Workshop on Labour Cost, Rome, 5-6 May 2015

Topic 1, item 1.5:

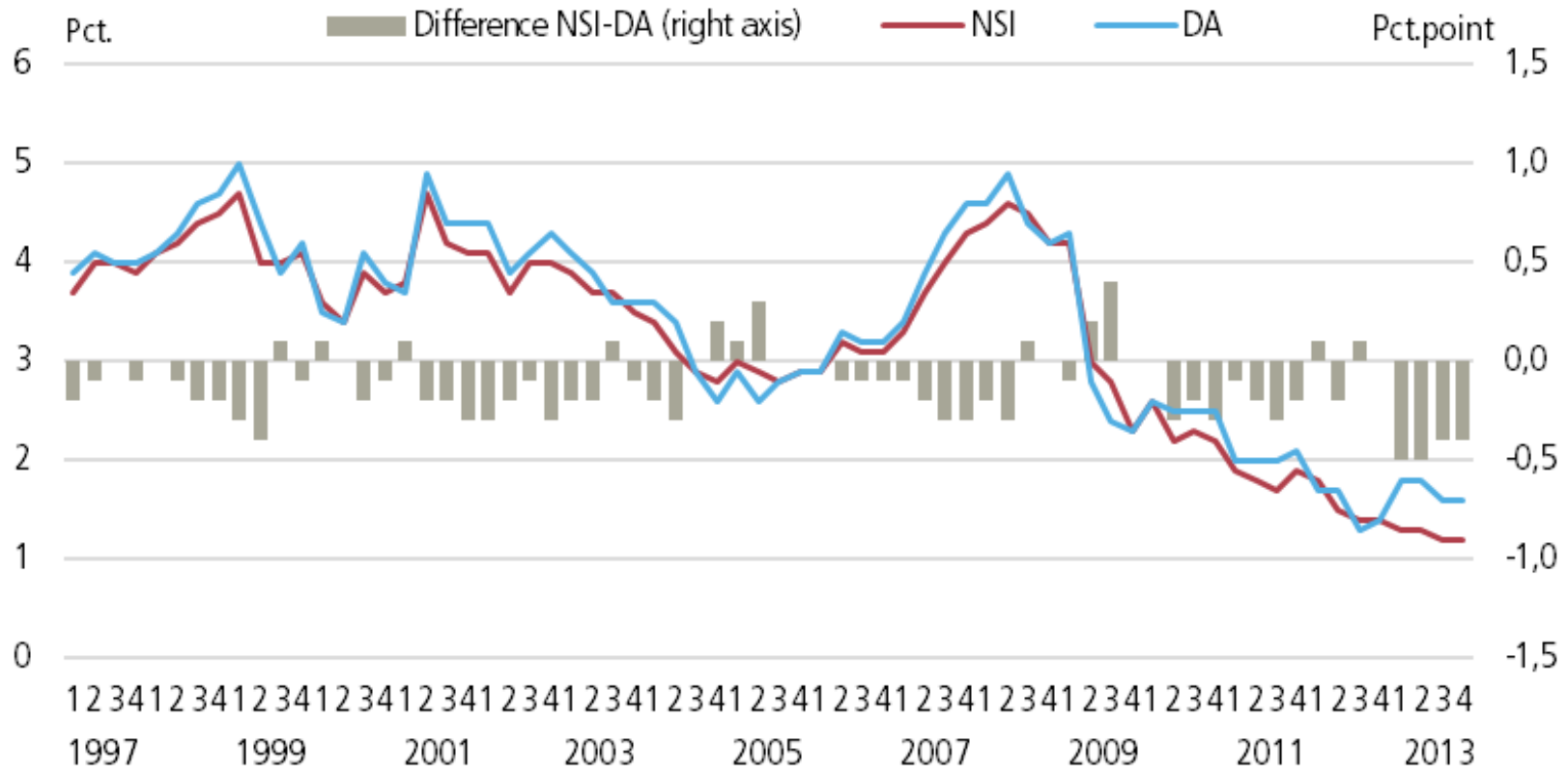
An Issue of Weighting - A Comparative Analysis on Growth Rates in Labour Costs

STATISTICS DENMARK

Background

- Both Statistics Denmark (NSI) and The Confederation of Danish Employers (DA) compile quarterly labour cost statistics on the private sector.
  - NSI: Index of Average Earnings and LCI.
  - DA: Quarterly Statistical Review (KonjunkturStatistik).
- Data sources for both statistics are quite similar but the final results differ.
- Has led to quite substantial confusion by the main users.
  - Various ministries within Central government, Danish National Bank and Trade Unions.

