

Royalty Stacking and Standard Essential Patents: Theory and Evidence from the World Mobile Wireless Industry*

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Abstract

We build an equilibrium royalty stacking model that links the observable number of SEP holders with prices, quantities, concentration and margins, in principle observable market variables. We show that roughly 10 SEP holders suffice to reduce equilibrium output to about one-tenth of the competitive level; with 100 SEP holders output nearly collapses. As the number of SEP holders increases prices increase; (ii) quantity falls or stagnates; (iii) manufacturers' margins fall; (iv) downstream manufacturing concentrates. Because royalties are endogenous and rise with shocks that increase downstream surplus, neither fast technological change nor falling manufacturing costs can undo the effects of royalty stacking.

We look for royalty stacking in the world mobile wireless industry, where the number of SEP holders for the 2G, 3G, and 4G wireless cellular standards grew from 2 in 1994 to 130 in 2013. We fail to reject the null hypothesis that there is no royalty stacking. Between 1994 and 2013: (i) the number of devices sold each year rose 62 times or 20.1% per year on average; (ii) controlling for technological generation, the real average selling price of a device fell between -11.4% and -24.8% per year (iii) the introductory average selling price of successive generations fell over time; (iv) neither the average gross margin of SEP holders nor of non-SEP holders shows any trend; (v) the number of device manufacturers grew from one to 43; (vi) since 2001, concentration fell and the number of equivalent manufacturers rose from six to nine.

JEL classification: L1, O31, O38

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