Online Appendix for “The net effect of advice on strategy-proof mechanisms: An experiment for the Vickrey auction”

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October 5, 2021

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A Statistics used in hypotheses testing

A.1 Advice effect on sincere bidding

Suppose that sincere bidding behavior in treatment $j \in \{\mathsf{VA}, \mathsf{VN}, \mathsf{PA}, \mathsf{PN}, \mathsf{AA}, \mathsf{AN}\}$ is a realization of a random variable X_j with the Bernoulli distribution that takes the value of 1 (= sincere bidding) with the success rate of p_j. That is,

$$X_j \equiv \begin{cases} 1 & \text{with prob.}\, p_j, \\ 0 & \text{with prob.}\, 1 - p_j. \end{cases}$$

Let $\overline{X}_j$ denote the sample mean for n_j realizations of X_j and let

$$S_j \equiv \frac{\overline{X}_j(1 - \overline{X}_j)}{n_j}.$$

Hereinafter, superscripts "All," "Per," and "Im" correspond to all subjects, the subjects whose quiz scores are perfect, and those whose quiz scores are imperfect, respectively. Capital and small letters indicate random variables and realized values, respectively.

- **Result 2 and Result 9:** Given $j \in \{\mathsf{V}, \mathsf{P}, \mathsf{A}\}$ and $h \in \{\text{All}, \text{Per}, \text{Im}\}$, let $Y_j^h \equiv \left(\overline{X}_{j\mathsf{A}}^h - \overline{X}_{j\mathsf{N}}^h\right)$. The test statistic is

$$\widetilde{Y}_j^h \equiv \frac{Y_j^h - \mathbb{E}(Y_j^h)}{\sqrt{S_{j\mathsf{A}}^h + S_{j\mathsf{N}}^h}},$$

where $\mathbb{E}$ is the expectation operator. By the central limit theorem, Y_j^h approximately follows a standardized normal distribution.[32]

- **Result 3:** Let $Z_{\mathsf{V}}^{\text{All}} = \left(Y_{\mathsf{V}}^{\text{All}} - Y_{\mathsf{P}}^{\text{All}}\right)$. The test statistic is

$$\widetilde{Z}_{\mathsf{V}}^{\text{All}} \equiv \frac{Z_{\mathsf{V}}^{\text{All}} - \mathbb{E}(Z_{\mathsf{V}}^{\text{All}})}{\sqrt{S_{\mathsf{VA}}^{\text{All}} + S_{\mathsf{VN}}^{\text{All}} + S_{\mathsf{PA}}^{\text{All}} + S_{\mathsf{PN}}^{\text{All}}}}.$$

- **Result 10:** Let $Z_{\mathsf{A}}^{\text{All}} = \left(Y_{\mathsf{A}}^{\text{All}} - Y_{\mathsf{V}}^{\text{All}}\right)$. The test statistic is

$$\widetilde{Z}_{\mathsf{A}}^{\text{All}} \equiv \frac{Z_{\mathsf{A}}^{\text{All}} - \mathbb{E}(Z_{\mathsf{A}}^{\text{All}})}{\sqrt{S_{\mathsf{AA}}^{\text{All}} + S_{\mathsf{AN}}^{\text{All}} + S_{\mathsf{VA}}^{\text{All}} + S_{\mathsf{VN}}^{\text{All}}}}.$$

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[32] See page 255 of Jacquemet and L'Haridon (2018) for the construction of our test statistics.

- **Result 4 and Result 11:** Given $j \in \{\mathsf{V}, \mathsf{A}\}$, let $W_j = \left(Y_j^{\text{Per}} - Y_j^{\text{Im}}\right)$. The test statistic is

$$\widetilde{W}_j \equiv \frac{W_j - \mathbb{E}(W_j)}{\sqrt{S_{j\mathsf{A}}^{\text{Per}} + S_{j\mathsf{N}}^{\text{Per}} + S_{j\mathsf{A}}^{\text{Im}} + S_{j\mathsf{N}}^{\text{Im}}}}.$$

A.2 Advice effect on efficiency

Suppose that the efficiency ratio r in treatment $j \in \{\mathsf{VA}, \mathsf{VN}, \mathsf{PA}, \mathsf{PN}, \mathsf{AA}, \mathsf{AN}\}$ is a realization of a random variable R_j with mean $\mathbb{E}(R_j) \in [0,1]$ and variance $\text{Var}(R_j)$. Let $\overline{R}_j$ denote the sample mean for n'_j realizations of R_j. Let

$$T_j \equiv \frac{\sum_{k=1}^{n_j} (R_{jk} - \overline{R}_j)^2/(n'_j - 1)}{n'_j}.$$

Superscripts "All," "F13," and "L12" correspond to all periods, the former 13 periods (periods 1–13), and the latter 12 periods (periods 14–25), respectively.

- **Result 5 and Result 12:** Given $j \in \{\mathsf{V}, \mathsf{P}, \mathsf{A}\}$ and $h \in \{\text{All}, \text{F13}, \text{L12}\}$, let $U_j^h = \left(\overline{R}_{j\mathsf{A}}^h - \overline{R}_{j\mathsf{N}}^h\right)$. The test statistic is

$$\widetilde{U}_j^h \equiv \frac{U_j^h - \mathbb{E}(U_j^h)}{\sqrt{T_{j\mathsf{A}}^h + T_{j\mathsf{N}}^h}}.$$

- **Result 6:** Given $h \in \{\text{All}, \text{F13}, \text{L12}\}$, let $Q^h = \left(U_{\mathsf{V}}^h - U_{\mathsf{P}}^h\right)$. The test statistic is

$$\widetilde{Q}^h \equiv \frac{Q^h - \mathbb{E}(Q^h)}{\sqrt{T_{\mathsf{VA}}^h + T_{\mathsf{VN}}^h + T_{\mathsf{PA}}^h + T_{\mathsf{PN}}^h}}.$$

B Binary efficiency

Table 19 summarizes the frequencies of realization of efficient allocation by treatments and periods. Thereafter, we apply normal approximation the same as that we presented in Section 3.2. Suppose that the achievement of efficient allocation in treatment $j \in \{\mathsf{VA}, \mathsf{VN}, \mathsf{PA}, \mathsf{PN}, \mathsf{AA}, \mathsf{AN}\}$ is a realization of a random variable E_j with a Bernoulli distribution that takes the value of 1 (= efficient) with a success rate of q_j. That is,

$$E_j \equiv \begin{cases} 1 & \text{with prob.}\, q_j, \\ 0 & \text{with prob.}\, 1 - q_j. \end{cases}$$

Let $\overline{E}_j$ denote the sample mean for n'_j realizations of E_j and let

$$\Gamma_j \equiv \frac{\overline{E}_j(1 - \overline{E}_j)}{n'_j}.$$

From Table 19, we find a significant increase in the efficiency of the Vickrey auction for all periods and the former 13 periods. In contrast to the efficiency measure used in the main text, we also find that the advice effect on efficiency exists in the pay-your-bid auction for all periods only. Overall, it turns out that the net advice effect disappears if we use the binary efficiency as a measure of efficiency.

In Table 19, we have significance at the cells of ($\mathsf{AA}-\mathsf{AN}$, All periods) and ($\mathsf{AA}-\mathsf{AN}$, Periods 1–13). In sum, Hypothesis 5' is rejected in both the data all periods and the data of the former 12 periods.

Table 19: Binary efficiency by treatments and periods.

	Vickrey		(1)	Pay-your-bid		(2)		Ausubel		(3)	
Data	VA	VN	VA − VN	PA	PN	PA − PN	(1) − (2)	AA	AN	AA − AN	(3) − (1)
All periods	0.779	0.705	0.074***	0.823	0.783	0.039**	0.035	0.878	0.839	0.039**	−0.035
	(0.415)	(0.457)		(0.382)	(0.412)			(0.328)	(0.368)		
Periods 1–13	0.744	0.644	0.099***	0.823	0.782	0.041	0.059	0.850	0.794	0.057*	−0.042
	(0.437)	(0.480)		(0.383)	(0.414)			(0.357)	(0.406)		
Periods 14–25	0.817	0.771	0.047	0.822	0.785	0.038	0.009	0.907	0.892	0.015	−0.031
	(0.387)	(0.421)		(0.383)	(0.412)			(0.291)	(0.311)		

Notes: * denotes significant at the 10% level, ** at the 5% level, and *** at the 1% level.

C Analysis on the first-period data

In this section, we restrict our attention to the first period only and use both units' data. As shown in Table 20, Hypothesis 1, Hypothesis 2, and Hypothesis 3 are again rejected at the 5% significance level except for the cases including imperfectly scored subjects in the pay-your-bid auction, where the sample size is smaller than 30, while Hypothesis 4 is not ($p = 0.471$). Moreover, we reject Hypothesis 3' at the 5% significance level, while we fail to reject Hypothesis 1' ($p = 0.132$).

Table 20: Frequency of sincere bidding in period one by treatments and quiz scores.

	Vickrey		(1)	Pay-your-bid		(2)		Ausubel		
Data	VA	VN	VA − VN	PA	PN	PA − PN	(1) − (2)	AA	AN	AA − AN
All	0.468	0.188	0.281***	0.123	0.021	0.102***	0.178***	0.319	0.237	0.083
	(0.501)	(0.392)		(0.330)	(0.143)			(0.470)	(0.428)	
Perfect Score	0.512	0.233	0.279***	0.138	0.026	0.112***	0.167**	0.297	0.231	0.067
	(0.503)	(0.427)		(0.346)	(0.161)			(0.463)	(0.427)	
Imperfect Score	0.381	0.111	0.270***	$0.045^{b)}$	0.000	0.045	0.224**	0.343	0.243	0.100
	(0.492)	(0.319)		(0.213)	(0.000)			(0.482)	(0.435)	

Notes: a) * denotes significant at the 10% level, ** at the 5% level, and *** at the 1% level; and b) The number of observations is no more than 30.

D How did subjects perceive advice?

We examine how many subjects believed the advice in VA by employing a post experimental questionnaire. The questionnaire asks subjects whether they believe the advice, and if yes, since when they started believing it. Subjects chose one from four answers:

(a) Believed the advice before practice periods;

(b) Believed the advice after practice periods but before real periods;

(c) Believed the advice during real periods; and

(d) Never believed.

In VA, the number of subjects who chose (a), (b), (c), and (d) is, respectively, 13, 14, 14, and 22. Thus, in VA, 41 subjects believed the advice, and 22 did not.

We categorize the subjects in VA into two groups—agents who believed (a, b, c) and agents who never believed (d)—and run normal approximation parametric tests for group comparison. We obtain two reasonable results:

1. The VA subjects who believed the advice bid significantly more sincerely compared with those who never believed the advice (60.2% and 22.2%, respectively; $z = 22.97$, $p < 0.001$); and

2. The rate of sincere bidding among the VA subjects who never believed the advice is not significantly different from that of all VN subjects (22.2% and 20.6%, respectively; $z = 1.066$, $p = 0.143$).

These results suggest that providing advice is likely to increase sincere bids when subjects believe them, and that providing advice makes subjects bid more sincerely—not because subjects are influenced by the experimenter demand effect, but because subjects believe the advice.

We also observe that the same results as VA subjects hold for AA subjects.[33] On the other hand, we find that there is no statistical difference in the rate of sincere bidding between agents who believed and those who never did in PA ($p = 0.210$).[34] Moreover, the rate of sincere bidding among those who never believed the advice is significantly higher than the overall rate of sincere bidding in PN ($p < 0.001$).

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[33] The number of AA subjects who chose (a) believed the advice before practice periods, (b) believed the advice after practice periods but before real periods, (c) believed the advice during real periods, and (d) never believed were, respectively, 13, 6, 7, and 28. The AA subjects who believed the advice bid significantly more sincerely compared with those who never did ($p < 0.001$). The rate of sincere bidding among the AA subjects who never believed the advice is not significantly different from that of all AN subjects ($p = 0.697$).

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[34] The number of PA subjects who chose (a) believed the advice before practice periods, (b) believed the advice after practice periods but before real periods, (c) believed the advice during real periods, and (d) never believed were, respectively, 3, 1, 0, and 65. That is, 4 subjects believed the advice, and 65 never did.

E Additional table

Table 21: Bid category by treatments and units.

(a) Both units

	Vickrey			Pay-your-bid		
Bid category	VA	VN	VA − VN	PA	PN	PA − PN
Sincere	0.469	0.206	0.263***	0.083	0.058	0.025***
	(0.499)	(0.404)		(0.276)	(0.234)	
Over	0.453	0.634	−0.181***	0.006	0.009	−0.004**
	(0.498)	(0.482)		(0.074)	(0.095)	
Under	0.078	0.160	−0.083***	0.911	0.933	−0.021***
	(0.268)	(0.367)		(0.284)	(0.250)	

(b) Unit 1

	Vickrey			Pay-your-bid		
Bid category	VA	VN	VA − VN	PA	PN	PA − PN
Sincere	0.416	0.175	0.241***	0.020	0.006	0.014***
	(0.493)	(0.380)		(0.141)	(0.078)	
Over	0.556	0.732	−0.176***	0.001	0.001	0.000
	(0.497)	(0.443)		(0.034)	(0.033)	
Under	0.029	0.093	−0.065***	0.979	0.993	−0.014***
	(0.167)	(0.291)		(0.145)	(0.085)	

(c) Unit 2

	Vickrey			Pay-your-bid		
Bid category	VA	VN	VA − VN	PA	PN	PA − PN
Sincere	0.523	0.237	0.286***	0.146	0.110	0.036***
	(0.500)	(0.425)		(0.353)	(0.313)	
Over	0.350	0.536	−0.185***	0.010	0.017	−0.007**
	(0.477)	(0.499)		(0.099)	(0.130)	
Under	0.127	0.228	−0.101***	0.844	0.873	−0.029***
	(0.333)	(0.419)		(0.363)	(0.333)	

Notes: * denotes significant at the 10% level, ** at the 5% level, and *** at the 1% level. Numbers in parentheses are standard deviations.

F Experimental instructions (**VA** and **VN**)

Note: In this experiment, please remember that *you cannot communicate with other subjects.* If there is communication, this experiment will be stopped immediately.

First, please confirm the following items. If any of the items are missing, please contact the experimenter.

- Instructions (this handout)
- Record sheet
- Ballpoint pen, pencil, and eraser
- Calculator

F.1 Overview

In this experiment, you will act as a bidder in a sequence of auctions. Three bidders will participate in each auction. At the beginning of each period of the auction, the experimenter randomly matches you with two persons from the other subjects. The three of you will form a group. This experiment consists of 25 periods. The persons you are matched with will change every period. You will not know who you are matched with either during or after the experiment.

The rewards you receive after the experiment are determined based on the decisions you and the other two bidders make in the experiment. Your rewards will be paid to you in cash at the end of the experiment. A more detailed explanation of your rewards will be provided later in **F.3. Rewards**.

F.2 Auction

F.2.1 Procedure in each period

1. Two units of an identical object will be auctioned off in every period. Three bidders, including yourself, will participate in each period of the auction.
2. Each bidder will be assigned a value for the first unit ("value for the first unit") and another value for the second unit ("value for the second unit"). Your values will be randomly drawn from the interval 0 JPY to 1,000 JPY with increments of 10 JPY. Any numerical value within this interval has an equal possibility of

being drawn and being assigned as your value. The higher of these two values will be your "value for the first unit," while the lower value will be your "value for the second unit." Each of the other two bidders will be assigned values for the two units in the same manner as mentioned above. The values assigned to the other two bidders will typically be different from yours. Please note that, for each bidder, his/her value for the second unit will always be lower than his/her for the first unit. In addition, your "value for the first unit" and "value for the second unit" are only for your private information. The other bidders will not know your values.

3. You will submit your "bid for the first unit" and "bid for the second unit" to the experimenter. Then, please note the following three points:
    - Your "bid for the first unit" must be higher than your "bid for the second unit."
    - Your bids must exceed 0 JPY.
    - Your bids must be increments of 10 JPY.
4. Each of the three bidders will submit two bids. Therefore, there will be a total of 6 bids. The two highest bids will be the winning bids and a bidder who submits the winning bid(s) will win the object(s). In the case of a tie among the bids, the experimenter will randomly determine the winning bids. This procedure determines the number of units each bidder will earn.
5. If a bidder wins one unit (or two units), his/her "earnings" are equal to his/her value for the first unit (or the sum of his/her values for the first and second units) less his/her payment. If a bidder does not win anything, his/her "earnings" are 0.

F.2.2 Earnings calculation

We explain how to calculate bidder's earnings if the bidder wins an object using examples. There are three bidders, A, B, and C. Here, we focus on bidder A. In the following examples, amounts are displayed in JPY.

(1) The case where a bidder wins one unit: A bidder who wins one unit will pay the highest bid from among the other bidders' losing bids.

Example F.1. Suppose A's values for the first and second units are 680 and 480, respectively. The table below displays the bids from the three bidders.

Bidder	Bid for the first unit	Bid for the second unit
A	600	450
B	500	300
C	400	250

Here, the winning bids are "A's 600" and "B's 500." The losing bids are "A's 450," "B's 300," "C's 400," and "C's 250." Bidder A pays the highest bid from among the other bidders' losing bids (400). This payment differs from A's own bid for the first unit. Then, bidder A earns the following amount:

$$680 \text{ (value for the first unit)} - 400 \text{ (payment)} = 280$$

Example F.2. Suppose A's values for the first and second units are 680 and 480, respectively. The table below displays the bids from the three bidders.

Bidder	Bid for the first unit	Bid for the second unit
A	800	350
B	750	300
C	700	250

Here, the winning bids are "A's 800" and "B's 750." Thus, bidder A wins one unit. The losing bids are "A's 350," "B's 300," "C's 700," and "C's 250." Bidder A pays the highest bid from among the other bidders' losing bids (700). This payment differs from A's own bid for the first unit. Then, bidder A earns the following amount:

$$680 \text{ (value for the first unit)} - 700 \text{ (payment)} = -20$$

(2) The case where a bidder wins two units: A bidder who wins two units will pay the sum of the highest and second-highest bids from among the other bidders' losing bids.

Example F.3. Suppose A's values for the first and second units are 680 and 480, respectively. The table below displays the bids from the three bidders.

Bidder	Bid for the first unit	Bid for the second unit
A	600	550
B	500	300
C	400	250

Here, the winning bids are "A's 600" and "A's 550." The losing bids are "B's 500," "B's 300," "C's 400," and "C's 250." Bidder A pays the sum of the highest and second-highest bids from among the other bidders' losing bids ($400 + 500 = 900$). This payment differs from A's own bids. Then, bidder A earns the following amount:

680 (value for the first unit) + 480 (value for the second unit) – 900 (payment) = 260

Example F.4. Suppose A's values for the first and second units are 680 and 480, respectively. The table below displays the bids from the three bidders.

Bidder	Bid for the first unit	Bid for the second unit
A	900	850
B	800	600
C	700	550

Here, the winning bids are "A's 900" and "A's 850." The losing bids are "B's 800," "B's 600," "C's 700," and "C's 550." Bidder A pays the sum of the highest and second-highest bids from among the other bidders' losing bids ($800+700 = 1500$). This payment differs from A's own bids. Then, bidder A earns the following amount:

680 (value for the first unit)+480 (value for the second unit)−1500 (payment) = −340

The following summarizes how to calculate your earnings:

- The case where you win one unit, and the third-highest bid is yours:

  Your earnings = your value for the first unit – fourth highest bid

- The case where you win one unit, and the third-highest bid is not yours:

  Your earnings = your value for the first unit – third highest bid

Note that when your payment is higher than your value for the first unit, your earnings will be negative.

- The case where you win two units:

$$\begin{aligned}\text{Your earnings} = {} & (\text{your value for the first unit} + \text{your value for the second unit}) \\ & - (\text{third highest bid} + \text{fourth highest bid})\end{aligned}$$

  Note that when your payment is higher than the sum of your values for the first and second units, your earnings will be negative.

- If you do not win anything, your earnings are 0.

F.3 Rewards

Here, we explain the rewards you receive after the experiment. Your rewards are the sum of your earnings over all 25 periods and a participation fee of 1,000 JPY plus you score in the quiz to check your understanding of each instruction.

For example, if the sum of your earnings is 2,580 JPY and your score on the quiz is 420, your rewards will be 4,000 JPY.

Recording Sheet

Seat Number ____________

Period	Value for the first unit	Value for the second unit	Bid for the first unit	Bid for the second unit	Payment (first unit)	Payment (second unit)	Payment (total)	Your earnings
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								

Recording Sheet

Seat Number ____________

Period	Value for the first unit	Value for the second unit	Bid for the first unit	Bid for the second unit	Payment (first unit)	Payment (second unit)	Payment (total)	Your earnings
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								

G Experimental instructions (**PA** and **PN**)

Note: In this experiment, please remember that *you cannot communicate with other subjects.* If there is communication, this experiment will be stopped immediately.

First, please confirm the following items. If any of the items are missing, please contact the experimenter.

- Instructions (this handout)
- Record sheet
- Ballpoint pen, pencil, and eraser
- Calculator

G.1 Overview

In this experiment, you will act as a bidder in a sequence of auctions. Three bidders will participate in each auction. At the beginning of each period of the auction, the experimenter randomly matches you with two persons from the other subjects. The three of you will form a group. This experiment consists of 25 periods. The persons you are matched with will change every period. You will not know who you are matched with either during or after the experiment.

The rewards you receive after the experiment are determined based on the decisions you and the other two bidders make in the experiment. Your rewards will be paid to you in cash at the end of the experiment. A more detailed explanation of your rewards will be provided later in **G.3. Rewards**.

G.2 Auction

G.2.1 Procedure in each period

1. Two units of an identical object will be auctioned off in every period. Three bidders, including yourself, will participate in each period of the auction.
2. Each bidder will be assigned a value for the first unit ("value for the first unit") and another value for the second unit ("value for the second unit"). Your values will be randomly drawn from the interval 0 JPY to 1,000 JPY with increments of 10 JPY. Any numerical value within this interval has an equal possibility of

being drawn and being assigned as your value. The higher of these two values will be your "value for the first unit," while the lower value will be your "value for the second unit." Each of the other two bidders will be assigned values for the two units in the same manner as mentioned above. The values assigned to the other two bidders will typically be different from yours. Please note that, for each bidder, his/her value for the second unit will always be lower than his/her for the first unit. In addition, your "value for the first unit" and "value for the second unit" are only for your private information. The other bidders will not know your values.

3. You will submit your "bid for the first unit" and "bid for the second unit" to the experimenter. Then, please note the following three points:
   - Your "bid for the first unit" must be higher than your "bid for the second unit."
   - Your bids must exceed 0 JPY.
   - Your bids must be increments of 10 JPY.
4. Each of the three bidders will submit two bids. Therefore, there will be a total of 6 bids. The two highest bids will be the winning bids and a bidder who submits the winning bid(s) will win the object(s). In the case of a tie among the bids, the experimenter will randomly determine the winning bids. This procedure determines the number of units each bidder will earn.
5. If a bidder wins one unit (or two units), his/her "earnings" are equal to his/her value for the first unit (or the sum of his/her values for the first and second units) less his/her payment. If a bidder does not win anything, his/her "earnings" are 0.

G.2.2 Earnings calculation

We explain how to calculate bidder's earnings if the bidder wins an object using examples. There are three bidders, A, B, and C. Here, we focus on bidder A. In the following examples, amounts are displayed in JPY.

(1) The case where a bidder wins one unit: A bidder who wins one unit will pay his/her bid for the first unit.

Example G.1. Suppose A's values for the first and second units are 680 and 480, respectively. The table below displays the bids from the three bidders.

Bidder	Bid for the first unit	Bid for the second unit
A	600	450
B	500	300
C	400	250

Here, the winning bids are "A's 600" and "B's 500." Bidder A pays his/her bid for the first unit (600). Then, bidder A earns the following amount:

$$680 \text{ (value for the first unit)} - 600 \text{ (payment)} = 80$$

Example G.2. Suppose A's values for the first and second units are 680 and 480, respectively. The table below displays the bids from the three bidders.

Bidder	Bid for the first unit	Bid for the second unit
A	800	350
B	750	300
C	700	250

Here, the winning bids are "A's 800" and "B's 750." Thus, bidder A wins one unit and pays his/her bid for the first unit (800). Then, bidder A earns the following amount:

$$680 \text{ (value for the first unit)} - 800 \text{ (payment)} = -120$$

(2) The case where a bidder wins two units: A bidder who wins two units will pay the sum of his/her bids.

Example G.3. Suppose A's values for the first and second units are 680 and 480, respectively. The table below displays the bids from the three bidders.

Bidder	Bid for the first unit	Bid for the second unit
A	600	550
B	500	300
C	400	250

Here, the winning bids are “A’s 600” and “A’s 550.” Bidder A pays the sum of his/her bids ($600 + 550 = 1150$). Then, bidder A earns the following amount:

680 (value for the first unit) + 480 (value for the second unit) – 1150 (payment) = 10

Example G.4. Suppose A’s values for the first and second units are 680 and 480, respectively. The table below displays the bids from the three bidders.