Annual growth rate (percent) in Index of Average Earnings and DA's quarterly labour cost statistics (total economy)



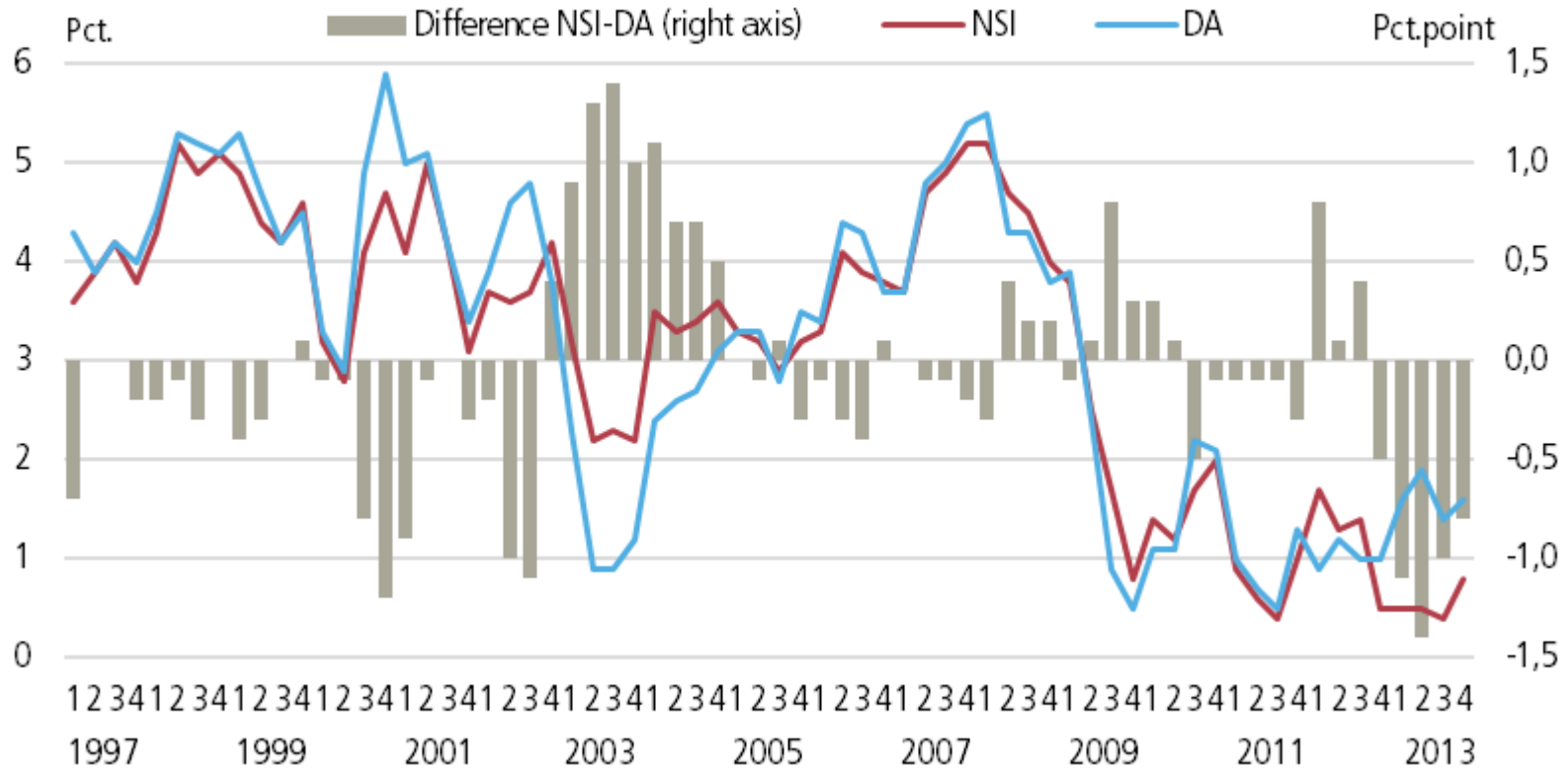
Task force set upon user demands

- For several years there has been a high demand for close investigation of why the statistics differ.
- The Index of Average Earnings is in principle based on similar data sources as DA's statistics.
  - Data reports by sample of enterprises operating in the private sector.
  - However since DA only covers a subsample of the entire private sector, it is not possible to make a full analysis of the different results on labour cost growth rates.
- The NACE section F (Construction) consists mainly of enterprises with DA-membership (90 percent).

Task force set upon user demands (cont.)

- Construction was chosen as an obvious case study.
  - By focusing on construction it therefore would be ensured that the population on labour cost data at least initially should be almost identical in the two quarterly statistics.

Annual growth rate (percent) in Index of Average Earnings and DA's quarterly labour cost statistics (NACE F Construction)



Task force set upon user demands (cont.)

- Construction was chosen as a obvious case study.
  - By focusing on construction it therefore would be ensured that the population on labour cost data at least initially should be almost identical in the two quarterly statistics.
- Remarkable “incoherencies” in the annual growth rates measured in the two statistics.
- These apparently incoherencies caused the need of a further investigation of the main reasons why the statistics differ.
  - Technical task force was set June 2013 with representatives from the NSI and DA.
  - Final report delivered June 2014.

The Danish labour cost data

- The data reports consist of detailed payroll information (labour costs, hours worked and occupation etc.) sent electronically to either the NSI or DA on the level of every single employee.
  - Reference periods is the middle month in each quarter.
  - Sample of private enterprises from the NSI Business Register.
  - Full coverage of enterprises with 100 employee or more and a stratified sample of enterprises with less than 100 employee.
  - Data has a high degree of precision (important part in income-tax return assessment).

Working method of the task force

- Focus on quarterly growth rates between 2012 Q2 and 2012 Q3 (NSI: -0.8 percent and DA: 0.4 percent).
