Bank Equity and Snow Risk to the coefficient of Snow Risk *per se*.[55] We do so by estimating the ratio of the coefficients β_1 and β_0 in expression (2). This shows that an additional basis point

[55]Recall that our measures of Bank Equity are de-meaned. We cannot directly interpret the coefficients of Snow Risk and its interaction with Bank Equity as evidence regarding labor productivity risk because it remains unclear to which (absolute) extent Snow Risk causes labor productivity risk. The IV estimates, however, allow us to measure the relative effect of Bank Equity on the sensitivity of employment to the labor productivity risk induced by Snow Risk.

of Bank Equity reduces the semi-elasticity of employment with respect to exogenous labor productivity risk by about 1.5%.

In conclusion, the regressions presented above reveal that bank capitalization affects the risk-taking of firms in the banks' vicinity when they commit to employing workers on a quasi-fixed basis. The IV estimates allow for a specific interpretation of the results as generalizable evidence concerning firms' risk-taking with respect to exogenous labor productivity risk. The evidence concerns small firms which typically cannot share the risk with any outside investors other than their banks. In this respect, the firms are real-life equivalents of those in the models of Arellano et al. (2019) and Quadrini (2017). The models highlight effects of financial frictions which affect firms' risk-taking with respect to labor productivity risk when the firms hire workers on a quasi-fixed basis. We next search for direct evidence that such financial frictions are caused by bank capitalization.

6 Further evidence

In this section, we use bank-level data to test for evidence that bank capitalization affects the behavior of Austrian regional banks in ski resort areas. We focus on the banks' provision of liquidity to their borrowers, and test whether this liquidity provision responds to snow shocks in the ski resorts. This complements the contributions of Giroud et al. (2011) and Brown et al. (2021) who also analyze banks' responses to clearly exogenous weather-induced liquidity shocks, but without testing for effects of bank capitalization. Giroud et al. (2011) analyze data about financially distressed hotels in Austrian ski resorts. We instead analyze data about these regions' banks. These banks are the key suppliers of credit to Austrian ski tourism businesses, but only few of these businesses will be financially distressed at any given point in time. The evidence in Giroud et al. (2011) therefore concerns a small (and non-representative) subsample of the banks' borrowers in ski resort municipalities. We, however, follow the lead of Giroud et al. (2011) in analyzing the effects of snow shocks.

The second part of this section addresses a concern regarding the external validity of our results. The concern is that the results come from firms which face unusually tight labor markets.[56] We, therefore, test for heterogeneity of the effects of bank capitalization across regions featuring lower vs. higher labor market tightness (LMT). These tests show that our results are actually driven by the regions with lower LMT (which alleviates the concern about external validity). Moreover, we see a pattern that is consistent with the idea that bank capitalization affects the sensitivity of quasi-fixed employment to labor productivity risk because it affects banks' provision of liquidity insurance to employers. We find that, in areas with lower LMT, the extent of this liquidity insurance depends more strongly on bank capitalization and also that bank capitalization more strongly alleviates the negative effect of snow risk on the employment of these areas' tourism businesses during the starting weeks of the skiing season. Both effects of bank capitalization are stronger in the low-LMT areas than in those with high LMT. We interpret this pattern as a consequence of cross-sectional heterogeneity in the degree to which the tourism businesses commit to quasi-fixed labor costs when they hire workers. While the workers' employment is quasi-fixed during the starting weeks of the skiing season, their hours and total pay may be somewhat variable. In areas with high LMT, the workers may be more willing to accept some pay variation because they should find it easier to tap into other sources of wage income. The tourism businesses in high-LMT areas may therefore engage in more risk-sharing with their workers,[57] and they may depend less on bank-provided liquidity insurance in order to cope with cash flow shocks due to a lack of snow. In areas with higher LMT, bank capitalization would therefore have a weaker effect on the sensitivity of the firms' employment with respect to Snow Risk during the starting weeks of the skiing season.

[56]As discussed in Section 3, the tourism businesses mostly hire workers who have to move before they can start working. The reason is that the firms are typically located in rural areas with relatively small local populations.

[57]To test this hypothesis in a direct way, we would need more granular wage data, but these data are not available.

6.1 The effects of snow shocks on banks

We now use bank-level balance sheet data in order to analyze the effects of snow shocks on the banks in the vicinity of ski resort municipalities. We focus on snow shocks during the starting weeks of the skiing season. The analysis in Table 4 shows that these shocks have little effect on the employment of tourism personnel in the ski resort municipalities, but the risk of the shocks affects this employment negatively, and more strongly so in areas in which banks have relatively little equity capital. Do the workers' employers share the risk of the shocks with their banks? Does the extent of this risk-sharing with banks depend on bank capitalization? If so, bank capitalization could affect the sensitivity of the employment with respect to labor productivity risk because the employers in areas with better capitalized banks may be less concerned about committing to quasi-fixed labor costs. This could explain why we find the real effect of bank capitalization that we document above.

Lacking suitable data at the bank-firm level, we use bank-level balance sheet data to analyze the effects of the snow shocks on banks. We show that Unexpected Snow during the starting weeks of the skiing season in a municipality j affects the interest income growth of the regional banks around the municipality. It appears that negative snow shocks reduce the interest payments of the banks' borrowers in the same year. We focus on this effect because it is relatively clear-cut evidence that the banks allow their borrowers to conserve some liquidity (cash), rather than transferring it to the banks through interest payments. While it is likely that the borrowers also respond to snow shocks by withdrawing bank deposits or applying for loans, this may not only be motivated by their need to deal with cash flow shocks.[58] Interest payments are, however, pre-determined by the loans a borrower received prior to a snow/cash flow shock. As a consequence, we can use short-run changes in banks' interest income in order to identify banks' provision of liquidity to their borrowers when

[58] Instead, snow shocks may also proxy for investment opportunities. For example, a hotel may choose to expand after a winter with particularly good snow because it expects a stronger demand going forward. Recall that, as discussed in Section 2, the firms tend to expand their fixed assets between skiing seasons (in order to avoid disruptions of their operations during the seasons), so that, in our main regressions, the firm-year fixed effects should control for the resulting variation in employment.

the snow shocks occur. If a borrower fails to make interest payments, a bank will typically capitalize the shortfall, so that the borrower essentially receives a loan. Alternatively, the bank could explicitly write off the interest payment not received. In both cases, there will be an *immediate* drop in the interest income reported by the bank.

The regressions regarding banks' interest income growth appear in Table 9. Our measure of Unexpected Snow is based on the variable defined in expression (6), but, given that we only have annual bank data, we sum this variable across all starting weeks of a skiing season, as stated in expression (7)[59]. We focus on the starting weeks in order to specifically measure the effects of snow shocks during the period for which we find that bank capitalization affects the response of employment to the risk of the snow shocks. We use the resulting measure of snow shocks to explain changes in the (annual) interest income growth of the regional banks within a 20 kilometer radius around a ski-resort municipality, i.e., the banks which are part of banking groups such as the savings banks. We focus on the regional banks because they tend to operate in sufficiently small regions that they should be strongly affected by the snow shocks in ski resorts. Moreover, focusing on these banks allows us to use the instrument for Bank Equity that we also used in Table 8.

The first column of Table 9 shows OLS estimates, based on the measure of Bank Equity which directly results from the banks' balance sheets, as stated in expression (9). The next two columns show two first-stage regressions, while the last column shows IV estimates, based on the instrument defined in expression (10). Both the OLS and the IV estimates show a positive baseline effect of Unexpected Snow on bank-level interest income. Unexpected Snow is measured in terms of Snow Weeks, defined (in Section 4.1) as weeks with sufficient snow for skiing. An unexpected additional Snow Week adds somewhat more than 1% to the interest income growth of regional banks in the vicinity of ski resort municipalities. The magnitude of this effect is roughly consistent with the findings of Töglhofer et al. (2011) who analyze panel data about 185 Austrian ski resorts and find that an unexpected change in snow conditions

[59]Given that the starting weeks of a skiing season are the weeks before Christmas, they all fall into the same calendar year.

by one standard deviation changes the number of tourists' overnight stays in nearby hotels by 0.6-1.9%.[60] One standard deviation of Unexpected Snow equals about 1.5 Snow Weeks.

