Structural change and commuting flows: evidence from Italy

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Extended abstract

An important issue among economists is to understand commuting decisions of workers and their choices regarding where to live and where to work. As a matter of fact, even though workers rank commuting among their least enjoyable and most stressful activities (Krueger et al., 2009), they make significant daily investments, as commuting costs remain substantial both in terms of the opportunity cost of time and overall household spending (Small et al., 2007; Van Ommeren et al., 1997), particularly so before the spread of the Covid-19 pandemic.

According to well established and widely-debated economic theories, the relationship between residence, workplace location, and commuting depends explicitly on the spatial distribution of economic activity, which - in its turn - is affected by two major drivers: i) the decline in transport costs (Redding and Turner, 2015) and ii) structural change (Brülhart et al., 2020; Michaels et al., 2012). As a result, the dispersion of manufacturing from central cities and the concentration of services in high-density areas increased the openness of labour markets across and within regions, leading to a surging role of connectivity in the location decision of people (Henderson et al., 2018; Hummels, 2007). Thus, workers started accessing high-productivity employment areas without having to live there, so as to balance the accessibility to jobs and residential amenities by living in a place that fits their skills and matches their needs (Chen and Rosenthal, 2008; Teulings et al., 2018).

Although the aforementioned dynamics are recognisable features in many late-20$^{\text{th}}$ century mature economies, the mechanisms behind are still debated. Hence, the main contribution if this working paper is to empirically quantify the impact of the tertiarization process of the economy on the increasing commuting patterns in Italy over the period of 1991-2011. During this time span, Italy experienced a substantial deindustrialization in connection with a shift of economic activity toward service sectors, as shown in Figure 1.

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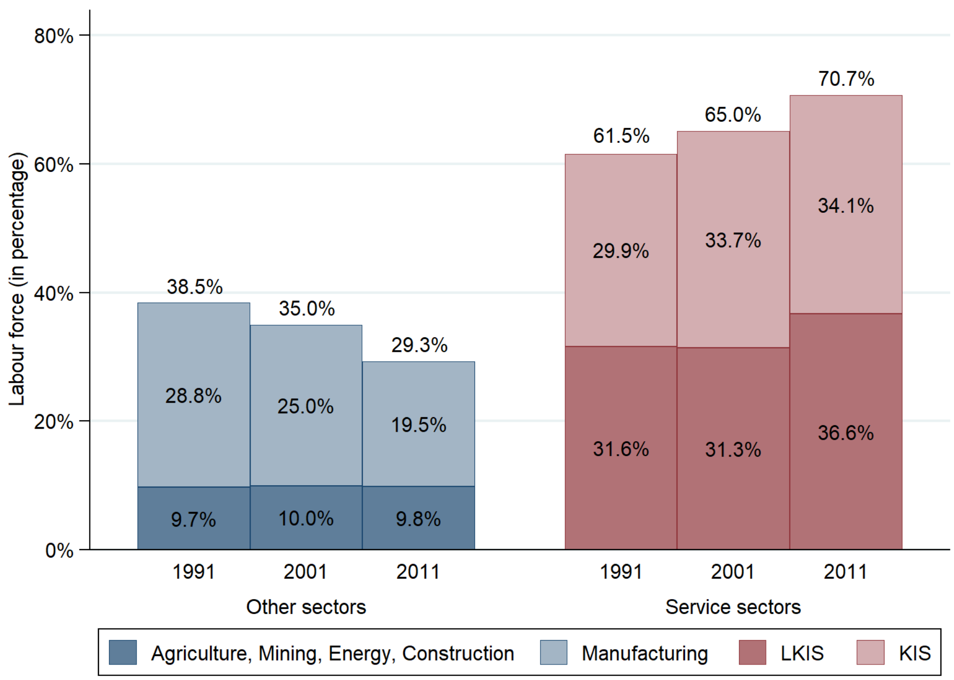
Figure 1: Sectoral composition of the Italian labour force, 1991-2011



Notes: LKIS stands for less knowledge-intensive services. KIS stands for knowledge-intensive services. *Source*: Authors' own elaboration.

