Adjustment costs and factor demand: some lessons from corporate real estate

Antonin Bergeaud
Simon Ray
External Trade and Structural Policies
Research Division

The adjustment costs associated with a change in the quantity of production factors (labour and capital) hinder the optimal allocation of these factors and stifle corporate growth. This issue of Rue de la Banque uses the example of the tax on real estate gains to estimate the impact of these frictions on the behaviour of firms. At the aggregate level, these frictions hamper the creation of jobs by productive companies and the reallocation of jobs from less productive to more productive firms.

A great deal of research has been done on how adjustment costs and economic frictions can hold back business growth. In France, for example, there is the research of Garicano et al. (2016, 2017) on the impact of regulation related to firm size. Similarly, the costs associated with adjusting the capital stock of a company have been given special attention (e.g. Cooper and Haltiwanger, 2006). This literature has also demonstrated the very strong negative effect of resource misallocation on aggregate productivity (see Restuccia and Rogerson, 2017 for a review of recent literature).

Following an approach that is complementary to that adopted by the articles proposing indirect measurements of misallocation (e.g. Hsieh and Klenow, 2009), Bergeaud and Ray (2017) focus on the impact of adjustment costs of a specific type of capital: corporate real estate. Specifically, their work leverages the heterogeneity of the level of the tax on real estate gains that owner companies pay when they sell assets that have appreciated. This tax generates significant differences (between companies and over time) in the adjustment cost of real estate assets used in the production process. This makes it possible to identify and measure the impact of a source of friction hindering the optimal adjustment of production factors.

The conclusion is that this tax has a clearly negative direct impact on the propensity of firms to transfer their operations to other premises, and ultimately on the dynamics of employment.

## Corporate relocation, an important but little studied phenomenon

While abundant literature focuses on the geographical determinants of corporate location decisions, the relocation of firms and the internal factors that explain it are a topic that is still rarely mentioned in economics.[1] Yet, referring to the FIBEN[2] database, specifically to firms with just a single location and with fewer than 250 employees from 1994 to 2013, we estimate that nearly one in five firms relocated during those 20 years. In 70% of the cases, the distance between the old and the new premises is less

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1 However, see the studies by Pellenbarg et al. (2002) and Brouwer et al. (2004).

2 Fichier bancaire des entreprises (FIBEN – company database) is a very large database of accounting data (corresponding to tax declarations) of all companies located in France whose turnover exceeds EUR 750,000 per year or benefiting from a loan exceeding EUR 380,000.

C1 Complementarity between labour factor dynamics and the annual frequency of local relocation

(x-axis: growth rate of employment, %; y-axis: annual frequency of local relocation)
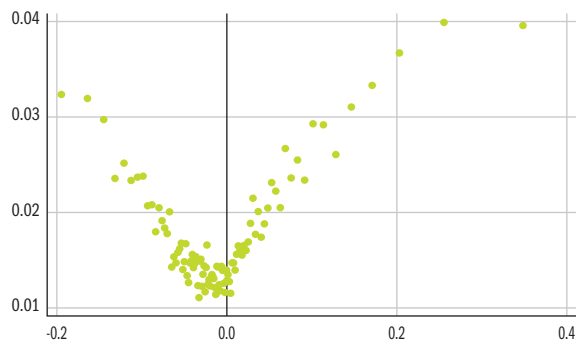
Source: Calculations of the authors based on the FIBEN database.
Note: Labour factor dynamics are measured by the rate of employment growth in %. The latter is adjusted for a geographical and sectoral effects. The values of the annual frequency of local relocation range from 0 to 1.

than 15 kilometres. This is called local relocation. Such local moves indicate that, in very many cases, the relocation does not change the type of demand that the firm faces:[3] same types of customers, same purchasing power.

Then why do firms move? The rationale put forward by Bergeaud and Ray (2017) is quite simple: a firm can only accommodate employees in premises of a given size up to a certain threshold. Similarly, it is not in the interest of firms to own premises that are too big compared to their workforce. It is this complementarity between real estate capital and labour that explains the local relocations observed in the data. The main issue, therefore, is not a change in location but an adjustment of the size of a production factor, in this case real estate.

Complementarity between real estate capital and labour

To demonstrate this complementarity, Chart 1 represents, for each percentile of the distribution of the growth rate of employment, the observed average frequency of local relocation over the period.

The resulting "U" curve shows that firms that relocate their operations are those that are characterized by a fairly strong employment dynamic, be it positive or negative. Even if it does not say much about the direction of the causality between these two quantities, Chart 1 shows that there are many firms that stagnate at a relatively constant level of employment and that do not relocate (the case of non-local moves is rare enough not to change Chart 1 when included).

