

Table S3. Equations for model of IVD marketing process

Variable	Descriptions	Equations
Testing	Number of diagnostic tests. If the number of products in the market is greater than the number of testing demand, the test is performed as much as the testing demand. If insufficient, test as many products as possible.	= IF THEN ELSE(amount of products > = testing demand, testing demand, amount of products)
Testing demand	Demand for diagnostic tests. Increase or decrease according to the number of infected people and testing policy	= Testing policy*(total Infected*80+testing policy*base testing 1+testing policy*base testing 2)
Total tested	Number of cumulative diagnostic tests	= INTEG (testing, 0)
Testing policy	Intensity of testing policy	1
Base testing 1	In addition to the infected, the policy of actively conducting tests on contacts and epidemiologically related people is reflected.	= DELAY FIXED (20,000, 420, 0)
Base testing 2	During the first year of the COVID-19 outbreak, diagnostic tests were only conducted on individuals who met the criteria for case definition. However, in the second year, the policy changed to allow anyone, regardless of their symptoms or epidemiological association, to undergo COVID-19 testing.	= DELAY FIXED (100,000, 710, 0)
Total sales	Total amount of sales	= Testing*cost of product
Cost of product	Cost per test. Calibration to match actual sales	= 330*cost change P
Cost change P	More products enter the market, less product price due to marketing competition.	= IF THEN ELSE (marketing product > = 300, 0.2, 1)
Manufacturing capacity	Number of IVD available to produce per day. Production starts after outbreak of infectious disease.	= DELAY FIXED (30,000, 400, 0)
Amount of products	Amount of IVD products distributed to the market	= Manufacturing capacity*marketing product
Susceptible	Number of people with the possibility of infection	= INTEG (lost of immunity 1+lost of immunity 2-infection+new born-death without pandemic-initial infected-"2nd attack"- "3rd attack"- "4th attack"- "5th attack"-baseline adjustment)
Initial population	The total population in 2019 [60]	= 51,779,203
New born	Average daily births in '19-'21 [61]	762
Death without pandemic	Average daily deaths in '17-'19 [62]	803
Infection	Infection by contact with an infected or susceptible person.	= Infection rate*contact with infected
Infection rate	Probability of infection on contact. Calibration to match actual data	0.01
Contact with infected	When an uninfected person comes into contact with another person, the probability that the person in contact is infected.	= Susceptible*prevalence*contact rate
Positive rate	Average number of infected people compared to the total number of diagnostic tests. Calibration to match actual data.	0.004
Sensitivity	Sensitivity of diagnostic test kit (based on regulation of MFDS)	0.95
Identified positive	Number of infected people identified as infected through diagnostic tests	= Testing*sensitivity*positive rate
Contact rate	Number of contacts per person per day. Calibration to match actual data	= 100/policy C
Policy C	Intensity of contact control policies such as social distancing	= 1*Policy adjustment
Policy adjustment	Changes in the intensity of quarantine policies according to the identification of infected people	= IF THEN ELSE (identified positive > = 1,000, 100, IF THEN ELSE (identified positive > = 500, 50, IF THEN ELSE (identified positive > = 100, 25, IF THEN ELSE (identified positive > = 50, 10, 1))))
Testing	Number of diagnostic tests. If the number of products in the market is greater than the number of testing demand, the test is performed as much as the testing demand. If insufficient, test as many products as possible.	= IF THEN ELSE (amount of products > = testing demand, testing demand, amount of products)

(Continued on the next page)

Table S3. Continued

Variable	Descriptions	Equations
Testing demand	Demand for diagnostic tests. Increase or decrease according to the number of infected people and testing policy	= Testing policy*(total Infected*80+testing policy*base testing 1+testing policy*base testing 2)
Total tested	Number of cumulative diagnostic tests	= INTEG (testing, 0)
Testing policy	Intensity of testing policy	1
Base testing 1	In addition to the infected, the policy of actively conducting tests on contacts and epidemiologically related people is reflected.	= DELAY FIXED(20,000, 420, 0)
Base testing 2	During the first year of the COVID-19 outbreak, diagnostic tests were only conducted on individuals who met the criteria for case definition. However, in the second year, the policy changed to allow anyone, regardless of their symptoms or epidemiological association, to undergo COVID-19 testing.	= DELAY FIXED(100,000, 710, 0)
Total sales	Total amount of sales	= Testing*cost of product
Cost of product	Cost per test. Calibration to match actual sales	#NAME?
Cost change P	More products enter the market, less product price due to marketing competition.	= IF THEN ELSE (marketing product > = 300, 0.2, 1)
Manufacturing capacity	Number of IVD available to produce per day. Production starts after outbreak of infectious disease.	= DELAY FIXED(30,000, 400, 0)
Amount of products	Amount of IVD products distributed to the market	= Manufacturing capacity*marketing product
Susceptible	Number of people with the possibility of infection	= INTEG (lost of immunity 1+lost of immunity 2-infection+new born-death without pandemic-initial infected-"2nd attack"-3rd attack-"4th attack"-5th attack"-baseline adjustment)
Initial population	The total population in 2019 [60]	= 51,779,203
New born	Average daily births in '19-'21 [61]	762
Death without pandemic	Average daily deaths in '17-'19 [62]	803
Infection	Infection by contact with an infected or susceptible person.	= Infection rate*contact with infected
Infection rate	Probability of infection on contact. Calibration to match actual data	0.01
Contact with infected	When an uninfected person comes into contact with another person, the probability that the person in contact is infected.	= Susceptible*prevalence*contact rate
Positive rate	Average number of infected people compared to the total number of diagnostic tests. Calibration to match actual data.	0.004
Sensitivity	Sensitivity of diagnostic test kit (based on regulation of MFDS)	0.95
Identified positive	Number of infected people identified as infected through diagnostic tests	= Testing*sensitivity*positive rate

IVD, *in vitro* diagnostics; COVID-19, coronavirus disease 2019; MFDS, Ministry of Food and Drug Safety; KDCA, Korea Disease Control and Prevention Agency.