- Building a common data set containing the raw data reports by the construction enterprises as well as the statistical output data used by the NSI and DA respectively.
- Focus areas:
  - in depth analysis of differences in labour cost definition and the data population actually applied in the two labour cost statistics when officially released and the effect on the final results on quarterly growth in hourly labour costs.
  - an examination of differences in methodology, when compiling quarterly growth rates and their effect on the final results.

Different approaches

- Labour Cost definition
  - Almost similiar: total gross earnings excluding irregular payment (bonuses and holiday pay).
  - Quarterly data on absence are used directly by DA in constructing actual hours worked.
  - NSI approximates hours worked as paid hours by assuming constant rates of absence.

Different approaches continued

- Different methodologies in compiling quarterly growth rates in hourly labour costs.
  - Growth rates are compiled based on principal of identical enterprises (local units) in the base quarter t-1 and the current quarter t in both statistics.

- However, in short:
  - NSI compiles growth rates in average hourly labour costs.
  - DA compiles average growth rates in hourly labour costs.

DA methodology

- The data is divided between white and blue collar workers in 35 sub-activities (NACE).
- White collar worker are then categorised according to the 9 major groups of ISCO-08 in the base and current quarter. This is also done for blue collar workers.
- Based on this, DA calculates 315 average earnings (hence, each for ever ISCO-08, NACE combination – 9 x 35) as a **simple arithmetic mean**. This is done for both blue and white collar workers, resulting in 630 average earnings in the base and current quarter.
- These average earnings are then used in calculating an average growth rate. In total DA uses information from 630 growth rates, 315 for blue collar and 315 for white collar.
- Each of these 315 growth rates are then combined according to a fixed weighting principle, where the fixed weight are changed once every year and based on the total number of hours worked from the annual DA-SES the year before. This sum is then divided by the same 9 x 35 combination as mentioned above.
- By combining the 315 growth for blue collar workers and the 315 growth rates for white collar workers, DA ends up with a weighted growth rate for each of the 35 sub-activities and one weighted growth rates for DA as a hole.

