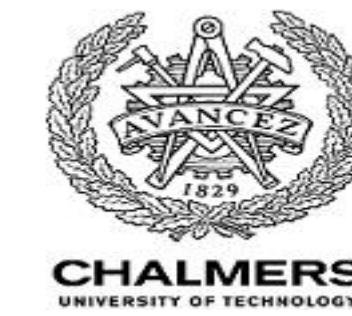


# Urban Resilience Index: Case study of six global cities within the RECREATE project

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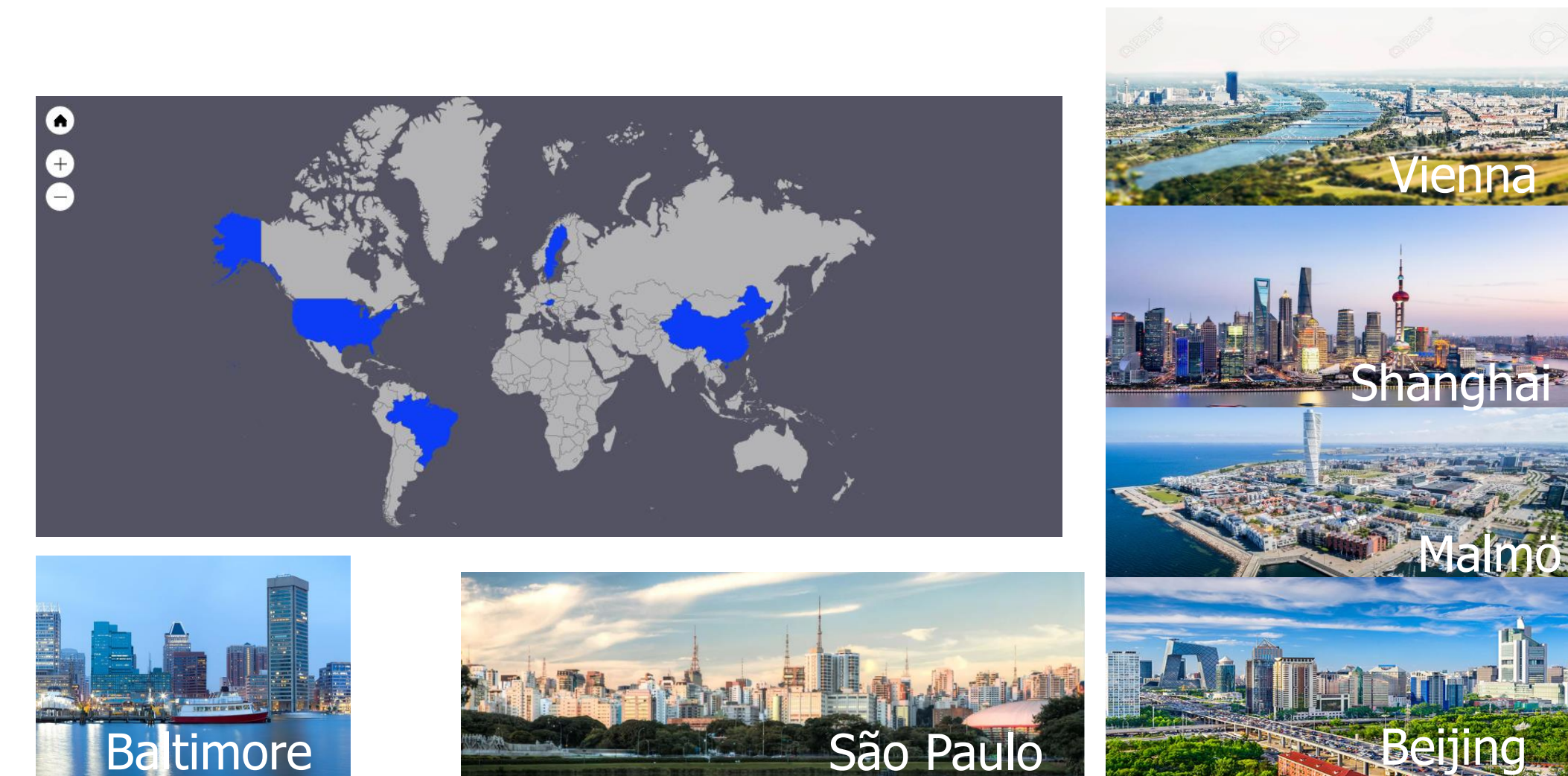
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## Resilience in cities