Bidder	Bid for the first unit	Bid for the second unit
A	900	850
B	800	600
C	700	550

Here, the winning bids are “A’s 900” and “A’s 850.” Bidder A pays the sum of his/her bids ($900 + 850 = 1750$). Then, bidder A earns the following amount:

680 (value for the first unit)+480 (value for the second unit)−1750 (payment) = −590

The following summarizes how to calculate your earnings:

- The case where you win one unit:

  Your earnings = your value for the first unit – your bid for the first unit

  Note that when your payment is higher than your value for the first unit, your earnings will be negative.

- The case where you win two units:

  Your earnings = (your value for the first unit + your value for the second unit)
  – (your bid for the first unit + your bid for the second unit)

  Note that when your payment is higher than the sum of your values for the first and second units, your earnings will be negative.

- If you do not win anything, your earnings are 0.

G.3 Rewards

Here, we explain the rewards you receive after the experiment. Your rewards are the sum of your earnings over all 25 periods and a participation fee of 1,000 JPY plus you score in the quiz to check your understanding of each instruction.

For example, if the sum of your earnings is 2,580 JPY and your score on the quiz is 420, your rewards will be 4,000 JPY.

Recording Sheet

Seat Number ____________

Period	Value for the first unit	Value for the second unit	Bid for the first unit	Bid for the second unit	Payment (first unit)	Payment (second unit)	Payment (total)	Your earnings
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								

Recording Sheet

Seat Number ____________

Period	Value for the first unit	Value for the second unit	Bid for the first unit	Bid for the second unit	Payment (first unit)	Payment (second unit)	Payment (total)	Your earnings
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								

H Text of advice (**VA** and **PA**)

Advice on decision making

The following advice is about the auction in which you are participating. Please consider carefully whether this advice is true or false. It is completely up to you whether you follow the advice or not.

You can maximize your earnings by bidding your valuations as they are, regardless of what others bid.

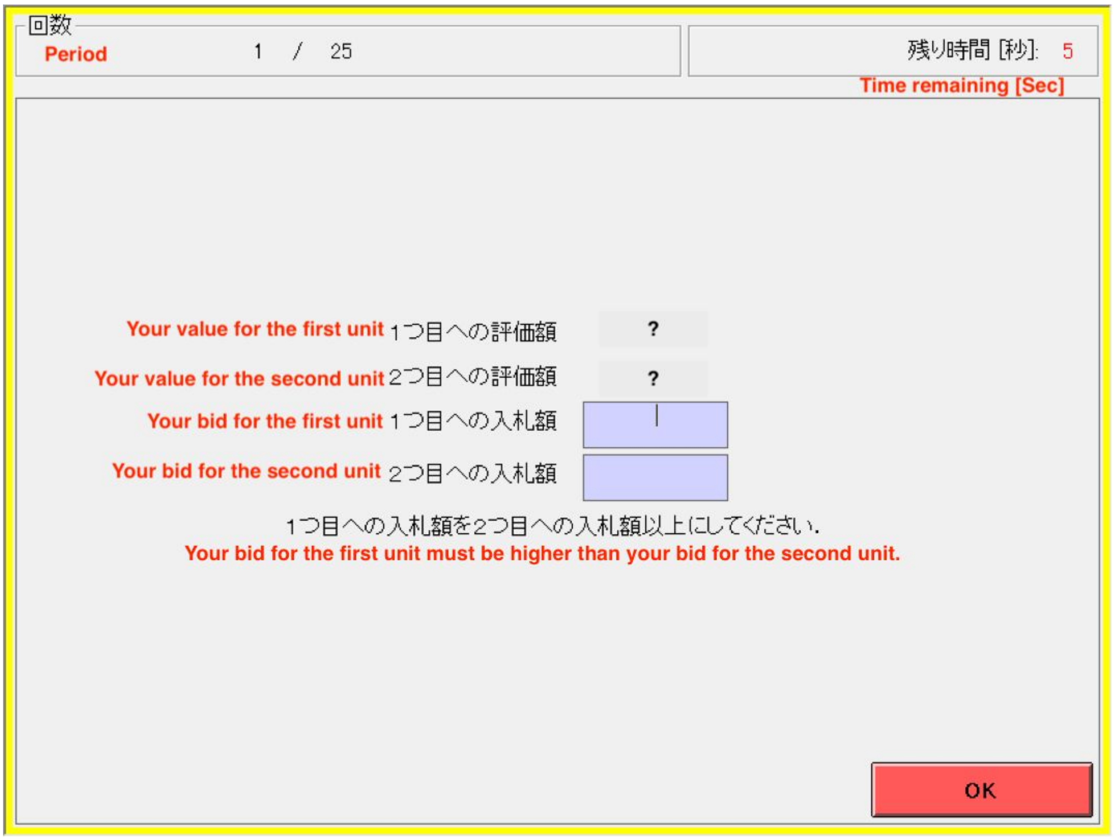
I Auction screens and procedures (**VA**, **VN**, **PA**, and **PN**)

I.1 Bidding screen

When you are ready to submit your bid, the following screen will be displayed. The upper-left corner of the screen displays the current experimental period. The screenshot below shows that the current experimental period is the first period in a total of 25 periods. In the center of the screen, "Your value for the first unit" and "Your value for the second unit" will be displayed. First, transcribe this information into the corresponding columns on the record sheet.

Next, you submit "Your bid for the first unit" and "Your bid for the second unit," both in increments of 10 JPY. You input your bids into the corresponding cells on the screen. *Please note that your bid for the first unit must be higher than your bid for the second unit.* After that, transcribe your bids into the corresponding columns on the record sheet. After the transcription, click the "OK" button.

You will have 60 seconds to finalize your bid on this screen.



回数
Period 1 / 25

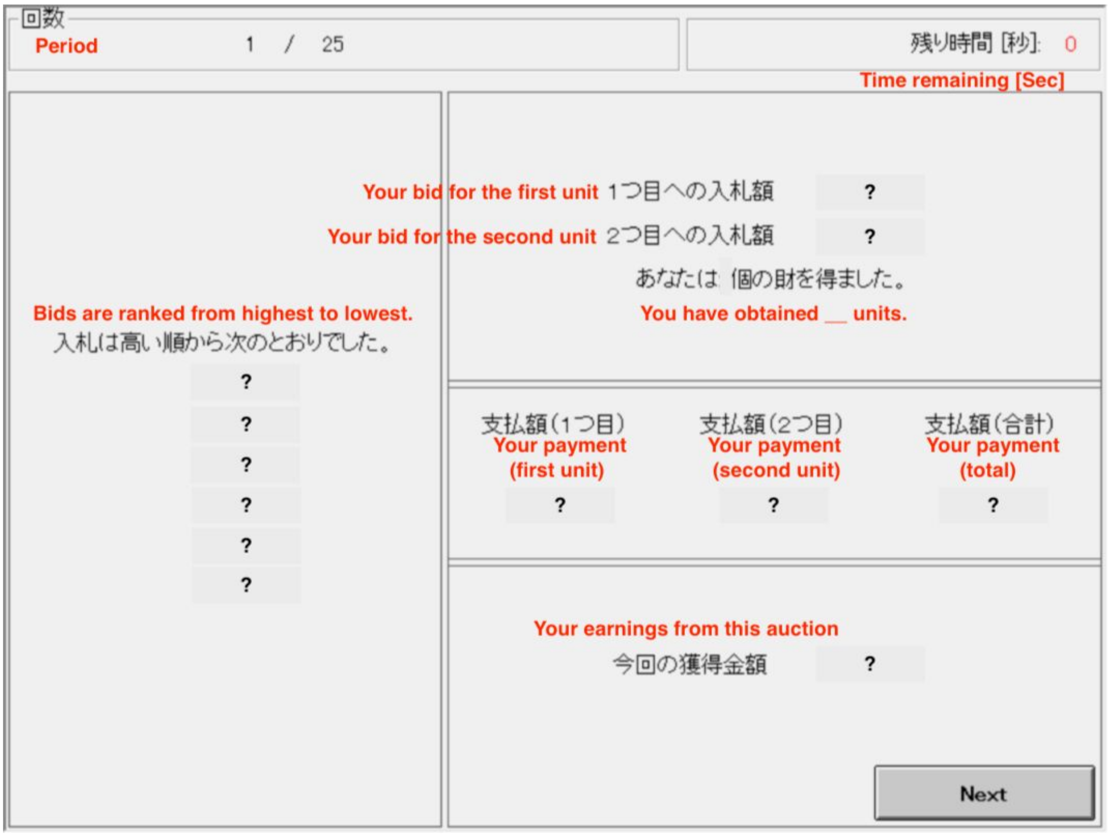
残り時間 [秒]: 5
Time remaining [Sec]

Your value for the first unit 1つ目への評価額 ?
Your value for the second unit 2つ目への評価額 ?
Your bid for the first unit 1つ目への入札額
Your bid for the second unit 2つ目への入札額

1つ目への入札額を2つ目への入札額以上にしてください.
Your bid for the first unit must be higher than your bid for the second unit.

I.2 Auction results screen

After all the subjects have clicked the “OK” button, the following screen will be displayed. On the left side of the screen, all the bids will be ranked from highest to lowest. The right side will be divided into three sections. The top section will show “Your bid for the first unit,” “Your bid for the second unit,” and the number of units you win in this auction. In the middle section, your payments will be displayed in the following order: your payment for the first unit, your payment for the first unit, and your total payment in this auction. Transcribe this information into the corresponding columns on your record sheet. Finally, the bottom section will show the amount of “Your earnings from this auction.” Transcribe this information into the corresponding column on your record sheet. After the transcription, click the “Next” button.


回数
Period 1 / 25
残り時間 [秒]: 0
Time remaining [Sec]
Your bid for the first unit 1つ目への入札額 ?
Your bid for the second unit 2つ目への入札額 ?
あなたは 個の財を得ました。
You have obtained __ units.
Bids are ranked from highest to lowest.
入札は高い順から次のとおりでした。
?
?
?
?
?
?
支払額(1つ目)
Your payment (first unit)
?
支払額(2つ目)
Your payment (second unit)
?
支払額(合計)
Your payment (total)
?
Your earnings from this auction
今回の獲得金額 ?
Next

After all the subjects have clicked the “Next” button, the next auction will start. This marks the end of one auction period. This experiment includes a series of 25 auctions.

J Quiz (VA, VN, PA, and PN)

Please answer all questions below.

The bids from three bidders are shown in the following table. Suppose that B's value for the first unit is 900, and B's value for the second unit is 700. Suppose that C's value for the first unit is 500.

Bidder	Bid for the first unit	Bid for the second unit
A	800	500
B	1000	700
C	600	500

(1) Find (two) winning bids.

(2) Calculate B's payment.

(3) Calculate B's earnings.

(4) Calculate C's payment.

(5) Calculate C's earnings.

Suppose that B's bid for the first unit is 900; all other bids are shown in the table above.

(6) Find (two) winning bids.

(7) Calculate B's payment.

(8) Calculate B's earnings.

Suppose that B's bid for the first unit is 400 and 300 for the second unit; all other bids are shown in the table above.

(9) Find (two) winning bids.

(10) Calculate B's payment.

(11) Calculate B's earnings.

Suppose that C's bid for the first unit is 1,000; all other bids are shown in the table above.

(12) Find (two) winning bids.

(13) Calculate C's payment.

(14) Calculate C's earnings.

Suppose that C's bid for the first unit is 500; all other bids are shown in the table above.

(15) Find (two) winning bids.

(16) Calculate C's payment.

(17) Calculate C's earnings.

K Post-experiment survey (**VA** and **PA**)

Seat Number ____________

Faculty / Department____________ Age ________ Gender: Male / Female

1. Did you understand the auction rules (that is, how to calculate bidder's earnings)?
   (a) I understood it after receiving the instructions.
   (b) I understood it after confirming the rules.
   (c) I understood it by following the practice, and before the first real period.
   (d) I understood it during the real periods. (from period ________)
   (e) I did not understand it.

2. Did you trust the decision-making advice?
   (a) I trusted it before the practice.
   (b) I trusted it after the practice, and before the first real period.
   (c) I began trusting it during the real periods. (from period ________)
   (d) I did not trust it.

If you answer is (c) or (d), please write your reason(s) below.

3. How did you decide to bid? Please write specifically.

The number of times you bid your values: first unit (____times), second unit (____times).

4. What did you think about others' bids? Please circle your selection and write specific details.

(Thought deeply, Didn't think much, Didn't think at all)

5. What do you think is the optimal bidding strategy? Please write your ideas and their reasoning.

6. If you had been aware of the others' values, would you have changed the way you decided to bid? If so, how would it have changed? Please write your ideas and reasons.

Thank you for your answers.

L Post-experiment survey (VN and PN)

Seat Number ____________

Faculty / Department____________ Age ________ Gender: Male / Female

1. Did you understand the auction rules (that is, how to calculate bidder's earnings)?
   (a) I understood it after receiving the instructions.
   (b) I understood it after confirming the rules.
   (c) I understood it by following the practice, and before the first real period.
   (d) I understood it during the real periods. (from period ________)
   (e) I did not understand it.

2. How did you decide to bid? Please write specifically.

The number of times you bid your values: first unit (____times), second unit (____times).

3. What did you think about others' bids? Please circle your selection and write specific details.

(Thought deeply, Didn't think much, Didn't think at all)

4. What do you think is the optimal bidding strategy? Please write your ideas and their reasoning.

5. If you had been aware of the others' values, would you have changed the way you decided to bid? If so, how would it have changed? Please write your ideas and reasons.

Thank you for your answers.

M Experimental instruction (**AA** and **AN**)

Note: In this experiment, please remember that *you cannot communicate with other subjects*. If there is communication, this experiment will be stopped immediately.

First, please confirm the following items. If any of the items are missing, please contact the experimenter.

- Instructions (this handout)
- Record sheet
- Ballpoint pen, pencil, and eraser
- Calculator

M.1 Overview

In this experiment, you will act as a bidder in a sequence of auctions. Three bidders will participate in each auction. At the beginning of each period of the auction, the experimenter randomly matches you with two persons from the other subjects. The three of you will form a group. This experiment consists of 25 periods. The persons you are matched with will change every period. You will not know who you are matched with either during or after the experiment.

The rewards you receive after the experiment are determined based on the decisions you and the other two bidders make in the experiment. Your rewards will be paid to you in cash at the end of the experiment. A more detailed explanation of your rewards will be provided later in **M.3. Rewards**.

M.2 Auction

M.2.1 Procedure in each period

1. Two units of an identical object will be auctioned off in every period. Three bidders, including yourself, will participate in each period of the auction.
2. Each bidder will be assigned a value for the first unit ("value for the first unit") and another value for the second unit ("value for the second unit"). Your values will be randomly drawn from the interval 0 JPY to 1,000 JPY with increments of 10 JPY. Any numerical value within this interval has an equal possibility of

being drawn and being assigned as your value. The higher of these two values will be your "value for the first unit," while the lower value will be your "value for the second unit." Each of the other two bidders will be assigned values for the two units in the same manner as mentioned above. The values assigned to the other two bidders will typically be different from yours. Please note that, for each bidder, his/her second unit's value will always be lower than his/her first unit's value. In addition, your "value for the first unit" and "value for the second unit" are only for your private information. The other bidders will not know your values.

3. In the auction, a price will start from 0 (initial price) and rise in increments of 10 JPY every 2 seconds. For each price, you are supposed to reveal your demand (i.e., units you wish to buy) at that price. Your demand starts from two units at price 0, and you decide whether to reduce your demand as the price increases. As will be explained later, the "demand reduction button" (hereinafter "button") is displayed on your screen. To reduce your demand by one unit at a price, click the button once. To reduce another unit, click the button again. Thus, clicking the button twice makes your demand 0 units.

4. At the initial price, each of the three bidders demands two units; thus, the "aggregate demand" is six units. As the price increases, the aggregate demand decreases. When the aggregate demand becomes two units, the auction is closed. That is, the auction ends when the button is clicked four times or the auction ends when the price reaches 2,000 JPY (i.e., the maximum limit price) even if the aggregate demand does not become two units.

5. The two units will be allocated to the remaining demands after the auction is closed. We explain the number of units you win, and your payments in each of the four cases below:

   a) The case where your demand becomes 0 units (i.e., you click the button twice) during the auction:

      You win 0 units, and you pay 0.

   b) The case where your demand is one unit (i.e., you click the button once) when the aggregate demand becomes three units:

      The auction is closed when someone clicks the button once after that time.

      (1) If your click closes the auction, then you win 0 units, and you pay 0.

    (2) If some other bidder's click closes the auction, then you win one unit, and you pay the closing price.

c) The case where your demand remains two units (i.e., you never clicked the button) until the aggregate demand becomes three units:

   You are assured to earn at least one unit. You pay the price for this unit when you are assured. The auction is closed when someone clicks the button once after that time.

    (1) If your click closes the auction, then you win one unit, and you pay the price when you are assured.
    (2) If some other bidder's click closes the auction, then you win two units, and you pay the price when you are assured the first unit + the closing price.

d) The case where the price reaches 2,000 JPY before the aggregate demand becomes two units:

   Each unsold unit will be allocated with equal probabilities to the remaining demands.

    (1) If no bidder is assured to win one unit until the auction is closed, two units will be allocated to remaining demands with equal probabilities. You pay 2,000 JPY for each unit you win. That is, you pay:
        "the number of units you win (0, 1, or 2)" × 2,000 JPY.
    (2) If some bidder is assured to win one unit until the auction is closed, the remaining one unit will be allocated to the remaining demands with equal probabilities. If you win one unit at the end of the auction, its price is 2,000 JPY. If you have been assured to win one unit once the price reaches 2,000 JPY, then you also pay the price when you were assured one unit. Thus, if you have been assured no unit, you pay:
        "the number of units you win (0 or 1)" × 2,000 JPY.
        If you have been assured one unit during the auction, you pay:
        "the price when you were assured" + "the number of units you win (0, 1, or 2)" × 2,000 JPY.

M.2.2 Earnings calculation

We explain how to calculate bidder's earnings if the bidder wins some units using these examples. There are three bidders, A, B, and C. Here, we focus on bidder A. In the following examples, amounts are displayed in JPY. The price at the time a bidder intends to click the button is called the "demand reduction price." Now, consider the case where the button is clicked four times before the price reaches the maximum limit price.

(1) Bidder demanding one unit when the auction is closed

Example M.1. Suppose A's values for the first and second units are 680 and 480, respectively. The table below displays the "demand reduction prices" (the prices at which bidders plan to click the button). All the prices in the table will not be observed during the auction as the auction is closed before the button is clicked for all the prices.

Bidder	First demand reduction price	Second demand reduction price
A	450	600
B	300	500
C	250	400

"C's 250," "B's 300," "C's 400," and "A's 450" are the four lowest (demand reduction) prices in ascending order. When bidder A clicks the button at the forth lowest price (450), the auction ends. As A's own click closes the auction and A's demand is one unit at that time, A's payment is the third lowest price (400). This payment is different from A's own demand reduction price. Then, bidder A earns the following amount:

680 (value for the first unit) – 400 (payment) = 280

Example M.2. Suppose A's values for the first and second units are 680 and 480, respectively. The table below displays the bidders' demand reduction prices.

Bidder	First demand reduction price	Second demand reduction price
A	350	800
B	300	750
C	250	700

"C's 250," "B's 300," "A's 350," and "C's 700" are the four lowest (demand reduction) prices in ascending order. When bidder C clicks the button at the fourth lowest price (700), the auction ends. As C's click closes the auction and A's demand is one unit at that time, A's payment is 700. This payment is different from A's own demand reduction price. Then, bidder A earns the following amount:

$$680 \text{ (value for the first unit)} - 700 \text{ (payment)} = -20$$

(2) Bidder demanding two units when the auction is closed

Example M.3. Suppose A's values for the first and second units are 680 and 480, respectively. The table below displays the bidders' demand reduction prices.

Bidder	First demand reduction price	Second demand reduction price
A	550	600
B	300	500
C	250	400

"C's 250," "B's 300," "C's 400," and "B's 500" are the four lowest (demand reduction) prices in ascending order. When bidder C clicks the button at the third lowest price (400), A is assured to win one unit. Subsequently, when B clicks the button at the forth lowest price (500), the auction ends. Thus, A's payment is the sum of the third and fourth lowest prices (400 + 500 = 900). Then, bidder A earns the following amount:

$$680 \text{ (value for the first unit)} + 480 \text{ (value for the second unit)} - 900 \text{ (payment)} = 260$$

Example M.4. Suppose A's values for the first and second units are 680 and 480, respectively. The table below displays the bidders' demand reduction prices.

Bidder	First demand reduction price	Second demand reduction price
A	850	900
B	600	800
C	550	700

"C's 550," "B's 600," "C's 700," and "B's 800" are the four lowest (demand reduction) prices in ascending order. A's payment is calculated similarly to Example M.3. and is the sum of the third and fourth lowest prices (700 + 800 = 1500). Thus, bidder A earns the following amount:

$$680 \text{ (value for the first unit)} + 480 \text{ (value for the second unit)} - 1500 \text{ (payment)} = -340$$

When the button is clicked four times before the price reaches the maximum limit price, the following summarizes how to calculate your earnings:

- The case where your demand is 0 units at the end of the auction:

  $$\text{Your earnings} = 0$$

- The case where your demand is one unit at the end of the auction:
  - If some other bidder's click closes the auction, then:

    $$\text{Your earnings} = \text{your value for the first unit} - \text{fourth demand reduction price}$$

  - If your click closes the auction, then:

    $$\text{Your earnings} = \text{your value for the first unit} - \text{third demand reduction price}$$

- The case where your demand remains two units at the end of the auction:

  $$\begin{aligned}\text{Your earnings} = {} & (\text{your value for the first unit} + \text{your value for the second unit}) \\ & - (\text{third demand reduction price} + \text{fourth demand reduction price})\end{aligned}$$

If the button is not clicked four times before the price reaches the maximum limit price, then your earnings are the sum of values for the units you win minus the payment calculated as described in 5d of Section M.2.1. If you do not win anything, your earnings are 0.

M.3 Rewards

Here, we explain the rewards you receive after the experiment. Your rewards are the sum of your earnings over all 25 periods and a participation fee of 1,000 JPY plus you score in the quiz to check your understanding of each instruction.

For example, if the sum of your earnings is 2,580 JPY and your score on the quiz is 420, your rewards will be 4,000 JPY.

Recording Sheet

Seat Number ____________

Period	Value for the first unit	Value for the second unit	First demand reduction price	Second demand reduction price	Payment (first unit)	Payment (second unit)	Payment (total)	Your earnings
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								

Note: If you reduced demand once or did not reduce at all, please denote a slash mark in the corresponding cells.

Recording Sheet

Seat Number ____________

Period	Value for the first unit	Value for the second unit	First demand reduction price	Second demand reduction price	Payment (first unit)	Payment (second unit)	Payment (total)	Your earnings
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								

Note: If you reduced demand once or did not reduce at all, please denote a slash mark in the corresponding cells.

N Text of advice (**AA**)

Advice on decision making

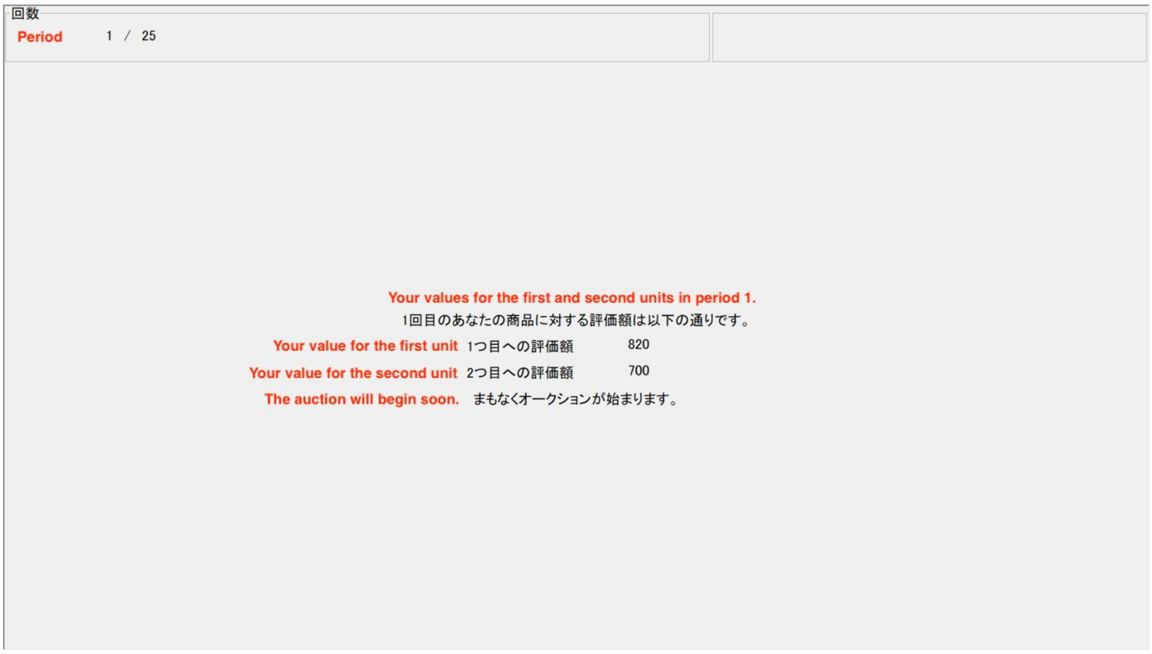
The following advice is about the auction in which you are participating. Please consider carefully whether this advice is true or false. It is completely up to you whether you follow the advice or not.

