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Economic inequalities and discontent in European cities

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This paper reconsiders a stylized fact of the literature on the relationship between urbanization and subjective well-being, the urban well-being paradox, i.e., the densest settings typically show the highest level of individual discontent. By drawing on an original sample based on more 50,000 individuals in 83 cities of the 27 member states of the European Union plus the UK, the paper highlights three main results. First, bigger cities are characterized by intrinsically higher inequalities than smaller ones, suggesting a scaling of disparities: interpersonal inequalities represent an often-overlooked cause of urbanization diseconomies. Second, compositional effects on discontent are particularly detrimental in cities, suggesting a scaling of discontent. Moreover, compositional and contextual characteristics mix in cities, amplifying the negative effect of inequalities especially for the most fragile social groups. Third, discontent with life and discontent with specific domains of city life do not always go in tandem. Nevertheless, the advantages of largest cities seem especially a benefit for élite individuals.

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INTRODUCTION

A recurrent finding documented in the literature on the relationship between urbanization and subjective well-being is the higher level of discontent experienced by individuals living in the densest settings with respect to smaller settings, a stylized fact labeled by some scholars as the urban well-being paradox[1,2]. This result is somewhat puzzling from an economic perspective. In fact, cities are expected to positively influence individuals' prosperity in several ways, for instance, by providing job opportunities, amenities, and possibilities for social interaction, as repeatedly highlighted in the literature on urban economics[3–7].

The spatial mismatch between the objective and subjective dimensions of well-being, therefore, has opened a lively and rich debate on the possible causes and interpretations of this unexpected, if not illogical, result. Starting from the competing theory[8], suggesting that, in comparison with other types of settings, cities allow for higher wages as to compensate for their intrinsic higher disutility level in terms of congestion, pollution, crime, several authors have concluded that the negative externalities of large cities (cost of living, land rent, commuting etc.) more than offset the positive ones, like wider job opportunities, consumption amenities, etc.[9–11].

This conclusion, however, conflicts with the empirical evidence confirming the steady if not increasing inflows of individuals in the largest cities, thus casting doubts on this line of interpretation

Accordingly, alternative hypotheses have been considered.

First, the urban well-being paradox can be the outcome of excess of optimism (if not irrationality) of urban migrants expecting to move to places where their satisfaction is higher than in their original place but ending into false/misplaced hopes[12,13]. Yet, rational individuals might be purposely willing to accept a reduced well-being in order to access the extra benefits of the city.

Second, the urban well-being paradox can be the outcome of compositional effects within cities. A recent but rapidly expanding stream of studies in this field is in fact showing the important role of people characteristics, and their interplay with place characteristics, in the explanation of the urban well-being paradox[1,2,12,14,15]. In fact, the high cost of living and the increasing segregation characterizing urban communities[16,17] suggest that taking advantage of the cities' positive externalities is a privilege of a relatively small portion of the urban population. The élite minority of high-education, high-income individuals are more likely to benefit of the urban environment compared with the majority of less affluent individuals.

Third, the difference in the perception of cities as the best place to live is expected to broaden in times of increasing inequality and polarization of wealth. A frequently overlooked cost of large cities, in fact, is the high level of interpersonal income disparities and its scaling with city size, making the largest cities the most unequal settings[18–20]. In fact, on the one hand cities attract the best talents and the most skilled and educated individuals, taking on élite jobs and earning superstar compensations[21]. On the other hand, the majority of urban jobs are for those at the bottom of the skill and education distribution, frequently penalized by unsecure and precarious jobs, i.e., gig jobs[22]. Moreover, interpersonal and spatial inequalities have been documented as one of the primary sources of individual and political discontent[23–25].

These three potential explanations have been rarely considered jointly and very few works tried to explain and to examine whether the urban well-being paradox vary across different groups of individuals. The present paper aims to reconsider each of these candidate explanations and, possibly more interestingly, to test the role of their interplay as a source of the urban well-being paradox, specifically by studying whether inequalities and discontent (with life in general and with different domains of city life in particular) are subject to scaling effects and whether individual disadvantage conditions can amplify the perception of these negative scaling effects. In doing so, the paper extends previous studies by introducing some novelties.

First, the paper enables understanding the relative importance of individual vs contextual characteristics for discontent, and whether individuals experiencing an economic disadvantage condition (i.e., low income), suffer most from living in the largest cities and whether this condition is amplified by the level of interpersonal inequalities. This aspect can be fully examined as the

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analysis focuses on the discontent expressed by about 50,000 individuals living a sample of 83 European cities in 2019[26].

Second, in terms of measurement, individuals' discontent is measured at the city level, rather than at the regional one, as in most existing studies. This choice allows for a more precise identification of the relationship between individual subjective well-being and urbanization; in fact, this approach enables an objective measurement of city size (i.e., in terms of the resident population) and, thus, to establish a clear city ranking and to assess more precisely any potential scaling of discontent with city size.