Resilience is the capacity of a system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, and feedbacks, that is, the capacity to change in order to sustain **identity**; resilience is a dynamic concept focusing on how to persist with change (Folke et al., 2010; Walker et al., 2004), how to evolve with change.

## Locations

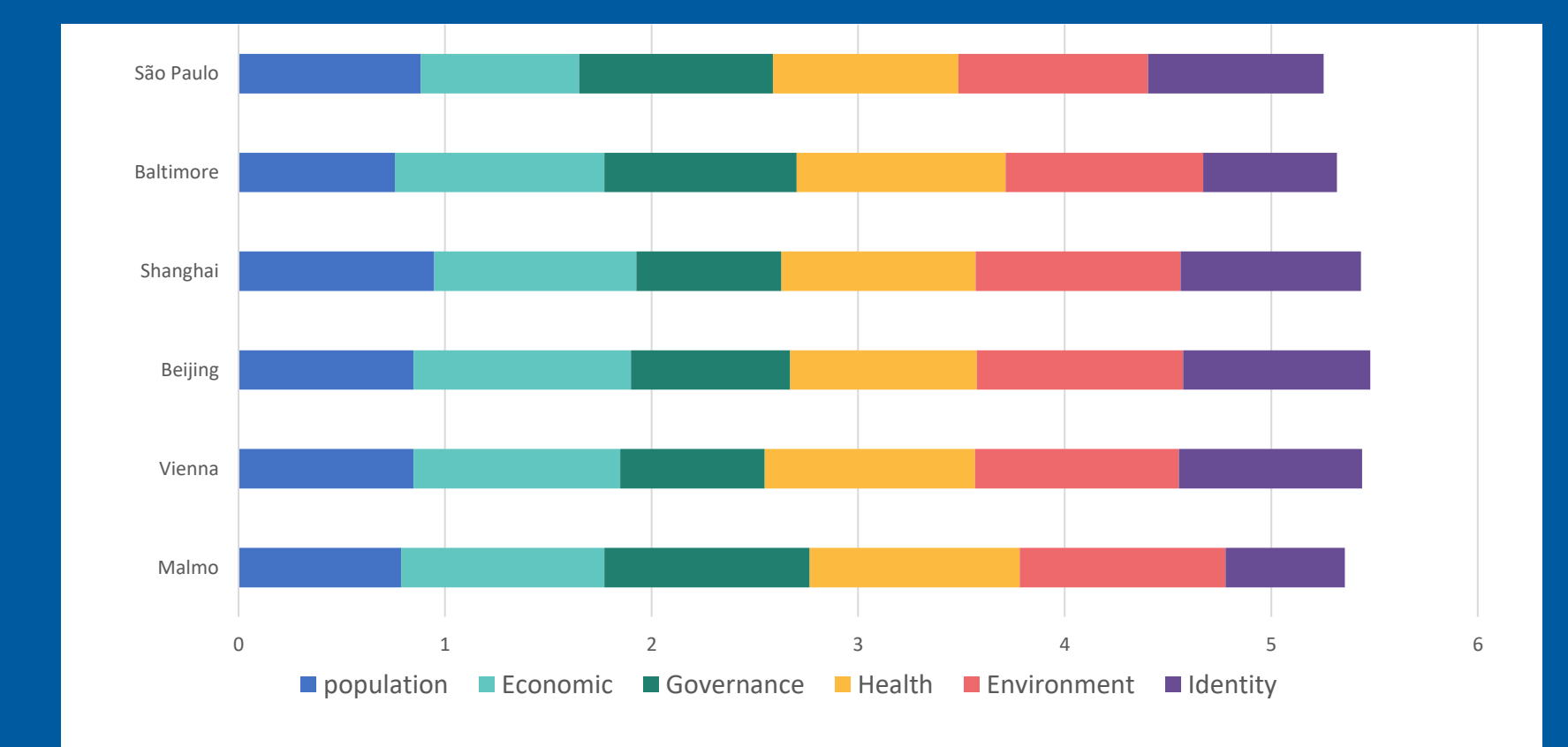


## Selecting variables

Table 1: Urban resilience index indicators

Dimension	Indicator	Source
Population	Absolute population	
	City area	(Chen & Quan, 2021; Zheng et al., 2018)
	Population density	(Feldmeyer et al., 2020; Zheng et al., 2018)
	The proportion of the population with minimum living standard	(Varis et al., 2019)
Economic	Human development index	(Chen & Quan, 2021; Feldmeyer et al., 2020; Wang et al., 2018; Zheng et al., 2018)
	Per capita GDP	modified from (Wang et al., 2018; Zheng et al., 2018)
	Per capita (disposable) income	(Wang et al., 2018)
	The proportion of infrastructure investment in the whole budget	modified from (Wang et al., 2018)
	Living costs*	Bottero et al., 2020; X. Chen & Quan, 2021; Feldmeyer et al., 2020
Governance	Unemployment*	Zheng, 2018;
	The proportion of environmental expenditure in fiscal expenditure (%)	
	Infrastructure density (area covered by infrastructure/total area)	Wang et al., 2018
Health	Correct disposal of waste	Wang et al., 2018
	Recycle waste	Wang et al., 2018