NSI methodology

- The micro data regarding the base and the current quarter are grouped by economic activity according to NACE and size classes, corresponding to the enterprise sample design strata.
- In every NACE*size class stratum an average of hourly earnings is compiled by weighting the hourly earnings from every individual with their number of hours worked respectively, resulting in a weighted average of hourly earnings, which contrary to DA ‘s method (simple arithmetic mean) take into account if an employee works full time or part time.
- The stratum averages for quarter t-1 and t are weighted by the corresponding sum of employee according to the Business Register, resulting in a total average of hourly earnings within every NACE section for base and current quarter.
- For every NACE section the quarterly growth rate is compiled as percentage growth in hourly earnings from quarter t-1 to t.
- The quarterly growth rates are then finally chain linked to the Index value t-1.

Calculation of quarterly growth rate in hourly labour costs with application of different weighting methodology (NSI labour cost definition)

Type of employment contract	ISCO 1 digit	Sum of labour costs (DKK)		Hours paid/worked		Number of Employees		Labour costs per hour (NSI)		Percentage growth (NSI)	Labour cost per hour (DA), i. e. simple arithmetic mean		Percentage growth (DA)
		2012 Q2	2012 Q3	2012 Q2	2012 Q3	2012 Q2	2012 Q3	2012 Q2	2012 Q3		2012 Q2	2012 Q3	
Total	**Total**	**383.432.532**	**397.829.262**	**1.526.310**	**1.592.077**	**10.243**	**10.450**	**251,22**	**249,88**	**-0,53**			**0,41**
Blue collar	Total	140.514.034	156.252.120	691.859	767.805	4.986	5.175	203,10	203,50	0,20			0,14
White collar	Total	242.918.498	241.577.142	834.451	824.272	5.257	5.275	291,11	293,08	0,68			0,62
Blue collar	1	44.766	44.766	160	160	1	1	279,42	279,42	0,00	279,42	279,42	0,00
Blue collar	2	91.959	110.527	264	349	2	2	348,16	317,09	-8,92	333,28	323,52	-2,93
Blue collar	3	979.522	1.370.358	3.551	5.696	25	39	275,88	240,56	-12,80	264,24	236,49	-10,50
Blue collar	4	216.700	390.376	1.296	2.609	12	22	167,22	149,62	-10,52	165,21	148,45	-10,15
Blue collar	5	78.046	154.793	424	819	3	7	183,95	188,91	2,70	177,17	184,56	4,17
Blue collar	6	386.358	382.546	2.179	2.025	14	13	177,30	188,88	6,53	176,57	188,90	6,98
Blue collar	7	95.971.702	107.193.218	458.521	512.057	3.413	3.525	209,31	209,34	0,01	209,15	209,50	0,17
Blue collar	8	6.151.060	6.676.351	32.659	35.089	207	215	188,34	190,27	1,03	188,07	189,48	0,75
Blue collar	9	36.593.921	39.929.185	192.805	209.001	1.309	1.351	189,80	191,05	0,66	190,20	190,52	0,17
White collar	1	62.938.416	62.552.773	170.847	168.679	1.072	1.072	368,39	370,84	0,66	368,25	370,61	0,64
White collar	2	56.067.832	55.974.188	180.501	179.695	1.137	1.151	310,62	311,50	0,28	310,38	311,07	0,22
White collar	3	79.389.241	79.191.334	287.450	285.911	1.810	1.834	276,18	276,98	0,29	275,96	276,76	0,29
White collar	4	21.249.336	20.869.482	101.849	98.450	653	640	208,64	211,98	1,60	208,80	212,16	1,61
White collar	5	2.254.480	2.436.646	9.022	9.572	58	62	249,88	254,57	1,88	250,37	256,81	2,57
White collar	7	6.887.344	7.010.614	27.765	28.007	172	173	248,08	250,32	0,91	248,21	250,94	1,10
White collar	8	417.707	390.973	1.762	1.635	11	10	237,02	239,11	0,88	237,02	240,19	1,33
White collar	9	13.714.142	13.151.132	55.254	52.323	344	333	248,20	251,36	1,27	247,67	250,65	1,20

Calculation of quarterly growth rate in hourly labour costs with application of different weighting methodology (NSI labour cost definition)

