

Transportation Infrastructure and Labor Market Integration: the Moscow Oblast Case

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Februari, 2013

The model of city organization proposed by von Thünen in the beginning of the XIXth century, and then formalized by Alonso followed by Muth and Mills (see Ner (1986)), is one of the most “successful” models in economics in terms of practical applications. The model explains why the gradient of population density and land rents decline from the city center towards the periphery. In fact, almost all modern cities fit this pattern, i.e. the model invented two centuries ago is capable of describing today’s spatial structure of cities. Even though von Thünen’s original idea of a city center as a single “marketplace” is no longer realistic, a multitude of factors beyond this make central locations nevertheless attractive. If firms are located near each other, they can take advantage of a common labor pool, easier access to consumers and suppliers, shared infrastructure, and knowledge spillovers, to name but a few advantages. Access to the center brings tangible economic benefits to both labor and capital and these benefits exceed possible losses due to increased competition, and so the von Thünen mechanism still works today, albeit through different channels.

In cities, there are generally two types of spatial organizations possible with respect to household income. If the advantages of amenities in a city center are not very strong, rich people tend to choose to locate in suburbs in order to consume higher quality housing. Such patterns are typical in US cities. If the advantages of a center are strong, the rich choose to live in the center. (Brueckner et al. (1999)) Due to historical circumstances, such patterns are typical of European or Russian cities. In these cases we observe a declining gradient of income; the further we move from the center, the further residents’ average income falls.

There are two forces at work shaping this declining gradient of wage. First, poor people sort themselves into suburban locations. Second, residents of the suburbs who want to

take advantage of the labor market in the center face a barrier involving commuting costs. Many of them forgo high-wage opportunities that require tedious everyday commuting and therefore remain poor as a consequence.

An apparent policy solution to reduce income inequality would be to reduce transportation costs. The higher transportation costs are, the steeper the gradient of income. Fast and convenient transportation promotes the integration of local labor markets, gives the residents of the suburbs more, and often better, job opportunities, and works toward equalization of income across the agglomeration. Moreover, as transportation costs decline, the geographic area of agglomeration grows, which opens new opportunities for real estate development as

well as new possibilities for rural residents to commute and participate in large labor market.

We conducted a study at CEFIR (Mikhailova et al. (2012)) comparing the spatial patterns of average wages in the Moscow agglomeration with several agglomerations in Western Europe. We considered municipal-level data for Moscow Oblast and for 25 agglomerations in Sweden, Germany, and Netherlands. In the sample of municipalities that are served by suburban train system, we estimated how average wages in a given municipality respond to different lengths of travel times to the city center.

Figure 1 shows the estimated wage-travel time relationship for Moscow Oblast and Figure 2 for the selected European cities.

Figure 1. Average Wage and Travel Time to the City Center, Moscow

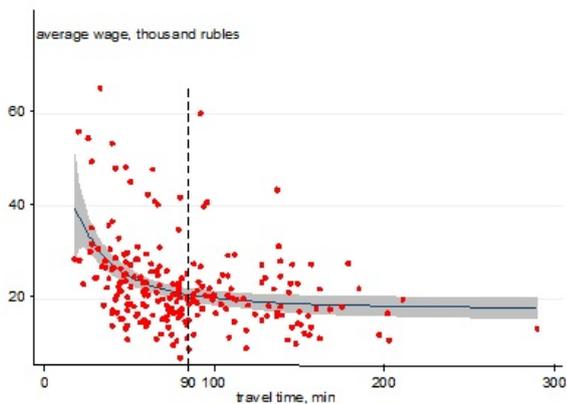
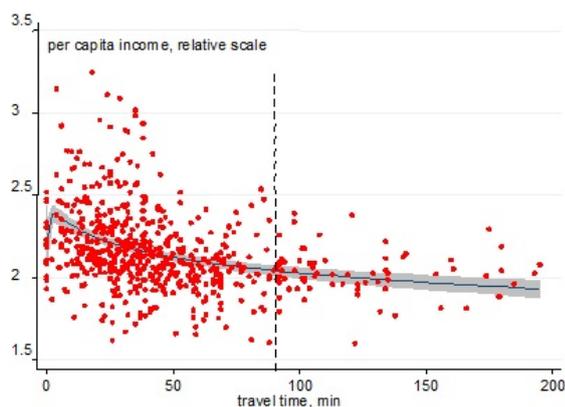


Figure 2. Average Wage and Travel Time to the City Center, Europe.



