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Place Based Policies with Unemployment†

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In this paper, we develop a stylized model of frictional local labor markets with the goal of studying the efficiency of unemployment differences across areas and the potential for place based policies to correct local market failures. Our model builds on the heavily studied Diamond (1982), Mortensen (1979), and Pissarides (1985) framework, adapted to a local labor market setting with a competitive housing market. The result is a simple search analog of the classic Roback (1982) model that provides a tractable environment for studying the effects of local job creation efforts.

Unemployment rates vary enormously across cities and regions. In the United States, variation in unemployment rates across labor markets at a moment in time rivals that of variation over the business cycle. Column 1 in Table 1 reports unemployment rates in US metropolitan areas with the highest and lowest unemployment rates in 2008. In that year, the unemployment rate in Flint—the city at the top of the list—was almost 15 percent, while the unemployment rate in Iowa City—located less than 500 miles from Flint—was only 2.6 percent. The 12 percentage point difference between these two cities is more than double the change in national unemployment rates observed over the course of the Great Recession.[1] Spatial differences in unemployment rates are not simply an artifact of differences in the average characteristics of residents. Column 2 in Table 1 shows that metropolitan area–specific unemployment rates adjusted for education, age, gender, and race continue to exhibit a remarkable degree of variability.

Table 1—Metropolitan Areas with the Highest and Lowest Unemployment Rate in 2008

Rank		Unemp. rate	Adjusted unemp. rate
Panel A. Areas with the highest rate			
1.	Flint, MI	0.1462	0.1399
2.	Yuba City, CA	0.1099	0.1072
3.	Anniston, AL	0.1074	0.0899
4.	Merced, CA	0.1060	0.0948
5.	Toledo, OH/MI	0.1058	0.1064
6.	Yakima, WA	0.1047	0.0970
7.	Detroit, MI	0.1044	0.1082
8.	Chico, CA	0.1031	0.1092
Panel B. Areas with the lowest rate			
278.	Odessa, TX	0.0383	0.0307
279.	Fargo-Morehead, ND/MN	0.0362	0.0467
280.	Charlottesville, VA	0.0348	0.0362
281.	Houma-Thibodoux, LA	0.0337	0.0107
282.	Billings, MT	0.0304	0.0324
283.	Rochester, MN	0.0297	0.0392
284.	Sioux Falls, SD	0.0285	0.0342
285.	Iowa City, IA	0.0265	0.0327

Notes: Data are from the 2008 American Community Survey. Adjusted rates are obtained from an individual-level linear probability regression of an indicator for unemployment on metropolitan area indicators and indicators for education, age, gender, and race.

Perhaps even more surprising is the fact that these staggering geographical differences can last for decades. A regression of 2008 unemployment rates in 2008 on 1990 rates across 239 metropolitan areas shows a remarkable degree of persistence, with a coefficient of 0.509 (0.045) and R^2 of 0.35 (Kline and Moretti 2013). European labor markets also exhibit marked and long lasting differences in regional unemployment rates (Elhorst 2003). For example, the unemployment rate in Southern Italy has been three to four times higher than the unemployment rate in Northern Italy for the past three decades. Similar regional differences, albeit

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[1] The national unemployment rate at the peak of the Great Recession was only 4.7 points higher than the rate in 2006, at the bottom of the cycle.

somewhat smaller, are observed in Spain, France, and Germany.

Given the persistence of these vast cross-sectional differences in unemployment rates, it is not surprising that a number of countries have adopted place based policies transferring resources toward areas with weak demand for labor, often with the explicit goal of reducing unemployment.[2]

Standard spatial equilibrium models (e.g., Roback 1982) suggest that place based policies may be highly inefficient. Under the standard modeling assumptions of static market clearing, the absence of agglomeration and crowding effects, and the absence of prior distortions due to taxes, place based policies may generate large deadweight losses by creating incentives to invest, work, and live in less productive or hospitable areas.[3] Recently, a variety of authors have sought to relax some of these assumptions. For example, Glaeser and Gottleib (2008), Kline (2010), and Kline and Moretti (2012) study the implications of agglomeration externalities for the efficiency of place based policies from the point of view of local and national governments.

