

## **Appendix B**

The completion time in the different dispatching rule and skill  
for two step scheduling.

**Appendix Table B1** The result of  $C_{\max}$  from two step scheduling in different dispatching rule and skill, penalty 25 % (class 1,data 1).

			<b>FIFO</b>	<b>EDD</b>	<b>SPT</b>	<b>LPT</b>
<b>Cmax Company</b>			<b>259501.4</b>			
<b>Cmax Standard</b>			<b>349970.3</b>	<b>302758.9</b>	<b>164730</b>	<b>469266.7</b>
100 : 0			349980.92	302761.14	164732.91	469273.22
80 : 20	Single skill	Processing	349977.38	302760.22	164732.16	469272.19
80 : 20	Single skill	Continuous	349981.51	302760.67	164733.01	469275.27
80 : 20	Single skill	Maximum M/C	350028.63	302813.64	164851.91	469592.46
80 : 20	Multi skill	Processing	350009.19	302791.17	164820.3	469519.9
80 : 20	Multi skill	Continuous	350031.87	302802.12	164855.78	469625
80 : 20	Multi skill	Maximum M/C	350057.79	302908.76	164902.66	469755.35
80 : 20	Random allocate	Processing	350028.63	302847.24	164857.9	469612.33
80 : 20	Random allocate	Continuous	350062.65	302877.21	164908.14	469774.18
80 : 20	Random allocate	Maximum M/C	352700.07	302981.52	165019.17	469913.22
50 : 50	Single skill	Processing	351790.15	302890.13	164944.2	469811.74
50 : 50	Single skill	Continuous	352851.72	302934.65	165028.35	470116.62
50 : 50	Single skill	Maximum M/C	363619.14	308190.79	176827.04	501592.61
50 : 50	Multi skill	Processing	359069.53	305960.86	173690.77	494391.56
50 : 50	Multi skill	Continuous	364377.41	307047.24	177211.07	504821.56
50 : 50	Multi skill	Maximum M/C	370443.56	317629.82	181863.46	517755.56
50 : 50	Random allocate	Processing	363619.14	311524.92	177421.45	503564.12
50 : 50	Random allocate	Continuous	371580.97	314499.1	182407.38	519624.29
50 : 50	Random allocate	Maximum M/C	354403.26	303023.51	165073.72	470035.17
20 : 80	Single skill	Processing	352925.6	302914.88	164984.61	469914.55
20 : 80	Single skill	Continuous	354649.53	302967.8	165084.63	470276.94
20 : 80	Single skill	Maximum M/C	372135.09	309215.42	179108.91	507690.26
20 : 80	Multi skill	Processing	364746.82	306564.85	175381.05	499130.87
20 : 80	Multi skill	Continuous	373366.46	307856.15	179565.39	511528.3
20 : 80	Multi skill	Maximum M/C	383217.48	320434.93	185095.35	526902.04
20 : 80	Random allocate	Processing	372135.09	313178.46	179815.45	510033.66
20 : 80	Random allocate	Continuous	385064.54	316713.66	185741.87	529123.26
20 : 80	Random allocate	Maximum M/C	362569.23	303334.14	165477.22	470937.29
0 : 100	Single skill	Processing	358369.59	303097.99	165283.49	470675.06
0 : 100	Single skill	Continuous	363269.17	303213.04	165500.94	471462.87
0 : 100	Single skill	Maximum M/C	444462.28	341185.06	209002.51	594560.91
0 : 100	Random allocate	Processing	412964.95	325410.11	197524.45	557890.53
0 : 100	Random allocate	Continuous	449711.84	333095.34	210407.98	599389.66
0 : 100	Random allocate	Maximum M/C	349980.92	302761.14	164732.91	469273.22

**Appendix Table B1** The result of  $C_{\max}$  from two step scheduling in different dispatching rule and skill (class 1,data 2).

			<b>FIFO</b>	<b>EDD</b>	<b>SPT</b>	<b>LPT</b>
<b>Cmax Company</b>			<b>232856</b>			
<b>Cmax Standard</b>			<b>347425.81</b>	<b>325972.92</b>	<b>253244.29</b>	<b>434961.92</b>
100 : 0			347425.81	325972.92	253244.29	434961.92
80 : 20	Single skill	Processing	347436.34	325975.32	253248.78	434967.94
80 : 20	Single skill	Continuous	347432.83	325974.32	253247.62	434966.99
80 : 20	Single skill	Maximum M/C	347436.92	325974.81	253248.92	434969.84
80 : 20	Multi skill	Processing	347483.7	326031.84	253431.71	435263.85
80 : 20	Multi skill	Continuous	347464.4	326007.64	253383.12	435196.59
80 : 20	Multi skill	Maximum M/C	347486.92	326019.43	253437.66	435294.01
80 : 20	Random allocate	Processing	347512.66	326134.25	253509.74	435414.83
80 : 20	Random allocate	Continuous	347483.7	326068.01	253440.92	435282.27
80 : 20	Random allocate	Maximum M/C	347517.48	326100.28	253518.17	435432.28
50 : 50	Single skill	Processing	350135.72	326212.59	253688.85	435561.16
50 : 50	Single skill	Continuous	349232.41	326114.19	253573.6	435467.09
50 : 50	Single skill	Maximum M/C	350286.27	326162.13	253702.97	435749.69
50 : 50	Multi skill	Processing	360975.41	331821.28	271841.44	464924.69
50 : 50	Multi skill	Continuous	356458.87	329420.37	267019.96	458250.05
50 : 50	Multi skill	Maximum M/C	361728.16	330590.05	272431.83	467917.6
50 : 50	Random allocate	Processing	367750.21	341984.05	279584.07	479906.08
50 : 50	Random allocate	Continuous	360975.41	335411.05	272755.24	466752.08
50 : 50	Random allocate	Maximum M/C	368879.34	338613.28	280420.26	481638.2
20 : 80	Single skill	Processing	351826.53	326257.8	253772.71	435674.19
20 : 80	Single skill	Continuous	350359.62	326140.84	253635.71	435562.39
20 : 80	Single skill	Maximum M/C	352071.01	326197.82	253789.48	435898.29
20 : 80	Multi skill	Processing	369429.43	332924.47	275349.43	470576.58
20 : 80	Multi skill	Continuous	362094.89	330070.67	269618.47	462642.91
20 : 80	Multi skill	Maximum M/C	370651.86	331460.98	276051.18	474134.05
20 : 80	Random allocate	Processing	380431.25	345004.24	284552.56	488383.92
20 : 80	Random allocate	Continuous	369429.43	337191.37	276435.6	472748.68
20 : 80	Random allocate	Maximum M/C	382264.89	340997.64	285546.47	490442.77
0 : 100	Single skill	Processing	359933.13	326592.25	254393.02	436510.36
0 : 100	Single skill	Continuous	355764.02	326337.99	254095.2	436267.31
0 : 100	Single skill	Maximum M/C	360627.98	326461.86	254429.48	436997.52
0 : 100	Random allocate	Processing	441230.77	367345.38	321305.73	551096.73
0 : 100	Random allocate	Continuous	409962.44	350360.89	303660.18	517107.06
0 : 100	Random allocate	Maximum M/C	446442.15	358635.38	323466.41	555572.49

**Appendix Table B1** The result of  $C_{\max}$  from two step scheduling in different dispatching rule and skill (class 1,data 3).

			<b>FIFO</b>	<b>EDD</b>	<b>SPT</b>	<b>LPT</b>
<b>Cmax Company</b>			<b>269105.6</b>			
<b>Cmax Standard</b>			<b>313978.9</b>	<b>299539.6</b>	<b>214197.6</b>	<b>416888.9</b>
100 : 0	Single skill	Processing	313978.89	299539.65	214197.62	416888.88
80 : 20	Single skill	Processing	313988.42	299541.82	214201.39	416894.69
80 : 20	Single skill	Continuous	313985.25	299540.91	214200.41	416893.78
80 : 20	Single skill	Maximum M/C	313988.95	299541.35	214201.51	416896.51
80 : 20	Multi skill	Processing	314031.23	299593.76	214356.12	417178.3
80 : 20	Multi skill	Continuous	314013.79	299571.52	214315.02	417113.84
80 : 20	Multi skill	Maximum M/C	314034.14	299582.36	214361.15	417207.21
80 : 20	Random allocate	Processing	314057.39	299687.87	214422.11	417323.01
80 : 20	Random allocate	Continuous	314031.23	299627	214363.91	417195.95
80 : 20	Random allocate	Maximum M/C	314061.76	299656.65	214429.24	417339.74
50 : 50	Single skill	Processing	316427.94	299759.85	214573.61	417463.26
50 : 50	Single skill	Continuous	315611.59	299669.43	214476.13	417373.1
50 : 50	Single skill	Maximum M/C	316563.99	299713.48	214585.55	417643.95
50 : 50	Multi skill	Processing	326224.08	304913.74	229927.32	445606.71
50 : 50	Multi skill	Continuous	322142.35	302707.51	225849.25	439209.41
50 : 50	Multi skill	Maximum M/C	326904.36	303782.34	230426.68	448475.26
50 : 50	Random allocate	Processing	332346.67	314252.4	236476.15	459965.61
50 : 50	Random allocate	Continuous	326224.08	308212.41	230700.23	447358.17
50 : 50	Random allocate	Maximum M/C	333367.1	311154.97	237183.41	461625.76
20 : 80	Single skill	Processing	317955.97	299801.4	214644.54	417571.6
20 : 80	Single skill	Continuous	316630.28	299693.92	214528.66	417464.44
20 : 80	Single skill	Maximum M/C	318176.91	299746.28	214658.72	417786.38
20 : 80	Multi skill	Processing	333864.23	305927.46	232894.43	451023.76
20 : 80	Multi skill	Continuous	327235.79	303305.08	228047.1	443419.74
20 : 80	Multi skill	Maximum M/C	334968.97	304582.65	233487.98	454433.41
20 : 80	Random allocate	Processing	343806.9	317027.68	240678.57	468091.19
20 : 80	Random allocate	Continuous	333864.23	309848.36	233813.13	453105.61
20 : 80	Random allocate	Maximum M/C	345464.01	313345.98	241519.23	470064.5
0 : 100	Single skill	Processing	325282.14	300108.73	215169.2	418373.02
0 : 100	Single skill	Continuous	321514.39	299875.08	214917.3	418140.07
0 : 100	Single skill	Maximum M/C	325910.1	299988.91	215200.04	418839.94
0 : 100	Random allocate	Processing	398753.2	337557.17	271764.92	528198.24
0 : 100	Random allocate	Continuous	370495.1	321949.95	256840.06	495620.87
0 : 100	Random allocate	Maximum M/C	403462.89	329553.47	273592.45	532488.02

**Appendix Table B1** The result of  $C_{\max}$  from two step scheduling in different dispatching rule and skill (class 1,data 4).

			<b>FIFO</b>	<b>EDD</b>	<b>SPT</b>	<b>LPT</b>
<b>Cmax Company</b>			<b>243137</b>			
<b>Cmax Standard</b>			<b>357512.4</b>	<b>340386.9</b>	<b>216722</b>	<b>467440.1</b>
100 : 0			357512.4	340386.9	216722	467440.1
80 : 20	Single skill	Processing	357523.24	340389.42	216725.83	467446.59
80 : 20	Single skill	Continuous	357519.63	340388.39	216724.84	467445.57
80 : 20	Single skill	Maximum M/C	357523.85	340388.89	216725.96	467448.63
80 : 20	Multi skill	Processing	357571.99	340448.44	216882.38	467764.6
80 : 20	Multi skill	Continuous	357552.12	340423.18	216840.8	467692.31
80 : 20	Multi skill	Maximum M/C	357575.3	340435.49	216887.48	467797.01
80 : 20	Random allocate	Processing	357601.78	340555.39	216949.16	467926.85
80 : 20	Random allocate	Continuous	357571.99	340486.22	216890.27	467784.39
80 : 20	Random allocate	Maximum M/C	357606.74	340519.92	216956.37	467945.6
50 : 50	Single skill	Processing	360301	340637.19	217102.44	468084.1
50 : 50	Single skill	Continuous	359371.46	340534.44	217003.81	467983.02
50 : 50	Single skill	Maximum M/C	360455.92	340584.49	217114.52	468286.71
50 : 50	Multi skill	Processing	371455.38	346493.89	232637.1	499640.18
50 : 50	Multi skill	Continuous	366807.72	343986.81	228510.97	492467.16
50 : 50	Multi skill	Maximum M/C	372229.99	345208.21	233142.35	502856.57
50 : 50	Random allocate	Processing	378426.88	357106.04	239263.11	515740.22
50 : 50	Random allocate	Continuous	371455.38	350242.39	233419.12	501604.02
50 : 50	Random allocate	Maximum M/C	379588.79	353586.22	239978.7	517601.67
20 : 80	Single skill	Processing	362040.89	340684.4	217174.2	468205.58
20 : 80	Single skill	Continuous	360531.39	340562.27	217056.97	468085.43
20 : 80	Single skill	Maximum M/C	362292.47	340621.77	217188.56	468446.41
20 : 80	Multi skill	Processing	380154.85	347645.85	235639.18	505714.1
20 : 80	Multi skill	Continuous	372607.37	344665.86	230734.72	497188.03
20 : 80	Multi skill	Maximum M/C	381412.77	346117.65	236239.72	509537.19
20 : 80	Random allocate	Processing	391476.08	360259.78	243515.05	524851.09
20 : 80	Random allocate	Continuous	380154.85	352101.44	236568.71	508048.38
20 : 80	Random allocate	Maximum M/C	393362.95	356076.01	244365.63	527063.67
0 : 100	Single skill	Processing	370382.85	341033.64	217705.05	469104.19
0 : 100	Single skill	Continuous	366092.7	340768.13	217450.19	468842.98
0 : 100	Single skill	Maximum M/C	371097.87	340897.48	217736.26	469627.72
0 : 100	Random allocate	Processing	454040.75	383588.81	274967.77	592246.61
0 : 100	Random allocate	Continuous	421864.63	365853.29	259867.02	555718.97
0 : 100	Random allocate	Maximum M/C	459403.43	374493.67	276816.84	597056.57

**Appendix Table B1** The result of  $C_{\max}$  from two step scheduling in different dispatching rule and skill (class 1,data 5).

