

Innovative Cooperative Actions of Research & Development
in EUROCONTROL Programme CARE INO III

Dynamic Cost Indexing

UNIVERSITY OF WESTMINSTER



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Technical Discussion Document 5.0

Aircraft crewing – marginal delay costs

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1. Overview

This document derives *marginal* crew costs, i.e. the cost of crewing for additional minutes over and above those planned at the strategic phase. Marginal crew costs are appropriate for the cost index context. Calculations are furnished for twelve aircraft types, for flight and cabin crew, presenting a 'low', 'base' and 'high' cost scenario for each. These costs are derived from a detailed examination of payment mechanisms for aircraft crew, with reference to current salary ranges.

2.1 A review of crew payment

A review of flight and cabin crew¹ payment mechanisms has been undertaken for a wide range of airlines, covering low cost carriers (LCCs), charter operators and full service carriers (FSCs). Although the focus has been on European airlines, operators in North America, the Gulf region and Australia have been considered.

Table 1 illustrates the range of fixed and variable payment types available to airlines. Airlines will utilise various crew payment mechanisms, though some are more suited to a particular:

- market sector (FSCs compared with LCCs / charter airlines);
- geographical region (North America compared with Europe).

In Europe, airlines typically pay crew by fixed salaries (supplemented by flying time payments) whereas crew in North America are typically remunerated by a 'pay-and-credit' scheme whereby duty and flying time determine the salary (Nissen and Haase, 2006).

A brief description is provided for each payment mechanism listed in Table 1, although actual implementation will vary between airlines. Social security contributions are normally deducted from payments as a percentage of the total salary. Flight crew earn considerably higher salaries compared with cabin crew (see Table 2), which is reflected by the greater number of means of payment for pilots.

There are numerous drivers of airline crew costs, notably:

- base country (prevailing wage rates, social security/insurance contributions and union membership);
- type of operation (state-owned or former state-owned flag carriers with a predominance of long-serving staff at the top end of the salary scale paying more than recent start-up low cost carriers with newly recruited staff);
- size of aircraft flown (generally pilots flying larger aircraft are paid more than those flying smaller aircraft, though some airlines have a common pay scale).

¹ The terms 'cabin crew' and 'flight attendant' are interchangeable.

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Table 1. Range of crew payment mechanisms