Thus far, however, not much work has been devoted to studying the implications of labor market frictions for the efficiency of place based policies. Given the large geographical differences in the prevalence of unemployment observed in the real world, understanding spatial equilibrium when the labor market does not instantly clear would appear to be of primary importance.[4]

We develop here an equilibrium model with search frictions where workers are perfectly mobile and the productivity of a worker-firm match may vary across metropolitan areas. (For a longer version, see Kline and Moretti 2013). In equilibrium, higher local productivity results in higher nominal wages, higher housing costs, and lower unemployment rates. Although workers can move freely to arbitrage away differences in expected utility across metropolitan areas, equilibrium unemployment rates are not equalized across space. We find that if hiring costs are excessive, firms may post too few vacancies. This problem may be offset via hiring subsidies of the sort found in many place based policies. The optimal hiring subsidy is city specific in the sense that it depends upon the local productivity level.

I. Model Setup and Equilibrium

Consider a small representative city to which homogeneous workers may freely migrate and search for a job. Jobs are filled probabilistically via a constant returns to scale matching function $M(U, V)$ which takes the number of unemployed workers U and job vacancies V as arguments. Whether searching or employed, workers inelastically demand a unit of housing which they rent at rate c. Housing is supplied on a spot market according to marginal cost so that

$$c = g'(N),$$

where the function $g(\cdot)$ represents the total cost of producing housing for the local work force of size N and is assumed to be twice differentiable and convex.

The steady-state value of searching for a job is given by

$$(2) \qquad rJ^U = b + A - c + \theta q(\theta)\,(J^E - J^U)\,,$$

where $\theta \equiv \frac{V}{U}$ denotes market tightness, $q(\theta) \equiv \frac{M(U, V)}{V}$ denotes the job finding rate and r is the interest rate. The flow utility of unemployment b captures the generosity of the local safety net and the value of leisure. The term A gives the consumption value of the local mix of amenities in the city. The steady-state value of employment J^E obeys the recursion

$$(3) \qquad rJ^E = w + A - c + s(J^U - J^E)$$

[2] For example, the European Union Regional Development Fund explicitly targets regions with high unemployment and low income for generous subsidies. Since the 1970s, the main business support scheme in the United Kingdom—the Regional Selective Assistance—has targeted regions with high unemployment and low levels of per capita GDP. Italy has long provided regional transfers that single out high unemployment regions, especially in the South, for special infrastructure investments and, more recently, for hiring incentives and other labor market subsidies. Sweden, France, and Germany have similar programs. In the United States, the federal urban Empowerment Zone program was explicitly designed to benefit neighborhoods with high unemployment rates.

[3] Indeed, in standard models, such as that of Busso, Gregory, and Kline (forthcoming), successful job creation resulting from targeted incentives is actually a sign of inefficiency. The ideal place based subsidy would simply raise wages (or change other prices) in a way that raises the real income of the targeted group without changing behavior.

[4] See, also, Lutgena and Van der Linden (2012), and Molho (2001).

with w representing the wage and s an exogenous separation probability.

We depart from the standard general equilibrium assumption of a fixed work force by assuming that workers may freely exit the city and obtain flow utility z. Thus, we have the restriction that in an interior equilibrium

$$rJ^U = z. \tag{4}$$

This condition is analogous to the standard free-mobility assumption of Roback (1982), who requires that agents everywhere have equal utility. Here they need only have equal values of *search* across communities. The value of employment may vary across communities if it is offset by differences in the local cost of living or the probability of finding a job. Condition (4) in conjunction with the housing supply function will pin down a unique steady-state city size N.

