Quantitative Finance > Portfolio Management

Shadow prices and well-posedness in the problem of optimal investment and consumption with transaction costs

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(Submitted on 2 Apr 2012 (v1), last revised 15 Jun 2012 (this version, v2))

We revisit the optimal investment and consumption model of Davis and Norman (1990) and Shreve and Soner (1994), following a shadow-price approach similar to that of Kallsen and Muhle-Karbe (2010). Making use of the completeness of the model without transaction costs, we reformulate and reduce the Hamilton-Jacobi-Bellman equation for this singular stochastic control problem to a non-standard free-boundary problem for a first-order ODE with an integral constraint. Having shown that the free boundary problem has a smooth solution, we use it to construct the solution of the original optimal investment/consumption problem in a self-contained manner and without any recourse to the dynamic programming principle. Furthermore, we provide an explicit characterization of model parameters for which the value function is finite.

Comments:	31 pages, 20 figures
Subjects:	**Portfolio Management (q-fin.PM)**; Optimization and Control (math.OC)
Cite as:	**arXiv:1204.0305v2 [q-fin.PM]**

Submission history

From: Gordan Zitkovic [view email]
[v1] Mon, 2 Apr 2012 03:12:21 GMT (1044kb,D)
[v2] Fri, 15 Jun 2012 19:32:13 GMT (1677kb,D)

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