Energy	Energy consumption per GDP	Wang et al., 2018
	Use of renewable energy	Wang et al., 2018
Environment	Energy consumption per capita	Wang et al., 2018
	Life expectancy	Zheng, 2018
Identity	Insurance penetration and density (eg. Percentage of population covered by health insurance)	Chen & Quan, 2021; Zheng, 2018; Feldmeyer et al., 2020
	The proportion of the vulnerable population (<16 or >60 years old)*	Bottero et al., 2020; Feldmeyer et al., 2020
	Public health facilities per capita (Health worker number per thousand people)	Chen & Quan, 2021; Wang et al., 2018
	Total of permeable surface	Bottero et al., 2020; Feldmeyer et al., 2020
Identity	Total of area converted into urban area*	Bottero et al., 2020; Zheng, 2018
	Green area per capita	Zheng, 2018; Chen & Quan, 2021; Feldmeyer et al., 2020
	Days of poor air quality*	Zheng, 2018; Feldmeyer et al., 2020
	The proportion of bikes relative to cars	
Identity	N° protected and historical landmarks, cultural places (cinemas, museums) per capita (x100k)	Adapted from Montalto et al. (2019) and Wang et al., 2018
	Literacy and educational attainment	
	% of total budget spent on culture	
	number of start-ups	
Identity	Students in universities per 10k people	
	number of patents per 10k people	
	Indicators without specific sources represent the authors' collaboration on the subject.	
	Indicators followed by * represent negative contributions to resilience.	

