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Negotiating Group on Market Access

FORMULA APPROACHES TO TARIFF NEGOTIATIONS

Note by the Secretariat[1]

Revision

I. INTRODUCTION

1. With the aim of simplifying and unifying the documentation issued by the Secretariat regarding the use and impact of formulae for tariff negotiations, this document combines a revised version of the theoretical foundations of formulae approaches, TN/MA/S/3/Rev.1, with an updated and revised version of the document TN/MA/S/3/Rev.1/Add.1, which illustrates, where possible, various proposals for formula reductions which were submitted by Members up to end March 2003. A hypothetical tariff profile has been used to illustrate the properties of the theoretical formulae and the specific formulae proposed by Members.

II. FORMULA APPROACHES – SOME GENERAL CONSIDERATIONS

2. Two types of formula can be used in negotiations. The first is one that reduces the applicable tariff rates by the same percentage, regardless of the initial tariff rate. These are called *tariff independent* formulae. The second type of formula is called *tariff dependent*, since the percentage reduction in tariff rates depends on the initial tariff rate subject to negotiations. It includes the so-called harmonisation formulae which have the effect of reducing the dispersion of the applicable tariff rates.

3. To assess how these two types of formulae reduce different tariff rates a hypothetical tariff profile is used for a numerical analysis. It shows how a range of initial tariff rates is reduced using different formulae and different specifications. Some key descriptive statistics of the old and new tariff profiles are also provided in the numerical analysis. These are the tariff average, maximum, standard deviation, coefficient of variation and escalation ratio. The standard deviation is a measure of absolute dispersion of the tariff profile. It is dependent on the average level of the tariffs. The coefficient of variation is a measure of relative dispersion. It is defined as the standard deviation divided by the average and usually presented in percent, i.e. multiplied by 100. It is not affected by the average levels of tariffs. Tariff escalation is measured in this note as an arbitrary ratio of two tariff lines in the lower and upper spectrum of the tariff profile.

[1] This document has been prepared under the Secretariat's own responsibility and is not intended to prejudice the positions of any Members and to their rights and obligations under the WTO.

A. TARIFF INDEPENDENT FORMULAE

4. The defining feature of independent formulae is that they are not dependent, in any way, on the initial tariff rate. What is important is simply the rate of reduction. For example, the most commonly cited independent formula is the one used for the Kennedy Round where "an across the board cut of 50 per cent would be used as a working hypothesis for the determination of the general rate of linear reduction".[2]

5. Assume that the initial tariff rate prior to negotiations is given by t_0 and the final tariff rate resulting from the negotiations is t_1. The expression which relates the two tariff rates, where c is a constant parameter, would be:

$$t_1 = c \times t_0$$

6. The final tariff rate would necessarily depend upon both the parameter c and the initial tariff rate. The rate of reduction (R = 1 - c), however, is independent of the tariff rate depending only on the parameter c. The original tariff rate is not a determinant of the rate of reduction. All tariff rates will be reduced by the same percentage.

7. To assess how this particular formula operates consider our hypothetical tariff profile assuming different values for c (0.1, 0.25 and 0.5). Table 1 presents the original tariff profile and the resulting profile for the three different values of c. It shows that the formula results in a reduction in the overall average and maximum tariff rates and in the standard deviation. There is no impact on the coefficient of variation and on our pre-defined tariff escalation ratio. The latter result arises since all tariff rates are cut by the same proportion, which does not change ratios between different tariff rates. The reduction in the standard deviation is solely due to the reduction in the tariff averages.

8. Among the formulae proposed so far only the Indian proposal (see paragraphs 30 and 31) makes use of this type of formula. In order to address peaks a supplementary reduction is included which makes the final reduction dependent on the initial tariff rates in all those cases where there are 'national peaks', i.e. tariff rates more than three times the national average.

B. TARIFF DEPENDENT FORMULAE

9. In contrast to the previous section where the rate of reduction is independent of the initial tariff rate, there is a whole class of formulae that are a function of the initial tariff. The basic element of these formulae is that they aim to have higher reductions for higher tariff rates. Hence, they are commonly called 'harmonising' formulae, since the overall dispersion of the tariff profile is reduced.

10. Tariff dependent formulae can be linear, or non-linear. It should be noted that during the Tokyo Round Switzerland proposed a specific functional form of the non-linear formula. This formula is now commonly known as the Swiss formula. It is explained below.

1. Linear reduction formulae

11. An example of a basic linear formula is a generalisation of the tariff independent formula by adding an intercept:

$$t_1 = a + c \times t_0$$

[2] Hoda, A. (2001), Tariff Negotiations and Renegotiations under the GATT and WTO: Procedures and Practices, Cambridge: Cambridge University Press, .page 31

12. There are two possible cases depending on the value of *a*:

- *a*<0 : it implies that tariff rates below a certain threshold are reduced to zero and tariff rates above that threshold are cut by an increasing percentage as the tariff rates increase.

- *a*>0 : under the assumption that an increase in tariff rates is out of question, it implies that tariff rates below a certain threshold are not reduced at all, and that above that threshold tariff rates are cut by an increasing percentage as the tariff rates increase.

13. Linear formulae that are tariff dependent and harmonising can be used in 'tariff band' approaches which propose different linear cuts for different ranges or intervals of the tariff profile. The European Communities' proposal (see paragraphs 28 and 29) and the Korean proposal (see paragraphs 35 to 41) could be classified in this category.

Table 1

Impact of linear cut on the hypothetical tariff profile for various coefficients

	Initial	Final tariff rate after reduction			Reduction in percent		
Tariff line	tariff rate	c=.90	c=.75	c=.5	c=.90	c=.75	c=.5
Line 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Line 2	2.5	2.3	1.9	1.3	10.0	25.0	50.0
Line 3	5.0	4.5	3.8	2.5	10.0	25.0	50.0
Line 4	7.5	6.8	5.6	3.8	10.0	25.0	50.0
Line 5	10.0	9.0	7.5	5.0	10.0	25.0	50.0
Line 6	12.5	11.3	9.4	6.3	10.0	25.0	50.0
Line 7	15.0	13.5	11.3	7.5	10.0	25.0	50.0
Line 8	17.5	15.8	13.1	8.8	10.0	25.0	50.0
Line 9	20.0	18.0	15.0	10.0	10.0	25.0	50.0
Line 10	22.5	20.3	16.9	11.3	10.0	25.0	50.0
Line 11	25.0	22.5	18.8	12.5	10.0	25.0	50.0
Line 12	27.5	24.8	20.6	13.8	10.0	25.0	50.0
Line 13	30.0	27.0	22.5	15.0	10.0	25.0	50.0
Line 14	32.5	29.3	24.4	16.3	10.0	25.0	50.0
Line 15	35.0	31.5	26.3	17.5	10.0	25.0	50.0
Line 16	37.5	33.8	28.1	18.8	10.0	25.0	50.0
Line 17	40.0	36.0	30.0	20.0	10.0	25.0	50.0
Line 18	42.5	38.3	31.9	21.3	10.0	25.0	50.0
Line 19	45.0	40.5	33.8	22.5	10.0	25.0	50.0
Line 20	47.5	42.8	35.6	23.8	10.0	25.0	50.0
Line 21	50.0	45.0	37.5	25.0	10.0	25.0	50.0
Line 22	52.5	47.3	39.4	26.3	10.0	25.0	50.0
Line 23	55.0	49.5	41.3	27.5	10.0	25.0	50.0
Line 24	57.5	51.8	43.1	28.8	10.0	25.0	50.0
Line 25	60.0	54.0	45.0	30.0	10.0	25.0	50.0
Average	30.0	27,0	22,5	15,0	9,6	24,0	48,0
Maximum	60.0	4,6	12,0				
Std. Dev	18.4	16,6	13,8				
Coeff. Var.	61.3	61,3	61,3				
Escalation (line13/line5)	3.0	3,00	3,00				