Firms may post vacancies which entail flow cost k. Following Pissarides (2000, 2009) we assume the firm must pay a fixed hiring cost H before hiring a worker with whom it is matched. Note that k and H are distinguished by the fact that the vacancy costs are already sunk by the time the firm is matched with the worker, while the hiring costs are not. The value J^V of posting an unfilled vacancy is given by

$$rJ^V = -k + q(\theta)\,(J^F - J^V - H)\,. \tag{5}$$

The value J^F of a filled vacancy obeys

$$rJ^F = p - w + s(J^V - J^F)\,, \tag{6}$$

where p is the productivity of the match which we assume is city specific and common to all matches in the city. This parameter is important because it governs the strength of the local labor market. We are interested in understanding how the optimal policy depends on p.

Free entry of firms drives the value of an unfilled vacancy to zero:

$$rJ^V = 0. \tag{7}$$

In a steady state, there will be no migration, and the local unemployment rate $u \equiv \frac{U}{N}$ will be determined by the usual function of inflow and outflow rates:

$$u = \frac{s}{s + \theta q(\theta)}. \tag{8}$$

Finally, we assume wages are set via Nash bargaining over the match surplus, so that

$$J^E - J^U = \frac{\beta}{1-\beta}(J^F - J^V - H), \tag{9}$$

where β is the worker's share of the match surplus.

The nine equations of our model can be reduced to the following three relationships which characterize the behavior of the endogenous variables θ, c, and w (Kline and Moretti 2013):

$$\frac{k(r+s)}{(1-\beta)q(\theta)} = p - b - k\frac{\beta}{1-\beta}\theta - (r+s)\,H \tag{10}$$

$$c = b + A - z + k\frac{\beta}{1-\beta}\,\theta \tag{11}$$

$$w = \beta(p - (r+s)\,H) + (1-\beta)\,(c + z - A)\,. \tag{12}$$

Condition (10) is standard and can be graphed as the intersection of a modified job creation curve and a Beveridge curve. Not surprisingly, equilibrium market tightness is an increasing function of local productivity p and a decreasing function of hiring costs H. It is also straightforward to verify that equilibrium market tightness is a decreasing function of worker's bargaining power β, and the costs k of posting a vacancy. An interesting feature of this equation is that it does not depend on the local amenity level A or the outside option z. This is an artifact of our (somewhat artificial) assumption that firms do not use land to produce goods, which conveniently blocks one channel of feedback from the housing market to the labor market.

The local cost of living c is an increasing function of market tightness and, therefore, match productivity p. It also varies one for one with the amenity level A and the outside option

z (which can be thought of as the amenity value of the outside world) in order to keep workers indifferent.

Finally, the wage is a bargaining power weighted average of output net of hiring costs and the cash flow required for workers to obtain utility level z which is z plus the local cost of living c. Because firms do not use land, wages are invariant to the local amenity level A. Relaxing this restriction would make wages a decreasing function of the amenity level as in Roback (1982).

II. Efficiency

The social planner sets to maximize the total surplus in the economy relative to the outside option which is given by: $S \equiv [(p - sH) \times (1 - u) + (b - k\theta)\, u + A - z]\, N - g(N)$. Total surplus S consists of the output of productive matches net of the steady-state costs of hiring replacements plus the leisure associated with unemployment minus the flow cost of maintaining unfilled vacancies. This must then be netted out relative to the outside option which offers workers utility level z. The planner also deducts from the surplus the real costs of housing the local work force.[5] The static planner's problem is to

$$\max_{\theta, N} S \quad \text{s.t. } u = \frac{s}{s + \theta q(\theta)}.$$

This problem can be thought of as choosing the equilibrium the agent faces before entering the economy.

The first-order condition with respect to N shows that city size is always efficient (Kline and Moretti 2013). This is unsurprising since workers are free to move, and we have assumed a perfectly competitive housing market.

The first-order condition with respect to θ governs efficiency of the job creation process which determines the local unemployment rate. It is possible to show that for this second condition to coincide with (10) we need that $\frac{1-\beta}{k}(p - b - sH) - \beta\theta = (p - b)\frac{1-\alpha}{k} - \alpha\theta$.

[5] Because we are not concerned with transitional dynamics, we now limit our analysis to the case where agents have discount rates of zero, which allows us to compare steady states without considering the convergent paths between steady states.