## Following the best in class

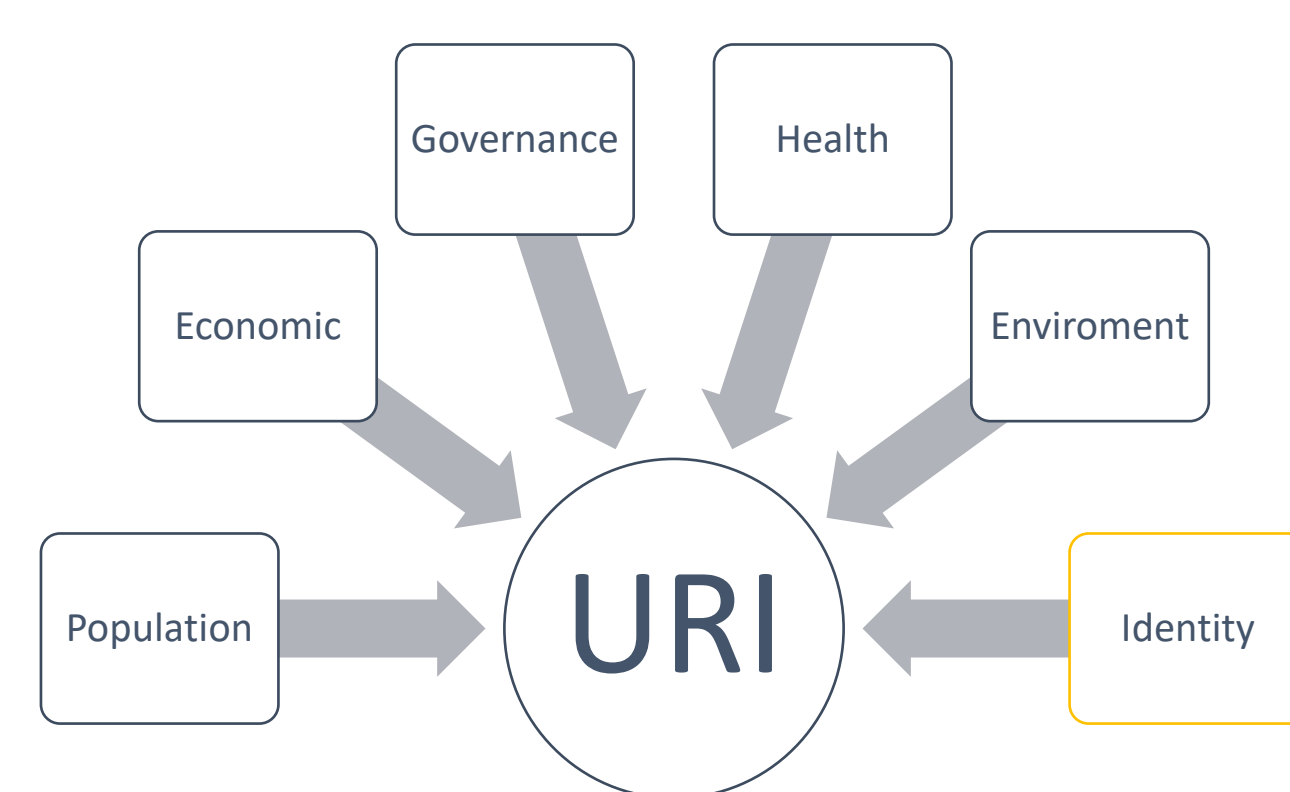


A pattern emerges for the three higher resilient cities: high values in population, except for São Paulo which has 2<sup>nd</sup> highest value in this dimension. These cities continue with high values in the economic, health, environment, and identity dimensions. The only dimension where these cities are not the benchmark is in the governance dimension, which might suggest that the overall higher resilience is a byproduct of the whole system, and not only from the

## Integration of variables

Identity at the collective level: plural, cross-cutting, live, and divided (Calhoun, 1994).

Cultures are groups of people who share knowledge, beliefs, norms, and behaviors (Geertz, 1977).