You can maximize your earnings by reducing your demands at your values as they are, regardless of the prices at which others reduce their demands.

O Auction screens and procedures (**AA** and **AN**)

O.1 Screen before beginning the auction

At the beginning of each period of the auction, the following screen will be displayed. The upper-left corner of the screen displays the current experimental period. The screenshot below shows that the current experimental period is the first period in a total of 25 periods. In the center of the screen, “Your value for the first unit” and “Your value for the second unit” will be displayed. First, transcribe this information in the corresponding columns on the record sheet.



Period 1 / 25

Your values for the first and second units in period 1.
1回目のあなたの商品に対する評価額は以下の通りです。
Your value for the first unit 1つ目への評価額 820
Your value for the second unit 2つ目への評価額 700
The auction will begin soon. まもなくオークションが始まります。

O.2 Decision-making screen

When an auction starts, the following screen will be displayed. The upper-left corner of the screen displays the current experimental period. The screenshot below shows that the current experimental period is the first period in a total of 25 periods.

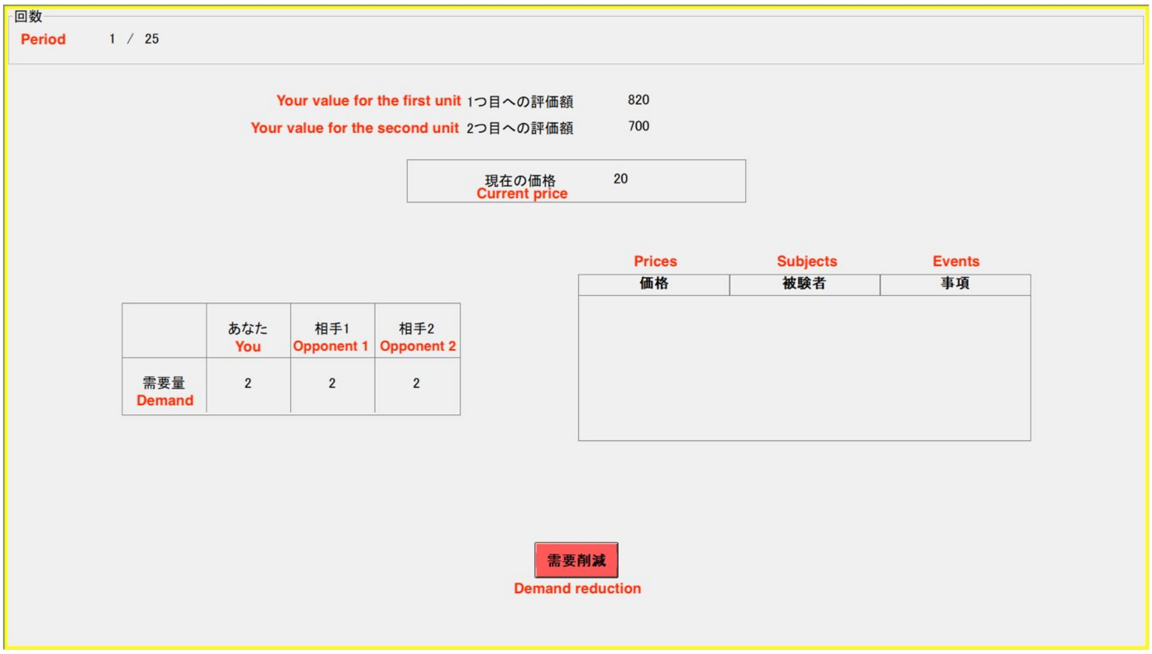
In the center of the screen, “Your value for the first unit” and “Your value for the second unit” will be displayed. In the box immediately below, you will see the current price. The price will rise in increments of 10 JPY every 2 seconds.

On the left of the screen, each bidder’s demand at the current price will be displayed. The screenshot below indicates that each bidder’s demand is 2 as the auction has just started. Please note that the other bidders’ numbers “1” and “2” will be randomly assigned after determining the group members. Hence, you cannot identify who they are based on these numbers.

On the right of the screen, you will see an event table. This table shows the history, from the beginning to the present point in time, of which bidders have reduced demand and at what price, and whether they have been assured to win one unit and at what price.

At the bottom of the screen, you can see the "demand reduction button." If you click this button once, you can reduce your demand by one unit. Since your demand is 2 at the beginning of the auction, you can click the button at most two times.

1) Screen just after the auction has begun



回数
Period 1 / 25

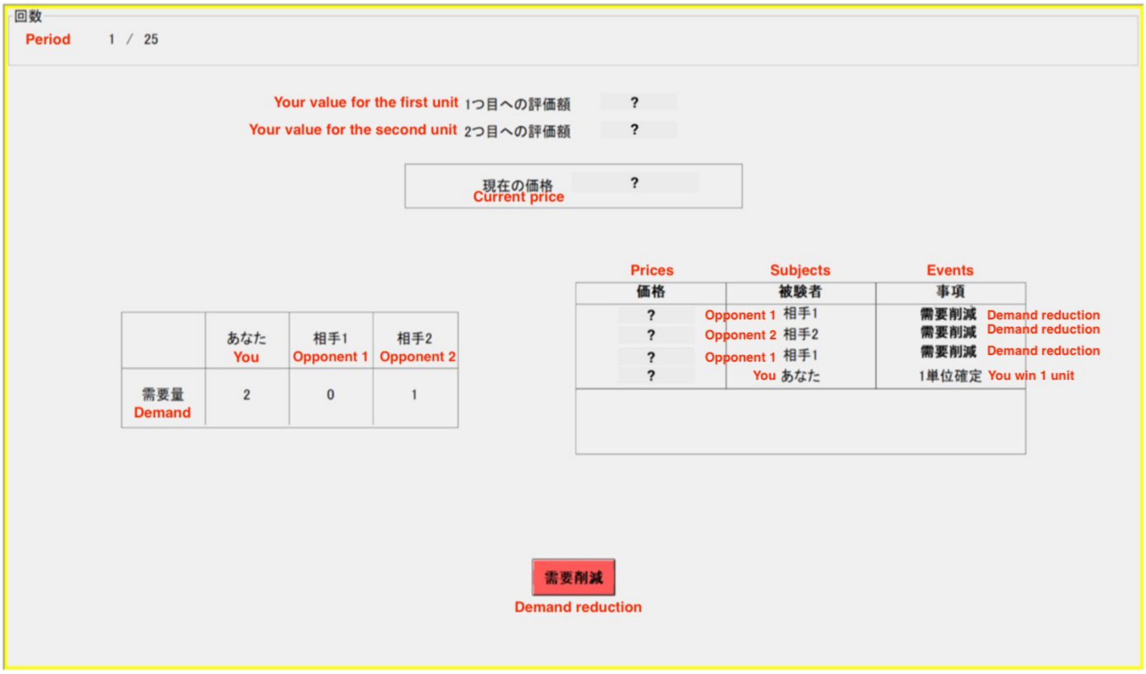
Your value for the first unit 1つ目への評価額 820
Your value for the second unit 2つ目への評価額 700

現在の価格 Current price 20

	あなた You	相手1 Opponent 1	相手2 Opponent 2
需要量 Demand	2	2	2

Prices 価格	Subjects 被験者	Events 事項

2) Screen in case you are assured to win one unit



Your value for the first unit 1つ目への評価額 ?

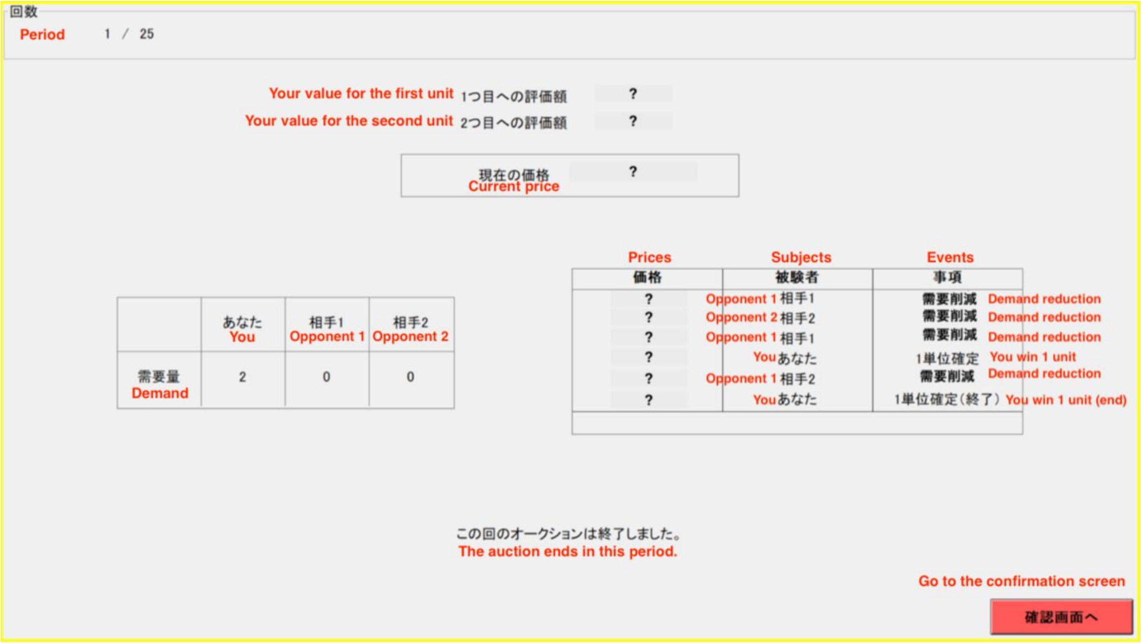
Your value for the second unit 2つ目への評価額 ?

現在の価格 Current price ?

	あなた You	相手1 Opponent 1	相手2 Opponent 2
需要量 Demand	2	0	1

Prices 価格	Subjects 被験者	Events 事項
?	Opponent 1 相手1	需要削減 Demand reduction
?	Opponent 2 相手2	需要削減 Demand reduction
?	Opponent 1 相手1	需要削減 Demand reduction
?	You あなた	1単位確定 You win 1 unit

3) Screen in case you are assured to win one more unit



Your value for the first unit 1つ目への評価額 ?

Your value for the second unit 2つ目への評価額 ?

現在の価格 Current price ?

	あなた You	相手1 Opponent 1	相手2 Opponent 2
需要量 Demand	2	0	0

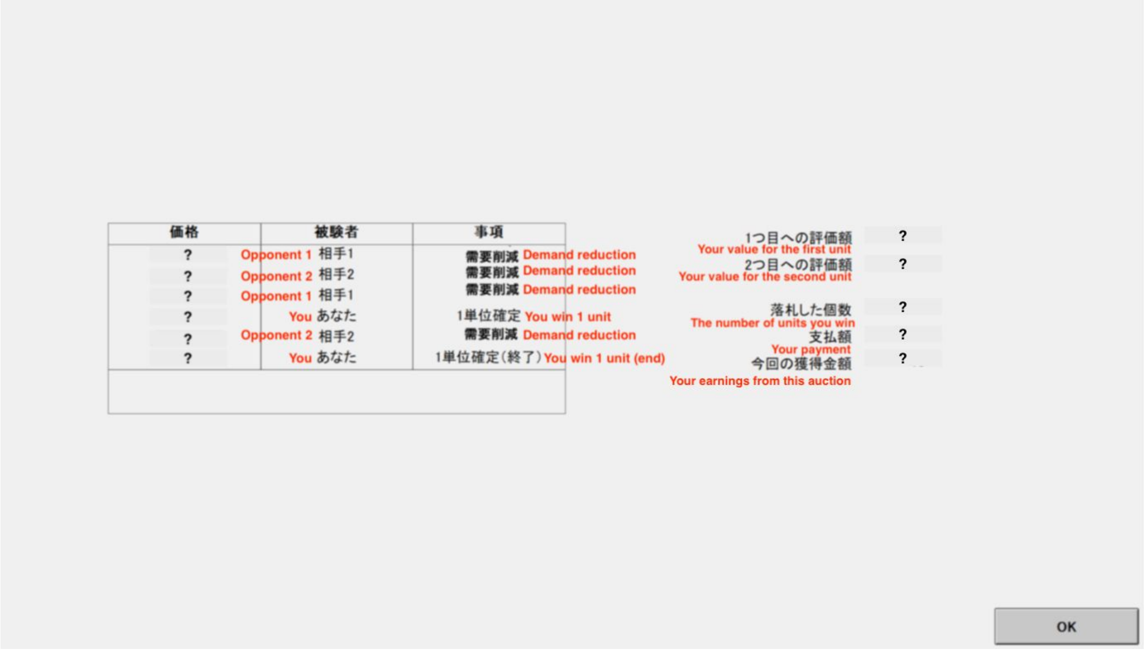
Prices 価格	Subjects 被験者	Events 事項
?	Opponent 1 相手1	需要削減 Demand reduction
?	Opponent 2 相手2	需要削減 Demand reduction
?	Opponent 1 相手1	需要削減 Demand reduction
?	You あなた	1単位確定 You win 1 unit
?	Opponent 1 相手2	需要削減 Demand reduction
?	You あなた	1単位確定（終了） You win 1 unit (end)

この回のオークションは終了しました。
The auction ends in this period.

When one period of the auction ends, transcribe your demand reduction price (at most two) in the corresponding cells on the record sheet. If the number of times you have reduced your demand is either 1 or 0, cross out the blank areas in the corresponding cells on the record sheet with a diagonal line. After the transcription, click the "Go to the confirmation screen" button.

O.3 Confirmation screen

When all the subjects have finished their inputs, the following screen will be displayed. On the left side of the screen, the event table is displayed again. The right side shows information on your earnings. From the top to the bottom, "'Your value for the first unit," "Your value for the second unit," the number of units you have earned in this auction, your total payment in this auction, and "Your earnings from this auction" will be displayed. Transcribe your payment for the first unit, your payment for the second unit, and your total payment into the corresponding columns on your record sheet. If the payment is 0, transcribe 0 into the corresponding cells on your record sheet. After the transcription, click the "OK" button.



価格	被験者	事項
?	Opponent 1 相手1	需要削減 Demand reduction
?	Opponent 2 相手2	需要削減 Demand reduction
?	Opponent 1 相手1	需要削減 Demand reduction
?	You あなた	1単位確定 You win 1 unit
?	Opponent 2 相手2	需要削減 Demand reduction
?	You あなた	1単位確定（終了）You win 1 unit (end)

1つ目への評価額 Your value for the first unit	?
2つ目への評価額 Your value for the second unit	?
落札した個数 The number of units you win	?
支払額 Your payment	?
今回の獲得金額 Your earnings from this auction	?

After all the bidders have clicked the "OK" button, the next period of the auction will begin. This marks the end of one auction period. This experiment involves a series of 25 auctions.

P Quiz (**AA** and **AN**)

Please answer all the questions below:

The three bidders planning demand reduction of the prices are shown in the following table. Suppose that B's value for the first unit is 900, and B's value for the second unit is 700. Suppose that C's value for the first unit is 500.

Bidder	First demand reduction price	Second demand reduction price
A	500	800
B	700	1000
C	500	600

(1) Specify winning bidders and how many unit(s) each winning bidder wins.

(2) Calculate B's payment.

(3) Calculate B's earnings.

(4) Calculate C's payment.

(5) Calculate C's earnings.

Suppose that B's second demand reduction price is 900; all other demand reduction prices are the same as the table above.

(6) Specify winning bidders and how many unit(s) each bidder has won.

(7) Calculate B's payment.

(8) Calculate B's earnings.

Suppose that B's first and second demand reduction prices are 300 and 400, respectively; all other demand reduction prices are the same as the table above.

(9) Specify winning bidders and how many unit(s) each bidder has won.

(10) Calculate B's payment.

(11) Calculate B's earnings.

Suppose that C's second demand reduction price is 1,000; all other demand reduction prices are the same as the table above.

(12) Specify winning bidders and how many unit(s) each bidder has won.

(13) Calculate C's payment.

(14) Calculate C's earnings.

Suppose that C's second demand reduction price is 500; all other demand reduction prices are the same as the table above.

(15) Specify winning bidders and how many unit(s) each bidder has won.

(16) Calculate C's payment.

(17) Calculate C's earnings.

Q Post-experiment survey (**AA**)

Seat Number ____________

Faculty / Department____________ Age _________ Gender: Male / Female

1. Did you understand the auction rules (that is, how to calculate bidder's earnings)?

   (a) I understood it after receiving the instructions.

   (b) I understood it after confirming the rules.

   (c) I understood it by following the practice, and before the first real period.

   (d) I understood it during the real periods. (from period _________)

   (e) I did not understand it.

2. Did you trust the decision-making advice?

   (a) I trusted it before the practice.

   (b) I trusted it after the practice, and before the first real period.

   (c) I began trusting it during the real periods. (from period _________)

   (d) I did not trust it.

If you answer is (c) or (d), please write your reason(s) below.

3. How did you decide to reduce your demands? Please write specifically.

The number of times you reduce your demands at your values : first unit (____times), second unit (____times).

4. What did you think about others' demand reductions? Please circle your selection and write specific details.

(Thought deeply, Didn't think much, Didn't think at all)

5. What do you think is the optimal demand reduction strategy? Please write your ideas and their reasoning.

6. If you had been aware of the others' values, would you have changed the way you decided to reduce your demands? If so, how would it have changed? Please write your ideas and reasons.

Thank you for your answers.

R Post-experiment survey (AN)

Seat Number ____________

Faculty / Department____________ Age ________ Gender: Male / Female

1. Did you understand the auction rules (that is, how to calculate bidder's earnings)?
    - (a) I understood it after receiving the instructions.
    - (b) I understood it after confirming the rules.
    - (c) I understood it by following the practice, and before the first real period.
    - (d) I understood it during the real periods. (from period ________)
    - (e) I did not understand it.

2. How did you decide to reduce your demands? Please write specifically.

The number of times you reduce your demands at your values : first unit (____times), second unit (____times).

3. What did you think about others' demand reductions? Please circle your selection and write specific details.

(Thought deeply, Didn't think much, Didn't think at all)

4. What do you think is the optimal demand reduction strategy? Please write your ideas and their reasoning.

5. If you had been aware of the others' values, would you have changed the way you decided to reduce your demands? If so, how would it have changed? Please write your ideas and reasons.

Thank you for your answers.

S Individual bidding data

This section provides figures showing that each subject's bidding behavior in each treatment.

Legends on the figures

- x-axis: period
- y-axis: bid value
- Green line with ∘: quiz score = 17
- Orange line with ×: quiz score < 17
- Blue dotted line: positive payoff
- Red solid line: negative payoff

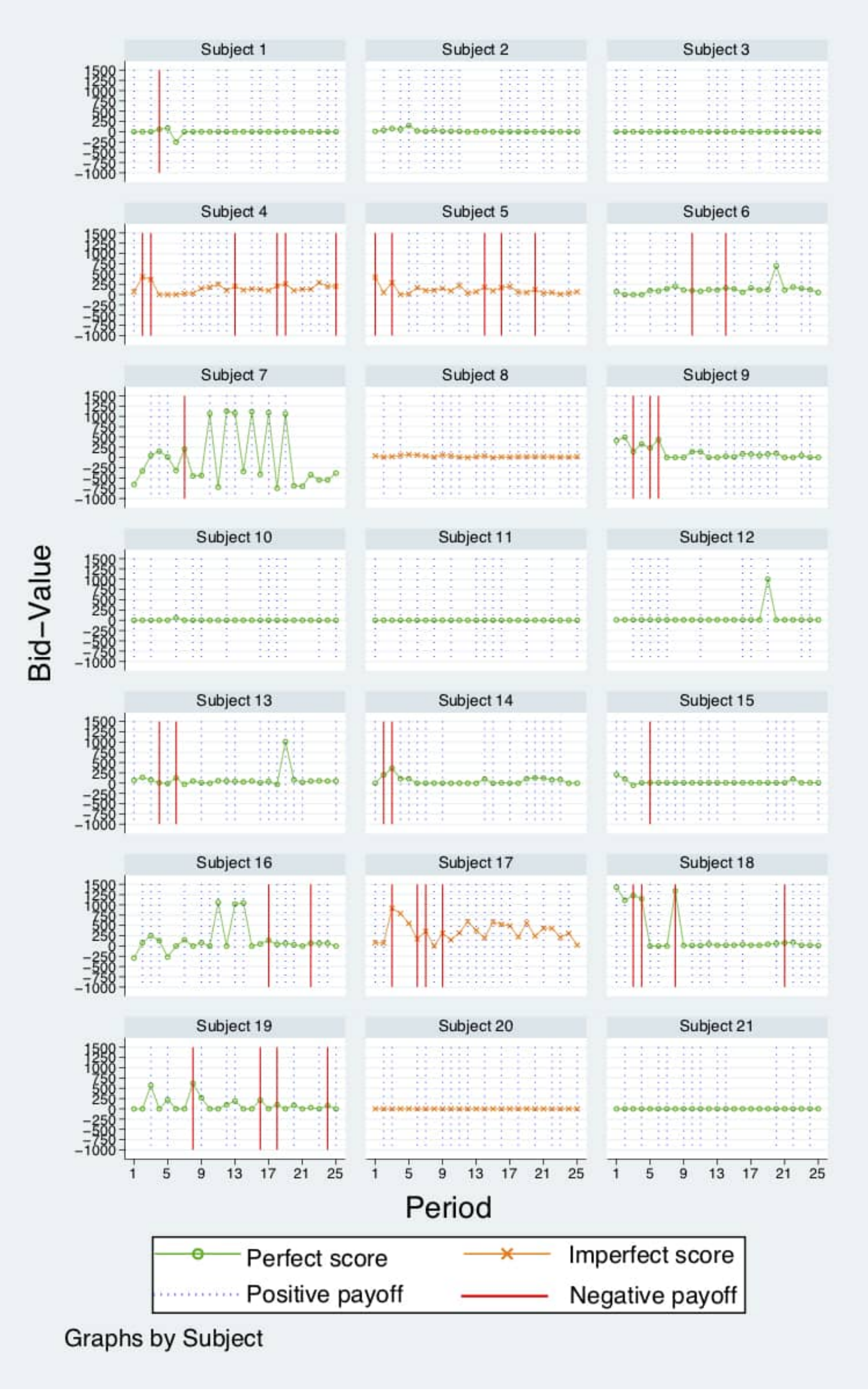


Figure 6: Time evolution of the gap between bid and value for unit 1 in VA1.

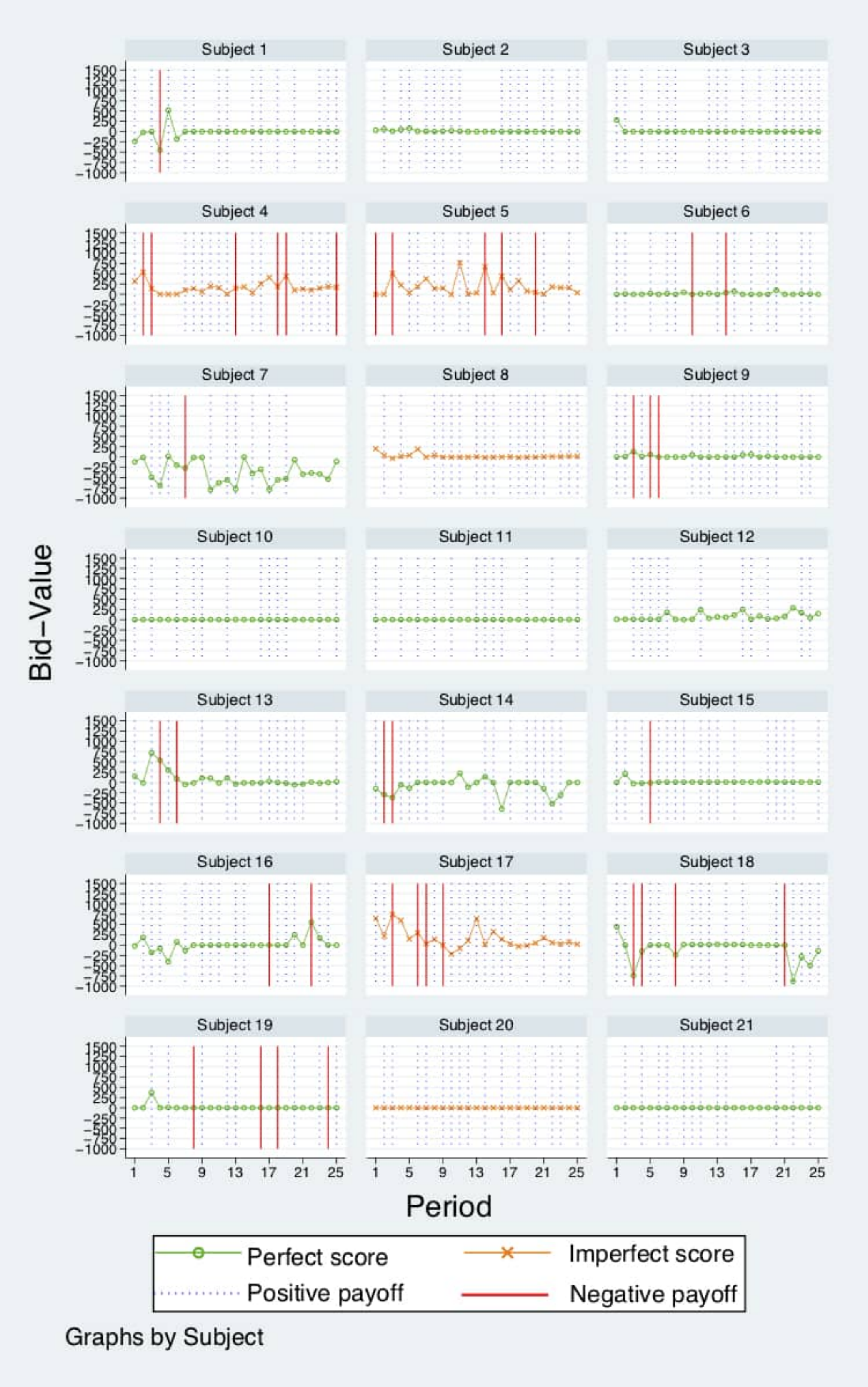


Figure 7: Time evolution of the gap between bid and value for unit 2 in VA1.

