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Power Law Distributions of Patents as Indicators of Innovation

DION O'NEALE, Industrial Research Ltd, SHAUN HENDY, Victoria University of Wellington — The total number of patents produced by a country (or the number of patents produced per capita) is often used as an indicator for innovation. Such figures however give an overly simplistic measure of innovation within a country. Here we present evidence that the distribution of patents amongst applicants within many countries is well-fitted to a power law distribution with exponents that vary between 1.66 (Japan) and 2.37 (Poland). We suggest that this exponent is a useful new metric for studying innovation. Using simulations based on simple preferential attachment-type rules that generate power laws, we find we can explain some of the variation in exponents between countries, with countries that have larger numbers of patents per applicant generally exhibiting smaller exponents in both the simulated and actual data. Similarly we find that the exponents for most countries are inversely correlated with other indicators of innovation, such as research and development intensity or the ubiquity of export baskets. This suggests that in more advanced economies, which tend to have smaller values of the exponent, a greater proportion of the total number of patents are filed by large companies than in less advanced countries.

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