			<b>FIFO</b>	<b>EDD</b>	<b>SPT</b>	<b>LPT</b>
<b>Cmax Company</b>			<b>361777.8</b>			
<b>Cmax Standard</b>			<b>409999.79</b>	<b>422079.01</b>	<b>281873.94</b>	<b>557349.35</b>
100 : 0	Single skill	Processing	409999.79	422079.01	281873.94	557349.35
80 : 20	Single skill	Processing	410012.24	422080.99	281876.89	557355.44
80 : 20	Single skill	Continuous	410008.09	422082.14	281877.9	557359.78
80 : 20	Single skill	Maximum M/C	410012.93	422080.66	281876.58	557354.57
80 : 20	Multi skill	Processing	410068.13	422155.32	282082.54	557736.26
80 : 20	Multi skill	Continuous	410045.36	422123.99	282028.46	557650.07
80 : 20	Multi skill	Maximum M/C	410071.93	422139.26	282089.16	557774.91
80 : 20	Random allocate	Processing	410102.3	422287.93	282169.39	557929.72
80 : 20	Random allocate	Continuous	410068.13	422202.17	282092.79	557759.86
80 : 20	Random allocate	Maximum M/C	410107.99	422243.95	282178.77	557952.08
50 : 50	Single skill	Processing	413197.8	422389.36	282368.75	558117.22
50 : 50	Single skill	Continuous	412131.8	422261.96	282240.47	557996.69
50 : 50	Single skill	Maximum M/C	413375.47	422324.03	282384.46	558358.8
50 : 50	Multi skill	Processing	425989.79	429651.66	302573.51	595742.92
50 : 50	Multi skill	Continuous	420659.79	426542.89	297206.96	587190.21
50 : 50	Multi skill	Maximum M/C	426878.13	428057.42	303230.64	599577.96
50 : 50	Random allocate	Processing	433984.79	442810.7	311191.46	614939.7
50 : 50	Random allocate	Continuous	425989.79	434299.8	303590.62	598084.49
50 : 50	Random allocate	Maximum M/C	435317.29	438446.14	312122.18	617159.19
20 : 80	Single skill	Processing	415193.13	422447.91	282462.09	558262.07
20 : 80	Single skill	Continuous	413462.02	422296.47	282309.6	558118.8
20 : 80	Single skill	Maximum M/C	415481.65	422370.24	282480.76	558549.21
20 : 80	Multi skill	Processing	435966.45	431080.1	306478.08	602985.11
20 : 80	Multi skill	Continuous	427310.9	427384.91	300099.23	592819.11
20 : 80	Multi skill	Maximum M/C	437409.05	429185.13	307259.17	607543.56
20 : 80	Random allocate	Processing	448949.78	446721.33	316721.64	625803
20 : 80	Random allocate	Continuous	435966.45	436605.01	307687.05	605768.38
20 : 80	Random allocate	Maximum M/C	451113.67	441533.48	317827.92	628441.15
0 : 100	Single skill	Processing	424759.79	422880.96	283152.52	559333.51
0 : 100	Single skill	Continuous	419839.8	422551.74	282821.04	559022.07
0 : 100	Single skill	Maximum M/C	425579.79	422712.13	283193.11	559957.74
0 : 100	Random allocate	Processing	520699.75	475649.28	357629.82	706161.63
0 : 100	Random allocate	Continuous	483799.76	453657.27	337989.4	662608.12
0 : 100	Random allocate	Maximum M/C	526849.74	464371.33	360034.76	711896.75

**Appendix Table B1** The result of  $C_{\max}$  from two step scheduling in different dispatching rule and skill (class 1,data 6).

			<b>FIFO</b>	<b>EDD</b>	<b>SPT</b>	<b>LPT</b>
<b>Cmax Company</b>			<b>184081.9</b>			
<b>Cmax Standard</b>			<b>246993.67</b>	<b>214789.64</b>	<b>141573.46</b>	<b>320219.85</b>
100 : 0			246993.67	214789.64	141573.46	320219.85
80 : 20	Single skill	Processing	247001.19	214791.23	141575.96	320224.3
80 : 20	Single skill	Continuous	246998.69	214790.58	141575.32	320223.6
80 : 20	Single skill	Maximum M/C	247001.61	214790.9	141576.04	320225.69
80 : 20	Multi skill	Processing	247034.87	214828.47	141678.23	320442.15
80 : 20	Multi skill	Continuous	247021.14	214812.53	141651.07	320392.63
80 : 20	Multi skill	Maximum M/C	247037.15	214820.3	141681.56	320464.35
80 : 20	Random allocate	Processing	247055.45	214895.96	141721.85	320553.29
80 : 20	Random allocate	Continuous	247034.87	214852.31	141683.38	320455.7
80 : 20	Random allocate	Maximum M/C	247058.88	214873.58	141726.56	320566.15
50 : 50	Single skill	Processing	248920.25	214947.57	141821.98	320661.02
50 : 50	Single skill	Continuous	248278.07	214882.74	141757.55	320591.77
50 : 50	Single skill	Maximum M/C	249027.28	214914.33	141829.87	320799.82
50 : 50	Multi skill	Processing	256626.45	218643.25	151969.99	342278.51
50 : 50	Multi skill	Continuous	253415.54	217061.24	149274.59	337364.64
50 : 50	Multi skill	Maximum M/C	257161.61	217831.96	152300.04	344481.9
50 : 50	Random allocate	Processing	261442.83	225339.69	156298.42	353307.85
50 : 50	Random allocate	Continuous	256626.45	221008.61	152480.84	343623.85
50 : 50	Random allocate	Maximum M/C	262245.56	223118.62	156765.88	354583.04
20 : 80	Single skill	Processing	250122.29	214977.37	141868.86	320744.24
20 : 80	Single skill	Continuous	249079.42	214900.3	141792.28	320661.93
20 : 80	Single skill	Maximum M/C	250296.1	214937.84	141878.24	320909.22
20 : 80	Multi skill	Processing	262636.63	219370.16	153931.09	346439.45
20 : 80	Multi skill	Continuous	257422.32	217489.73	150727.26	340598.67
20 : 80	Multi skill	Maximum M/C	263505.69	218405.84	154323.4	349058.47
20 : 80	Random allocate	Processing	270458.1	227329.75	159076	359549.25
20 : 80	Random allocate	Continuous	262636.63	222181.7	154538.3	348038.55
20 : 80	Random allocate	Maximum M/C	271761.68	224689.72	159631.64	361064.98
0 : 100	Single skill	Processing	255885.47	215197.74	142215.64	321359.83
0 : 100	Single skill	Continuous	252921.55	215030.2	142049.15	321180.89
0 : 100	Single skill	Maximum M/C	256379.46	215111.82	142236.02	321718.48
0 : 100	Random allocate	Processing	313682	242050.74	179622.46	405718.55
0 : 100	Random allocate	Continuous	291452.57	230859.34	169757.9	380695.29
0 : 100	Random allocate	Maximum M/C	317386.9	236311.56	180830.36	409013.61

**Appendix Table B2** The result of  $C_{\max}$  from two step scheduling in different dispatching rule and skill (class 2,data 1).

			<b>FIFO</b>	<b>EDD</b>	<b>SPT</b>	<b>LPT</b>
<b>Cmax Company</b>			<b>235247.5</b>			
<b>Cmax Standard</b>			<b>223278.18</b>	<b>197671.52</b>	<b>137720.26</b>	<b>317895.13</b>
100 : 0			223278.18	197671.52	137720.26	317895.13
80 : 20	Single skill	Processing	223284.97	197672.96	137722.74	317899.51
80 : 20	Single skill	Continuous	223282.72	197672.36	137722.1	317898.82
80 : 20	Single skill	Maximum M/C	223285.35	197672.66	137722.81	317900.9
80 : 20	Multi skill	Processing	223315.41	197707.24	137822.22	318115.78
80 : 20	Multi skill	Continuous	223303.01	197692.57	137795.8	318066.62
80 : 20	Multi skill	Maximum M/C	223317.48	197699.72	137825.46	318137.83
80 : 20	Random allocate	Processing	223334.02	197769.35	137864.65	318226.12
80 : 20	Random allocate	Continuous	223315.41	197729.18	137827.23	318129.24
80 : 20	Random allocate	Maximum M/C	223337.12	197748.75	137869.24	318238.88
50 : 50	Single skill	Processing	225019.77	197816.85	137962.06	318333.07
50 : 50	Single skill	Continuous	224439.25	197757.18	137899.38	318264.32
50 : 50	Single skill	Maximum M/C	225116.52	197786.25	137969.73	318470.86
50 : 50	Multi skill	Processing	231986.05	201217.99	147833.87	339793.62
50 : 50	Multi skill	Continuous	229083.43	199762.06	145211.83	334915.42
50 : 50	Multi skill	Maximum M/C	232469.82	200471.36	148154.93	341981.01
50 : 50	Random allocate	Processing	236339.97	207380.74	152044.5	350742.88
50 : 50	Random allocate	Continuous	231986.05	203394.84	148330.82	341129.19
50 : 50	Random allocate	Maximum M/C	237065.63	205336.69	152499.23	352008.81
20 : 80	Single skill	Processing	226106.39	197844.26	138007.66	318415.69
20 : 80	Single skill	Continuous	225163.66	197773.34	137933.16	318333.97
20 : 80	Single skill	Maximum M/C	226263.51	197807.89	138016.78	318579.46
20 : 80	Multi skill	Processing	237419.15	201886.96	149741.6	343924.35
20 : 80	Multi skill	Continuous	232705.5	200156.4	146624.96	338125.97
20 : 80	Multi skill	Maximum M/C	238204.76	200999.5	150123.22	346524.35
20 : 80	Random allocate	Processing	244489.63	209212.19	154746.48	356938.98
20 : 80	Random allocate	Continuous	237419.15	204474.44	150332.28	345511.84
20 : 80	Random allocate	Maximum M/C	245668.04	206782.57	155286.99	358443.7
0 : 100	Single skill	Processing	231316.22	198047.08	138345	319026.81
0 : 100	Single skill	Continuous	228636.88	197892.89	138183.04	318849.17
0 : 100	Single skill	Maximum M/C	231762.77	197968.01	138364.83	319382.85
0 : 100	Random allocate	Processing	283563.31	222759.97	174733.73	402773.09
0 : 100	Random allocate	Continuous	263468.28	212460.49	165137.66	377931.5
0 : 100	Random allocate	Maximum M/C	286912.49	217478.18	175908.76	406044.23

**Appendix Table B2** The result of  $C_{\max}$  from two step scheduling in different dispatching rule and skill (class 2,data 2).

			<b>FIFO</b>	<b>EDD</b>	<b>SPT</b>	<b>LPT</b>
<b>Cmax Company</b>			<b>264183</b>			
<b>Cmax Standard</b>			<b>194063.27</b>	<b>226850.91</b>	<b>99596.97</b>	<b>325172.48</b>
100 : 0			194063.27	226850.91	99596.97	325172.48
80 : 20	Single skill	Processing	194069.19	226852.59	99598.732	325176.99
80 : 20	Single skill	Continuous	194067.22	226851.9	99598.275	325176.29
80 : 20	Single skill	Maximum M/C	194069.51	226852.24	99598.788	325178.42
80 : 20	Multi skill	Processing	194095.64	226891.93	99670.677	325398.21
80 : 20	Multi skill	Continuous	194084.86	226875.09	99651.567	325347.93
80 : 20	Multi skill	Maximum M/C	194097.44	226883.29	99673.016	325420.76
80 : 20	Random allocate	Processing	194111.82	226963.2	99701.363	325511.08
80 : 20	Random allocate	Continuous	194095.64	226917.1	99674.298	325411.98
80 : 20	Random allocate	Maximum M/C	194114.51	226939.56	99704.677	325524.13
50 : 50	Single skill	Processing	195576.99	227017.71	99771.806	325620.48
50 : 50	Single skill	Continuous	195072.43	226949.24	99726.478	325550.16
50 : 50	Single skill	Maximum M/C	195661.09	226982.6	99777.356	325761.42
50 : 50	Multi skill	Processing	201631.77	230920.91	106910.93	347572.31
50 : 50	Multi skill	Continuous	199108.95	229250.07	105014.72	342582.43
50 : 50	Multi skill	Maximum M/C	202052.24	230064.07	107143.12	349809.78
50 : 50	Random allocate	Processing	205416	237993.38	109955.99	358772.23
50 : 50	Random allocate	Continuous	201631.77	233419.1	107270.31	348938.45
50 : 50	Random allocate	Maximum M/C	206046.71	235647.6	110284.84	360067.14
20 : 80	Single skill	Processing	196521.44	227049.18	99804.785	325704.98
20 : 80	Single skill	Continuous	195702.06	226967.78	99750.907	325621.4
20 : 80	Single skill	Maximum M/C	196658	227007.44	99811.382	325872.51
20 : 80	Multi skill	Processing	206353.98	231688.64	108290.57	351797.6
20 : 80	Multi skill	Continuous	202257.08	229702.63	106036.67	345866.48
20 : 80	Multi skill	Maximum M/C	207036.79	230670.17	108566.55	354457.12
20 : 80	Random allocate	Processing	212499.31	240095.19	111910.01	365110.16
20 : 80	Random allocate	Continuous	206353.98	234658.07	108717.74	353421.44
20 : 80	Random allocate	Maximum M/C	213523.54	237306.92	112300.9	366649.34
0 : 100	Single skill	Processing	201049.58	227281.93	100048.74	326330.09
0 : 100	Single skill	Continuous	198720.82	227104.98	99931.616	326148.39
0 : 100	Single skill	Maximum M/C	201437.71	227191.19	100063.08	326694.29
0 : 100	Random allocate	Processing	246460.39	255642.83	126364.45	411993.53
0 : 100	Random allocate	Continuous	228994.69	243822.99	119424.73	386583.25
0 : 100	Random allocate	Maximum M/C	249371.34	249581.37	127214.21	415339.56

**Appendix Table B2** The result of  $C_{\max}$  from two step scheduling in different dispatching rule and skill (class 2,data 3).

			<b>FIFO</b>	<b>EDD</b>	<b>SPT</b>	<b>LPT</b>
<b>Cmax Company</b>			<b>248668.7</b>			
<b>Cmax Standard</b>			<b>216073.77</b>	<b>210626.03</b>	<b>97965.915</b>	<b>325446.59</b>
100 : 0			216073.77	210626.03	97965.915	325446.59
80 : 20	Single skill	Processing	216080.35	210627.59	97967.648	325451.11
80 : 20	Single skill	Continuous	216078.17	210626.95	97967.199	325450.4
80 : 20	Single skill	Maximum M/C	216080.72	210627.26	97967.703	325452.53
80 : 20	Multi skill	Processing	216109.81	210664.11	98038.415	325672.52
80 : 20	Multi skill	Continuous	216097.81	210648.48	98019.618	325622.19
80 : 20	Multi skill	Maximum M/C	216111.81	210656.09	98040.716	325695.08
80 : 20	Random allocate	Processing	216127.82	210730.29	98068.599	325785.48
80 : 20	Random allocate	Continuous	216109.81	210687.49	98041.977	325686.29
80 : 20	Random allocate	Maximum M/C	216130.82	210708.34	98071.858	325798.54
50 : 50	Single skill	Processing	217759.18	210780.9	98137.888	325894.96
50 : 50	Single skill	Continuous	217197.38	210717.32	98093.302	325824.58
50 : 50	Single skill	Maximum M/C	217852.81	210748.3	98143.347	326036.03
50 : 50	Multi skill	Processing	224500.68	214404.94	105160.1	347865.3
50 : 50	Multi skill	Continuous	221691.72	212853.6	103294.94	342871.22
50 : 50	Multi skill	Maximum M/C	224968.84	213609.38	105388.48	350104.66
50 : 50	Random allocate	Processing	228714.12	220971.57	108155.29	359074.66
50 : 50	Random allocate	Continuous	224500.68	216724.45	105513.6	349232.59
50 : 50	Random allocate	Maximum M/C	229416.36	218793.56	108478.76	360370.66
20 : 80	Single skill	Processing	218810.73	210810.12	98170.327	325979.54
20 : 80	Single skill	Continuous	217898.42	210734.54	98117.331	325895.89
20 : 80	Single skill	Maximum M/C	218962.79	210771.36	98176.816	326147.21
20 : 80	Multi skill	Processing	229758.47	215117.76	106517.14	352094.16
20 : 80	Multi skill	Continuous	225196.92	213273.78	104300.16	346158.04
20 : 80	Multi skill	Maximum M/C	230518.73	214172.13	106788.61	354755.92
20 : 80	Random allocate	Processing	236600.81	222923.05	110077.31	365417.94
20 : 80	Random allocate	Continuous	229758.47	217874.8	106937.32	353719.36
20 : 80	Random allocate	Maximum M/C	237741.2	220334.2	110461.8	366958.41
0 : 100	Single skill	Processing	223852.46	211026.22	98410.288	326605.18
0 : 100	Single skill	Continuous	221259.57	210861.93	98295.08	326423.32
0 : 100	Single skill	Maximum M/C	224284.6	210941.97	98424.395	326969.68
0 : 100	Random allocate	Processing	274413.73	237358.69	124295.04	412340.83
0 : 100	Random allocate	Continuous	254967.08	226384.23	117468.97	386909.13
0 : 100	Random allocate	Maximum M/C	277654.83	231730.76	125130.88	415689.67

**Appendix Table B2** The result of  $C_{\max}$  from two step scheduling in different dispatching rule and skill (class 2,data 4).