The evidence for effects of snow shocks on the interest income of banks in Austrian ski resort areas contrasts with evidence in Giroud et al. (2011) that these banks do not engage in risk-sharing with ski hotels. While the latter evidence comes from Austrian tourism businesses at the verge of bankruptcy, the evidence in Table 9 results from the total population of borrowers paying interest to regional banks close to rural Austrian ski resorts. It is possible that the banks offer their borrowers insurance against weather-induced cash flow shocks, but only to borrowers who are not financially distressed. This contrasts with an assumption in the model of Arellano et al. (2019) which limits the risk-sharing between banks and firms to situations in which the firms default on their bank debt. It is, however, broadly consistent with evidence in Brown et al. (2021) that banks offer their borrowers insurance against weather-induced cash flow shocks.

The key finding in Table 9 is evidence that Unexpected Snow has a smaller effect on the interest income of banks with less equity capital. It appears that better bank capitalization increases the risk-sharing between banks and their borrowers. According to our IV estimates, an increase in Bank Equity by one (within) standard deviation (about 86 basis points) raises the effect of an unexpected additional Snow Week on the growth of bank-level interest income by about 1.8%. This is a substantial increase, given the baseline effect of 1.4% associated with (de-meaned) Bank Equity equal to zero.[61]

Figure 4 gives a graphical representation of the results discussed above. It illustrates how the snow conditions in the ski municipalities affect the interest income growth of nearby banks, i.e., the dependent variable of the regressions in Table 9. Similar to Figure 3, we again perform median splits to distinguish between four groups of observations.[62] We find that,

[60] It is likely that the tourism industry has a substantial effect on the interest income of banks in Austrian ski resort municipalities: In terms of contribution to GDP, tourism is Austria's biggest industry and it is even more important at the local level of skiing regions.

[61] It is, therefore, plausible that firms in areas with different extents of Bank Equity can actually perceive differences in the availability of bank-provided insurance against cash flow shocks.

[62] In contrast to Figure 3, in this figure we perform a median split with respect to Unexpected Snow

in areas with well-capitalized banks, bad winters (with below median Unexpected snow^{start}) are associated with negative bank interest income growth. The observations from the two groups with low levels of Bank Equity are, however, rather similar. The banks associated with the latter groups appear to be unable/unwilling to tolerate that their borrowers reduce their interest payments in years of negative snow shocks.

6.2 The effects of labor market tightness

Our results in Section 5 are based on data about employment in an industry operating in rural areas with small local populations and, therefore, with rather small local labor markets. This may raise questions regarding the generalizability of our results to industries with less tight labor markets. So far, we have only implicitly addressed these questions by stressing that our analysis measures effects of weather-induced labor productivity risk on *quasi-fixed* employment. Labor market tightness (LMT) is likely to be one reason why firms are willing to commit to this type of employment,[63] but this is of no concern for the external validity of our results, provided that LMT does not affect the sensitivity of the quasi-fixed employment with respect to weather-induced labor productivity risk. We actually find no evidence for such effects in unreported regressions like those in Table 4.[64] It is, however, possible that LMT matters for the effects of bank capitalization we document above. We therefore repeat the analyses in Tables 8 and 9 while distinguishing between the subsamples with below/above median LMT. As discussed in Section 4.1, LMT is defined as $(1 - \text{unemployment rate}_{c(i),T})$ in county $c(i)$ and year T. The average unemployment rate in the high LMT regions is 6.7%, but it is 12.8% in the low LMT regions, so that there is a rather substantial difference between the two types of regions.

instead of Snow Risk.

[63] Ellul et al. (2018), however, report in their Web Appendix that LMT reduces the stability of employment with respect to idiosyncratic firm-level sales shocks. In our setting, the effect of LMT may be different because we analyze the stability of firms' employment with respect to a risk which typically affects many employers in a region.

[64] In these regressions, we repeat the analysis in Table 4 while distinguishing between areas with below/above-median LMT, as it is done in Tables 10 and 11, discussed below.

Motivating our analysis below, there is a clear-cut argument that LMT may actually affect our results regarding the real effects of bank capitalization we document above: LMT may reduce the extent to which employers depend on risk-sharing with banks in order to cope with the risk of weather-induced labor productivity shocks. The reason is that LMT may affect the stability of workers' wage incomes and, thus, the extent to which quasi-fixed employment gives rise to quasi-fixed labor costs. In areas with higher LMT, a firm's workers may be more willing to accept wage fluctuations because it should be easier for a worker to earn wage income from a number of jobs. As a consequence, firms in areas with higher LMT may end up sharing more labor productivity risk with their workers. This risk-sharing does not necessarily affect employment measured in person-days, but it may affect employers' wage bills in other ways, e.g., via variation in workers' hours. In the end, employers in areas with high LMT may not fully commit to quasi-fixed labor costs when they hire workers for quasi-fixed employment during the starting weeks of the skiing season. Instead, the workers may end up bearing some labor productivity risk and the employers may depend less on risk-sharing with their house banks, which should weaken the effects of bank capitalization we document above.

Our data do not allow for analyses of the effects of snow shocks on the workers' wages or hours worked.[65] We can, however, test whether our results regarding effects of bank capitalization vary across areas with different extents of LMT. These tests appear in Tables 10 and 11 which report IV regressions like those in Tables 8 and 9, respectively, but with separate estimates for the subsamples with below/above median LMT.[66] We find evidence that our main results are mostly driven by the subsample with low LMT. It is actually only in this subsample that we find a significant effect of Bank Equity on the semi-elasticity of

[65] Given that we use administrative social security data, we only have exact data about the starting and ending dates of employment spells, as well as data about a worker's total wage income (because these data are important for health insurance and pension contributions), but we have no data about about hours worked (Zweimüller et al., 2009).

[66] We abstain from reporting IV estimates with triple interactions of Bank Equity, snow variables, and LMT. These estimates would add little to the evidence coming from the sample splits and they require a separate first-stage regression for every variable which depends on Bank Equity. This gives rise to problems of weak identification.

employment with respect to wheather-induced labor productivity risk: Column (4) of Table 10 reports a coefficient of Bank Equity interacted with Snow Risk which has a very similar magnitude as the corresponding estimate in Table 8.[67] Column (8), for high LMT, however, shows a statistically insignificant coefficient with the wrong sign for the interaction of Bank Equity with Snow Risk.[68]

Complementary evidence emerges from regressions explaining banks' interest income growth. See Table 11, where we again present separate results for low and high LMT. While both subsamples yield evidence that Bank Equity increases the sensitivity of banks' interest income growth to Unexpected Snow during the starting weeks of the skiing season, this effect is substantially smaller and only marginally significant in the subsample with high LMT. While there is a somewhat stronger baseline effect of Unexpected Snow in the high LMT sample, Bank Equity has a stronger effect on the risk-sharing between local banks and their borrowers in low LMT regions. This is consistent with the hypothesis that LMT reduces the extent to which employers rely on risk-sharing with banks in order to cope with the risk of weather-induced labor productivity shocks. As discussed above, this hypothesis is motivated by the argument that, in areas with higher LMT, employers and workers share more weather-induced labor productivity risk. Of course, this risk-sharing may not be a full substitute for the risk-sharing between employers and their house-banks.[69]

Taken together, the results in Tables 10 and 11 add to the evidence that the effects of Bank Equity on the sensitivity of employment with respect to weather-induced labor productivity risk are due to Bank Equity proxying for employers' access to bank-provided liquidity

[67]We again also find a negative effect of the interaction of Bank Equity and Expected Snow. As discussed above, this effect could point to Bank Equity proxying for the extent to which snow shocks cause demand/labor productivity shocks in ski tourism businesses. In the IV estimates, the effect is only significant at the 10% level.

[68]The same can be said about the baseline coefficient of Snow Risk in column (8) of Table 10. We, however, do find a significantly negative effect of Snow Risk on employment if we focus on the subsample with high LMT but do not attempt to estimate effects of Bank Equity.

[69]The banks' borrowers may also include some workers whose ability to make interest payments is shocked by Unexpected Snow. While this should have little effect on the banks' interest income (because the tourism businesses mostly hire workers from other Austrian regions or even from other countries), the effect could be somewhat stronger in areas with high LMT.

insurance. Given this hypothesis, we should see that, across the two sets of regressions, Bank Equity matters more strongly in the same subsample. This is what we actually find. Moreover, we find that this subsample happens to be that with low LMT. This alleviates concerns that our results do not generalize to industries with labor markets that are less tight than those behind our data in the present paper.