2. Non linear reduction formulae

14. There are any number of non-linear formulae imaginable, however, in practical terms only one type of formula, the so called Swiss formula, has been used so far in tariff negotiations. It was initially proposed during the Tokyo Round and adopted by some developed countries. The specification of the formula is as follows, where a is simply a coefficient.

$$t_1 = \frac{a \times t_0}{a + t_0}$$

15. The formula has the property of being a function of both the initial tariff and the coefficient *a*. The coefficient can be negotiated. The formula can be rearranged so that it that it can be compared easily to the other formulae presented so far (see annex for the transformation). It shows that an increase in the value of a reduces the rate of tariff reduction.

$$R = \frac{t_0}{a + t_0}$$

16. To illustrate how the value of the coefficient is critical to the effectiveness of the formula to reduce tariff rates, three values have been chosen for the numerical example: 5, 15 and 50. An increase in the value of the coefficient results in a smaller overall reduction of the key descriptive statistics. When *a* is equal to 5 the average is 3.9, the tariff escalation ratio is 1.3. When *a* is equal to 15 the average increases to 8.8, but the escalation coefficient rises slightly to 1.5. In the final case where *a* is equal to 50, there is still a significant cut in the overall average. Furthermore, despite tripling the value of parameter, the escalation coefficient rises to only 1.7. The results in Table 2 illustrate these points.

17. Overall the general impact of the Swiss formula is to widen the gap between the original and final tariff rate as the original tariff rate increases indicating that the cuts are greatest for the higher tariff rates. Figures 1 and 2 illustrate this point.

18. It can be shown graphically (Figures 1 and 2) and analytically that the Swiss formula has lower rates of percentage reduction than those generated by a tariff independent linear reduction in a certain range of low tariff rates. This range extends from rates just above zero to a certain value which is determined by the respective coefficients.

$$t_{1\text{-}Swiss} > t_{1\text{-}linear} \text{ for } t_0 < (a / c) - a$$

where *c* is the reduction coefficient from the linear formula and *a* is the Swiss formula coefficient.

19. For example, for c=0.9 and a=50 tariff rates up to 5.5 percent will be reduced less by the Swiss formula than by the linear cut. For other examples see Figure 2.

20. Among the proposals so far presented, the United States have adopted the Swiss formula (see paragraphs 42 and 43) while China (see paragraphs 25 to 27) has proposed a variant of the Swiss formula with properties very close to that of the original Swiss formula but with a Member specific coefficient.

Table 2

Impact of Swiss formula on the hypothetical tariff profile for various coefficients

	Initial	Final tariff rate after reduction			Reduction in percent		
Tariff line	Tariff rate	a=5	a=15	a=50	a=5	a=15	a=50
Line 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Line 2	2.5	1.7	2.1	2.4	33.3	14.3	4.8
Line 3	5.0	2.5	3.8	4.6	50.0	25.0	9.1
Line 4	7.5	3.0	5.0	6.5	60.0	33.3	13.0
Line 5	10.0	3.3	6.0	8.3	66.7	40.0	16.7
Line 6	12.5	3.6	6.8	10.0	71.4	45.5	20.0
Line 7	15.0	3.8	7.5	11.5	75.0	50.0	23.1
Line 8	17.5	3.9	8.1	13.0	77.8	53.9	25.9
Line 9	20.0	4.0	8.6	14.3	80.0	57.1	28.6
Line 10	22.5	4.1	9.0	15.5	81.8	60.0	31.0
Line 11	25.0	4.2	9.4	16.7	83.3	62.5	33.3
Line 12	27.5	4.2	9.7	17.7	84.6	64.7	35.5
Line 13	30.0	4.3	10.0	18.8	85.7	66.7	37.5
Line 14	32.5	4.3	10.3	19.7	86.7	68.4	39.4
Line 15	35.0	4.4	10.5	20.6	87.5	70.0	41.2
Line 16	37.5	4.4	10.7	21.4	88.2	71.4	42.9
Line 17	40.0	4.4	10.9	22.2	88.9	72.7	44.4
Line 18	42.5	4.5	11.1	23.0	89.5	73.9	46.0
Line 19	45.0	4.5	11.3	23.7	90.0	75.0	47.4
Line 20	47.5	4.5	11.4	24.4	90.5	76.0	48.7
Line 21	50.0	4.6	11.5	25.0	90.9	76.9	50.0
Line 22	52.5	4.6	11.7	25.6	91.3	77.8	51.2
Line 23	55.0	4.6	11.8	26.2	91.7	78.6	52.4
Line 24	57.5	4.6	11.9	26.7	92.0	79.3	53.5
Line 25	60.0	4.6	12.0	27.3	92.3	80.0	54.6
Average	30.0	3,9	8,8	17,00	77,2	58,9	34,0
Maximum	60.0	4,6	12,0	27,3			
Std. Dev	18.4	1,1	3,3	8,1			
Coeff. Var.	61.3	28,1	36,8	47,7			
Escalation (line13/line5)	3.0	1,3	1,7	2,3			