			FIFO	EDD	SPT	LPT
Cmax Company			256303.5			
Cmax Standard			247238.24	219777.79	96506.176	339036.47
100 : 0	Single skill	Processing	247238.24	219777.79	96506.176	339036.47
80 : 20	Single skill	Processing	247245.7	219779.42	96507.883	339041.18
80 : 20	Single skill	Continuous	247243.2	219778.75	96507.441	339040.44
80 : 20	Single skill	Maximum M/C	247246.12	219779.08	96507.937	339042.66
80 : 20	Multi skill	Processing	247279.41	219817.53	96577.595	339271.83
80 : 20	Multi skill	Continuous	247265.67	219801.21	96559.079	339219.4
80 : 20	Multi skill	Maximum M/C	247281.7	219809.16	96579.863	339295.34
80 : 20	Random allocate	Processing	247300.01	219886.58	96607.33	339389.51
80 : 20	Random allocate	Continuous	247279.41	219841.92	96581.105	339286.18
80 : 20	Random allocate	Maximum M/C	247303.44	219863.67	96610.541	339403.11
50 : 50	Single skill	Processing	249166.66	219939.39	96675.586	339503.57
50 : 50	Single skill	Continuous	248523.84	219873.05	96631.665	339430.25
50 : 50	Single skill	Maximum M/C	249273.79	219905.37	96680.964	339650.52
50 : 50	Multi skill	Processing	256880.49	223720.89	103593.16	362391.34
50 : 50	Multi skill	Continuous	253666.39	222102.15	101755.8	357188.71
50 : 50	Multi skill	Maximum M/C	257416.17	222890.77	103818.15	364724.2
50 : 50	Random allocate	Processing	261701.63	230572.84	106543.72	374068.77
50 : 50	Random allocate	Continuous	256880.49	226141.19	103941.39	363815.72
50 : 50	Random allocate	Maximum M/C	262505.16	228300.2	106862.37	375418.89
20 : 80	Single skill	Processing	250369.88	219969.88	96707.542	339591.68
20 : 80	Single skill	Continuous	249325.99	219891.02	96655.336	339504.53
20 : 80	Single skill	Maximum M/C	250543.87	219929.44	96713.934	339766.35
20 : 80	Multi skill	Processing	262896.62	224464.68	104929.98	366796.78
20 : 80	Multi skill	Continuous	257677.15	222540.59	102746.03	360612.78
20 : 80	Multi skill	Maximum M/C	263766.53	223477.97	105197.41	369569.69
20 : 80	Random allocate	Processing	270725.83	232609.12	108437.11	380676.93
20 : 80	Random allocate	Continuous	262896.62	227341.52	105343.9	368489.84
20 : 80	Random allocate	Maximum M/C	272030.7	229907.79	108815.87	382281.72
0 : 100	Single skill	Processing	256138.78	220195.37	96943.928	340243.44
0 : 100	Single skill	Continuous	253171.92	220023.94	96830.437	340053.99
0 : 100	Single skill	Maximum M/C	256633.25	220107.46	96957.825	340623.16
0 : 100	Random allocate	Processing	313992.51	247671.99	122442.98	429559.21
0 : 100	Random allocate	Continuous	291741.08	236220.69	115718.63	403065.54
0 : 100	Random allocate	Maximum M/C	317701.09	241799.52	123266.37	433047.89

**Appendix Table B2** The result of  $C_{\max}$  from two step scheduling in different dispatching rule and skill (class 2,data 5).

			<b>FIFO</b>	<b>EDD</b>	<b>SPT</b>	<b>LPT</b>
<b>Cmax Company</b>			<b>268446.1</b>			
<b>Cmax Standard</b>			<b>236139.21</b>	<b>229048.85</b>	<b>99542.479</b>	<b>305808.79</b>
100 : 0			236139.21	229048.85	99542.479	305808.79
80 : 20	Single skill	Processing	236146.36	229050.55	99544.24	305813.04
80 : 20	Single skill	Continuous	236143.98	229049.85	99543.783	305812.37
80 : 20	Single skill	Maximum M/C	236146.76	229050.19	99544.296	305814.37
80 : 20	Multi skill	Processing	236178.56	229090.26	99616.145	306021.08
80 : 20	Multi skill	Continuous	236165.44	229073.26	99597.047	305973.79
80 : 20	Multi skill	Maximum M/C	236180.74	229081.54	99618.484	306042.29
80 : 20	Random allocate	Processing	236198.23	229162.23	99646.815	306127.23
80 : 20	Random allocate	Continuous	236178.56	229115.68	99619.765	306034.03
80 : 20	Random allocate	Maximum M/C	236201.51	229138.36	99650.127	306139.5
50 : 50	Single skill	Processing	237981.09	229217.27	99717.219	306230.11
50 : 50	Single skill	Continuous	237367.12	229148.13	99671.916	306163.98
50 : 50	Single skill	Maximum M/C	238083.41	229181.81	99722.766	306362.66
50 : 50	Multi skill	Processing	245348.63	233158.29	106852.44	326874.73
50 : 50	Multi skill	Continuous	242278.82	231471.26	104957.26	322182
50 : 50	Multi skill	Maximum M/C	245860.26	232293.14	107084.5	328978.96
50 : 50	Random allocate	Processing	249953.34	240299.28	109895.83	337407.71
50 : 50	Random allocate	Continuous	245348.63	235680.68	107211.63	328159.52
50 : 50	Random allocate	Maximum M/C	250720.8	237930.77	110224.5	338625.51
20 : 80	Single skill	Processing	239130.3	229249.04	99750.18	306309.58
20 : 80	Single skill	Continuous	238133.26	229166.86	99696.332	306230.97
20 : 80	Single skill	Maximum M/C	239296.47	229206.89	99756.774	306467.14
20 : 80	Multi skill	Processing	251094.68	233933.45	108231.32	330848.41
20 : 80	Multi skill	Continuous	246109.52	231928.2	105978.66	325270.49
20 : 80	Multi skill	Maximum M/C	251925.54	232905.12	108507.16	333349.56
20 : 80	Random allocate	Processing	258572.42	242421.45	111848.78	343368.23
20 : 80	Random allocate	Continuous	251094.68	236931.65	108658.26	332375.55
20 : 80	Random allocate	Maximum M/C	259818.71	239606.17	112239.46	344815.74
0 : 100	Single skill	Processing	244640.21	229484.04	99994.004	306897.47
0 : 100	Single skill	Continuous	241806.54	229305.38	99876.942	306726.58
0 : 100	Single skill	Maximum M/C	245112.49	229392.42	100008.34	307239.98
0 : 100	Random allocate	Processing	299896.78	258119.73	126295.32	387459.74
0 : 100	Random allocate	Continuous	278644.26	246185.37	119359.4	363562.61
0 : 100	Random allocate	Maximum M/C	303438.87	251999.54	127144.61	390606.51

**Appendix Table B2** The result of  $C_{\max}$  from two step scheduling in different dispatching rule and skill (class 2,data 6).

			<b>FIFO</b>	<b>EDD</b>	<b>SPT</b>	<b>LPT</b>
<b>Cmax Company</b>			<b>273964.8</b>			
<b>Cmax Standard</b>			<b>204343.09</b>	<b>230530.24</b>	<b>108909.6</b>	<b>303677.78</b>
100 : 0			204343.09	230530.24	108909.58	303677.78
80 : 20	Single skill	Processing	204349.3	230531.95	108911.53	303682
80 : 20	Single skill	Continuous	204347.23	230531.25	108911.03	303681.33
80 : 20	Single skill	Maximum M/C	204349.64	230531.59	108911.59	303683.32
80 : 20	Multi skill	Processing	204377.16	230571.92	108990.2	303888.59
80 : 20	Multi skill	Continuous	204365.8	230554.81	108969.3	303841.63
80 : 20	Multi skill	Maximum M/C	204379.05	230563.15	108992.76	303909.65
80 : 20	Random allocate	Processing	204394.19	230644.35	109023.75	303994
80 : 20	Random allocate	Continuous	204377.16	230597.5	108994.16	303901.45
80 : 20	Random allocate	Maximum M/C	204397.02	230620.33	109027.38	304006.19
50 : 50	Single skill	Processing	205936.98	230699.75	109100.78	304096.16
50 : 50	Single skill	Continuous	205405.68	230630.16	109051.22	304030.49
50 : 50	Single skill	Maximum M/C	206025.52	230664.06	109106.85	304227.79
50 : 50	Multi skill	Processing	212312.48	234666.26	116907.44	324596.93
50 : 50	Multi skill	Continuous	209656.02	232968.31	114833.93	319936.89
50 : 50	Multi skill	Maximum M/C	212755.22	233795.52	117161.34	326686.49
50 : 50	Random allocate	Processing	216297.17	241853.43	120237.22	335056.5
50 : 50	Random allocate	Continuous	212312.48	237204.96	117300.43	325872.76
50 : 50	Random allocate	Maximum M/C	216961.29	239469.6	120596.82	336265.82
20 : 80	Single skill	Processing	206931.45	230731.72	109136.85	304175.08
20 : 80	Single skill	Continuous	206068.66	230649.01	109077.93	304097.02
20 : 80	Single skill	Maximum M/C	207075.24	230689.31	109144.06	304331.54
20 : 80	Multi skill	Processing	217284.83	235446.44	118416.08	328542.92
20 : 80	Multi skill	Continuous	212970.92	233428.21	115951.43	323003.86
20 : 80	Multi skill	Maximum M/C	218003.81	234411.45	118717.87	331026.64
20 : 80	Random allocate	Processing	223755.69	243989.33	122373.95	340975.48
20 : 80	Random allocate	Continuous	217284.83	238464.02	118883.19	330059.41
20 : 80	Random allocate	Maximum M/C	224834.17	241155.84	122801.39	342412.91
0 : 100	Single skill	Processing	211699.45	230968.25	109403.61	304758.87
0 : 100	Single skill	Continuous	209247.33	230788.43	109275.54	304589.18
0 : 100	Single skill	Maximum M/C	212108.14	230876.04	109419.3	305098.99
0 : 100	Random allocate	Processing	259515.74	259789.14	138179.93	384759.75
0 : 100	Random allocate	Continuous	241124.86	247777.59	130591.32	361029.15
0 : 100	Random allocate	Maximum M/C	262580.88	253629.37	139109.14	387884.59

**Appendix Table B3** The result of  $C_{\max}$  from two step scheduling in different dispatching rule and skill (class 3,data 1).

			<b>FIFO</b>	<b>EDD</b>	<b>SPT</b>	<b>LPT</b>
<b>Cmax Company</b>			<b>480181.7</b>			
<b>Cmax Standard</b>			<b>344659.37</b>	<b>467808.17</b>	<b>208841.66</b>	<b>678416.83</b>
100 : 0	Single skill	Processing	344659.37	467808.17	208841.66	678416.83
80 : 20	Single skill	Processing	344669.85	467811.64	208845.35	678426.25
80 : 20	Single skill	Continuous	344666.37	467810.21	208844.4	678424.77
80 : 20	Single skill	Maximum M/C	344670.44	467810.91	208845.47	678429.21
80 : 20	Multi skill	Processing	344716.84	467892.75	208996.21	678887.79
80 : 20	Multi skill	Continuous	344697.7	467858.03	208956.14	678782.87
80 : 20	Multi skill	Maximum M/C	344720.03	467874.94	209001.12	678934.83
80 : 20	Random allocate	Processing	344745.56	468039.73	209060.56	679123.27
80 : 20	Random allocate	Continuous	344716.84	467944.67	209003.81	678916.51
80 : 20	Random allocate	Maximum M/C	344750.35	467990.98	209067.51	679150.49
50 : 50	Single skill	Processing	347347.74	468152.15	209208.27	679351.5
50 : 50	Single skill	Continuous	346451.63	468010.94	209113.22	679204.79
50 : 50	Single skill	Maximum M/C	347497.1	468079.73	209219.91	679645.55
50 : 50	Multi skill	Processing	358101.12	476201.27	224178.07	725150.25
50 : 50	Multi skill	Continuous	353620.54	472755.68	220201.96	714739.73
50 : 50	Multi skill	Maximum M/C	358847.88	474434.3	224664.94	729818.34
50 : 50	Random allocate	Processing	364821.97	490785.99	230563.14	748516.96
50 : 50	Random allocate	Continuous	358101.12	481352.99	224931.65	728000.47
50 : 50	Random allocate	Maximum M/C	365942.12	485948.55	231252.72	751218.57
20 : 80	Single skill	Processing	349025.09	468217.03	209277.42	679527.81
20 : 80	Single skill	Continuous	347569.86	468049.18	209164.45	679353.42
20 : 80	Single skill	Maximum M/C	349267.62	468130.96	209291.25	679877.33
20 : 80	Multi skill	Processing	366487.83	477784.46	227070.98	733965.6
20 : 80	Multi skill	Continuous	359211.69	473688.93	222344.86	721591.33
20 : 80	Multi skill	Maximum M/C	367700.52	475684.19	227649.69	739514.24
20 : 80	Random allocate	Processing	377402.04	495120.31	234660.48	761739.99
20 : 80	Random allocate	Continuous	366487.83	483907.96	227966.71	737353.45
20 : 80	Random allocate	Maximum M/C	379221.08	489370.38	235480.12	764951.2
0 : 100	Single skill	Processing	357067.14	468697.01	209788.97	680831.99
0 : 100	Single skill	Continuous	352931.23	468332.12	209543.37	680452.89
0 : 100	Single skill	Maximum M/C	357756.46	468509.88	209819.04	681591.82
0 : 100	Random allocate	Processing	437717.44	527182.38	264969.53	859554.12
0 : 100	Random allocate	Continuous	406698.09	502807.71	250417.86	806539.92
0 : 100	Random allocate	Maximum M/C	442887.33	514682.55	266751.36	866535.03

**Appendix Table B3** The result of  $C_{\max}$  from two step scheduling in different dispatching rule and skill (class 3,data 2).