7 Conclusion

We present an analysis based on highly granular data from small firms exposed to weather risk as a quantifiable risk of demand shocks affecting the productivity of the firms' employees. Our setting yields evidence that the risk reduces the firms' willingness to commit to quasi-fixed employment. This mirrors the micro-foundations of analyses which show that the combination of labor productivity risk and financial frictions can have sizeable macroeconomic effects. While we focus on the form of employment which appears in the models of Quadrini (2017) and Arellano et al. (2019), our results also highlight that, in measuring effects of risk on employment, it is key to distinguish between different forms of employment. We actually only find such effects with respect to a risk of shocks to which the firms in our sample cannot respond by adjusting their employment after the shocks occur: Their employment is quasi-fixed with respect to snow shocks during the starting weeks of the skiing season, but it decreases in the risk of the shocks. For the season's ending weeks, we find the opposite pattern.

With its focus on quasi-fixed employment, our main analysis takes a cue from the analyses of Quadrini (2017) and Arellano et al. (2019). We, however, consider a different form of financial friction, i.e., that bank capitalization could affect the risk-sharing between banks and firms with respect to the risk that the firms' workers cannot "earn their pay". Our main result is evidence for a novel real effect of bank capitalization, i.e., its effect on the sensitivity of quasi-fixed employment with respect to exogenous labor productivity risk. This requires that we address the problem that bank capitalization may also proxy for the extent to which firms take risk when they employ workers on a quasi-fixed basis. We do so by using an instrumental variable and by exploiting a feature of the special setting we focus on, i.e., that we can test whether this variable measures the extent of weather-induced demand shocks affecting labor productivity in our sample of firms. This test yields no evidence putting the validity of our instrumental variable in doubt.

We next use the instrumental variable in order to measure the real effect of bank capitalization on the response of employment to exogenous (weather-induced) labor productivity risk. Since the absolute size of this effect should depend on the extent to which weather risk causes labor productivity risk, we measure its size compared to the main effect of weather risk on employment. Given the validity of our instrument, this yields evidence for a sizeable real effect of bank capitalization which can also occur in other settings. We find that, per basis point of bank equity above its mean, there is a 1.5% reduction in the semi-elasticity of employment with respect to exogenous labor productivity risk.

Our evidence raises the question of why we observe that bank capitalization affects the employment of non-financial firms. In addressing this question, we document an effect of bank capitalization on bank behavior when their borrowers have to "weather cash flow shocks" (Brown et al. (2021)). The evidence comes from IV regressions explaining variation in banks' interest income growth when their borrowers are subject to the very weather shocks the risk of which affects the employment of the non-financial firms in our sample. We find that the shocks have stronger effects on banks' interest income in regions where the local banks hold more equity capital. Moreover, we find stronger effects in those regions in which we also observe stronger effects of bank capitalization on the risk-sensitivity of the employment we analyzed before. The latter variation appears to be associated with variation in labor market tightness, which may proxy for firms' ability to share risk with their workers, rather than sharing it with their banks.

We hope that our analysis inspires future research on bank capitalization and the role of banks in economic adaptation to climate change. Our evidence suggests that adverse effects of increasing weather risk on small-firm employment are more pronounced if firms lack access to well-capitalized banks as risk-sharing partners.

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8 Figures and tables

Figure 1

This figure depicts a graphical representation of our research strategy in analyzing the employment of Austrian ski tourism businesses during the starting weeks of the skiing season. We use this setting to measure the effect of bank capitalization on the sensitivity of these small firms' employment with respect to exogenous (weather-induced) labor productivity risk. The broken arrow represents the validity of our instrument for bank capitalization, tested in Table 7. We use this instrument to rule out that we are measuring an effect specific to our setting, i.e., that bank capitalization may proxy for the extent of demand/labor productivity risk induced by snow risk. This allows us to identify employment effects of an exogenous labor productivity risk in a setting in which this risk is directly caused by demand risk. The effects concern a quasi-fixed form of firm-level employment in that the employment does not respond to the shocks resulting from snow risk, but it responds to information about this risk which is available well before the shocks occur.

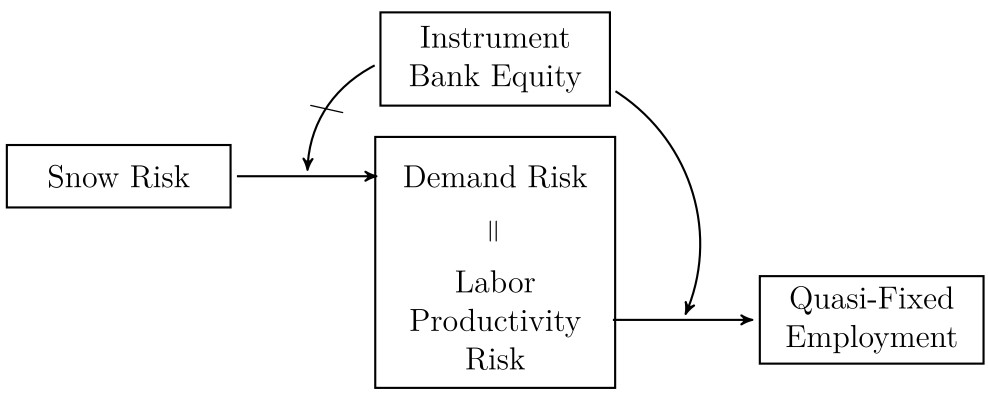

Figure 2

This figure depicts the employment of Austrian ski tourism businesses during the skiing season. It plots an average firm's total employment (solid line) and seasonal employment (dashed line), measured in terms of person-days per week. The shaded areas indicate the starting and the ending weeks of the skiing season. The first starting week (week 1) is the 47th week of a calendar year, while the last ending week is week 15 of the following year.

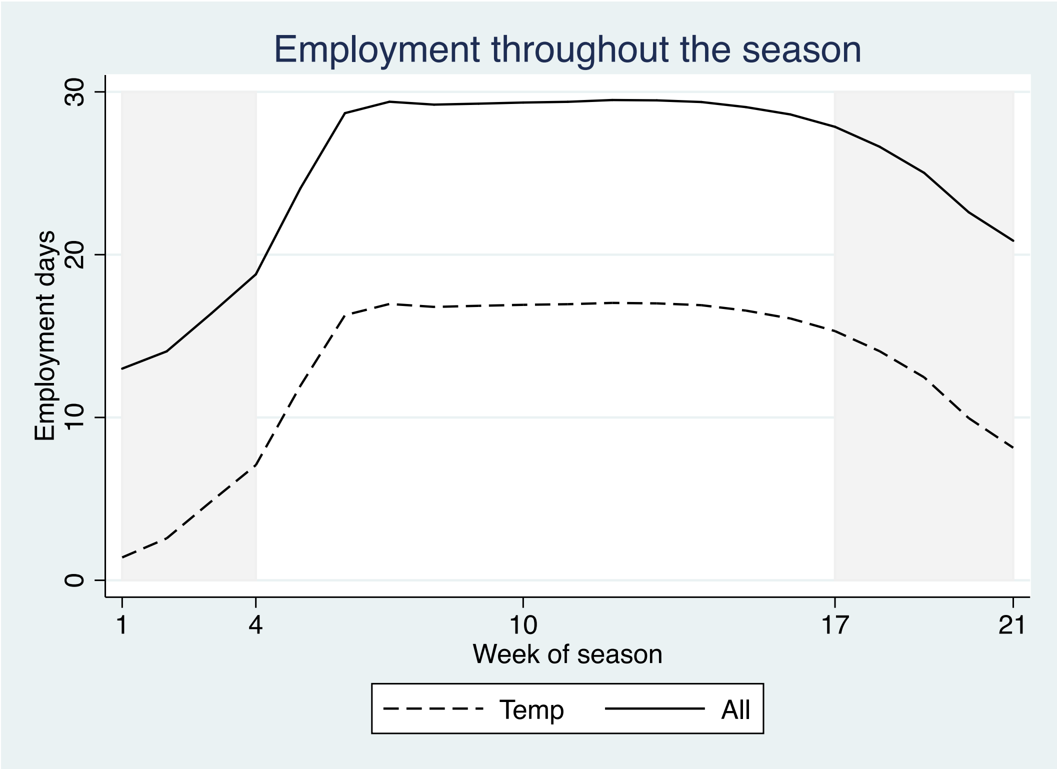

Figure 3

This bar chart depicts the seasonal employment of Austrian ski tourism businesses during the starting weeks of the skiing season, distinguishing between region-weeks with different levels of Snow Risk (SR) and Bank Equity (BE). We perform median splits for two variables, Snow Risk and Bank Equity^{grp}. This results in four groups for which we present group level averages of adjusted employment in bars 1 to 4. The solid (dashed) horizontal line depicts the average level of weekly employment days for firms located in areas with relatively low (high) bank capitalization. To these averages we add residuals from a regression of Employment Days on firm-year fixed effects and Exp. Snow. This yields the adjusted employment days for which the bars show group level averages. For formal definitions of the variables, see Section 4.1.