In the absence of hiring costs $(H = 0)$ this condition is satisfied whenever $\alpha = \beta$, which is often referred to as the Hosios (1990) condition. There is, in general, no reason to expect this condition to be satisfied.

Rearranging the relevant condition, we have that the optimal hiring cost obeys

$$H^* = \frac{1}{s\beta}\,\frac{\alpha - \beta}{1 - \alpha}(w - b)\,. \tag{13}$$

We have then that the ideal hiring cost is proportional to the local wage level w net of the value of the leisure b. Presumably, b does not vary substantially across communities (at least relative to w). By contrast, in equilibrium the wage is higher in more productive areas.

III. Place Based Hiring Subsidies

The policy implications of (13) depend on the relative magnitude of the parameters β and α. When $\beta > \alpha$, equilibrium unemployment is *above* its social optimum. This occurs because high bargaining power on the part of workers leads to excessive wages and therefore too little job creation, with job seekers inefficiently crowding each other out. Efficiency can be restored in such cases by imposing a hiring subsidy. By contrast, when $\beta < \alpha$, equilibrium unemployment is *below* its social optimum. In this case, low bargaining power on the part of workers leads to low wages and excessive job creation, with vacancies inefficiently crowding each other out. Efficiency can be restored in such cases via hiring costs, which, if too low, can be bolstered by taxing new hires.

Most estimates of α place it at or above one-half, with Shimer (2005) settling on a value of $\alpha = 0.72$. By contrast, labor economists examining the wage impact of shocks to firm profitability have repeatedly found estimates of β well below one-half. Abowd and Lemieux (1993), for example, find in a sample of unionized plants in Canada that β is no greater than 0.4. Unsurprisingly, researchers studying environments where workers are less formally organized typically find much lower bargaining shares (Barth et al. 2011; Card, Devicienti, and Maida 2010; Guiso, Pistaferri, and Schivardi 2005).

The empirical finding that $\beta < \alpha$ has the rather counterintuitive implication that positive hiring costs are optimal. If actual hiring costs are below the optimum, a hiring tax could be welfare improving. Despite being politically unpalatable, this possibility illustrates the point that labor market failures are not always remediable with subsidies.

However, a finding that $\beta < \alpha$ does not itself imply that existing hiring costs are too low or that hiring should be taxed. Although a calibration is beyond the scope of this paper, empirical estimates suggest that actual hiring costs are, in fact, very large (Bloom 2009). One justification for place based subsidies then could be that hiring costs are too high—that is, that hiring costs take the value $\overline{H} > H^*$. In such cases efficiency can be restored via an offsetting hiring subsidy.

If one ignores the costs of raising the necessary funds, the optimal subsidy B^* takes the form[6]

$$B^* = \overline{H} - \frac{1}{s\beta}\frac{\alpha - \beta}{1 - \alpha}(w - b).$$

This subsidy is decreasing in w, providing a rationale for intervening more heavily in areas with lower wages. Indirectly, this suggests subsidizing areas with lower productivity.[7] Of course, $\overline{H}$ and b may themselves vary across cities due to differences in regulations and variation in the generosity of the social safety net. Areas with greater hiring costs require a larger subsidy for obvious reasons. Interestingly, areas with a more generous safety net also require a larger hiring subsidy.

IV. Conclusion

In this paper, we studied some conditions under which local job creation could have an efficiency rationale. We found that, depending on the magnitude of hiring costs, firms may post too few vacancies, particularly in cities where the productivity of a match is low. In principle, this problem may be offset via place based hiring subsidies that vary with local productivity levels.

Thus, in our simple setting, excessive hiring costs provide a theoretical rationale for place based hiring subsidies even when workers are perfectly mobile. These subsidies ought to be targeted to less productive areas with lower wages. Relative to a neoclassical environment, the underlying motivation for such subsidies is that workers are not perfectly mobile between unemployment and employment. Search frictions yield rents, which, if split incorrectly, yield inefficient job creation behavior.

