For a convex body $K \subset \mathbf{R}^n$ and $i \in \{1, \ldots, n-1\}$, the function assigning to any i-dimensional subspace L of R^n, the i-dimensional volume of the orthogonal projection of K to L, is called the i-th projection function of K. Let $K, K_0 \subset \mathbf{R}^n$ be smooth convex bodies of class C^2 with postive Gauss-Kronecker curvature, and let K_0 be centrally symmetric. Excluding two exceptional cases, we prove that K and K_0 are homothetic if they have two proportional projection functions. The special case when K_0 is a Euclidean ball provides an extension of Nakajima's classical three-dimensional characterization of spheres to higher dimensions.