A Static Measure of Firm–Level Labour–Market Tightness

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1 Notation

f	firm (company)
o	four–digit occupation (SOC–4)
m	metropolitan area (CBSA)
P	reference period (**base period**), here $P = 2019$–H2

Core variables

- h_{fom} : head-count of employees of firm f in occupation o and metro m at period P.
- T_{om} : external labour-market tightness for occupation o in metro m (e.g. OEWS). This is a *given* scalar.

Define occupation and firm totals

$$H_{fo} = \sum_m h_{fom} \qquad \text{(employees of firm } f \text{ in occupation } o\text{)}, \tag{1}$$

$$H_f = \sum_o H_{fo} \qquad \text{(total employment of firm } f\text{)}. \tag{2}$$

2 Step 0. From OEWS Employment to a Tightness Index

The Occupational Employment and Wage Statistics (OEWS) data report the employment count EMP_{om} for every occupation o in every metropolitan area m in the base year P. Let

$$\mathrm{EMP}_m = \sum_k \mathrm{EMP}_{km} \qquad \text{(total employment in metro } m\text{)},$$

$$\mathrm{EMP}_o^{US} = \sum_k \mathrm{EMP}_{ok}^{US} \qquad \text{(national employment in occupation } o\text{)},$$

$$\mathrm{EMP}_{\mathrm{tot}}^{US} = \sum_k \mathrm{EMP}_k^{US}.$$

Location quotient

The *location quotient* compares an occupation's share in a metro with its share nation–wide:

$$\mathrm{LQ}_{om} = \frac{\dfrac{\mathrm{EMP}_{om}}{\mathrm{EMP}_m}}{\dfrac{\mathrm{EMP}_o^{US}}{\mathrm{EMP}_{\mathrm{tot}}^{US}}}. \tag{3}$$

Values smaller than one indicate that occupation o is relatively *scarce* in metro m.

Tightness metric

We define labour-market tightness as the inverse of the location quotient

$$T_{om} \;=\; \frac{1}{\mathrm{LQ}_{om}} \;=\; \frac{\dfrac{\mathrm{EMP}_{o}^{US}}{\mathrm{EMP}_{\mathrm{tot}}^{US}}}{\dfrac{\mathrm{EMP}_{om}}{\mathrm{EMP}_{m}}}. \tag{4}$$

The tighter (larger) T_{om}, the lower the local supply of workers in that occupation relative to national availability.

3 Step 1. Firm–Occupation Tightness

For each *firm–occupation* pair take a head-count weighted average of the metro-level tightness values:

$$\widehat{T}_{fo} \;=\; \frac{\sum_{m} h_{fom}\, T_{om}}{\sum_{m} h_{fom}} \tag{5}$$

The weights $\alpha_{fom} = h_{fom}/\sum_{k} h_{fok}$ sum to one by construction.

4 Step 2. Static Firm–Level Tightness

Freeze the occupational composition at the same base period P and form weights

$$\beta_{fo} = \frac{H_{fo}}{H_{f}}, \qquad \sum_{o} \beta_{fo} = 1. \tag{6}$$

The *static* tightness of firm f is the weighted average of the occupation-specific values from (3):

$$\mathrm{Tight}_{f} \;=\; \sum_{o} \beta_{fo}\, \widehat{T}_{fo} \;=\; \frac{\sum_{o} H_{fo}\, \widehat{T}_{fo}}{\sum_{o} H_{fo}}. \tag{7}$$

Missing occupation values

If a particular occupation o lacks a valid tightness measure (i.e. $\widehat{T}_{fo}$ is missing), exclude that occupation from the numerator and denominator in (5). Denote the retained set by $\bar{O}_f$; then

$$\mathrm{Tight}_{f} \;=\; \frac{\sum_{o \in \bar{O}_f} H_{fo}\, \widehat{T}_{fo}}{\sum_{o \in \bar{O}_f} H_{fo}}. \tag{8}$$

5 Interpretation

Equation (5) represents the average tightness of the labour markets that matter to firm f *given its workforce in 2019–H2*. Because both layers of weights—metro mix within occupations and occupation mix within the firm—are fixed at the base period, Tight_f is *time-invariant*. It captures the structural hiring difficulty the firm would face if it sought to staff its 2019 workforce again.

6 Implementation Outline (data-agnostic)

1. **OEWS layer:** calculate T_{om} via equation (**??**) (inverse of the location quotient).
2. **LinkedIn layer:** collect firm micro-data h_{fom} for the same period P.
3. Compute (3) to obtain tightness at the *firm–occupation* level.
4. Aggregate to firm level with (5), omitting occupations without T_{om}.
5. Store the resulting scalar Tight_f for downstream analysis (regressions, matching, etc.).