Payment	Description	Fixed, variable or either	Applies to: flight crew (FC)/cabin crew (CC)
Basic salary	Salary paid irrespective of hours worked (on the ground or airborne). Other payments will be earned in addition to the basic salary, e.g. per sector flown.	Fixed	Both
Sector pay	Set payment per sector flown, usually higher for longer or international sectors. This can account for 40-50% of the total annual salary for LCC crew.	Fixed	Both
Flight duty pay	Hourly rate of pay, earned during time on duty (ground & airborne). Payment covers period of time from the moment crew member reports for duty, until after the last flight's debrief. May be guaranteed min. num. hours per month.	Variable	Both
Flying pay / block pay	Hourly rate, usually earned off-blocks (although may accrue from doors closed / engine start / other event). Rate of pay may be higher than for flight duty pay as time qualifying for payment is less. Although on duty, no pay earned until aircraft is off-blocks/etc. May be guaranteed min. num. hours per month.	Variable	Both
Productivity pay	Hourly rate, usually earned off-blocks. Overrides the lower flying pay/block pay once an hours threshold for the month has been reached.	Variable	FC
Overtime pay	Hourly rate of pay or a fixed payment (e.g. per day worked or per sector) made once an hours threshold for the month has been reached, or when a day-off is worked. A typical overtime hourly rate is 1.5 x hourly rate of pay.	Either	Both
Deadhead pay	Hourly rate, earned off-blocks or by scheduled/actual flight time, whereby crew member flies as a passenger or on jumpseat in order to reposition. Hours count as on duty, but pay may be reduced, e.g., 50% of normal hourly rate.	Variable	Both
<i>Per diem</i>	Usually a daily allowance to cover meals and other small expenses while on duty or per overnight stay away from base. Can also be paid as an hourly allowance.	Either	Both
Duty rig	Rate of pay based on time spent on duty, from reporting for duty until release. Expressed as a ratio, e.g. duty rig of 1:2 = 1 hour of pay per 2 hours on duty. Common in North America.	Variable	FC
Trip rig	Rate of pay based on time spent away from home base while on duty, expressed as a ratio (e.g. a trip rig of 1:3.5 = 1 hour of pay per 3.5 hours away). A trip rig might be used in place of a <i>per diem</i> allowance as crew are paid during nights away on duty. Common in North America.	Variable	FC
Commission	Commission per on-board sale.	Variable	CC
Standby pay	Payment (hourly rate or equivalent to sector pay) earned whilst on airport standby, at a lower rate than flight duty pay or flying pay/block pay. If required for duty, the flight duty pay or flying pay/block pay applies instead.	Either	Both
Loyalty bonus	Payment per year of continuous employment with the company (may only apply when the airline is profitable).	Fixed	FC
Base weighting	Additional payment if working from expensive base (e.g. London Heathrow).	Fixed	CC
Training pay	Payment (hourly rate or equivalent to sector pay). Covers training on ground.	Either	Both
Uniform allowance	Monthly payment to cover clothing expenses.	Fixed	Both
Housing allowance	Monthly allowance to cover relocation expenses (e.g. to an overseas base).	Fixed	FC
Other allowances	Other <i>ad hoc</i> or annual payments might be made for ID cards, medicals, visas and passport renewals.	Fixed	Both
Other benefits	Other company benefits may include health insurance, life insurance, loss of licence insurance, children's education assistance, company profit sharing, subsidised/free staff travel and exchange rate protection (i.e. a guaranteed rate between payments in the local currency against the US dollar etc).	Either	FC
Pension	Company pension contributions, usually a percentage of the basic salary.	Variable	Both

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Typical 2008 pilot and flight attendant salaries have been calculated for various European airlines, using their corresponding payment schemes with realistic annual block/flight duty hours, sectors flown and overnight stopovers. A smoothed range of salaries was calculated using the payment schemes of between two and seven European airlines for each of the twelve aircraft types. Pilots' salaries increase by size of aircraft, although commonality can be seen within aircraft families (e.g. A320 family). In contrast, flight attendants' salaries are more consistent across all aircraft types. Table 2 shows the range of gross salaries in Euros (i.e. before tax) paid to pilots and flight attendants for each aircraft type, on-costs, such as company pension contributions, are not included here.

Table 2. Range of typical crew salaries before overtime

Aircraft	Flight crew				Cabin crew			
	Captain		First Officer		Senior Flight Attendant		Flight Attendant	
	From	To	From	To	From	To	From	To
B737-300	85 000	160 000	38 000	85 000	30 000	45 000	20 000	30 000
B737-400	67 000	162 000	38 000	85 000				
B737-500	63 000	136 000	38 000	102 000				
B737-800	70 000	162 000	38 000	102 000				
B757-200	85 000	149 000	50 000	85 000				
B767-300ER	100 000	170 000	63 000	120 000				
B747-400	110 000	205 000	78 000	150 000				
A319	67 000	126 000	36 000	67 000				
A320	67 000	126 000	36 000	67 000				
A321	67 000	126 000	36 000	67 000				
ATR42-300	66 000	102 000	35 000	66 000				
ATR72-200	66 000	102 000	35 000	66 000				

All costs are Euros (2008). Key exchange rates used: EUR 1.0 = USD 1.5 and EUR 1.0 = GBP 0.8 (2008 January-August average), various sources. Costs are gross per annum including allowances, excluding on-costs and overtime.

The lower end of the salary scales represents inexperienced members of crew (e.g. 'year 1' rank), although cadet pilots and trainee flight attendants often earn less than this for a set number of months as experience is acquired. The upper end of the salary scale represents experienced or senior staff at the top end of their respective pay scales, without exceeding working time limits². For captains this can include line training pay (though not the higher base training pay). The top of an airline's captain salary scale might not be reached for 20 years for a full service carrier, whereas it could take just three years to reach the same rank with a low cost carrier (albeit with a much lower basic salary).