Concurrently, the openness of municipalities to commuting increased over time, as shown by the kernel densities plotted in Figure 2 representing the share of residents who work in a municipality other than the one where they live. At the beginning of our sample period, we find a large concentration of municipalities with about half of residents commuting beyond the municipality boundaries to reach the workplace. Ten and twenty years later, we find a greater concentration of municipalities with shares of outgoing workers well above 60%, as shown by the clear shift in density towards higher values. More precisely - and by referring to the median municipality - the percentage of outgoing workers raised from 54 in 1991 to 65 in 2011.

As a result, an increasing number of neighbouring municipalities started to be included in the commuting zone of large urban centers, which led to significant changes in the spatial extent of local labour markets (LLMs) over time[1]. Indeed, their number decreased from 784 in 1991 to 686 in 2001, up to 611 in 2011. By way of example, Figure 3 displays the municipalities belonging to the LLMs of Milan and Rome in each sample year. In both scenarios, we find that the LLMs boundaries widened considerably over our period of analysis.

[1]The Italian LLMs are the so-called "commuting zones" (i.e., aggregations of multiple neighbouring municipalities) defined as self-contained labour markets in which approximately 75% of residents also work within the market borders.

Figure 2: Distribution across municipalities of the shares of outgoing workers

Notes: dashed and solid lines show kernel densities of the corresponding distribution for each sample year. Residents represents the sum between the own and the outgoing workers. *Source*: Authors' own elaboration.

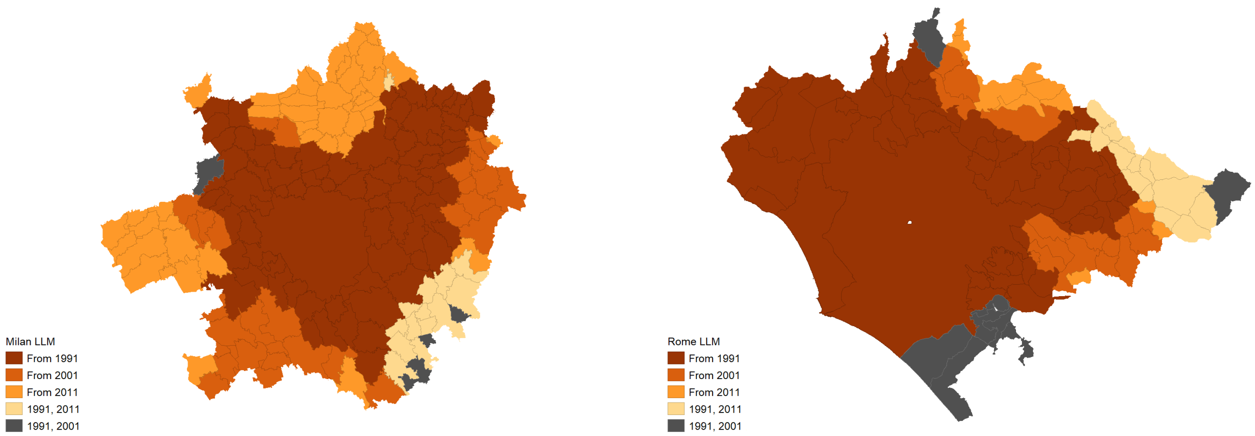
To test for the response of commuting to local labor demand shocks induced by structural change, we employ a newly-constructed dataset that combine Italian municipality-to-municipality commuting patterns over the 1991, 2001, and 2011 census years with the sectoral composition of the labour force within 70 different agricultural, manufacturing, and service industries at the municipality level. To address endogeneity concerns related with the long-standing debate whether jobs follow workers or workers follow jobs, we construct sector-related exogenous local labour demand shocks (in logs) by adopting a "shift-share" approach *a la* Bartik (1991) by using national changes in industry employment levels as the "shift" component and initial municipalities' industry employment shares as the "share" component, as proposed by Goldsmith-Pinkham et al. (2020). Formally:

$$bartik_{it}^{g} = \sum_{s \in g} \omega_{is,1991} \cdot L_{st} \tag{1}$$

$$bartik_{jt}^{g} = \sum_{s \in g} \omega_{js,1991} \cdot L_{st} \tag{2}$$

Figure 3: Changing boundaries of the LLMs of Milan and Rome

(a) Milan (b) Rome



Source: Authors' own elaboration.