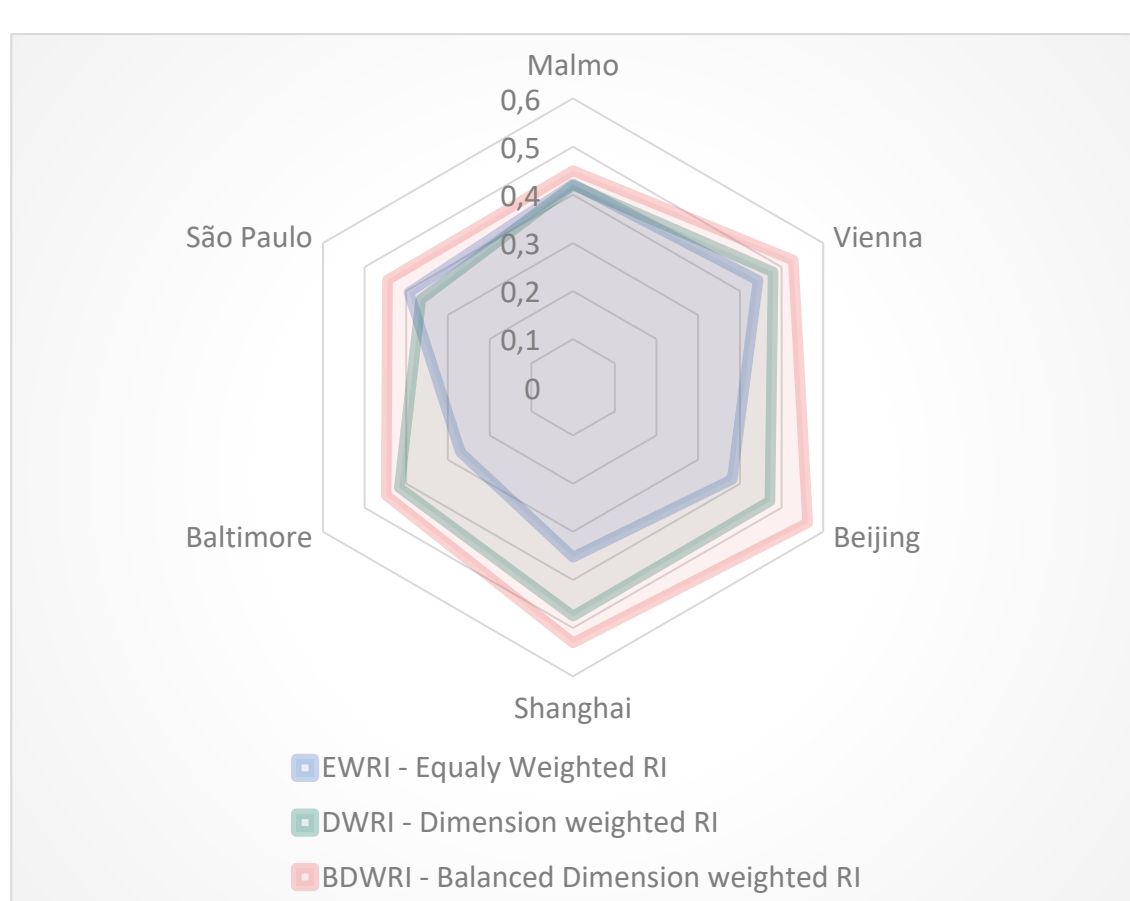


## Conclusions

Cities formed two different groups in terms of resilience: Beijing, Shanghai, and Vienna is the highest URI when compared to Malmö, Baltimore and São Paulo.

Resilience in URI appears as a system property, instead of a dominant dimension

## Results



The first group is formed by Beijing (0.563), Shanghai (0.531), and Vienna (0.529) with higher resilience values, typically higher than 0.5 in the URI assessment.

The second group is formed by Malmö (0.450), Baltimore (0.448), and São Paulo (0.445), with lower values for resilience.