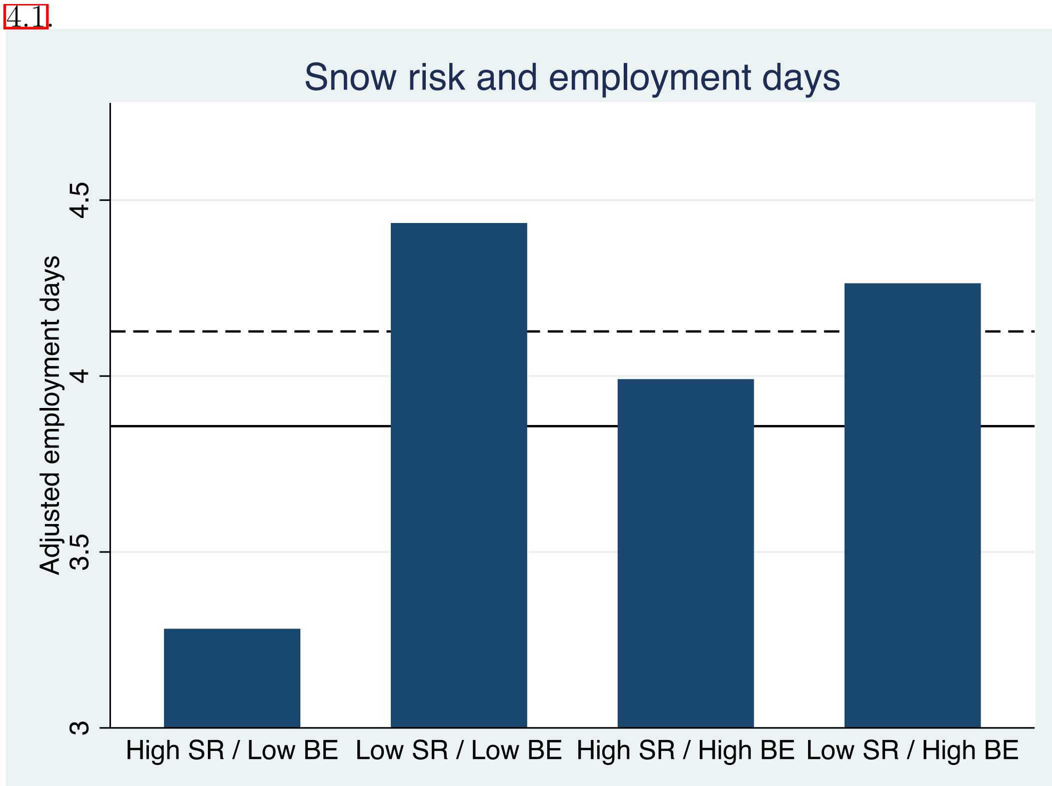

Figure 4

This bar chart depicts the interest income growth of regional banks close to Austrian ski resorts, distinguishing between region-years with different levels of Unexpected Snow (UES) and Bank Equity (BE). We perform median splits for two variables, Unexpected snow$_t$ and Bank Equity^{grp}. This results in four groups for which we present the group level averages of banks' interest income growth in bars 1 to 4. The solid (dashed) horizontal line depicts the average level of interest income growth for the groups with low (high) Bank Equity (BE). For formal definitions of the variables, see Section 4.1.

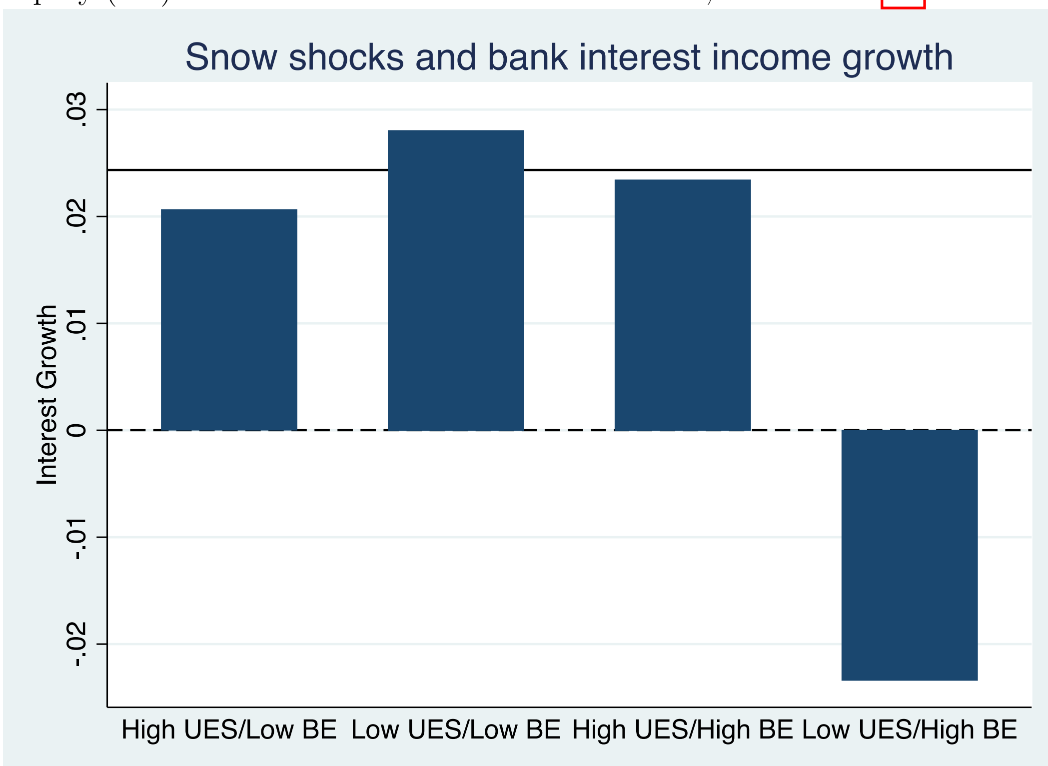

Table 1: **Summary statistics: Snow conditions**

This table reports summary statistics regarding the snow conditions that Austrian ski tourism businesses faced during the years 1998-2006. We split the variation in the snow variables into variation between and within firm-years. Snow Days are defined as the number of days in a week for which a ski resort's average snow coverage exceeds 15 centimeters. Weeks in which the majority of days are snow days are considered Snow Weeks. Expected Snow (Snow Risk) is defined as the backward-looking 5 year average (variance) of Snow Week in a given resort and week, e.g. the week before Christmas. For formal definitions of the variables, see Section 4.1.

Variable	Category	Mean	SD	Obs
	High season			
Snow Days	overall	5.766	2.522	975288
	between		1.899	81274
	within		1.66	12
Snow Week	overall	.82	.384	975288
	between		.276	81274
	within		.267	12
Expected Snow	overall	.782	.254	975288
	between		.22	81274
	within		.128	12
Snow Risk	overall	.132	.129	975288
	between		.1	81274
	within		.081	12
	Starting weeks			
Snow Days	overall	2.847	3.151	325096
	between		2.717	81274
	within		1.595	4
Snow Week	overall	.397	.489	325096
	between		.406	81274
	within		.272	4
Expected Snow	overall	.383	.272	325096
	between		.219	81274
	within		.162	4
Snow Risk	overall	.203	.114	325096
	between		.081	81274
	within		.08	4
	Ending weeks			
Snow Days	overall	4.749	3.091	406370
	between		2.65	81274
	within		1.592	5
Snow Week	overall	.681	.466	406370
	between		.386	81274
	within		.262	5
Expected Snow	overall	.633	.326	406370
	between		.299	81274
	within		.132	5
Snow Risk	overall	.157	.131	406370
	between		.11	81274
	within		.072	5

Table 2: **Summary statistics: Employment**

This table reports summary statistics regarding the employment of Austrian ski tourism businesses during the years 1998-2006. We split the variation in our measures of employment into variation between and within firm-years. Employment Days is defined as the total number of days these workers are employed during a firm-week. We report summary statistics based on all employees and based on firms' seasonal employees during the skiing season. For formal definitions of the variables, see Section 4.1.