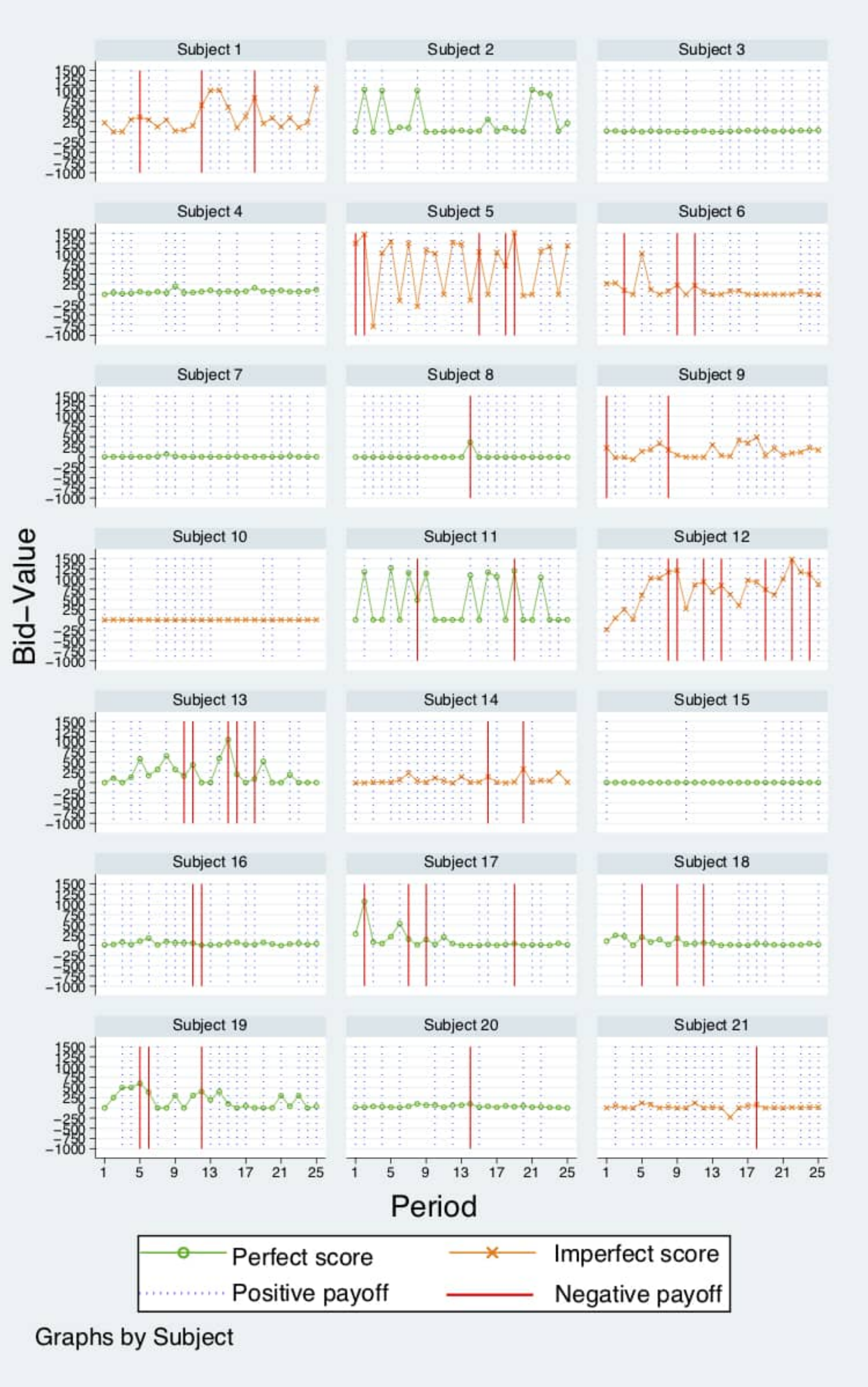


Figure 8: Time evolution of the gap between bid and value for unit 1 in VA2.

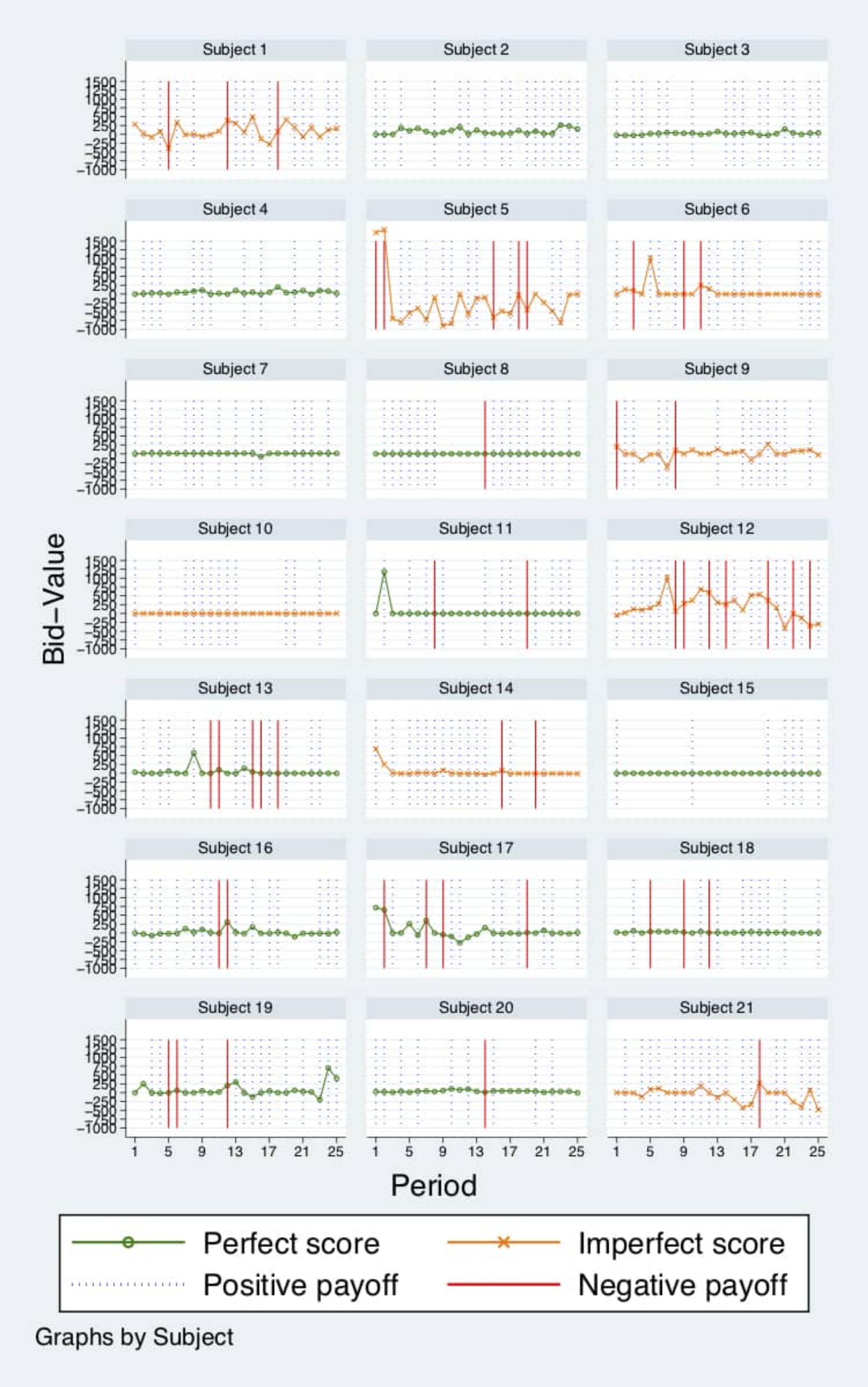


Figure 9: Time evolution of the gap between bid and value for unit 2 in VA2.

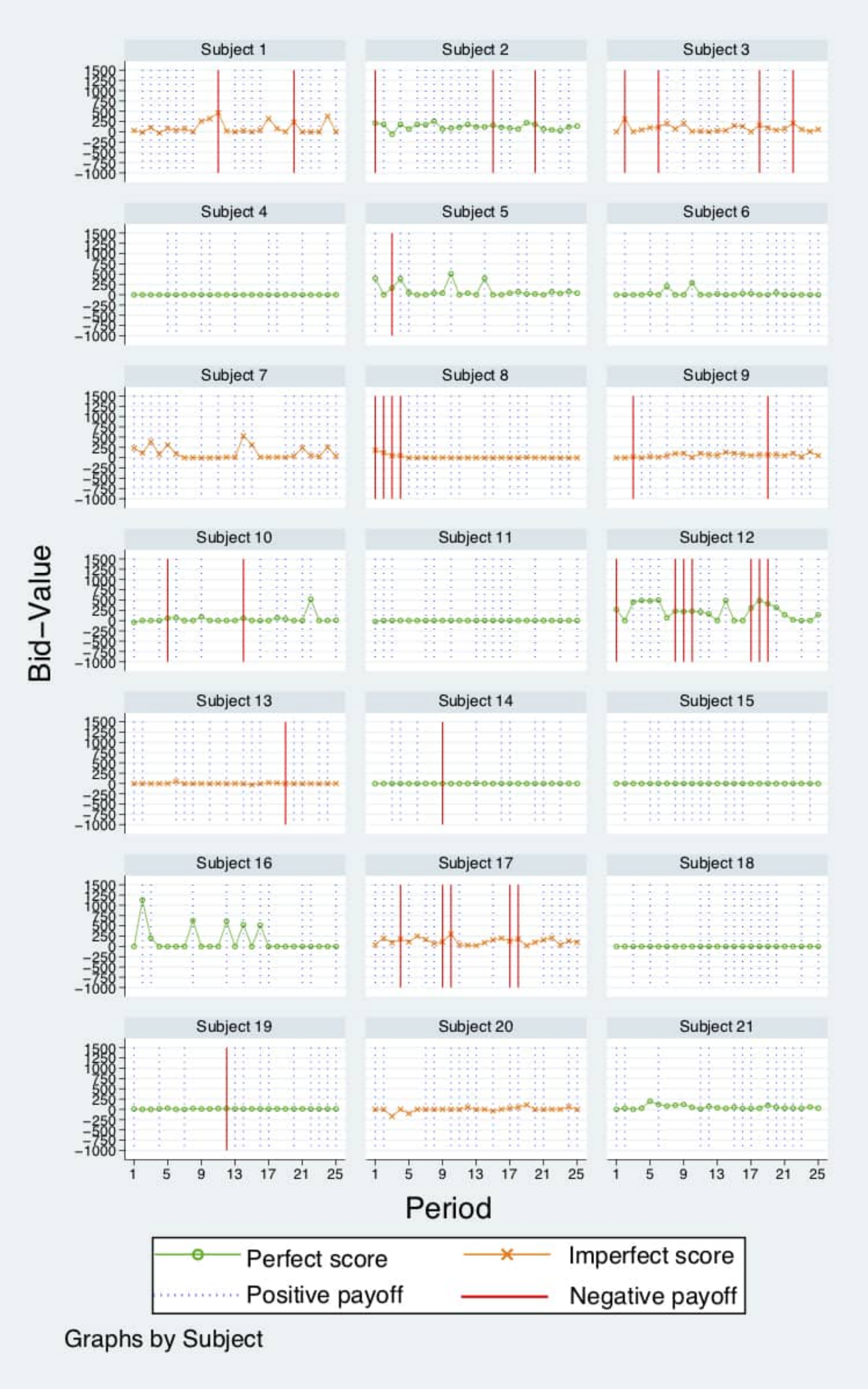


Figure 10: Time evolution of the gap between bid and value for unit 1 in VA3.

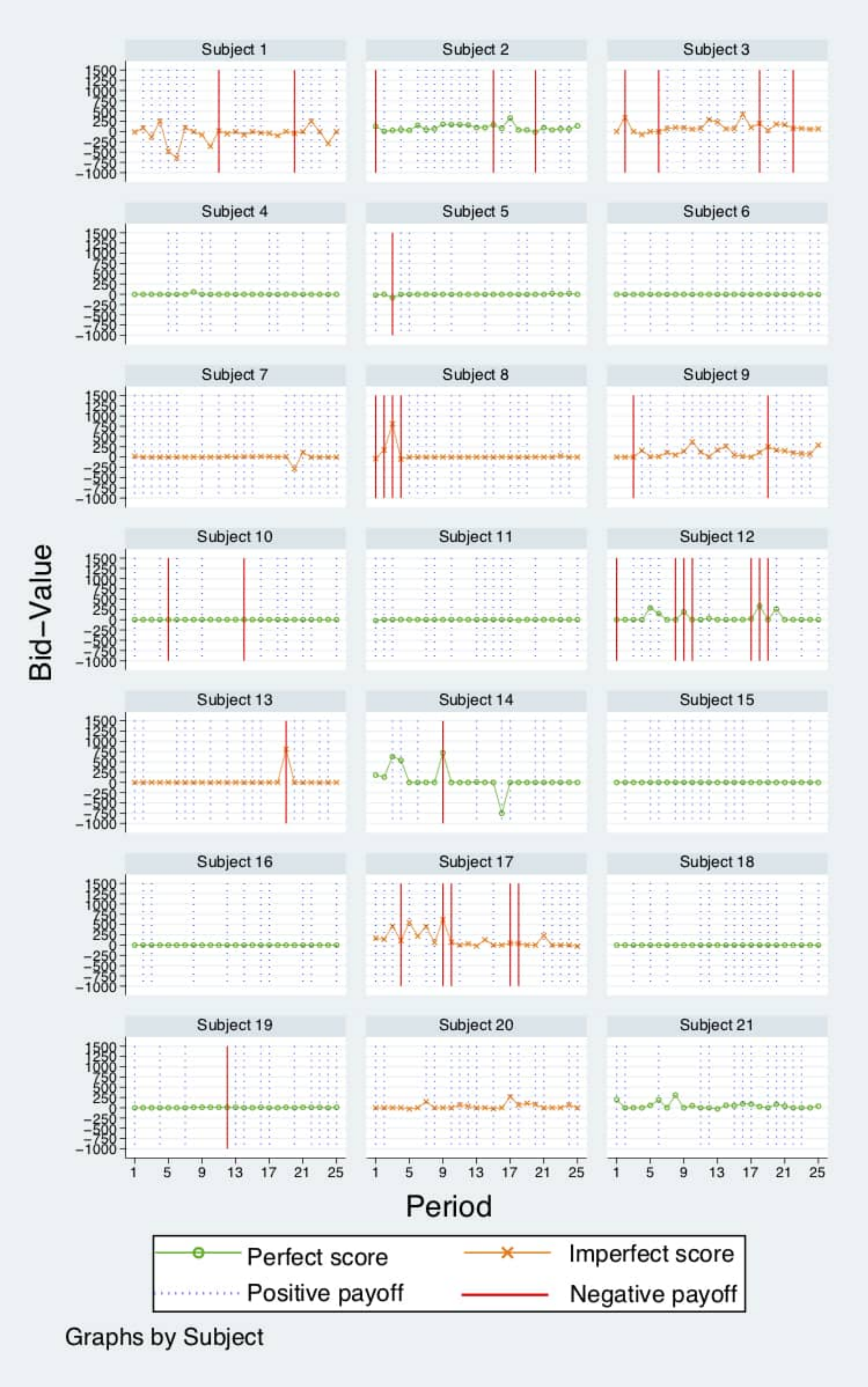


Figure 11: Time evolution of the gap between bid and value for unit 2 in VA3.

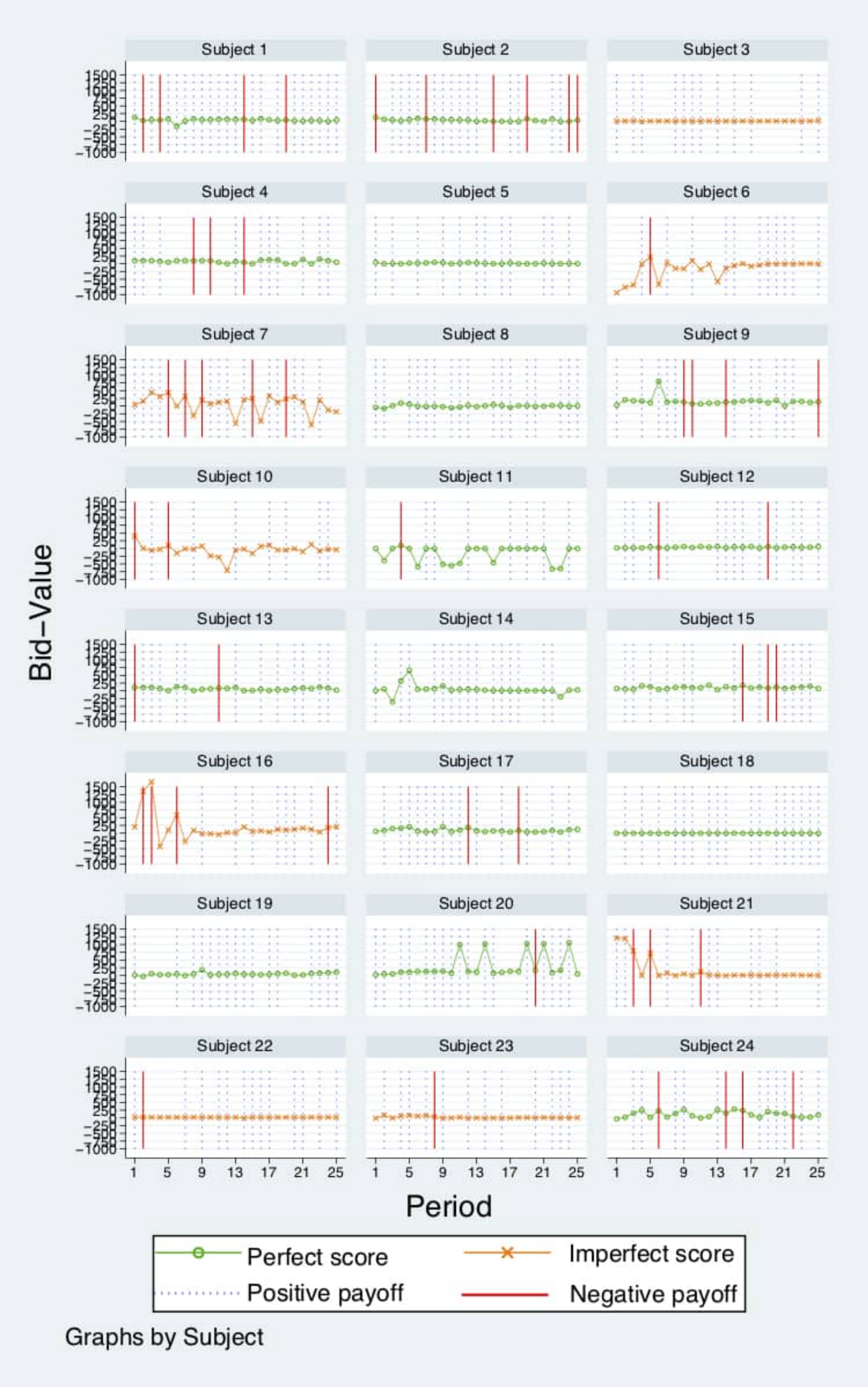


Figure 12: Time evolution of the gap between bid and value for unit 1 in VN1.

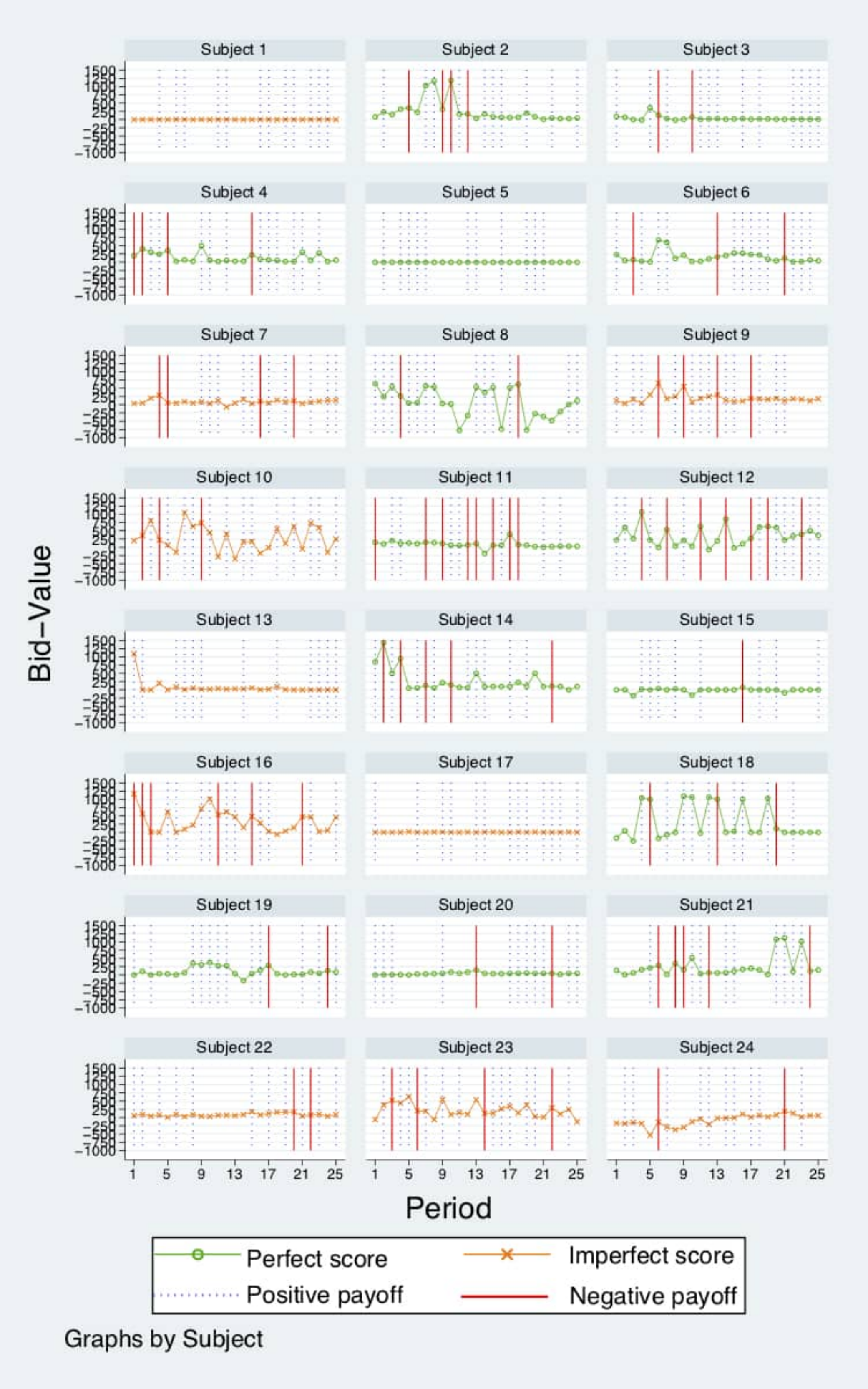


Figure 13: Time evolution of the gap between bid and value for unit 2 in VN1.