Figure 1: Comparison of linear cut and Swiss formula

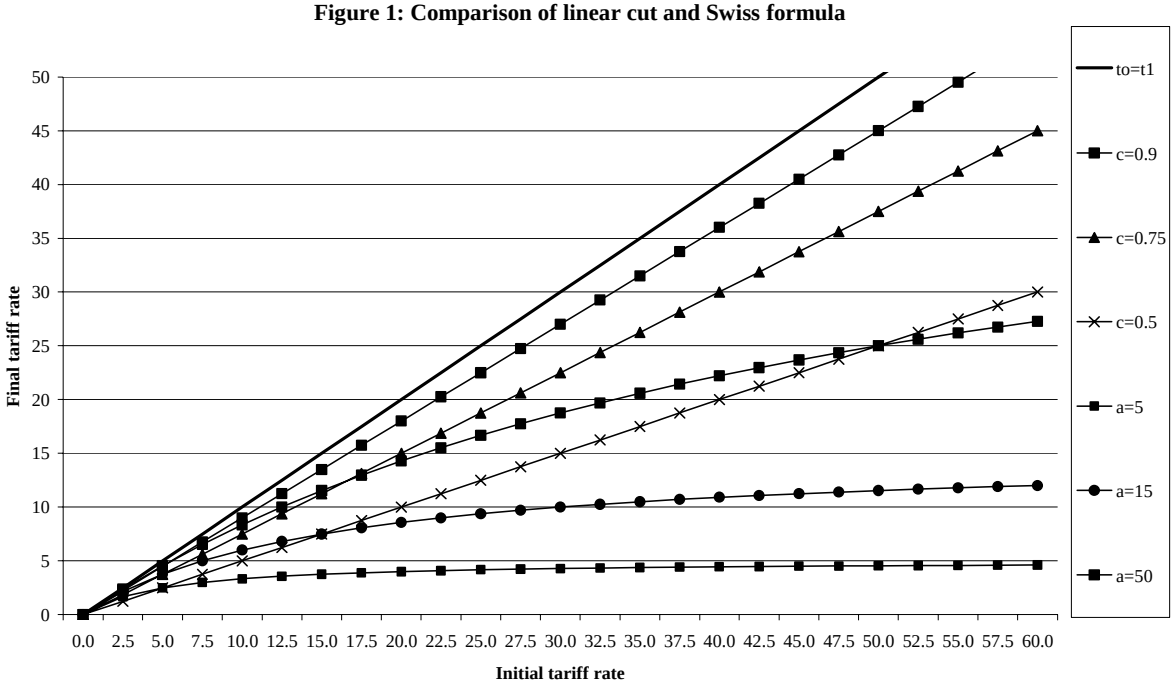
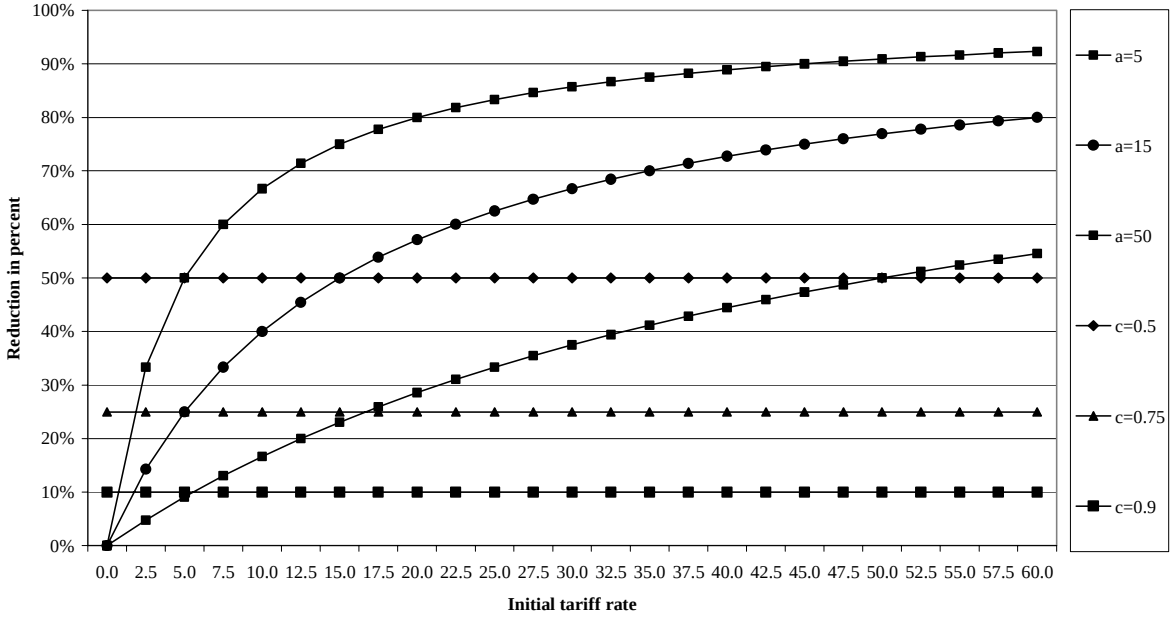


Figure 2: Reductions in percent for linear cut and Swiss formula



III. FORMULA PROPOSALS BY MEMBERS

1. Methodology

21. The aim of this section is to better understand the various proposals for modalities that include a formula approach for tariff negotiations. It confines itself to illustrating the properties of several formulae using a hypothetical tariff profile and with numerical examples presented in tables and graphs. It complements the document TN/MA/6/Rev.1 entitled "Overview of Proposals Submitted". It does not address the specifics of the various proposals such as the base period, implementation, product coverage, treatment of non-ad valorem duties and their application by Members. Nor does it present all the formula proposals listed in document TN/MA/6/Rev.1 because not all of them include a clearly defined functional form and explicitly specified parameters or coefficients. Calculations to determine the ratio of reductions without such information are not possible.

22. The same hypothetical tariff profile is used to evaluate the effect of implementing a specific proposal. For the proposals that include the tariff average as a parameter, the average tariff of the hypothetical tariff profile is used. This means that the reductions calculated for the various initial duty rates do not apply to real tariff profiles, where the average is lower or higher than the average of the hypothetical tariff profile. In these cases, where possible, the properties of the formula with respect to the different profiles are discussed.

23. It should be noted that for presentation purposes, the notation for the formulae proposed by Members has been standardised using the same notation as in the previous section, i.e. the original tariff rate is denoted as t0 and the final rate as t1. The text does not distinguish between bound and applied rates, since the purpose of the document is to illustrate the use of different formula methodologies.

24. Formulae that propose a reduction of the average weighted tariff have to be distinguished from those that propose a methodology for a line-by-line reduction. Following the classification made in document TN/MA/6/Rev.1 regarding weighted tariff average reductions and line by line reductions, they have been presented in different figures and tables.

2. Proposals

(a) China[3]

25. The Chinese formula is specified as:

$$t_1 = \frac{\left(t_a + \left(B \times P\right)\right) \times t_0}{\left(t_a + P^2\right) + t_0}$$

where,

t_a is the simple average of the base rates (*A* in TN/MA/20).
P is a peak factor defined as the ratio of the tariff rate over the average rate (t_0 / t_a)
B is an adjusting coefficient for the year of implementation. *B*=1 for 2015 or *B*=3 for 2010.

26. The formula is very similar to the Swiss formula but instead of a fixed coefficient, a variable factor based on the simple average of the base rates t_a, a peak factor and an additional parameter for the year of implementation have been used. The properties of the Chinese formula are similar to what

[3] TN/MA/W/20.

is known about the properties of the Swiss formula discussed in paragraph 16, such as higher cuts for higher rates. Furthermore it can be shown that for *B*=1 the formula reduces any initial tariff rate below a maximum level which is the current average of the base rates. This is equivalent to the effect of the standard Swiss formula using the tariff average as coefficient.

