Medical Care Output and Productivity

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variables are based only on the most recently published trial in each year, while in models 7 and 9 they are computed as a three-year moving average of published trial results. In both cases the drug effect is calculated relative to placebo, but very similar results are obtained using just the change relative to the baseline values.

Results in models 6 and 7 are encouraging. The signs of the coefficients on the characteristics variables conform to our priors, with increased toxicity negatively associated with market share, and increased efficacy positively associated. Though the coefficient on price is insignificant, and corresponds to a very small elasticity, it is at least negative in model 6. A very small price effect is also consistent with our interpretation of results from estimating the price equation.

Models 8 and 9 include fixed drug effects in the estimation to control for drug-specific problems in measuring market share or characteristics. Several of these dummies are highly significant, and they markedly improve the fit of the model, suggesting that we do indeed have systematic problems in measuring market shares. Furthermore the estimated coefficients on the other variables change substantially when we include fixed drug effects, indicating that the equations omit significant variables driving quantities consumed, either quality characteristics of drugs or other drug-specific factors which determine demand.

11.7 Conclusion

Economic considerations appear to play a relatively minor role in the market for DMARDs. Information from published clinical trials relating to key quality characteristics of these drugs (efficacy and toxicity) is statistically associated with changes in their quantity shares in this market, but has no consistent impact on relative prices. Given the nature of RA, these results may not be too surprising. They do, however, point to some interesting economic issues which we have not attempted to address in this study.

First, there is the question of using prices to measure the impact of technical change on consumer welfare in markets such as this one. Most prior work on innovation, quality change, and pricing has examined the prices of new goods which embody technological change in the form of improvements to tangible aspects of quality. Here the technical change takes a rather unusual form: R&D generates revisions to the intangible information set possessed by physicians and patients, affecting perceived quality rather than physical characteristics such as speed, durability, weight, and so on. R&D surely improves welfare in this context, but the fact that relative prices in this market change very little (and are most likely determined exogenously) and that demand appears to be quite price inelastic means that its impact is very difficult to see in price space. Rather,

the most visible direct effect of changes in quality is seen in movements in quantities, which has significant implications for how we should interpret movements in, for example, a fixed-weight price index.

Second, these results hint at an interesting variety of nonprice competition. Rents to producers in this market are determined initially by the level of prices (which to a rough approximation they set once in real terms, often based upon conditions prevailing in unrelated markets) and then by the evolution of quantities as consumers and/or their agents respond to exogenous changes in perceived quality. In such circumstances the role played by marketing and promotional activity may well be very important. Our analysis here is based on the generation of new information about product quality in the form of publication of research results in peer reviewed journals by (hopefully) impartial authors. The question of how this information reaches practicing physicians and their patients has not been examined here. In future work we hope to extend our analysis of this market to include marketing and promotional activity by producers of these drugs, which may shed light on the interesting question of the relative importance of objective versus persuasive information in drug choices.

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