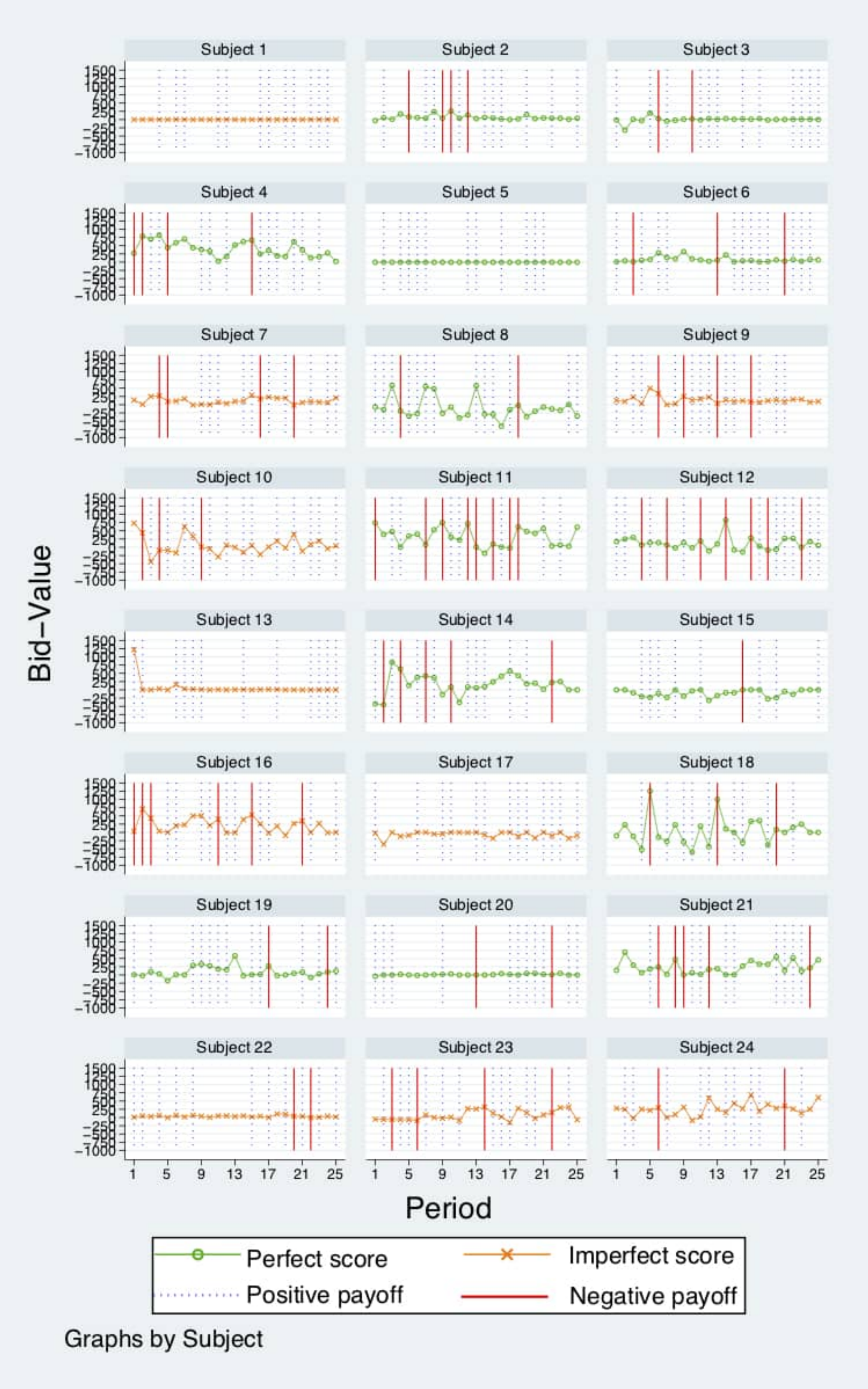


Figure 14: Time evolution of the gap between bid and value for unit 1 in VN2.

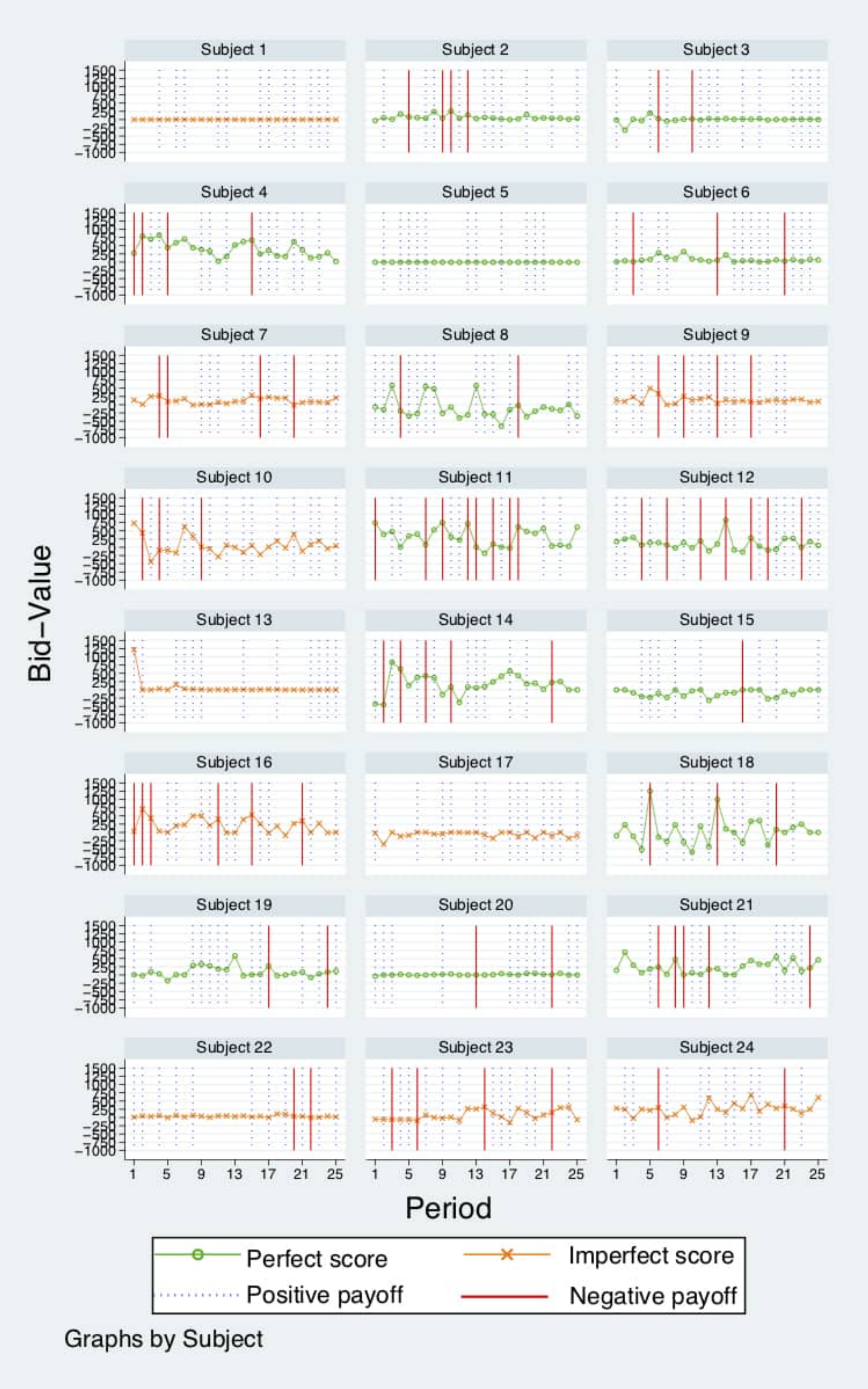


Figure 15: Time evolution of the gap between bid and value for unit 2 in VN2.

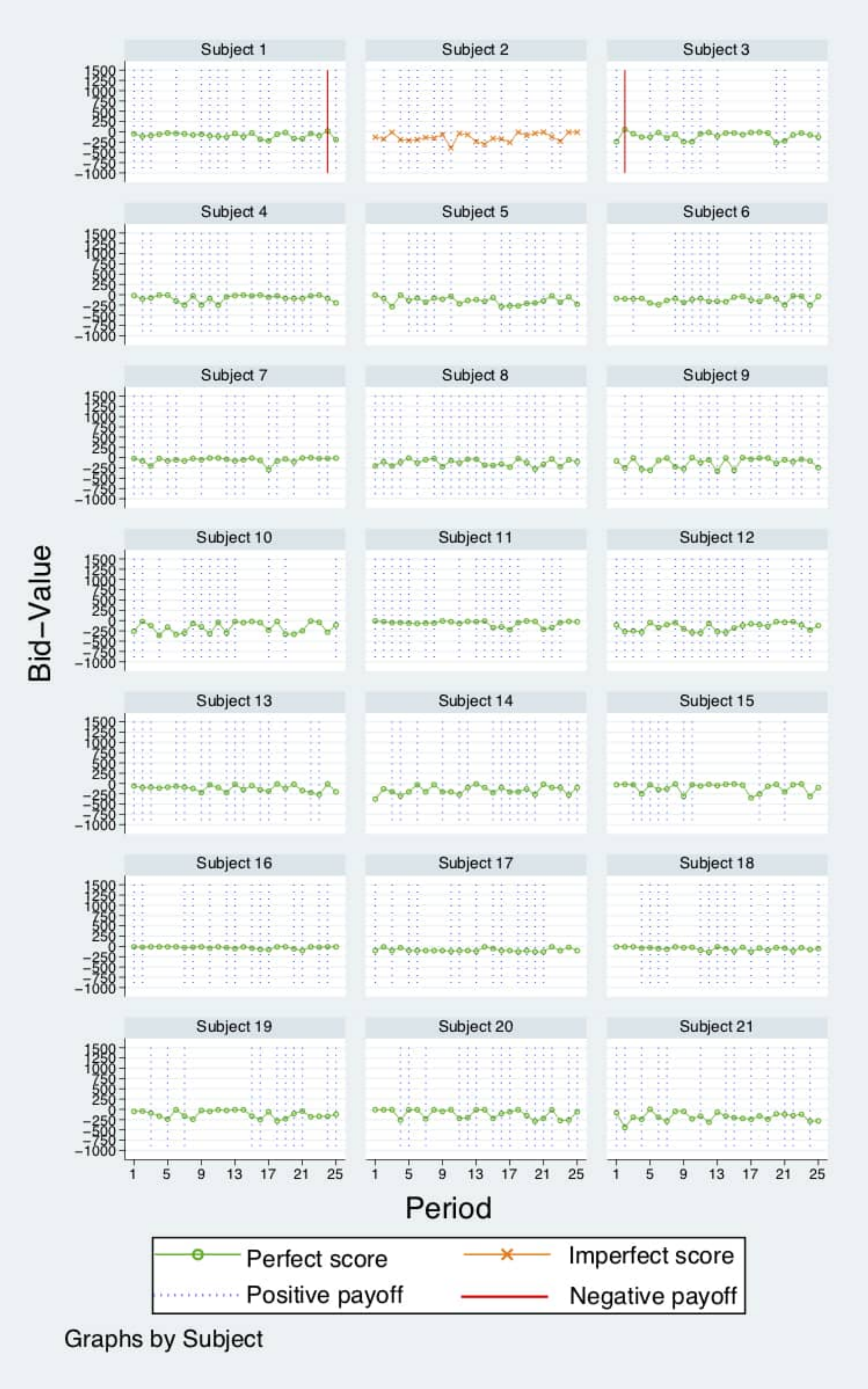


Figure 16: Time evolution of the gap between bid and value for unit 1 in PA1.

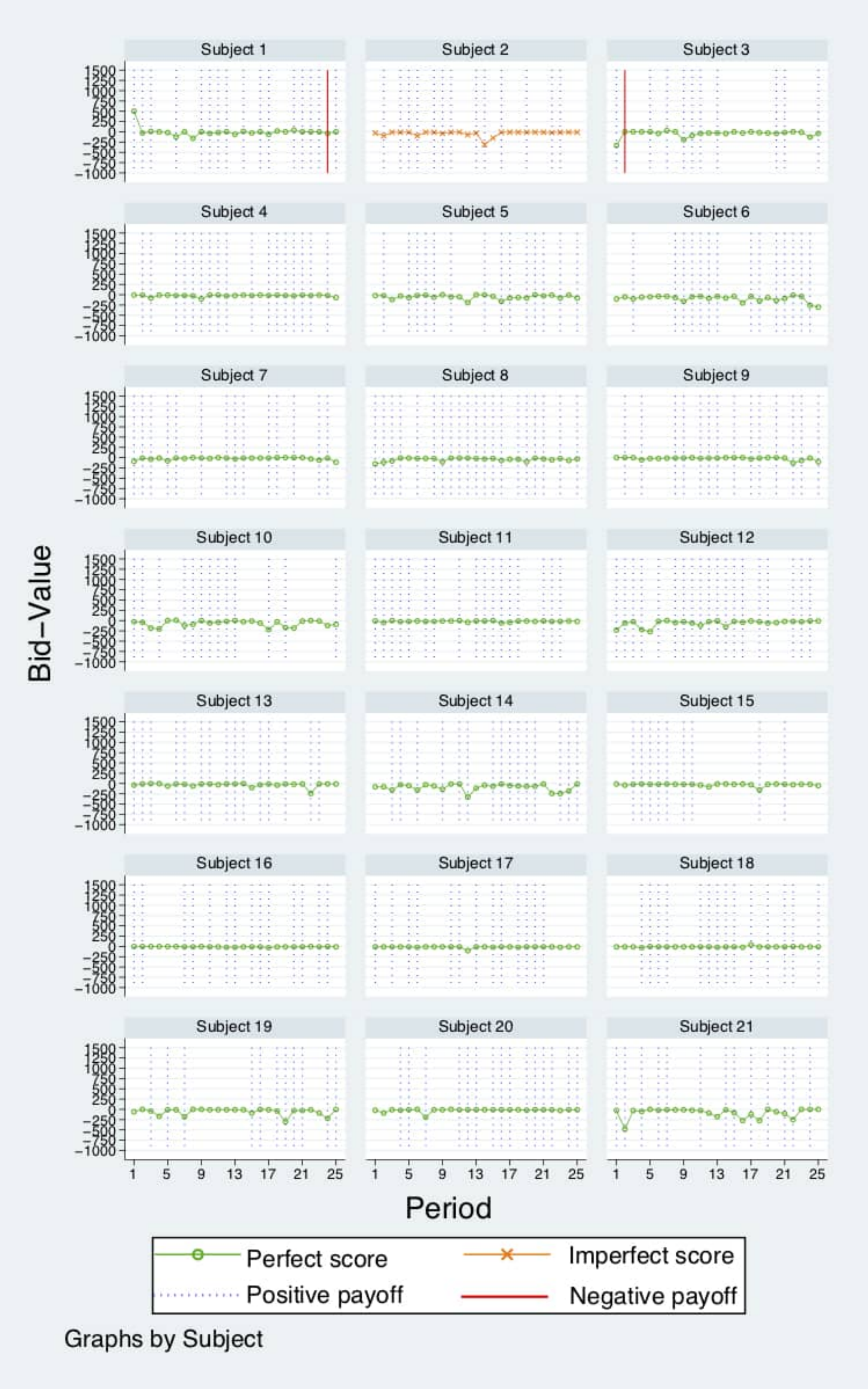


Figure 17: Time evolution of the gap between bid and value for unit 2 in PA1.

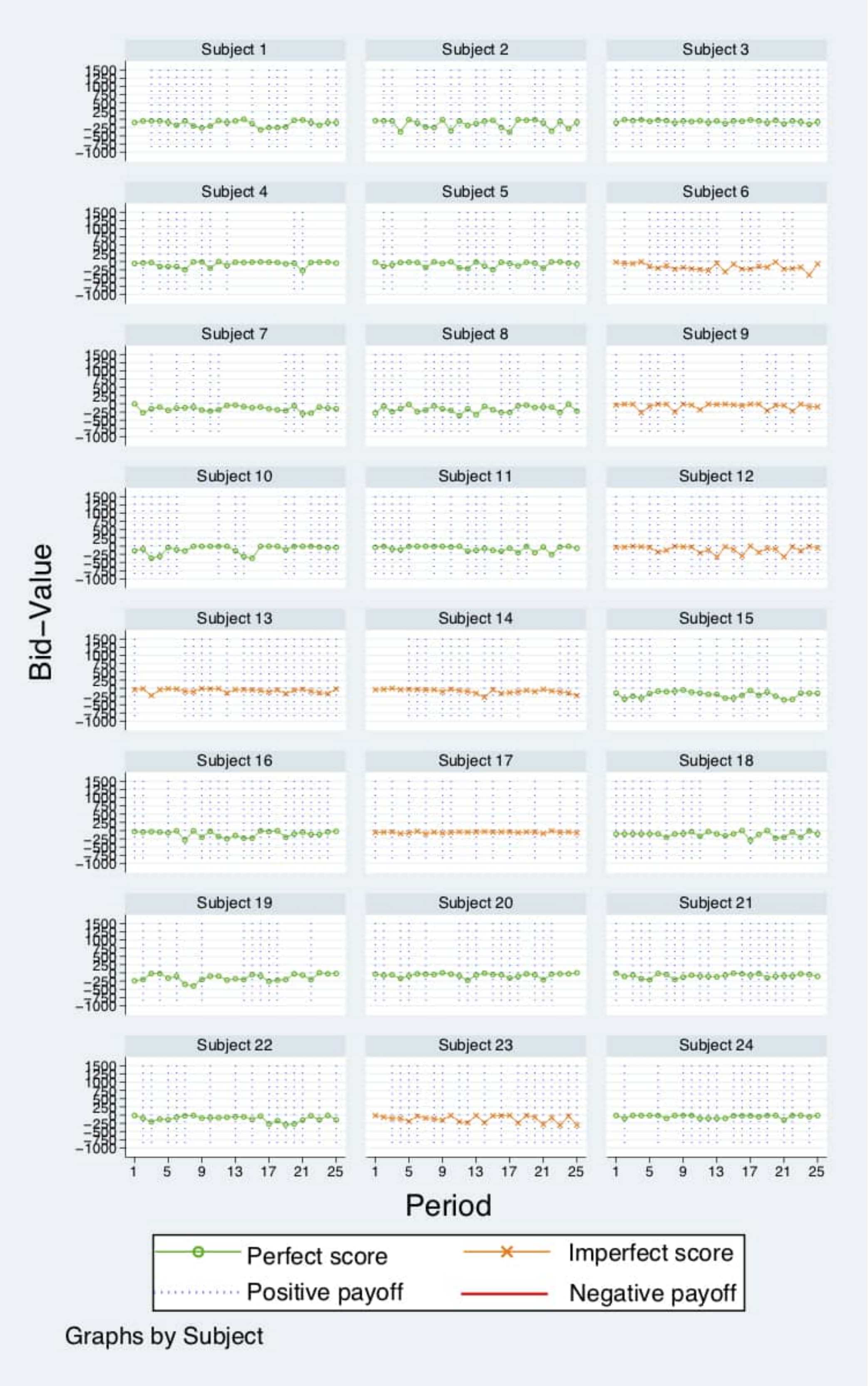


Figure 18: Time evolution of the gap between bid and value for unit 1 in PA2.

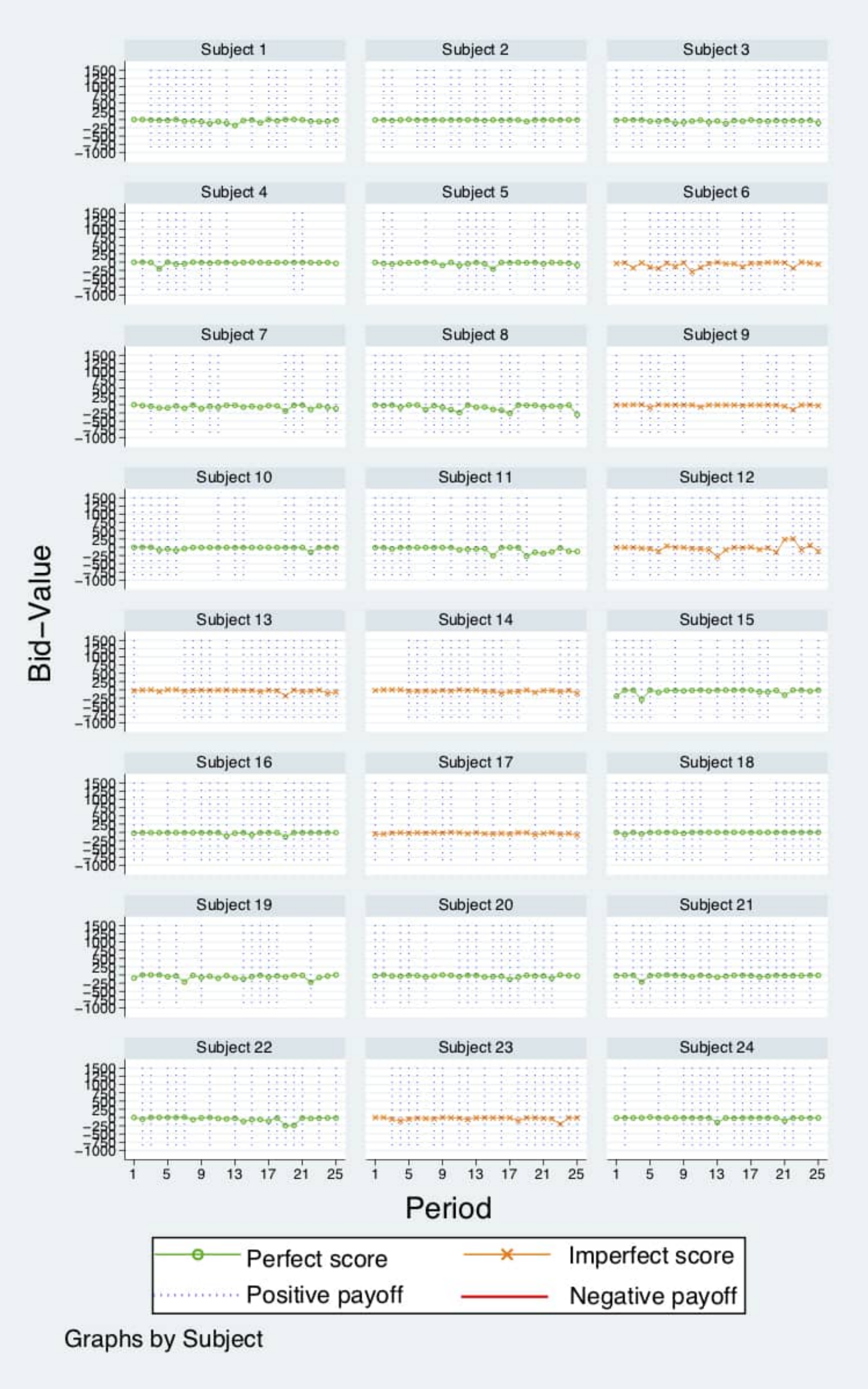


Figure 19: Time evolution of the gap between bid and value for unit 2 in PA2.

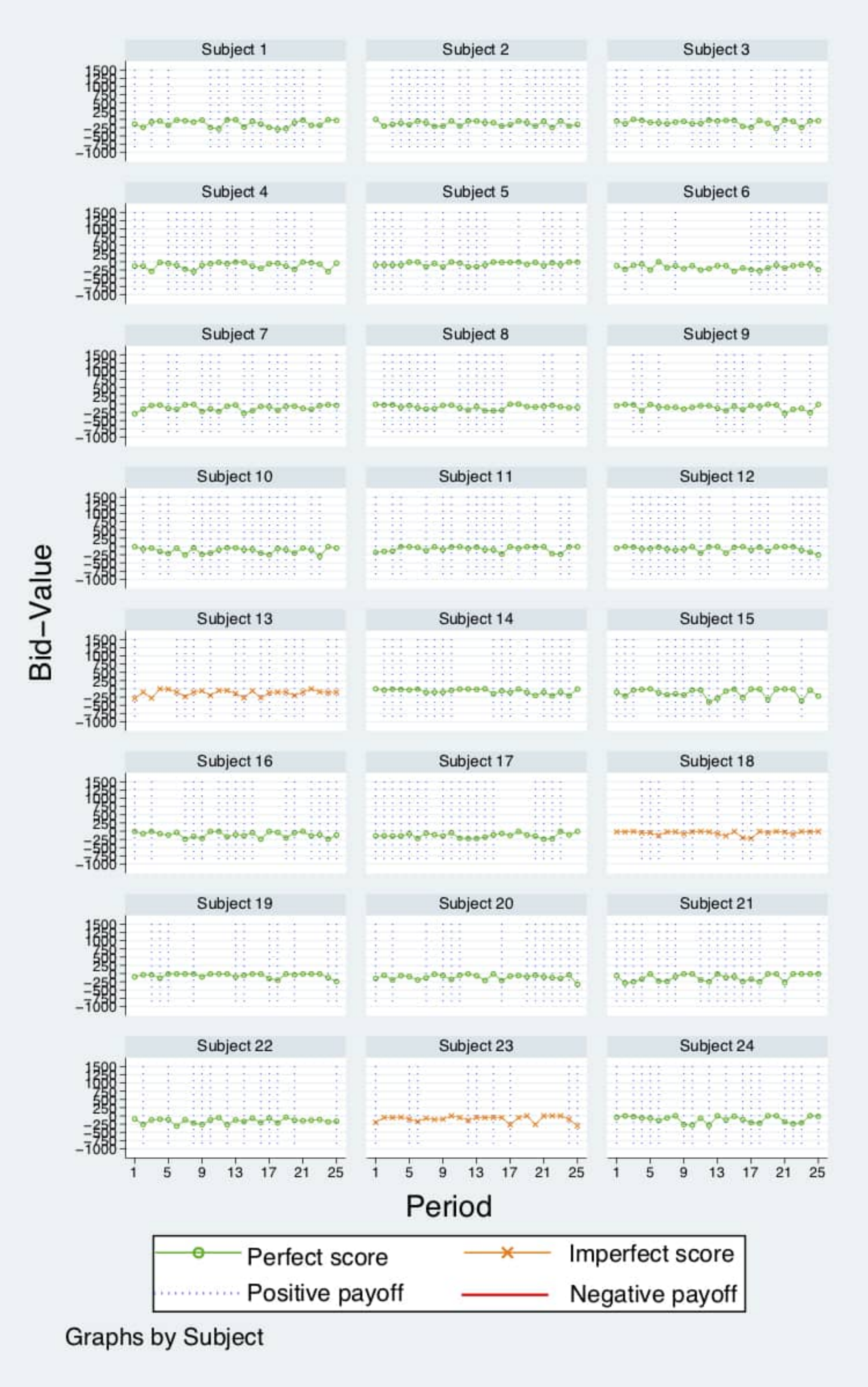


Figure 20: Time evolution of the gap between bid and value for unit 1 in PA3.