² Since July 2008 EU flight time limits have been harmonised by Regulation (EC) 1899/2006, Subpart Q, *Flight and Duty Time Limitations and Rest Requirements*. Briefly, crew flying time is limited to a maximum of 900 block-hours (i.e. off-blocks) in a calendar year or 100 block-hours in any 28 consecutive days, with additional maximum limits on duty time as well as minimum rest periods. Flight crew are typically paid overtime after 700 block-hours have been worked.

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From a European perspective, for marginal crew cost contributions incurred by airlines during delay, even delays in excess of an hour could result in no additional crew costs. For example, an at-gate delay would have no effect on the cost of crew paid *by block-hours worked* as this payment mechanism is triggered off-blocks. As another example, an airborne delay will have no effect on the cost of crew paid *by sectors flown* as this payment mechanism is cycles-based. In both cases, a large proportion of pay would normally be fixed as basic salary, with *per diem* allowances paid daily.

2.2 Assumptions for low, base and high cost scenarios

This section presents the methodology for calculating 'low', 'base' and 'high' scenarios, for marginal crew costs. The main assumptions are listed in Table 3. A common set of twelve aircraft types is supported across the Dynamic Cost Indexing research programme, the same as originally selected in reporting on delay costs to the Performance Review Commission by Cook et al. (2004).

The assumption is made that under each scenario the number of crew is appropriate to the airline's business model. The scheduling and optimisation of aircraft crew is a complex process³ and is split into three phases. This begins weeks in advance of the day of operation:

- 'crew pairing' – an anonymous sequence of flight legs which start and end at the home base (e.g. over a day for short haul or multiple days for medium/long haul);
- 'crew rostering' – the assignment of pairings to individuals taking into account a multitude of rules (e.g. company requirements such as language competency and cost minimisation, individual preferences expressed through 'bidlines' or decided by seniority, and regulations governing operations such as flight time limitations);
- 'crew tracking' – up to and including the day of operations, accommodating changes to the timetable and crew/equipment availability.

2.2.1 Aircraft seats

The number of aircraft seats is important as it determines the minimum allowed complement of cabin crew. Briefly, in the EU⁴ and the US⁵, for aircraft with 20 or more⁶ seats fitted, there is a requirement for a minimum of one member of cabin crew per 50 seats (per deck) – irrespective of the number of passengers on board. These requirements vary around the world, e.g. in Canada⁷ the minimum requirement is for there to be one member of cabin crew per 40 passengers (per deck) *on board*. The EU/US minimum cabin crew regulations have been applied to the three cost scenarios. A further requirement is that one member of cabin crew must hold a senior rank.

³ There are a number of crew scheduling software suites available to airlines, e.g. Rocode and AirCrews (Sabre), NetLine/Crew (Lufthansa Systems) and Carmen Crew Pairing / Carmen Crew Rostering (Jeppesen).

⁴ Regulation (EC) 1899/2006, section *OPS 1.990: Number and composition of cabin crew*.

⁵ FAA Code of Federal Regulations – 14 Aeronautics and Space, section *121.391: Flight attendants*.

⁶ There are differences in the cabin crew regulations for aircraft with fewer than 20 seats, and up to 50 seats, but these do not affect the selected twelve aircraft types.

⁷ Canadian Aviation Regulations, section *705.104: Flight Attendant Requirements*.