We stress that our discussion is meant to stimulate further work on efficiency considerations in the local labor market literature rather than to assess the desirability of any particular policy. Local hiring subsidies of the sort studied in our model are likely to face significant implementation problems as authorities cannot easily infer which matches are new.

[6] Raising the funds with taxes on labor will induce additional distortions, hence reducing the size of the optimal subsidy.

[7] In a more general model where firms use land, wages would also depend negatively on the local amenity level. In such a case, areas with a more attractive mix of amenities ought to receive larger hiring subsidies.

REFERENCES

Abowd, John M., and Thomas Lemieux. 1993. "The Effects of Product Market Competition on Collective Bargaining Agreements: The Case of Foreign Competition in Canada." *Quarterly Journal of Economics* 108 (4): 983–1014.

Barth, Erling, Alex Bryson, James Davis, and Richard Freeman. 2011. "The Contribution of Dispersion across Plants to the Increase in US Earnings Dispersion." Unpublished.

Bloom, Nicholas. 2009. "The Impact of Uncertainty Shocks." *Econometrica* 77 (3): 623–85.

Busso, Matias, Jesse Gregory, and Patrick Kline. Forthcoming. "Assessing the Incidence and Efficiency of a Prominent Place Based Policy." *American Economic Review*.

Card, David, Francesco Devicienti, and Agata Maida. 2010. "Rent-sharing, Holdup, and Wages: Evidence from Matched Panel Data." National Bureau of Economic Research Working Paper 16192.

Diamond, Peter A. 1982. "Wage Determination and Efficiency in Search Equilibrium." *Review of Economic Studies* 49 (2): 217–27.

Elhorst, J. Paul. 2003. "The Mystery of Regional Unemployment Differentials: Theoretical and Empirical Explanations." *Journal of Economic Surveys* 17 (5): 709–48.

Glaeser, Edward L., and Joshua D. Gottlieb. 2008. "The Economics of Place-Making Policies."

Brookings Papers on Economic Activity 2: 155–239.

Guiso, Luigi, Luigi Pistaferri, and Fabiano Schivardi. 2005. "Insurance within the Firm." *Journal of Political Economy* 113 (5): 1054–87.

Hosios, Arthur J. 1990. "On the Efficiency of Matching and Related Models of Search and Unemployment." *Review of Economic Studies* 57 (2): 279–98.

Kline, Patrick. 2010. "Place Based Policies, Heterogeneity, and Agglomeration." *American Economic Review* 100 (2): 383–87.

Kline, Patrick, and Enrico Moretti. 2012. "Local Economic Development, Agglomeration Economies and the Big Push: 100 Years of Evidence from the Tennessee Valley Authority." Unpublished.

Kline, Patrick, and Enrico Moretti. 2013. "Place Based Policies with Unemployment." NBER Working Paper 18758.

Lutgena Vanessa, and Bruno Van der Linden. 2012. "Regional Equilibrium Unemployment Theory." Unpublished.

Molho, Ian. 2001. "Spatial Search, Migration and Regional Unemployment." *Economica* 68 (270): 269–83.

Mortensen, Dale T. 1979. "The Matching Process as a Non-Cooperative Bargaining Game." In *The Economics of Information and Uncertainty*, edited by John J. McCall, 233–58. Chicago: University of Chicago Press.

Pissarides, Christopher A. 1985. "Short-run Equilibrium Dynamics of Unemployment Vacancies, and Real Wages." *American Economic Review* 75 (4): 676–90.

Pissarides, Christopher A. 2000. Equilibrium Unemployment Theory. 2nd ed. Cambridge, MA: MIT Press.

Pissarides, Christopher A. 2009. "The Unemployment Volatility Puzzle: Is Wage Stickiness the Answer?" *Econometrica* 77 (5): 1339–69.

Roback, Jennifer. 1982. "Wages, Rents, and the Quality of Life." *Journal of Political Economy* 90 (6): 1257–78.

Shimer, Robert. 2005. "The Cyclical Behavior of Equilibrium Unemployment and Vacancies." *American Economic Review* 95 (1): 25–49.

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