Type of employment contract	ISCO 1 digit	Sum of labour costs (DKK)		Hours paid/worked		Number of Employees		Labour costs per hour (NSI)		Percentage growth (NSI)	Labour cost per hour (DA), i. e. simple arithmetic mean		Percentage growth (DA)
		2012 Q2	2012 Q3	2012 Q2	2012 Q3	2012 Q2	2012 Q3	2012 Q2	2012 Q3		2012 Q2	2012 Q3	
Total	**Total**	**383.432.532**	**397.829.262**	**1.526.310**	**1.592.077**	**10.243**	**10.450**	**251,22**	**249,88**	**-0,53**			**0,41**
Blue collar	Total	140.514.034	156.252.120	691.850	767.805	4.986	5.175	203,10	203,50	0,20			0,14
White collar	Total	242.918.498	241.577.142	834.459	824.272	5.257	5.275	291,11	293,08	0,68			0,62
Blue collar	1	44.766	44.766	160	160	1	1	279,42	279,42	0,00	279,42	279,42	0,00
Blue collar	2	91.959	110.527	264	349	2	2	348,16	317,09	-8,92	333,28	323,52	-2,93
Blue collar	3	979.522	1.370.358	3.551	5.696	25	39	275,88	240,56	-12,80	264,24	236,49	-10,50
Blue collar	4	216.700	390.376	1.296	2.609	12	22	167,22	149,62	-10,52	165,21	148,45	-10,15
Blue collar	5	78.046	154.793	424	819	3	7	183,95	188,91	2,70	177,17	184,56	4,17
Blue collar	6	386.358	382.546	2.179	2.025	14	13	177,30	188,88	6,53	176,57	188,90	6,98
Blue collar	7	95.971.702	107.193.218	458.521	512.057	3.413	3.525	209,31	209,34	0,01	209,15	209,50	0,17
Blue collar	8	6.151.060	6.676.351	32.659	35.089	207	215	188,34	190,27	1,03	188,07	189,48	0,75
Blue collar	9	36.593.921	39.929.185	192.805	209.001	1.309	1.351	189,80	191,05	0,66	190,70	190,52	0,17
White collar	1	62.938.416	62.552.773	170.847	168.679	1.072	1.072	368,39	370,84	0,66	368,25	370,51	0,64
White collar	2	56.067.832	55.974.188	180.501	179.695	1.137	1.151	310,62	311,50	0,28	310,38	311,07	0,22
White collar	3	79.389.241	79.191.334	287.450	285.911	1.810	1.834	276,18	276,98	0,29	275,96	276,76	0,29
White collar	4	21.249.336	20.869.482	101.849	98.450	653	640	208,64	211,98	1,60	208,80	212,16	1,61
White collar	5	2.254.480	2.436.646	9.022	9.572	58	62	249,88	254,57	1,88	250,37	256,81	2,57
White collar	7	6.887.344	7.010.614	27.765	28.007	172	173	248,06	250,32	0,91	248,21	250,94	1,10
White collar	8	417.707	390.973	1.762	1.635	11	10	237,02	239,11	0,88	237,02	240,19	1,33
White collar	9	13.714.142	13.151.132	55.254	52.323	344	333	248,20	251,35	1,27	247,67	250,95	1,20

Calculation of quarterly growth rate in hourly labour costs with application of different weighting methodology (DA's labour cost definition)