Third, city-level data allows also to emphasize what specific domains of a city life matter most for individual discontent and whether heterogeneity exists in this relationship depending on city size, social groups and existing level of inequalities in each city.

The rest of the paper is organized as follows. The next section comments on the empirical results. Then, the discussion and some policy reflections are presented. The last section offers a short description of the data and the econometric approach applied in the empirical analysis.

RESULTS

Scaling of inequalities

Inequalities and urbanization are strongly but perversely related. In fact, by dividing the 83 cities in our sample in four mutually exclusive groups depending on their population size (see "Methods" and Supplementary Table 2 for details), it soon emerges that the most populous cities, i.e., high-rank cities, suffer from significantly higher levels of inequalities than low-rank ones as captured by the Gini index (Table 1), a fact consistent with much of the literature. The gap in inequalities between top- and low-rank cities partially reflects the gap in income per capita between the two groups of cities, with the income per capita in the biggest cities being about 50% greater than in the smallest cities. Importantly, this gap in per capita income and its distribution does not originate from a different capacity to generate growth across the different groups of cities (i.e., the different groups of cities show similar GDP growth rates). This latter result is consistent with previous finding in the literature[27–29] but, at the same time, it raises warnings about the alternative modes through which the economic advantages created by cities are spread among the urban population. Put shortly, high individual wealth in the largest cities comes together with high disparities but without boosting aggregate economic growth, suggesting the existence of an important trade-off between growth (i.e., efficiency) and equity (i.e., inclusiveness).

This conclusion raises some reflections on how living in cities of different sizes, and thus characterized by different mixes of urbanization economies and diseconomies, affects individual discontent in general and with respect to specific domains of urban life, i.e., the scaling of individual discontent.

Scaling of discontent

Table 2 reports the first set of results on the estimation of individual discontent depending on a series of individual and city-level characteristics. It is worth noting that the choice of the contextual variables included in the empirical analysis is purposely parsimonious for two main reasons. First, the variables considered match those used in most literature. This choice boosts the comparability of our results with existing studies[23,30]. Second, data availability at NUTS3 level imposed considerable restrictions in the indicators to be embedded in the empirical exercise.

While confirming most stylized facts in the literature about the role of individual characteristics, including age, occupational status, education, estimates also highlights interesting messages.

Specifically, as highlighted in the literature, living in top-rank cities significantly dampens individual well-being (Table 2, column 1) suggesting a scaling of discontent with city size. This effect also persists after controlling for the average income in the city and its evolution over time. However, high average income in the city does mitigate discontent whereas high economic prospects do not. This result is somewhat consistent with Table 1, but it departs from most of previous analyses for European regions stressing the importance of the evolution and trend in regional economic performance and income per capita rather than their absolute values[25,26,30]. Importantly, these results vanish when accounting for the level of intra-city income disparities. In this case, both the perverse effect of urbanization and the mitigating effect of economic growth become not significant, while the effect of the Gini index is strongly significant and positive, i.e., interpersonal inequalities matter for discontent more than any specific city rank and aggregate economic growth. Quite interestingly, all individual-level variables preserve their sign and significance after controlling for GDP per capita growth but two of them lose it when introducing the inequality variable, namely those accounting for the migration status (i.e., the dummy variable flagging individuals who lived previously in another city) and for the household composition (i.e., the dummy variable flagging single individuals without children). While results from Table 2, columns 1 and 2 could apparently support an interpretation of the urban well-being paradox as the outcome of excess of optimism (if not irrationality) of urban migrants, especially those without family ties, expecting to move to places where their satisfaction might improve and be greater than in their original place but ending into false/misplaced hopes[12,13], estimates from column 3 clarifies that this interpretation can be somewhat superficial. In fact, what urban residents value in expressing their dissatisfaction is the fairness of opportunities and of the distribution of the economic advantages generated in cities.

Table 1. ANOVA on indicators of economic performance and inequality across cities of different rank.

Variable	1st rank	2nd rank	3rd rank	4th rank	F-test
Per capita GDP (PPPs)	44.894	36.471	32.124	29.697	2.30*
	(24.502)	(19.874)	(16.805)	(15.400)	
Per capita GDP (PPPs) average annual compound growth rate, 2011–2018	1.763	1.510	1.926	1.866	0.31
	(1.322)	(1.070)	(1.346)	(1.669)	
Gini index	0.330	0.304	0.290	0.284	5.34***
	(0.034)	(0.036)	(0.034)	(0.046)	
Number of observations	21	17	17	19	

The table reports group means. Standard deviations in parentheses. ***$P < 0.01$, *$P < 0.1$. For the list of cities in each of the four groups, see Supplementary Table A1 in Appendix).

