

1 Results

1.1 Single-Minded

Single-Minded, Uniform Reward, Over Demanded, 7 bidders, 20 goods

	Welfare	Revenue	EF	EFLoss	MC	MC Loss	Time
Huang et. al.	0.9574	0.9574	0.1205	0.5265	0.0000	0.0000	0.0002
Guruswamin et. al. Unl. Supply	0.8376	0.8376	0.0000	0.0000	0.4111	0.4111	0.0032
LP greedy utilitarian	0.9753	0.9753	0.0011	0.0019	0.1077	0.2837	0.0001
LP greedy egalitarian	0.6371	0.6371	0.0791	0.0968	0.1440	0.4607	0.0011
LP optimal utilitarian	1.0000	1.0000	0.0012	0.0018	0.0942	0.2574	0.0404
LP optimal egalitarian	0.6757	0.6757	0.0841	0.1014	0.1227	0.4193	0.0378

Single-Minded, Uniform Reward, Under Demanded, 7 bidders, 20 goods

	Welfare	Revenue	EF	EFLoss	MC	MC Loss	Time
Huang et. al.	0.9846	0.9846	0.0257	0.1027	0.0000	0.0000	0.0003
Guruswamin et. al. Unl. Supply	0.5432	0.5432	0.0000	0.0000	0.8317	0.8317	0.0013
LP greedy utilitarian	0.9942	0.9942	0.0000	0.0001	0.0244	0.0895	0.0000
LP greedy egalitarian	0.8821	0.8821	0.0518	0.1082	0.0333	0.1512	0.0000
LP optimal utilitarian	1.0000	1.0000	0.0000	0.0001	0.0225	0.0824	0.0123
LP optimal egalitarian	0.8966	0.8966	0.0523	0.1088	0.0293	0.1365	0.0138

Single-Minded, Elitist Reward, Over Demanded, 7 bidders, 20 goods

	Welfare	Revenue	EF	EFLoss	MC	MC Loss	Time
Huang et. al.	0.9356	0.9356	0.1205	0.5310	0.0000	0.0000	0.0002
Guruswamin et. al. Unl. Supply	0.9070	0.9070	0.0000	0.0000	0.4110	0.4110	0.0035
LP greedy utilitarian	0.9903	0.9903	0.0006	0.0015	0.0963	0.1594	0.0001
LP greedy egalitarian	0.4032	0.4032	0.0809	0.1675	0.1424	0.5590	0.0001
LP optimal utilitarian	1.0000	1.0000	0.0005	0.0014	0.0888	0.1475	0.0400
LP optimal egalitarian	0.4270	0.4270	0.0872	0.1854	0.1213	0.5205	0.0383

Single-Minded, Elitist Reward, Under Demanded, 7 bidders, 20 goods

	Welfare	Revenue	EF	EFLoss	MC	MC Loss	Time
Huang et. al.	0.9828	0.9828	0.0257	0.1024	0.0000	0.0000	0.0001
Guruswamin et. al. Unl. Supply	0.6690	0.6690	0.0000	0.0000	0.8317	0.8317	0.0025
LP greedy utilitarian	0.9960	0.9960	0.0000	0.0000	0.0241	0.0697	0.0000
LP greedy egalitarian	0.8301	0.8301	0.0525	0.1457	0.0332	0.1594	0.0002
LP optimal utilitarian	1.0000	1.0000	0.0000	0.0000	0.0228	0.0651	0.0159
LP optimal egalitarian	0.8432	0.8432	0.0533	0.1478	0.0292	0.1448	0.0159

1.2 Singleton

Singleton, Uniform Reward, Over Demanded, 12 bidders, 9 goods

	Welfare	Revenue	EF	EFLoss	MC	MC Loss	Time
Guruswamin Envy-Free Approx	0.9744	0.8679	0.0000	0.0000	0.0569	0.0000	0.0048
LP greedy utilitarian	0.9450	0.8503	0.0130	0.0174	0.0787	0.0801	0.0148
LP greedy egalitarian	0.8862	0.7791	0.0646	0.0994	0.1096	0.1052	0.0156
LP optimal utilitarian	0.9706	0.8744	0.0000	0.0000	0.0534	0.0541	0.5622
LP optimal egalitarian	0.9151	0.8094	0.0554	0.0835	0.0816	0.0780	0.8274

Singleton, Uniform Reward, Under Demanded, 9 bidders, 9 goods

	Welfare	Revenue	EF	EFLoss	MC	MC Loss	Time
Guruswamin Envy-Free Approx	0.8844	0.7546	0.0000	0.0000	0.5123	0.0000	0.0048
LP greedy utilitarian	0.8921	0.8007	0.0014	0.0018	0.4293	0.4544	0.0101
LP greedy egalitarian	0.8854	0.7863	0.0049	0.0070	0.4478	0.4623	0.0094
LP optimal utilitarian	0.9063	0.8203	0.0000	0.0000	0.4205	0.4462	0.5010
LP optimal egalitarian	0.9045	0.8178	0.0021	0.0023	0.4274	0.4505	0.5063