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Table 3. Low, base and high cost scenario assumptions

Factor		Scenario		
		Low ^(d)	Base	High
Aircraft seats <i>(% of max. available)</i>	Narrowbody	100% (single-class)	85% (2-class)	85% (2-class)
	Widebody	100% (single-class)	85% (2-class)	75% (3-class)
Flight crew ranks		Captain / First Officer	Captain / First Officer	Captain / First Officer
Flight crew <i>(in addition to minimum required)</i>	Narrowbody	+0	+0	+0
	Widebody	+0	+0	+1 (relief Captain)
Cabin crew ranks		(Senior/) Flight Attendant(s)	(Senior/) Flight Attendant(s)	(Senior/) Flight Attendant(s)
Cabin crew <i>(in addition to minimum required)</i>	Narrowbody	+0	+1	+2
	Widebody	+0	+3 (1 deck) +5 (2 decks)	+5 (1 deck) +8 (2 decks)
Senior cabin crew ^(a) <i>(number of senior flight attendants)</i>	Narrowbody	1 (per class)	1 ^(b) (per class)	1 ^(b) (per class)
	Widebody	2 (per class)	2 ^(b) (per class)	2 ^(b) (per class, -1 from total ^(c))
Overtime payment		No	Yes	Yes
On-costs <i>(as % of crew pay)</i>		+20%	+30%	+40%

- (a) The number of senior flight attendants *within* the cabin crew, i.e. not in addition to the cabin crew.
 (b) If three or fewer cabin crew are required in total, then only one of these crew members is assumed to be a senior flight attendant (over-riding the seniority assumption – this only affects the two ATR aircraft).
 (c) See footnote 10.
 (d) See footnote 11.

The number of seats fitted can vary a great deal within an aircraft type, reflecting the differing cost models and markets served by carriers. It is not uncommon for the number of seats to cluster just under multiples of the '50 seat' rule (e.g. 149 or 150 seats, requiring at least three flight attendants) so as not to trigger the automatic requirement on an additional member of cabin crew. This is not always the case; low cost carrier easyJet's A319 fleet has 156 seats (26 rows of six seats), requiring at least four flight attendants. The typical range of seats per aircraft and assumed number of seats for the calculations are shown for each scenario in Table 4. For the low cost scenario, it is assumed that each aircraft has the maximum allowed number of seats fitted in a single class configuration – typical of low cost carriers. A review of full service carriers' seat layouts led to the base scenario assuming 85% of the maximum possible of number of seats in a two-class layout, and the high cost scenario assuming the same for narrowbodies and 75% in a three-class layout for widebodies.

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2.2.2 Crew allocations

The twelve aircraft types each require a flight crew of two – one captain (commander) and one first officer (no flight engineer required). For the high cost scenario, an additional relief captain has been assumed for the two widebody aircraft – as would be required with flights of up to 12 hours' duration. The high cost scenario assumption *could* be made more extreme with two relief pilots, as required for even longer haul flights, as well as a deadhead⁸ pilot on board. As introduced in Section 2.2.1, minimum cabin crew requirements are a function of the number of aircraft seats. For the low cost scenario the minimum number of flight attendants is assumed (i.e. one per 50 seats, per deck). The base and high cost scenarios assume additional cabin crew, even though the number of seats is lower, due to the additional classes of passenger provided for, with fewer passengers per flight attendant in business/first class, and with up to eight additional staff assumed for the B747-400. As mentioned, as a minimum, there must be one senior ranked flight attendant on board (the job title varies between airlines, e.g. 'Purser', 'Customer Service Manager' and 'Cabin Manager'). For each scenario a proportion of the total cabin crew complement are assumed to be of the higher rank, who are more likely to serve premium-fare passengers. Table 4 shows the assumed flight and cabin crew for the three scenarios.

2.2.3 Overtime and on-costs

The calculation of marginal crew block-hour costs incurred by the airlines is discussed in the next section. Briefly, no overtime payment is assumed for the low cost scenario (see also footnote 11), but overtime pay is assumed for the base and high cost scenarios.

On-costs cover a range of additional crew-related costs to the airline, such as administration and personnel costs associated with managing crew, company contributions to crew pension schemes and social security/insurance contributions. Doganis (2005) provides a comparison of on-costs for a range of European airlines. The lowest proportion of additional cost was found to be 17-18%, with the highest proportion being an extra 52%. Removing extreme values, the on-cost low to high scenario range can be rounded to 20-40%, with the mid-point (30%) adopted for the base cost scenario.