Table 2. Dissatisfaction with life as a function of individual and city characteristics.

Dependent variable: individual discontent	[a]	[b]	[c]
Individual characteristics			
Age	0.011***	0.011***	0.010***
	(0.001)	(0.001)	(0.001)
Age squared	−0.000***	−0.000***	−0.000***
	(0.000)	(0.000)	(0.000)
Female	−0.009	−0.008	−0.008
	(0.007)	(0.007)	(0.007)
Household composition			
Single without children	0.026*	0.025*	0.024
	(0.015)	(0.015)	(0.015)
Single with children	0.021	0.019	0.018
	(0.018)	(0.018)	(0.019)
Couple without children	−0.012	−0.012	−0.018
	(0.014)	(0.014)	(0.014)
Couple with children	−0.012	−0.012	−0.016
	(0.013)	(0.013)	(0.014)
Occupation			
Retired	−0.067***	−0.067***	−0.062***
	(0.021)	(0.021)	(0.022)
Unemployed	0.124***	0.122***	0.133***
	(0.021)	(0.021)	(0.021)
House person	0.014	0.016	0.030
	(0.025)	(0.025)	(0.026)
Manager/professional	−0.086***	−0.087***	−0.072***
	(0.018)	(0.019)	(0.019)
Technician	−0.027	−0.028	−0.015
	(0.020)	(0.020)	(0.020)
Clerk	−0.018	−0.016	−0.006
	(0.017)	(0.017)	(0.018)
Famer/craftsman	0.021	0.024	0.034
	(0.021)	(0.021)	(0.022)
Manual worker	0.068***	0.070***	0.077***
	(0.021)	(0.021)	(0.022)
Difficulty in paying the bills	0.256***	0.260***	0.255***
	(0.012)	(0.012)	(0.012)
Low education	0.079***	0.079***	0.078***
	(0.011)	(0.011)	(0.011)
Previously living in another city	0.011*	0.011*	0.009
	(0.007)	(0.007)	(0.007)
City characteristics			
Per capita GDP in PPP (2018)		−0.031*	−0.031*
		(0.016)	(0.016)
Average yearly GDP growth rate (2011–18)		0.006	0.003
		(0.018)	(0.018)
Resident in the EU	0.279***	0.241**	0.248**
	(0.099)	(0.106)	(0.102)
Gini index			0.041**
			(0.017)
3rd rank city	0.005	0.013	0.003
	(0.031)	(0.031)	(0.033)
2nd rank city	0.039	0.049	0.022
	(0.031)	(0.032)	(0.035)
1st rank city	0.057**	0.090***	0.053
	(0.027)	(0.032)	(0.037)
Constant	1.237***	1.264***	1.285***
	(0.098)	(0.106)	(0.103)
Random effects			
Level 1 (individual) variance	0.516	0.518	0.518
	(0.003)	(0.003)	(0.003)
Level 2 (city) variance	0.005	0.005	0.005
	(0.001)	(0.001)	(0.005)
Level 3 (country) variance	0.031	0.027	0.024
	(0.009)	(0.008)	(0.008)
ICC—level 2 (city)	0.009	0.009	0.009
ICC—level 3 (country)	0.056	0.048	0.044
Observations	49,544	48,887	46,257

ICC Intraclass Correlation Coefficient.
Reference categories: 4th rank cities (urban ranking), student (occupation), other household (household composition). Standard errors in parentheses.
***$P < 0.01$, **$P < 0.05$, *$P < 0.1$.

Inequalities and discontent for different domains of life

The main conclusion from the results displayed in Tables 1 and 2 is that, after controlling for individual socio-demographic characteristics, interpersonal inequalities represent the chief explanation of individual discontent, beyond the pure effect of city size and economic wealth. Importantly, specific domains of city life, accounting for different aspects of urbanization (dis)economies (e.g., public service, job opportunities, etc.) can be particularly valued in terms of discontent by individuals suffering from disadvantage conditions; evidence in this respect could be particularly informative to identify priority area of policy intervention[31].

Table 3 helps shedding light on the interplay among these dimensions, even if results show a quite heterogeneous picture, depending on the individual and city-level variables and domains of city life considered. In detail, living in top-rank cities augments discontent with most of city life domains, with the exclusion of job opportunities, public transport, and cultural facilities, confirming the role of big cities as a consumption locus[32–34], as a matching mechanism for labor demand and supply, and as a transport node[3]. Importantly, results suggest that the negative effects of interpersonal inequalities cumulate with the one of living in top-rank cities when considering discontent with respect to the city of residence in general, the level of social capital in the city, the quality of greenspaces and the environment and, finally, public services in terms of health and sport facilities. Moreover, the effects of economic growth gain some significance in the assessment of specific domains, probably reflecting the expectation that specific interventions enabled by better economic conditions could improve on the current situation.