Theoretical predictions

To explore this idea, Bergeaud and Ray (2017) propose a simple model of heterogeneous firms whose production function is composed of two assets: labour and real estate capital. The former adjusts with no friction, whereas to adjust the latter, the company must pay a fixed cost. A shock to the productivity levels is then introduced, which produces the following effects:

■ Firms that experience a sufficiently strong positive shock adjust their real estate volume upwards. Similarly, firms that experience a negative shock of sufficiently large magnitude adjust it downwards. These two groups of firms optimize their labour factor accordingly.[4]

■ The other firms do not relocate and only adjust their labour factor marginally.

■ The number of firms that do not relocate following the productivity shock increases when the fixed adjustment cost is higher.

As a result, compared to a frictionless situation where all firms adjust their volume of real estate in an optimal way, the existence of adjustment costs reduces the dynamics of employment by preventing firms facing low amplitude shocks from relocating. These shocks therefore restrict the reallocation of employment from firms that are becoming less productive to firms that are becoming more productive. On an aggregate level, the direct effect of the adjustment cost is therefore negative compared to a frictionless situation,[5] both on job creation and on production.

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3 *Similarly, a firm that relocates locally tends to retain the same employees, which is not the case for more distant moves. Weltevreden et al. (2007) show that when the distance of the relocation exceeds 20 kilometres, most employees leave the firm.*

4 *We use a production function that generates complementarity between real estate capital and employment. As a result, there is an optimal level of real estate capital for each level of employment and any shock that modifies the optimal level of employment affects the demand for real estate capital. In the event of positive shocks, the congestion problem resulting from a productivity shock is very intuitive, i.e. as one would expect. In the event of a negative shock, the reduction in the firm's demand for labour generates overcapacity in terms of real estate capital, in the absence of mobility. This overcapacity is costly for the company; it also creates an incentive for mobility. This result is a classic consequence of Cobb-Douglas-type production functions.*

5 *Like all forms of friction hampering the adjustment of production factors, they can also act as a buffer in case of a strongly negative aggregate shock. In that case, and only in that case, a non-frictional situation would be less positive. However, friction has a perverse dynamic effect, by allowing low-productivity firms to retain more labour, which will have the long-term effect of increasing the misallocation of employment and production.*

## Highlighting the role of adjustment costs

Moving a firm's operations to adjust the size of its real estate is a transaction that involves a lot of friction costs, most of which are unobservable. Examples include the costs associated with finding new premises, or those caused by disruption during the move, or the various costs incurred to sell the previous premises. However, firms that do not own their real estate face much less friction than proprietors, who must also sell the previous premises.[6]

To demonstrate this prediction, we replicate the research presented in Chart 1 but separate the firms into two groups depending on their occupation status: owner or tenant of the premises. The results shown in Chart 2 clearly show that these two groups of firms have the same U-shaped relationship between employment dynamics and their probability of moving locally, but that for a given level of employment growth, tenant companies have a much higher rate of mobility. This empirical result is a first indication that the adjustment costs of the volume of real estate are a drag on employment growth.

Of course, comparing firms in these two groups is a risky exercise: the choice of the occupation status is endogenous and can be explained, for example, by how old the firm is, the entrepreneur's risk aversion, growth expectations and local circumstances, especially the size of locally available commercial real estate. That is why the rest of this paper focuses on firms that own their real estate.

C2 Complementarity between relocation and labour, tenants and owners

(x-axis: growth rate of employment, in %; y-axis: annual frequency of local relocation)
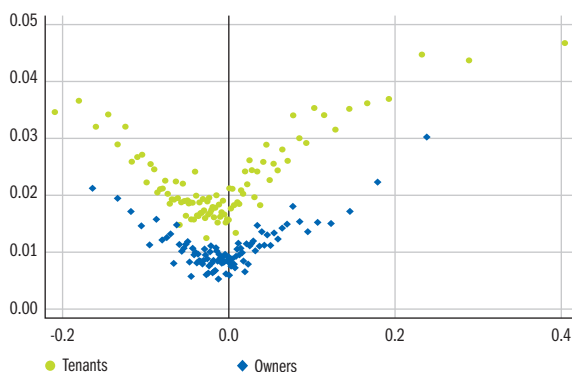
Source: Calculations of the authors based on the FIBEN database.
Note: Same units as for Chart 1.