			<b>FIFO</b>	<b>EDD</b>	<b>SPT</b>	<b>LPT</b>
<b>Cmax Company</b>			<b>495819</b>			
<b>Cmax Standard</b>			<b>663186.18</b>	<b>495863.63</b>	<b>223477.25</b>	<b>920171.18</b>
100 : 0			663186.18	495863.63	223477.25	920171.18
80 : 20	Single skill	Processing	663206.32	495867.3	223481.2	920183.96
80 : 20	Single skill	Continuous	663199.61	495865.8	223480.18	920181.95
80 : 20	Single skill	Maximum M/C	663207.43	495866.53	223481.33	920187.97
80 : 20	Multi skill	Processing	663296.73	495953.28	223642.63	920809.96
80 : 20	Multi skill	Continuous	663259.89	495916.48	223599.76	920667.66
80 : 20	Multi skill	Maximum M/C	663302.87	495934.41	223647.88	920873.77
80 : 20	Random allocate	Processing	663352	496109.08	223711.49	921129.35
80 : 20	Random allocate	Continuous	663296.73	496008.31	223650.76	920848.92
80 : 20	Random allocate	Maximum M/C	663361.21	496057.4	223718.93	921166.28
50 : 50	Single skill	Processing	668359.05	496228.24	223869.55	921438.92
50 : 50	Single skill	Continuous	666634.77	496078.56	223767.84	921239.93
50 : 50	Single skill	Maximum M/C	668646.43	496151.48	223882	921837.76
50 : 50	Multi skill	Processing	689050.46	504760.08	239888.43	983558.09
50 : 50	Multi skill	Continuous	680429.04	501107.85	235633.68	969437.77
50 : 50	Multi skill	Maximum M/C	690487.37	502887.14	240409.42	989889.66
50 : 50	Random allocate	Processing	701982.59	520219.48	246720.97	1015251.5
50 : 50	Random allocate	Continuous	689050.46	510220.76	240694.82	987423.98
50 : 50	Random allocate	Maximum M/C	704137.95	515091.93	247458.87	1018915.9
20 : 80	Single skill	Processing	671586.56	496297.01	223943.55	921678.05
20 : 80	Single skill	Continuous	668786.44	496119.1	223822.66	921441.52
20 : 80	Single skill	Maximum M/C	672053.25	496205.78	223958.35	922152.12
20 : 80	Multi skill	Processing	705187.99	506438.22	242984.08	995514.8
20 : 80	Multi skill	Continuous	691187.4	502097.07	237926.75	978730.95
20 : 80	Multi skill	Maximum M/C	707521.43	504211.99	243603.34	1003040.7
20 : 80	Random allocate	Processing	726188.89	524813.74	251105.45	1033186.6
20 : 80	Random allocate	Continuous	705187.99	512928.96	243942.58	1000109.9
20 : 80	Random allocate	Maximum M/C	729689.04	518718.98	251982.53	1037542.1
0 : 100	Single skill	Processing	687060.9	496805.77	224490.94	923446.99
0 : 100	Single skill	Continuous	679102.67	496419	224228.13	922932.8
0 : 100	Single skill	Maximum M/C	688387.28	496607.43	224523.12	924477.58
0 : 100	Random allocate	Processing	842246.47	558798.64	283538.55	1165856.9
0 : 100	Random allocate	Continuous	782559.72	532962.16	267967.1	1093951
0 : 100	Random allocate	Maximum M/C	852194.27	545549.17	285445.26	1175325.4

**Appendix Table B3** The result of  $C_{\max}$  from two step scheduling in different dispatching rule and skill (class 3,data 3).

			<b>FIFO</b>	<b>EDD</b>	<b>SPT</b>	<b>LPT</b>
<b>Cmax Company</b>			<b>498053.3</b>			
<b>Cmax Standard</b>			<b>690173.19</b>	<b>458765.22</b>	<b>185030.87</b>	<b>902123.19</b>
100 : 0			690173.19	458765.22	185030.87	902123.19
80 : 20	Single skill	Processing	690194.13	458768.62	185034.14	902135.72
80 : 20	Single skill	Continuous	690187.15	458767.22	185033.29	902133.75
80 : 20	Single skill	Maximum M/C	690195.29	458767.9	185034.25	902139.66
80 : 20	Multi skill	Processing	690288.22	458848.17	185167.8	902749.44
80 : 20	Multi skill	Continuous	690249.88	458814.11	185132.3	902609.94
80 : 20	Multi skill	Maximum M/C	690294.61	458830.7	185172.15	902812
80 : 20	Random allocate	Processing	690345.73	458992.3	185224.81	903062.57
80 : 20	Random allocate	Continuous	690288.22	458899.08	185174.53	902787.64
80 : 20	Random allocate	Maximum M/C	690355.32	458944.5	185230.97	903098.77
50 : 50	Single skill	Processing	695556.54	459102.55	185355.68	903366.06
50 : 50	Single skill	Continuous	693762.09	458964.07	185271.47	903170.97
50 : 50	Single skill	Maximum M/C	695855.62	459031.53	185365.99	903757.08
50 : 50	Multi skill	Processing	717089.94	466996.07	198618.72	964266.85
50 : 50	Multi skill	Continuous	708117.69	463617.09	195095.94	950423.48
50 : 50	Multi skill	Maximum M/C	718585.32	465263.26	199050.08	970474.23
50 : 50	Random allocate	Processing	730548.32	481298.87	204275.81	995338.68
50 : 50	Random allocate	Continuous	717089.94	472048.21	199286.38	968056.91
50 : 50	Random allocate	Maximum M/C	732791.38	476554.94	204886.76	998931.14
20 : 80	Single skill	Processing	698915.38	459166.18	185416.95	903600.51
20 : 80	Single skill	Continuous	696001.32	459001.58	185316.85	903368.62
20 : 80	Single skill	Maximum M/C	699401.06	459081.77	185429.2	904065.28
20 : 80	Multi skill	Processing	733884.16	468548.66	201181.8	975989.04
20 : 80	Multi skill	Continuous	719313.84	464532.3	196994.52	959534.38
20 : 80	Multi skill	Maximum M/C	736312.55	466488.99	201694.53	983367.32
20 : 80	Random allocate	Processing	755739.64	485549.4	207905.99	1012922
20 : 80	Random allocate	Continuous	733884.16	474553.79	201975.4	980494.02
20 : 80	Random allocate	Maximum M/C	759382.22	479910.63	208632.19	1017192.1
0 : 100	Single skill	Processing	715019.42	459636.87	185870.17	905334.75
0 : 100	Single skill	Continuous	706737.35	459279.04	185652.57	904830.64
0 : 100	Single skill	Maximum M/C	716399.77	459453.37	185896.81	906345.13
0 : 100	Random allocate	Processing	876519.95	516991.7	234759.4	1142990.1
0 : 100	Random allocate	Continuous	814404.36	493088.2	221866.82	1072494.6
0 : 100	Random allocate	Maximum M/C	886872.55	504733.5	236338.08	1152272.9

**Appendix Table B3** The result of  $C_{\max}$  from two step scheduling in different dispatching rule and skill (class 3,data 4).

			<b>FIFO</b>	<b>EDD</b>	<b>SPT</b>	<b>LPT</b>
<b>Cmax Company</b>			<b>806619.2</b>			
<b>Cmax Standard</b>			<b>726537.5</b>	<b>806356.67</b>	<b>304470.28</b>	<b>1113793</b>
100 : 0			726537.5	806356.67	304470.28	1113793
80 : 20	Single skill	Processing	726559.54	806362.65	304475.67	111380.85
80 : 20	Single skill	Continuous	726552.19	806360.19	304474.27	111380.6
80 : 20	Single skill	Maximum M/C	726560.76	806361.39	304475.84	111381.33
80 : 20	Multi skill	Processing	726658.59	806502.46	304695.6	111456.62
80 : 20	Multi skill	Continuous	726618.23	806442.61	304637.19	111439.4
80 : 20	Multi skill	Maximum M/C	726665.32	806471.77	304702.76	111464.34
80 : 20	Random allocate	Processing	726719.13	806755.81	304789.41	111495.28
80 : 20	Random allocate	Continuous	726658.59	806591.95	304706.67	111461.34
80 : 20	Random allocate	Maximum M/C	726729.23	806671.78	304799.54	111499.75
50 : 50	Single skill	Processing	732204.49	806949.58	305004.76	111532.75
50 : 50	Single skill	Continuous	730315.5	806706.18	304866.19	111508.66
50 : 50	Single skill	Maximum M/C	732519.33	806824.76	305021.72	111581.03
50 : 50	Multi skill	Processing	754872.46	820823.77	326829.23	119051.77
50 : 50	Multi skill	Continuous	745427.48	814884.65	321032.46	117342.62
50 : 50	Multi skill	Maximum M/C	756446.63	817778.07	327539.04	119818.16
50 : 50	Random allocate	Processing	769039.94	845963.33	336138.03	122888.01
50 : 50	Random allocate	Continuous	754872.46	829703.75	327927.88	119519.71
50 : 50	Random allocate	Maximum M/C	771401.19	837625.09	337143.36	123331.55
20 : 80	Single skill	Processing	735740.31	807061.43	305105.58	111561.69
20 : 80	Single skill	Continuous	732672.71	806772.1	304940.87	111533.06
20 : 80	Single skill	Maximum M/C	736251.58	806913.06	305125.74	111619.08
20 : 80	Multi skill	Processing	772551.54	823552.71	331046.81	120499.04
20 : 80	Multi skill	Continuous	757213.53	816493.28	324156.6	118467.49
20 : 80	Multi skill	Maximum M/C	775107.88	819932.49	331890.51	121409.99
20 : 80	Random allocate	Processing	795558.56	853434.35	342111.54	125058.91
20 : 80	Random allocate	Continuous	772551.54	834107.73	332352.69	121055.24
20 : 80	Random allocate	Maximum M/C	799393.07	843523.26	343306.5	125586.11
0 : 100	Single skill	Processing	752692.85	807888.75	305851.36	111775.81
0 : 100	Single skill	Continuous	743974.4	807259.79	305493.3	111713.57
0 : 100	Single skill	Maximum M/C	754145.93	807566.21	305895.2	111900.56
0 : 100	Random allocate	Processing	922702.63	908699.46	386299.1	141117.57
0 : 100	Random allocate	Continuous	857314.25	866685.05	365084.22	132413.95
0 : 100	Random allocate	Maximum M/C	933600.69	887153.61	388896.84	142263.67

**Appendix Table B3** The result of  $C_{\max}$  from two step scheduling in different dispatching rule and skill (class 3,data 5).

			<b>FIFO</b>	<b>EDD</b>	<b>SPT</b>	<b>LPT</b>
<b>Cmax Company</b>			<b>578156</b>			
<b>Cmax Standard</b>			<b>485308.43</b>	<b>578105.42</b>	<b>241375.3</b>	<b>1061383.7</b>
100 : 0			485332.53	578150	241376.51	1061697
80 : 20	Single skill	Processing	485323.12	578109.7	241379.57	1061398.4
80 : 20	Single skill	Continuous	485318.21	578107.95	241378.46	1061396.1
80 : 20	Single skill	Maximum M/C	485323.94	578108.8	241379.71	1061403.1
80 : 20	Multi skill	Processing	485389.28	578209.94	241553.93	1062120.5
80 : 20	Multi skill	Continuous	485362.32	578167.03	241507.62	1061956.4
80 : 20	Multi skill	Maximum M/C	485393.78	578187.94	241559.6	1062194.1
80 : 20	Random allocate	Processing	485429.73	578391.58	241628.3	1062488.9
80 : 20	Random allocate	Continuous	485389.28	578274.1	241562.71	1062165.4
80 : 20	Random allocate	Maximum M/C	485436.47	578331.33	241636.33	1062531.5
50 : 50	Single skill	Processing	489093.81	578530.5	241799.02	1062846
50 : 50	Single skill	Continuous	487832	578355.99	241689.17	1062616.5
50 : 50	Single skill	Maximum M/C	489304.11	578441.01	241812.47	1063306
50 : 50	Multi skill	Processing	504235.43	588477.39	259100.83	1134498.2
50 : 50	Multi skill	Continuous	497926.42	584219.43	254505.32	1118210.9
50 : 50	Multi skill	Maximum M/C	505286.93	586293.82	259663.55	1141801.4
50 : 50	Random allocate	Processing	513698.94	606500.83	266480.59	1171055.4
50 : 50	Random allocate	Continuous	504235.43	594843.76	259971.81	1138957.3
50 : 50	Random allocate	Maximum M/C	515276.19	600522.85	267277.58	1175282.1
20 : 80	Single skill	Processing	491455.64	578610.68	241878.94	1063121.8
20 : 80	Single skill	Continuous	489406.56	578403.26	241748.37	1062849
20 : 80	Single skill	Maximum M/C	491797.15	578504.31	241894.93	1063668.6
20 : 80	Multi skill	Processing	516044.6	590433.86	262444.41	1148289.8
20 : 80	Multi skill	Continuous	505799.2	585372.71	256982.05	1128930.2
20 : 80	Multi skill	Maximum M/C	517752.17	587838.4	263113.27	1156970.6
20 : 80	Random allocate	Processing	531412.7	611857.06	271216.21	1191742.8
20 : 80	Random allocate	Continuous	516044.6	598001.13	263479.68	1153590.1
20 : 80	Random allocate	Maximum M/C	533974.05	604751.46	272163.54	1196766.8
0 : 100	Single skill	Processing	502779.5	579203.82	242470.18	1065162.2
0 : 100	Single skill	Continuous	496955.8	578752.9	242186.32	1064569.1
0 : 100	Single skill	Maximum M/C	503750.12	578972.58	242504.94	1066351
0 : 100	Random allocate	Processing	616341.67	651478.56	306246.84	1344773.1
0 : 100	Random allocate	Continuous	572663.91	621356.96	289428.29	1261832.4
0 : 100	Random allocate	Maximum M/C	623621.29	636031.58	308306.26	1355694.8

**Appendix Table B3** The result of  $C_{\max}$  from two step scheduling in different dispatching rule and skill (class 3,data 6).

			<b>FIFO</b>	<b>EDD</b>	<b>SPT</b>	<b>LPT</b>
<b>Cmax Company</b>			<b>578159.3</b>			
<b>Cmax Standard</b>			<b>451424.55</b>	<b>401859.36</b>	<b>190574.44</b>	<b>695359.94</b>
100 : 0			451424.55	401859.36	190574.44	695359.94
80 : 20	Single skill	Processing	451438.29	401862.38	190577.77	695369.55
80 : 20	Single skill	Continuous	451433.73	401861.16	190576.9	695368.04
80 : 20	Single skill	Maximum M/C	451439.05	401861.75	190577.88	695372.59
80 : 20	Multi skill	Processing	451499.84	401932.06	190715.43	695842.62
80 : 20	Multi skill	Continuous	451474.76	401902.23	190678.87	695735.09
80 : 20	Multi skill	Maximum M/C	451504.02	401916.76	190719.91	695890.84
80 : 20	Random allocate	Processing	451537.46	402058.32	190774.15	696083.98
80 : 20	Random allocate	Continuous	451499.84	401976.66	190722.36	695872.06
80 : 20	Random allocate	Maximum M/C	451543.73	402016.44	190780.49	696111.88
50 : 50	Single skill	Processing	454945.71	402154.89	190908.94	696317.91
50 : 50	Single skill	Continuous	453772.01	402033.58	190822.21	696167.54
50 : 50	Single skill	Maximum M/C	455141.33	402092.68	190919.56	696619.31
50 : 50	Multi skill	Processing	469030.16	409069.29	204569.34	743260.46
50 : 50	Multi skill	Continuous	463161.64	406109.44	200941.02	732589.94
50 : 50	Multi skill	Maximum M/C	470008.25	407551.42	205013.62	748045.14
50 : 50	Random allocate	Processing	477832.94	421597.95	210395.92	767210.74
50 : 50	Random allocate	Continuous	469030.16	413494.75	205257.01	746181.86
50 : 50	Random allocate	Maximum M/C	479300.07	417442.46	211025.17	769979.83
20 : 80	Single skill	Processing	457142.64	402210.63	190972.04	696498.62
20 : 80	Single skill	Continuous	455236.63	402066.44	190868.95	696319.88
20 : 80	Single skill	Maximum M/C	457460.31	402136.68	190984.67	696856.87
20 : 80	Multi skill	Processing	480014.82	410429.29	207209.21	752295.97
20 : 80	Multi skill	Continuous	470484.75	406911.13	202896.48	739612.66
20 : 80	Multi skill	Maximum M/C	481603.17	408625.1	207737.3	757983.18
20 : 80	Random allocate	Processing	494309.94	425321.24	214134.86	780764
20 : 80	Random allocate	Continuous	480014.82	415689.54	208026.59	755768.43
20 : 80	Random allocate	Maximum M/C	496692.46	420381.9	214882.81	784055.42
0 : 100	Single skill	Processing	467675.89	402622.93	191438.85	697835.38
0 : 100	Single skill	Continuous	462258.79	402309.48	191214.73	697446.81
0 : 100	Single skill	Maximum M/C	468578.73	402462.19	191466.29	698614.18
0 : 100	Random allocate	Processing	573309.24	452863.4	241792.79	881020.99
0 : 100	Random allocate	Continuous	532681.03	431924.91	228513.95	826682.79
0 : 100	Random allocate	Maximum M/C	580080.61	442125.71	243418.78	888176.25

**Appendix Table B4** The result of  $C_{\max}$  from two step scheduling in different dispatching rule and skill (class 4,data 1).