Moving to individual-level characteristics, results offer an even more mixed picture. Importantly, only two characteristics preserve the same sign and significance as in Table 2, i.e., those accounting for low-educated individuals and low-income individuals, as captured by the two dummy variables flagging individuals with low education and/or experiencing regularly difficulties in paying bills. People exhibiting such characteristics show high discontent along all dimensions. The other individual characteristics, instead, show more irregular patterns.

Table 3. Dissatisfaction with different aspects of urban life as a function of individual and city characteristics.

Dependent variable-dissatisfaction with:	Life in the city	Job opportunities	Safety in my neighborhood	Trust in people	Public transport	Healthcare services	Cultural facilities	Schools and educational facilities	Air quality
Retired	−0.017	−0.183***	0.010	−0.011	−0.055**	−0.013	−0.012	−0.021	−0.077***
	(0.020)	(0.028)	(0.025)	(0.024)	(0.025)	(0.026)	(0.024)	(0.026)	(0.025)
Unemployed	0.099***	−0.010	0.091***	0.088***	0.059**	0.075***	0.038	0.087***	0.028
	(0.020)	(0.027)	(0.024)	(0.023)	(0.024)	(0.025)	(0.023)	(0.025)	(0.024)
House person	0.057**	−0.130***	0.031	0.046	0.020	0.014	0.055**	0.060**	−0.026
	(0.024)	(0.032)	(0.029)	(0.028)	(0.029)	(0.030)	(0.028)	(0.030)	(0.029)
Manager/professional	0.006	−0.236***	−0.003	0.009	0.003	−0.001	0.000	−0.001	−0.012
	(0.018)	(0.024)	(0.021)	(0.021)	(0.022)	(0.022)	(0.021)	(0.022)	(0.022)
Technician	0.013	−0.176***	0.022	0.019	0.007	0.014	0.012	0.007	−0.007
	(0.019)	(0.026)	(0.023)	(0.022)	(0.023)	(0.024)	(0.022)	(0.024)	(0.023)
Clerk	0.042**	−0.127***	0.023	0.043**	0.035*	0.042**	0.020	0.045**	0.014
	(0.016)	(0.022)	(0.020)	(0.019)	(0.020)	(0.021)	(0.019)	(0.020)	(0.020)
Famer/craftsman	0.058***	−0.108***	0.009	0.067***	0.041*	0.056**	0.009	0.056**	0.007
	(0.020)	(0.028)	(0.025)	(0.024)	(0.025)	(0.026)	(0.024)	(0.025)	(0.025)
Manual worker	0.051**	−0.097***	0.050**	0.097***	0.079***	0.058**	0.066***	0.095***	0.042*
	(0.020)	(0.027)	(0.024)	(0.023)	(0.025)	(0.025)	(0.024)	(0.025)	(0.025)
Difficulty in paying the bills	0.128***	0.212***	0.134***	0.148***	0.080***	0.162***	0.103***	0.133***	0.074***
	(0.011)	(0.015)	(0.014)	(0.013)	(0.014)	(0.014)	(0.013)	(0.014)	(0.014)
Low education	0.070***	−0.006	0.103***	0.081***	0.047***	0.045***	0.036***	0.051***	0.038***
	(0.010)	(0.014)	(0.012)	(0.012)	(0.012)	(0.013)	(0.012)	(0.013)	(0.012)
Per capita GDP in PPP (2018)	−0.076***	−0.177***	−0.067***	−0.017	−0.048	−0.108***	−0.088***	−0.053**	−0.036
	(0.026)	(0.039)	(0.026)	(0.019)	(0.038)	(0.030)	(0.031)	(0.022)	(0.050)
Average yearly GDP growth rate (2011–18)	−0.024	−0.069*	0.007	−0.001	−0.046	0.039	−0.012	−0.021	0.007
	(0.027)	(0.039)	(0.028)	(0.022)	(0.038)	(0.033)	(0.031)	(0.022)	(0.048)
Resident in the EU	0.335***	0.294*	0.327**	0.330**	0.392***	0.494***	0.244*	0.391***	0.423**
	(0.115)	(0.152)	(0.140)	(0.135)	(0.150)	(0.178)	(0.129)	(0.083)	(0.170)
Gini index	0.050*	0.056	0.036	0.060***	0.065	0.134***	0.109***	0.095***	0.071
	(0.027)	(0.041)	(0.027)	(0.019)	(0.040)	(0.031)	(0.032)	(0.023)	(0.052)
3rd rank city	0.043	−0.193**	0.085	0.054	−0.043	0.081	−0.187***	0.130**	0.026
	(0.057)	(0.089)	(0.052)	(0.037)	(0.087)	(0.060)	(0.067)	(0.052)	(0.121)
2nd rank city	0.167***	−0.025	0.166***	0.125***	−0.039	0.033	−0.141**	0.171***	0.176
	(0.061)	(0.094)	(0.056)	(0.039)	(0.092)	(0.063)	(0.071)	(0.054)	(0.127)
1st rank city	0.219***	−0.091	0.221***	0.153***	−0.010	0.128*	−0.102	0.215***	0.254*
	(0.064)	(0.100)	(0.059)	(0.042)	(0.098)	(0.067)	(0.075)	(0.058)	(0.135)
Observations	46,536	41,153	45,810	45,403	43,465	45,582	44,011	39,776	45,781