Variable	Category	Mean	SD	Obs
Main winter season				
Employment Days	overall	28.785	61.602	975288
	between		61.085	81274
	within		7.961	12
Employment Days (seasonal employees)	overall	16.359	40.101	975288
	between		39.7	81274
	within		5.655	12
Starting weeks				
Employment Days	overall	15.56	47.854	325096
	between		46.763	81274
	within		10.162	4
Employment Days (seasonal employees)	overall	3.976	20.542	325096
	between		18.146	81274
	within		9.628	4
Ending weeks				
Employment Days	overall	24.594	57.34	406370
	between		56.758	81274
	within		8.155	5
Employment Days (seasonal employees)	overall	11.99	34.767	406370
	between		33.873	81274
	within		7.832	5

Table 3: **Summary statistics: Banks in ski-resorts**

This table reports summary statistics regarding variables describing the local banks of municipalities close to Austrian ski resorts. We split the variation in our banking measures into variation between and within municipalities. Bank Equity is defined as the average equity ratio of banks operating in a 20 kilometer radius around a municipality, both for all banks (*all*) and for the subset of regional banks (*reg*). In each case, we report separate statistics based on bank-level balance sheet data and based on balance sheet data aggregated at the level of Austria's banking groups (*grp*), e.g., the group of savings banks. Bank Equity is reported in basis points. In addition, we report the regional banks' interest income growth. For formal definitions of the variables, see Section 4.1.

Variable	Category	Mean	SD	Obs
Bank Equity^{all}	overall	818.013	125.846	3654
	between		80.278	406
	within		96.989	9
Bank Equity^{grp,all}	overall	794.978	77.281	3654
	between		11.19	406
	within		76.468	9
Bank Equity^{reg}	overall	801.682	116.652	3654
	between		78.841	406
	within		86.055	9
Bank Equity^{grp,reg}	overall	801.785	80.873	3654
	between		9.534	406
	within		80.31	9
Δlog(I)	overall	.012	.102	3248
	between		.018	406
	within		.1	8

Table 4: **Snow and employment**

This table reports results for regressions explaining the log of weekly Employment Days (ED) of Austrian ski tourism businesses during the years 1998-2006. The dependent variable is defined in expression (3). We use explanatory variables based on information about the snow conditions in ski resorts for different weeks of the skiing season. We distinguish between variables known before the start of a season (*ex-ante*), and variables describing (*within-season*) unexpected snow realizations. For formal definitions of the variables, see Section 4.1. We report separate estimates based on data about the *starting* and *ending* weeks of the skiing season. In parentheses, we report standard errors clustered at the municipality-year level. *,**,*** indicate statistical significance at the 10%, 5% and 1% levels respectively.

	Log(ED)					
	Starting weeks			Ending weeks		
Ex-ante						
Exp. Snow	0.275***	0.276***	0.276***	0.336***	0.338***	0.339***
	(0.0527)	(0.0526)	(0.0528)	(0.0442)	(0.0445)	(0.0445)
Snow Risk	-0.249***	-0.257***	-0.259***	-0.00320	0.00139	0.00350
	(0.0649)	(0.0651)	(0.0648)	(0.0588)	(0.0591)	(0.0591)
Within-season						
Unexpected Snow$_{\tau}$	0.0315	0.0276	0.0283	0.0595***	0.0540***	0.0577***
	(0.0199)	(0.0201)	(0.0192)	(0.0213)	(0.0202)	(0.0194)
Unexpected Snow$_{\tau-1}$		0.0179	0.0170		0.0245	0.0197
		(0.0184)	(0.0159)		(0.0156)	(0.0131)
Unexpected Snow$_{\tau-2}$			0.00374			0.0138
			(0.0210)			(0.0149)
N	325096	325096	325096	406370	406370	406370
R^2	0.167	0.167	0.167	0.186	0.186	0.186
Firm-Season FE	YES	YES	YES	YES	YES	YES
Week FE	YES	YES	YES	YES	YES	YES

Table 5: **Snow and employment: Effects of bank equity**

This table reports results for regressions explaining the log of weekly Employment Days (ED) of Austrian ski tourism businesses during the years 1998-2006. The dependent variable is defined in expression (3). We focus on the *starting weeks* of the skiing season. We use explanatory variables measuring the Expected Snow and Snow Risk in ski resorts for different weeks of the skiing season. Bank Equity^{all} (Bank Equity^{reg}) measures the average equity ratio of all (regional) banks located in a 20 kilometer radius around a firm's municipality. For formal definitions of the variables, see Section 4.1. All Bank Equity measures are demeaned and defined in terms of basis points. In the first three columns, we measure Bank Equity using individual banks' balance sheets. In the last three columns, we use Bank Equity aggregated at the level of banking groups, e.g., the group of savings banks. In parentheses, we report standard errors clustered at the municipality-year level. *,**,*** indicate statistical significance at the 10%, 5% and 1% levels respectively. The ratio β_1/β_0 equals the coefficient of the interaction of Snow Risk and Bank Equity divided by the baseline coefficient of Snow Risk. Below our estimate regarding this ratio, we report the p-value of a test that it equals zero.

	Log(ED)					
	Bank level			Group level		
Exp. Snow	0.245***	0.220***	0.234***	0.245***	0.215***	0.234***
	(0.0490)	(0.0484)	(0.0484)	(0.0490)	(0.0461)	(0.0473)
Snow Risk	-0.249***	-0.261***	-0.272***	-0.249***	-0.227***	-0.225***
	(0.0648)	(0.0671)	(0.0653)	(0.0648)	(0.0632)	(0.0642)
All banks						
Bank Equity^{all} × Exp. Snow		-0.00137***			-0.00153**	
		(0.000330)			(0.000646)	
Bank Equity^{all} × Snow Risk		0.00130**			0.00248***	
		(0.000543)			(0.000771)	
Regional banks						
Bank Equity^{reg} × Exp. Snow			-0.00122***			-0.000630
			(0.000337)			(0.000659)
Bank Equity^{reg} × Snow Risk			0.00129**			0.00206***
			(0.000523)			(0.000793)
N	325096	325096	325096	325096	325096	325096
R^2	0.167	0.168	0.168	0.167	0.168	0.167
Firm-Season FE	YES	YES	YES	YES	YES	YES
Week FE	YES	YES	YES	YES	YES	YES
β_1/β_0		-0.00	-0.00		-0.01	-0.01
P-Value		0.07	0.06		0.02	0.05

Table 6: **Placebo test**

This table reports results for regressions explaining the log of weekly Employment Days (ED) of Austrian ski tourism businesses during the years 1998-2006. The dependent variable is defined in expression (3). We focus on the *ending weeks* of the skiing season. We use explanatory variables measuring the Expected Snow and Snow Risk in ski resorts for different weeks of the skiing season. Bank Equity^{all} (Bank Equity^{reg}) measures the average equity ratio of all (regional) banks located in a 20 kilometer radius around a firm's municipality. For formal definitions of the variables, see Section 4.1. All Bank Equity measures are demeaned and defined in terms of basis points. In the first three columns, we measure Bank Equity using individual banks' balance sheets. In the last three columns, we use Bank Equity aggregated at the level of banking groups, e.g., the group of savings banks. In parentheses, we report standard errors clustered at the municipality-year level. *,**,*** indicate statistical significance at the 10%, 5% and 1% levels respectively. The ratio β_1/β_0 equals the coefficient of the interaction of Snow Risk and Bank Equity divided by the baseline coefficient of Snow Risk. Below our estimate regarding this ratio, we report the p-value of a test that it equals zero.

