Contents lists available at ScienceDirect

Journal of Development Economics

journal homepage: www.elsevier.com/locate/devec

The effect of commuting costs and transport subsidies on informality rates

Ana I. Moreno-Monroy [a,*], Héctor M. Posada [b]

[a] Organisation for Economic Co-operation and Development, OECD, Paris, France
[b] Economics Department, University of Antioquia, Colombia

ABSTRACT

In this article we study the relationship between accessibility and informality using a spatial search model. In the model, formal workers commute every day to the Central Business District (CBD) to work in formal firms. Informal workers choose their commuting frequency knowing that they either can work at home and save on commuting costs, or have a higher remuneration at the CBD but incur commuting costs. We demonstrate that the difference in urban costs between formal and informal workers is a mechanism through which improvements in accessibility lead to lower informality rates. Next, we use the model to compare the impact and efficiency of four policy options: a hiring-costs subsidy and a transport subsidy for either all workers, formal workers, or informal workers. We find that a transport subsidy targeted at informal workers is undesirable. We also find that a hiring-costs subsidy is superior to transport subsidies in reducing informality.

1. Introduction

In highly segregated cities in emerging economies, a large segment of the lower-income population has to bear long and costly commutes to formal jobs. As a result, workers with limited access to job centers may opt for carrying out productive informal activities within or near home. According to recent estimates, informal employment accounts for more than half of non-agricultural employment in most developing regions of the world (Vanek et al., 2012). Informality carries negative consequences in terms of productivity (Busso et al., 2012), inequality growth and trade (Bacchetta et al., 2009), and foregone tax revenues and contributions to the social security system. The existent literature has focused mostly on institutional explanations for the existence and persistence of informality, and on the effect of social protection subsidies and cash transfers in the transition to formal employment (Garganta and Gasparini, 2015; Ferreira and Robalino, 2010; Perry et al., 2007). Little is known, however, about the effect of commuting costs on informality, and whether transport policies can have an impact on informality rates.

In order to investigate how accessibility affects informality, we build a spatial search model. In the model, there are three possible labor market statuses: formally employed, informally employed and unemployed; a formal sector where the hiring process is subject to search frictions which result in unemployment; and an informal sector where all workers are self-employed and have lower productivity than formal workers. On a linear city, formal and unemployed workers commute every day

to a unique Central Business District (CBD), where all formal activity is centralized. Instead of imposing commuting differences, we allow informal workers to endogenously choose their commuting frequency knowing that commuting to the CBD implies a larger remuneration yet also positive commuting costs, while staying at home implies a lower remuneration but no commuting costs. A segmented city emerges in equilibrium, with formal workers residing at the CBD, and informal workers residing in the periphery. In order to attract workers, formal firms have to compensate workers for the lower commuting costs and social protection transfers they would get if they were informally employed. We demonstrate that a reduction in commuting costs has a positive impact on formal job creation, because formal firms can offer a smaller compensation in order to attract workers.

We use the model to compare the impact and efficiency of four policy options to reduce informality: a subsidy on formal firms hiring-costs, a transport subsidy for either all workers, formal workers only, or informal workers only. An example of the latter is a recent transport subsidy program implemented in Bogotá. The subsidy, covering 50 to 60 percent of the integrated public transport system fare (around USD 0.35 per trip), targets about 900 thousand low-income beneficiaries of the subsidized social protection program. A significant percentage of the potential beneficiaries are informal workers (Rodríguez et al., 2016). A recent evaluation of the impact of the subsidy found that the subsidy has the largest effect on the hourly income of informal workers, possibly due to increases in time management ease. Notably, this effect is not verified for formal workers. The study also does not find evidence of

significant effects of the subsidy on labor participation level or variables associated with employment status (Rodríguez et al., 2016).

Our simulation results shed light on possible drivers of the effect of the subsidy on employment status. In the model, formal firms pay a *spatial compensation* in order to attract workers, equal to the difference in urban costs (commuting cost plus land rent) savings and the net benefit of commuting, both obtained by a worker in the informal sector. Urban cost savings are always positive because formal workers are willing to pay higher rents to be close to the CBD and minimize daily commuting costs, while informal workers optimally choose a lower commuting frequency given that they can work near or at home. The net benefit of commuting is the difference between the wage obtained at the CBD and the home based remuneration times the (endogenous) informal commuting frequency. Remarkably, the net benefit of commuting increases with the commuting frequency given that the wage at CBD is higher than the home-based remuneration. Under this structure, we show that a subsidy targeted exclusively at informal workers has no effect on the informality rate and slightly decreases welfare. The intuition behind this result is as follows. With the subsidy, informal commuting frequency increases because informal workers can access the CBD at a lower cost, increasing the net benefit they derive from commuting to the CBD. Consequently, formal firms have to pay a larger spatial compensation in order to attract workers, leading to a decrease in formal job creation and an increase in the informality rate. The increase in both the informality rate and the informal commuting frequency, however, have an additional, offsetting effect. Because the number of formal workers has effectively diminished, there is less competition for land at the CBD, and because the informal commuting frequency increases, there is more competition for land in city periphery. As a result, urban costs savings are lower, pushing down the formal wage. With a lower formal wage, there is more formal employment creation and a lower informality rate. In the end, the informality rate is the same as it was initially, implying that the subsidy had no impact. On the other hand, we show that a transport subsidy for all workers does bring a reduction in the informality rate, and that a hiring-costs subsidy implemented through, for instance, centralized employment agencies, is superior to transport subsidies in reducing informality. These results hold when we relax the assumption that unemployed workers commute daily to the CBD.