where i and j denote the 8 051 municipalities of origin and destination, t indexes the 3 sample years of analysis, while s denotes the 70 industries previously mentioned now grouped into three main industry groups (g) that aggregate the labour force of each municipality into the following categories: i) that employed in agriculture, mining, energy, construction, and manufacturing sectors (i.e., "other" sectors), ii) that employed in less knowledge-intensive services (LKIS) sectors, and iii) that employed in knowledge-intensive services (KIS) sectors. Then, we estimate the following log-log model:

$$commuters_{ijt} = \beta_0 + \sum_{g=1}^{G} \beta_{1g} bartik_{it}^{g} + \sum_{g=1}^{G} \beta_{2g} bartik_{jt}^{g} + \beta_k X_{ijt} + \alpha_i + \alpha_j + \delta_t + \epsilon_{ijt} \quad (3)$$

where $commuters_{ijt}$ is the log of the total number of workers commuting between municipalities i-j observed in year t, while $bartik_{it}^{g}$ and $bartik_{jt}^{g}$ are the local labor demand shocks computed in Equations 1 and 2. Then, X_{ijt} is a vector of control variables that takes into account important demographic and route-specific characteristics, such as the log of the population of both municipalities of origin and destination, the log of their distance in kilometres, and a dummy variable taking the value of 1 if the direct route becomes connected by an high-speed rail (HSR) line. Finally, α_i and α_j are full sets of municipality-level fixed effects intended to absorb any difference in commuting flows due to time-invariant factors, δ_t are year dummies accounting for the nationwide common evolution of commuting patterns, while ϵ_{ijt} are heteroskedasticity- and autocorrelation-consistent standard errors clustered at the origin-destination level.

By briefly focusing on the coefficients associated with the local labour demand shocks of our most complete specification (i.e., column 4 of Table 1), our preliminary findings seem to go in the expected direction. More precisely, both LKIS and KIS shocks at destination act as strong pull factors as they exert a positive and statistically significant effect on commuting flows (with the latter being much higher in intensity), while a combined shock at destination in other types of industries does not attract commuters. Conversely, a LKIS shock at origin operates as a restraining factor, while a (plausibly) negative manufacturing shock at origin acts as a push factor because - as a matter of fact - the percentage of the labour force employed in that sector experienced a significant contraction during our period of analysis, as shown in Figure 1.

Table 1: Structural change and commuting flows

	$commuters_{ijt}$			
	(1)	(2)	(3)	(4)
Panel A: variables at origin				
$bartik\_other_{it}$	-0.039***	-0.016***	-0.137***	-0.060***
	(0.002)	(0.002)	(0.005)	(0.005)
$bartik\_LKIS_{it}$	0.049***	0.019***	0.013*	-0.079***
	(0.003)	(0.003)	(0.007)	(0.007)
$bartik\_KIS_{it}$	0.057***	0.063***	0.092***	-0.011
	(0.002)	(0.002)	(0.007)	(0.007)
$population_{it}$				0.462***
				(0.005)
Panel B: variables at destination				
$bartik\_other_{jt}$	0.048***	0.071***	-0.067***	0.005
	(0.002)	(0.002)	(0.005)	(0.005)
$bartik\_LKIS_{jt}$	0.041***	0.011***	0.103***	0.020***
	(0.003)	(0.003)	(0.007)	(0.007)
$bartik\_KIS_{jt}$	0.028***	0.035***	0.380***	0.292***
	(0.002)	(0.002)	(0.008)	(0.008)
$population_{jt}$				0.300***
				(0.005)
Panel C: variables at origin-destination				
$distance_{ij}$				-1.201***
				(0.002)
HSR_{ijt}				0.155***
				(0.033)
constant	-0.164***	-0.164***	-1.254***	-2.269***
	(0.007)	(0.007)	(0.087)	(0.010)
Year FE		✓	✓	✓
i and j FE			✓	✓
Observations	2 195 127	2 195 127	2 195 127	2 185 968
R^2	0.04	0.05	0.09	0.58

Notes: All of the specifications present OLS estimates. Standard errors clustered at the origin-destination level appear in parentheses. Significance values: ***p<0.01, **p<0.05, *p<0.10.

The next steps of the analysis will be mainly devoted both to strengthening the descriptive evidence relating with the structural transformation of the Italian economy toward service industries, and to carrying out a comprehensive heterogeneity analysis aimed at better understanding the mechanisms behind the increase in commuting patterns across space and time.

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