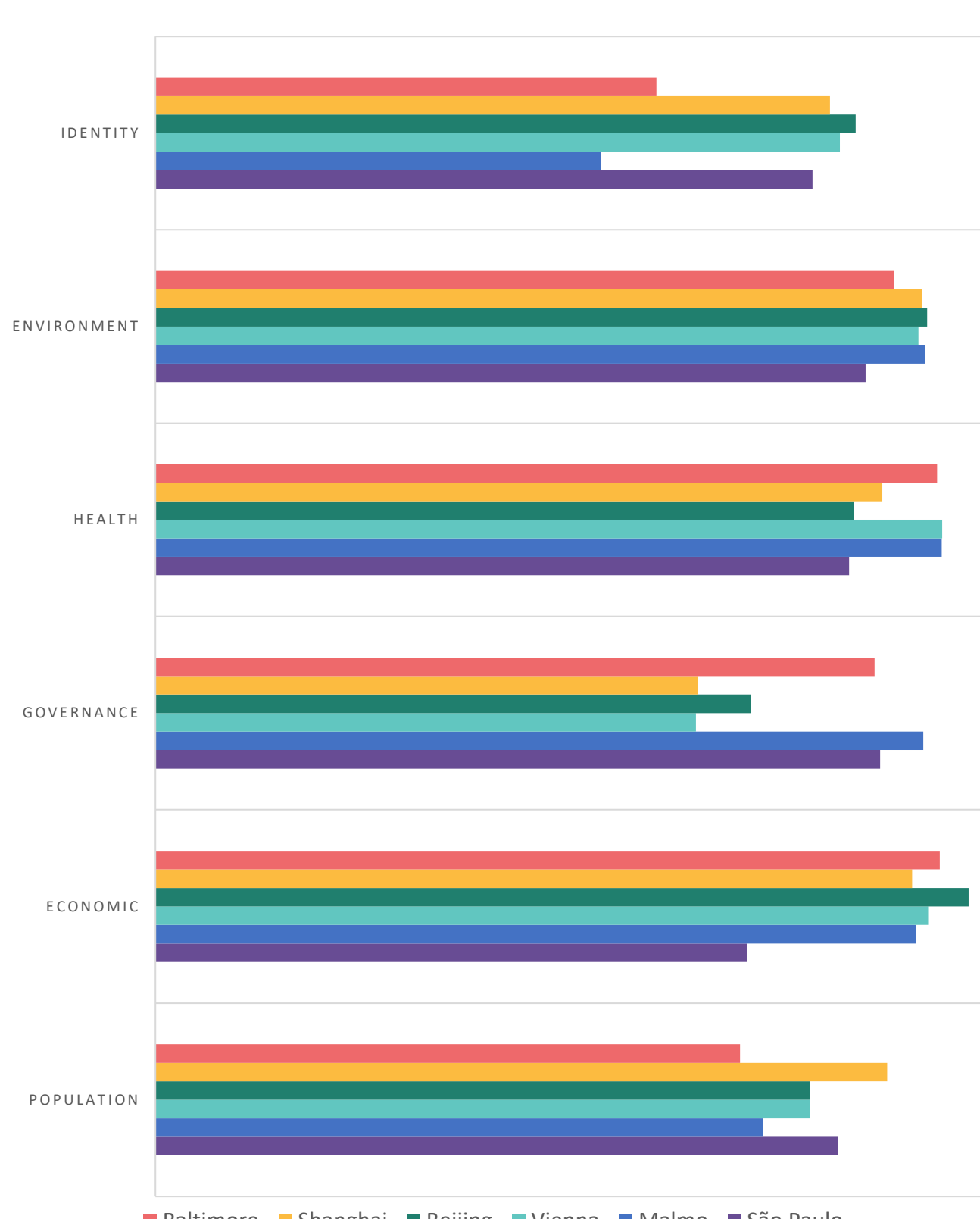


Table 2: values for each dimension

City/Dimension	Population	Economic	Governance	Health	Environment	Identity	CURI
Malmö	0.79	0.98	0.99	1.02	1.00	0.58	0.450
Vienna	0.85	1.00	0.70	1.02	0.99	0.89	0.529
Beijing	0.85	1.05	0.77	0.90	1.00	0.91	0.563
Shanghai	0.95	0.98	0.70	0.94	0.99	0.87	0.531
Baltimore	0.76	1.02	0.93	1.01	0.96	0.65	0.448
São Paulo	0.88	0.77	0.94	0.90	0.92	0.85	0.445
Mean	0.84	0.97	0.84	0.97	0.98	0.79	0.49
SD	0.07	0.10	0.13	0.06	0.03	0.14	0.05

## References

Calhoun, C. (1994). *Social Theory and the Politics of Identity*. Wiley-Blackwell.

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