Matrix models of the form $x(t + 1) = P(x(t))x(t)$ are used to describe the (discrete time) dynamics of structured populations. I will show how one can extend the Fundamental Bifurcation Theorem for such matrix models to Darwinian matrix models. A Darwinian matrix model is an (evolutionary game theoretic) extension of a population model which accounts for evolution that results when a phenotypic trait $u$ is subject to natural selection. Secondly, for Darwinian matrix models I will show how the basic properties of the fundamental bifurcation can be ascertained either by means of the inherent growth rate $r$ or the inherent net reproductive number $R_0$. This result is not obvious because in general there is no particular relationship between the monotonicity and concavity properties of $r = r(u)$ and $R_0 = R_0(u)$ as functions of the trait $u$. This result can be a significant aid to the study of Darwinian matrix models since $R_0$ is typically more mathematically tractable than $r$. I’ll illustrate this with some applications. (Received September 14, 2009)