			FIFO	EDD	SPT	LPT
Cmax Company			135958.3			
Cmax Standard			198000	162250	81000	224500
100 : 0			198000	162250	81000	224500
80 : 20	Single skill	Processing	198006.01	162251.2	81001.433	224503.12
80 : 20	Single skill	Continuous	198004	162250.71	81001.061	224502.63
80 : 20	Single skill	Maximum M/C	198006.34	162250.95	81001.478	224504.1
80 : 20	Multi skill	Processing	198033	162279.34	81059.944	224655.85
80 : 20	Multi skill	Continuous	198022	162267.29	81044.403	224621.13
80 : 20	Multi skill	Maximum M/C	198034.83	162273.16	81061.847	224671.42
80 : 20	Random allocate	Processing	198049.5	162330.31	81084.901	224733.77
80 : 20	Random allocate	Continuous	198033	162297.34	81062.889	224665.35
80 : 20	Random allocate	Maximum M/C	198052.25	162313.4	81087.596	224742.78
50 : 50	Single skill	Processing	199544.4	162369.3	81142.19	224809.3
50 : 50	Single skill	Continuous	199029.6	162320.33	81105.326	224760.75
50 : 50	Single skill	Maximum M/C	199630.2	162344.19	81146.704	224906.61
50 : 50	Multi skill	Processing	205722	165160.98	86948.281	239964.91
50 : 50	Multi skill	Continuous	203148	163965.95	85406.134	236519.88
50 : 50	Multi skill	Maximum M/C	206151	164548.14	87137.116	241509.66
50 : 50	Random allocate	Processing	209583	170219.4	89424.757	247697.36
50 : 50	Random allocate	Continuous	205722	166947.75	87240.561	240908.09
50 : 50	Random allocate	Maximum M/C	210226.5	168541.63	89692.21	248591.37
20 : 80	Single skill	Processing	200508	162391.81	81169.011	224867.64
20 : 80	Single skill	Continuous	199672	162333.59	81125.194	224809.93
20 : 80	Single skill	Maximum M/C	200647.33	162361.95	81174.377	224983.3
20 : 80	Multi skill	Processing	210540	165710.08	88070.309	242882.06
20 : 80	Multi skill	Continuous	206360	164289.63	86237.266	238787.2
20 : 80	Multi skill	Maximum M/C	211236.67	164981.64	88294.763	244718.2
20 : 80	Random allocate	Processing	216810	171722.67	91013.923	252073.09
20 : 80	Random allocate	Continuous	210540	167833.89	88417.721	244003.16
20 : 80	Random allocate	Maximum M/C	217855	169728.43	91331.825	253135.74
0 : 100	Single skill	Processing	205128	162558.28	81367.416	225299.22
0 : 100	Single skill	Continuous	202752	162431.72	81272.16	225173.77
0 : 100	Single skill	Maximum M/C	205524	162493.38	81379.08	225550.66
0 : 100	Random allocate	Processing	251460	182842.77	102769.4	284441.5
0 : 100	Random allocate	Continuous	233640	174388.9	97125.48	266898.17
0 : 100	Random allocate	Maximum M/C	254430	178507.45	103460.49	286751.61

**Appendix Table B4** The result of  $C_{\max}$  from two step scheduling in different dispatching rule and skill (class 4,data 2).

			<b>FIFO</b>	<b>EDD</b>	<b>SPT</b>	<b>LPT</b>
<b>Cmax Company</b>			<b>57658</b>			
<b>Cmax Standard</b>			<b>117619.5</b>	<b>68937.75</b>	<b>52806</b>	<b>205177.5</b>
100 : 0			117619.5	68937.75	52806	205177.5
80 : 20	Single skill	Processing	117623.07	68938.311	52806.934	205180.35
80 : 20	Single skill	Continuous	117621.88	68938.101	52806.692	205179.9
80 : 20	Single skill	Maximum M/C	117623.27	68938.203	52806.964	205181.24
80 : 20	Multi skill	Processing	117639.1	68950.264	52845.079	205319.93
80 : 20	Multi skill	Continuous	117632.57	68945.147	52834.947	205288.2
80 : 20	Multi skill	Maximum M/C	117640.19	68947.64	52846.32	205334.16
80 : 20	Random allocate	Processing	117648.9	68971.923	52861.349	205391.15
80 : 20	Random allocate	Continuous	117639.1	68957.915	52846.999	205328.62
80 : 20	Random allocate	Maximum M/C	117650.54	68964.74	52863.106	205399.39
50 : 50	Single skill	Processing	118536.93	68988.49	52898.697	205460.18
50 : 50	Single skill	Continuous	118231.12	68967.68	52874.665	205415.81
50 : 50	Single skill	Maximum M/C	118587.9	68977.818	52901.64	205549.11
50 : 50	Multi skill	Processing	122206.66	70174.635	56683.839	219311.36
50 : 50	Multi skill	Continuous	120677.61	69666.882	55678.473	216162.84
50 : 50	Multi skill	Maximum M/C	122461.5	69914.249	56806.945	220723.15
50 : 50	Random allocate	Processing	124500.24	72323.89	58298.318	226378.29
50 : 50	Random allocate	Continuous	122206.66	70933.811	56874.383	220173.36
50 : 50	Random allocate	Maximum M/C	124882.5	71611.029	58472.677	227195.35
20 : 80	Single skill	Processing	119109.35	68998.052	52916.183	205513.5
20 : 80	Single skill	Continuous	118612.73	68973.317	52887.617	205460.76
20 : 80	Single skill	Maximum M/C	119192.12	68985.367	52919.681	205619.21
20 : 80	Multi skill	Processing	125068.74	70407.94	57415.317	221977.43
20 : 80	Multi skill	Continuous	122585.66	69804.409	56220.309	218235.01
20 : 80	Multi skill	Maximum M/C	125482.58	70098.437	57561.645	223655.54
20 : 80	Random allocate	Processing	128793.35	72962.609	59334.336	230377.4
20 : 80	Random allocate	Continuous	125068.74	71310.319	57641.805	223002.04
20 : 80	Random allocate	Maximum M/C	129414.12	72115.281	59541.585	231348.59
0 : 100	Single skill	Processing	121853.8	69068.782	53045.528	205907.93
0 : 100	Single skill	Continuous	120442.37	69015.01	52983.428	205793.28
0 : 100	Single skill	Maximum M/C	122089.04	69041.207	53053.132	206137.73
0 : 100	Random allocate	Processing	149376.77	77687.386	66998.035	259959.89
0 : 100	Random allocate	Continuous	138791.01	74095.45	63318.618	243926.5
0 : 100	Random allocate	Maximum M/C	151141.06	75845.368	67448.576	262071.17

**Appendix Table B4** The result of  $C_{\max}$  from two step scheduling in different dispatching rule and skill (class 4,data 3).

			FIFO	EDD	SPT	LPT
<b>Cmax Company</b>			<b>97812.22</b>			
<b>Cmax Standard</b>			72296.471	120190.59	49934.118	190461.18
100 : 0			72296.471	120190.59	49934.118	190461.18
80 : 20	Single skill	Processing	72298.664	120191.48	49935.001	190463.82
80 : 20	Single skill	Continuous	72297.933	120191.11	49934.772	190463.41
80 : 20	Single skill	Maximum M/C	72298.786	120191.29	49935.029	190464.66
80 : 20	Multi skill	Processing	72308.52	120212.32	49971.072	190593.4
80 : 20	Multi skill	Continuous	72304.504	120203.4	49961.491	190563.94
80 : 20	Multi skill	Maximum M/C	72309.19	120207.75	49972.245	190606.61
80 : 20	Random allocate	Processing	72314.545	120250.08	49986.457	190659.51
80 : 20	Random allocate	Continuous	72308.52	120225.66	49972.887	190601.46
80 : 20	Random allocate	Maximum M/C	72315.549	120237.56	49988.118	190667.15
50 : 50	Single skill	Processing	72860.383	120278.97	50021.774	190723.58
50 : 50	Single skill	Continuous	72672.413	120242.69	49999.048	190682.39
50 : 50	Single skill	Maximum M/C	72891.712	120260.36	50024.557	190806.14
50 : 50	Multi skill	Processing	75116.033	122346.97	53601.059	203581.29
50 : 50	Multi skill	Continuous	74176.179	121461.72	52650.37	200658.6
50 : 50	Multi skill	Maximum M/C	75272.676	121892.99	53717.469	204891.83
50 : 50	Random allocate	Processing	76525.815	126094.12	55127.733	210141.34
50 : 50	Random allocate	Continuous	75116.033	123670.56	53781.24	204381.47
50 : 50	Random allocate	Maximum M/C	76760.778	124851.27	55292.61	210899.8
20 : 80	Single skill	Processing	73212.226	120295.64	50038.309	190773.08
20 : 80	Single skill	Continuous	72906.975	120252.51	50011.296	190724.12
20 : 80	Single skill	Maximum M/C	73263.102	120273.52	50041.616	190871.2
20 : 80	Multi skill	Processing	76875.247	122753.73	54292.755	206056.14
20 : 80	Multi skill	Continuous	75348.989	121701.49	53162.738	202582.14
20 : 80	Multi skill	Maximum M/C	77129.624	122214.12	54431.125	207613.89
20 : 80	Random allocate	Processing	79164.636	127207.7	56107.407	213853.62
20 : 80	Random allocate	Continuous	76875.247	124326.99	54506.925	207007.26
20 : 80	Random allocate	Maximum M/C	79546.2	125730.41	56303.385	214755.15
0 : 100	Single skill	Processing	74899.144	120418.95	50160.619	191139.22
0 : 100	Single skill	Continuous	74031.586	120325.2	50101.897	191032.79
0 : 100	Single skill	Maximum M/C	75043.737	120370.88	50167.81	191352.54
0 : 100	Random allocate	Processing	91816.518	135445.18	63354.312	241314.32
0 : 100	Random allocate	Continuous	85309.836	129182.77	59875.002	226430.92
0 : 100	Random allocate	Maximum M/C	92900.965	132233.69	63780.35	243274.16

**Appendix Table B4** The result of  $C_{\max}$  from two step scheduling in different dispatching rule and skill (class 4,data 4).

			<b>FIFO</b>	<b>EDD</b>	<b>SPT</b>	<b>LPT</b>
<b>Cmax Company</b>			<b>74236.32</b>			
<b>Cmax Standard</b>			<b>96368</b>	<b>88432.67</b>	<b>63460.67</b>	<b>168238</b>
100 : 0			96368	88432.67	63460.67	168238
80 : 20	Single skill	Processing	96370.923	88433.325	63461.793	168240.34
80 : 20	Single skill	Continuous	96369.949	88433.056	63461.502	168239.97
80 : 20	Single skill	Maximum M/C	96371.086	88433.187	63461.828	168241.07
80 : 20	Multi skill	Processing	96384.061	88448.659	63507.634	168354.79
80 : 20	Multi skill	Continuous	96378.708	88442.095	63495.458	168328.77
80 : 20	Multi skill	Maximum M/C	96384.954	88445.293	63509.125	168366.46
80 : 20	Random allocate	Processing	96392.092	88476.443	63527.187	168413.19
80 : 20	Random allocate	Continuous	96384.061	88458.473	63509.942	168361.91
80 : 20	Random allocate	Maximum M/C	96393.43	88467.228	63529.298	168419.94
50 : 50	Single skill	Processing	97119.67	88497.695	63572.071	168469.78
50 : 50	Single skill	Continuous	96869.114	88471	63543.189	168433.4
50 : 50	Single skill	Maximum M/C	97161.43	88484.005	63575.607	168542.71
50 : 50	Multi skill	Processing	100126.35	90019.269	68120.941	179827.24
50 : 50	Multi skill	Continuous	98873.568	89367.928	66912.722	177245.58
50 : 50	Multi skill	Maximum M/C	100335.15	89685.248	68268.886	180984.86
50 : 50	Random allocate	Processing	102005.53	92776.309	70061.173	185621.86
50 : 50	Random allocate	Continuous	100126.35	90993.131	68349.931	180534.06
50 : 50	Random allocate	Maximum M/C	102318.72	91861.859	70270.713	186291.83
20 : 80	Single skill	Processing	97588.661	88509.96	63593.084	168513.51
20 : 80	Single skill	Continuous	97181.774	88478.231	63558.755	168470.26
20 : 80	Single skill	Maximum M/C	97656.476	88493.689	63597.288	168600.18
20 : 80	Multi skill	Processing	102471.31	90318.55	69000.01	182013.33
20 : 80	Multi skill	Continuous	100436.87	89544.346	67563.885	178944.68
20 : 80	Multi skill	Maximum M/C	102810.38	89921.522	69175.862	183389.31
20 : 80	Random allocate	Processing	105522.96	93595.652	71306.229	188900.99
20 : 80	Random allocate	Continuous	102471.31	91476.112	69272.195	182853.47
20 : 80	Random allocate	Maximum M/C	106031.57	92508.709	71555.294	189697.33
0 : 100	Single skill	Processing	99837.248	88600.692	63748.528	168836.93
0 : 100	Single skill	Continuous	98680.832	88531.715	63673.898	168742.92
0 : 100	Single skill	Maximum M/C	100029.98	88565.319	63757.666	169025.35
0 : 100	Random allocate	Processing	122387.36	99656.544	80516.233	213157.55
0 : 100	Random allocate	Continuous	113714.24	95048.849	76094.42	200010.76
0 : 100	Random allocate	Maximum M/C	123832.88	97293.624	81057.679	214888.72

**Appendix Table B4** The result of  $C_{\max}$  from two step scheduling in different dispatching rule and skill (class 4,data 5).