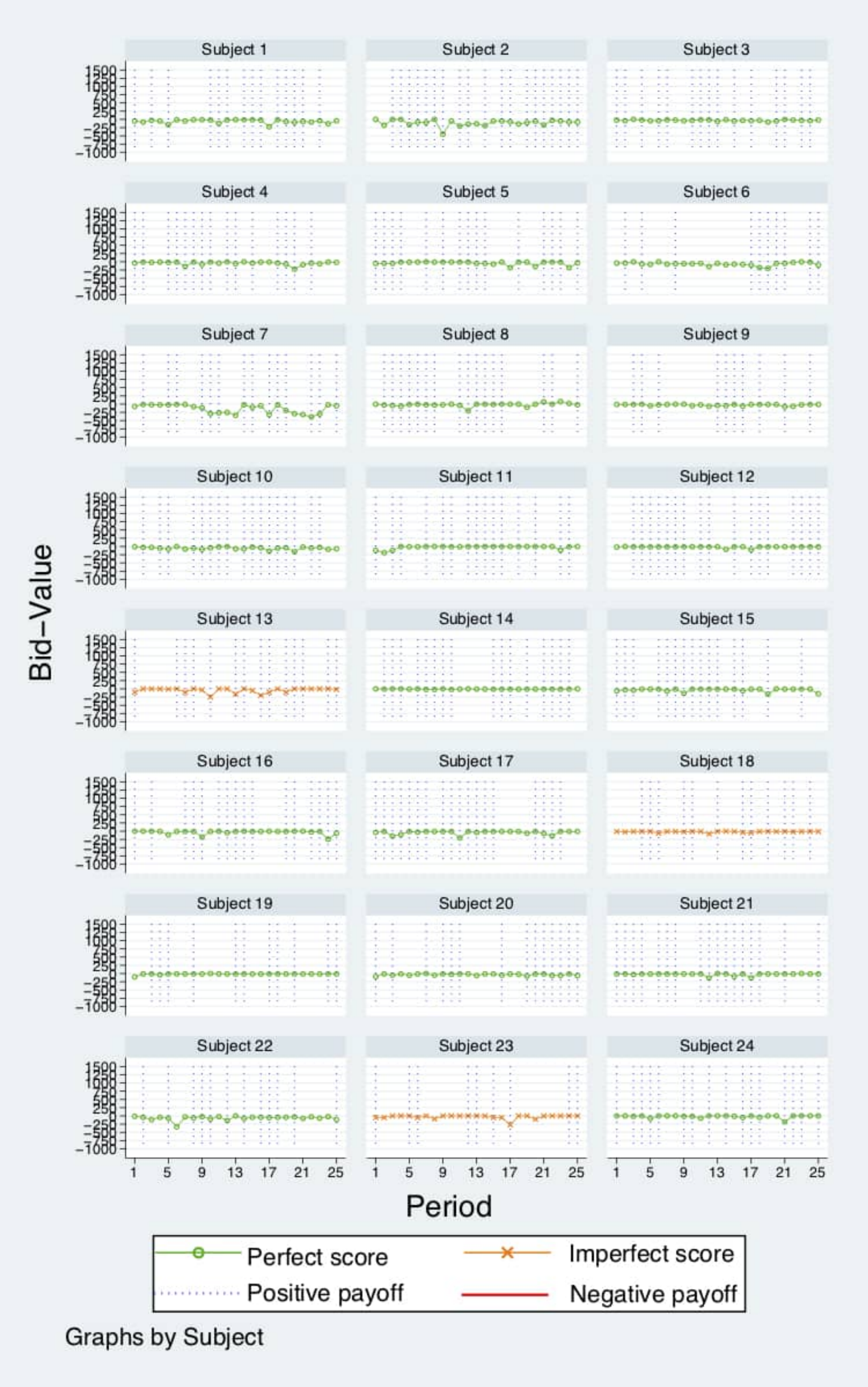


Figure 21: Time evolution of the gap between bid and value for unit 2 in PA3.

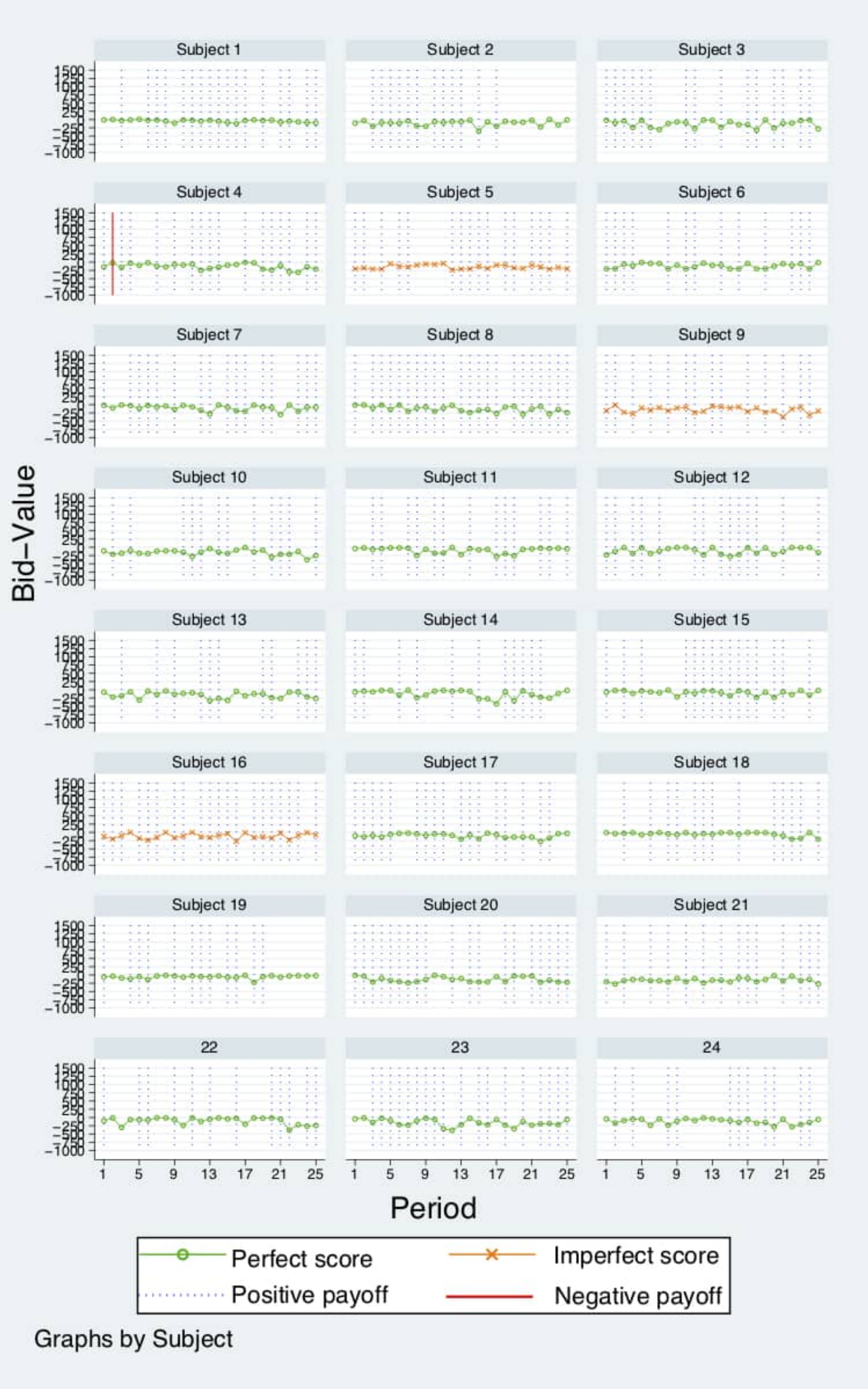


Figure 22: Time evolution of the gap between bid and value for unit 1 in PN1.

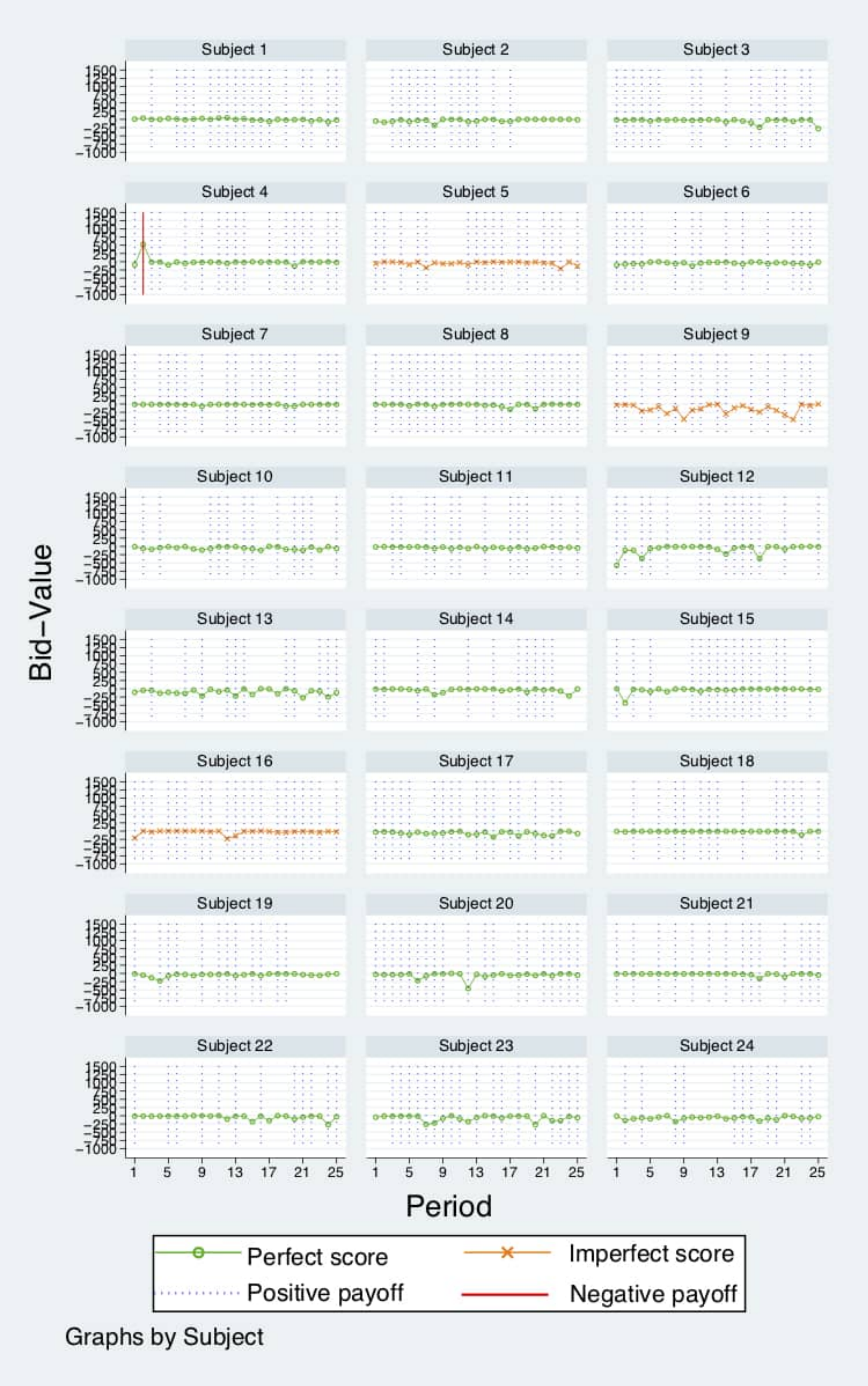


Figure 23: Time evolution of the gap between bid and value for unit 2 in PN1.

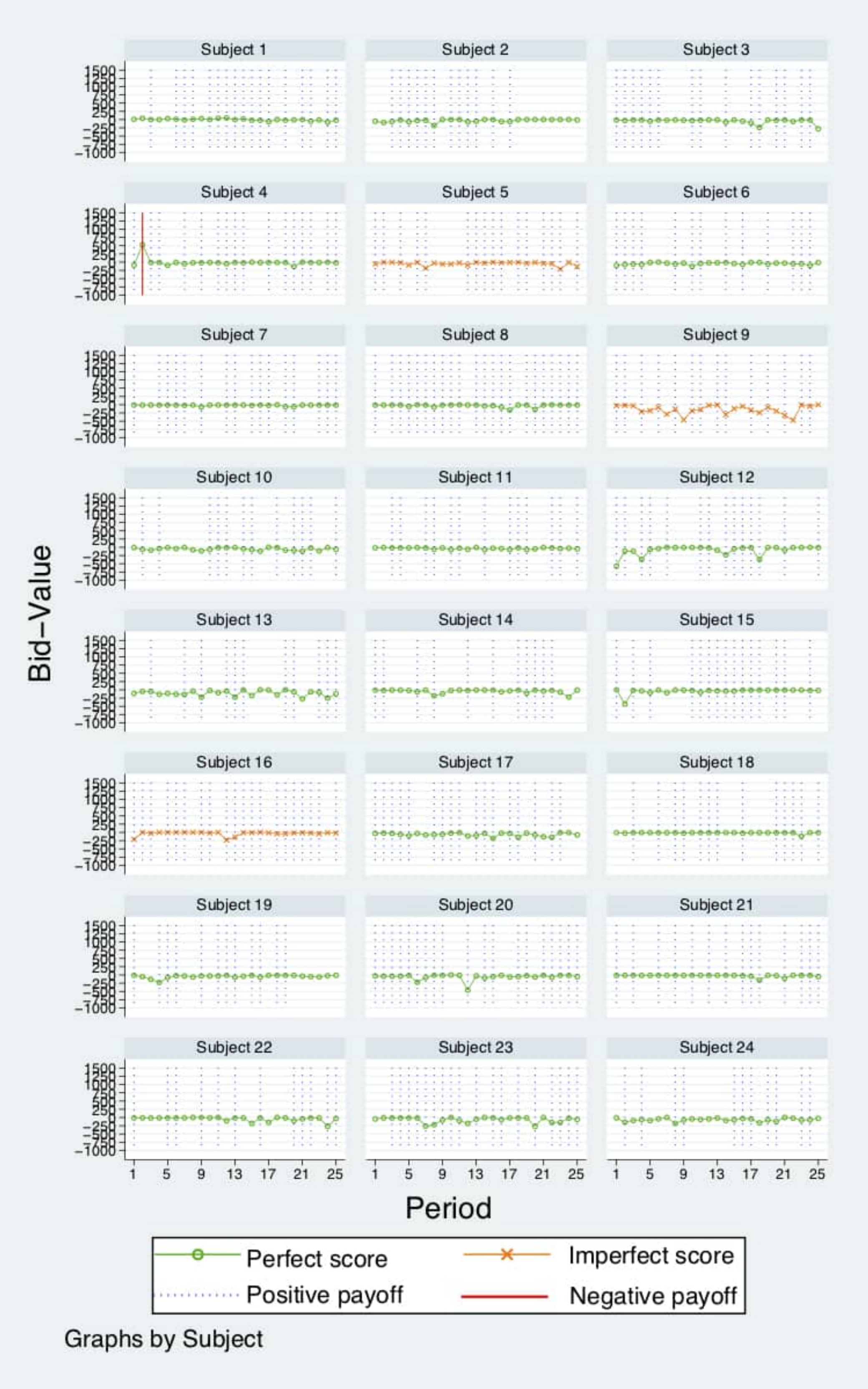


Figure 24: Time evolution of the gap between bid and value for unit 1 in PN2.

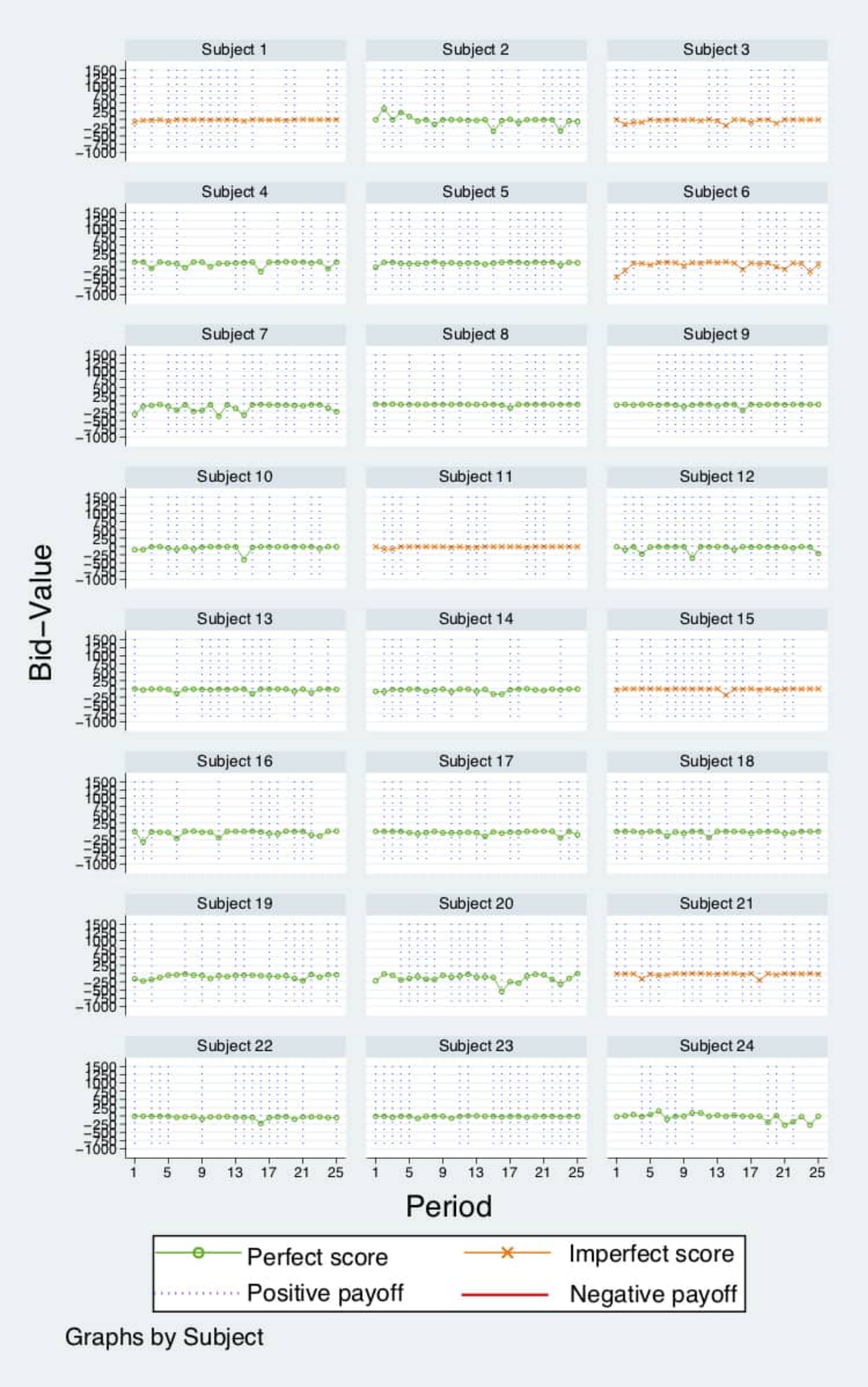


Figure 25: Time evolution of the gap between bid and value for unit 2 in PN2.

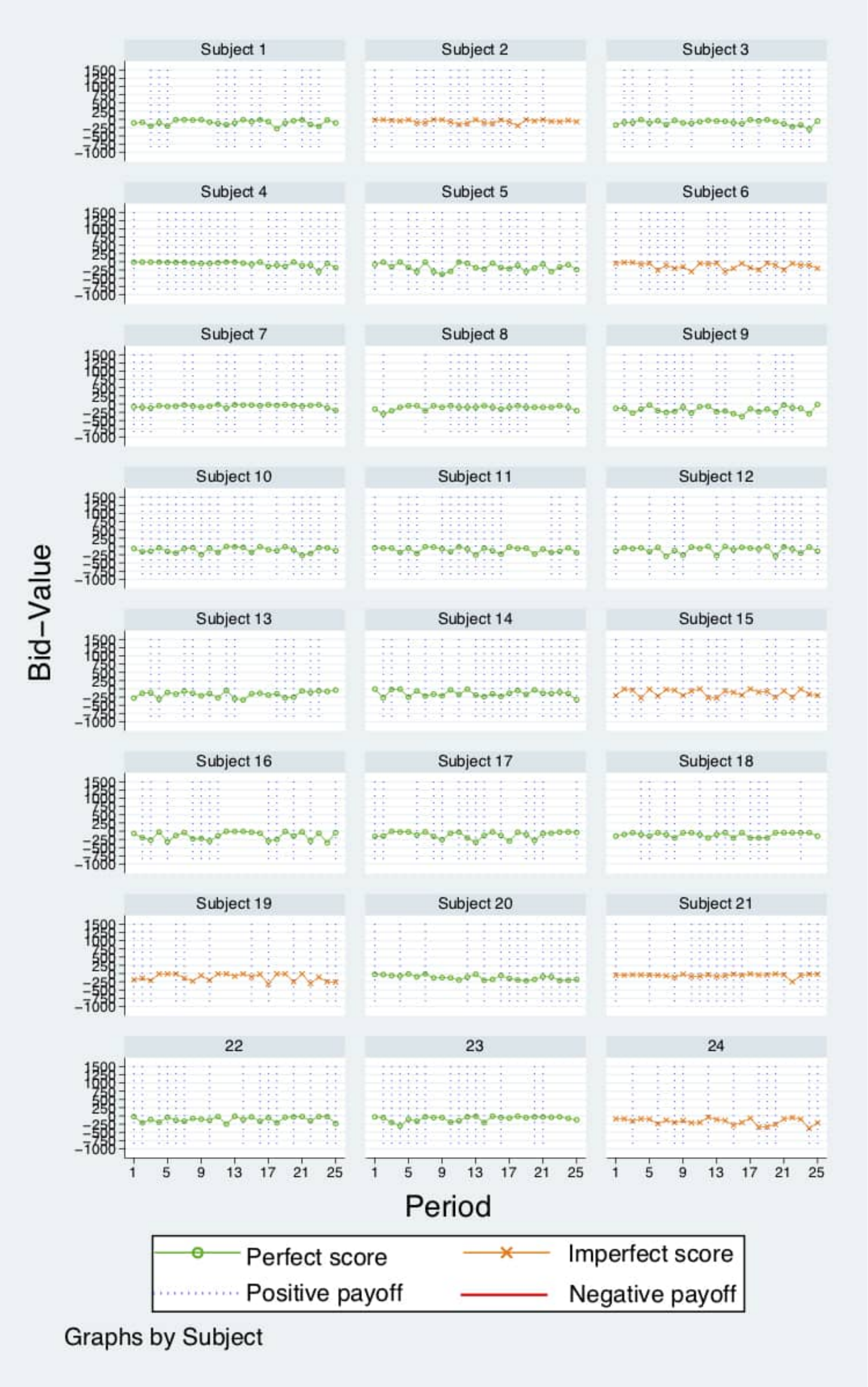


Figure 26: Time evolution of the gap between bid and value for unit 1 in PN3.