Reference categories: 4th rank cities. Standard errors in parentheses. ***$P < 0.01$, **$P < 0.05$, *$P < 0.1$. Full estimates are in Supplementary Table 4.

Individual disadvantage and interpersonal inequalities

Importantly, the negative effects of interpersonal inequalities for individual discontent amplify for individual in a position of economic disadvantage. Table 4 in fact highlights that the interaction between the Gini index and the dummy for individuals with difficulties paying bills is positive and strongly significant while the two non-interacted terms maintain their sign and significance. These results are highly plausible; fragile and disadvantaged categories of individuals are those with the most limited opportunities to enjoy the amenities and advantages of big cities, including the variety of (élite) job opportunities.

These results confirm once more that the relationship between discontent with personal life, discontent with specific domains of city life and the size of the city of residence is rooted into a complex combination of cumulative but adverse effects of contextual factors characterizing disadvantaged places, i.e., "places that do not matter"[25], of individual disadvantage conditions, i.e., "people who do not matter", and on the unbalance in opportunities and wealth in those places where some people matter less than the others (do) (Lenzi and Perucca[23,35]. The concomitance of these conditions is predominant in the biggest cities, where the gap between affluent and poor individuals is the highest.

DISCUSSION

The results presented in Tables 1–4 convey important messages and stimulate reflections on the relationship and the interplay

Table 4. Dissatisfaction with different aspects of urban life as a function of the interplay between individual and city characteristics.

Dependent variable-dissatisfaction with:	Life in general	Life in the city	Job opportunities	Safety in my neighborhood	Trust in people from my neighborhood	Public transport	Healthcare services	Cultural facilities	Schools and educational facilities	Air quality
Retired	−0.062***	−0.017	−0.183***	0.010	−0.011	−0.055**	−0.013	−0.012	−0.021	−0.077***
	(0.022)	(0.020)	(0.028)	(0.025)	(0.024)	(0.025)	(0.026)	(0.024)	(0.026)	(0.025)
Unemployed	0.132***	0.099***	−0.010	0.091***	0.088***	0.059**	0.074***	0.038	0.087***	0.027
	(0.021)	(0.020)	(0.027)	(0.024)	(0.023)	(0.024)	(0.025)	(0.023)	(0.025)	(0.024)
House person	0.030	0.057**	−0.130***	0.031	0.046	0.019	0.014	0.054*	0.060**	−0.026
	(0.026)	(0.024)	(0.032)	(0.029)	(0.028)	(0.029)	(0.030)	(0.028)	(0.030)	(0.029)
Manager/professional	−0.072***	0.005	−0.236***	−0.003	0.009	0.003	−0.001	0.000	−0.001	−0.012
	(0.019)	(0.018)	(0.024)	(0.021)	(0.021)	(0.022)	(0.022)	(0.021)	(0.022)	(0.022)
Technician	−0.015	0.013	−0.176***	0.022	0.019	0.007	0.014	0.012	0.007	−0.007
	(0.020)	(0.019)	(0.026)	(0.023)	(0.022)	(0.023)	(0.024)	(0.022)	(0.024)	(0.023)
Clerk	−0.006	0.042**	−0.127***	0.023	0.043**	0.035*	0.042**	0.020	0.045**	0.014
	(0.018)	(0.016)	(0.022)	(0.020)	(0.019)	(0.020)	(0.021)	(0.019)	(0.020)	(0.020)
Famer/craftsman	0.034	0.058***	−0.107***	0.009	0.067***	0.041*	0.056**	0.009	0.056**	0.007
	(0.022)	(0.020)	(0.028)	(0.025)	(0.024)	(0.025)	(0.026)	(0.024)	(0.025)	(0.025)
Manual worker	0.077***	0.051**	−0.097***	0.050**	0.097***	0.079***	0.058**	0.067***	0.095***	0.042*
	(0.022)	(0.020)	(0.027)	(0.024)	(0.023)	(0.025)	(0.025)	(0.024)	(0.025)	(0.025)
Difficulty in paying the bills	0.241***	0.112***	0.185***	0.138***	0.144***	0.065***	0.139***	0.087***	0.110***	0.060***
	(0.014)	(0.013)	(0.018)	(0.016)	(0.015)	(0.016)	(0.016)	(0.015)	(0.016)	(0.016)
Low education	0.078***	0.070***	−0.006	0.103***	0.081***	0.047***	0.045***	0.036***	0.051***	0.038***
	(0.011)	(0.010)	(0.014)	(0.012)	(0.012)	(0.012)	(0.013)	(0.012)	(0.013)	(0.012)
Previously living in another city	0.009	0.011*	−0.008	−0.010	−0.004	−0.016**	−0.016**	−0.011	−0.009	0.012
	(0.007)	(0.006)	(0.009)	(0.008)	(0.007)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Per capita GDP in PPP (2018)	−0.031*	−0.075***	−0.177***	−0.067***	−0.017	−0.048	−0.107***	−0.088***	−0.052**	−0.036
	(0.016)	(0.026)	(0.039)	(0.026)	(0.019)	(0.038)	(0.030)	(0.031)	(0.022)	(0.050)
Average yearly GDP growth rate (2011–18)	0.003	−0.024	−0.069*	0.007	−0.000	−0.046	0.039	−0.012	−0.021	0.008
	(0.018)	(0.027)	(0.039)	(0.028)	(0.022)	(0.038)	(0.033)	(0.031)	(0.022)	(0.048)
Resident in the EU	0.248**	0.334***	0.292*	0.328**	0.329**	0.392***	0.493***	0.243*	0.389***	0.422**
	(0.102)	(0.115)	(0.153)	(0.140)	(0.135)	(0.150)	(0.178)	(0.130)	(0.083)	(0.170)
Gini index	0.039**	0.048*	0.052	0.037	0.059***	0.063	0.130***	0.107***	0.091***	0.068
	(0.017)	(0.027)	(0.041)	(0.027)	(0.019)	(0.040)	(0.031)	(0.032)	(0.023)	(0.052)
3rd rank city	0.004	0.044	−0.192**	0.085	0.054	−0.042	0.082	−0.187***	0.131**	0.026
	(0.033)	(0.057)	(0.090)	(0.052)	(0.037)	(0.087)	(0.060)	(0.067)	(0.052)	(0.121)
2nd rank city	0.023	0.168***	−0.024	0.166***	0.125***	−0.038	0.034	−0.140**	0.172***	0.177
	(0.035)	(0.061)	(0.095)	(0.056)	(0.039)	(0.092)	(0.063)	(0.071)	(0.054)	(0.127)