	Log(ED)					
	Bank level			Group level		
Exp. Snow	0.283***	0.261***	0.278***	0.283***	0.268***	0.260***
	(0.0404)	(0.0371)	(0.0393)	(0.0404)	(0.0380)	(0.0373)
Snow Risk	-0.0143	-0.0372	-0.0145	-0.0143	-0.0196	-0.0278
	(0.0296)	(0.0267)	(0.0288)	(0.0296)	(0.0267)	(0.0261)
All banks						
Bank Equity^{all} × Exp. Snow		0.000905***			0.000794*	
		(0.000265)			(0.000434)	
Bank Equity^{all} × Snow Risk		0.000462**			-0.0000366	
		(0.000209)			(0.000319)	
Regional banks						
Bank Equity^{reg} × Exp. Snow			0.000689***			0.000964**
			(0.000258)			(0.000421)
Bank Equity^{reg} × Snow Risk			-0.000107			0.000122
			(0.000217)			(0.000312)
N	406370	406370	406370	406370	406370	406370
R^2	0.185	0.186	0.185	0.185	0.185	0.185
Firm-Season FE	YES	YES	YES	YES	YES	YES
Week FE	YES	YES	YES	YES	YES	YES
β_1/β_0		-0.01	0.01		0.00	-0.00
P-Value		0.25	0.73		0.91	0.71

Table 7: **Snow and touristic demand**

This table reports results for instrumental variables (IV) regressions explaining the number of tourists arrivals (A) in Austrian ski resorts during the skiing-seasons 1998-2006. The dependent variable is the annual growth rate ($\Delta log(A)$) of the number of tourists that arrive in a ski resort municipality. We use explanatory variables measuring the sum of Snow Weeks in a skiing season ($Snow^{Sum}$), Bank Equity, and an interaction term. Bank Equity^{reg} measures the average equity ratio of all regional banks located in a 20 kilometer radius around a municipality. The instrument for this measure is similarly defined, but measures the aggregate Bank Equity of the banking groups to which the regional banks belong (Bank Equity^{grp,reg}). For formal definitions of the variables, see Section 4.1. All Bank Equity measures are demeaned and defined in terms of basis points. The first column reports reduced form estimates (RF), columns 2 and 3 report the first stage estimates, and, column 4 reports the IV estimates. In parentheses, we report standard errors clustered at the municipal level. *,**,*** indicate statistical significance at the 10%, 5% and 1% levels respectively.

	RF	1st stage results		IV 2nd stage
	$\Delta log(A)$	Bank Equity^{reg} × 1	Bank Equity^{reg} × Snow^{sum}	$\Delta log(A)$
Snow^{sum}	0.00319*	-0.735	23.32	0.00268*
	(0.00181)	(1.151)	(28.25)	(0.00138)
Bank Equity^{grp,reg}	-0.000262	0.812***	0.00675	
	(0.000252)	(0.141)	(1.805)	
Bank Equity^{grp,reg} × Snow^{sum}	0.0000101	-0.00899	0.638***	
	(0.0000136)	(0.00811)	(0.162)	
Bank Equity^{reg}				-0.000322
				(0.000304)
Bank Equity^{reg} × Snow^{sum}				0.0000114
				(0.0000167)
N	1961	1961	1961	1961
Resort FE	YES	YES	YES	YES
F-Test of excluded instruments		41.17	42.45	
Angrist-Pischke F-Test		34.04	72.50	
Endogeneity test (p-value)	.			0.58

Table 8: **Snow, employment, and bank equity: IV estimates**

This table reports results for regressions explaining the log of weekly Employment Days (ED) of Austrian ski tourism businesses during the years 1998-2006. The dependent variable is defined in expression (3). We focus on the *starting weeks* of the skiing season. We use explanatory variables measuring the Expected Snow and Snow Risk in ski resorts for different weeks of the skiing season. Bank Equity^{reg} measures the average equity ratio of all regional banks located in a 20 kilometer radius around a municipality. The instrument for this measure is similarly defined, but measures the aggregate Bank Equity of the banking groups to which the regional banks belong (Bank Equity^{grp,reg}). For formal definitions of the variables, see Section 4.1. All Bank Equity measures are de-meaned and defined in terms of basis points. The first column reports OLS estimates, columns 2 and 3 report the first stage estimates, and, column 4 reports the IV estimates. In parentheses, we report standard errors clustered at the municipality-year level. *,**,*** indicate statistical significance at the 10%, 5% and 1% levels respectively. The ratio β_1/β_0 equals the coefficient of the interaction of Snow Risk and Bank Equity divided by the baseline coefficient of Snow Risk. Below our estimate regarding this ratio, we report the p-value of a test that it equals zero.

	OLS	1st stage results		IV 2nd stage
	Log(ED)	Bank Equity^{reg} × Exp. Snow	Bank Equity^{reg} × Snow Risk	Log(ED)
Exp. Snow	0.234***	-1.934	-7.053***	0.256***
	(0.0484)	(4.287)	(1.782)	(0.0478)
Snow Risk	-0.272***	-36.88***	-7.852**	-0.230***
	(0.0653)	(5.713)	(3.930)	(0.0741)
Bank Equity^{reg} × Exp. Snow	-0.00122***			-0.000873
	(0.000337)			(0.00101)
Bank Equity^{reg} × Snow Risk	0.00129**			0.00346***
	(0.000523)			(0.00131)
Bank Equity^{grp,reg} × Exp. Snow		0.634***	-0.0223	
		(0.0584)	(0.0322)	
Bank Equity^{grp,reg} × Snow Risk		-0.0530	0.583***	
		(0.0933)	(0.0654)	
N	325096	325096	325096	325096
Firm-Season FE	YES	YES	YES	YES
Week FE	YES	YES	YES	YES
β_1/β_0	-0.005			-0.015
P-Value	0.06			0.04
F-Test of excluded instruments		122.19	88.84	
Angrist-Pischke F-Test		135.89	87.77	
Endogeneity test (p-value)				0.04

Table 9: **Banks' provision of liquidity insurance: IV estimates**

This table reports results for regressions explaining the interest income (I) of banks in the vicinity of municipalities in Austrian ski resorts during the years 1998-2006. The dependent variable is the annual growth rate ($\Delta log(I)$) of interest income of the average regional bank operating in the 20 kilometer radius around a municipality. We use explanatory variables measuring Unexpected Snow observed in the starting weeks of skiing season, Bank Equity, and an interaction term. Bank Equity^{reg} measures the average equity ratio of all regional banks located in a 20 kilometer radius around a municipality. The instrument for this measure is similarly defined, but measures the aggregate Bank Equity of the banking groups to which the regional banks belong (Bank Equity^{grp,reg}). For formal definitions of the variables, see Section 4.1. All Bank Equity measures are de-meaned and defined in terms of basis points. The first column reports OLS estimates, columns 2 and 3 report the first stage estimates, and, column 4 reports the IV estimates. In parentheses, we report standard errors clustered at the municipal level. *,**,*** indicate statistical significance at the 10%, 5% and 1% levels respectively.

	OLS	1st stage results		IV 2nd stage
	$\Delta log(I)$	Bank Equity^{reg} × 1	Bank Equity^{reg} × UE Snow	$\Delta log(I)$
Unexpected Snow^{start}	0.0107***	4.589	37.68	0.0137***
	(0.00263)	(3.802)	(24.68)	(0.00486)
Bank Equity^{reg}	0.000128***			0.000103
	(0.0000373)			(0.0000836)
Bank Equity^{reg} × Unexpected Snow^{start}	0.0000552**			0.000212***
	(0.0000230)			(0.0000603)
Bank Equity^{grp,reg}		0.744***	0.103	
		(0.0715)	(0.0841)	
Bank Equity^{grp,reg} × Unexpected Snow^{start}		0.0367	0.715***	
		(0.0262)	(0.129)	
N	3248	3248	3248	3248
Resort FE	YES	YES	YES	YES
F-Test of excluded instruments		56.42	24.39	
Angrist-Pischke F-Test		165.82	293.98	
Endogeneity test (p-value)				0.00

Table 10: **Snow, employment, and bank equity: Sample splits by labor market tightness**

This table reports results for regressions explaining the log of weekly Employment Days (ED) of Austrian ski tourism businesses during the years 1998-2006. The dependent variable is defined in expression (3). We focus on the *starting weeks* of the skiing season. We use explanatory variables measuring the Expected Snow and Snow Risk in ski resorts for different weeks of the skiing season. Bank Equity^{reg} measures the average equity ratio of all regional banks located in a 20 kilometer radius around a municipality. The instrument for this measure is similarly defined, but measures the aggregate Bank Equity of the banking groups to which the regional banks belong (Bank Equity^{grp,reg}). For formal definitions of the variables, see Section 4.1. All Bank Equity measures are de-meaned and defined in terms of basis points. We split the sample of firms based on the degree of labor market tightness (LMT) observerved in the ski resort, and report the estimates separately for counties that face low and high levels of LMT. LMT is defined as $(1 - \text{unemployment rate}_{c(i),t})$ in county $c(i)$ and year t. The results are reported in two panels. The left (right) panel reports results for for firms in counties with low (high) LMT. In each panel, the first column reports OLS estimates, columns 2 and 3 report the first stage estimates, and, column 4 reports the IV estimates. In parentheses, we report standard errors clustered at the municipality-year level. *,**,*** indicate statistical significance at the 10%, 5% and 1% levels respectively. The ratio β_1/β_0 equals the coefficient of the interaction of Snow Risk and Bank Equity divided by the baseline coefficient of Snow Risk. Below our estimate regarding this ratio, we report the p-value of a test that it equals zero.