27. The percentage cuts for any given tariff rate will depend on the tariff average of the Member concerned. For the same tariff rate, Members with lower tariff averages will experience relatively higher reduction rates than Members with higher tariff averages. Therefore, the overall result of applying this formula will depend on the statistical properties of different Members' tariff profiles.

(b) European Communities[4]

28. The European Communities' proposal is within the class of linear tariff dependent formulae, however, with an adjustment, which gives it the properties of a step-wise linear function. The formula is applied across a set of tariff intervals and the tariff rate cuts depend upon the upper and lower bound of the applicable interval.

29. The formula is specified as:

$$t_1 = B_1^L + \left(t_0 - B_0^L\right) \times \left[\frac{B_1^U - B_1^L}{B_0^U - B_0^L}\right]$$

where B_j^i are the upper and lower bounds of the respective tariff intervals. The superscripted letters *U* and *L* are, respectively, the upper and lower bounds of the interval. The intervals are defined as follows:

	Base		Final	
	B^L_0	B^U_0	B^L_1	B^U_1
Interval 1	0	to less than 2	0	to 0
Interval 2	2	to 15	1.6	to 7.5
Interval 3	15	to 50	7.5	to 15
Interval 4	50	to more than 50	15	to 15

(c) India[5]

30. India proposes a simple linear cut on the individual bound tariff lines of each Member, with a higher percentage cut for developed countries than for developing countries. In addition to the linear cut, any tariff in excess of three times the national average tariff shall be reduced to no more than three times the national average which results after applying the initial linear cut. The formula is specified as:

Step (1) $t_1 = c \times t_0$ where c = (1- ($A \times Y$/100)) and
Step (2) $t_1 \leq 3 \times t_{a1}$

where
A is defined as 'less than full reciprocity' parameter with
$A = 1$ for developed countries and

[4] TN/MA/W/11/Add.1 and Add.2
[5] TN/MA/W/10/Add.2; suggestions for the treatment of unbound lines are beyond the scope of this document and have therefore not been included.

A = 0.67 for developing countries,
Y is the reduction percentage (to be negotiated)
t_{a1} is the simple average tariff after applying the linear cut.

31. The following supplementary modalities are proposed for developing country Members: (a) The actual reductions of at least 15 percent of currently bound rates can differ from the rates calculated under Step (1) under condition that the overall percentage reduction still meets the reduction percentage resulting from Step (1). (b) The flexibility in the application of the formula shall also apply for Step (2).

(d) Japan[6]

32. Japan proposes that each Member sets a target level of a trade-weighted tariff average according to a formula and that each Member reduce its trade-weighted tariff average to that target level. Each Member will retain flexibility on ways to realize the target tariff level. The formula is specified as:

$$t_{1a}^{w} = \frac{A \times t_{0a}^{w}}{A + t_{0a}^{w}} + \alpha$$

where, t_{0a}^{w} is the weighted tariff average prior to the application of the formula and t_{1a}^{w} is the weighted average after the application of the formula. A is a constant whose values varies as follows:

$t_{0a}^{w} \leq 10\%$, $A = 10$
$10\% < t_{0a}^{w} \leq 20\%$, $A = 20$
$20\% < t_{0a}^{w} \leq 30\%$, $A = 30$
$30\% < t_{0a}^{w}$, $A = 40$

33. The term α in this specification has been proposed as a constant equal to 0.3.

34. The formula applies to the reduction of the trade-weighted tariff average as opposed to a reduction of the tariff rates on a line-by-line basis. This means that the formula is used to determine the end result, or the objective of the tariff negotiations. A lower coefficient will yield a higher cut and a higher coefficient a lower cut.

(e) Republic of Korea[7]

35. The objective of this proposal is to lower the weighted tariff average of Members by 40 percent. This is achieved by applying a reduction formula that results in a higher reduction of tariff peaks. The starting point is a 20 percent minimum reduction by tariff line, which is followed by a further reduction aimed at harmonising the tariff profile. Two criteria are used to distinguish which tariff rates should be addressed and the applicable methodology. These are twice the national average and 25 percent.

36. For the case where tariff rates are above twice the national average but less than 25 percent, the following formula is applicable which includes the initial 20 per cent reduction:

[6] TN/MA/W/15.
[7] TN/MA/W/6/Add.1.

$$t_1 = (t_0 \times 0.8) - (0.7 \times (t_0 - 2 \times t_a))$$

37. If the tariff rate is less than twice the national average, but still above 25 percent the following formula is applicable which includes the initial 20 per cent reduction:

$$t_1 = (t_0 \times 0.8) - (0.7 \times (t_0 - 25))$$

38. In cases where the tariff rate is above two times the simple national average and at the same time above 25 percent, the final tariff rate shall be whichever is lower after the reduction.

39. The formula reduces higher tariff rates in a way that takes into account individual tariff profiles since the cut is dependent on the tariff average. This means tariff profiles that have duties predominantly below 25 percent but above twice the national average will still be subject to further tariff reductions. Alternatively, profiles with duties predominantly above 25 percent, but with high overall averages will still be subject to reductions since the 25 percent rule will apply.

40. The overall result of applying this formula will, therefore, depend on the statistical properties of each Members' tariff profile. It should be noted though that for all tariff profiles with an average of above 12.5 percent the tariff rate reductions in percentage are identical for a given tariff rate because the 25 percent rule applies in all cases where twice the national average is greater than 25 percent.

41. The Korean proposal is similar to the Japanese proposal in that both seek a reduction of the weighted tariff average. However, the application of the Korean formula for the targeted reduction of weighted tariff averages differs slightly from that of the Japanese proposal as illustrated in figure 8.

(f) United States[8]

42. The United States has proposed a modality, which includes the elimination of tariff rates at or below 5 percent and the application of a Swiss formula on the tariff profile for all other tariff rates. The proposed coefficient is 8, which converts the general Swiss formula into the following specification:

$$t_1 = \frac{8 \times t_0}{8 + t_0}$$

43. The general properties of this formula are described earlier in section II.B.2. What is important to note about the US proposal is the value of 8 for the coefficient. This implies a maximum tariff rate of 8 percent after tariff reductions for any tariff profile.

3. Tariff reduction simulations with hypothetical tariff profile

44. The reduction effects of the formulae presented above applied to a hypothetical tariff profile are illustrated in tables 3 to 5 and figures 3 to 6. The proposals using line by line reductions and those targeting reductions of average weighted tariff rates are shown separately because they are not strictly comparable in their implications.

