

## **Pricing Patents Through Citations**

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I study patents, citations and their relationship with patent values. My goal is to obtain a better predictor of patent values using only information available in the original patent document. In the literature, citation counts are regarded as the best method available. They are easy to compute; moreover, citations are better predictors of value than are such alternatives as renewals or even the number of claims made. But citation counts have no theoretical justification. Taken together patent citations are a complicated network that can provide much more information than simple counts reveal. In an effort to extract additional information, I develop a theory concerning how and why citations arise and what type of information they convey. The theory explicitly describes the R&D process in terms of a sequence of forward-looking and profit-maximizing decisions where citations arise as a natural by-product. Patent citations provide more information than just a prior-to-new-art link. They constitute a crude form of book-keeping of the "market stealing" that takes place. Every time a patent is cited, it loses part (or even all) of its market share. This allows me to retrieve the value of any single patent by tracking down the value of all the patents that cited it. There is a recursive nature to this argument. To retrieve the value of those who cite our patent, we need the value of the citations of citations, and so on. Thus, the pricing algorithm derived uses the entire network of (forward) citations to price any individual patent. The algorithm is applied to the actual citations network of all U.S. patents granted between 1975 and 1999. At the distributional level, the algorithm provides a much better fit to patent values than simple counts. The patent value distribution by cohort converges to a Pareto-Levy, whereas the distribution of citation counts is not nearly as skewed.