Singleton, Elitist Reward, Over Demanded, 12 bidders, 9 goods

	Welfare	Revenue	EF	EFLoss	MC	MC Loss	Time
Guruswamin Envy-Free Approx	0.9028	0.8680	0.0000	0.0000	0.3656	0.0000	0.0038
LP greedy utilitarian	0.9000	0.8707	0.0050	0.0067	0.3362	0.3358	0.0127
LP greedy egalitarian	0.8183	0.6676	0.0457	0.1226	0.2893	0.2685	0.0129
LP optimal utilitarian	0.9168	0.8866	0.0000	0.0000	0.3155	0.3209	0.6019
LP optimal egalitarian	0.8453	0.7014	0.0403	0.1073	0.2641	0.2527	0.8829

Singleton, Elitist Reward, Under Demanded, 9 bidders, 9 goods

	Welfare	Revenue	EF	EFLoss	MC	MC Loss	Time
Guruswamin Envy-Free Approx	0.8814	0.8000	0.0000	0.0000	0.6127	0.0000	0.0045
LP greedy utilitarian	0.8982	0.8415	0.0009	0.0010	0.5084	0.5270	0.0087
LP greedy egalitarian	0.8909	0.8260	0.0038	0.0061	0.5307	0.5328	0.0086
LP optimal utilitarian	0.9114	0.8589	0.0000	0.0000	0.4947	0.5205	0.5215
LP optimal egalitarian	0.9089	0.8555	0.0020	0.0032	0.5020	0.5244	0.5017

1.3 Size-Interchangeable

Size-Interchangeable, Uniform Reward, Over Demanded, 11 bidders, 3 goods

	Welfare	Revenue	EF	EFLoss	MC	MC Loss	Time
Simple Pricing	0.8575	0.6220	0.0032	0.0045	0.1988	0.1988	0.0054
LP greedy utilitarian	0.8652	0.6556	0.0118	0.0214	0.0959	0.0872	0.0086
LP greedy egalitarian	0.8601	0.6521	0.0054	0.0084	0.1020	0.0924	0.0064
LP optimal utilitarian	0.8781	0.6657	0.0087	0.0183	0.0640	0.0561	0.5392
LP optimal egalitarian	0.8671	0.6573	0.0069	0.0148	0.0711	0.0614	0.4115

Size-Interchangeable, Uniform Reward, Under Demanded, 3 bidders, 3 goods

	Welfare	Revenue	EF	EFLoss	MC	MC Loss	Time
Simple Pricing	0.9355	0.8747	0.0004	0.0003	0.4883	0.4883	0.0000
LP greedy utilitarian	0.9502	0.8989	0.0084	0.0100	0.0909	0.0856	0.0018
LP greedy egalitarian	0.9464	0.8945	0.0069	0.0057	0.0964	0.0903	0.0011
LP optimal utilitarian	0.9561	0.9039	0.0086	0.0098	0.1315	0.1267	0.0366
LP optimal egalitarian	0.9496	0.8974	0.0087	0.0086	0.1393	0.1324	0.0347

Size-Interchangeable, Elitist Reward, Over Demanded, 11 bidders, 3 goods

	Welfare	Revenue	EF	EFLoss	MC	MC Loss	Time
Simple Pricing	0.8237	0.6909	0.0014	0.0021	0.3534	0.3534	0.0046
LP greedy utilitarian	0.8372	0.7214	0.0065	0.0113	0.2292	0.1914	0.0097
LP greedy egalitarian	0.8351	0.7183	0.0028	0.0045	0.2311	0.1929	0.0056
LP optimal utilitarian	0.8440	0.7272	0.0053	0.0110	0.2084	0.1730	0.5908
LP optimal egalitarian	0.8376	0.7206	0.0047	0.0107	0.2132	0.1757	0.4568

Size-Interchangeable, Elitist Reward, Under Demanded, 3 bidders, 3 goods

	Welfare	Revenue	EF	EFLoss	MC	MC Loss	Time
Simple Pricing	0.9425	0.8928	0.0008	0.0006	0.5048	0.5048	0.0000
LP greedy utilitarian	0.9548	0.9124	0.0087	0.0118	0.1129	0.1002	0.0011
LP greedy egalitarian	0.9518	0.9087	0.0049	0.0049	0.1196	0.1052	0.0012
LP optimal utilitarian	0.9587	0.9160	0.0063	0.0070	0.1540	0.1407	0.0367
LP optimal egalitarian	0.9527	0.9100	0.0067	0.0075	0.1609	0.1447	0.0347