45. Table 3 shows, based on the hypothetical tariff profile, the base rates before and after application of the various line by line formulae. For those formulae that use the tariff average as parameter the average of the hypothetical tariff profile has been used, i.e. t_a=30. Descriptive statistics before and after reduction highlight the overall effects of the application of the various proposals on

[8] TN/MA/W/18.

the hypothetical tariff profile. For those formulae that include the tariff average as a parameter the hypothetical calculations are only indicative and require the following qualifications:

46. The application of the Chinese proposal to tariff profiles with lower/higher tariff averages would, for a given tariff rate, result in a higher/lower cut than that shown in the tables and figures.

47. In the case of the Korean proposal for line by line cuts, tariff profiles with a tariff average below 12.5 percent would be subject to higher cuts than those shown in the examples given in the tables and figures. In addition, the application of the 40 per cent reduction of trade weighted tariff averages may require additional cuts than those indicated in the hypothetical example (tables 1 and 2 and figures 1 and 2). Likewise, the line by line cut included in the Korean formula may result in a reduction in the trade weighted tariff average which could be higher than the 40 percent reduction indicated in the hypothetical example (table 5 and figures 5 and 6).

48. The reduction rate used for the Indian formula, by way of example, is the same one presented in their proposal. Depending on the actual tariff average of the Member concerned, rates above three time the national would be capped at that rate.

49. Table 4 illustrates how the application of the formulae results in different percentage reductions for the different tariff rates and indicates also the reduction of the simple average of the hypothetical tariff profile. Table 5 illustrates the same point for the formulae for reductions of weighted tariff averages.

4. General Observations

50. Formulae by their very nature are technical. Nevertheless, it is extremely important to understand their properties in the context of their application to the tariff profiles of Members. In this regard, despite the diversity of innovative proposals on the use of formulae as a modality for market access negotiations, some general observations can be made:

- All proposals reduce higher rates by proportionately more than lower rates. Some proposals include continuous increases in reduction rates, others provide for threshold levels after which higher reduction rates apply. This is accomplished through different specifications.

- All proposals have similar effects at higher levels of tariffs, although with different absolute impacts due to different parameters.

- Some proposals take into account the diversity of the Members profiles via an explicit provision in the functional design of the formula for the current level of base rates.

- The treatment of the lower tariff rates differs significantly amongst the proposals.

Table 3

Impact on tariff rates of various line by line formula proposals on the hypothetical tariff profile

Tariff line	Initial tariff rate	China t_a=30, B=1	China t_a=30, B=3	European Communities	India [a] 50%	India [b] 33%	Korea t_a=30	USA
Line 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Line 2	2.5	2.3	2.3	1.8	1.3	1.7	2.0	0.0
Line 3	5.0	4.3	4.4	3.0	2.5	3.4	4.0	0.0
Line 4	7.5	6.0	6.1	4.1	3.8	5.0	6.0	3.9
Line 5	10.0	7.6	7.7	5.2	5.0	6.7	8.0	4.4
Line 6	12.5	8.9	9.2	6.4	6.3	8.4	10.0	4.9
Line 7	15.0	10.1	10.4	7.5	7.5	10.1	12.0	5.2
Line 8	17.5	11.2	11.6	8.0	8.8	11.7	14.0	5.5
Line 9	20.0	12.2	12.7	8.6	10.0	13.4	16.0	5.7
Line 10	22.5	13.0	13.7	9.1	11.3	15.1	18.0	5.9
Line 11	25.0	13.8	14.6	9.6	12.5	16.8	20.0	6.1
Line 12	27.5	14.6	15.4	10.2	13.8	18.4	20.3	6.2
Line 13	30.0	15.2	16.2	10.7	15.0	20.1	20.5	6.3
Line 14	32.5	15.9	17.0	11.2	16.3	21.8	20.8	6.4
Line 15	35.0	16.4	17.7	11.8	17.5	23.5	21.0	6.5
Line 16	37.5	17.0	18.3	12.3	18.8	25.1	21.3	6.6
Line 17	40.0	17.5	18.9	12.9	20.0	26.8	21.5	6.7
Line 18	42.5	17.9	19.5	13.4	21.3	28.5	21.8	6.7
Line 19	45.0	18.3	20.1	13.9	22.5	30.2	22.0	6.8
Line 20	47.5	18.8	20.6	14.5	23.8	31.8	22.3	6.8
Line 21	50.0	19.1	21.1	15.0	25.0	33.5	22.5	6.9
Line 22	52.5	19.5	21.6	15.0	26.3	35.2	22.8	6.9
Line 23	55.0	19.8	22.1	15.0	27.5	36.9	23.0	7.0
Line 24	57.5	20.1	22.5	15.0	28.8	38.5	23.3	7.0
Line 25	60.0	20.4	23.0	15.0	30.0	40.2	23.5	7.1
Average	30.0	13.6	14.7	10.0	15.0	20.1	16.7	5.4
Maximum	60.0	20.4	23.0	15	30	40.2	23.5	7.1
Std. Dev	18.4	5.9	6.7	4.5	9.2	12.3	7.4	2.2
Coeff. Var.	61.3	43.5	45.5	45.4	61.2	61.3	44.6	40.7
Escalation (line13/line5)	3.0	2.0	2.1	2.1	3.0	3.0	2.6	1.4

Notes:
a Applicable to developed countries.
b Applicable to developing countries.

Table 4

Percentage reduction arising from the application of various line by line formula proposals

Tariff line	Initial tariff rate	China t_a=30, B=1	China t_a=30, B=3	European Communities	India [a] 50%	India [b] 33%	Korea t_a=30	USA
Line 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Line 2	2.5	7.5	6.9	26.9	50.0	33.0	20.0	100.0
Line 3	5.0	13.9	12.9	40.8	50.0	33.0	20.0	100.0
Line 4	7.5	19.5	18.1	45.4	50.0	33.0	20.0	48.4
Line 5	10.0	24.4	22.7	47.7	50.0	33.0	20.0	55.6
Line 6	12.5	28.7	26.8	49.1	50.0	33.0	20.0	61.0
Line 7	15.0	32.6	30.4	50.0	50.0	33.0	20.0	65.2
Line 8	17.5	36.1	33.6	54.1	50.0	33.0	20.0	68.6
Line 9	20.0	39.2	36.6	57.1	50.0	33.0	20.0	71.4
Line 10	22.5	42.0	39.2	59.5	50.0	33.0	20.0	73.8
Line 11	25.0	44.6	41.6	61.4	50.0	33.0	20.0	75.8
Line 12	27.5	47.0	43.9	63.0	50.0	33.0	26.4	77.5
Line 13	30.0	49.2	45.9	64.3	50.0	33.0	31.7	78.9
Line 14	32.5	51.2	47.8	65.4	50.0	33.0	36.2	80.2
Line 15	35.0	53.0	49.5	66.3	50.0	33.0	40.0	81.4
Line 16	37.5	54.8	51.1	67.1	50.0	33.0	43.3	82.4
Line 17	40.0	56.3	52.6	67.9	50.0	33.0	46.3	83.3
Line 18	42.5	57.8	54.0	68.5	50.0	33.0	48.8	84.2
Line 19	45.0	59.2	55.3	69.0	50.0	33.0	51.1	84.9
Line 20	47.5	60.5	56.6	69.5	50.0	33.0	53.2	85.6
Line 21	50.0	61.7	57.7	70.0	50.0	33.0	55.0	86.2
Line 22	52.5	62.9	58.8	71.4	50.0	33.0	56.7	86.8
Line 23	55.0	64.0	59.8	72.7	50.0	33.0	58.2	87.3
Line 24	57.5	65.0	60.8	73.9	50.0	33.0	59.6	87.8
Line 25	60.0	66.0	61.7	75.0	50.0	33.0	60.8	88.2
Average	30.0	43.9	41.0	42.3	48.0	31.7	34.7	75.8