3 Calculation of marginal minute crew costs

3.1 Assigning seats and crew to the twelve supported aircraft types

Table 4 shows the assigned number of seats for the twelve aircraft types and the (resulting) assumed crew – the total cabin crew numbers being driven by the maximum number of seats available. The typical range of seats per aircraft, shown in the left-hand column, was established using ICAO 2006 fleet data⁹ (ICAO Digest of Statistics) with a sample of over 4 000 aircraft. Unusual aircraft seat configurations were excluded from this range, such as all-business class aircraft with considerably fewer seats (e.g. B737-800 with 56 seats) and Japanese domestic-only widebodies with high density seating (e.g. B747-400 with up to 569 seats).

⁸ See Table 1.

⁹ 2006 is the most recent full year of data.

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As introduced in the preceding discussion, the typical maximum numbers of seats were used to populate the low cost scenario. This then formed the upper reference point, relative to which the number of seats assigned to the base and high cost scenarios were derived (see Table 3). Total cabin crew were assigned relative to the number of seats per scenario. Taking the B767-300ER as an example, for the low cost scenario the minimum number of cabin crew has been assigned (7 for 328 seats), for the base cost scenario 9 cabin crew (6 for 279 seats, plus 3 additional staff), and for the high cost scenario 10 cabin crew (5 for 246 seats, plus 5 additional staff).

Of the total number of cabin crew, senior members have been allocated by the number of cabin classes. Taking the B767-300ER again, 2 senior flight attendants have been assigned for the low cost scenario (2 for the single-class configuration), 4 for the base cost scenario (2 for each of the cabin classes), and 5 for the high cost scenario (2 for each of the cabin classes, minus 1 from the total¹⁰). Flight crew numbers consist of two pilots in each case, except for the widebody high cost scenario.

Table 4. Assigned aircraft seats and members of crew for the three scenarios

Aircraft (min.-max. seat range)	Total seats			Total flight crew (Captain / First Officer)			Total cabin crew (Senior/) Flight Attendant(s)		
	Low	Base	High	Low	Base	High	Low	Base	High
B737-300 (118-149)	149	127	127	2 (1+1)	2 (1+1)	2 (1+1)	3 (1+2)	4 (2+2)	5 (2+3)
B737-400 (123-170)	170	145	145	2 (1+1)	2 (1+1)	2 (1+1)	4 (1+3)	4 (2+2)	5 (2+3)
B737-500 (104-133)	133	113	113	2 (1+1)	2 (1+1)	2 (1+1)	3 (1+2)	4 (2+2)	5 (2+3)
B737-800 (140-189)	189	161	161	2 (1+1)	2 (1+1)	2 (1+1)	4 (1+3)	5 (2+3)	6 (2+4)
B757-200 (160-235)	235	200	200	2 (1+1)	2 (1+1)	2 (1+1)	5 (1+4)	5 (2+3)	6 (2+4)
B767-300ER (190-328)	328	279	246	2 (1+1)	2 (1+1)	3 (2+1)	7 (2+5)	9 (4+5)	10 (5+5)
B747-400 (284-474)	474	403	356	2 (1+1)	2 (1+1)	3 (2+1)	11 (2+9)	14 (4+10)	16 (5+11)
A319 (82-156)	156	133	133	2 (1+1)	2 (1+1)	2 (1+1)	4 (1+3)	4 (2+2)	5 (2+3)
A320 (110-180)	180	153	153	2 (1+1)	2 (1+1)	2 (1+1)	4 (1+3)	5 (2+3)	6 (2+4)
A321 (149-220)	220	187	187	2 (1+1)	2 (1+1)	2 (1+1)	5 (1+4)	5 (2+3)	6 (2+4)
ATR42-300 (42-50)	50	43	43	2 (1+1)	2 (1+1)	2 (1+1)	1 (1+0)	2 (1+1)	3 (1+2)
ATR72-200 (60-70)	70	60	60	2 (1+1)	2 (1+1)	2 (1+1)	2 (1+1)	3 (1+2)	4 (2+2)

¹⁰ A judgemental correction to prevent the proportion of senior flight attendants from exceeding half of the cabin crew.