			<b>FIFO</b>	<b>EDD</b>	<b>SPT</b>	<b>LPT</b>
<b>Cmax Company</b>			<b>97138.42</b>			
<b>Cmax Standard</b>			<b>118560</b>	<b>116052.63</b>	<b>49146.316</b>	<b>169822.11</b>
100 : 0			118560	116052.63	49146.316	169822.11
80 : 20	Single skill	Processing	118563.6	116053.49	49147.185	169824.47
80 : 20	Single skill	Continuous	118562.4	116053.14	49146.96	169824.1
80 : 20	Single skill	Maximum M/C	118563.8	116053.31	49147.213	169825.21
80 : 20	Multi skill	Processing	118579.76	116073.61	49182.687	169940
80 : 20	Multi skill	Continuous	118573.17	116065	49173.257	169913.74
80 : 20	Multi skill	Maximum M/C	118580.86	116069.2	49183.841	169951.78
80 : 20	Random allocate	Processing	118589.64	116110.07	49197.829	169998.95
80 : 20	Random allocate	Continuous	118579.76	116086.49	49184.474	169947.19
80 : 20	Random allocate	Maximum M/C	118591.29	116097.98	49199.464	170005.76
50 : 50	Single skill	Processing	119484.77	116137.96	49232.589	170056.08
50 : 50	Single skill	Continuous	119176.51	116102.93	49210.222	170019.35
50 : 50	Single skill	Maximum M/C	119536.14	116120	49235.328	170129.69
50 : 50	Multi skill	Processing	123183.84	118134.77	52755.404	181520.48
50 : 50	Multi skill	Continuous	121642.56	117280	51819.714	178914.5
50 : 50	Multi skill	Maximum M/C	123440.72	117696.42	52869.978	182689
50 : 50	Random allocate	Processing	125495.76	121752.91	54257.992	187369.66
50 : 50	Random allocate	Continuous	123183.84	119412.79	52932.743	182233.94
50 : 50	Random allocate	Maximum M/C	125881.08	120552.85	54420.268	188045.93
20 : 80	Single skill	Processing	120061.76	116154.06	49248.863	170100.21
20 : 80	Single skill	Continuous	119561.17	116112.42	49222.277	170056.56
20 : 80	Single skill	Maximum M/C	120145.19	116132.71	49252.118	170187.7
20 : 80	Multi skill	Processing	126068.8	118527.52	53436.188	183727.14
20 : 80	Multi skill	Continuous	123565.87	117511.51	52323.999	180629.6
20 : 80	Multi skill	Maximum M/C	126485.96	118006.49	53572.374	185116.09
20 : 80	Random allocate	Processing	129823.2	122828.15	55222.21	190679.66
20 : 80	Random allocate	Continuous	126068.8	120046.62	53646.978	184575.2
20 : 80	Random allocate	Maximum M/C	130448.93	121401.73	55415.096	191483.5
0 : 100	Single skill	Processing	122828.16	116273.13	49369.244	170426.68
0 : 100	Single skill	Continuous	121405.44	116182.61	49311.448	170331.78
0 : 100	Single skill	Maximum M/C	123065.28	116226.71	49376.321	170616.88
0 : 100	Random allocate	Processing	150571.2	130782.03	62354.782	215164.61
0 : 100	Random allocate	Continuous	139900.8	124735.22	58930.365	201894.03
0 : 100	Random allocate	Maximum M/C	152349.6	127681.1	62774.098	216912.08

**Appendix Table B4** The result of  $C_{\max}$  from two step scheduling in different dispatching rule and skill (class 4,data 6).

			<b>FIFO</b>	<b>EDD</b>	<b>SPT</b>	<b>LPT</b>
<b>Cmax Company</b>			<b>115973.5</b>			
<b>Cmax Standard</b>			<b>121883.08</b>	<b>138495</b>	<b>69785.769</b>	<b>189881.54</b>
100 : 0			121883.08	138495	69785.769	189881.54
80 : 20	Single skill	Processing	121886.8	138496.03	69787.005	189884.18
80 : 20	Single skill	Continuous	121885.56	138495.6	69786.684	189883.76
80 : 20	Single skill	Maximum M/C	121887	138495.81	69787.044	189885.01
80 : 20	Multi skill	Processing	121903.41	138520.04	69837.415	190013.36
80 : 20	Multi skill	Continuous	121896.64	138509.76	69824.025	189983.99
80 : 20	Multi skill	Maximum M/C	121904.54	138514.77	69839.054	190026.52
80 : 20	Random allocate	Processing	121913.57	138563.55	69858.916	190079.26
80 : 20	Random allocate	Continuous	121903.41	138535.41	69839.953	190021.4
80 : 20	Random allocate	Maximum M/C	121915.26	138549.12	69861.238	190086.88
50 : 50	Single skill	Processing	122833.79	138596.84	69908.274	190143.14
50 : 50	Single skill	Continuous	122516.89	138555.03	69876.514	190102.08
50 : 50	Single skill	Maximum M/C	122886.6	138575.4	69912.163	190225.45
50 : 50	Multi skill	Processing	126636.54	140979.78	74910.528	202961.72
50 : 50	Multi skill	Continuous	125052.06	139959.71	73581.887	200047.93
50 : 50	Multi skill	Maximum M/C	126900.62	140456.67	75073.219	204268.27
50 : 50	Random allocate	Processing	129013.26	145297.6	77044.142	209501.81
50 : 50	Random allocate	Continuous	126636.54	142504.96	75162.342	203759.46
50 : 50	Random allocate	Maximum M/C	129409.38	143865.48	77274.567	210257.96
20 : 80	Single skill	Processing	123426.95	138616.04	69931.382	190192.49
20 : 80	Single skill	Continuous	122912.34	138566.35	69893.631	190143.68
20 : 80	Single skill	Maximum M/C	123512.72	138590.56	69936.005	190290.32
20 : 80	Multi skill	Processing	129602.36	141448.49	75877.214	205429.04
20 : 80	Multi skill	Continuous	127029.28	140236	74297.95	201965.62
20 : 80	Multi skill	Maximum M/C	130031.21	140826.7	76070.593	206982.04
20 : 80	Random allocate	Processing	133461.99	146580.78	78413.293	213202.79
20 : 80	Random allocate	Continuous	129602.36	143261.36	76176.528	206377.26
20 : 80	Random allocate	Maximum M/C	134105.27	144878.51	78687.182	214101.58
0 : 100	Single skill	Processing	126270.89	138758.14	70102.318	190557.52
0 : 100	Single skill	Continuous	124808.29	138650.11	70020.25	190451.41
0 : 100	Single skill	Maximum M/C	126514.66	138702.74	70112.367	190770.19
0 : 100	Random allocate	Processing	154791.54	156072.79	88541.254	240579.91
0 : 100	Random allocate	Continuous	143822.06	148856.64	83678.721	225741.81
0 : 100	Random allocate	Maximum M/C	156619.78	152372.2	89136.666	242533.79

**Appendix Table B5** The result of  $C_{\max}$  from two step scheduling in different dispatching rule and skill (class 5,data 1).

			FIFO	EDD	SPT	LPT
Cmax Company			686073			
Cmax Standard			435039.02	404693.52	252858.94	619476.73
100 : 0			435039.02	404693.52	252858.94	619476.73
80 : 20	Single skill	Processing	435052.2	404696.52	252863.41	619485.33
80 : 20	Single skill	Continuous	435047.8	404695.29	252863.56	619488.32
80 : 20	Single skill	Maximum M/C	435052.93	404695.89	252862.25	619483.8
80 : 20	Multi skill	Processing	435111.51	404766.69	253046.07	619906.77
80 : 20	Multi skill	Continuous	435087.34	404736.65	252997.55	619810.97
80 : 20	Multi skill	Maximum M/C	435115.53	404751.29	253052.01	619949.73
80 : 20	Random allocate	Processing	435147.76	404893.84	253123.98	620121.79
80 : 20	Random allocate	Continuous	435111.51	404811.6	253055.26	619933
80 : 20	Random allocate	Maximum M/C	435153.8	404851.67	253132.39	620146.65
50 : 50	Single skill	Processing	438432.3	404991.09	253302.82	620330.2
50 : 50	Single skill	Continuous	437301.2	404868.93	253187.74	620196.23
50 : 50	Single skill	Maximum M/C	438620.82	404928.44	253316.91	620598.7
50 : 50	Multi skill	Processing	452005.52	411954.26	271427.78	662150
50 : 50	Multi skill	Continuous	446350.01	408973.53	266613.64	652643.93
50 : 50	Multi skill	Maximum M/C	452948.11	410425.68	272017.27	666412.54
50 : 50	Random allocate	Processing	460488.78	424571.27	279158.63	683486.64
50 : 50	Random allocate	Continuous	452005.52	416410.93	272340.19	664752.59
50 : 50	Random allocate	Maximum M/C	461902.66	420386.48	279993.54	685953.54
20 : 80	Single skill	Processing	440549.49	405047.22	253386.55	620491.19
20 : 80	Single skill	Continuous	438712.66	404902.02	253249.76	620331.95
20 : 80	Single skill	Maximum M/C	440855.63	404972.76	253403.29	620810.34
20 : 80	Multi skill	Processing	462591.47	413323.85	274930.43	670199.48
20 : 80	Multi skill	Continuous	453407.31	409780.87	269208.19	658900.28
20 : 80	Multi skill	Maximum M/C	464122.16	411506.94	275631.11	675266.06
20 : 80	Random allocate	Processing	476367.71	428320.82	284119.56	695560.86
20 : 80	Random allocate	Continuous	462591.47	418621.19	276014.95	673293
20 : 80	Random allocate	Maximum M/C	478663.74	423346.65	285111.96	698493.09
0 : 100	Single skill	Processing	450700.4	405462.44	254005.91	621682.07
0 : 100	Single skill	Continuous	445479.94	405146.78	253708.55	621335.9
0 : 100	Single skill	Maximum M/C	451570.48	405300.56	254042.32	622375.88
0 : 100	Random allocate	Processing	552499.53	456057.22	320816.8	784877.02
0 : 100	Random allocate	Continuous	513346.02	434971.07	303198.1	736468.63
0 : 100	Random allocate	Maximum M/C	559025.12	445243.81	322974.2	791251.43

**Appendix Table B5** The result of  $C_{\max}$  from two step scheduling in different dispatching rule and skill (class 5,data 2).

			<b>FIFO</b>	<b>EDD</b>	<b>SPT</b>	<b>LPT</b>
<b>Cmax Company</b>			<b>526005</b>			
<b>Cmax Standard</b>			<b>396983.38</b>	<b>307317.03</b>	<b>179208.53</b>	<b>637949.45</b>
100 : 0			396983.38	307317.03	179208.53	637949.45
80 : 20	Single skill	Processing	396995.44	307319.31	179211.7	637958.31
80 : 20	Single skill	Continuous	396991.43	307318.37	179210.88	637956.92
80 : 20	Single skill	Maximum M/C	396996.11	307318.83	179211.8	637961.09
80 : 20	Multi skill	Processing	397049.56	307372.59	179341.15	638392.31
80 : 20	Multi skill	Continuous	397027.51	307349.78	179306.77	638293.66
80 : 20	Multi skill	Maximum M/C	397053.24	307360.9	179345.36	638436.55
80 : 20	Random allocate	Processing	397082.65	307469.15	179396.37	638613.75
80 : 20	Random allocate	Continuous	397049.56	307406.7	179347.67	638419.32
80 : 20	Random allocate	Maximum M/C	397088.16	307437.12	179402.33	638639.35
50 : 50	Single skill	Processing	400079.87	307543	179523.12	638828.37
50 : 50	Single skill	Continuous	399047.71	307450.23	179441.56	638690.41
50 : 50	Single skill	Maximum M/C	400251.9	307495.43	179533.11	639104.88
50 : 50	Multi skill	Processing	412465.75	312830.7	192368.81	681895.24
50 : 50	Multi skill	Continuous	407304.97	310567.2	188956.89	672105.69
50 : 50	Multi skill	Maximum M/C	413325.88	311669.93	192786.6	686284.88
50 : 50	Random allocate	Processing	420206.93	322411.84	197847.89	703868.13
50 : 50	Random allocate	Continuous	412465.75	316215.02	193015.46	684575.43
50 : 50	Random allocate	Maximum M/C	421497.12	319233.99	198439.62	706408.59
20 : 80	Single skill	Processing	402011.86	307585.63	179582.46	638994.16
20 : 80	Single skill	Continuous	400335.7	307475.36	179485.51	638830.17
20 : 80	Single skill	Maximum M/C	402291.22	307529.08	179594.33	639322.83
20 : 80	Multi skill	Processing	422125.68	313870.75	194851.24	690184.75
20 : 80	Multi skill	Continuous	413744.92	311180.28	190795.72	678548.6
20 : 80	Multi skill	Maximum M/C	423522.48	312491.02	195347.84	695402.41
20 : 80	Random allocate	Processing	434696.82	325259.18	201363.84	716302.4
20 : 80	Random allocate	Continuous	422125.68	317893.46	195619.87	693370.52
20 : 80	Random allocate	Maximum M/C	436792.01	321481.89	202067.19	719322.07
0 : 100	Single skill	Processing	411274.8	307900.93	180021.42	640220.55
0 : 100	Single skill	Continuous	406511	307661.23	179810.67	639864.06
0 : 100	Single skill	Maximum M/C	412068.77	307778.01	180047.23	640935.05
0 : 100	Random allocate	Processing	504168.92	346321.71	227372.26	808281.95
0 : 100	Random allocate	Continuous	468440.41	330309.26	214885.36	758430.03
0 : 100	Random allocate	Maximum M/C	510123.67	338110.2	228901.26	814846.45

**Appendix Table B5** The result of  $C_{\max}$  from two step scheduling in different dispatching rule and skill (class 5,data 3).

			<b>FIFO</b>	<b>EDD</b>	<b>SPT</b>	<b>LPT</b>
<b>Cmax Company</b>			<b>716643.8</b>			
<b>Cmax Standard</b>			<b>398149.5</b>	<b>363040.46</b>	<b>173463.04</b>	<b>504931.31</b>
100 : 0			398149.5	363040.46	173463.04	504931.31
80 : 20	Single skill	Processing	398161.58	363043.15	173466.11	504938.32
80 : 20	Single skill	Continuous	398157.55	363042.05	173465.31	504937.22
80 : 20	Single skill	Maximum M/C	398162.25	363042.58	173466.21	504940.53
80 : 20	Multi skill	Processing	398215.86	363106.1	173591.41	505281.83
80 : 20	Multi skill	Continuous	398193.74	363079.15	173558.13	505203.75
80 : 20	Multi skill	Maximum M/C	398219.54	363092.28	173595.49	505316.85
80 : 20	Random allocate	Processing	398249.04	363220.16	173644.86	505457.09
80 : 20	Random allocate	Continuous	398215.86	363146.39	173597.72	505303.21
80 : 20	Random allocate	Maximum M/C	398254.57	363182.33	173650.63	505477.36
50 : 50	Single skill	Processing	401255.07	363307.4	173767.54	505626.96
50 : 50	Single skill	Continuous	400219.88	363197.82	173688.6	505517.77
50 : 50	Single skill	Maximum M/C	401427.6	363251.2	173777.21	505845.82
50 : 50	Multi skill	Processing	413677.33	369553.89	186201.4	539714.01
50 : 50	Multi skill	Continuous	408501.39	366879.95	182898.86	531965.67
50 : 50	Multi skill	Maximum M/C	414539.99	368182.64	186605.79	543188.37
50 : 50	Random allocate	Processing	421441.25	380872.3	191504.82	557105.36
50 : 50	Random allocate	Continuous	413677.33	373551.86	186827.32	541835.36
50 : 50	Random allocate	Maximum M/C	422735.23	377118.23	192077.57	559116.11
20 : 80	Single skill	Processing	403192.73	363357.76	173824.98	505758.19
20 : 80	Single skill	Continuous	401511.65	363227.5	173731.14	505628.39
20 : 80	Single skill	Maximum M/C	403472.91	363290.96	173836.47	506018.33
20 : 80	Multi skill	Processing	423365.64	370782.52	188604.24	546275.09
20 : 80	Multi skill	Continuous	414960.26	367604.2	184678.74	537065.18
20 : 80	Multi skill	Maximum M/C	424766.53	369152.61	189084.91	550404.82
20 : 80	Random allocate	Processing	435973.7	384235.92	194908.05	566946.97
20 : 80	Random allocate	Continuous	423365.64	375534.63	189348.23	548796.59
20 : 80	Random allocate	Maximum M/C	438075.05	379773.72	195588.84	569337.02
0 : 100	Single skill	Processing	412482.88	363730.24	174249.87	506728.87
0 : 100	Single skill	Continuous	407705.09	363447.07	174045.88	506446.71
0 : 100	Single skill	Maximum M/C	413279.18	363585.02	174274.85	507294.39
0 : 100	Random allocate	Processing	505649.87	409117.56	220082.62	639747.97
0 : 100	Random allocate	Continuous	469816.41	390201.7	207996.06	600290.62
0 : 100	Random allocate	Maximum M/C	511622.11	399417.11	221562.61	644943.71

**Appendix Table B5** The result of  $C_{\max}$  from two step scheduling in different dispatching rule and skill (class 5,data 4).