The tax on real estate gains

To compare the owner firms, we use real estate price data at the geographical *département* level to assess, year by year, what share of the selling price a firm would have to pay in the form of a tax on real estate gains. In concrete terms, if we consider premises with a volume V, acquired during year t_0 at a price $p_0 V$, then, in case of resale during year t, the share that we call *Tax* is defined by:

$$Tax = \frac{p_t - p_0}{p_t} \, \tau(t - t_0)$$

Where $\tau(t - t_0)$ is the marginal rate, which decreases with the number of years the real estate asset has been owned. In other words, our indicator of the size of the capital gains tax that the firm would have to pay in the event of a hypothetical sale depends only on the level of local prices and the length of the ownership.

Chart 3 shows, as might be expected, and as the model predicts, that the higher the *Tax*, the lower the probability of moving.

C3 Size of real estate gains tax and frequency of relocation

(x-axis: Tax variable; y-axis: annual frequency of local relocation)
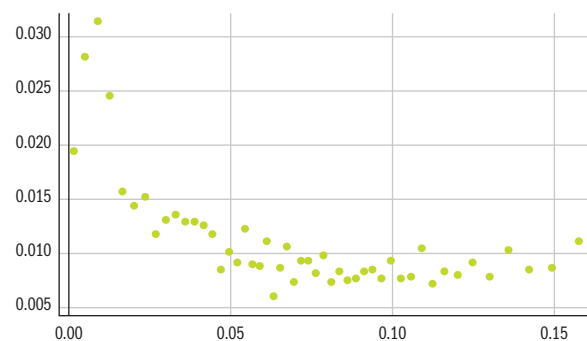
Source: Calculations of the authors based on the FIBEN database.
Note: The size of the tax on real estate gains is measured by the value of the Tax variable.
The values of the annual frequency of local relocation range from 0 to 1.

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6 The case of firms that keep the two premises and thus increase the volume of their real estate by opening a second location is very rare, according to the data. We have not considered them in this paper.

Empirical results

To formally test the other predictions of the model, we use the *Tax* variable as a measure of the constraint to the firms' mobility and test its direct effect on employment using a linear model to control specific characteristics of the firm (size, age), and by absorbing the specificities of the sector and the *département* to which the observation corresponds. It is useful to point out that the value of the *Tax* variable can be calculated at any time, whether the firm relocates or not. As such, this quantity can be characterised as a "latent" tax.

The findings agree with the theoretical model. The adjustment costs captured by this latent tax have a negative impact on aggregate job creation.

The estimation results suggest that a drop in the standard deviation of this *Tax* quantity *(a 4 percentage point decrease, for an average value of around 7.7%)* would entail a 5% increase in the employment growth rate of growing[7] firms.

Adjustment cost and misallocation

Another consequence of the existence of adjustment costs is the increase in the misallocation of production factors. To show this, we used the following methodology: (i) for each *département*, we calculate the correlation between the share of employment and the level of productivity of the firms located in this *département*; (ii) we calculate the rate of firms that own their real estate.

We thus consider that (i) is a measurement of the misallocation of employment. This is because, in a frictionless model, the most productive firms would also be the largest. We also consider that (ii) measures

C4 Misallocation of employment and share of owner firms
(x-axis: share of owner firms; y-axis: measure of misallocation)
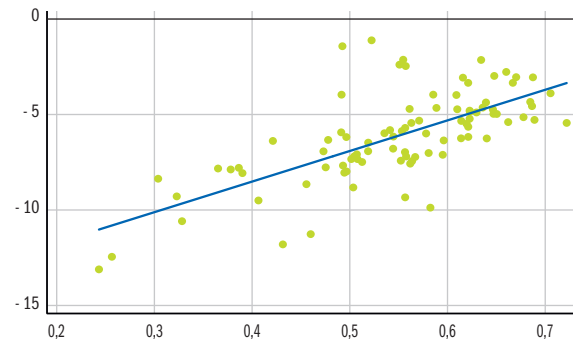
Source: Calculations of the authors based on the FIBEN database.
Note: The measurement of misallocation that we have chosen corresponds to the correlation between the share of employment and the productivity level of the firms in each département*. The closer the correlation is to 0, the greater the misallocation.*

the cost of adjusting the volume of real estate in each *département*. Chart 4 shows that these two values are positively related.

To summarise, the paper by Bergeaud and Ray (2017) looks at the impact of production factor adjustment costs on corporate growth. The originality of the study is that it uses an observable and heterogeneous measure to quantify the friction that firms face by taking the example of the tax on capital gains realised by selling real estate. The aggregate effects of such a tax are important for two reasons: they reduce job creation, but they also slow down the reallocation of jobs from less productive firms to more productive firms by forcing the former to maintain a level of employment that is too high.

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7 *Specifically, firms that feature a positive average growth rate over the observation period.*

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