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3.2 Low cost scenario – zero costing

With careful management of crew working hours, for certain delays it is quite possible that no extra payment will be made to any crew, e.g. under 'flying/block pay' or 'sector pay' mechanisms, with crew well within total duty hours. Zero-cost is thus assigned to the low cost scenario¹¹. Variable pay elements for LCCs are typically sector-based, to encourage productivity, comprising as much as half the salary, the rest being mostly fixed salary.

3.3 Base and high cost scenarios – proxy and overtime costing

However, it cannot be assumed that at-gate and airborne hours do not generate additional costs to the airline for the base and high cost scenarios. Although variable, time-based payments (as listed in Table 1) are actually used by only a small proportion of European airlines, crew hours clearly cannot be assumed to be cost-free and a method is needed to calculate crew costs per (block-) hour. Although a delay experienced by an individual flight may have no *immediate* effect on the amount paid by the airline to the delayed crew, over a period of time (initially 28 consecutive days, then the calendar year), delays are likely to affect crews' remaining flight and duty hours – limited by Regulation (EC) 1899/2006. Either overtime payments will be paid earlier than would have been the case without such delays (when the hours worked or duty threshold is reached) and/or out-of-hours crew will need to be covered by other/reserve crew. We treat at-gate and airborne hours the same – although at-gate hours are not block-hours, delays here will still reduce crew members' remaining available hours. For the base and high cost scenarios, the crew cost per (block-) hour has been calculated from the typical total salaries presented in Table 2. The mid-salary value has been taken as the starting point for the base cost scenario calculation for each aircraft type, with the upper salary values determining the high cost scenario starting point¹². Cycles-based sector pay and allowances were first subtracted from the annual, total cost estimates¹³. The remaining proportion of the salary can now be treated as 'time-based'.

For the base cost scenario, proxy rates have been calculated, based on the 'time-based' salary (the remaining 95% of the captains' salaries, for example) for flight and cabin crew, for each aircraft type. These rates have each been calculated from an 'optimistic' and 'pessimistic' position from the carriers' point of view. The pessimistic position for the airline assumes a time-based salary for pilots consisting of 700 block-hours (BH) paid at the basic hourly rate (see footnote 2), with 200BH paid at the overtime rate (assumed to be 1.5 times the basic hourly rate of pay), with cabin crew paid for 850BH at the basic hourly rate only, plus 50BH on overtime. The optimistic position comprises 700BH (basic) + 50BH (overtime) for flight crew, and 900BH basic for cabin crew, the latter tending to be worked more often to the full limit. The final, base cost scenario, per crew member, is taken as the average of the lower (optimistic) rate and the higher (pessimistic) rate.

For the high cost scenario, it is assumed that delay minutes are paid for at overtime rates.

¹¹ This means that the assumptions presented in Table 3 for the low cost scenario do not have any quantitative effect on the low cost scenario costing. These assumptions are retained in Table 3, however, to show their relationship with the base and high cost scenarios, to set the latter in the appropriate context.

¹² The lower salary value is not used, as the low cost scenario is assigned zero cost.

¹³ Based on multiple sources and judgement, the following proportions were subtracted: 5% from captains' salaries, 10% from first officers', 20% from senior flight attendants' and 25% from flight attendants' salaries.

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Table 5 shows the calculated cost per crew member, excluding on-costs, for the three scenarios. The base scenario costs, being proxy rates, are not the rates at which crew would actually be paid, but instead allow the determination of an ***equivalent marginal (block-) hour crew cost to the airline***, based on realistic operational assumptions. They are averaged back over the whole year, allowing typical delay costs to be proportionately spread over crew paid at basic and overtime rates.