			<b>FIFO</b>	<b>EDD</b>	<b>SPT</b>	<b>LPT</b>
<b>Cmax Company</b>			<b>598720.3</b>			
<b>Cmax Standard</b>			<b>351547.12</b>	<b>353494.92</b>	<b>165555.25</b>	<b>483302.37</b>
100 : 0			351547.1	353494.9	165555.3	483302.4
80 : 20	Single skill	Processing	351557.76	353497.54	165558.18	483309.08
80 : 20	Single skill	Continuous	351554.21	353496.46	165557.42	483308.03
80 : 20	Single skill	Maximum M/C	351558.36	353496.99	165558.27	483311.19
80 : 20	Multi skill	Processing	351605.69	353558.83	165677.77	483637.88
80 : 20	Multi skill	Continuous	351586.16	353532.6	165646	483563.14
80 : 20	Multi skill	Maximum M/C	351608.95	353545.38	165681.66	483671.39
80 : 20	Random allocate	Processing	351634.99	353669.9	165728.78	483805.63
80 : 20	Random allocate	Continuous	351605.69	353598.06	165683.79	483658.34
80 : 20	Random allocate	Maximum M/C	351639.87	353633.06	165734.29	483825.03
50 : 50	Single skill	Processing	354289.17	353754.84	165845.87	483968.23
50 : 50	Single skill	Continuous	353375.14	353648.14	165770.52	483863.71
50 : 50	Single skill	Maximum M/C	354441.5	353700.12	165855.1	484177.71
50 : 50	Multi skill	Processing	365257.44	359837.09	177712.89	516595.14
50 : 50	Multi skill	Continuous	360687.32	357233.46	174560.91	509178.71
50 : 50	Multi skill	Maximum M/C	366019.12	358501.89	178098.85	519920.67
50 : 50	Random allocate	Processing	372112.61	370857.9	182774.54	533241.52
50 : 50	Random allocate	Continuous	365257.44	363729.94	178310.28	518625.62
50 : 50	Random allocate	Maximum M/C	373255.13	367202.53	183321.19	535166.14
20 : 80	Single skill	Processing	356000.03	353803.87	165900.69	484093.83
20 : 80	Single skill	Continuous	354515.72	353677.04	165811.13	483969.59
20 : 80	Single skill	Maximum M/C	356247.41	353738.83	165911.66	484342.82
20 : 80	Multi skill	Processing	373811.75	361033.41	180006.2	522875.17
20 : 80	Multi skill	Continuous	366390.2	357938.66	176259.66	514059.77
20 : 80	Multi skill	Maximum M/C	375048.67	359446.36	180464.96	526828
20 : 80	Random allocate	Processing	384944.07	374133.08	186022.63	542661.57
20 : 80	Random allocate	Continuous	373811.75	365660.57	180716.27	525288.66
20 : 80	Random allocate	Maximum M/C	386799.46	369788.21	186672.39	544949.23
0 : 100	Single skill	Processing	364202.8	354166.56	166306.21	485022.93
0 : 100	Single skill	Continuous	359984.23	353890.83	166111.52	484752.86
0 : 100	Single skill	Maximum M/C	364905.89	354025.16	166330.05	485564.23
0 : 100	Random allocate	Processing	446464.82	398360.5	210049.55	612344.1
0 : 100	Random allocate	Continuous	414825.58	379942	198513.99	574576.92
0 : 100	Random allocate	Maximum M/C	451738.02	388915.11	211462.07	617317.28

**Appendix Table B5** The result of  $C_{\max}$  from two step scheduling in different dispatching rule and skill (class 5,data 5).

			FIFO	EDD	SPT	LPT
Cmax Company			778044.5			
Cmax Standard			473862.88	464967.77	197871.61	671356.04
100 : 0			473862.88	464967.77	197871.61	671356.04
80 : 20	Single skill	Processing	473877.27	464971.22	197875.11	671365.36
80 : 20	Single skill	Continuous	473872.48	464969.8	197874.2	671363.9
80 : 20	Single skill	Maximum M/C	473878.07	464970.49	197875.22	671368.29
80 : 20	Multi skill	Processing	473941.88	465051.84	198018.04	671822.1
80 : 20	Multi skill	Continuous	473915.55	465017.33	197980.08	671718.27
80 : 20	Multi skill	Maximum M/C	473946.26	465034.14	198022.69	671868.65
80 : 20	Random allocate	Processing	473981.37	465197.92	198079.01	672055.12
80 : 20	Random allocate	Continuous	473941.88	465103.44	198025.24	671850.52
80 : 20	Random allocate	Maximum M/C	473987.95	465149.47	198085.59	672082.07
50 : 50	Single skill	Processing	477559.03	465309.66	198218.96	672280.98
50 : 50	Single skill	Continuous	476326.99	465169.31	198128.91	672135.8
50 : 50	Single skill	Maximum M/C	477764.37	465237.68	198229.99	672571.97
50 : 50	Multi skill	Processing	492343.55	473309.91	212402.42	717603.07
50 : 50	Multi skill	Continuous	486183.34	469885.24	208635.18	707300.9
50 : 50	Multi skill	Maximum M/C	493370.26	471553.67	212863.72	722222.58
50 : 50	Random allocate	Processing	501583.88	487806.08	218452.11	740726.59
50 : 50	Random allocate	Continuous	492343.55	478430.35	213116.42	720423.62
50 : 50	Random allocate	Maximum M/C	503123.93	482998.01	219105.46	743400.08
20 : 80	Single skill	Processing	479865.16	465374.15	198284.48	672455.45
20 : 80	Single skill	Continuous	477864.41	465207.32	198177.44	672282.88
20 : 80	Single skill	Maximum M/C	480198.62	465288.6	198297.59	672801.34
20 : 80	Multi skill	Processing	503874.22	474883.49	215143.38	726326.67
20 : 80	Multi skill	Continuous	493870.44	470812.82	210665.51	714081.19
20 : 80	Multi skill	Maximum M/C	505541.51	472795.97	215691.69	731817.56
20 : 80	Random allocate	Processing	518879.88	492114.08	222334.22	753811.99
20 : 80	Random allocate	Continuous	503874.22	480969.8	215992.06	729679.26
20 : 80	Random allocate	Maximum M/C	521380.82	486399.06	223110.81	756989.79
0 : 100	Single skill	Processing	490921.96	465851.21	198769.16	673746.07
0 : 100	Single skill	Continuous	485235.61	465488.53	198536.46	673370.91
0 : 100	Single skill	Maximum M/C	491869.69	465665.22	198797.65	674497.99
0 : 100	Random allocate	Processing	601805.88	523981.48	251051.19	850608.1
0 : 100	Random allocate	Continuous	559158.22	499754.8	237263.89	798145.66
0 : 100	Random allocate	Maximum M/C	608913.83	511557.54	252739.43	857516.36

**Appendix Table B5** The result of  $C_{\max}$  from two step scheduling in different dispatching rule and skill (class 5,data 6).

			<b>FIFO</b>	<b>EDD</b>	<b>SPT</b>	<b>LPT</b>
<b>Cmax Company</b>			<b>538983.4</b>			
<b>Cmax Standard</b>			<b>327288.35</b>	<b>318168.1</b>	<b>163184.58</b>	<b>461970.06</b>
100 : 0			327288.35	318168.1	163184.58	461970.06
80 : 20	Single skill	Processing	327298.33	318170.36	163187.89	461976.51
80 : 20	Single skill	Continuous	327295.02	318169.39	163187.14	461975.51
80 : 20	Single skill	Maximum M/C	327298.88	318169.86	163187.98	461978.53
80 : 20	Multi skill	Processing	327342.95	318225.53	163305.76	462290.8
80 : 20	Multi skill	Continuous	327324.77	318201.91	163274.46	462219.36
80 : 20	Multi skill	Maximum M/C	327345.98	318213.42	163309.6	462322.83
80 : 20	Random allocate	Processing	327370.22	318325.49	163356.04	462451.15
80 : 20	Random allocate	Continuous	327342.95	318260.84	163311.7	462310.36
80 : 20	Random allocate	Maximum M/C	327374.77	318292.33	163361.47	462469.69
50 : 50	Single skill	Processing	329841.25	318401.95	163471.46	462606.57
50 : 50	Single skill	Continuous	328990.3	318305.91	163397.19	462506.66
50 : 50	Single skill	Maximum M/C	329983.07	318352.7	163480.55	462806.8
50 : 50	Multi skill	Processing	340052.65	323876.35	175168.58	493793.37
50 : 50	Multi skill	Continuous	335797.9	321532.92	172061.73	486704.29
50 : 50	Multi skill	Maximum M/C	340761.77	322674.6	175549.02	496972.12
50 : 50	Random allocate	Processing	346434.77	333795.79	180157.77	509705.01
50 : 50	Random allocate	Continuous	340052.65	327380.17	175757.42	495734.23
50 : 50	Random allocate	Maximum M/C	347498.46	330505.73	180696.58	511544.68
20 : 80	Single skill	Processing	331434.05	318446.08	163525.5	462726.62
20 : 80	Single skill	Continuous	330052.17	318331.92	163437.22	462607.87
20 : 80	Single skill	Maximum M/C	331664.37	318387.54	163536.3	462964.63
20 : 80	Multi skill	Processing	348016.67	324953.12	177429.05	499796.21
20 : 80	Multi skill	Continuous	341107.24	322167.65	173736.15	491369.91
20 : 80	Multi skill	Maximum M/C	349168.24	323524.68	177881.25	503574.57
20 : 80	Random allocate	Processing	358380.8	336743.67	183359.35	518709.27
20 : 80	Random allocate	Continuous	348016.67	329117.87	178128.96	502103.18
20 : 80	Random allocate	Maximum M/C	360108.15	332833	183999.8	520895.96
0 : 100	Single skill	Processing	339070.78	318772.52	163925.21	463614.71
0 : 100	Single skill	Continuous	335143.32	318524.35	163733.3	463356.56
0 : 100	Single skill	Maximum M/C	339725.36	318645.25	163948.71	464132.12
0 : 100	Random allocate	Processing	415656.27	358549.88	207042.27	585316.12
0 : 100	Random allocate	Continuous	386200.31	341972.06	195671.87	549215.93
0 : 100	Random allocate	Maximum M/C	420565.59	350048.43	208434.57	590069.79

**Appendix Table B6** The result of  $C_{\max}$  from two step scheduling in different dispatching rule and skill (class 6,data 1).

			<b>FIFO</b>	<b>EDD</b>	<b>SPT</b>	<b>LPT</b>
<b>Cmax Company</b>			<b>1111697</b>			
<b>Cmax Standard</b>			<b>657535.71</b>	<b>767715.51</b>	<b>272848.37</b>	<b>1087491.4</b>
100 : 0			657535.71	767715.51	272848.37	1087491.4
80 : 20	Single skill	Processing	657555.65	767721.2	272853.2	1087506.5
80 : 20	Single skill	Continuous	657549	767718.86	272851.95	1087504.1
80 : 20	Single skill	Maximum M/C	657556.75	767720	272853.35	1087511.2
80 : 20	Multi skill	Processing	657645.29	767854.32	273050.29	1088246.3
80 : 20	Multi skill	Continuous	657608.76	767797.33	272997.94	1088078.2
80 : 20	Multi skill	Maximum M/C	657651.38	767825.09	273056.7	1088321.7
80 : 20	Random allocate	Processing	657700.08	768095.52	273134.36	1088623.8
80 : 20	Random allocate	Continuous	657645.29	767939.52	273060.21	1088292.4
80 : 20	Random allocate	Maximum M/C	657709.22	768015.52	273143.44	1088667.4
50 : 50	Single skill	Processing	662664.48	768280.01	273327.34	1088989.7
50 : 50	Single skill	Continuous	660954.89	768048.27	273203.16	1088754.5
50 : 50	Single skill	Maximum M/C	662949.41	768161.17	273342.54	1089461
50 : 50	Multi skill	Processing	683179.59	781489.34	292885.15	1162404.3
50 : 50	Multi skill	Continuous	674631.63	775834.82	287690.43	1145716.4
50 : 50	Multi skill	Maximum M/C	684604.25	778589.59	293521.23	1169887.2
50 : 50	Random allocate	Processing	696001.54	805424.19	301227.15	1199860.8
50 : 50	Random allocate	Continuous	683179.59	789943.79	293869.69	1166973.2
50 : 50	Random allocate	Maximum M/C	698138.53	797485.52	302128.06	1204191.4
20 : 80	Single skill	Processing	665864.49	768386.49	273417.68	1089272.3
20 : 80	Single skill	Continuous	663088.22	768111.04	273270.08	1088992.7
20 : 80	Single skill	Maximum M/C	666327.2	768245.23	273435.76	1089832.6
20 : 80	Multi skill	Processing	699179.63	784087.5	296664.69	1176535.2
20 : 80	Multi skill	Continuous	685298.32	777366.37	290490.09	1156699.4
20 : 80	Multi skill	Maximum M/C	701493.18	780640.77	297420.77	1185429.6
20 : 80	Random allocate	Processing	720001.59	812537.2	306580.25	1221057.1
20 : 80	Random allocate	Continuous	699179.63	794136.72	297834.95	1181965.9
20 : 80	Random allocate	Maximum M/C	723471.92	803101.05	307651.11	1226204.6
0 : 100	Single skill	Processing	681206.99	769174.17	274086.01	1091362.9
0 : 100	Single skill	Continuous	673316.56	768575.35	273765.14	1090755.2
0 : 100	Single skill	Maximum M/C	682522.06	768867.08	274125.3	1092580.9
0 : 100	Random allocate	Processing	835070.34	865153.96	346178.55	1377851.6
0 : 100	Random allocate	Continuous	775892.13	825152.91	327167.02	1292870.7
0 : 100	Random allocate	Maximum M/C	844933.37	844640.6	348506.49	1389041.9

**Appendix Table B6** The result of  $C_{\max}$  from two step scheduling in different dispatching rule and skill (class 6,data 2).