Table 4 continued

Dependent variable-dissatisfaction with:	Life in general	Life in the city	Job opportunities	Safety in my neighborhood	Trust in people from my neighborhood	Public transport	Healthcare services	Cultural facilities	Schools and educational facilities	Air quality
1st rank city	0.053	0.219***	−0.091	0.222***	0.153***	−0.010	0.128*	−0.102	0.215***	0.254*
	(0.037)	(0.064)	(0.100)	(0.059)	(0.042)	(0.098)	(0.067)	(0.075)	(0.058)	(0.135)
Difficulty in paying the bills * Gini index	0.024**	0.027**	0.045***	−0.006	0.008	0.025*	0.040***	0.027**	0.041***	0.024*
	(0.012)	(0.011)	(0.015)	(0.013)	(0.013)	(0.013)	(0.014)	(0.013)	(0.014)	(0.013)
Observations	46,257	46,536	41,153	45,810	45,403	43,465	45,582	44,011	39,776	45,781

Reference categories: 4th rank cities. Standard errors in parentheses. ***$P < 0.01$, **$P < 0.05$, *$P < 0.1$. Full estimates are in Supplementary Table 6.

between individual-level characteristics, inequalities, and different aspects of city life.

First, cities, especially large ones, are characterized by extremely high level of inequalities that are not necessarily the outcome of enhanced growth but simply reflect the disproportionate concentration of affluent individuals in cities[18–20]. The wide gaps in large cities in terms of education, occupation and income, which are key determinants of individual well-being as highlighted by the literature, as well as by our analyses, not only sizeably affect income inequalities but also well-being. While highly educated individuals employed in skilled occupations are generally less discontent, the opposite occurs for the least-educated individuals and least-skilled workers. The social composition of cities, whose heterogeneity increases with city size, and the relative size of different groups of individuals can determine the final effect on urban well-being. As long as disadvantaged individuals represent the larger fraction of urban resident population, then, the urban well-being paradox can emerge[35]. Unbalanced distribution of income and opportunities, particularly strong in the largest cities, can therefore explain the urban well-being paradox. Regardless the actual economic performance, therefore, urban well-being can be the lowest when the proportion of left-behind individuals with respect of the whole population, is the largest.