Type of employment contract	ISCO 1 digit	Sum of labour costs (DKK)		Hours paid/worked		Number of Employees		Labour costs per hour (NSI)		Percentage growth (NSI)	Labour cost per hour (DA), i. e. simple arithmetic mean		Percentage growth (DA)
		2012 Q2	2012 Q3	2012 Q2	2012 Q3	2012 Q2	2012 Q3	2012 Q2	2012 Q3		2012 Q2	2012 Q3	
Total	**Total**	**392.091.401**	**411.788.934**	**1.368.052**	**1.448.150**	**10.243**	**10.450**	**286,61**	**284,36**	**-0,79**			**0,43**
Blue collar	Total	152.393.013	173.241.108	650.507	740.491	4.986	5.175	234,27	233,95	-0,13			-0,07
White collar	Total	239.698.389	238.547.826	717.545	707.659	5.257	5.275	334,05	337,09	0,91			0,87
Blue collar	1	44.766	44.766	140	140	1	1	319,80	319,80	0,00	319,80	319,80	0,00
Blue collar	2	96.339	117.879	244	328	2	2	395,00	359,02	-9,11	383,49	372,16	-2,95
Blue collar	3	757.679	1.266.636	2.948	5.096	25	39	257,03	248,54	-3,30	257,68	248,10	-3,72
Blue collar	4	230.291	431.394	1.200	2.513	12	22	191,96	171,67	-10,57	190,85	171,76	-10,01
Blue collar	5	79.820	161.382	384	723	3	7	207,96	223,23	7,34	201,63	219,79	9,01
Blue collar	6	419.079	432.939	1.939	1.945	14	13	216,16	222,56	2,96	217,27	221,17	1,79
Blue collar	7	103.654.834	117.603.208	432.972	493.750	3.413	3.525	239,40	238,18	-0,51	239,97	239,25	-0,30
Blue collar	8	6.847.481	7.657.003	30.342	33.866	207	215	225,68	226,09	0,19	224,00	223,99	0,00
Blue collar	9	40.262.724	45.525.902	180.339	202.128	1.309	1.351	223,26	225,23	0,88	221,53	222,82	0,58
White collar	1	62.003.577	61.656.782	146.206	143.840	1.072	1.072	424,08	428,65	1,08	424,14	428,61	1,05
White collar	2	55.287.850	54.967.369	155.008	153.472	1.137	1.151	356,68	358,16	0,42	356,60	358,38	0,50
White collar	3	78.272.173	78.351.817	247.417	246.176	1.810	1.834	316,36	318,28	0,61	316,24	317,91	0,53
White collar	4	21.028.250	20.669.284	87.858	84.758	653	640	239,34	243,86	1,89	239,72	244,43	1,96
White collar	5	2.249.766	2.433.427	7.766	8.350	58	62	289,70	291,41	0,59	293,87	293,99	0,04
White collar	7	6.762.735	6.954.582	23.705	24.219	172	173	285,29	287,15	0,65	285,74	287,65	0,67
White collar	8	415.736	382.776	1.518	1.396	11	10	273,95	274,23	0,10	274,97	278,22	1,18
White collar	9	13.678.301	13.131.789	48.067	45.448	344	333	284,56	288,94	1,54	284,04	288,26	1,49

Main results on the case study on Construction

	NSI labour cost definition		DA labour cost definition	
	(1)	(2)	(3)	(4)
	NSI methodology	DA methodology	NSI methodology	DA methodology
Quarterly growth rate in hourly labour costs	-0.53 pct.	0.41 pct.	-0.79 pct.	0.43 pct.
Difference due to methodology (A)	-0.94 pct.		-1.21 pct.	
Difference due to labour cost definition (B)	0.26 pct.		0.02 pct.	

Flexible weights between blue and white collar employee are sensitive to the final NSI-results in Danish data

- Days of absence (i.e. due to holidays, temporary lay-offs caused by wheather conditions etc.) especially for blue collar employee affects overall growth rates in hourly labour costs, because they often are without any payment.
  - Possible scenarios:
    - 1 extra day off (7.4 hours) in **2012 Q2 (May)** results in a reduction of 36,900 hours in total for blue collar employee amounting to 7.5 mill. DKK reduction in total labour costs. The overall resulting growth rate now amounts to -1.0 percent (-0.5 percent initially).
    - 1 extra day off (7.4 hours) in **2012 Q3 (August)** results in a reduction of 38,300 hours in total for blue collar employee amounting to 7.8 mill. DKK reduction in total labour costs. The overall resulting growth rate now amounts to -0.1 percent (-0.5 percent initially).
  - Despite that both white collar and blue collar employee has unchanged growth rates (0.2 and 0.7 percent respectively) the overall result is highly affected, due to the relative shift in weights between the two types of employee.

Reactions and reflections

- The reactions to the common study were overall positive and gave sufficient answers to users why the statistics differ. It became very clear and an accepted fact that users should be careful with comparing the results directly.
- Weighting principles are not irrelevant and should be considered carefully, especially in the light of new future plans regarding a possible labour price index.

Questions?

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