Table 5. Marginal costs per member of crew (excluding on-costs)

Aircraft	Captain			First Officer			Senior F/A			Flight Attendant		
	Low	Base	High	Low	Base	High	Low	Base	High	Low	Base	High
B737-300	0	179	326	0	85	164	0	34	60	0	21	38
B737-400	0	167	330	0	85	164	0	34	60	0	21	38
B737-500	0	145	277	0	97	197	0	34	60	0	21	38
B737-800	0	169	330	0	97	197	0	34	60	0	21	38
B757-200	0	171	303	0	93	164	0	34	60	0	21	38
B767-300ER	0	197	346	0	127	231	0	34	60	0	21	38
B747-400	0	230	417	0	158	289	0	34	60	0	21	38
A319	0	141	257	0	71	129	0	34	60	0	21	38
A320	0	141	257	0	71	129	0	34	60	0	21	38
A321	0	141	257	0	71	129	0	34	60	0	21	38
ATR42-300	0	123	208	0	70	127	0	34	60	0	21	38
ATR72-200	0	123	208	0	70	127	0	34	60	0	21	38

All costs are Euros per (block-) hour (2008)

Table 6. Marginal crew costs per aircraft (excluding on-costs)

Aircraft	Flight crew cost (Captain(s) + First Officer)			Cabin crew cost (Senior/) F/A(s)			Total crew cost (Flight crew + cabin crew)		
	Low	Base	High	Low	Base	High	Low	Base	High
B737-300	0	264	490	0	110	234	0	374	724
B737-400	0	252	494	0	110	234	0	362	728
B737-500	0	242	474	0	110	234	0	352	708
B737-800	0	266	527	0	131	272	0	397	799
B757-200	0	264	467	0	131	272	0	395	739
B767-300ER	0	324	923	0	241	490	0	565	1413
B747-400	0	388	1123	0	346	718	0	734	1841
A319	0	212	386	0	110	234	0	322	620
A320	0	212	386	0	131	272	0	343	658
A321	0	212	386	0	131	272	0	343	658
ATR42-300	0	193	335	0	55	136	0	248	471
ATR72-200	0	193	335	0	76	196	0	269	531

All costs are Euros per (block-) hour (2008)

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Table 6 shows the marginal (block-) hour cost for the crew on board, i.e. per aircraft, excluding on-costs. Taking the B737-300 base cost scenario as an example, the EUR 264 flight crew cost is for the captain and first officer (EUR 179 + EUR 85; see Table 5) and the EUR 110 cabin crew cost is for two senior flight attendants and two flight attendants ((EUR 34 × 2) + (EUR 21 × 2); see Table 5).

Table 7. Marginal crew costs per aircraft, per minute (on-costs included)

Aircraft	At-gate or airborne		
	Low	Base	High
B737-300	0	8.1	16.9
B737-400	0	7.8	17.0
B737-500	0	7.6	16.5
B737-800	0	8.6	18.6
B757-200	0	8.6	17.2
B767-300ER	0	12.2	33.0
B747-400	0	15.9	43.0
A319	0	7.0	14.5
A320	0	7.4	15.4
A321	0	7.4	15.4
ATR42-300	0	5.4	11.0
ATR72-200	0	5.8	12.4

All costs are Euros per marginal minute (2008)

Finally, Table 7 shows the total crew cost (flight crew plus cabin crew) from Table 6 with on-costs included (an additional 30% on the base cost scenario and an additional 40% on the high cost scenario), converted to per-minute costs. These marginal crew costs apply both to delays at-gate or airborne, and are **appropriate for use in the cost index**. It should be noted that an airline might allocate the low cost scenario for at-gate costs and the base cost scenario for airborne costs (for example if a 'flying/block pay' mechanism is used, the at-gate costs would be zero, but the airborne costs non-zero).

When the base cost scenarios are scaled back up using the typical block-hours assumed¹⁴ per aircraft type, these are in the range of 85-90% of the full, bottom-line annual costs (with cycles-based sector pay and allowances added back on to the salaries with overtime). These base cost scenario marginal costs are thus **almost unit costs**. This is intended to reflect the more likely effect of delays averagely impacting existing/reserve crew, working 750 – 900BH, rather than the less likely alternative of airlines having reserve pools specifically to cover additional (delay) hours within basic allocations of 700BH, with no overtime.

¹⁴ Averaging 825BH per annum for flight crew, 900BH for cabin crew.

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