Second, regression results in Table 2 support further these conclusions. Urban ranking is indirectly a proxy for inequalities, and, in fact, its relevance vanishes once the level of inequalities is directly controlled for. All this suggests that an important but frequently overlooked negative effects of urbanization is the scaling of inequalities. This effect, however, is fully intrinsic to the nature of big cities, which by definition are composed of a large variety and mix of social groups and the co-existence of individuals characterized by different levels of education, job opportunities and earnings, and consequently, perceived well-being.

Third, this general message becomes more nuanced when unpacking and distinguishing the perceived dissatisfaction with personal life, with city life in general, and its specific aspects. In this case, in fact, the effects of urbanization diseconomies in general, as captured by city ranking, and interpersonal inequalities cumulate, with particularly adverse effect for the most disadvantaged categories of individuals. The possibility to enjoy the agglomeration advantages accrue especially to affluent individuals, thus exacerbating existing gaps and contributing to the general narrative of big cities as the privileged settings for élite people.

In conclusion, these messages raise important policy warnings about the consequences of the urban well-being paradox and in particular warn about the possible translation of discontent originated by socioeconomic disparities into political discontent, if not threat to political stability, as the literature on the rise of populist, anti-system parties show[23,25,26]. Importantly, the emergence of discontent represents a red flag and could be used to develop anticipatory policy interventions in two main directions. First, these warnings could be used to highlight the priority areas of policy intervention in urban contexts, in line with existing studies[36], and, second, to mitigate the risk that individual discontent translates into *political discontent*. Interventions on both dimensions require, however, a mix of actions ranging from the urban scale to the national one, combining possibly, not only improved accessibility to public services (e.g., transport facilities, healthcare, schooling, cultural services, green areas), but also redistributive and labor policy measures to mitigate the rise of interpersonal and occupational inequalities[26].

Future research should focus on the spatial dimension of inequality within the city, as proposed in other works[37], and its effect on discontent. While urban areas are characterized, on average, by high-income inequalities, this phenomenon is, within cities, also strongly spatially polarized. Very little is known about

the relationship between the size and intensity of spatial urban inequalities (e.g., center vs periphery) and discontent.

METHODS

Data

The data used in this analysis come from the "Perception survey on the quality of life in European cities"[31]. This survey, conducted in 2019 on behalf of the European Commission, is aimed at measuring citizens' perception with a several aspects of urban life, from transport to educational services, from environmental issues to perceived trust and safety. The sample of respondents includes 52,500 individuals from 83 European cities located in 35 countries. More precisely, the survey was conducted in 79 cities and 4 Greater cities (Paris, Lisbon, Athens, and Manchester). A city is a local administrative unit (LAU) where most of the population lives in an urban center of at least 50,000 inhabitants. A Greater city is an approximation of the urban center when this stretches beyond the administrative city boundaries.

Compared with similar surveys, the distinctive trait of this study consists in its exclusive focus on individuals living in cities. This is an interesting feature for the research on the relationship between the degree of urbanization and individuals' perception of the setting of residence. Typically, in fact, survey studies disclose poor information on the location of the respondents, generally defined only at the regional (e.g., NUTS2) level. Although previous literature achieved important results using such data, pointing to a strong association between lower individual well-being in the most urbanized regions[2,38,39], a deeper understanding and confirmation of the so-called urban well-being paradox was prevented by data availability until now. The availability of rich data at the city level, however, is not free of limitations; first, by excluding rural and peripheral areas, the data prevents the possibility to compare different types of settlement structures. Second, differently from other surveys, such as Eurobarometer or the European Social Survey, the survey data used in this paper are available only in cross-sectional form, thus limiting the generalization of the results.

Nonetheless, the survey data used in the present paper have two main advantages. First, they cover cities of very different size, allowing to test also whether the extent and intensity of urbanization advantages and disadvantages on individuals' well-being significantly vary within the sample, proportionally to the dimension of the city of residence, i.e., scaling of discontent. Second, beside the usual socio-demographic aspect, the survey is not limited to the study of individuals' well-being and satisfaction with life but it also includes questions on a number of other domains associated with urban life. These domains cover most of the advantages (e.g., job opportunities, availability of educational and cultural services and amenities) and disadvantages (e.g., poor safety, environmental issues) generated by cities on the well-being of their resident population. Therefore, the study of the determinants of dissatisfaction for different aspects of urban life allows shedding light on the mechanisms making discontent varying not only across cities of different size but also for different social groups of urban residents and different domains of city life.

Econometric approach

The methods applied in the empirical analysis are consistent with state-of-the-art literature on the subject, using multilevel econometric models to test the joint effect of individual and contextual elements for individual discontent[23,40].