			<b>FIFO</b>	<b>EDD</b>	<b>SPT</b>	<b>LPT</b>
<b>Cmax Company</b>			<b>466874</b>			
<b>Cmax Standard</b>			<b>448537.75</b>	<b>326614.0179</b>	<b>197882.09</b>	<b>682938.75</b>
100 : 0			448537.75	326614.0179	197882.09	682938.75
80 : 20	Single skill	Processing	448551.41	326616.44	197885.59	682948.23
80 : 20	Single skill	Continuous	448546.87	326615.44	197884.68	682946.74
80 : 20	Single skill	Maximum M/C	448552.16	326615.93	197885.7	682951.21
80 : 20	Multi skill	Processing	448612.56	326673.07	198028.53	683412.85
80 : 20	Multi skill	Continuous	448587.64	326648.83	197990.57	683307.23
80 : 20	Multi skill	Maximum M/C	448616.71	326660.64	198033.18	683460.2
80 : 20	Random allocate	Processing	448649.93	326775.69	198089.5	683649.89
80 : 20	Random allocate	Continuous	448612.56	326709.32	198035.73	683441.76
80 : 20	Random allocate	Maximum M/C	448656.16	326741.65	198096.09	683677.3
50 : 50	Single skill	Processing	452036.39	326854.18	198229.46	683879.65
50 : 50	Single skill	Continuous	450870.2	326755.59	198139.4	683731.96
50 : 50	Single skill	Maximum M/C	452230.76	326803.62	198240.49	684175.66
50 : 50	Multi skill	Processing	466030.77	332473.9	212413.67	729983.67
50 : 50	Multi skill	Continuous	460199.78	330068.27	208646.23	719503.75
50 : 50	Multi skill	Maximum M/C	467002.61	331240.24	212874.99	734682.87
50 : 50	Random allocate	Processing	474777.26	342656.66	218463.68	753506.13
50 : 50	Random allocate	Continuous	466030.77	336070.73	213127.71	732852.88
50 : 50	Random allocate	Maximum M/C	476235.01	339279.26	219117.06	756225.75
20 : 80	Single skill	Processing	454219.28	326899.48	198294.98	684057.13
20 : 80	Single skill	Continuous	452325.45	326782.29	198187.94	683881.58
20 : 80	Single skill	Maximum M/C	454534.92	326839.38	198308.09	684408.98
20 : 80	Multi skill	Processing	476945.19	333579.26	215154.77	738857.77
20 : 80	Multi skill	Continuous	467476.06	330719.84	210676.67	726401.03
20 : 80	Multi skill	Maximum M/C	478523.38	332112.89	215703.11	744443.39
20 : 80	Random allocate	Processing	491148.89	345682.79	222345.99	766817.29
20 : 80	Random allocate	Continuous	476945.19	337854.56	216003.5	742268.21
20 : 80	Random allocate	Maximum M/C	493516.17	341668.31	223122.62	770049.91
0 : 100	Single skill	Processing	464685.16	327234.58	198779.68	685370.01
0 : 100	Single skill	Continuous	459302.71	326979.83	198546.97	684988.39
0 : 100	Single skill	Maximum M/C	465582.24	327103.94	198808.18	686134.9
0 : 100	Random allocate	Processing	569643.01	368067.87	251064.48	865283.4
0 : 100	Random allocate	Continuous	529274.6	351049.97	237276.46	811915.83
0 : 100	Random allocate	Maximum M/C	576371.07	359340.74	252752.81	872310.84

**Appendix Table B6** The result of  $C_{\max}$  from two step scheduling in different dispatching rule and skill (class 6,data 3).

			<b>FIFO</b>	<b>EDD</b>	<b>SPT</b>	<b>LPT</b>
<b>Cmax Company</b>			<b>475930.5</b>			
<b>Cmax Standard</b>			<b>413675.17</b>	<b>326808.28</b>	<b>211368.45</b>	<b>623991.21</b>
100 : 0			413675.17	326808.28	211368.45	623991.21
80 : 20	Single skill	Processing	413687.75	326810.72	211372.24	623999.86
80 : 20	Single skill	Continuous	413683.57	326809.73	211371.27	623998.5
80 : 20	Single skill	Maximum M/C	413688.45	326810.21	211372.36	624002.59
80 : 20	Multi skill	Processing	413744.15	326867.39	211524.92	624424.37
80 : 20	Multi skill	Continuous	413721.16	326843.13	211484.37	624327.88
80 : 20	Multi skill	Maximum M/C	413747.98	326854.95	211529.89	624467.64
80 : 20	Random allocate	Processing	413778.62	326970.07	211590.05	624640.96
80 : 20	Random allocate	Continuous	413744.15	326903.66	211532.61	624450.79
80 : 20	Random allocate	Maximum M/C	413784.36	326936.01	211597.08	624666
50 : 50	Single skill	Processing	416901.87	327048.6	211739.54	624850.89
50 : 50	Single skill	Continuous	415826.31	326949.95	211643.35	624715.94
50 : 50	Single skill	Maximum M/C	417081.13	326998.01	211751.32	625121.35
50 : 50	Multi skill	Processing	429808.53	332671.67	226890.47	666975.46
50 : 50	Multi skill	Continuous	424430.76	330264.6	222866.25	657400.11
50 : 50	Multi skill	Maximum M/C	430704.83	331437.28	227383.23	671269.05
50 : 50	Random allocate	Processing	437875.2	342860.48	233352.8	688467.59
50 : 50	Random allocate	Continuous	429808.53	336270.64	227653.17	669597.01
50 : 50	Random allocate	Maximum M/C	439219.64	339481.08	234050.71	690952.46
20 : 80	Single skill	Processing	418915.09	327093.93	211809.53	625013.05
20 : 80	Single skill	Continuous	417168.46	326976.67	211695.19	624852.65
20 : 80	Single skill	Maximum M/C	419206.19	327033.8	211823.53	625334.53
20 : 80	Multi skill	Processing	439874.63	333777.68	229818.38	675083.6
20 : 80	Multi skill	Continuous	431141.49	330916.57	225035.08	663702.05
20 : 80	Multi skill	Maximum M/C	441330.15	332310.44	230404.09	680187.1
20 : 80	Random allocate	Processing	452974.34	345888.41	237499.71	700629.8
20 : 80	Random allocate	Continuous	439874.63	338055.53	230724.95	678199.66
20 : 80	Random allocate	Maximum M/C	455157.63	341871.55	238329.27	703583.4
0 : 100	Single skill	Processing	428567.51	327429.24	212327.27	626212.61
0 : 100	Single skill	Continuous	423603.4	327174.33	212078.7	625863.92
0 : 100	Single skill	Maximum M/C	429394.86	327298.51	212357.7	626911.48
0 : 100	Random allocate	Processing	525367.5	368286.81	268175.48	790596.85
0 : 100	Random allocate	Continuous	488136.74	351258.79	253447.74	741835.68
0 : 100	Random allocate	Maximum M/C	531572.63	359554.49	269978.87	797017.72

**Appendix Table B6** The result of  $C_{\max}$  from two step scheduling in different dispatching rule and skill (class 6,data 4).

			<b>FIFO</b>	<b>EDD</b>	<b>SPT</b>	<b>LPT</b>
<b>Cmax Company</b>			<b>476980</b>			
<b>Cmax Standard</b>			<b>388944.17</b>	<b>335010.33</b>	<b>215840</b>	<b>678824.5</b>
100 : 0			388944.17	335010.33	215840	678824.5
80 : 20	Single skill	Processing	388956	335012.78	215843.82	678833.92
80 : 20	Single skill	Continuous	388952.07	335011.76	215842.83	678832.45
80 : 20	Single skill	Maximum M/C	388956.65	335012.26	215843.94	678836.89
80 : 20	Multi skill	Processing	389009.02	335070.87	215999.73	679295.74
80 : 20	Multi skill	Continuous	388987.42	335046.01	215958.32	679190.76
80 : 20	Multi skill	Maximum M/C	389012.63	335058.12	216004.8	679342.81
80 : 20	Random allocate	Processing	389041.44	335176.13	216066.23	679531.36
80 : 20	Random allocate	Continuous	389009.02	335108.05	216007.58	679324.48
80 : 20	Random allocate	Maximum M/C	389046.84	335141.22	216073.42	679558.6
50 : 50	Single skill	Processing	391977.96	335256.63	216218.89	679759.73
50 : 50	Single skill	Continuous	390966.71	335155.51	216120.66	679612.93
50 : 50	Single skill	Maximum M/C	392146.51	335204.77	216230.92	680053.96
50 : 50	Multi skill	Processing	404113.02	341020.83	231690.33	725586
50 : 50	Multi skill	Continuous	399056.75	338553.35	227580.99	715169.22
50 : 50	Multi skill	Maximum M/C	404955.74	339755.45	232193.52	730256.9
50 : 50	Random allocate	Processing	411697.44	351465.35	238289.38	748966.76
50 : 50	Random allocate	Continuous	404113.02	344710.12	232469.17	728437.93
50 : 50	Random allocate	Maximum M/C	412961.5	348001.13	239002.06	751669.99
20 : 80	Single skill	Processing	393870.83	335303.1	216290.36	679936.14
20 : 80	Single skill	Continuous	392228.62	335182.9	216173.6	679761.65
20 : 80	Single skill	Maximum M/C	394144.53	335241.46	216304.66	680285.87
20 : 80	Multi skill	Processing	413577.33	342154.6	234680.19	734406.65
20 : 80	Multi skill	Continuous	405366.29	339221.67	229795.7	722024.95
20 : 80	Multi skill	Maximum M/C	414945.84	340650.53	235278.29	739958.62
20 : 80	Random allocate	Processing	425893.9	354569.27	242524.01	762197.73
20 : 80	Random allocate	Continuous	413577.33	346539.8	235605.94	737796.54
20 : 80	Random allocate	Maximum M/C	427946.66	350451.59	243371.13	765410.87
0 : 100	Single skill	Processing	402946.19	335646.82	216819.05	681241.12
0 : 100	Single skill	Continuous	398278.86	335385.51	216565.22	680861.79
0 : 100	Single skill	Maximum M/C	403724.08	335512.82	216850.13	682001.4
0 : 100	Random allocate	Processing	493959.13	377529.81	273848.73	860070.64
0 : 100	Random allocate	Continuous	458954.16	360074.43	258809.43	807024.58
0 : 100	Random allocate	Maximum M/C	499793.3	368578.33	275690.27	867055.75

**Appendix Table B6** The result of  $C_{\max}$  from two step scheduling in different dispatching rule and skill (class 6,data 5).

			<b>FIFO</b>	<b>EDD</b>	<b>SPT</b>	<b>LPT</b>
<b>Cmax Company</b>			<b>471869.4</b>			
<b>Cmax Standard</b>			<b>341894.19</b>	<b>332773.06</b>	<b>171235</b>	<b>488756.45</b>
100 : 0			341894.19	332773.06	171235	488756.45
80 : 20	Single skill	Processing	341904.57	332775.57	171238.03	488763.29
80 : 20	Single skill	Continuous	341901.11	332774.55	171237.24	488762.22
80 : 20	Single skill	Maximum M/C	341905.15	332775.05	171238.13	488765.42
80 : 20	Multi skill	Processing	341951.18	332833.27	171361.72	489095.79
80 : 20	Multi skill	Continuous	341932.19	332808.57	171328.87	489020.21
80 : 20	Multi skill	Maximum M/C	341954.35	332820.6	171365.75	489129.69
80 : 20	Random allocate	Processing	341979.67	332937.82	171414.48	489265.44
80 : 20	Random allocate	Continuous	341951.18	332870.2	171367.95	489116.49
80 : 20	Random allocate	Maximum M/C	341984.42	332903.14	171420.18	489285.06
50 : 50	Single skill	Processing	344560.97	333017.79	171535.59	489429.87
50 : 50	Single skill	Continuous	343672.05	332917.34	171457.66	489324.17
50 : 50	Single skill	Maximum M/C	344709.13	332966.27	171545.13	489641.72
50 : 50	Multi skill	Processing	355228.07	338743.49	183809.74	522424.98
50 : 50	Multi skill	Continuous	350783.45	336292.49	180549.62	514924.85
50 : 50	Multi skill	Maximum M/C	355968.84	337486.56	184208.94	525788.05
50 : 50	Random allocate	Processing	361895.01	349118.26	189045.04	539259.22
50 : 50	Random allocate	Continuous	355228.07	342408.14	184427.62	524478.38
50 : 50	Random allocate	Maximum M/C	363006.17	345677.18	189610.44	541205.56
20 : 80	Single skill	Processing	346224.86	333063.94	171592.29	489556.89
20 : 80	Single skill	Continuous	344781.31	332944.54	171499.66	489431.25
20 : 80	Single skill	Maximum M/C	346465.45	333002.71	171603.63	489808.69
20 : 80	Multi skill	Processing	363547.5	339869.69	186181.72	528775.88
20 : 80	Multi skill	Continuous	356329.73	336956.35	182306.64	519861
20 : 80	Multi skill	Maximum M/C	364750.46	338375.67	186656.22	532773.32
20 : 80	Random allocate	Processing	374374.15	352201.46	192404.56	548785.57
20 : 80	Random allocate	Continuous	363547.5	344225.61	186916.15	531216.61
20 : 80	Random allocate	Maximum M/C	376178.59	348111.28	193076.61	551099.05
0 : 100	Single skill	Processing	354202.39	333405.37	172011.72	490496.47
0 : 100	Single skill	Continuous	350099.66	333145.81	171810.35	490223.36
0 : 100	Single skill	Maximum M/C	354886.18	333272.26	172036.38	491043.88
0 : 100	Random allocate	Processing	434205.63	375008.66	217255.78	619254.49
0 : 100	Random allocate	Continuous	403435.16	357669.85	205324.46	581061.1
0 : 100	Random allocate	Maximum M/C	439334.05	366116.96	218716.75	624283.79

**Appendix Table B6** The result of  $C_{\max}$  from two step scheduling in different dispatching rule and skill (class 6,data 6).

			<b>FIFO</b>	<b>EDD</b>	<b>SPT</b>	<b>LPT</b>
<b>Cmax Company</b>			<b>587405.5</b>			
<b>Cmax Standard</b>			<b>490553.75</b>	<b>411968.49</b>	<b>237816.0</b>	<b>687373.71</b>
100 : 0			490553.75	411968.49	237816.05	687373.71
80 : 20	Single skill	Processing	490568.68	411971.55	237820.21	687383.24
80 : 20	Single skill	Continuous	490563.72	411970.3	237819.12	687381.75
80 : 20	Single skill	Maximum M/C	490569.51	411970.91	237820.34	687386.25
80 : 20	Multi skill	Processing	490635.56	412042.99	237992	687850.87
80 : 20	Multi skill	Continuous	490608.31	412012.41	237946.37	687744.58
80 : 20	Multi skill	Maximum M/C	490640.1	412027.3	237997.58	687898.54
80 : 20	Random allocate	Processing	490676.44	412172.42	238065.27	688089.46
80 : 20	Random allocate	Continuous	490635.56	412088.71	238000.64	687879.98
80 : 20	Random allocate	Maximum M/C	490683.25	412129.49	238073.18	688117.05
50 : 50	Single skill	Processing	494380.12	412271.42	238233.47	688320.71
50 : 50	Single skill	Continuous	493104.68	412147.06	238125.24	688172.06
50 : 50	Single skill	Maximum M/C	494592.69	412207.65	238246.72	688618.64
50 : 50	Multi skill	Processing	509685.4	419359.76	255280.15	734724.12
50 : 50	Multi skill	Continuous	503308.2	416325.45	250752.41	724176.15
50 : 50	Multi skill	Maximum M/C	510748.26	417803.7	255834.57	739453.85
50 : 50	Random allocate	Processing	519251.2	432203.59	262551.09	758399.34
50 : 50	Random allocate	Continuous	509685.4	423896.55	256138.29	737611.97
50 : 50	Random allocate	Maximum M/C	520845.5	427943.57	263336.33	761136.62
20 : 80	Single skill	Processing	496767.48	412328.56	238312.22	688499.34
20 : 80	Single skill	Continuous	494696.25	412180.75	238183.57	688322.66
20 : 80	Single skill	Maximum M/C	497112.69	412252.76	238327.97	688853.48
20 : 80	Multi skill	Processing	521622.21	420753.98	258574.43	743655.86
20 : 80	Multi skill	Continuous	511266.07	417147.31	253192.61	731118.22
20 : 80	Multi skill	Maximum M/C	523348.23	418904.4	259233.42	749277.75
20 : 80	Random allocate	Processing	537156.41	436020.54	267216.88	771796.94
20 : 80	Random allocate	Continuous	521622.21	426146.54	259594.43	747088.44
20 : 80	Random allocate	Maximum M/C	539745.44	430956.95	268150.24	775050.55
0 : 100	Single skill	Processing	508213.74	412751.24	238894.73	689820.75
0 : 100	Single skill	Continuous	502327.09	412429.9	238615.06	689436.65
0 : 100	Single skill	Maximum M/C	509194.84	412586.45	238928.98	690590.61
0 : 100	Random allocate	Processing	623003.33	464255.54	301730.95	870902.48
0 : 100	Random allocate	Continuous	578853.48	442790.34	285160.41	817188.35
0 : 100	Random allocate	Maximum M/C	630361.63	453247.74	303760	877975.55