The residents of the Moscow agglomeration are at a clear disadvantage according to the data shown above. Residents of Moscow Oblast, even those who live in relative proximity to the city, lose drastically in terms of average wage. Doubling the travel time (say, from 20 min to 40 min, which is the range most commuters fit into) results in a 25% drop in the average wage for residents in Moscow Oblast compared to only a 5% drop in Europe. The wage in a municipality, from which it would take 90 minutes to travel to the city center, is almost half of the average wage inside Moscow's Ring Road whereas in Europe 90 minutes translates into a 10% loss of in average wages.

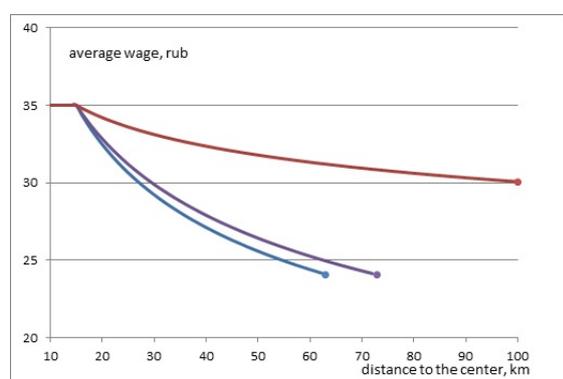
A 90 minutes travel time could be considered as a realistic limit to the size of an agglomeration. This is roughly the maximum distance over which a typical working commuter would be willing to travel each day in each direction. A 90 minute commute in Europe represents approximately a 100 kilometer distance. In Moscow Oblast, however, it is only 63 km. So, Moscow Oblast loses in the effective "reach" of suburban transportation: people who live further than roughly 60 km from the center cannot practically commute.

Even for the same commuting time, the difference in wages between center and suburban municipality is much smaller in Europe (see Figures 1 and 2). This means that a commute for the same time length (in terms of railroad transport) presents a larger barrier for the residents of Moscow Oblast. This is obviously an over simplification of the situation since taking into account only commuting times as the measure of costs we ignore many other critical factors such as price (relative to income), the convenience of schedule and travel comfort, alternative modes of transportation, etc. Suburban trains in Moscow Oblast run infrequently, they are overcrowded, and alternative transportation modes (car or bus) face considerable delays due to road congestion. All of these additional factors serve to reduce the labor market

opportunities of the Moscow Oblast residents and make wage inequality even deeper.

Figure 3 presents wage-distance gradients for the Moscow agglomeration under different scenarios using a hypothetical “European” gradient to show what could be the case if changes were made to reduce barriers to transportation bringing the Moscow agglomeration in line with European standards. The graphs end at a distance that corresponds to a typical 90-minute commuting time under various scenarios ranging from the status quo to the best case, where Moscow Oblast replicates European standards. The red curve represents the upper bound estimate of the possible effect of investments to improve the transportation infrastructure to bring Moscow regional transportation network in line with the quality of a typical European agglomeration. The residents of Moscow region could gain up to 24% more in terms of current average wages if this were to take place. The purple curve, however, presents a more modest scenario assuming that the structure of Moscow regional transportation network remains the same, but the travel time were to be cut by 20%. Even in this case, the gains to Moscow Oblast residents are about 3% of wages which is very significant economically for an area populated by 5.5 million people.

Figure 3. Wage Distance Gradient



Note: BLUE – Estimated actual wage gradient for Moscow Oblast; Red – European wage gradient applied to Moscow Oblast data, simulation; Purple – a Moscow Oblast gradient given 20% cut in the travel time, simulation.

Further, it is important to note that to take advantage of labor market integration residents do not necessarily all have to commute to work to the center. The mere possibility of commuting creates arbitrage opportunities in the labor market and puts upward pressure on wages. As a result, it is important for economic policy to constantly improve transportation infrastructure even if the private benefits of increased usage are modest.

In the end, our analysis did not touch on the other benefits from transportation infrastructure. Apart from labor market integration, improvements in transportation infrastructure promote real estate development (Baum-Snow (2007), Garcia-López(2012)) and expand the market for goods and services. We leave these questions for further research.

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