Notes:
a Applicable to developed countries.
b Applicable to developing countries.

Table 5

Applying different formulae to hypothetical weighted tariff averages

(Initial and final tariff rate and reductions by case in percent)

Hypothetical cases	Initial weighted average	Weighted average rates after reduction			Reductions in percent		
		Japan	Korea cut 40%	Linear cut 50%	Japan	Korea cut 40%	Linear cut 50%
Case 1	0.0	0.3	0.0	0.0	n.a	0.0	0.0
Case 2	2.5	2.3	1.5	1.3	8.0	40.0	50.0
Case 3	5.0	3.6	3.0	2.5	27.3	40.0	50.0
Case 4	7.5	4.6	4.5	3.8	38.9	40.0	50.0
Case 5	10.0	5.3	6.0	5.0	47.0	40.0	50.0
Case 6	12.5	8.0	7.5	6.3	36.1	40.0	50.0
Case 7	15.0	8.9	9.0	7.5	40.9	40.0	50.0
Case 8	17.5	9.6	10.5	8.8	45.0	40.0	50.0
Case 9	20.0	10.3	12.0	10.0	48.5	40.0	50.0
Case 10	22.5	13.2	13.5	11.3	41.5	40.0	50.0
Case 11	25.0	13.9	15.0	12.5	44.3	40.0	50.0
Case 12	27.5	14.6	16.5	13.8	46.7	40.0	50.0
Case 13	30.0	15.3	18.0	15.0	49.0	40.0	50.0
Case 14	32.5	18.2	19.5	16.3	43.9	40.0	50.0
Case 15	35.0	19.0	21.0	17.5	45.8	40.0	50.0
Case 16	37.5	19.7	22.5	18.8	47.6	40.0	50.0
Case 17	40.0	20.3	24.0	20.0	49.3	40.0	50.0
Case 18	42.5	20.9	25.5	21.3	50.8	40.0	50.0
Case 19	45.0	21.5	27.0	22.5	52.3	40.0	50.0
Case 20	47.5	22.0	28.5	23.8	53.7	40.0	50.0
Case 21	50.0	22.5	30.0	25.0	55.0	40.0	50.0
Case 22	52.5	23.0	31.5	26.3	56.2	40.0	50.0
Case 23	55.0	23.5	33.0	27.5	57.3	40.0	50.0
Case 24	57.5	23.9	34.5	28.8	58.5	40.0	50.0
Case 25	60.0	24.3	36.0	30.0	59.5	40.0	50.0