	Low LMT				High LMT			
	OLS	1st stage results		IV 2nd stage	OLS	1st stage results		IV 2nd stage
	Log(ED)	Bank Equity^{reg} × Exp. Snow	Bank Equity^{reg} × Snow Risk	Log(ED)	Log(ED)	Bank Equity^{reg} × Exp. Snow	Bank Equity^{reg} × Snow Risk	Log(ED)
Exp. Snow	0.198***	11.98**	-5.438**	0.211***	0.241***	-12.02*	-7.844***	0.330***
	(0.0757)	(5.506)	(2.577)	(0.0762)	(0.0547)	(6.696)	(1.792)	(0.0776)
Snow Risk	-0.298***	-30.84***	9.592*	-0.318***	-0.140	-49.12***	-26.61***	0.0521
	(0.0877)	(7.579)	(5.321)	(0.109)	(0.0947)	(8.026)	(4.952)	(0.142)
Bank Equity^{reg} × Exp. Snow	-0.00186***			-0.00201*	0.000508			0.00441**
	(0.000491)			(0.00116)	(0.000356)			(0.00206)
Bank Equity^{reg} × Snow Risk	0.00199***			0.00365**	-0.000239			0.000124
	(0.000700)			(0.00155)	(0.000712)			(0.00257)
Bank Equity^{grp,reg} × Exp. Snow		0.714***	-0.00885			0.465***	-0.0214	
		(0.0712)	(0.0448)			(0.0838)	(0.0254)	
Bank Equity^{grp,reg} × Snow Risk		0.0464	0.662***			-0.0509	0.475***	
		(0.125)	(0.0974)			(0.111)	(0.0633)	
N	154456	154456	154456	154456	166824	166824	166824	166824
Firm-Season FE	YES	YES	YES	YES	YES	YES	YES	YES
Week FE	YES	YES	YES	YES	YES	YES	YES	YES
β_1/β_0	-0.01			-0.01	0.00			0.00
P-Value	0.03			0.01	0.71			0.96
F-Test of excluded instruments		85.89	49.99			31.01	33.37	
Angrist-Pischke F-Test		112.08	49.83			34.76	90.67	
Endogeneity test (p-value)				0.28				0.05

Table 11: **Banks' provision of liquidity insurance: Sample splits by labor market tightness**

This table reports results for regressions explaining the interest income (I) of banks in the vicinity of municipalities in Austrian ski resorts during the years 1998-2006. The dependent variable is the annual growth rate ($\Delta log(I)$) of interest income of the average regional bank operating in the 20 kilometer radius around a municipality. We use explanatory variables measuring Unexpected Snow observed in the starting weeks of skiing season, Bank Equity, and an interaction term. Bank Equity^{reg} measures the average equity ratio of all regional banks located in a 20 kilometer radius around a municipality. The instrument for this measure is similarly defined, but measures the aggregate Bank Equity of the banking groups to which the regional banks belong (Bank Equity^{grp,reg}). For formal definitions of the variables, see Section 4.1. All Bank Equity measures are de-meaned and defined in terms of basis points. We split the sample of firms based on the degree of labor market tightness (LMT) observerved in the ski resort, and report the estimates separately for counties that face low and high levels of LMT. LMT is defined as ($1-$ unemployment rate$_{c(i),t}$) in county $c(i)$ and year t. The results are reported in two panels. The left (right) panel reports results for for firms in counties with low (high) LMT. In each panel, the first column reports OLS estimates, columns 2 and 3 report the first stage estimates, and, column 4 reports the IV estimates. In parentheses, we report standard errors clustered at the municipal level. *,**,*** indicate statistical significance at the 10%, 5% and 1% levels respectively.

	Low LMT				High LMT			
	OLS	1st stage results		IV 2nd stage	OLS	1st stage results		IV 2nd stage
	$\Delta Log(I)$	Bank Equity^{reg} $\times 1$	Bank Equity^{reg} $\times$ UE Snow	$\Delta Log(I)$	$\Delta Log(I)$	Bank Equity^{reg} $\times$ 1	Bank Equity^{reg} $\times$ UE Snow	$\Delta Log(I)$
Unexpected Snow^{start}	0.00214	1.721	-0.346	-0.00292	0.0127***	-0.933	10.40	0.0122***
	(0.00434)	(3.013)	(28.31)	(0.0107)	(0.00297)	(2.052)	(19.75)	(0.00455)
Bank Equity^{reg}	0.0000770			0.0000206	0.000142*			0.000200
	(0.0000462)			(0.000123)	(0.0000718)			(0.000135)
Bank Equity^{reg} $\times$ Unexpected Snow^{start}	0.0000655***			0.000256***	0.0000432			0.000149*
	(0.0000198)			(0.0000734)	(0.0000424)			(0.0000877)
Bank Equity^{grp,reg}		0.704***	0.192			0.715***	0.0181	
		(0.0947)	(0.176)			(0.115)	(0.0702)	
Bank Equity^{grp,reg} $\times$ Unexpected Snow^{start}		0.0393	0.851***			0.00626	0.671***	
		(0.0428)	(0.214)			(0.0291)	(0.136)	
N	1388	1365	1365	1365	1480	1461	1461	1461
Resort FE	YES	YES	YES	YES	YES	YES	YES	YES
F-Test of excluded instruments		27.98	8.86			20.95	12.18	
Angrist-Pischke F-Test		92.26	65.87			70.55	82.84	
Endogeneity test (p-value)				0.03				0.05

Figure A.1: 2006 General Terms of Trade for the Hotel Industry

This figure depicts paragraph 5 of the general terms of trade of the Austrian hotel industry in the last year of our sample period in 2006. Paragraph 5 defines the cancellation policy used in standard accommodation agreements.

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§ 5 Cancellation of the Accommodation Agreement – Cancellation fee

Cancellation by the Proprietor

5.1 If the Accommodation Agreement provides for a down payment and such down payment has not been made by the Party in time, the Proprietor may rescind the Accommodation Agreement without granting any grace period.

5.2 If the Guest fails to arrive by 6.00 p.m. on the agreed date of arrival, the Proprietor shall not be obliged to accommodate them unless a later time of arrival has been agreed upon.

5.3 If the Party has made a down payment (see 3.3), the rooms shall be deemed reserved until 12.00 noon on the day following the date of arrival at the latest. If a down payment to the amount of more than four days has been made, the obligation to accommodate the Guest shall end on 6.00 p.m. on the fourth day, the date of arrival being deemed the first day, unless the Guest informs the Proprietor of a later date of arrival.

5.4 Unless otherwise agreed upon, the Proprietor may rescind the Accommodation Agreement for objectively justified reasons by means of a unilateral declaration by 3 months before the agreed date of arrival of the Party.

Cancellation by the Party – Cancellation fee

5.5 The Party may rescind the Accommodation Agreement by means of a unilateral declaration by 3 months before the agreed date of arrival of the Guest without being liable to pay a cancellation fee.

5.6 Outside the period specified in § 5.5., the Party may only rescind the Accommodation Agreement by means of a unilateral declaration subject to the following cancellation fees:

- 40% of the total agreed price by 1 month before the date of arrival;

- 70% of the total agreed price by 1 week before the date of arrival;

- 90% of the total agreed price within the last week preceding the date of arrival.

