Econometric Models for Count Data with an Application to the Patents-R&D Relationship

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This paper focuses on developing and adapting statistical models of counts (non-negative integers) in the context of panel data and using them to analyze the relationship between patents and R&D expenditures. The model used is an application and generalization of the Poisson distribution to allow for independent variables; persistent individual (fixed or random) effects, and "noise" or randomness in the Poisson probability function. We apply our models to a data set previously analyzed by Pakes and Griliches using observations on 128 firms for seven years, 1968-74. Our statistical results indicate clearly that to rationalize the data, we need both a disturbance in the conditional within dimension and a different one, with a different variance, in the marginal (between) dimension. Adding firm specific variables, log book value and a scientific industry dummy, removes most of the positive correlation between the individual firm propensity to patent and its R&D intensity. The other new finding is that there is an interactive negative trend in the patents - R&D relationship, that is, firms are getting less patents from their more recent R&D investments, implying a decline in the "effectiveness" or productivity of R&D.

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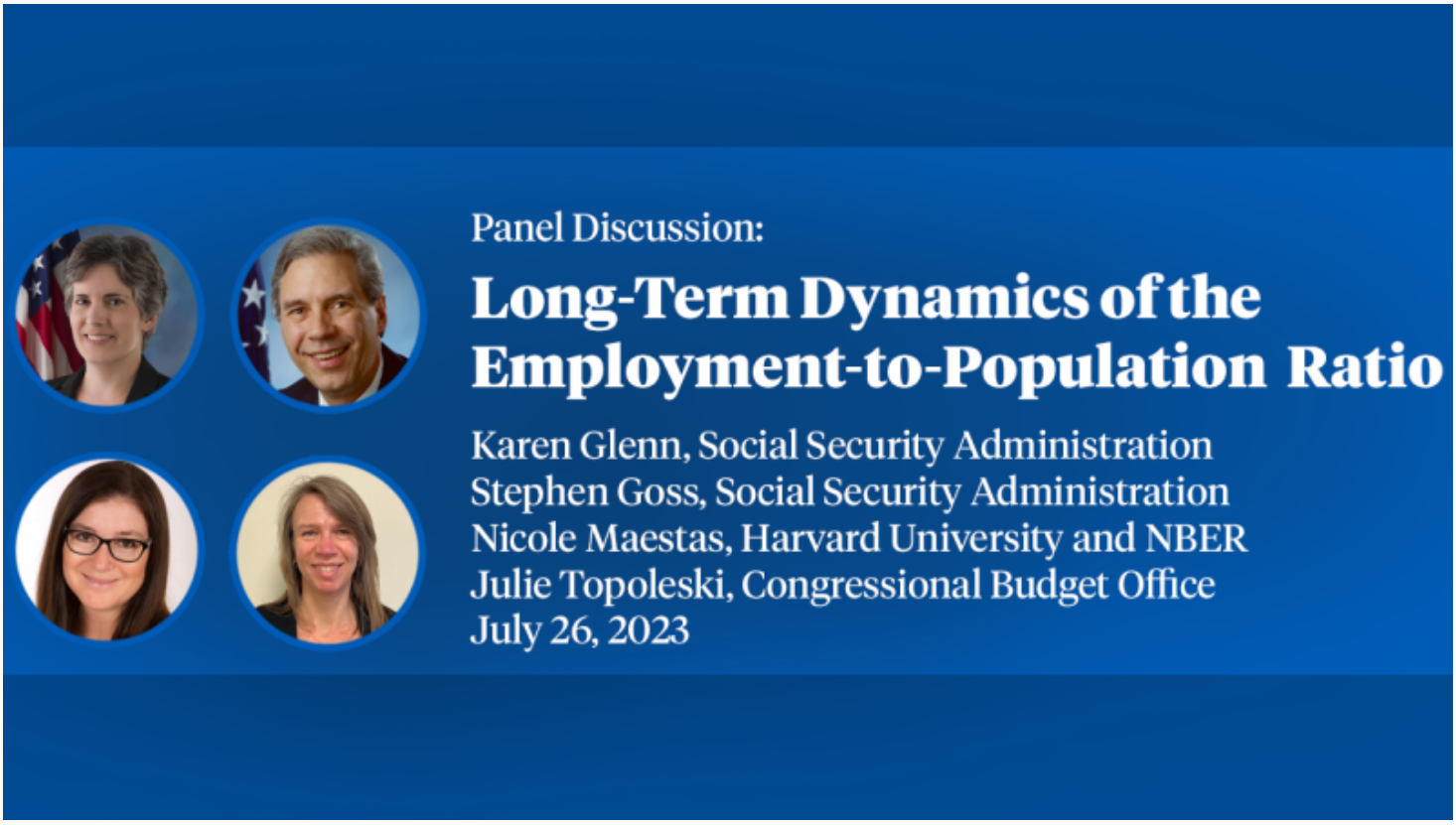

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