Figure 3: Comparison of formula proposals for line by line reductions

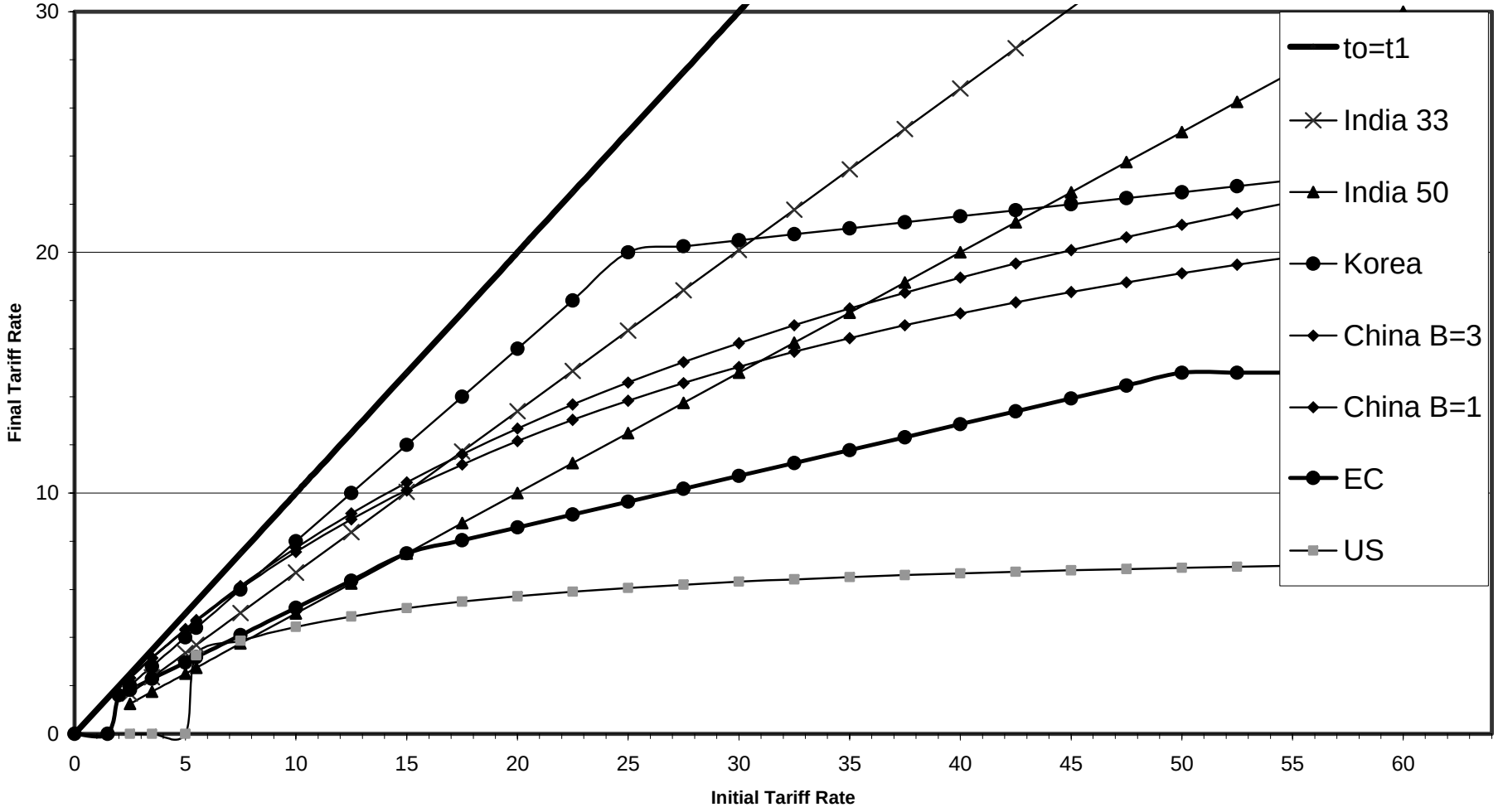


Figure 4: Reductions in percent of initial tariff rates

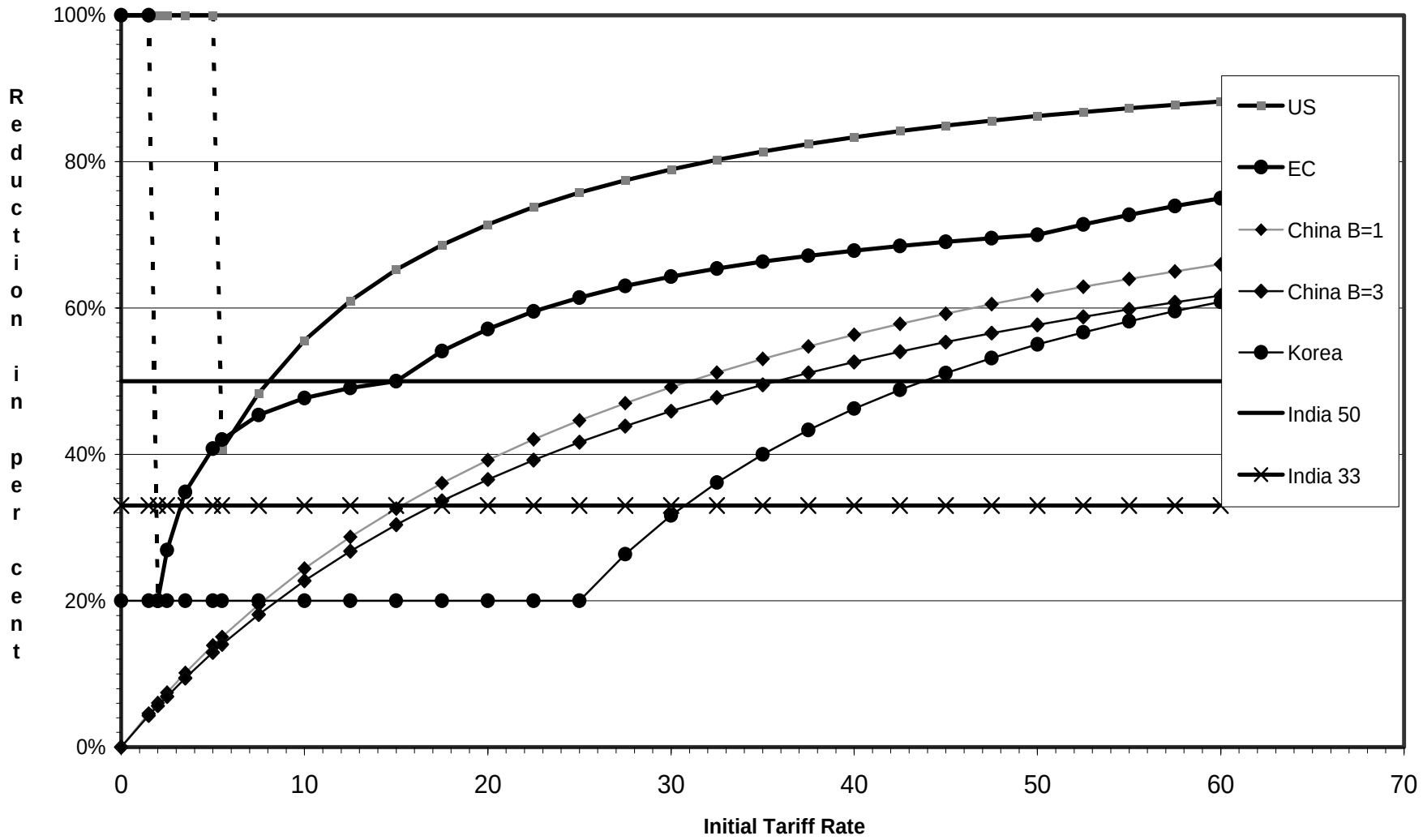


Figure 5: Comparison of formula proposals for weighted tariff average reductions

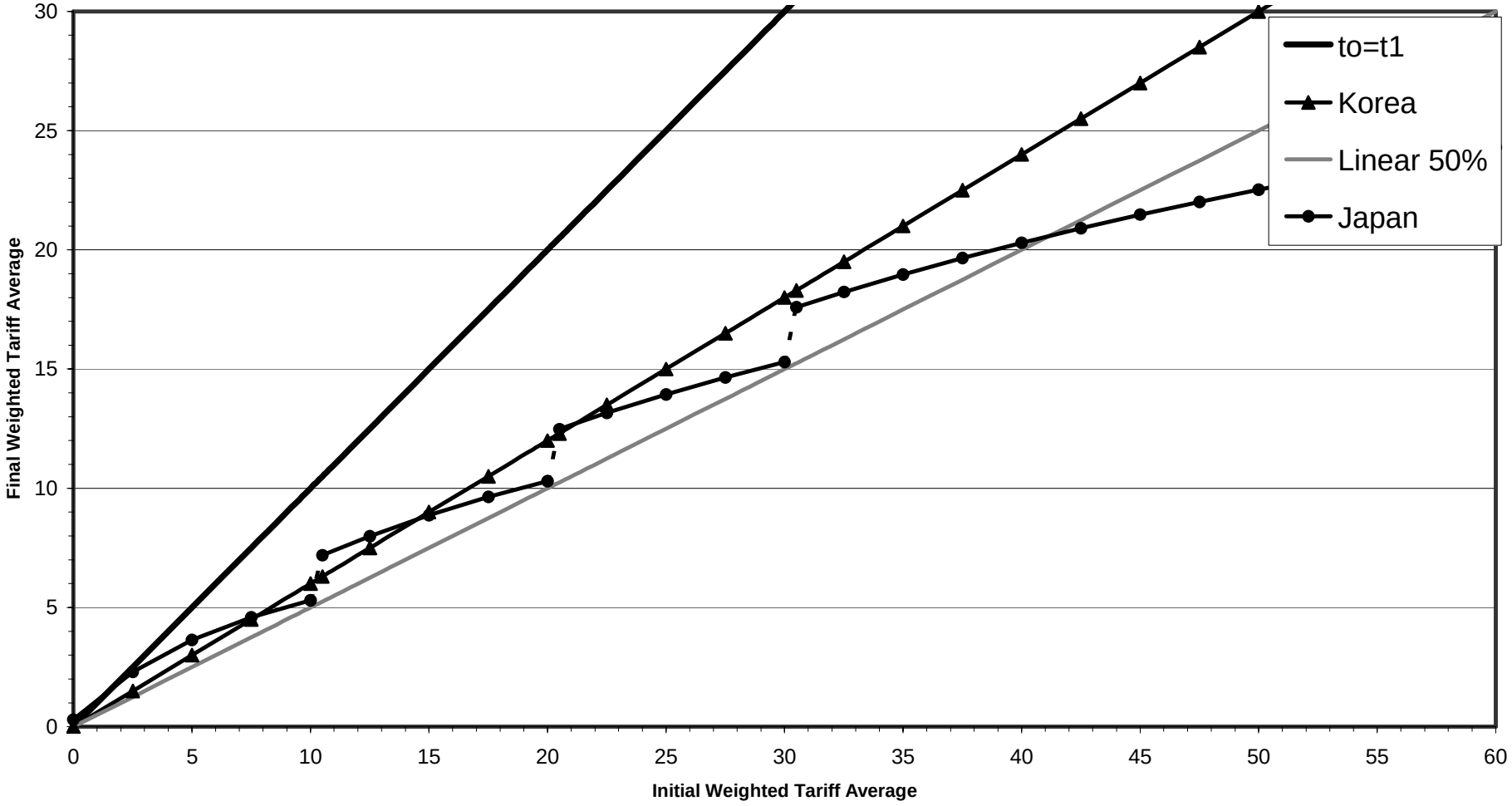
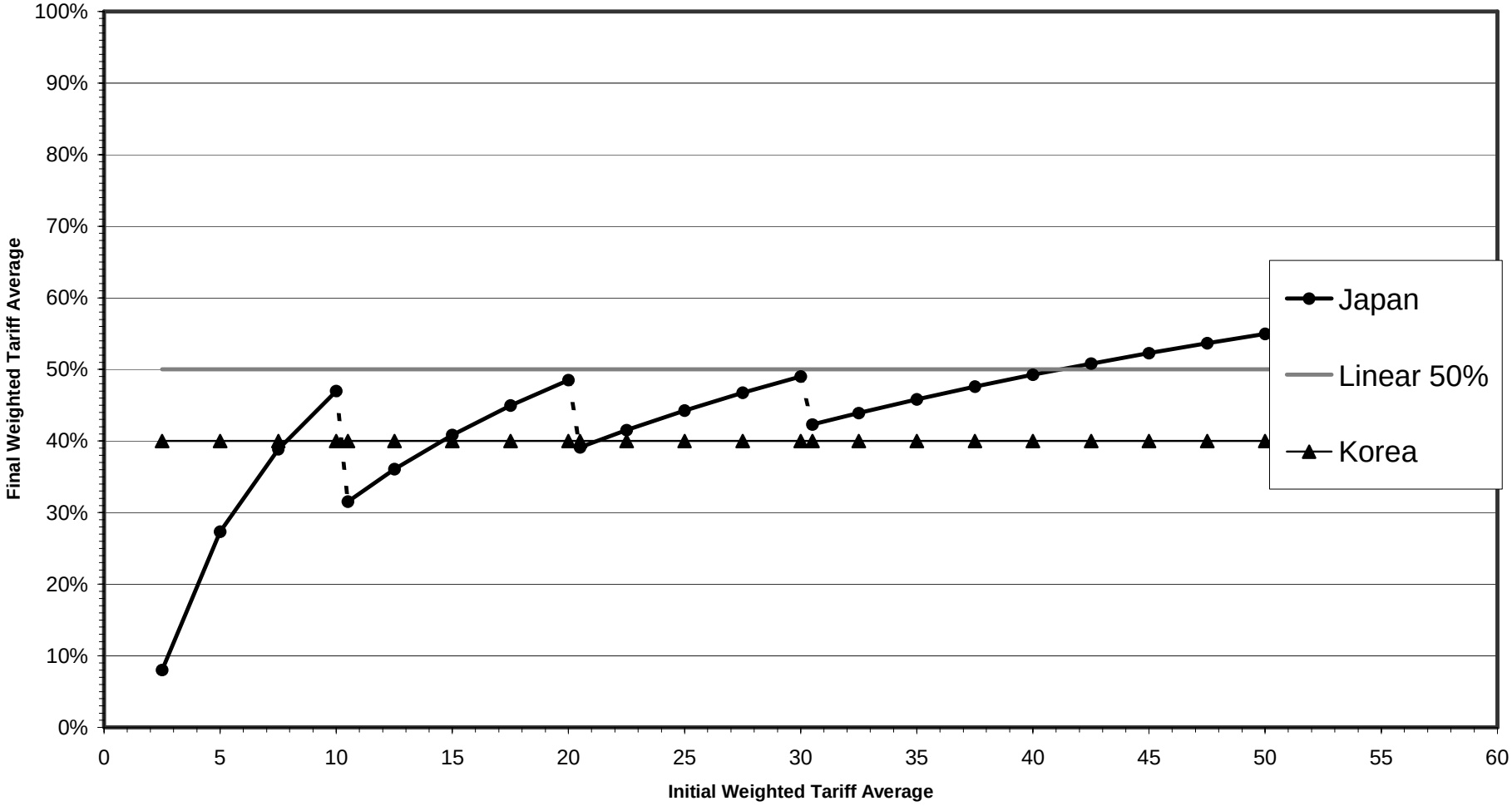


Figure 6: Reductions in percent of initial weighted tariff averages



ANNEX TARIFF REDUCTIONS AND THE SWISS FORMULA

Let t_1 be the final tariff, t_0 the initial tariff. The Swiss Formula is given as:

$$t_1 = \frac{at_0}{a + t_0} \qquad \text{A.1}$$

The difference between the new tariff and the old tariff is:

$$\begin{aligned} t_1 - t_0 &= \left(\frac{at_0}{a + t_0} \right) - t_0 \\ &= \frac{at_0 - t_0(a + t_0)}{(a + t_0)} \\ &= \frac{at_0 - t_0 a - (t_0)^2}{(a + t_0)} \\ &= \frac{-(t_0)^2}{(a + t_0)} \end{aligned} \qquad \text{A.2}$$

The rate of reduction is given as:

$$R = \left| \frac{t_1 - t_0}{t_0} \right| \cdot 100 \qquad \text{A.3}$$

Substituting A.2 into A.3 gives us:

$$\begin{aligned} R &= \left| \frac{\dfrac{-(t_0)^2}{(a + t_0)}}{t_0} \right| \cdot 100 \\ &= \left| \frac{-(t_0)^2}{(a + t_0)t_0} \right| \cdot 100 \\ &= \left| \frac{t_0}{a + t_0} \right| \cdot 100 \end{aligned} \qquad \text{A.4}$$