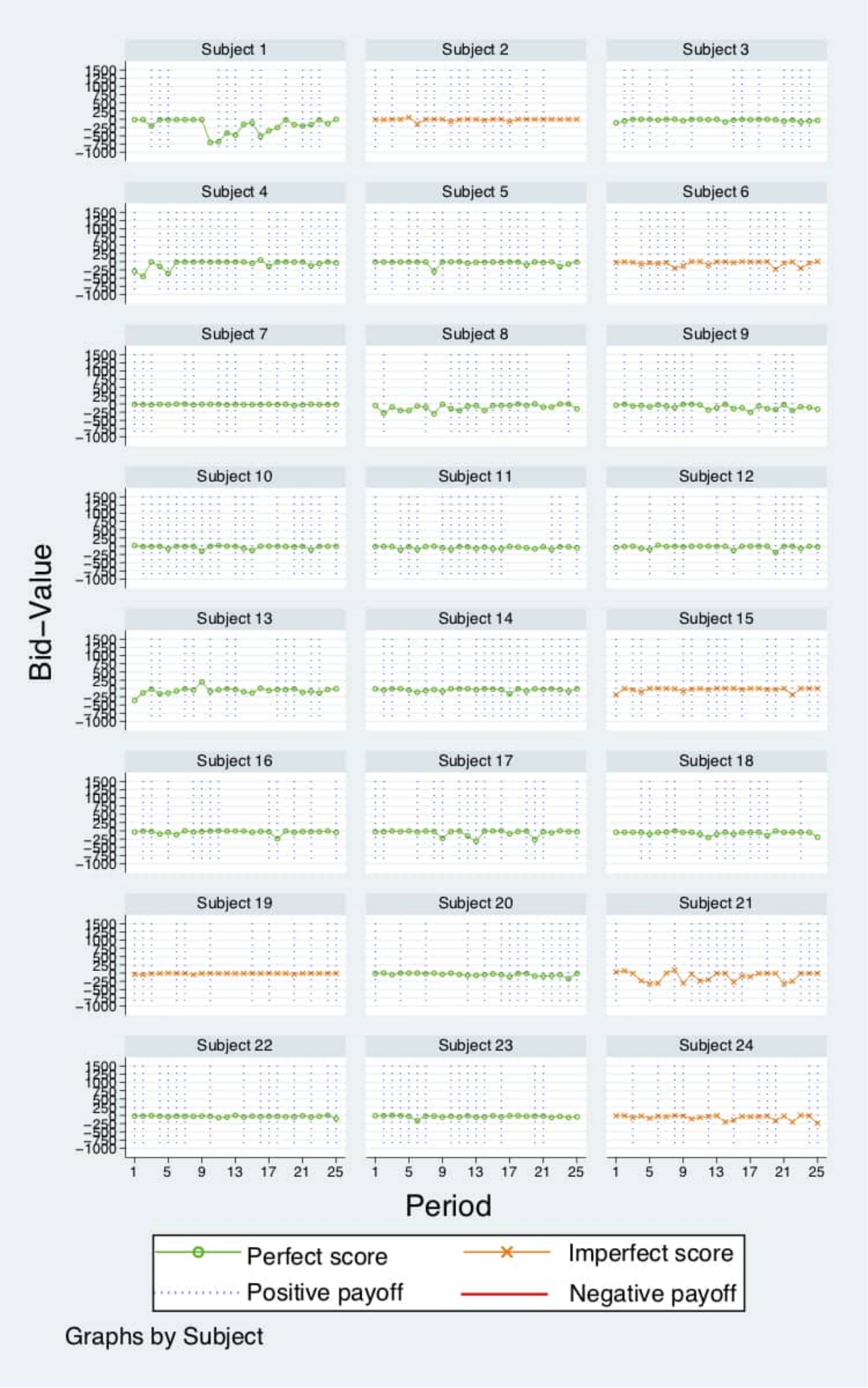


Figure 27: Time evolution of the gap between bid and value for unit 2 in PN3.

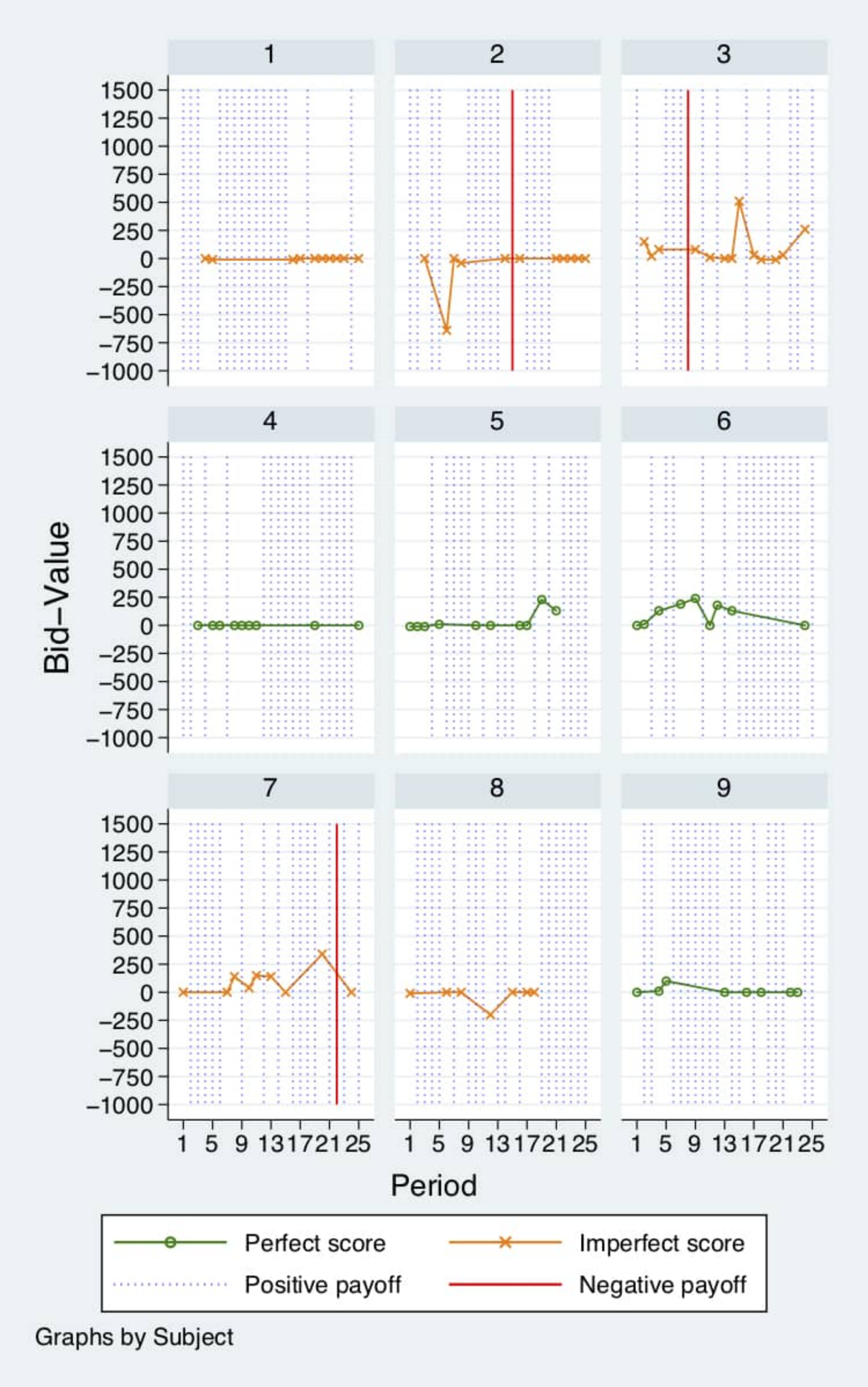


Figure 28: Time evolution of the gap between bid and value for unit 1 in AA1.

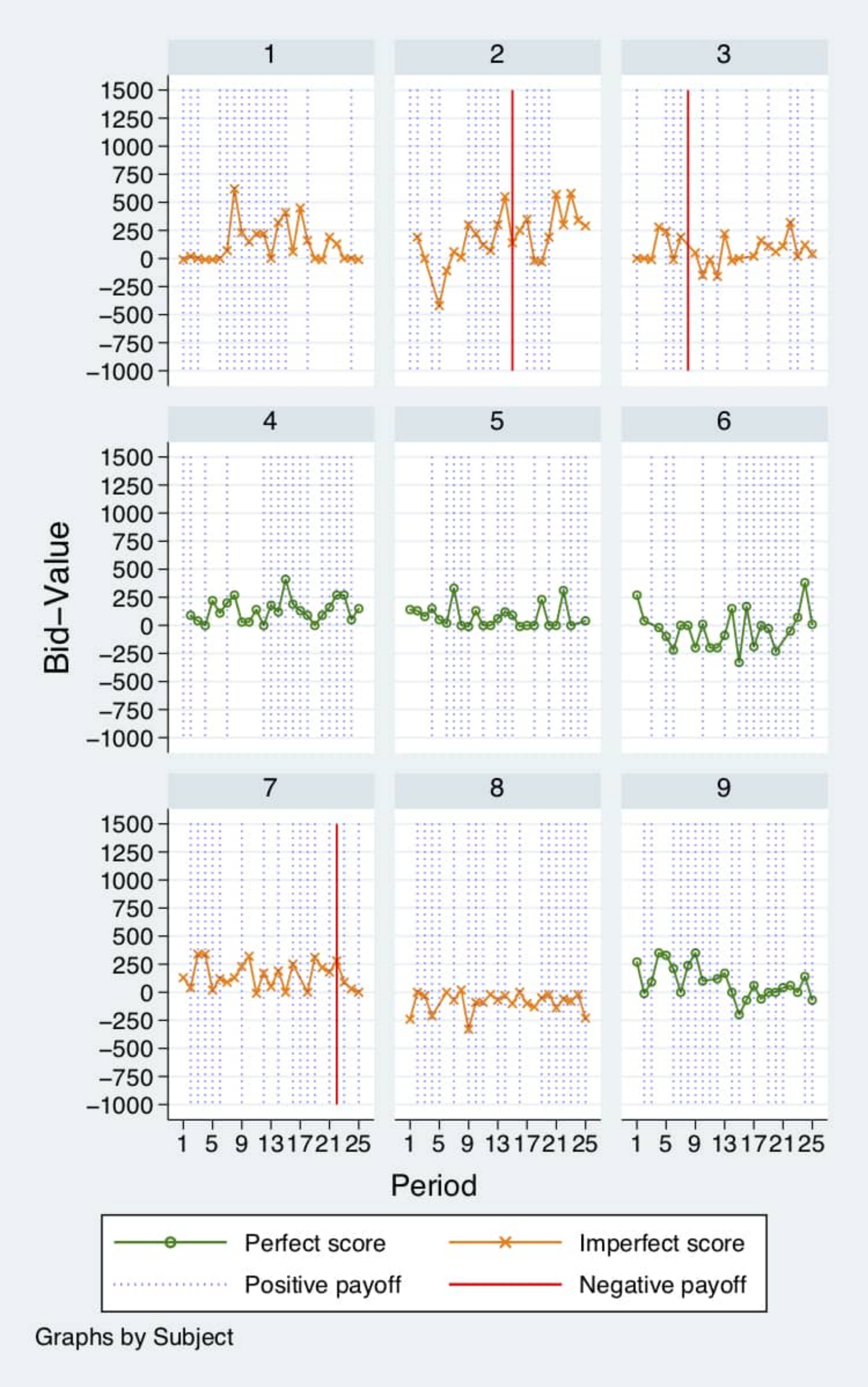


Figure 29: Time evolution of the gap between bid and value for unit 2 in AA1.

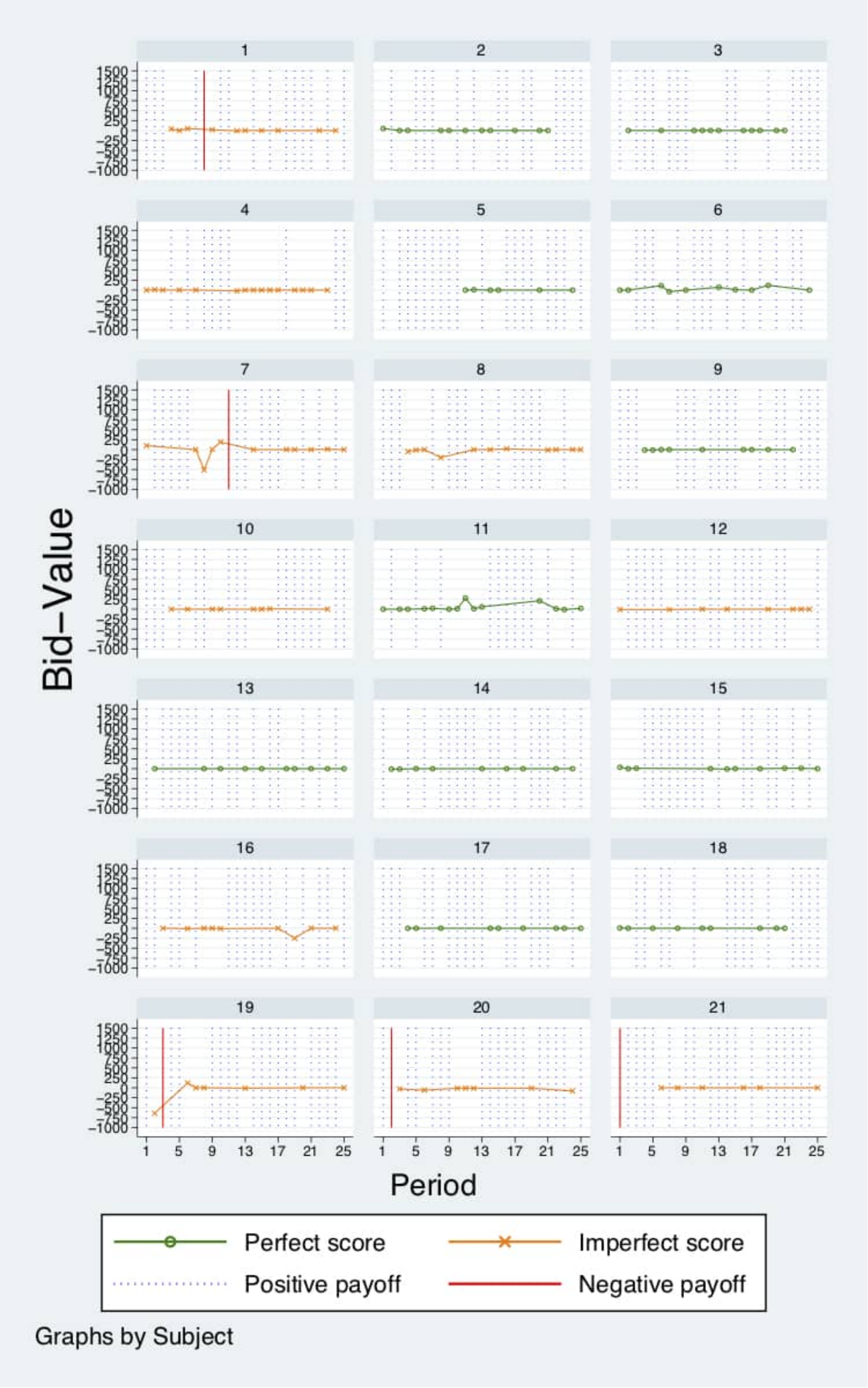


Figure 30: Time evolution of the gap between bid and value for unit 1 in AA2.

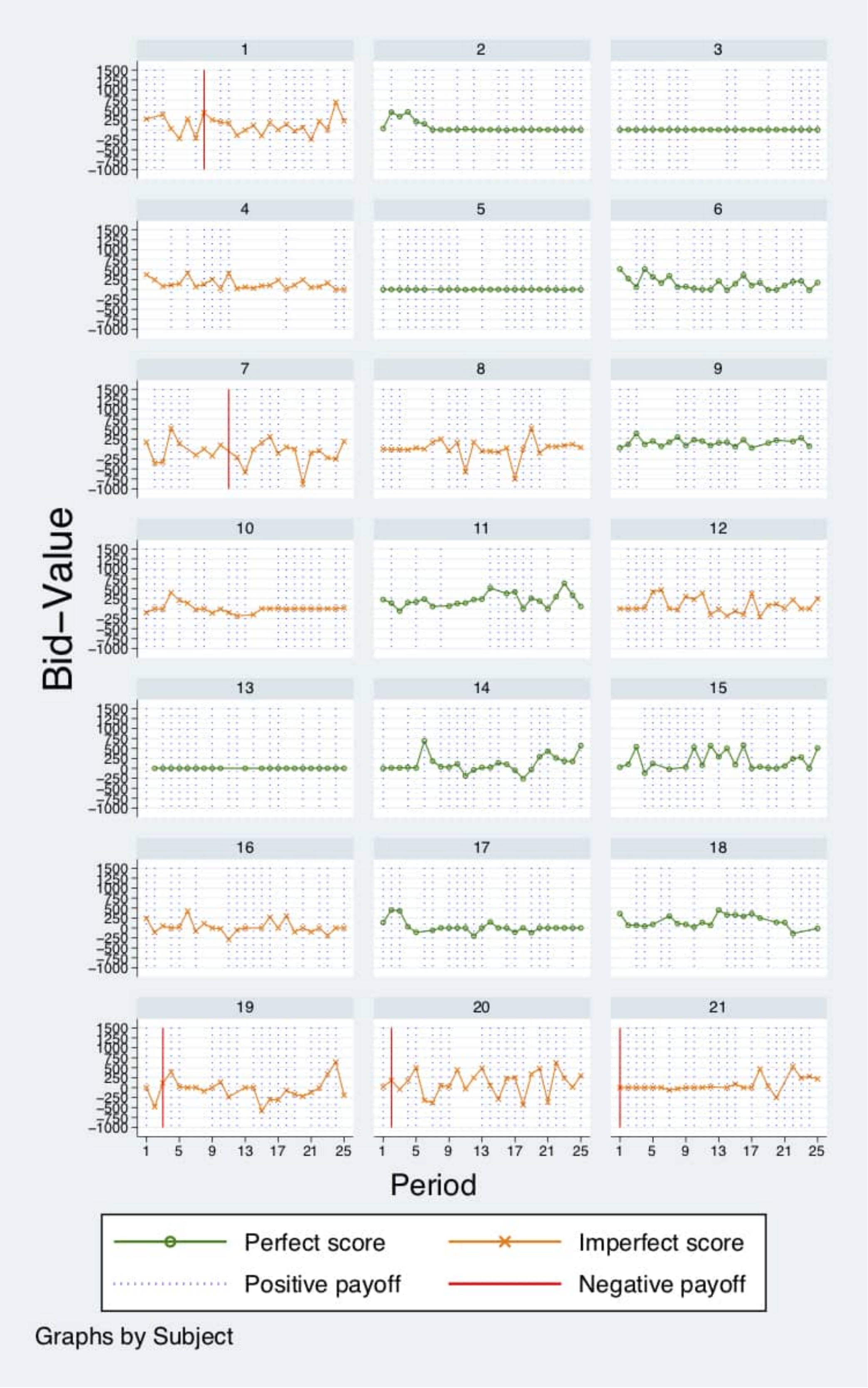


Figure 31: Time evolution of the gap between bid and value for unit 2 in AA2.

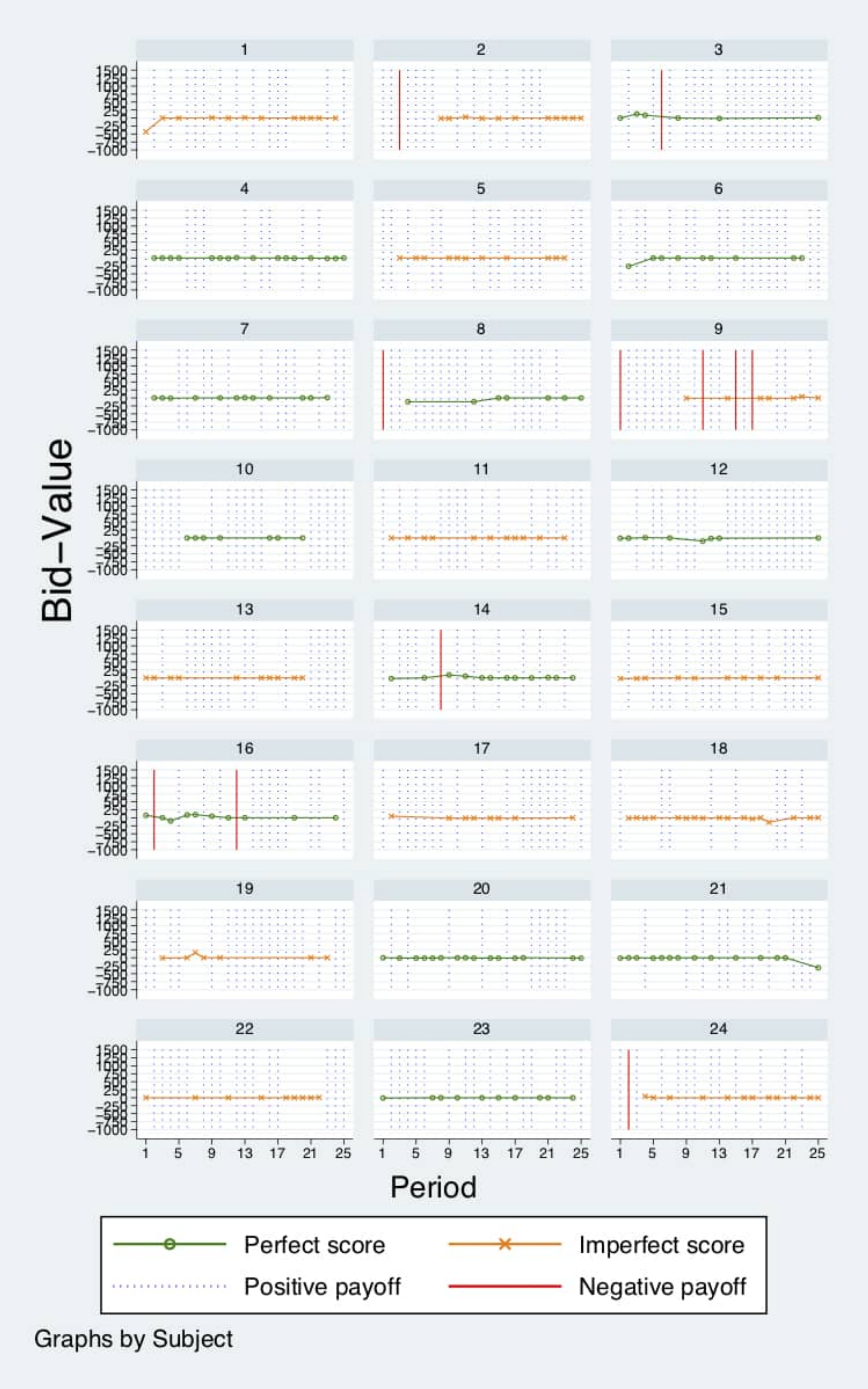


Figure 32: Time evolution of the gap between bid and value for unit 1 in AA3.

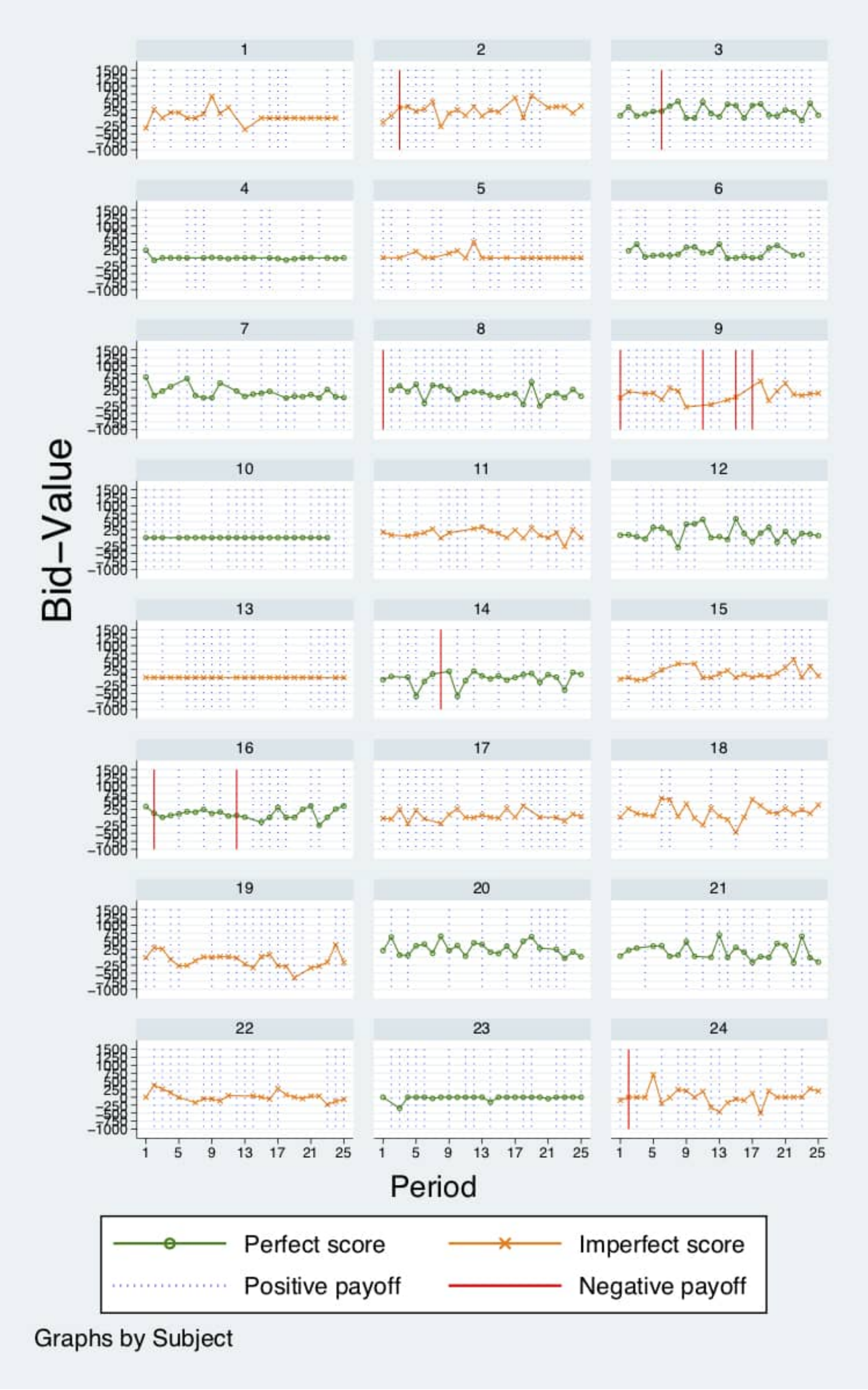


Figure 33: Time evolution of the gap between bid and value for unit 2 in AA3.