2

(a) Cancellation policy

3 months or more	3 months to 1 month	1 month to 1 week	up to 1 week
no cancellation fee	40%	70%	90%

…

3

(b) Cancellation fee schedule

Figure A.2

This figure illustrates the matching of snow data to firms, given the firms' municipality keys. We first collect the coordinates of all ski lifts within a radius of 10 km for each municipality's center. Next, we determine the closest data grid point to the center of each ski lift. Coordinates of ski lifts were retrieved from OpenStreetMap, the 1 × 1 km grid data on snow depth was provided by the Austrian Meteorological Office.

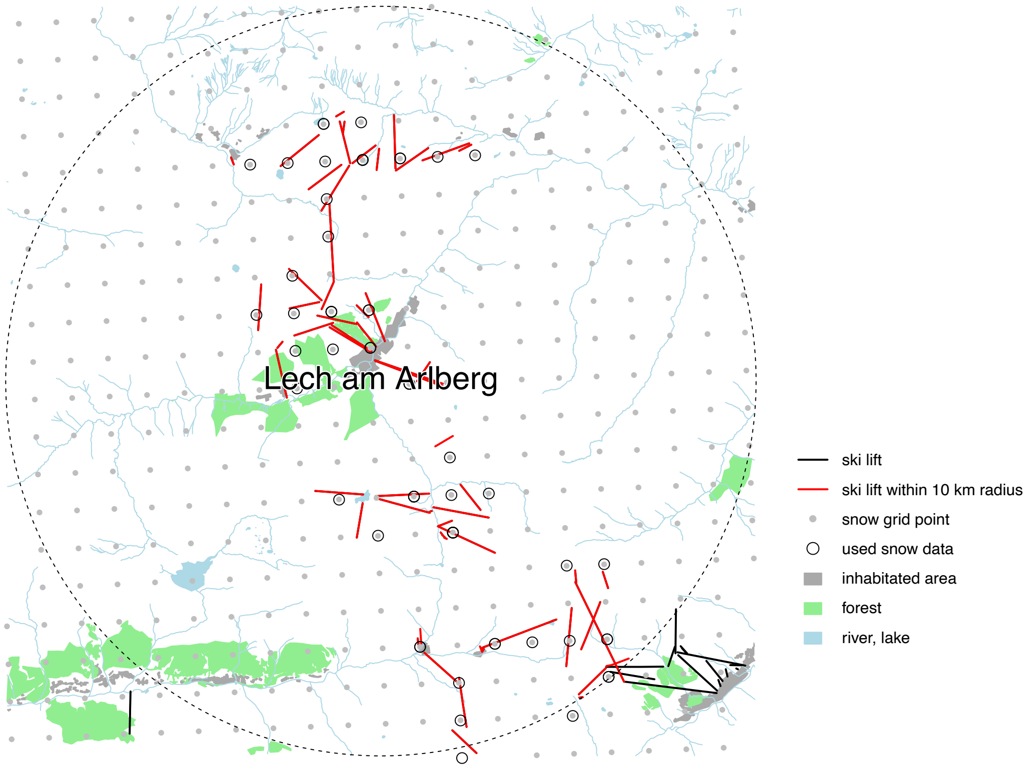

Figure A.3

This figure illustrates the development of winter temperatures (December to February) in the Austrian Alps from the winter seasons 1895/96 to 2018/19. The bars show the deviation of the average temperature from the long-term mean, the green line shows the 10-year moving average, and the black dashed line shows the linear time trend. It is based on measurements from the five alpine weather stations Obergurgl-Vent, Schmittenhöhe, Sonnblick, Villacher Alpe (all in Austria) and Säntis (Switzerland). The figure is a replication of Figure 1 from (Aigner and Gattermayr, 2019), and uses data from the Austrian Meteorological Office (available at `www.zamg.ac.at/histalp/`) and the Federal Office of Meteorology in Switzerland (`www.meteoschweiz.admin.ch`).

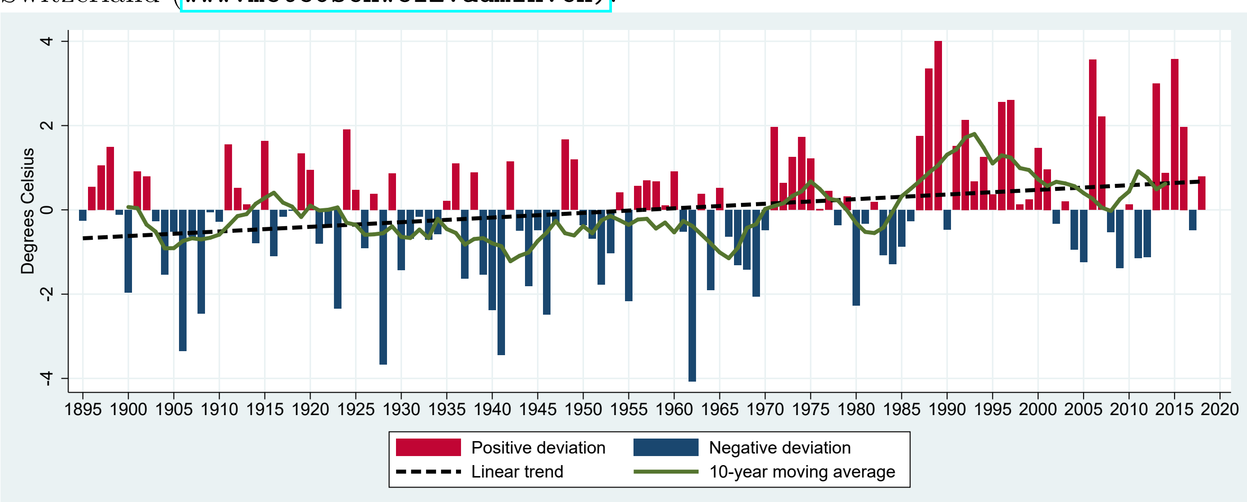

Table A.1: **Long run trends in snow conditions**

This table reports regressions measuring long-run trends in our measures of Expected Snow and Snow Risk in municipalities in Austrian ski resorts during the years 1983-2007. The dependent variables are defined in expressions (4) and (5). While our snow data start in 1978, we need the first five years of data to compute the value of the dependent variables of our regressions in the year 1983. We measure linear time trends and allow for the trends to differ across a number of dimensions. *Altitude* is a ski resort's altitude, and *High* is a dummy variable indicating ski resorts at above-median altitude. *Start* (*End*) are dummy variables indicating the starting (ending) weeks of the year. In parentheses, we report clustered standard errors. We cluster the standard errors at the level of ski resorts to address the problem that consecutive years' observations of our dependent variables are based on overlapping snow data. *,**,*** indicate statistical significance at the 10%, 5% and 1% levels respectively.

	Expected Snow				**Snow Risk**			
Year	-0.00538***	-0.00591***	-0.00543***	-0.00605***	0.00142***	0.00110***	0.00208***	0.00204***
	(0.000172)	(0.000236)	(0.000184)	(0.000259)	(0.0000921)	(0.000130)	(0.000113)	(0.000160)
Year × *Altitude*	0.000938***		0.000962***		0.000166*		-0.000159	
	(0.000161)		(0.000173)		(0.0000899)		(0.000103)	
Year × *High*		0.00147***		0.00166***		0.000705***		0.0000243
		(0.000335)		(0.000355)		(0.000176)		(0.000214)
Year × *Start*			0.00640***	0.00599***			-0.00210***	-0.00253***
			(0.000241)	(0.000332)			(0.000144)	(0.000200)
Year × *End*			-0.00491***	-0.00420***			-0.00111***	-0.00189***
			(0.000239)	(0.000308)			(0.000149)	(0.000205)
Year × *Altitude* × *Start*			0.000323				0.000454***	
			(0.000247)				(0.000140)	
Year × *Altitude* × *End*			-0.000361				0.00100***	
			(0.000245)				(0.000123)	
Year × *High* × *Start*				0.000960**				0.00106***
				(0.000474)				(0.000277)
Year × *High* × *End*				-0.00157***				0.00201***
				(0.000482)				(0.000285)
N	473550	473550	473550	473550	473550	473550	473550	473550
R^2	0.051	0.051	0.077	0.077	0.012	0.013	0.017	0.017
Resort-Week FE	YES	YES	YES	YES	YES	YES	YES	YES
Clustered SEs	Resort	Resort	Resort	Resort	Resort	Resort	Resort	Resort