Based on these considerations, the empirical model tested in the paper takes the following form:

$$\text{discontent}_{i,f} = \alpha(\text{intraregional inequalities}_c) + \beta(\text{interregional inequalities}_c) + \delta X_i + \eta Q_c + \mu_n + \xi_c + \varepsilon_i \quad (1)$$

where i stands for the individual, f for the different urban domains on which individuals expressed their dissatisfaction, while c and n stand respectively for the city and the country of residence. The dependent variables are represented by the self-reported level of discontent with life, of discontent with city life in general, and with different aspects associated with the living conditions in the city of residence. All these variables have been reverse-coded so as to rank from 1 (individuals very satisfied, i.e., very low discontent) to 4 (respondents not at all satisfied, i.e., very high discontent).

Following[23], the city-level independent variables of main interest are represented by the inter- and intra-city inequalities. The former variable, empirically measured as GDP per capita growth in the eight years before the survey, captures the competitiveness of the city compared with the other cities of the EU. It captures the economic aggregate advantages that the city generates on the resident population. On the other hand, intra-city inequalities, measured by the Gini index of after-tax disposable income, reflect the extent to which the distribution of such advantages is symmetric within the resident population. Unfortunately, data on GDP and Gini are not available at the city level. For this reason, we used data at the finest territorial disaggregation available. GDP and the Gini index are measured respectively at the NUTS3 and NUTS2 level.

The chief hypothesis tested in the analysis is whether the association between intra-city inequalities and discontent is stronger for those people at the bottom of the social scale, whose scarce financial resources limit the possibility of taking full advantage of the benefits of urbanization, an approach consistent with recent evidence[35]. Testing this hypothesis on the respondents' discontent with different aspects of urban life allows identifying those domains in which material (i.e., income) inequalities translate into a perceived social divide in terms of satisfaction. Empirically, this intuition is grasped by interacting the intra-city inequalities variable with a dummy variable, defined at the individual level, equal to one if the respondent experiences most of the times difficulties in paying her bills in the twelve months before the interview, and equal to zero otherwise.

This individual variable is included in the term X in Eq. (1), jointly with other characteristics of the respondents such as age, gender, household composition, occupation, education, previous residence in other cities. Other contextual factors (Q in Eq. (1)) include the level of GDP per capita in Parity Purchasing Power (PPP) 1 year before the survey, and the rank of the city. This is captured by a set of dummy variables, where 1st rank cities are those with more than one million inhabitants, 2nd rank those between 500k and one million, 3rd rank between 250k and 500k residents, and 4th rank that are represented by cities with less than 250k inhabitants (see Supplementary Table 1 for the list of cities, the population size used for the city ranking refers to the same territorial units considered by the survey). All city-level continuous variables have been mean standardized, including those measuring inter- and intra-city disparities. Supplementary Table 2 reports the full definition of all variables, jointly with some descriptive statistics.

From the methodological point of view, Eq. (1) is estimated through a multilevel linear model, where the standard errors are assumed to be correlated at two levels, corresponding to the country and city of residence of the respondent. This approach is consistent with a long stream of research on life satisfaction, since it allows considering the hierarchical structure of the survey data[40]. More in details, the model being estimated is a random intercept model where the intercept of the group regression lines is allowed to vary randomly across countries and regions. Therefore, in Eq. (1), μ_c and ξ_r are the effect of unobserved characteristics of, respectively, the country and city of residence, and ε_i is the residual error term. This approach allows controlling for any potential country effect on discontent, independent of individual and contextual characteristics. Descriptive evidence on

the intra-country variance of discontent is available in Supplementary Table 1 and Supplementary Fig. 1.

Several works within the literature on happiness discussed whether the dependent variable typically used in these studies should be treated as continuous or categorical[41]. In order to test whether this choice influences our findings, we proceeded as follows. In the analysis reported in the main paper, the four levels of self-reported discontent are treated as continuous, and the association with individual and urban characteristics is studied by the means of linear multilevel models. As a robustness check, we report in Supplementary Tables 3, 5, and 7 the results from an ordered logit multilevel model, i.e., adopting a categorical regression model instead of a linear one. The results obtained by applying alternative econometric frameworks are fully consistent with those presented here.

Finally, in order to mitigate possible sorting effects (i.e., unhappy people might be more likely than others to move to cities with specific characteristics in terms of size, wealth, and discontent), estimates include a dummy variable equal to one if the respondent ever lived in another city for at least 1 year, and equal to zero otherwise. Non-natives in the city where the interview took place are therefore included in this group. Sorting is possibly the chief channel introducing potential risks of endogeneity. In fact, there are weak conceptual reasons to expect reverse causality from the individual level of discontent to the characteristics of the city of residence.

DATA AVAILABILITY

Data used in the analysis are available at https://ec.europa.eu/regional_policy/information-sources/maps/quality-of-life_en.

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C.L.: conceptualization, writing—original draft, and writing—review and editing. G.P.: conceptualization, formal analysis, writing—original draft, and writing—review and editing.

COMPETING INTERESTS

The authors declare no competing interests.

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