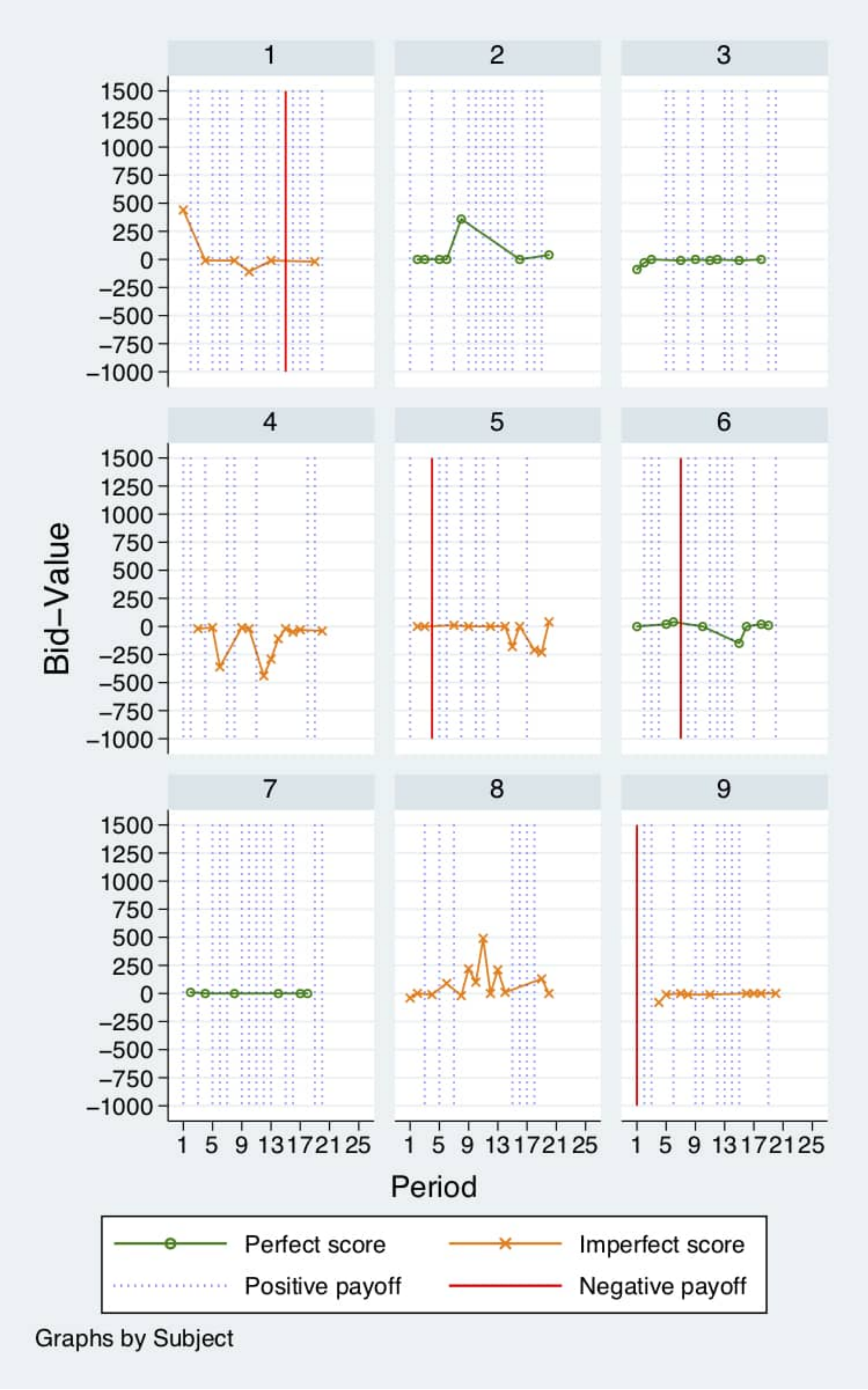


Figure 34: Time evolution of the gap between bid and value for unit 1 in AN1.

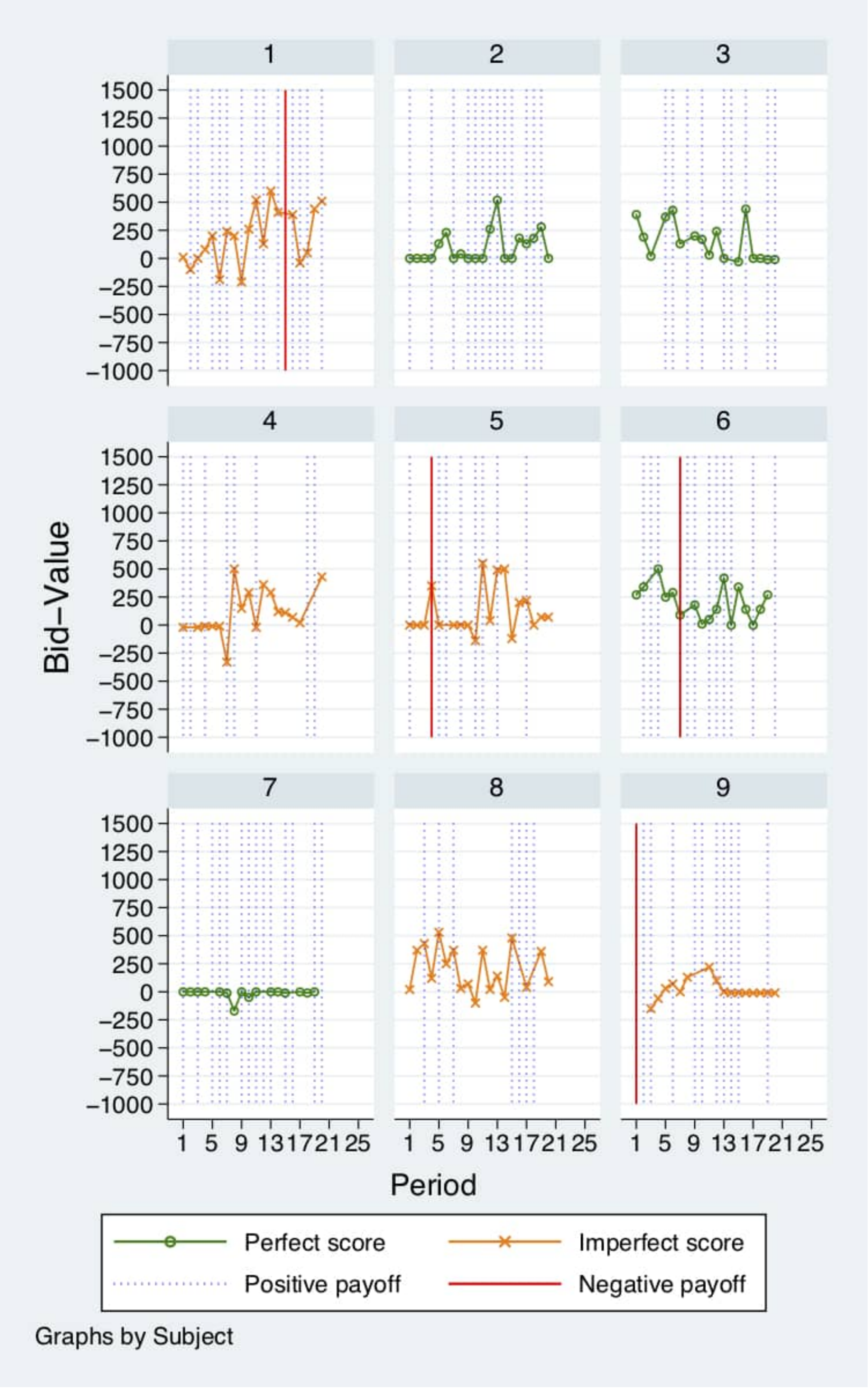


Figure 35: Time evolution of the gap between bid and value for unit 2 in AN1.

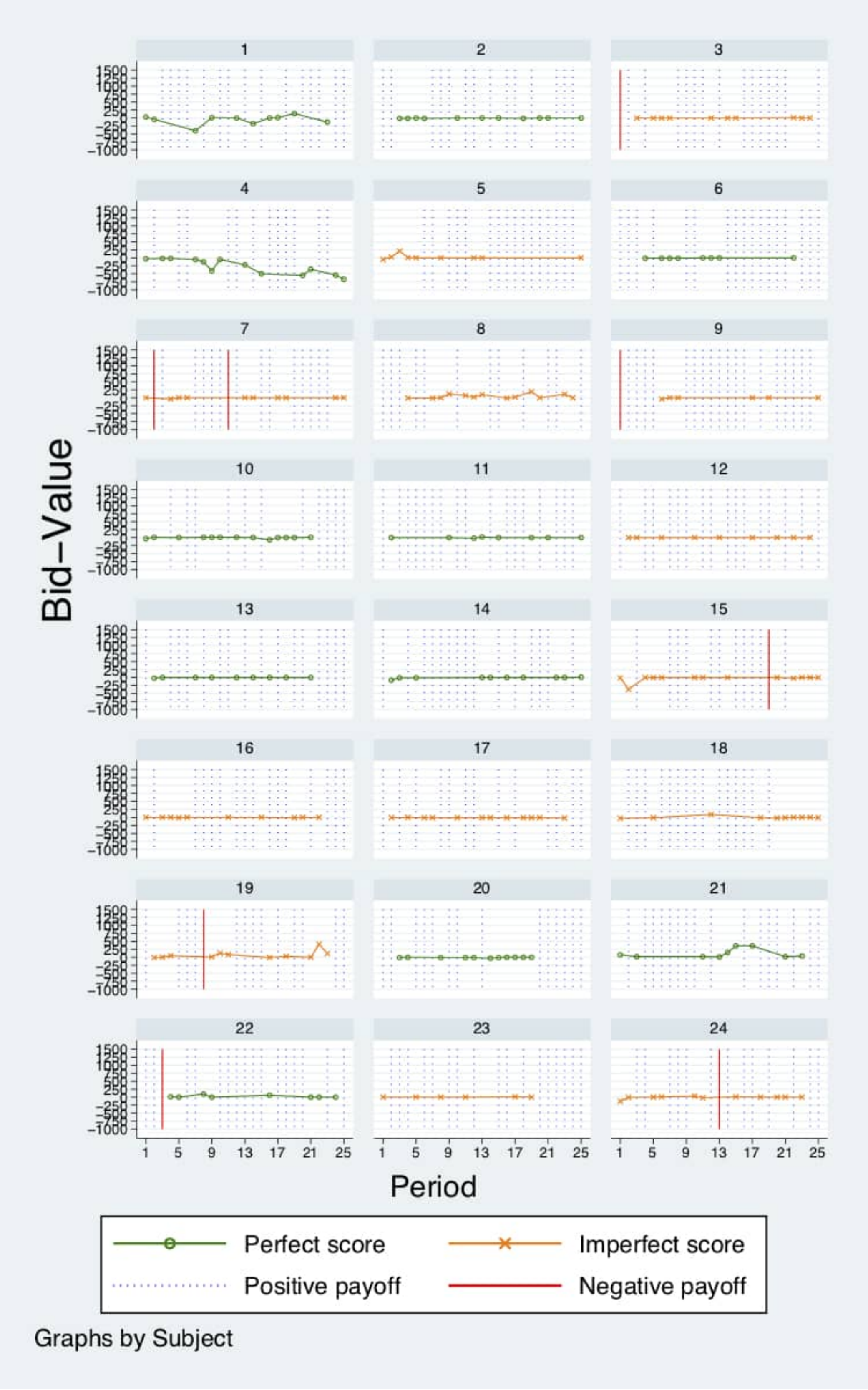


Figure 36: Time evolution of the gap between bid and value for unit 1 in AN2.

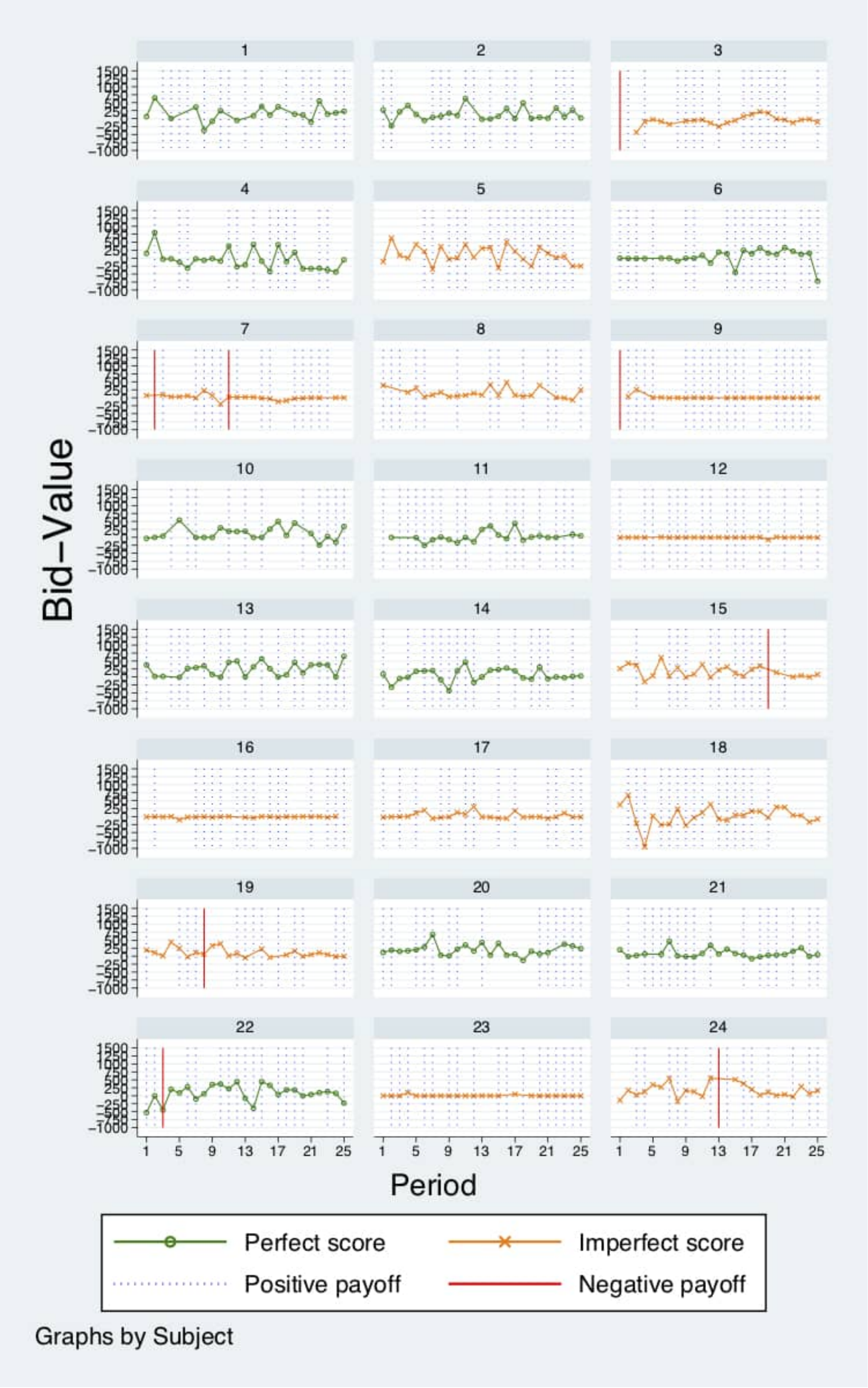


Figure 37: Time evolution of the gap between bid and value for unit 2 in AN2.

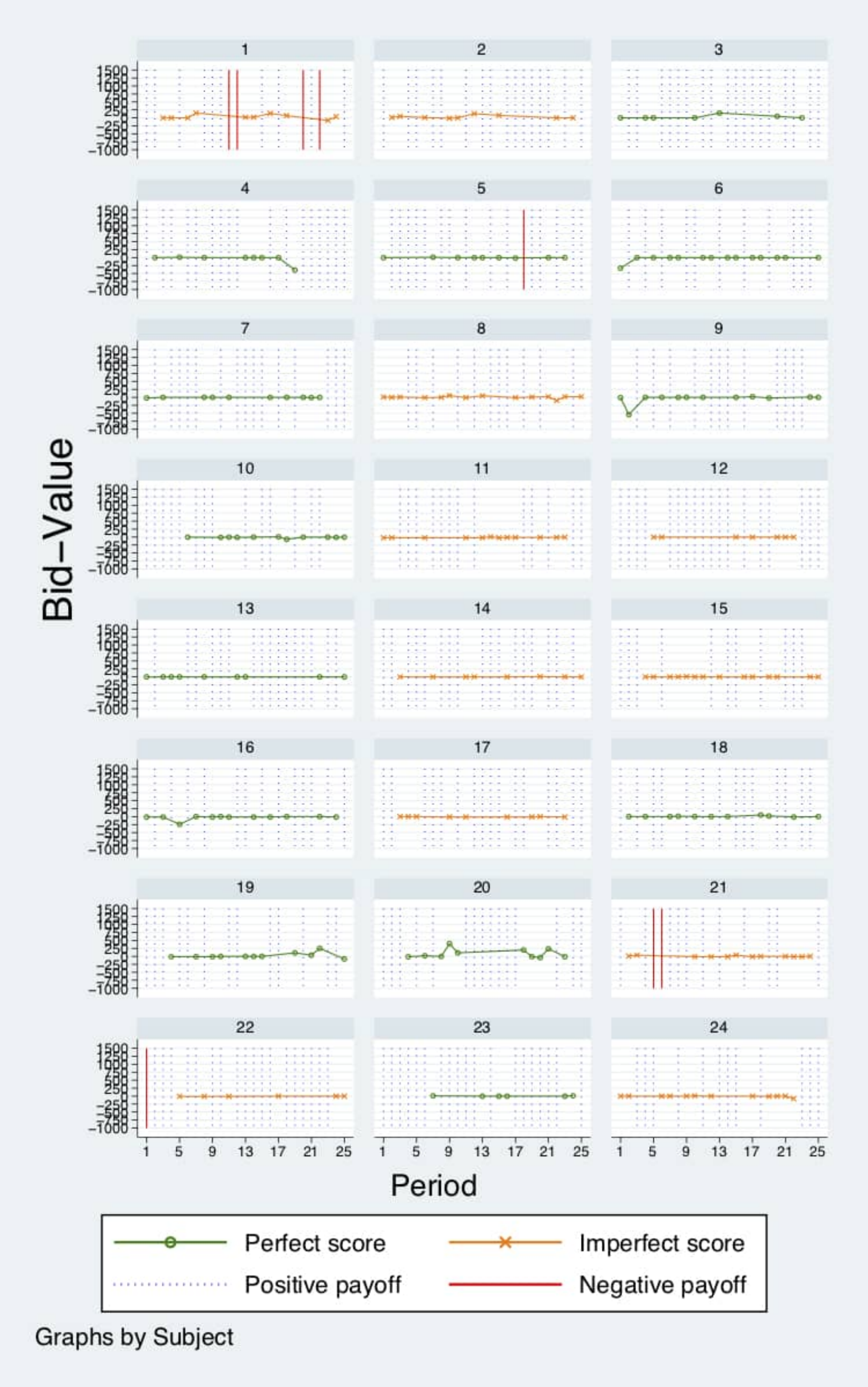


Figure 38: Time evolution of the gap between bid and value for unit 1 in AN3.

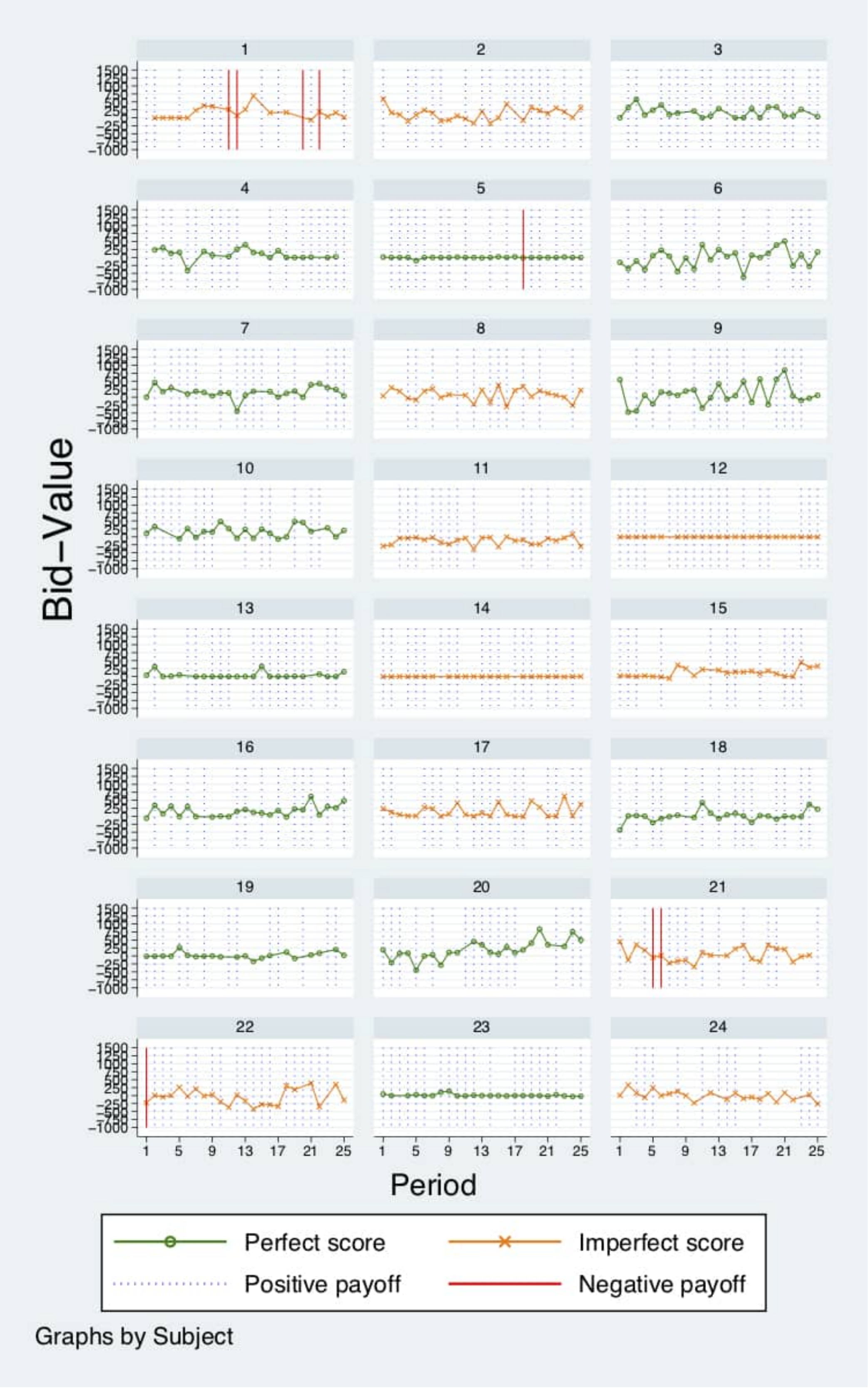


Figure 39: Time evolution of the gap between bid and value for unit 2 in AN3.

References

Jacquemet, N. and O. L'Haridon (2018) *Experimental Economics: Method and Applications*, Cambridge University Press.