Our findings can be contrasted with recent experimental evidence on the effect of transport subsidies on labor market outcomes in urban areas in developing countries. Franklin (2016) focuses on the effect of work commuting costs on the labor outcomes of young workers in Addis Ababa. Using a randomized controlled trial, he finds that a transport subsidy leads to increased search efficiency and improves employment outcomes. For the same city, Abebe et al. (2016) find that a transport subsidy increases job search intensity and efficacy, especially for those with an initial low predicted probability of finding employment. These improvements do not translate into overall higher formal employment rates, however. These findings, as well as ours, suggest that the impact of pro-poor commuting subsidies may be more directly related to poverty alleviation than to city-wide labor market outcomes. Our results suggest that policies aiming for an overall reduction in commuting costs, for instance those focused on improving public transport provision, have a more direct impact on formal employment rates. These policies could complement policies tackling search and hiring costs, which have found support in recent experimental literature (Hardy and McCasland, 2015; Abebe et al., 2016).

There is some evidence concerning the effects of improvements in accessibility on labor market outcomes in the context of the Spatial Mismatch Hypothesis (SMH) literature. According to the SMH, the adverse labor outcomes of minorities in developed countries are the result of the spatial disconnection between low-skilled jobs and the places where minorities reside (Kain, 1968; Ihlanfeldt and Sjoquist, 1998; Gobillon et al., 2007). Previous works have found a significant and positive effect of improved accessibility on job search intensity and labor market outcomes (Kawabata, 2003; Holzer et al., 2003; Phillips, 2014). An impor-

tant difference of our study with respect to the SMH literature is that we take into consideration that a significant proportion of employment in cities in emerging economies is located in densely populated low-income areas. In terms of urban structure, this means that we consider cities with centralized formal employment and decentralized informal employment, instead of cities experiencing suburbanization of formal low-skilled jobs, as in the standard SMH literature. The assumptions of our model are based on empirical evidence suggesting that in large cities in developing countries informal workers live far away from central areas but commute shorter distances (Motte et al., 2016; Suárez et al., 2016). Our model suggests that the reduction in the difference in urban costs between formal and informal workers is a mechanism through which improvements in accessibility can lead to lower informality rates.

Our work is connected to a large body of literature analyzing the reasons behind the existence and persistence of an urban informal sector (Camacho et al., 2013; Ferreira and Robalino, 2010; Jütting et al., 2008). Recent contributions highlight the need to consider the heterogeneity of informal activities and the different motivations for choosing informality from the worker perspective (Günther and Launov, 2012; Maloney, 2004), but they do not consider the location decisions of informal workers. In this paper, we bridge this gap by modeling explicitly the choices of workers that face the possibility of working in the informal sector at home or at the CBD. In this way, we translate the heterogeneity of the urban informal sector into its spatial expression. Our results show that location decisions have non-trivial effects on informality rates, through their effect of commuting and housing costs, so that they should be considered in policy designs aiming to reduce urban informality.

From a theoretical point of view, our model integrates two existing extensions of the standard search and matching framework: the inclusion of an informal sector and the integration of an urban land-use market. Regarding the first extension, unlike existing works (Zenou, 2011, 2008), we do not consider the informal sector to be a residual sector or a buffer where rural-urban migrants queue for formal jobs. In fact, we focus on the case with no rural-urban migration, as the model is calibrated to the case of consolidated urban areas in Latin America. In our model, the informal sector is a micro-entrepreneurial unregulated sector that offers intrinsic benefits, such as health-care subsidies, so that being informal is, to some extent, a matter of choice (Albrecht et al., 2009; Maloney, 2004). Regarding the second extension, previous works incorporate a spatial compensation paid by formal firms resulting from assumed commuting differences between unemployed and employed workers (Wasmer and Zenou, 2002; Zenou and Smith, 1995). In our framework, we instead consider commuting differences between formal and informal workers. Our contribution to existing theoretical models lies in making the commuting choices of informal workers endogenous.

The article is structured as follows. In Section 2 we provide some empirical evidence of commuting differences between formal and informal workers to support some of the assumptions of our model. In Section 3 we define the environment of the model by describing the formal and informal sectors, and the behaviour of workers. In Section 4 we describe the market equilibrium in the labor and land markets, and show that our results are robust to different specifications of the commuting behaviour of unemployed workers. We then develop some comparative statics exercises. In Section 5 we compare the impact of the proposed policies. Finally, in section 6 we discuss our results and conclude.

2. Commuting behaviour by type of worker

Commuting behaviour differences between formal and informal workers have not been subject to formal empirical testing in the literature, since data on both worker status and commuting behaviour is usually not available. In particular, studies have analyzed the correlation between worker status and commuting behaviour, but have not